

Spatial Data Sovereignty and Privacy in Indian Country: A Policy Analysis

By

Lea A. Shanley

A dissertation submitted in partial fulfillment of

the requirements for the degree of

Doctor of Philosophy

(Environment and Resources)

at the

UNIVERSITY OF WISCONSIN-MADISON

2015

Date of final oral examination: 05/29/15

This dissertation is approved by the following members of the Final Oral Committee:

Stephen J. Ventura, Professor, Gaylord Nelson Institute for

Environmental Studies

Kristin R. Eschenfelder, Professor, Library and Information Studies

Larry Nesper, Professor, Anthropology and American Indian Studies

Gary D. Sandefur, Professor, Sociology

Joanne I. Gabrynowicz, Professor, Space Law and Research

Harlan J. Onsrud, Professor, Spatial Information Science and Engineering



© 2015 LEA A. SHANLEY. All rights reserved.

This work is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License found at:
<http://creativecommons.org/licenses/by-nc-nd/4.0/>.

The dissertation is provided for research, reference use, and educational purposes only. It is not for commercial use or sale. This dissertation may be shared and distributed in whole, or in part, for educational and non-commercial uses, provided this copyright notice and the following attribution is given:

Shanley, L. A. (2015). *Spatial Data Sovereignty and Privacy in Indian Country: A Policy Analysis*. Madison, Wisconsin: University of Wisconsin-Madison.

Copies are available for download free of charge at: <http://www.LeaShanley.org>.

Users may not use technical measures to obstruct or control the reading or further copying of the copies that they make or distribute. Users may not accept compensation of any manner in exchange for copies.

This report does not constitute legal advice, and the content is not intended to be a substitute for specific legal advice or opinions.

Abstract: Ownership, control of and access to tribal spatial data are long-standing issues for American Indian tribes in the United States. Federal and state court decisions resulting in the disclosure of tribal information under freedom of information laws, the sophisticated data integration and analysis capacity of GIS, and advances in satellite remote sensing heighten concerns. Fundamental issues are at stake, including tribes' rights and interests in their knowledge and resources, federal agencies' authority and decision-making that affect those resources, and the public's right to know. Within the context of the federal-tribal relationship, this research investigates tribes' concerns regarding unwanted disclosure of tribal spatial data and the circumstances under which disclosure may occur. This study also evaluated mechanisms to mitigate these risks.

Sensitive tribal spatial data include sacred sites and cultural resources, information about land parcel status, water rights, resource leases, and more. Tribes are concerned about the potential for misuse of their spatial data for several reasons: infringement on individual and group privacy; misappropriation of intellectual property and its use for commercial gain; misinterpretation or discrediting of cultural practices; abrogation of treaty rights; and the impact on the federal Trust relationship. Spatial data about tribes potentially may be disclosed under the Freedom of Information Act if the federal government creates or maintains the data, or if tribes share their data with the federal government in response to consultation, litigation, or federal funding requirements.

Tribes may strengthen their sovereignty by building the internal capacity to understand and use spatial technologies to their advantage, and by keeping abreast of new spatial technologies and their potential implications. Tribes could develop criteria to assess the

sensitivity of spatial data, regardless of the technology; use that criteria to identify the most sensitive and valuable information; and enact tribal freedom of information and privacy statutes that balance the need for disclosure with the need to keep some data confidential. Ultimately, controlling access to sensitive spatial data of tribes' land and resources will require a creative combination of legal, policy, and technical solutions.

For my Grandmothers Ann and Marcella,

My Parents Bill and Elaine,

Frank and Mary,

Ann and Gunter, Bill and Tanya,

and all my friends and colleagues

whose patience, kindness, love, and support carried me through.

ACKNOWLEDGEMENTS

My heartfelt appreciation is extended to:

- All those who were interviewed for and contributed to this dissertation research for generously offering their expertise, experience, and time.
- My advisor, Steve Ventura, and faculty mentors, including Harlan Onsrud, Gary Sandefur, Joanne Irene Gabrynowicz, Larry Nesper, Kristin Eschenfelder, Tom Lillesand, and Frank Scarpace, for their expertise, encouragement, and patience.
- Merv Tano and Renee M. Pulani, whose breadth of knowledge, wisdom, friendship, and thoughtful critique guided my research.
- Crystal Bond, Celine Elm, Chris English, Jhon Goes In Center, Stan Lalio, Bryan Marozas, Rosemarie McKeon, Tracy Mofle, Richard Monette, James Rattling Leaf, CloAnn Villegas, Alvin Warren, William Whatley, Holly Youngbear-Tibbits, and many others who generously offered their expertise, guidance, gentle tactfulness, friendship, and time.
- Bill Northover, who kindly welcomed me into the Inter-Tribal GIS Council; he is greatly missed.
- Jason Kessler, whose empathetic leadership inspires me and who created the space for me to finish this journey.

I am deeply appreciative of the tribal government staff, tribal members, and federal agency staff who offered guidance and contributed greatly to this research. I also would like to thank the Gaylord Nelson Institute for Environmental Studies, the Inter-Tribal GIS Council, the Indigenous Mapping Network, the Bureau of Indian Affairs, the Environmental Protection Agency, the Federal Geographic Data Committee, the Wisconsin Department of Natural Resources Bureau of Endangered Resources, and the Wisconsin State Historical Society.

Finally, I could not have completed this process without the love and support of my family, the encouragement of my friends and colleagues, and the everlasting patience and kindness of my adviser.

The individuals mentioned in this acknowledgement were not asked to endorse the conclusions that this dissertation suggests; this report exclusively represents the views of the author, who retains responsibility for the content, including all errors of fact and interpretation.

**SPATIAL DATA SOVEREIGNTY AND PRIVACY IN INDIAN COUNTRY:
A POLICY ANALYSIS**

Abstract.....	i
1. INTRODUCTION	1
1.1 Goals and Focus of the Study.....	4
1.2 Research Questions and Significance of Research	11
1.2.1 Research Questions.....	12
1.2.2 How Will Research Address Gaps in Existing Knowledge?	14
1.2.3 What Aspects Are Unique to American Indian Tribes?	17
1.2.4 Significance of Research.....	18
1.3 Challenges and Limitations.....	20
1.4 Organization.....	21
2. METHODS AND CONCEPTUAL FRAMEWORK	22
2.1 Formative Cases	22
2.2 Methods Overview	25
2.3 Conceptual Framework	27
2.3.1 Privacy	27
2.3.2 Intellectual and Cultural Property.....	32
2.3.3 Trust and Data Sharing	33
2.3.4 Power and Surveillance.....	38
2.4 Methods for this Study	40
2.4.1 Archival Research.....	42
2.4.2 Participatory Research	47
2.4.3 Interviews with Tribal Governments and Bureau of Indian Affairs	53
3. CORE CONCEPTS: TRIBES AND THE FEDERAL GOVERNMENT	56
3.1 What is an Indian Tribe?	56
3.2 What is Indian Country?	58
3.3 Doctrine of Trust Responsibility	59
3.3.1 What is the Trust Doctrine?	59
3.3.2 Duty of Consultation.....	68

3.3.3	Conflict Between the Trust Doctrine and the Public Trust.....	72
3.4	Doctrine of Plenary Power	75
3.5	Treaties	77
3.5.1	Doctrine of Reserved Rights	78
3.5.2	Canons of Construction.....	80
3.6	Application of Federal Statutes to Tribes.....	82
3.6.1	Federal Laws Specific to Tribes	83
3.6.2	Federal Laws of General Applicability.....	84
3.7	Tribal Self Government.....	86
3.7.1	Doctrine of Tribal Sovereignty	86
3.7.2	Source and Scope of Tribal Powers	89
3.7.3	Sovereign Immunity of the Tribes	91
3.8	Role of the Bureau of Indian Affairs and Department of the Interior	92
3.9	Summary	96
4.	GIS IMPLEMENTATION BY THE BIA AND TRIBES.....	97
4.1	What is Special About Geospatial Technologies?	100
4.2	Implementation of GIS by the Bureau of Indian Affairs	108
4.3	Implementation of GIS by Tribes.....	129
4.4	Tribal Concerns Regarding GIS Data Access and Use	137
4.4.1	Traditional Knowledge and Cultural Resources Information.....	138
4.4.2	Land Parcel Boundaries	143
4.4.3	Reservation Boundaries	146
4.4.4	Water Availability Data	147
4.4.5	Water Quality Data	149
4.4.6	Environment and Resources Data.....	154
4.5	Summary	157
5.	SPATIAL DATA ACCESS AND RIGHTS	159
5.1	Rights of Access.....	162
5.1.1	Open Government Policies	163
5.1.2	Freedom of Information	166
5.1.2.1	What is an “Agency”?	168
5.1.2.2	What is an “Agency Record”?	170
5.1.2.3	Exemptions.....	172

5.1.2.4	Is There a Tribal Trust Exemption to FOIA?	175
5.1.2.5	Which Exemptions May Apply to Tribal Spatial Data?	187
5.1.2.6	FOIA Regulations	212
5.1.3	Federal Data Acquisition and Management.....	213
5.1.3.1	Indian Self-Determination and Education Assistance Act.....	215
5.1.3.2	Indian Land Consolidation Act and Program.....	217
5.1.3.3	OMB Circular A-110, Federally Funded Research Grants.....	217
5.1.3.4	Information Quality Act and Guidelines.....	219
5.1.3.5	Federal Activities Inventory Reform Act and OMB Circular A-76.....	222
5.1.3.6	OMB Circular A-16 Revised, National Spatial Data Infrastructure	223
5.1.3.7	Federal Acquisition Regulations	226
5.1.4	Accountability and Judicial Review of Agency Actions	227
5.1.5	Discovery	227
5.2	Rights of Control.....	228
5.2.1	Rights of Privacy.....	228
5.2.1.1	Individual Privacy	228
5.2.1.2	Group Privacy	230
5.2.2	Rights of Intellectual Property	235
5.2.2.1	Trade Secrets	235
5.2.2.2	Copyright.....	236
5.2.2.3	Cultural Property.....	243
5.2.3	Other Control Mechanisms	247
5.2.4	National Security	249
5.3	Summary	250
6.	HIGH-RESOLUTION COMMERCIAL SATELLITE IMAGERY PRIVACY AND ACCESS	253
6.1	Introduction	253
6.2	Commercial High-Resolution Satellite Imagery	256
6.3	Tribal Concerns Raised by High-Resolution Satellite Imagery.....	261
6.4	Limitations of High-Resolution Satellite Imagery	263
6.5	Rights of Privacy and Remotely Sensed Imagery.....	265
6.5.1	Government Surveillance and the Fourth Amendment	265
6.5.2	Commercial Aerial Surveillance.....	273

6.6	Potential Strategies.....	275
6.6.1	Is Preventing Image Gathering an Option?.....	276
6.6.2	Is a Tribe a “Sensed State”?.....	278
6.6.3	Application of Equity Principles.....	281
6.7	Discussion	283
6.7.1	Acquiring Data and Imagery.....	283
6.7.2	Benefits of Remotely Sensed Imagery.....	284
6.8	Summary	286
7.	ALTERNATIVE APPROACHES AND TRADE-OFFS.....	287
7.1	Policy Options	290
7.1.1	Tribal Freedom of Information and Privacy Statutes	291
7.1.2	Data Handling Policies and Practices	295
7.1.3	Ownership, Contracts and Licensing	299
7.1.4	FOIA Exemptions	303
7.1.5	FOIA Amendment	307
7.1.6	United Nations Principles	311
7.2	Ethical Best Practices	311
7.3	Technical Options	314
7.4	Trade-Offs	317
7.4.1	Reducing Data Disputes Through Collaboration.....	317
7.4.2	Federal and Tribal Government Transparency and Accountability.....	318
7.4.3	Preservation of Sensitive Sites Through Awareness and Education	323
7.5	Potential Implications of Emerging Technologies.....	324
7.6	Conclusion.....	328
	REFERENCES.....	331

1. INTRODUCTION

The Department of Interior's Bureau of Indian Affairs (BIA) administers and manages 55.7 million surface acres of land and 57 million acres of subsurface estates held in trust by the federal government for American Indian tribes and Alaska Natives.¹ Through the government-to-government relationship, the BIA and other executive departments and agencies have a trust responsibility toward federally recognized tribes and a duty to consult with tribal governments regarding proposed federal policies and actions that have tribal implications.² These agencies create, maintain, and disseminate spatial information and data, and satellite imagery as part of this consultation process (e.g., BIA, 2003; Getter, 1985; Getter and Bonner, 1986). In addition, tribal governments, as well as tribal corporations, create, maintain, and disseminate spatial data and satellite imagery as part of their own day-to-day government and business activities (e.g., Bohnenstiehl and Tuwaletstiwa, 1999; PE&RS, 2001; Native Geography, 2000, 2001; Goes In Center, 2000; He, 1995; Marozas, 1991, 1993, 1996; Rattling Leaf, 2002).

Under the Freedom of Information Act (FOIA), outside parties have demanded that the BIA hand over government-held tribal documents and data, despite confidentiality agreements, in some cases adversely affecting tribes' land and natural resource rights and

¹ U.S. DOI Website, accessed June 10, 2004. <http://www.doi.gov/bureaus.html>.

² See, for example, Obama Executive Memorandum 110509: Tribal Consultation (November 5, 2009). Accessed October 24, 2011. www.justice.gov/otj/pdf/obama-executive-memo110509.pdf; Clinton Executive Order 13175: Consultation and Coordination With Indian Tribal Governments (November 6, 2000), accessed October 24, 2011. <http://www.epa.gov/fedreg/eo/eo13175.htm>.

interests. As will be discussed in Chapter 4, this has resulted in the unwanted intrusion of tourists at tribal sacred ceremonies, destruction of sacred sites, and theft of cultural artifacts. This has resulted in the reduced bargaining power of tribes when negotiating leases with companies for tribal timber, rangeland, oil and gas, and minerals, resulting in lower economic returns. This has affected tribes' ability to assert their sovereign authority, including enforcing tribal air and water quality regulations within the boundaries of their reservations. This also has weakened tribes' defense of their water rights and hunting and fishing treaty rights during litigation.

While public access to tribal information has been a long-standing concern among tribes,³ federal and state court decisions, as well as the sophisticated data collection, integration and analysis capacity of geospatial information systems, and significant leaps in the resolution of commercial satellite imagery, have brought information control, privacy and safety concerns to the forefront. For example, in *Department of the Interior and Bureau of Indian Affairs, Petitioners v. Klamath Water Users Protective Association* (99-1871), decided on March 5, 2001, the United States Supreme Court ruled that documents shared by tribes with the federal government—at the government's request—are not exempt from the Freedom of Information Act (FOIA) under Exemption 5, a provision that protects intra-agency and inter-agency records from public inspection. Although in keeping with the Court's history of narrowly interpreting FOIA to encourage government disclosure, this decision has had a far-reaching impact on the Federal-tribe trust

³ See, for example, Indian Amendment to Freedom of Information Act: Hearings on S. 2652 before the Subcommittee on Indian Affairs of the Senate Committee on Interior and Insular Affairs, 94th Congress, 2nd Session (1976); Indian Trust Information Protection Act of 1978, S. 2773, 95th Congress, 2nd Session. (1978).

relationship. It has caused a ripple effect, sparking conflicts over access to government-held tribal information and data. In addition, federal acquisition regulations for government procurement contracts, OMB Circular A-110 on federally funded research grants, and other federal policies may impact the reporting requirements of federal grantees and contractors, including tribes and other collaborators, like universities.

Fundamental issues are at stake, including tribes' rights and interests in their knowledge, territories, and resources, federal agencies' authority and decision-making processes that affect those resources, and the public's right to know. The incorporation of tribal expertise, information, and data into federal environmental planning and policy formulation is critical if tribes' rights and interests are to be protected. However, if federal agencies and other cooperating organizations are unable to guarantee confidentiality, tribes' willingness to share information may erode. Thus, the federal government's ability to perform its trust obligation will be impeded and tribes' rights and interests may be abrogated (e.g., Mense, 2011; Gee, 2014; Kemper, 2014; Brown, 2004; Harding, 2000; Lum, 1999; Marcus, 1995; Waldron, 2001). Definitions of extent and limits of access to spatial information and data by tribal members also will influence issues of trust and transparency in decision-making within tribes.

Based on history, experience, and cultural values, many tribes would like to assert ownership and control over the terms within which spatial data and satellite imagery of

their lands and resources are accessed and used.⁴ But, restricting access to this information may be difficult to achieve given the United States' long-standing domestic position of open government. In particular, if this information is created by, shared with, or funded through the federal government, it may become accessible to outside parties under the Freedom of Information Act (FOIA) and other federal guidelines and regulations.

1.1 Goals and Focus of the Study

Within the framework of the intersection between tribal, federal and societal interests, and using archival research, qualitative methods, and policy analysis, this dissertation research explores tribal concerns and perceptions regarding unwanted access to spatial data and satellite imagery of tribes' territories and resources, investigates the circumstances under federal policy and regulatory requirements may make tribal spatial data accessible to outsiders, and proposes several strategies, including policy and technical solutions, that seek to achieve an appropriate balance between preventing misuse and encouraging tribal government transparency for tribal members.

Given the growing number of location-aware technologies that can be used to collect spatial data and imagery, and given the complexity and diversity of the laws and policies that may apply to them, this dissertation will focus specifically on hardcopy maps, geographic information systems (GIS) data, and high-resolution commercial satellite

⁴ As expressed by Crystal Bond, Cartographer for the Cherokee Nation, everything else has been taken and now the dominant society wants Indian nations' information too. Crystal Bond, Cartographer at the Cherokee Nation GeoData Center, Tahlequah, Oklahoma. Private communications, July 2001.

imagery. It will not address ground-based photography, pictometry (i.e., oblique aerial photography), radar, LiDAR (Light Detection and Ranging), or hyperspectral imagery. It also will not include data collected through unmanned aerial vehicles (UAVs), distributed sensor networks, or mobile phones. That said, the potential implications of these emerging technologies are discussed briefly in Chapter 7.

Because of the complexity of federal law with regards to Native Alaskans and Native Hawaiians, and because of the complexity and diversity of tribal-state relationships, this dissertation also is limited in scope to federally recognized tribes within the continental United States and to the federal-tribal government-to-government relationship.

Furthermore, the spatial data under consideration will not include detailed realty and trust fund asset information maintained by the BIA's Division of Land Titles and Records (DLTR) and regional Land Title Records Offices (LTRO)—e.g., automated land titles and records system-of-record: Trust Asset and Accounting Management System – Title Module (TAAMS-Title).

Specific aims:

Geographic information systems (GIS) and satellite remote sensing have become important tools for land administration, planning and management. Therefore, the technology itself and how it is implemented and used are of critical concern to tribes and to federal agencies that interact with tribes. Within this broad framework of the intersection between tribal and the dominant society's interests, this dissertation will explore a series of questions, enumerated in Section 1.2 through the explication of five

areas: (1) concerns of tribes with regards to unwanted access to spatial data and remotely sensed imagery of tribal lands and resources; (2) development and implementation of GIS by the Bureau of Indian Affairs (BIA) and tribes; (3) the Freedom of Information Act and other federal policies and regulations that may impact the disclosure of tribal spatial data; (4) the extent to which the federal trust responsibility and treaty obligations impose a Federal responsibility for safeguarding tribal spatial data; and (5) alternative strategies for controlling the dissemination of tribal spatial data and satellite imagery, including intellectual property and contract law, administrative best practices and procedures, and technical solutions.

Definitions:

Tribe: The Native American Rights Fund (NARF) states that “[a]n Indian tribe was originally a body of people bound together by blood ties who were socially, politically, and religiously organized, who lived together in a defined territory and who spoke a common language or dialect.”⁵

In order to be eligible for federal Indian services administered by the U.S. Department of the Interior, however, a tribe must be officially recognized by the federal government through treaties, acts of Congress, executive orders, and so forth. As defined in Executive Order 13175 of November 6, 2000 (Clinton, 2000b), issued by former President Bill Clinton and endorsed in President Obama’s Executive Memorandum 110509 of November 2009, an “*Indian tribe*’ means an Indian or Alaska Native tribe, band, nation,

⁵ Native American Rights Fund Web Site, Frequently Asked Questions, accessed June 29, 2004. <http://www.narf.org/pubs/faqs.html>

pueblo, village, or community that the Secretary of the Interior acknowledges to exist as an Indian tribe pursuant to the Federally Recognized Indian tribe List Act of 1994, 25 U.S.C. 479a.”

According to the Department of Interior Bureau of Indian Affairs:

“[a] *federally recognized tribe* is an American Indian or Alaska Native tribal entity that is recognized as having a government-to-government relationship with the United States, with the responsibilities, powers, limitations, and obligations attached to that designation, and is eligible for funding and services from the Bureau of Indian Affairs. Furthermore, federally recognized tribes are recognized as possessing certain inherent rights of self-government (i.e., tribal sovereignty [and self-determination]) and are entitled to receive certain federal benefits, services, and protections because of their special relationship with the United States. At present, there are 566 federally recognized American Indian and Alaska Native tribes and villages.”^{6,7} Some states have their own tribe recognition process, not linked to federal recognition.

Indian country refers to “‘all lands within the boundaries of an Indian reservation, including fee land.’ It includes reservations, trust land, fee land, allotments, and

⁶ U.S. Department of the Interior’s Bureau of Indian Affairs FAQs Website, accessed October 24, 2011. <http://www.bia.gov/FAQs/index.htm> See also Federally Recognized Indian Tribe List Act of 1994 (Pub. L. 103-454) and 25 U.S.C. §479a.

⁷ Importantly, membership in a tribe distinguishes Native Americans as a political group, rather than an ethnicity.

dependent Indian communities.”⁸ It is defined in a federal criminal statute (Title 18, U.S. Code, section 1151) as follows, which, according to (Pevar, 2012), courts have applied in civil contexts:

1. “All land within the limits of any Indian reservation under the jurisdiction of the United States government, notwithstanding the issuance of any patent, and including rights-of-way running through the reservation;
2. All dependent Indian communities within the borders of the United States whether within the original or subsequently acquired territory thereof, and whether within or without the limits of a state; and
3. All Indian allotments, the Indian titles to which have been extinguished, including rights-of-way running through the same.”

Agency, as defined in Executive Order 13175 (2000), is “any authority of the United States that is an ‘agency’ under 44 U.S.C. 3502(1), other than those considered to be independent regulatory agencies, as defined in 44 U.S.C. 3502(5).” Under 44 U.S.C. 3502(1), “the term ‘agency’ means any executive department, military department, Government corporation, Government controlled corporation, or other establishment in the executive branch of the Government (including the Executive Office of the President), or any independent regulatory agency, but does not include: (a) the Government Accountability Office; (b) Federal Election Commission; (c) the governments of the District of Columbia and of the territories and possessions of the

⁸ For definitions of Reservation, Trust Land, Allotment, Fee Land, Checkerboard Land, and Ceded Territory, visit EPA’s website, accessed October 24, 2011.

<http://www.epa.gov/Indian/wetg/training/EPA/common/data/text-only/Old/epa01a.htm>

United States, and their various subdivisions; or (d) Government-owned contractor-operated facilities, including laboratories engaged in national defense research and production activities.”

“(10) the term “**person**” means an individual, partnership, association, corporation, business trust, or legal representative, an organized group of individuals, a State, territorial, tribal, or local government or branch thereof, or a political subdivision of a State, territory, tribal, or local government or a branch of a political subdivision;”

In addition, the following definitions will be adopted, as described in Appendix D of the Office of Management and Budget (OMB) Circular A-16 Revised, “Coordination of Geographic Information and Related Spatial Data Activities” (August 19, 2002). Circular A-16 “provides direction for federal agencies that produce, maintain or use spatial data either directly or indirectly in the fulfillment of their mission,” and “establishes a coordinated approach to electronically develop the National Spatial Data Infrastructure (NSDI) and establishes the Federal Geographic Data Committee (FGDC).”⁹

Data: Factual information, especially information organized for analysis or used to reason or make decisions. In Computer Science, numerical or other information represented in a form suitable for processing by computer.

⁹ Circular No. A-16 Revised, US Office of Management and Budget Website, Accessed April 13, 2015. Available at: https://www.whitehouse.gov/omb/circulars_a016_rev/.

Data Theme: Electronic records and coordinates for a topic or subject, such as elevation, vegetation, or hydrography. In this Circular, data theme refers to a Geographic Information System (GIS), or location-based data theme.

Geographic Information: Coordinate and attribute data for location-based features, usually in the categories of point (e.g., a well), line (e.g., a road), polygon (e.g., a forest), cell (e.g., a raster-based “rectangle”), or coordinates (e.g., the latitude-longitude of a point on the ground).

Geographic Information System (GIS): A computer system for the input, editing, storage, retrieval, analysis, synthesis, and output of location-based information. GIS may refer to hardware and software, or include data.

Geospatial Data: Information that identifies the geographic location and characteristics of natural or constructed features and boundaries on the Earth. This information may be derived from, among other things, remote sensing, mapping, and surveying technologies. Statistical data may be included in this definition at the discretion of the collecting agency.

Geospatial Services: A collection of operations, accessible through an interface that allows a user to evoke a behavior or value to the user.

Global Positioning System (GPS): A satellite-based system deployed to determine locations on the Earth’s surface. It is commonly used for surveying, mapping, and navigation on the land and water.

Metadata: Information about data, such as content, source, vintage, accuracy, condition, projection, responsible party, contact phone number, method of collection, and other characteristics or descriptions.

National Spatial Data Infrastructure (NSDI): The technology, policies, standards, human resources, and related activities necessary to acquire, process, distribute, use, maintain, and preserve spatial data (e.g., information and process discovery, publishing data, publishing symbol libraries, query filtering, data fusing, Earth imaging, photogrammetry, location processing, and spatial analysis).

Spatial Data: Information that identifies the geographic location and characteristics of natural or constructed features and boundaries on the Earth. This information may be derived from remote sensing, mapping, charting, surveying technologies, GPS, or statistical data, among other sources.

1.2 Research Questions and Significance of Research

As stated earlier, although in keeping with the Supreme Court's history of narrowly interpreting FOIA to encourage government disclosure, the *Klamath Water Users* decision as well as other related events and court decisions have had an impact on the federal-tribe trust relationship. It has caused a ripple effect, sparking new conflicts over access to federal government-held tribal documents and data. This, in turn, may have eroded tribes' willingness to share information and hence, impede the federal government's ability to perform its trust obligations.

I hypothesize that improved methods and strategies may be developed to achieve a better balance between public dissemination of tribal spatial data and protection of that data to meet tribal needs. In working to demonstrate this hypothesis, the following two premises were explored:

Premise 1: Access to tribal spatial data under the federal Freedom of Information Act will hinge: (1) on the source of funding used for its creation and maintenance, and associated regulations; and, (2) on whether it is “controlled” by the Federal government for the purposes of FOIA.

Premise 2: Controlling access to spatial data and satellite imagery of tribes’ land and natural resources will require a creative combination of policy, administrative, and technical solutions; no single remedy will be sufficient.

1.2.1 Research Questions

The issues of who can access tribal spatial data and imagery, who can appropriately interpret and use it, and how privacy, access and transparency might be balanced raises numerous questions and concerns. This dissertation explores and attempts to address several, although not all, of the questions enumerated below.

External Access Concerns

- What are tribes’ concerns with regard to external access to spatial data and satellite imagery of their lands and resources? Which of these data are considered sensitive or confidential and for what reasons?

- What are the consequences of the external access to tribal spatial data and satellite imagery? What are potential problems versus actual occurrences?
- Who should own, control and interpret a tribe's spatial data and satellite imagery?
- Are these struggles about control of information or do they arise from loss of control of information?

Brief History of BIA and Tribal GIS Implementation

- How has this information been created, maintained and disseminated? What institutional and funding arrangements have been used to create and maintain tribal spatial data?
- What spatial data have tribes been required to share?
- What strategies have tribes adopted to address issues of spatial data access and control?

Questions Relating to Federal FOIA and Regulations

- Under what circumstances does this information become accessible under the Freedom of Information Act (FOIA) and federal regulations? Are there examples of forced access?
- Could a tribe be considered an "agency" for the purposes of FOIA (e.g., under Pub. L. 93-638)?
- Does tribal created and maintained spatial data constitute an "agency record" for the purposes of FOIA?

- Does “control” of tribal spatial data for the purposes of FOIA depend on the institutional and funding arrangements involved in its creation and management?
- Which of the nine exceptions might be applicable for protecting tribal spatial data from unwanted outside access?

Federal Trust Responsibility

- To what extent do the federal trust responsibility and treaty obligations impose a federal responsibility for safeguarding tribes’ spatial data under FOIA?
- How are federal agencies like the BIA meeting these obligations?

Potential Strategies

- What policy, administrative, and technical mechanisms might be employed to ensure the confidentiality of tribal spatial data if it is created, maintained, and possibly shared?
- What are the tradeoffs?

1.2.2 How Will Research Address Gaps in Existing Knowledge?

As discussed in the previous sections, some tribes would like to assert control over the terms within which spatial data and satellite imagery of their lands and resources are accessed and used. But, if this information is created by, shared with, or funded through

the federal government, it may become accessible to outside parties under the Freedom of Information Act (FOIA) and federal regulations. This dissertation will explore several aspects of this problem that have not been fully discussed in the literature.

First, only a small handful of articles have offered concrete examples where tribal information under the control of federal agencies has been disclosed under FOIA, where tribal spatial data maintained and used by tribal governments has been disclosed and, as a result, misused by outside parties, or where tribes' unwillingness to share information has negatively impacted tribes' land and resource rights. Most of this literature has focused on information about cultural resources and sacred sites (e.g., Mense, 2011; Skibine, 2012; Harding, 2000; Waldron, 2001). This dissertation will add to this body of literature with specific examples related to tribal spatial data. In particular, this dissertation will investigate the outcome of a FOIA request made by the Wisconsin Department of Natural Resources (WDNR) during the fall of 1997. The WDNR requested Tribal Boundary and Land Status GIS data of all the tribes in Wisconsin. The WDNR first pursued cooperative release of the data from the Tribal councils with only minor success, and so challenged the BIA's prerogative to hold the records above the FOIA statute. The WDNR administrative appeal was resolved in 2001, noticeably after the Klamath decision, and in favor of the WDNR.

Second, through interviews and a review of the literature, this dissertation attempts to identify and convey the concerns of tribes with regards to disclosure of sensitive and

confidential tribal spatial data. However, this dissertation is not intended to provide an in-depth look at the issues of tribal data sharing.

Third, little has been written about the history of the development and implementation of GIS by the Bureau of Indian Affairs (BIA) (Palmer and Rundstrom, 2013; Palmer, 2006; Getter and Bonner, 1996; Marchand and Winchell, 1994). Determining who originally created tribal spatial data sets maintained—the BIA, the tribes, outside consultants, or some combination thereof, how they were created, and under what contractual arrangements will be critical to the determination of agency control over the information for the purposes of FOIA, as we will see in the Wisconsin DNR FOIA case.

Fourth, while several authors have raised concerns regarding the release of confidential tribal information under FOIA (e.g., Brown, 2004; Harding, 2000; Marcus, 1995), only a handful of law review articles have analyzed this issue with more depth. In a short paper, Lum (1999) studies the relationship between cultural resource protection in land use and environmental decision-making and public disclosure of confidential tribal information. Through this exploration, Lum (1999) briefly reviews each of the nine exemptions under FOIA and how they might be applied to tribal information. Waldron (2001), on the other hand, focuses on Exemption 5 of FOIA in her criticism of the *Klamath* Supreme Court decision (see Section 2.1.1.2), which she dissects in light of the federal trust responsibility. Although both Lum (1999) and Waldron (2001) consider the possible impact of tribal information disclosure on the government-to-government consultation process during federal environmental policy decision-making, neither offers much in the

way of a solution outside of the nine FOIA exemptions. Lear and Jones (1999) also focus on access to tribal land and title records within the context of the FOIA and the Privacy Act. This paper, however, takes a strong position of open access, with an emphasis on obtaining mineral ownership information, and ignores the federal trust doctrine. Kemper (2014) focuses on tribal data about jaguars and access to this information under the National Environmental Policy Act (NEPA).

Overall, these authors do not examine OMB regulations (e.g., OMB Circular A-16, OMB Circular A-130, OMB Circular A-110) with respect to tribal spatial data, nor do they look at the applicability of FOIA as a ‘federal statute of applicability’ to tribal governments. They do not discuss tribal spatial data, the different funding arrangements under which it is created, or how these arrangements might affect the disclosure of tribal information. Finally, these authors do not offer other strategies for protecting the confidentiality of this information outside of the nine FOIA exemptions. This dissertation, in contrast, explores these topics and, based on a policy analysis, proposes options for balancing the concerns described above with the need for tribal government transparency and accountability, including intellectual property rights and contracts, administrative best practices and procedures, and technical solutions.

1.2.3 What Aspects Are Unique to American Indian Tribes?

Nearly a third of the population in Indian Country is below the poverty level. Economic growth, while improving, is still dependent on resources and constrained by geographic

isolation. Even so, reservations offer a rich and unique environmental, cultural and political landscape.

Tribes are “distinct, independent political communities”; they have sovereignty and inherent powers of self-government. Tribal governments function under a variety of governmental systems, including constitutions, Articles of Association, and traditional systems of government. With some limited exceptions, tribes’ internal affairs do not fall within the purview of the federal government, nor are tribal governments subordinate to state governments.

Tribes have a special legal relationship with the United States. The Federal trust responsibility to Indian tribes is a legally enforceable fiduciary duty and moral obligation on the part of the United States to protect tribal lands, assets, resources, and treaty rights. Often it is within the context of this government-to-government consultation, particularly during natural resource policy development, that tribes are required to share otherwise proprietary or sensitive spatial data with federal agencies. Furthermore, due to cultural and historical differences, tribes do not necessarily share the same views towards this information as the dominant society, nor do they foster “open access” information policies to the same extent as promulgated by federal and state governments.

1.2.4 Significance of Research

This research can lead to guidelines for federal agencies and other organizations working with tribes through validation of approaches to trust-building based on ethical handling,

protection, and appropriate dissemination of tribal spatial data shared by or created with tribes as part of these collaborations. This research also may guide tribes, which will need to decide how to fund and whether to share their spatial data and remotely sensed imagery.

Tribes will need to understand how the *Klamath Water Users* Supreme Court decision and other similar cases may impact access to spatial data of their lands and resources. They will need to be aware of their legal obligations in regards to FOIA and the possible ramifications of accepting federal funding. Tribes will need to determine whether or not they want to share their spatial data with the federal government, knowing that it could be disclosed to third parties who may be adverse to their interests. They will need to explore alternative mechanisms for protecting this information, until such time as a legislative fix may be implemented. The *Klamath Water Users* decision focused on FOIA exemption five, but others exemptions might be applicable (e.g., four, which covers trade secrets and financial information, and six, which covers privacy). In addition, federal agencies will need to develop guidelines on how to fulfill their trust obligations and on how to respond to FOIA requests in the future.

There is a clear need for solutions. It is hoped that this dissertation will be useful both for tribes, which are considering developing GIS databases through cooperative agreements or federal grants and which are engaged in an Integrated Management Resource Plan (IMRP) or other planning processes, and for federal agencies, which are accustomed to working in an open access environment. Furthermore, these issues transcend Indian Country and potentially affect other fields dealing with sensitive spatial information, such

as health, crime mapping, archeology, coastal and marine spatial planning, and environmental protection. As Lipton (2003, 707) notes, issues relating to the control of, and access to, information are “emerging as issues at the heart of most legal and policy questions relating to information.”

Finally, although primarily seeking assistance and guidance for a practical problem, this dissertation provides an interdisciplinary synthesis of three different fields—public policy, sociology, and geospatial information science – to come to a new understanding of the issues.

1.3 Challenges and Limitations

Given the highly sensitive nature of this topic, no federal funding was sought to support this dissertation research so that the information collected would not be not subject to FOIA (as per OBM Circular A-110). However, this limited the ability to travel to meet with interview participants in person and greatly reduced the time available to pursue this research. Furthermore, some participants, understandably, were unwilling to share information or to allow it to be published. Internal documents that describe tribal government and agency procedures and actions were hard to obtain, and those that were cannot be published due to confidentiality agreements. Finally, relationships explored through the qualitative analysis are not representative of a generalization of all tribal experiences.

1.4 Organization

Chapter 2 summarizes the archival research and qualitative methods used in this study, and describes the formative participatory research that lead to this inquiry. It also presents a conceptual framework for understanding the findings. Chapter 3 of this dissertation provides a review of core concepts related to tribes and the tribal-federal government-to-government relationship. Chapter 4 provides a short history of the development of GIS by the Bureau of Indian Affairs and tribes, as well as describes the priority data sets that tribes consider sensitive and why. Chapters 5 and 6 analyze the circumstances under which tribal spatial data and satellite imagery may be made available to outside parties. Chapters 6 and 7 offer strategies for mitigating unwanted access and potential misuse of the information. Chapter 7 discusses the counter concerns, including the benefits of transparency and a robust tribal geospatial program, and examines the tradeoffs. Lastly, I speculate on the potential implications of emerging technologies, such as UAVs, mobile technologies, and smart sensor networks, on tribal data protection.

2. METHODS AND CONCEPTUAL FRAMEWORK

This research was inspired by and grew out of my participation in a collaboration with a tribe on a 3-year University of Wisconsin-Madison research and outreach project to develop a multi-purpose land information system that more effectively shared data, applications, and expertise across tribal government departments, tribal enterprise, and tribal college. As this project was instrumental in developing many of the fundamental ideas for this dissertation, it is presented first along with related activities emerging at the time, followed by a conceptual framework and the methods for gathering supporting evidence.

2.1 Formative Cases

The University collaboration with tribal organizations resulted in several successful applications of GIS, but for several reasons, failed to achieve the long-term goal of a formal GIS data sharing agreement between the organizations. When I began working with the tribe, I brought with me an open data/open government perspective held by the dominant society—that GIS data is a public good and should be made freely available to all for good governance. Conducting a GIS user needs assessment for the tribe, and working for the tribal enterprise to build their GIS database, however, made me more aware of the challenges in developing a GIS data policy within the context of a complex institutional and cultural setting of tribal governance.

Many of the tribal government departments, including forestry, environmental services, conservation, community development, realty, and historic preservation, handled access to GIS datasets differently. For instance, one department director did not want a “white, outsider touching [his] parcel data,” although GIS parcel data sets are considered an open record in most county governments. The locations of bald eagles’ nests were considered highly sensitive by one department, while another thought that this data should be shared because “everyone on the reservation knows where the nests are” and because any development or use of the forested areas needed to avoid the nests. The historic preservation office was not ready to use GIS because elders did not want their cognitive maps, oral histories, and traditional uses of the forest to be digitally recorded or shared outside of a select circle of trusted individuals. At the same time, the forestry department would have appreciated having GIS datasets of traditional hunting camps, and other culturally important and sacred places so that they could avoid disturbing these places in the course of timber harvesting operations. The forestry department also needed an up-to-date parcel map so that they did not inadvertently harvest on private lands, but a consistent data sharing process between forestry and community development had not been established due to technical issues and organizational tensions over control of the data.

Several events occurred during this time that galvanized my interest in the issues surrounding the handling and protection of tribal GIS data. First, while we were conducting our project, an employee of the tribe left his position, taking all of a tribal government department’s GIS data without permission to his new position at a consulting

firm. Second, the tribe accepted funding from multiple sources to create some of their GIS data and collect areal imagery of their reservation, including the tribal government, federal government, and state government (e.g., state land records modernization grants). This resulted in “composite datasets,” derived from multiple datasets and multiple funding sources, resulting in a tangle of data ownership and access obligations. Third, the State’s Department of Natural Resources (DNR) made a freedom of information act (FOIA) request to the Bureau of Indian Affairs (BIA) to obtain GIS data sets for all tribes in state. The DNR did so after ignoring the tribes’ invitation to meet with them in good faith to discuss why the data were needed. Fourth, the U.S. Supreme Court ruled in favor of the Klamath Water Users Protective Association, which sought access to the Klamath’s and other tribes’ sensitive documents and geographic information through a FOIA request to the BIA, giving the Association an advantage in water rights litigation. Fifth, due in part to budget cuts and in part to the *Klamath* decision, the BIA mailed back to the tribes all GIS data sets that it had archived at its Geospatial Data Services Center in Lakewood, CO. In doing so, the BIA mistakenly mailed some of the GIS data CDs to the wrong tribes, or to the wrong tribal departments within tribes, inadvertently sparking internal conflicts over which department owned the information. These events created uncertainty as to whether tribal GIS data sets created, maintained or funded by the BIA could be protected from unwanted third party access. Apparently, a Memorandum of Understanding between the BIA and a tribe, stipulating Tribal Chairman approval before GIS data could be released, was not sufficient protection under FOIA. In the wake of these events, the BIA offered little to no guidance for tribes. Nor was there much if any discussion in the literature aside from (W. Madsen, 1995) and (Lum, 1999). Lastly, a

conflict between George-Pacific and the Penobscot Nation in Maine over regulation of wastewater discharge under the Clean Water Act resulted in litigation over state open records law access to tribal internal documents and correspondence between the tribes and federal agencies.

In order to assess the implications of these challenges to tribal information sovereignty, we need to understand the process and institutional agreements by which the Bureau of Indian Affairs implemented GIS database development within the agency and at tribal governments. Only one other researcher has published a review of BIA implementation of GIS since its inception (Palmer, 2006; Palmer & Rundstrom, 2013). My evidence and interpretation is developed in Chapter 4, Section 4.2.

It also is important to recognize and appreciate the range of experiences and concerns tribes and their members have regarding the real and potential risks of third party GIS data access. At least four conceptual frameworks provide a lens through which we may: (1) better understand the origins and underpinnings of the arguments for protecting tribal geospatial information and data; (2) assess the strengths and weaknesses of existing federal and tribal data policy frameworks; and (3) offer potential federal and tribal policy options for addressing the problem. These conceptual frameworks include Privacy (Section 2.3.1); Intellectual and Cultural Property (Section 2.3.2); Trust (Section 2.3.3); and Power and Surveillance (Section 2.3.4).

2.2 Methods Overview

The methodology used in this study is based on the Eightfold Path, a policy analysis methodology developed by Professor Eugene Bardach of the Goldman School of Public Policy, University of California, Berkeley. This method is detailed in his book *A Practical Guide for Policy Analysis: The Eightfold Path to More Effective Problem Solving*, 4th Edition (Bardach, 2012), which is widely recognized by scholars in public administration and public policy, and recommended by the Congressional Quarterly. This method is summarized in Section 2.4.

To gather evidence to support this policy research, I relied on archival and secondary source materials, as described in Section 2.4.1. In addition, this dissertation leveraged statutory and court case research: (1) to understand how federal statutes, case law, administrative code, and international agreements may govern the disclosure of geospatial information and data and remotely sensed imagery related to tribes and their reservations; (2) to determine the extent to which the Federal trust responsibility and treaty obligations may impose a Federal responsibility for safeguarding tribal geospatial information and data; and (3) to propose policy and programmatic options for limiting the inappropriate disclosure of tribal geospatial information and data, and remotely sensed imagery. Participatory research and semi-structured interviews augmented and enhanced these sources, helping to refine the research questions, identifying the most sensitive tribal GIS data sets, and informing the policy and programmatic analysis. These approaches are described in Section 2.4.2 and Section 2.4.3, respectively.

Of note, the participatory research and interviews were not intended to provide an in-depth look at the social or cultural barriers to GIS data sharing, as explored in other studies (e.g., Onsrud and Rushton, 1996; Wehn de Montalvo, 2003). Nor were they intended to provide a history of technology or other Science and Technology Studies analysis, which is beyond the scope of this study. Further, this document should not be construed as legal advice, and the content is not intended to be a substitute for specific legal advice or opinions.

2.3 Conceptual Framework

2.3.1 Privacy

Access to information is a critical ingredient of democracy, but drawing the line between public information, for which there is a right to access, and private information, for which there is limited or no right to access without meeting social or commercial terms, is often difficult. The right to privacy has been characterized as a balance that must be negotiated between the rights of individuals and the interests of society at large (Cho, 2005). While the United States Constitution does not explicitly state that there is a fundamental right to privacy, the Supreme Court held in *Griswold v. Connecticut* that such a right does exist through the combined effect of the First, Fourth, Fifth, and Fourteenth Amendments, and the Bill of Rights (Alderman & Kennedy, 1995; Cho, 2005; Curry, 1998).

Privacy rights are implemented through the U.S. Constitution, state constitutions, federal and state statutes, tort law, evidentiary privileges, property law, and contract law (Solove & Schwartz, 2011). Congress, for example, has enacted several statutes that contain

privacy provisions, including: the Freedom of Information Act (1974); Privacy Act (1974); the Health Insurance Portability and Accountability Act (1996); Electronic Freedom of Information Act (1996); E-Government Act of 2002; and Federal Information Security Management Act of 2002 (GSA, 2015; Onsrud, 1994).¹⁰ However, some critics contend that these data protection laws and ‘fair information practices,’ permit individuals to access and correct personal records, but offer inadequate protection against inappropriate data collection and use (Cho, 1998; Curry, 1998). What is more, the majority of these U.S. laws do not apply to the commercial sector. Curry (1998, 111) notes that privacy legislation “has been hindered by a strong anti-regulation tradition and by a continued reliance within the legal system on the view that damages to an individual’s right to privacy can and should be handled in civil courts, through the system of torts.”¹¹ Despite the general recognition of the four privacy torts enumerated in Prosser’s restatement of torts (Prosser, 1977), however, only one—commercial appropriation of another’s name or likeness—is “widely accepted” (Diamond, Levin, & Madden, 2007; Kar, Crowsey, & Zale, 2013).

¹⁰ Also see: Family Educational Rights and Privacy Act (1974); Right to Financial Privacy Act (1978); Electronic Fund Transfer Act (1978); Privacy Protection for Rape Victims (1978); Privacy Protection Act (1980); Cable Communications Policy Act (1984); Electronic Communications Privacy Act (1986); Computer Fraud and Abuse Act (1986); Computer Matching & Privacy Protection Act (1988); Video Privacy Protection Act (1988); Telephone Consumer Protection Act (1991); Driver’s Privacy Protection Act (1994); the Health Insurance Portability and Accountability Act (1996); Telecommunications Act (1996); Electronic Freedom of Information Act (1996); E-Government Act of 2002; Federal Information Security Management Act of 2002; and Fair and Accurate Credit Transactions Act (2003).

¹¹ Based on Judge Prosser’s 1977 restatement of torts, there are four privacy torts, including: (1) unreasonable intrusion on the seclusion of another; (2) commercial appropriation of another’s name or likeness; (3) public disclosure of private facts; and (4) public disclosure of private facts that places a person in a false light (similar to defamation) (Prosser, 1977).

Curry (1998, 101), citing Flaherty (1989), comments that privacy has been expressed conceptually in numerous ways, including: “the right to individual autonomy, the right to be left alone, the right to a private life, the right to control information about oneself, the right to limit accessibility, the right of exclusive control of access to private realms, the right to minimize intrusiveness, the right to expect confidentiality,” or “the right to secrecy.”

Ethicist Joren van den Hoven offers four reasons for providing privacy protection, including (van den Hoven, 2001):

- *Information-based harm*: the release of information leads to distress or harm; for example, the release of locations of a tribe’s sacred sites could result in intrusion on their religious ceremonies or vandalism.
- *Informational inequality*: the release of personal information results in one party accruing disproportionate benefits over the other; for instance, a BIA release of data to third parties could result in unfair tribal land lease negotiations, or undermine a tribe’s position in water rights litigation. Strahilevitz (2011) also underscores that privacy laws are distributive. “Privacy protections create winners and losers,” he states. “So do the absence of privacy protections.”
- *Informational injustice*: the transfer of information from one context to another where it does not belong; for example, this could include the cultural appropriation of a tribal member’s oral histories or religious practices by a non-Indian.
- *Encroachment on moral autonomy*: “the capacity to shape our own moral biographies, to reflect on our moral careers, to evaluate and identify our own

moral choices, without the critical gaze and interference of others and pressure to conform to the ‘normal’ or socially desired identities” (van den Hoven, 2001, 439). This capacity to withdraw from external scrutiny, Reiman (1995, 42) argues, is a form of sovereignty. Without the autonomy privacy affords, external pressures or internal censorship curtail our outward behavior and leads to our assimilation into the dominant culture.

In providing a comprehensive review of the literature on information privacy and technology, Nissenbaum (2010, 2-3, 67-88) comments that those who have attempted to define privacy have “sought to establish whether privacy is a claim, a right, an interest, a value, a preference, or merely a state of existence. They have defended accounts of privacy as a descriptive concept, a normative concept, a legal concept, or all three.” Rather than dive into that “conceptual quagmire to claim a definition,” she offers a “framework of contextual integrity,” explaining:

“finely calibrated systems of social norms, or rules, govern the flow of personal information in distinct social contexts... These norms, which [she] call[s] context-relative informational norms, define and sustain essential activities and key relationships and interests, protect people and groups against harm, and balance the distribution of power. Responsive to historical, cultural, and even geographic contingencies, informational norms evolve over time in distinct patterns from society to society. Information technologies alarm us when they flout these informational norms—when, in the words of the framework, they violate contextual integrity (p.3).”

Further, the public-private dichotomy employed by academic scholars and the courts when discussing privacy does not sufficiently address the concerns raised by new technologies, like facial recognitions software and social networking apps, which

“radically changes our capacity to conduct public surveillance,”¹² and makes it necessary “to protect privacy even in public” (Nissenbaum, 2010, 117). Nissenbaum (2010, 127) asserts rather that we experience a violation of our privacy not based on whether we are in a private or public space, but when informational norms within a certain context are breached. These norms moderate the appropriate flow of information, and are based on the form of the information, the subject matter, and its sensitivity for that context or use. It is also dependent on “the respective roles of the...sender (who may be the subject), and the recipient of this information; and the principles under which the information is sent or transmitted from the sender to the recipient.”

In the United States, a right to privacy inures to the individual. But, the concept of privacy could pertain to a group or community, such as an American Indian tribe, which asserts a separate identity from the dominant society. Strahilevitz (2011) indicates that “[c]ollective privacy issues arise when the disclosure of a single piece of information affects the potential privacy rights of multiple individuals” (see also Strahilevitz, 2013).¹³ The idea of collective privacy is gaining recognition in the literature (Bloustein, 1978; Elizabeth A. Brandt, 1980; Brown, 2004; Curry, 1998; W. Madsen, 1995; Moreland, 1991; Post, 1989; Roberts & Gregor, 1971; Schroeder, 1998; Strahilevitz, 2011, 2013). Privacy already has been extended to groups in certain social settings, such as doctors

¹² Observations and data collected on each of us—from the moment we wake up to the moment we go to sleep—can now be coordinated, centralized, combined with other data, and analyzed on a massive scale.

¹³ Interestingly, Strahilevitz (2011) highlights two court cases where collective privacy is considered, but unfortunately handled in contradictory ways. The Federal Court of Appeals for the Second Circuit upheld the U.S. Government’s decision to withhold a list of names of Guantanamo Bay detainees who alleged being tortured; they did so because some wished to remain anonymous. The South Dakota Supreme Court, on the other hand, allowed the disclosure of the name of a father charged with incest, despite the fact that it revealed the victim’s identity against her wishes.

and patients, attorneys and clients, and priests and parishioners (Bloustein, 1978; Brown, 2004). “If we define privacy as freedom from unwanted or inappropriate attention,” Brown (2004, 29-30) adds, “there is little doubt that many indigenous communities depend on collective privacy for the successful completion of important cultural activities.” Given cultural differences, sovereignty and self-determination, tribal civil law and tribal courts may handle privacy differently from Anglo-American law (Moreland 1991). Although it is unlikely that tribal governments could assert successfully a claim of privacy to halt BIA release of sensitive geographic information or data in Federal courts, the concepts of contextual integrity and collective privacy are a useful way to understand tribal concerns and why this issue is important to understand when developing GIS data policies.

2.3.2 Intellectual and Cultural Property

Intellectual property rights, such as copyright and trade secrets may be used as a form of control over tribal geospatial information and GIS data. Intellectual property rights protect the ownership of a creative work by an author, i.e., individual or legal entity. For example, copyright allows an author to protect her interests in even a small amount of creative expression in her map products, geographic databases and GIS data sets; however, others may still copy the factual information in these works, such as the boundaries of a lake, without violating the copyright (Cho, 2005; Karjala, 1995; Litman, 2000b; NRC, 2000; NRC, 2004; Onsrud, 1994). Thus, copyright offers only “thin protection.” Furthermore, while copyright offers a limited monopoly for a long period of time, eventually the information must be made publicly accessible (unless never

published). Thus, some would describe intellectual property rights as “affirmative rights” not “protection” because intellectual property rights do not provide a “defensive shield” against unauthorized use, but rather give the owner the right to seek enforcement of these rights through the courts.

It also should be noted that the question of whether it is appropriate to apply intellectual property rights to tribal knowledge and spatial data is a difficult one. Paterson and Karjala (2003, pp. 633-635) decry the dilemma faced by indigenous people who are “either forced to commodify their own cultural property and thereby perhaps misappropriate its position in the indigenous community [e.g., “diminishing the inherent spirituality or dignity of native heritage”] or [to] renounce commoditization, thus allowing other non-indigenous people to appropriate indigenous cultural traditions.” Here, commodification “can be defined as the conversion of intangible cultural property into items of economic worth that can be traded for commercial gain by such means as license, rental, or sale” (Barsh, 1999a; Brown, 2004, 2010).

2.3.3 Trust and Data Sharing

The study of GIS implementation has paid ample attention to organizational and institutional issues in the diffusion and adoption of geospatial technologies. For example, the National Center for Geographic Information and Analysis (NCGIA)¹⁴ designated the use and value of GIS as one of their major research initiatives, and included patterns and

¹⁴ NCGIA is an independent research consortium, originally funded by the National Science Foundation, “dedicated to basic research and education in geographic information science and its related technologies, including geographic information systems (GIS).” Accessed May 9, 2015. Available at: <http://www.ncgia.ucsb.edu/about/overview.php>.

practices of adoption as a significant component (Goodchild, Egenhofer, & Fegas, 1998). Onsrud et al. (1995) called for case study research to better understand incentives and barriers associated with successful use of GIS. They posited more than twenty factors that might influence adoption and use. Specialist meetings were held on multi-participant systems and adoption of GIS by non-traditional organizations (W. J. Craig, Harris, & Weiner, 2002; Onsrud & Rushton, 1996; Sheppard, 1995). Not unexpectedly, issues such as trust, effective communication, organizational stability, and appropriate technology transfer processes consistently emerge as factors that influence the success of GIS both within and between organizations. GIS data access and sharing practices and policies, for example, may be influenced by institutional, political, and cultural differences,¹⁵ including “differing social contracts between citizens and state with respect to freedom of information and privacy” (Campbell & Masser, 1995; Craiglia & Masser, 2003; de Man, 2003; van den Toorn & de Man, 2004). Despite the open data rhetoric, Elwood (2008) emphasizes research that has shown, in practice, there are:

“many disincentives for sharing data, including liability concerns, desire for cost recovery, and the power of data in creating political or economic influence, especially when to freely available to all. Political and legal structures, societal expectations of privacy or freedom of information, and individual and institutional attitudes also have demonstrated capacity to impede the notion of free and open data sharing the underlies the SDI [Spatial Data Infrastructure] model” (see also Campbell & Masser, 1995; W. J. Craig, 2005; Craiglia & Masser, 2003; Harvey & Tulloch, 2000, 2006; Openshaw & Goddard, 1987).

In his examination of local government participation in the National Spatial Data Infrastructure, Harvey (2003a) highlights the role of trust in inter- and intra-governmental

¹⁵ The authors van den Toorn and de Man (2000), referencing Hofstede (1980), indicate national cultural differences are based upon four factors: “ways of dealing with uncertainty,” “relationship with authority,” “division of [gender] roles”; and “individualism versus collectivism (van den Toorn & de Man, 2004).”

operations. He defines trust as “an indicator of people’s willingness to place faith in relationships and institutions in which they have limited influence.” According to the *Oxford English Dictionary*, trust also implies an “obligation or responsibility imposed on one in whom confidence is placed or authority is vested, or who has given an understanding of fidelity.” Political, professional, and personal relationships are important for establishing trust between government staff (Harvey 2003a). Harvey (2003a) notes that “[in] local government, politics are the dominant aspect of geographic-information work, and the smaller bureaucratic apparatus offers less shielding from political and budgetary fluctuations.” Local governments are acutely aware of the “significant implications for the ownership and control of information and consequently the distribution of power” (Campbell & Masser, 1995). Harvey found that local governments often coordinate and share GIS data informally “with people and institutions they trust.” On the other hand, they are more likely to use formal contracts when sharing GIS data with the private sector (Harvey, 2003a, 2003b; Harvey & Tulloch, 2000).

Those within the scientific community, on the other hand, restrict access to data to maintain a competitive advantage over those conducting similar research (i.e., to be the first to discover new knowledge), to wait for a patent application to be processed, and to gain leverage in negotiations with corporations for commercialization of their work. Scientists eventually will publish their data and findings in order to increase their reputation within their field (Blumenthal et al., 2006; Hilgartner & Brandt-Rauf, 1994; Hilgartner, 1997; Pryor, 2009; Vogeli et al., 2006). Pryor (2009) found that:

“researchers in the life sciences express a keen sense of ‘ownership’ toward their data, which frequently (and perhaps unfortunately) emerged as an attitude resonant of protectiveness. ... They feel responsible for the data they have generated and are genuinely concerned for the consequences of someone outside their immediate research orbit apply any inappropriate analysis. Rather than making their data freely available, they want first to know who is going to use the data and for what purpose.”

As with local governments, scientists share data based on trusted relationships. Based on a survey across scientific disciplines, Cragin et al. (2010) found that scientists will share their data with current collaborators and close colleagues, or with individual requesters that have been vetted sufficiently (). Similarly, in an examination of measureable environmental data sharing practices, Van House et al. (1998) found that communities of practice—with shared methods, language, and social norms—are sources of credibility and trust (). “[T]he nature of the relationships that have been developed have a strong influence,” Pryor (2009) concurs, “not only on whom a scientist might be willing to share data with, but also the manner of sharing, which might be realized through research collaborations, joint funding bids, or other practical scientific justifications.” Concerns about misuse of data may include: misappropriation, misinterpretation, and “disregard of good faith practices.” “However,” Cragin et al. (2010) remarks, “some scientists seem to use concern for ‘misuse’ of their data as a way to limit—or at least explain—their actual sharing practices” (see also Van House et al., 1998).

Trust also plays a significant role in how indigenous communities share geographic information and data about their lands and resources. According to Weinstein (1998), limiting access to information about land and resources is a form of common-property

resource management; access to information provides access to that land. In the context of First Nations in Canada, he states:

“[c]hildren and people who marry into the group are brought into the system by training and experience and, perhaps, cultural initiation. Outsiders may be brought into the system as they gain trust and friendship. As people are brought into the system, they are provided with geographic knowledge [e.g., travel routes, harvesting locations]. ...Along with the geographic details, they are taught the...rules and environmental values. Among these are rules of appropriate behavior toward the resources and toward other humans (Weinstein, 1998).”

Stevens (2008) notes that indigenous communities have complex rules governing information sharing with individuals and groups, based on: tribal membership; status and role; “relationship of a person to people, animals, or objects depicted;” and “context in which a resource will be reused or reproduced.”

The importance of trusted personal relationships to American Indians and tribes is evidenced in the feedback the BIA received on its “modernization” (i.e., reorganization) efforts in 2008. During a BIA listening session held on March 13, 2008, an American Indian from the Southern Plains Region commented:

“First, what are the goals of the Department of Interior or BIA? It seems that tribal goals do not become part of the direction that the BIA is being taken. As a rule, tribal leaders and members know their local BIA officers and staffs; they know who to talk to. There they don’t know the ASIA or the Director of the BIA. They will never talk to people like that. The BIA must—if its goal is to assist tribes and Indians—go back to focusing on providing services at the local level. People don’t eat policies” (BIA, 2008).

In my own experience as a member of the Inter-Tribal GIS Council, and as a researcher collaborating with tribal government staff, I found trust and credibility was a fundamental ingredient in all interactions with my American Indian colleagues and friends. While working on a reservation, for example, we were frequently and understandably asked,

“Who are you, why are you here, what are you getting out of it, and what are you going to give back?” This is a matter of cultural protocol, and over time I learned to answer these questions before being asked. When I contacted people at other tribes, they would first check with my American Indian colleagues before returning my email or phone call. As researchers, we had a responsibility to understand and do our best to be sensitive to the social and cultural norms and practices of tribes. This required that we work slowly, counter the demands of academia, in order to listen and be responsive to the unique needs and priorities expressed by the tribe. Lastly, trust in the form of the Federal Trust Responsibility plays a significant role in the Federal-Tribal government-to-government relationship, which will be discussed in detail in Chapter 3.

2.3.4 Power and Surveillance

James C. Scott, in *Seeing Like A State* (1998), argues that the state, in an effort to increase its political control, attempts to render society “legible.” By standardizing measurements, conducting cadastral surveys and censuses, creating surnames, and arranging geometric cityscapes, the state imposes order, facilitates taxation, and modifies behavior (Scott, 1998). To support his assertions, Scott presents and analyses a series of large-scale state projects that sought to transform society and nature in the name of “progress.” One such example is the Tanzanian government’s plan in the 1970s to force millions of dispersed, rural farmers into newly constructed villages. Not surprisingly, these grand schemes of social engineering wrought havoc on communities and biological diversity alike, because, Scott contends, these efforts were motivated by “high-modernist” ideology and based upon “thin simplifications” that failed to capture the infinite

complexity of natural and social processes.¹⁶ This builds on Foucault's (1977) examination of power and knowledge, and state assertion of that power through surveillance of populations (e.g., demographics and censuses). Monmonier (2010, 1) adds that "[m]aps exert power in two ways: by shaping public opinion and by telling us where we can't go and what we can't (or must) do in specific places." Boundary maps, such as property maps and jurisdictional borders, for example, regulate our activities, and exclude people.

Many authors within GIScience have reviewed the potential implications of mapping and geospatial technologies for surveillance and control (Cole & Sutton, 2014; Crampton, 2003; Curry, 1998; Harley, 1988; Monmonier, 2002, 2010; NRC, 2007b; D. Wood, 1992). Palmer and Rundstrom argue that GIS implementation by the Bureau of Indian Affairs is a form of centralized control of tribes (Palmer, 2006, 2012; Palmer & Rundstrom, 2013). Lindh and Haider (2010, 3-5) provide a brief review of power representation and knowledge in the context of indigenous knowledge, noting "[d]iscourses legitimize certain kind of knowledge while disregarding other ways of knowing. This disregarded forms of knowledge, that is knowledge that which is not given space within a certain discourse is something which Foucault refers to as subjugated knowledge." New and emerging geospatial technologies—such as new imaging sensors

¹⁶ Unfortunately, Scott simplifies the idea of an authoritarian state. Fischer (2000, 24) counters that such thinking ignores the fact that "[p]ower no longer belongs to the state alone" but is instead "dispersed throughout the spectrum of social relations." In what Fischer calls the "complex network of micropowers," the professional disciplines – "operating outside of (but in conjunction with) the state" – and the institutions themselves (i.e., the set of rules and norms of behavior) *exercise* power. Scott does not address nor offer counterexamples where other agents (like NGOs) played a role in project failure. Furthermore, he barely comments on the standardizing effects of the market-economy. These issues, however, are beyond the scope this dissertation and will not be addressed here.

and facial recognition—are dramatically increasing the ability of government, corporations and others to monitor our daily lives over a large geographic extend for an extended period of time. Chapter 6 explores government and commercial surveillance in the context of satellite remote sensing. Chapter 7 briefly discusses the potential risks of emerging geospatial technologies.

2.4 Methods for this Study

Policy analysis is a “social science discipline [that] uses multiple methods of inquiry and argument to produce and transform policy-relevant information that may be utilized...to resolve policy problems” (W. N. Dunn, 1981, ix). Two primary approaches are used for analyzing policy issues: rational analysis and the alternative paradigm to rational analysis. Rational analysis is based on economics and statistics, with an emphasis on positivism, whereas the alternative paradigm to rational analysis (or soft system analysis) is based on the policy sciences and in turn social sciences, with an emphasis on hermeneutics and pragmatism. The policy sciences view policy as a social process, not an inherently rational one, in which the analyst is an integral part (Parsons, 1995).

Observation, problem definition, and analysis are all “forms of participation,” Parsons (1995, 88) asserts. Policy science is contextual, multi-disciplinary, and problem-oriented (Lasswell, 1970), intersecting the fields of political science, philosophy, economics, psychology, social science, history, law, geography, anthropology, and more. It takes into account “the wider contexts of problems, social process, values, and institutions within which policy-making and policy analysis” take place (Parsons, 1995, 81). It also places an emphasis on participatory decision-making, and treats policy development as a

“negotiated learning process.” Reviews of the conceptual development of the study of policy analysis, policy sciences and decision-making are provided in (Justin Fox, 2015; Parsons, 1995; Weimer & Vining, 2011).

This study uses a broad policy sciences approach for three principal reasons: because it takes a holistic or systems-based approach; because it considers the values and concerns of stakeholders; and because it takes into account context and uncertainty, including the complex web of organizational issues, institutional arrangements, distribution of power, cultural norms, current and past policies, history, and politics (Parsons 1995, 609).

Specifically, this study employs the implementation framework provided in the *Eightfold Path*, developed by Bardach (2012, xvi), which outlines eight stages for policy analysis that are iterated and adapted as needed:

- Define the Problem
- Assemble Evidence
- Construct the Alternatives
- Select the Criteria
- Project the Outcomes
- Confront the Trade-offs
- Decide
- Tell Your Story.

The issue of inappropriate tribal GIS data access emerged in several contexts over the course of my fieldwork with tribal governments, as described in the introduction of this chapter. The first step in the process of analyzing this issue was to gather evidence to: (1) “assess the nature and extent of the problem;” (2) “assess the particular features of the concrete policy situation” (i.e., the social, political, and organizational contexts and activities that may affect the issue); and (3) “assess the current policies and those that

may be applicable” (Bardach, 2012, 12). To build a body of evidence, I collected archival materials and reviewed secondary sources (Section 2.4.1), in combination with field research, which included a series of interviews with BIA and tribal government staff (Section 2.4.3) and participant-observations (Section 2.4.2). The evidence for this study includes a review and synthesis of the literature on the core concepts of federal trust responsibility, the federal-tribal government-to-government relationship, tribal sovereignty and self-determination, as provided in Chapter 3. It also includes a brief review and synthesis of the literature on the theory of GIS and participatory mapping (Chapter 4, Section 4.1); a history of GIS development by the Bureau of Indian Affairs (Section 4.2) and use by tribes (Section 4.3); and an understanding of tribes’ concerns within the social, organizational, and cultural contexts in which the problem emerges (Section 4.4).

Chapters 5 and 6 examine the laws, policies and regulations that could affect access to tribal GIS data and high-resolution satellite imagery of reservations, and based on this analysis, provide policy options and other intervention strategies to mitigate the potential risks. Chapter 7 identifies a set of criteria for evaluating the projected outcomes of each strategy, and discusses the trade-offs. Selecting a course of action from among these options (or none of the options), however, is for each tribe to decide based on their own unique circumstances and concerns.

2.4.1 Archival Research

Archival research is a form of primary research that involves mining data and evidence from original documents to help interpret and analyze motivations, events and outcomes. These records may be maintained within institutional or online repositories, such as Cornell's Legal Information Institute,¹⁷ held in the collections of university libraries, or stored by organizations or government entities. Records may include government documents, reports, memoranda, contracts, maps, photographs, presentation slide handouts, meeting notes, diaries, letters, oral histories, archived web pages, and so forth (Clifford, French, & Valentine, 2010; Huberman & Miles, 2002). In order to provide a history of the development and use of GIS by the Bureau of Indian Affairs at BIA agencies and tribal governments, I visited the BIA Area Office in Fort Snelling, Minnesota, in 2004 and 2005 to examine an extensive set of historical files related to the BIA's national and regional GIS efforts. In addition, I attended annual conferences of the Inter-Tribal GIS Council, Indigenous Mapping Network, Inter-Tribal Timber Council, and Aboriginal Mapping Network, as well as the Native Geography tracks of ESRI's Annual Users Conferences, using the opportunity to consult with participants from tribes and government agencies, and obtaining copies of PowerPoint presentations and other relevant documents from speakers.

Policy documents from the U.S. Government, including Presidential Executive Orders, Office of Management and Budget Memoranda and Circulars, and the Code of Federal Regulations, were accessed via the Internet through White House website, federal agency

¹⁷ <https://www.law.cornell.edu/>.

websites, and the National Archives' online Federal Register.¹⁸ U.S. Congressional records and statutes were accessed through online databases such as the Library of Congress' THOMAS,¹⁹ and the National Archive's Center for Legislative Archives.²⁰ The Supreme Court and Federal court cases were accessed through LexisNexis Legal research and Westlaw.

The primary archival materials collected from the BIA that inform this study include hundreds of pages of USDOJ and BIA memoranda and documents from 1986-2000 on the status of BIA GIS implementation, including: *USDOJ Memorandum on Coordination of Digital Cartography Activities* (Hodel, 1985); *USDOJ Memorandum to BIA Area Directors on GIS Program Coordination and Tracking* (Ryan, 1986); *Department of the Interior Geographic Information System Implementation Planning Report* (GIS Technology Implementation Planning Committee, 1985); *BLM Memorandum 1268 (D-400): Draft Amended Cooperative Strategy for Technology Transfer* (Parker, 1986); *Memorandum from Chairman, IDCCC GIS Task Force on 5-year GIS Research Plan*; (Kleckner, 1986); *The GIS II Contract Guide & The Desktop Products Guide for tribes* (BIA, 1995); *BIA Database Organization Guidelines* (BIA, 1997a); BIA GDSC quarterly reports (BIA, 1990a); *BIA Memorandum on Arc/Info Workspace Size Limits* (Bonner, 1990a); *BIA Strategic Plan for Indian Integrated Resource Information Program* (BIA, 1992); *BIA Strategic Plan for the Geographic Data Service Center* (BIA, 1993);

¹⁸ Federal Register. Accessed April 24, 2015. Available at: <http://www.archives.gov/federal-register/cfr/about.html>

¹⁹ Library of Congress' THOMAS. Accessed April 24, 2015. Available at: <http://thomas.loc.gov/home/thomas.php>.

²⁰ National Archive Center for Legislative Archives. Accessed August 1, 2013. Available at: <http://www.archives.gov/legislative/research/>

Guidelines for Integrated Resource Management in Indian Country (D. Hall, 1996, 2001); *BIA Final 1997 Self-Governance Negotiation Guidance for BIA Programs* (BIA, 1996a); *BIA Land Title Mapper Progress Reports* (BIA, 1997b, 1998); *BIA Land Title Mapper, Presentation to the ESRI User Conference* (Skinner, 1999); *BIA Meeting Summaries for the Tribal Sub-Group on Tribal Shares* (BIA, 1997c); two unpublished *Letters from BIA Field Solicitor on the State of Wisconsin Request for Information on Tribal Lands* (Pfister, 1997, 2000); *Memorandum to BIA Regional Directors on Geographic Data Service Center* (Viriden, 2000); *Possible Scenarios for Tribal/Federal Data Sharing and Access* (Anonymous, 2001); *BIA Guidelines for Integrated Resource Management Planning in Indian Country* (BIA, 2001); and *A Tribal Executive's Guide to Integrated Resource Management Planning* (BIA, 2005).

In addition, the following U.S. Government documents and others were located through the Internet, including: *Final Report of the Commission on Indian Trust Administration and Reform* (USDOJ, 2013); the U.S. Forest Service *Draft Policy Statement on Confidentiality of Indian Sacred Sites* (USFS, 2014); U.S. Department of the Interior *Final Report: Examination, and Recommendations for Support Functions* (USDOJ, 2012); *Order No. 3335 Reaffirmation of the Federal Trust Responsibility to Federally Recognized Indian tribes* (Jewell, 2014); *National Geospatial Resource Center (NGRC): A Capabilities Brief, Presentation to the ESRI User Conference* (Seitz, 2010); *Geospatial Agenda in Indian Affairs, Presentation to the ESRI User Conference* (Moore, 2010); OMB Circular A-16 Revisited, *Coordination of Geographic Information and Related Spatial Data Activities* (OMB, 2002a), OMB Circular A-16, *Supplemental Guidance*

(OMB, 2010), OMB *Memorandum on Open Data Policy—Managing Information as an Asset* (OMB, 2013a) and Supplemental Guidance (OMB, 2013b); and Executive Order *Making Open and Machine Readable the New Default for Government Information* (Obama, 2013a). The Department of Justice maintains an online *Guide to the Freedom of Information* (USDOJ, 2014). Copies of the transcripts from the two Congressional hearings on a tribal exemption to FOIA held in the 1970s were obtained from the University of Wisconsin-Madison Law Library.

These primary sources were supplemented with secondary sources, including: Mark Palmer's dissertation *Creating Indigital Peripheries: The Bureau of Indian Affairs, Geographic Information Systems, and the Digitization of Indian Country* and subsequent journal publication (Palmer, 2006; Palmer & Rundstrom, 2013); snapshots on BIA GIS implementation authored by BIA staff (BIA, 2014a; Bonner, Getter, Szajgin, & Bagwell, 1986; Getter, 1985; Getter & Bonner, 1986; Marozas, 1991, 1993; Marozas, 1996; Wallace & Zekowski, 2013); and first hand accounts of tribal GIS implementation, such as a thesis by Sam Adams on the Colville reservation's GIS implementation efforts (Adams, 1999); a thesis by Helen Kahn on the Ho-Chunk tribe's GIS implementation efforts (Kahn, 1997); and articles by tribal GIS and natural resource managers (Anonymous, 2010; Barnes, 1994; Bohnenstiehl & Tuwaletstiwa, 2001; Eric Brandt, 1995; Galla, Buckley, & Koett, 1997; He, 1995; Marchand & Winchell, 1992; Peterson, 2001; Provost, 2001; Rattling Leaf, 2002; Taylor, Gadsden, Kerski, & Warren, 2012). Special compilations of American Indian mapping and GIS articles were found in

PE&RS Focus Issue: Native American Contributions to Remote Sensing (2001); *ESRI Native Geography* (2000, 2001, 2009); and Cole & Sutton, 2014.

Lastly, I worked directly for and collaborated with three tribes on GIS data sharing and data policy, as described in Section 2.1, and through that process was given access to unpublished tribal documents, including a data policy document and three examples of tribal GIS data contracts and confidentiality riders. Because of the sensitive nature of these documents, they cannot be listed here or shared, but the generalized concepts therein are incorporated into this research. The National Indian Law Library's website²¹ provides a subset of tribal codes and constitutions, which were referenced for the discussion on tribal open records statutes.

2.4.2 Participatory Research

Tribal government staff met with faculty from the University of Wisconsin-Madison and expressed interest in receiving technical assistance for the modernization of their land records, and development of a rural addressing system for emergency management. This resulted in my working with the tribal government, tribal enterprise, and tribal college for nearly three years, spending the first summer in residence and thereafter commuting weekly.

²¹ Finding Tribal Codes and Ordinances Webpage, National Indian Law Library. Accessed April 24, 2015. Available at <http://narf.org/nill/triballaw/codes.html>.

The successful implementation of a GIS-based multipurpose land information system depends on organizational choices and institutional relations as much or more than on technical specifications, such as hardware and software. Ample anecdotal evidence exists about the failure of “top-down” and “parachute” approaches, i.e., dropping technology on someone’s desk and telling them to “do GIS,” including many tribes who did not institutionalize GIS under BIA-led initiatives. To be successful, a strategically planned GIS implementation process must include a thorough needs assessment and a meaningful approach to build trust among the participants. To adapt this process to the tribal government context, we combined standard GIS implementation practices (Ventura, 1990) with participatory mapping methodologies. Participatory mapping (or Public Participation GIS) is a sub-discipline of geography that developed out of participatory approaches to natural resource management and land use planning. It is a “bottom up” approach that combines Participatory Action Research (PAR) and Participatory Rural Appraisal (PRA) methods with geospatial technologies. The intent is to build capacity within local communities and marginalized groups to unleash their power “to conduct their own analysis of their own reality” (R. Chambers, 1992; Friere, 1968). The academic community perceives PGIS as a less extractive and more ethical approach to conducting research with local communities and groups (see Chapter 4, Section 4.1 for a review).

The first step in the process was working with tribal government, tribal enterprise, and county staff to develop and refine the project goals and activities. We purposefully chose to begin this process with mid-level technical staff already managing land information. Tribal agency administrators gave us permission to conduct detailed user needs

assessments and data documentation in each tribal department. It is significant to note, however, that this permission came from a level below the ultimate authorities—the tribal chairman, tribal legislature, and the tribal enterprises board of directors.

Over a period of one year, detailed assessments were conducted through interviews and review of existing documents and databases. These were presented to agency staff in informal working group meetings for iterative review and feedback. In addition, we conducted several joint GIS pilot projects in which we provided technical assistance and facilitated the communication necessary for collaboration between tribal departments. Notably, to address a major priority for the tribe, we helped to design a rural addressing system to improve emergency response times, and drafted an addressing statute that the tribe adopted to implement that system. At the forestry department's request, I also spent several months updating their GIS datasets, reconciling differences with the BIA-maintained datasets of the reservation, and meticulously compiling the metadata. In addition, to build local technical capacity, we taught short courses in GIS and GPS through the tribal college to tribal government staff, undergraduates, and high school students.

The last phase of the project was the development of a vision statement and a memorandum of understanding (MOU) between the tribal departments and tribal enterprise.²² The joint vision statement defined a common set of goals, provided

²² The MOU was a small step toward implementation. In substance, it only called for creation of a joint policy working groups charged with 1) designating a technical working group; 2) discussing issues of mutual concern and benefit; and 3) identifying mutual priorities and projects.

suggestions for resolving continuing issues such as GIS data access and security, and identified opportunities for collaboration across tribal government departments. Yet, neither the vision statement nor the MOU were adopted by the organizations. Although tribal staff participated in the vision document and MOU's development, we were told at the administrative level that "now is not the right time to pursue adoption" because of strained relations between the tribal departments and the county government unrelated to GIS. Even so, we considered it a partial success that a vision document and memorandum of understanding were drafted, reviewed, and refined by participating tribal staff and at least presented to administrators. The concepts were generally accepted, even if higher-level politics prevented formal adoption.

Barriers to the successful GIS implementation and coordination at the tribe included: high staff turnover rates; the sometimes-conflicting goals and agendas of tribal departments (protect old growth forest vs. build homes for returning tribal members); intra-agency rivalries over the control of GIS operations; and possibly the lack of a high-level GIS champion within tribal organizations. GIS implementation and coordination also was impeded noticeably by the sensitivity of some geographic information and GIS data. Some tribal departments were concerned about the potential for losing control of sensitive or proprietary data, and some individuals feared losing control of any GIS data their agency generated or maintained.

We did not set out specifically to evaluate the differences in GIS implementation strategies. However, the needs assessment process made it apparent that top-down

approaches to GIS implementation on reservations, such as promoted by the Bureau of Indian Affairs during the 1990s, had resulted in limited and segregated systems. Data sharing between the tribe, the tribal corporation, and the contiguous county was limited, and no joint applications existed at the onset of the project. Though this also must be attributed to broader inter-organizational issues having nothing to do with technology deployment, the development of GIS in the three organizations proceeded without any explicit recognition of common goals or potential for synergism.

We appear to have played an equivocal role in the project, both assisting and constraining progress. We tried to keep a generally low profile. Our self-defined role was providing technical support and facilitation behind the scenes for activities that the tribal organizations selected as important. The goal of our work was in large part technology capacity building through training and community-identified pilot projects. In three years, we hoped that there would be enough in-house expertise and coordination that we as academics would no longer be needed. Nonetheless, for some tribal government staff, a few years of interaction barely begins the trust-building process, especially given the revolving door of researchers on reservations. As Middleton (2008, 300-301) cautioned:

“[w]hile participatory researchers work to provide products that can be used as tools (such as maps) by community groups, they remain implicated within the colonial research enterprise through a variety of persistent dynamics of class, race, rewards, and expectations. For example, participatory researchers wade into a series of ongoing community relationships with the goal of “helping,” or contributing, to underfunded, technologically challenged grassroots efforts. As a researcher seeks to be ‘useful’ to community efforts and particular organizations, s/he may undertake tasks that local people may strategically not be doing. For example, some people may not have wanted others to know where their family allotments were [on a map] and how they had changed hands over time.”

Like Middleton, we also:

“[U]nknowingly and inevitably walked into a web of relationships between people and groups that long preexisted [our] arrival, and [we] sometimes exacerbated tensions by offering assistance in the face of situations where people had been explicitly denied or decidedly refused opportunities to participate” (Middleton, 2008).

We promoted a carefully paced system integration process, working from the bottom up with technical staff. As a result, the organizations made at least some progress in GIS implementation, and implemented a rural addressing system critical to emergency management. In addition to technical assistance, we were able to provide the neutral forum for discussion and development of common goals and activities. Many unresolved inter-organizational issues remained, but hopefully we increased awareness of technical and data policy issues and facilitated joint applications that demonstrated the value of collaboration.

Data Policy Development

In addition, I helped GIS managers from two tribes, located in different parts of the country, to develop a GIS data access policy, providing background research and some template language. They edited, added to, and adapted this for their own specific contexts. The policy that was formally adopted by one of these tribes, included four levels of access to tribal data, including:

- *Public*: Data that is publicly available, such as the National Agriculture Imagery Program (NAIP) aerial imagery, produced by the U.S. Department of Agriculture Farm Service Agency, and taken during the growing season.

- *Restricted:* Access to restricted data is provided on a case-by-case basis, and may include outside contractors and university researchers. Users are required to sign a data license agreement, which stipulates that users cannot share nor make money from tribal data. Restricted data may include public data to which the tribe has added value. While the tribe has not yet been required to enforce the agreement, it has “been very beneficial for putting everyone on the same page.”
- *Confidential:* Data that is considered proprietary (i.e., licensed data like pictometry) or sensitive (e.g., water data developed for a continuing lawsuit) is only accessible by tribal government staff and possibly tribal members.
- *Classified:* Data this is considered highly sensitive is “locked down.” Only the tribal cultural department can have access to classified data, and the data is stored on servers not connected to the Internet (e.g., locations of sacred sites and other cultural data).

All tribal government employees are provided with a copy of the GIS data access policy. In addition, they are required to read and sign a code of ethics “to inform and remind them of their responsibilities.” The policy and code of ethics are discussed in person with each employee, and gentle reminders are given as needed at the quarterly meetings.

2.4.3 Interviews with Tribal Governments and Bureau of Indian Affairs

Initial interviews were conducted informally with six American Indian members of the Inter-Tribal GIS Council who worked for tribal governments, four staff from the Bureau of Indian Affairs, and one staff member of the U.S. Environmental Protection Agency to

scope out the range of issues associated with inappropriate access to tribal GIS data and approaches taken to limit that access. In addition, two staff at a State Historic Preservation Office and three staff at a State Department of Natural Resources Bureau of Endangered Species also initially were consulted to understand how state government handled sensitive tribal cultural information and other kinds of sensitive data.

A series of formal, semi-structured interviews were then conducted with tribal members and staff from four tribes. The four tribes were selected through purposive sampling (Silverman, 2011), based on the degree of GIS implementation (beginning, advanced), on the degree to which tribal information is kept confidential generally (open, closed), and to some degree, on geographic distribution in different regions of the country. This resulted in the following pairings: beginning/open; beginning/closed; advanced/open; and advanced/closed. If time and resources had permitted, it also would have been useful to explore the possible influence of non-Indians in tribal GIS leadership positions.

For each tribal government, interview participants were identified through a snowball sampling approach; although this approach may introduce bias, snowball sampling is considered appropriate for exploratory research (Biernacki & Waldorf, 1981; Kalton & Anderson, 1986). Colleagues at the Bureau of Indian Affairs and at tribal governments with whom I had worked made the introductions on my behalf. Due to the geographic distribution of the participants across the country, the majority of the interviews were conducted by phone. Interview notes were transcribed and shared back with the participants for review and feedback to ensure that the information was accurately and

appropriately recorded (or redacted, if needed). Once vetted, the interview notes were then iteratively coded (Silverman, 2011, 57-86).

The transcript from the *1976 Hearing Before the Subcommittee on Indian Affairs on an Amendment to Freedom of Information Act*, includes the testimonies of eight tribal Governors and Chairmen, who expressed their deep concerns and cited examples of unwanted access to their information and data (Senate, 1976a). This included information about: sacred sites and cultural resources, water quality and availability, forests and rangeland, oil and gas reserves, and mineral resources. Interview participants in this study echoed these same concerns more than thirty years later. In addition, as part of a larger Federal Geographic Data Committee's (FGDC) Framework Data Survey, the Inter-Tribal GIS Council conducted a survey of tribal GIS implementation and use in 1999 (FGDC, 1999). This survey also uncovered general concern regarding third party access to tribal GIS data.

The names of the tribes and individuals who participated in the interviews will be kept confidential. As this research touched on a highly sensitive topic—sensitive tribal GIS data, participants were understandably cautious at times and occasionally redacted information. Internal documents that describe tribal government and agency procedures, contracts, and actions, obtained during the course of this research, were not necessarily appropriate for publication in a dissertation. The results from these interviews are discussed in Chapter 4, Section 4.4.

3. CORE CONCEPTS: TRIBES AND THE FEDERAL GOVERNMENT

The U.S. Freedom of Information Act (FOIA) applies to all agencies within the Executive branch of the federal government, including the Executive Office of the President and independent regulatory agencies,²³ but entities that “are neither chartered by the federal government [n]or controlled by it” are not subject to the FOIA’s provisions. The courts have determined that the FOIA is not applicable to state governments, municipal corporations, the courts, Congress, or private citizens. The FOIA, however, is silent on its applicability to tribal governments and tribal corporations. In order to extrapolate whether it might be applicable, we first must understand the core concepts of Federal-Tribal *trust responsibility*, the doctrines of *tribal sovereignty* and *reserved rights*, and the *canons of construction* established by the Supreme Court for the interpretation of federal law as it pertains to tribes. This chapter explicates these core concepts, based on a review and synthesis of the literature (Deloria & Wilkins, 1999; Pevar, 2009, 2012; Robertson, 2001; Tsosie, 2003; Wilkins & Lomawaima, 2001; Wilkinson, 1980; M. C. Wood, 1994, 1995, 2003), interaction with tribal and legal experts, and analysis and integration of recent activities and policies promulgated by the Obama Administration (NCITAR, 2013a, 2013b; Newland, 2013; Obama, 2009c; Obama, 2013b).

3.1 What is an Indian Tribe?

²³ 5 U.S.C. § 552(f)(1).

According to the Native American Rights Fund, “an *Indian tribe* was originally a body of people bound together by blood ties who were socially, politically, and religiously organized, who lived together in a defined territory, and who spoke a common language or dialect” (NARF, 2013). However, there is no universal definition of an Indian tribe that is applicable in all circumstances. Tribes may be recognized officially by other tribal governments, by state governments, and/or by the federal government, depending on the context (Pevar, 2012; Canby, 2015).

Tribes officially recognized by the federal government have standing in federal law and are eligible to participate in Federal Indian programs administered by the U.S.

Department of the Interior (USDOI). As defined in Executive Order 13175 of November 6, 2000 (Clinton, 2000b), issued by President Bill Clinton and endorsed in President Obama’s Executive Memorandum 110509 of November 2009, an “ ‘Indian tribe’ means an Indian or Alaska Native tribe, band, nation, pueblo, village, or community that the Secretary of the Interior acknowledges to exist as an Indian tribe pursuant to the Federally Recognized Indian tribes List Act of 1994, 25 U.S.C. 479a.”

The U.S. Department of Interior Bureau of Indian Affairs (BIA) elaborates on this definition, stating that:

A “federally recognized tribe is an American Indian or Alaska Native tribal entity that is recognized as having a government-to-government relationship with the United States, with the responsibilities, powers, limitations, and obligations attached to that designation, and is eligible for funding and services from the Bureau of Indian Affairs.

Furthermore, federally recognized tribes are recognized as possessing certain inherent rights of self-government (i.e., tribal sovereignty) and are entitled to

receive certain federal benefits, services, and protections because of their special relationship with the United States. At present, there are 566 federally recognized American Indian and Alaska Native tribes and villages” (BIA, 2013).

Historically, treaties, Congressional action, presidential executive orders, Federal administrative actions, and federal court decisions could establish federal recognition.

Today, however, under Public Law 103-454, the Federally Recognized Indian tribes List Act (108 Stat. 4791, 4792), recognition is formally established by: (1) an Act of Congress; (2) the administrative procedures under 25 C.F. R. Part 83; or (3) the decision of a United States Court (BIA, 2013; Pevar, 2012).

Importantly, this recognition as *a political entity with power of self-governance* is what distinguishes tribes and their citizens from other ethnic groups. The Commerce clause of the United States Constitution explicitly recognizes this political relationship by granting to Congress the power to “regulate commerce with foreign nations, among the several states, and with Indian tribes.”²⁴ Within their own borders, tribes have the right to form their own government, elect governing councils, adjudicate legal cases, levy taxes, and establish criteria for citizenship.

3.2 What is Indian Country?

In general, *Indian Country* refers to “all land under the supervision of the U.S. government that has been set aside primarily for the use of Indians,” whether it be inside or outside reservation boundaries (Pevar, 2012). With limited exceptions, Indian country is under the civil, criminal, and regulatory jurisdiction of the federal government and tribal governments, rather than that of the states.

²⁴ U.S. Constitution, Article 1, sec. 8, cl. 3

Congress defined Indian Country in a federal criminal statute (Title 18, U.S. Code, section 1151) as follows, which the courts and federal agencies also have applied in civil and regulatory contexts:

1. “all land within the limits of any Indian reservation under the jurisdiction of the United States government, notwithstanding the issuance of any patent, and including rights-of-way running through the reservation;
2. all dependent Indian communities within the borders of the United States whether within the original or subsequently acquired territory thereof, and whether within or without the limits of a state; and
3. all Indian allotments, the Indian titles to which have been extinguished, including rights-of-way running through the same.”

Notably, under subsection (a), Indian Country includes *all tracts of land within the boundaries of a reservation*, even if those tracts are not held in trust or are owned privately by non-Indians.²⁵ Subsection (b) and (c) also include federal trust land and restricted allotments *outside* of reservation boundaries, such as tribal housing projects and tribal government buildings (Pevar, 2012; Canby, 2015).

3.3 Doctrine of Trust Responsibility

3.3.1 What is the Trust Doctrine?

²⁵ For definitions of Reservation, Trust Land, Allotment, Fee Land, Checkerboard Land, and Ceded Territory, visit EPA’s website, accessed October 24, 2011.
<http://www.epa.gov/Indian/wetg/training/EPA/common/data/text-only/Old/epa01a.htm>.

The relationship between the U.S. government and tribes was founded on the principles of tribal sovereignty and international law, and shaped through the nearly 400 treaties and agreements signed between 1778 and 1871, when tribes were independent nations with military power. These “‘contracts among nations,’ the Bureau of Indian Affairs asserts, “‘recognized and established unique sets of rights, benefits, and conditions for the treaty-making tribes [that] agreed to cede millions of acres of their homelands to the United States and accept its protection” (BIA, 2013). The United States, in return, made promises to protect and improve conditions for tribal governments and communities. The National Commission on Indian Trust Administration and Reform notes that “the [m]ost important from the Indian perspective were the promises of permanent homelands, access to natural resources, and recognition of the right to continue to exist as distinct sovereign peoples” (NCITAR, 2013b).

The U.S. Supreme Court first articulated the *trust doctrine* in what is now known as the “Marshall Trilogy”: *Johnson v. McIntosh* (1823); *Cherokee Nation v. Georgia* (1831);²⁶ and *Worcester v. Georgia* (1832).²⁷ In *Johnson*, Chief Justice Marshall wrote, “The person who purchases lands from the Indians, within their territory, incorporates himself with them, so far as respects the property purchased: holds their title under their protection, and subject to their laws.”²⁸ *Johnson* is important for the trust doctrine

²⁶ *Cherokee Nation v. Georgia*, 30 U.S. 1 (U.S.S.C. 1831). Available at http://www.law.cornell.edu/supct/html/historics/USSC_CR_0030_0001_ZS.html

²⁷ *Worcester v. Georgia* 31 U.S. 515 (U.S.S.C. 1832). Available at: http://www.law.cornell.edu/supct/html/historics/USSC_CR_0031_0515_ZS.html Accessed August 13, 2013.

²⁸ *Johnson*, 21 U.S. (8 Wheat.) 543 (1823) at 593, as cited by Monette (1996, 128).

because Marshall opined, based on the notion that European “discovery” of the tribal lands, that tribes merely had the right of occupancy in their property versus a right of dominion. The United States government asserts dominion, thus reducing tribal sovereignty. Scholars, however, argue that there is no constitutional or statutory basis for this opinion (Miller, 2005; EagleWoman, 2010).

In *Cherokee Nation v. Georgia*, Chief Justice Marshall called tribes “domestic-dependent nations” and compared the relationship of the federal government and tribes to that of a “guardian-ward.” In *Worcester*, however, Marshall reached a different conclusion:

“This relation [between the Cherokee Nation and the United States] was that of a nation claiming and receiving the protection of one more powerful; not that of individuals abandoning their national character, and submitting, as subjects, to the laws of a master...

[The Treaty of Hopewell] thus explicitly recognizes the national character of the Cherokee, and their right of self-government; thus guaranteeing their lands; assuming the duty of protection, and, of course, pledging the faith of the United States for that protection; has been frequently renewed, and is now in full force.”

The Court in *Worcester* goes on to define the trust relationship as “the unique legal and moral duty of the United States to assist Indians in the protection of their property and rights,” and thus upheld the federal government’s duty to protect Cherokee rights from intrusions by state governments and private citizens (Deloria & Lytle, 1983; Deloria & Wilkins, 1999; Tsosie, 2003).²⁹

Based on this opinion, Monette (1996, 129) eloquently argues, “a treaty also could be viewed as establishing a federative-type relationship between two overlapping sovereign

²⁹ Nonetheless, President Andrew Jackson did not enforce the Court’s decision, resulting in forced removals of the Cherokee people from their homelands.

spheres, similar to the relationship between the American Union and its member states.”

Professor Vine Deloria Jr., however, warned:

[B]oth the federal government and the Indians have used the contradictory aspect of these ideas whenever it suited their needs. . . . Predicting the outcomes of litigation, the legislative process, or discretionary administrative actions is therefore perilous since it cannot be predicted which set of interpretive tools will be chosen to characterize and resolve the controversy” (Deloria & Lytle, 1983).

In the modern era, the Supreme Court has reaffirmed the “longstanding and substantial trust obligation to Indians” through numerous judicial rulings, including the *United States v. Mitchell* (1983),³⁰ *Cobell v. Norton* (2001),³¹ and *United States v. Jicarilla Apache tribes* (2011).³²

Congress creates a federal-tribal trust relationship through the promulgation of statutes, such as the Indian Self-Determination and Education Assistance Act, the Federal Oil and Gas Royalty Management Act, the Indian Health Care Improvement Act, and the American Indian Trust Fund Management Reform Act, which address treaty obligations through the creation of tribal programs and services (Pevar, 2012). Additionally, the Executive Office of the President has recognized the trust doctrine through many Executive Orders and Memoranda (Clinton, 1994, 2000b; Obama, 2009c; Obama, 2009d; Obama, 2013b).

³⁰ *United States v. Mitchell*, 463 U.S. 206, 225 (1983). Known as *Mitchell II*. Available at: <http://www.law.cornell.edu/supremecourt/text/463/206> Accessed August 23, 2013.

³¹ *Cobell v. Norton*, 240 F.3d 1081, 1098 (D.C. Cir. 2001).

³² *United States v. Jicarilla Apache Tribe*, 131 S. Ct., 2313, 2324 (2011), citing *United States v. Mitchell*, 463 U.S. 206, 225 (1983).

Unfortunately, the three branches of the federal government have not always adhered to the principles of the trust doctrine nor interpreted it consistently over the last two centuries, leading to confusion, paternalistic characterizations (e.g., “guardian-ward”), “removals, and allotment of tribal lands, and the loss of approximately 90 million acres of land by 1934” (K. J. Chambers, Corbett, Keller, & Wood, 2004; Deloria & Wilkins, 1999; NCITAR, 2013b; Wilkins & Lomawaima, 2001; M. C. Wood, 2003).³³ In his statement on the signing of Executive Order on Consultation and Coordination with Indian Tribal Governments, President Clinton stated:

“Indian nations and tribes ceded lands, water, and mineral rights in exchange for peace, security, health care, and education. The Federal Government did not always live up to its end of the bargain” (Clinton, 2000a).

During the opening of the Tribal Nations Conference in 2009, President Obama remarked:

“We know the history that we share. It’s a history marked by violence and disease and deprivation. Treaties were violated. Promises were broken. You were told your lands, your religion, your cultures, your languages were not yours to keep. And that’s a history that we’ve got to acknowledge if we are to move forward” (Obama, 2009c).

President Nixon’s 1970 Message to Congress on Indian Affairs established the “model for the bipartisan modern conception of the trust responsibility” (R. P. Chambers, 2013):

“This policy of forced termination is wrong, in my judgment, for a number of reasons. First, the premises on which it rests are wrong. Termination implies that the Federal government has taken on a trusteeship responsibility for Indian communities as an act of generosity toward a disadvantaged people and that it can therefore discontinue this responsibility on a unilateral basis whenever it sees fit. But the unique status of Indian tribes does not rest on any premise such as this. The special relationship between Indians and the Federal government is the result instead of solemn obligations which have been entered into by the United States Government. Down through the years through written treaties and through formal

³³ “The trust doctrine should not be viewed as a source of federal power *over* Indians [and tribes], but rather as a source of federal responsibility *to* Indians [and tribes].” (Pevar, 2012)

and informal agreements, our government has made specific commitments to the Indian people. For their part, the Indians have often surrendered claims to vast tracts of land and have accepted life on government reservations. In exchange, the government has agreed to provide community services such as health, education and public safety, services which would presumably allow Indian communities to enjoy a standard of living comparable to that of other Americans.

This goal, of course, has never been achieved. But the special relationship between the Indian tribes and the Federal government which arises from these agreements continues to carry immense moral and legal force. To terminate this relationship would be no more appropriate than to terminate the citizenship rights of any other American” (Nixon, 1970).

Similarly, in its final report to Congress in 1977, the American Indian Policy Review Commission offered a comprehensive “statement of policy” (not a definition) for the trust doctrine that is commonly cited:

“1) The trust responsibility to American Indians extends from the protection and enhancement of Indian trust resources and tribal self-government to the provision of economic and social programs necessary to raise the standard of living and social well-being of the Indian people to a level comparable to the non-Indian society; 2) The trust responsibility extends through the tribes to the Indian member, whether on or off reservation; 3) The trust responsibility applies to all United States agencies and instrumentalities, not just those charged specifically with administration of Indian affairs” (Commission, 1977).

The Commission also emphasized that the United States should be held to the “highest standards of care and good faith consistent with the principles of common law trust,” and that “[l]egal and equitable remedies be available in Federal courts for breach of standards” (Commission, 1977).

Despite assumptions to the contrary, all federal agencies have a trust responsibility, not just the Bureau of Indian Affairs (NCITAR, 2013b; Obama, 2009d; M. C. Wood,

2003).³⁴ In 2000, President William Clinton issued Executive Order No. 13175 *Consultation and Coordination with Indian Tribal Governments* (Clinton, 2000b). This order, which superseded Executive Order No. 13084, dated February 13, 1996, set forth three fundamental principles to guide agency policy formulation and implementation with regards to tribes, as follows:

“(a) The United States has a unique legal relationship with Indian tribal governments as set forth in the Constitution of the United States, treaties, statutes, Executive orders, and court decisions. Since the formation of the Union, the United States has recognized Indian tribes as domestic dependent nations under its protection. The Federal Government has enacted numerous statutes and promulgated numerous regulations that establish and define a trust relationship with Indian tribes.

(b) Our Nation, under the law of the United States, in accordance with treaties, statutes, Executive Orders, and judicial decisions, has recognized the right of Indian tribes to self-government. As domestic dependent nations, Indian tribes exercise inherent sovereign powers over their members and territory. The United States continues to work with Indian tribes on a government-to-government basis to address issues concerning Indian tribal self-government, tribal trust resources, and Indian tribal treaty and other rights.

(c) The United States recognizes the right of Indian tribes to self-government and supports tribal sovereignty and self-determination.”

This order supplemented, but did not supersede the requirements contained in the Executive Memorandum of April 29, 1994, on *Government-to-Government Relations with Native American Tribal Governments*, which was intended to clarify the responsibilities of “executive departments and agencies including every component bureau and office” to ensure that “the Federal Government operates within a government-

³⁴ In footnote 36 Wood (2003) noted, “See *Parravano*, 70 F.3d at 546)”This trust responsibility extends not just to the Interior Department, but attaches to the federal government as a whole.”); *Pyramid Lake Paiute Tribe of Indians v. U.S. Department of Navy*, 898 F.2d 1410 (9th Cir. 1990); *Nance v. EPA*, 645 F.2d 701, 711 (9th Cir. 1981); *N.W. Sea Farms*, 931 F. Supp. At 1519 (“This obligation has been interpreted to impose a fiduciary duty owed in conducting ‘any Federal government action’ which related to Indian tribes.” (quoting *Nance*, 645 F.2d at 711).” (M. C. Wood, 2003)

to-government relationship with federally recognized Native American tribes” (Clinton, 1994, 2000b).

Since 2008, the Obama Administration has taken initial steps towards ensuring the federal government meets its trust responsibility consistently across all federal agencies. For example, the Administration has worked to return governmental authority and decision making to tribes; settled the \$3.4 billion dollar *Cobell* litigation, a class-action lawsuits against the BIA; supported passage of the Claims Settlement Act of 2010, the Tribal Law and Order Act, and the Indian Health Care Improvement Act; supported the United Nations Declaration on the Rights of Indigenous Peoples (Obama, 2009c; UN, 2007); and prioritized the tribal consultation process for *all* federal agencies (A. Cohen, 2011; EOP, 2012; Newland, 2013; Obama, 2009d). Additionally, on April 30, 2009, Congress passed a joint resolution that “acknowledge[d] a long history of official depredations and ill-conceived policies by the Federal Government regarding Indian tribes and offer[ed] an apology to all Native Peoples on behalf of the United States” (U.S. Congress, 2009).

In response to the Cobell Settlement, Secretary of the Interior Ken Salazar established and appointed five prominent American Indians to the Secretarial Commission on Indian Trust Administration and Reform (hereafter Trust Commission) on December 8, 2009 to conduct a “forward-looking, comprehensive evaluation of the Interior’s trust management of nearly \$4 billion in Native American trust funds” (DOI, 2013; Salazar, 2009). In the process, the Trust Commission developed a white paper entitled *The Federal Trust*

Responsibility to support a consistent implementation of the trust responsibility across the federal government (NCITAR, 2013b). In December 2013, the Trust Commission issued its Final Report and Recommendations, which called for a renewed emphasis on the United State’s fiduciary obligations with respect to the trust doctrine, a restructuring of the trust administration, and the collaborative development of “a judicially enforceable uniform consultation policy that could be codified in federal statute” (USDOJ, 2013).

In the spirit of the American Indian Policy Review Commission’s statement of policy on the trust responsibility (Commission, 1977), the Obama Administration also established the White House Council on Native American Affairs through Executive Order 13647 on June 26, 2013, citing goals of: protecting trust resources, including “tribal lands, environments, and natural resources, and promoting respect for tribal cultures”; providing services to support the sustainable economic development and social and physical well-being of the Indian people; recognizing tribes’ right to self government; and “improve[ing] coordination of Federal programs and the use of resources available to tribal communities” (Obama, 2013b).

In response to the Trust Commissions final report, Secretary of the Interior Sally Jewell issued Secretarial Order No. 3335 on August 20, 2014, underscoring the Department of the Interior’s trust responsibilities for Indian Country, and establishing seven guiding principles that apply to all Interior agencies, including: “supporting tribal sovereignty and self-determination; protecting tribal lands and resources; building partnerships; practicing

responsiveness and timeliness; and seeking legal advice to ensure compliance with the trust responsibility” (DOI, 2014; Jewell, 2014, p. 5.

3.3.2 Duty of Consultation

One expression of the trust relationship is the federal government’s responsibility to consult with tribal governments on policy formulation and management decisions that may impact tribal lands, assets, resources, and/or treaty rights. Under the trust responsibility and duty of consultation, the federal government has a “duty to make, retain and furnish information to Indian beneficiaries” (NCITAR, 2013). It is also through the requirements of the trust relationship and consultation process that tribes share their information and spatial data with the federal government.

President Lyndon B. Johnson affirmed the federal government’s duty to consult with tribes on March 6, 1968 in his *Special Message to Congress on the Problems of the American Indian* (L. B. Johnson, 1968). On April 29, 1994, President Bill Clinton issued a Presidential Memorandum reaffirming that “[e]ach executive department and agency shall consult, to the greatest extent practicable, and to the extent permitted by law, with tribal governments prior to taking actions that affect federally recognized tribal governments” (Clinton, 1994). President Clinton subsequently issued Executive Order 130007 on *Indian Sacred Sites* (Clinton, 1996) and Executive Order 13175 on *Consultation and Coordination with Indian Tribal Governments*, requiring that “federal agencies to have an accountable process to ensure meaningful and timely input by tribal officials in developing policies responsible for strengthening the government-to-

government relationship between the United States and Indian tribes” (Clinton, 2000b). In addition, more than ten federal statutes, as well as other policies, procedures, or guidelines, implement this consultation requirement, including the National Historic Preservation Act (NHPA), National Forest Management Act, Federal Land Policy and Leasing Act, National Environmental Policy Act (NEPA), Surface Mining Control and Reclamation Act, and Mineral Leasing Act (EOP, 2009; Hutt & Lavalley, 2005; C. Rogers, 2002; Tsosie, 2003). For example, the Bureau of Indian Affairs *Guidelines for Integrated Resource Management Planning in Indian Country* (IRMP) outlines a process for consultation with tribes for the management of land and cultural resources (BIA, 2001, 2005).

Critics have noted, however, that consultation requirements while laudable are not well defined in federal statutes and policies. Agencies either have been reluctant to consult with tribes or used consultation merely as window dressing for decisions the federal government had already made (Galanda, 2010; Haskew, 2000; Hutt & Lavalley, 2005; Pevar, 2012). As President Barack Obama observed during the opening of the *Tribal Conference & Interactive Discussion with Tribal Leaders*, all “too often, Washington thought it knew what was best for you [tribes]. There was too little consultation between governments. ...[O]ver the past nine years, only a few agencies have made an effort to implement that executive order [EO 13175] – and it’s time for that to change” (Obama, 2009c).

To begin to address these concerns, President Obama signed an Executive Memorandum on *Tribal Consultation* on November 5, 2009, which stressed:

“History has shown that failure to include the voices of tribal officials in formulating policy affecting their communities has all too often led to undesirable and, at times, devastating and tragic results. By contrast, meaningful dialogue between Federal officials and tribal officials has greatly improved Federal policy toward Indian tribes. . . . My Administration is committed to regular and meaningful consultation and collaboration with tribal officials in policy decisions that have tribal implications³⁵ include, as an initial step, through complete and consistent implementation of Executive Order 13175” (Obama, 2009c).

This memorandum mandates all executive departments and agencies to submit a detailed action plan on how they will implement the policies and directives of Executive Order 13175, and to submit annual progress reports thereafter. In addition, the President tasked the newly formed White House Council on Native American Affairs to:

“(c) coordinate a more effective and efficient process for executive departments, agencies, and offices to honor the United States commitment to tribal consultation as set forth in Executive Order 13175 of November 6, 2000 (Consultation and Coordination With Indian Tribal Governments), and my memorandum of November 5, 2009 (Tribal Consultation); and

(d) assist the White House Office of Public Engagement and Intergovernmental Affairs in organizing the White House Tribal Nations Conference each year by bringing together leaders invited from all federally recognized Indian tribes and senior officials from the Federal Government to provide for direct government-to-government discussion of the Federal Government’s Indian country policy priorities” (Obama, 2013b).

In 2010, the DOI Assistant Secretary of Indian Affairs appointed a tribal consultation team, drawn from nominations of BIA officials from each internal bureau/office and

³⁵ As per E.O. 13175, “policies that have tribal implications” refers “to regulations, legislative comments or proposed legislation, and other policy statements or actions that have substantial direct effects on one of or more Indian tribes, on the relationship between the Federal government and Indian tribes, or on the distribution of power and responsibilities between the Federal Government and Indian tribes.” (Clinton, 2000b)

tribal officials representing each BIA region.³⁶ In early 2011, the team released a draft consultation policy and requested feedback from the tribes.³⁷ The Secretary of Interior Ken Salazar issued Order No. 3317 titled *Department of the Interior Policy on Consultation with Indian tribes*, which officially authorized and implements the final consultation policy (DOI, 2011; Jensen, 2012; Salazar, 2011). Other agencies, such as the U.S. Department of Agriculture (USDA, 2010) and U.S. Environmental Protection Agency (USEPA, 2011), have similarly updated and implemented consultation policies as per Obama's memorandum.

Based on numerous court opinions, Pevar (2012) states that as part of the consultation process an agency should: (1) "inform the tribes of all relevant facts, and do so as early in the decision-making process as possible; (2) give the tribes sufficient time to consider the situation and provide the tribes with technical assistance and additional data if the tribes requests it; (3) maintain a dialogue with the tribes, address the tribes' concerns in a timely manner, keep the tribes informed of developments, and be open to looking at things from the tribes' perspective; (4) document the consultation process by notifying the tribes in writing of developments and potential plans, and request written comments from the tribes; (5) accept the tribes' recommendation unless compelling reasons require otherwise; and (6) when the tribes' recommendation is not accepted, send a written and

³⁶ Letter from Larry Echo Hawk, Asst. Sec'y, Dep't of Interior, Bureau of Indian Affairs, to Tribal Leaders (March 22, 2010), available at <http://www.doi.gov/news/pressreleases/upload/Mar222010-TribalLeaderletter.pdf>; Press Release, U.S. Dep't Interior, Secretary Salazar Announces Next Stage in Developing Department-Wide Tribal Consultation Policy (Mar. 25, 2010), available at <http://www.bia.gov/idc/groups/public/documents/text/idc008367.pdf>.

³⁷ Press Release, Dep't Interior, Secretary Salazar, Assistant Secretary Echo Hawk Submit Draft Consultation Policy to Tribal Leaders (Jan. 14, 2011), available at <http://www.bia.gov/idc/groups/public/documents/text/idc012835.pdf>; see Policy on Consultation with Indian tribes, [76 Fed. Reg. 28,446](#) (proposed May 17, 2011).

detailed explanation of the reasons for that decision."³⁸ Based on an in-depth study of the federal-tribal consultation process, Hutt and Lavalley (2005) also make recommendations for consultation best practices and offer a model protocol. Skibine (2012), Mense (2001), Plaut (2009), and Tsosie (2003) review the concerns and challenges of the consultation process with respect to locations and information related to sacred sites (see also USFS, 2014).

3.3.3 Conflict Between the Trust Doctrine and the Public Trust

While the federal government is charged with protecting tribal lands, assets, resources, and treaty rights, it is also obligated to protect the public trust. The *public trust doctrine* originated from concepts of common property under Roman law, and was incorporated into the common law of the United States in the late 1800s. The doctrine applies to public lands generally, and in the eastern parts of the United States, to tides, navigable waterways, and submerged lands, which are held in trust by state governments and managed for the benefit of the public. The concept of public trust with respect to federal public lands and the natural resources contained therein, however, is largely a matter of public policy rather than legal doctrine (Tsosie, 2003; Wilkinson, 1980). The public's expectation is that the government will manage public lands sustainably for a range of uses—commercial, recreational, cultural, and aesthetic (Tsosie, 2003).

³⁸ As referenced in Pevar (2012), “see *Pueblo of Sandia v. United States*, 50 F.3d 856, 862 (10th Cir. 1995); *Oglala Sioux Tribe of Indians v. Andrus*, 603 F.2d 707 (8th Cir. 1979); *Klamath Tribe v. United States*, 1996 WL 924509 at *8 (D. Ore. 1996); *Lower Brule Tribe v. Deer*, 911 F.Supp. 395 (D.S.D. 1995); *Mescalero Apache Tribe v. Rhoades*, 904 F.Supp. 251, 261-62 (D.N.M. 1992); *Attakai v. United States*, 746 F. Supp. 1395, 1407-08 (D. Zriz. 1990).” (Pevar, 2012)

While the Bureau of Indian Affairs (BIA) is charged with the responsibility of defending tribal rights and assets, other agencies within the Department of the Interior (DOI)³⁹ frequently come into conflict with tribes when promoting the public's interests in land, water, and resources. These agencies often have more political clout at the Secretary's level where compromises are negotiated. Furthermore, the Solicitor of the Department of the Interior and the Department of Justice must represent not only tribal interests, but also those DOI agencies and their stakeholders who may be in conflict with tribes (Canby, 2015).⁴⁰

President Richard Nixon described this conflict of interest in his *Special Message to the Congress on Indian Affairs*, in 1970:

“The United States Government acts as a legal trustee for the land and water rights of American Indians. These rights are often of critical economic importance to the Indian people; frequently they are also the subject of extensive legal dispute. In many of these legal confrontations, the Federal government is faced with an inherent conflict of interest. The Secretary of the Interior and the Attorney General must at the same time advance both the national interest in the use of land and water rights and the private interests of Indians in land which the government holds as trustee.

Every trustee has a legal obligation to advance the interests of the beneficiaries of the trust without reservation and with the highest degree of diligence and skill. Under present conditions, it is often difficult for the Department of the Interior and the Department of Justice to fulfill this obligation. No self-respecting law firm would ever allow itself to represent two opposing clients in one dispute; yet the Federal government has frequently found itself in precisely that position. There is considerable evidence that the Indians are the losers when such situations arise. More than that, the credibility of the Federal government is damaged whenever it appears that such a conflict of interest exists” (Nixon, 1970).

³⁹ These DOI agencies may include, for example, the Bureau of Reclamation, Bureau of Land Management, National Park Service, Fish and Wildlife Service, Bureau of Mines, and the Office of Surface Mining Reclamation and Enforcement.

⁴⁰ See *Nevada v. United States*, 463 U.S. 110, 127 (1983), cited by Canby (2009, 56).

The Nixon Administration prepared legislation to establish an independent Indian Trust Counsel Authority in an attempt to mitigate these administrative conflicts of interest. In 1977, the American Indian Policy Review Commission also recommended the creation of a cabinet level Department of Indian Affairs with its own solicitor's office.

Unfortunately, Congress took no action other than a few studies and hearings (AIPC, 1977; R. P. Chambers, 1971). Since 2012, the Trust Commission has been working on a *conflict of interest protocol*. This protocol would mandate disclosure of federal conflicts of interest and create a process for the appointment of an independent counsel to represent the tribes (NCITAR, 2013a).

Administrative conflicts aside, Supreme Court Justice Rehnquist emphasized in *Nevada v. United States (1983)*⁴¹ that the federal government cannot enforce the Indian trust doctrine to the exclusion of other beneficiaries:

“[I]t may well appear that Congress was requiring the Secretary of the Interior to carry water on at least two shoulders when it delegated to him both the responsibility for the supervision of the Indian tribes and the commencement of reclamation projects in areas adjacent to reservation lands. But Congress chose to do this, and it is simply unrealistic to suggest that the Government may not perform its obligation to represent Indian tribes in Litigation when Congress has obligated it to represent other interests as well. In this regard, the Government cannot follow the fastidious standards of a private fiduciary...”

This conflict of interest is highlighted in the tension between the requirements of the Freedom of Information Act and tribes' concerns over who can access and use their information when they share it with the Federal government. In the Supreme Court

⁴¹ 463 U.S. 110 (1983).

decision *Department of the Interior v. Klamath Water Users Protective Association*,⁴² to be discussed in Chapter 5, the Court ruled in favor of the “public interest” in information held by the federal government while subordinating the government’s trust responsibility to tribes.

Nonetheless, many scholars have asserted that the federal trust relationship distinguishes conflicts involving tribal governments from conflicts with individual stakeholders. The federal trust responsibility is a pre-existing obligation to tribes, originating before any other individual stakeholder’s claim and founded on treaties; it therefore should be given greater weight than the public interest during federal policy decision-making processes in circumstances where tribes, tribal sovereignty, and treaty rights may be affected (Deloria & Lytle, 1983; Getches, Wilkinson, & Williams, 1998; Haskew, 2000; Juliano, 2003; Royster, 1995; Shepherd, 2001; Tsosie, 2003; M. C. Wood, 1994, 1995, 2003).⁴³

Furthermore, Tsosie (2003) citing Wood (1994) argues, “trust claims should encompass ‘the complex interrelationships between culture, religion, spirituality, and tradition’ that define tribal ways of life and provides a standard of ‘affirmative protection’ of native cultural and religious vitality.”

3.4 Doctrine of Plenary Power

The U.S. Congress has the exclusive, political authority to deal with tribes and Indian affairs, as well as the authority to preempt state intrusion into Indian Country without

⁴² 532 U.S. 1 (2001).

⁴³ Royster comments that when the federal government is operating under statutes that require “full fiduciary attention to tribal interests,” as is the case in tribal mineral development, decision-making “should not be subject to competing federal claims” (Royster, 1995).

tribal consent; the executive and judicial branches of the federal government and state governments do not have this authority unless Congress delegates power to them.

Congressional *plenary power*—as an exclusive or pre-emptive power— stems from two legal sources. As stated earlier, the commerce clause of the United States Constitution expressly bestows upon Congress the power to “regulate commerce with foreign nations, among the several states, and with Indian tribes.”⁴⁴ Second, the treaty clause of the Constitution confers to the President, with the permission of two-thirds of the Senate, the plenary power over treaty making⁴⁵ (F. S. Cohen, 1942; Getches et al., 1998; Monette, 1996; Wilkins & Lomawaima, 2001).

Plenary power “does not mean absolute. It means without subject-matter limitation” (Getches et al., 1998). Nevertheless, during the period of forced assimilation (1880s to 1920s), judicial opinions such as *United States v. Kagama* (1886)⁴⁶ and *Lone Wolf v. Hitchcock* (1903)⁴⁷ transformed the concept of plenary power from Congressional authority *to deal with* tribes into absolute authority *over* tribes. The contradiction between tribal sovereignty and federal trust responsibility on the one hand, and the notion of unlimited Congressional plenary power on the other, is termed “irreconcilability” in Federal Indian law.

Arguing against this problematic interpretation of plenary power, Wilkins and Lomawaima (2001) assert:

⁴⁴ U.S. Constitution, Article 1, sec. 8, cl. 3.

⁴⁵ U.S. Constitution, Article 2, sec. 2, cl. 2.

⁴⁶ Supreme Court, 118, U.S. 375 (1886).

⁴⁷ Supreme Court, 187 U.S. 553 (1903).

“[O]ur nation was founded in direct opposition to the unlimited and absolute powers claimed by Europe’s royal crowns. . . . Since ‘absolute’ congressional power is not enumerated anywhere in the Constitution, the idea of ‘absolute’ political power directly contradicts the very nature of democratic government. It also violates the treaty and trust relationship between the United States and Indian tribes. Congressional plenary power defined as absolute and unlimited is irreconcilable with tribal sovereignty.”

M. C. Wood (1994) and other legal scholars concur. The trust doctrine should not be associated with the doctrine of plenary power; rather, it “should be recognized as a doctrine of federal restraint, not permission, and as an important source of protection for Indian rights” and self-determination. Even so, because tribes “inhabit a unique political and legal space as extraconstitutional entities,” this doctrine, which is underscored in the Constitution and recognized by Congress, the courts, and the executive branch, has rarely been used by the Supreme Court to set aside congressional action or to rule it unconstitutional. The result is limited judicial oversight of congressional actions affecting tribes (Pevar, 2012; Wilkins & Lomawaima, 2001; Canby, 2015; M. C. Wood, 1994).

3.5 Treaties

From 1785 to 1871, the federal government established formal relations with most tribes in the lower continental United States through treaties, primarily to obtain American Indian Land and avoid warfare.⁴⁸ A law (Title 25, U.S. Code, section 71) passed in 1871 prohibited the federal government from signing new treaties with tribal governments, allowing the House of Representatives to have its say in Indian affairs thereafter through legislation.⁴⁹ The U.S. Supreme Court defined “a treaty, including one between the

⁴⁸ California tribes signed treaties with the United States, but these were never ratified by the Senate and are thus unenforceable (Pevar, 2012).

⁴⁹ For an in depth review of Indian treaties, see Canby (2009).

United States and an Indian tribe,” as “essentially a contract between two sovereign nations.”⁵⁰ In exchange for American Indian Land, most Indian treaties expressly recognized tribal government sovereignty, made assurances of federal protection, and promised resources, such as food, medical care, and education. However, the courts have sometimes debated whether an Indian treaty was a grant of rights to a tribe, or whether a tribe reserved all rights that were not explicitly ceded in treaties.

3.5.1 Doctrine of Reserved Rights

Because Indian treaties were intended primarily for the transfer of land and typically listed only surrendered rights, the Supreme Court stated that an Indian treaty is “not a grant of rights to the Indians, but a grant of rights from them, a reservation of those not granted. And the form of the instrument and its language was adapted to that purpose.”⁵¹ This is known as the *doctrine of reserved rights*. Reserved rights, for example, may include rights to hunt, gather, or fish “at the usual and accustomed grounds and stations” on or off reservation, as well the concomitant authority in the use, management, and protection of natural resources affecting those reserved rights, such as air and water pollution control (Goodman, 2000). Stan Webster of the Oneida Nation and Wisconsin Indian Resource Council explains:

“The Indian nations viewed treaties as covenants, as moral statements which could not be broken unless by mutual consent.... The purpose of these intergovernmental contracts was not given rights to the Indians—rights which as sovereign nations they already possessed—but to remove from them certain rights which they already had. In treaty making, tribes were the grantors and the United States the recipient, and rights were granted to the U.S. by or from Indian

⁵⁰ *Washington v. Washington State Commercial Passenger Fishing Vessel Association*, 443 U.S. 658, 675 (1979).

⁵¹ *United States v. Winans*, 198 U.S. 371 (1905).

nations...rights to land, water, hunting, government, etc., which were not expressly granted away by the tribes in a treaty, or taken away by later federal statute, were reserved by that tribes” (Wilkins & Lomawaima, 2001).

Importantly, reserved rights also include political rights, “such as the power to regulate domestic relations, tax, administer justice, or exercise civil and criminal jurisdiction” as with any sovereign government.⁵² Even termination of a tribes’ federally recognized status does not extinguish their reserved rights.⁵³

The supremacy clause of the Constitution (Article VI, Clause 2) establishes the U.S. Constitution, U.S. treaties, and federal statutes as the “supreme law of the land.” This means that Indian treaties take precedence over state constitutions and laws that may conflict.⁵⁴ According to Monette (1995) and other scholars, it also gives Indian treaties similar status in law to the Tenth Amendment.⁵⁵ Based on an analysis of judicial decisions and the Constitution, these scholars assert that just as the Tenth Amendment creates a balance of powers between federal and state governments, so do treaties create a

⁵² As cited in Pevar (2012), see for example, *Menominee Tribe v. United States*, 391 U.S. 404 (1968); *United States v. Adair*, 723 F.2d 1394, 1412-15 (9th Cir. 1983), cert. denied, 467 U.S. 1252 (1984); *United States v. Dion*, 476 U.S. 734, 739 (1986); *Swim v. Bergland*, 696 F.2d 712 (9th Cir. 1983); *United States v. Washington*, 135 F.3d 681 (9th Cir. 1998), amended, 157 F.3d 630, 644 (9th Cir. 1998); *United States v. Confederated tribes of Colville Indian Reservation*, 606 F.3d 698, 713 (9th Cir. 2010).

⁵³ Congress amended Public Law 280 two months after the termination act; it reads “nothing in this section shall authorize the alienation, encumbrance, or taxation of any real or personal property, including water rights, belonging to any Indian or any Indian tribe, band, or community that is held in trust by the United States...or shall deprive any Indian or any Indian tribe, band, or community of any right, privilege, or immunity afforded under Federal treaty, agreement, or statute with respect to hunting, trapping, or fishing or the control, licensing, or regulation thereof (67 Stat. 588).” After the Menominee Termination Act of 1954, the State of Wisconsin attempted to regulate Menominee hunting and fishing. However, the Supreme Court in *Menominee tribe v. United States*, 391 U.S. 404 (1968) agreed with the tribe, ruling that their reserved rights “survived” the termination. Justice William O. Douglas stated, “the intention to abrogate or modify a treaty is not to be lightly imputed to the Congress” (391 U.S. 404, 412-13). Cited in (Wilkins & Lomawaima, 2001).

⁵⁴ *Worcester v. Georgia*, 31 U.S. (6 Pet.) 515 (1832).

⁵⁵ The Tenth Amendment, ratified in 1791 as par of the Bill of Rights, reads: “The powers not delegated to the United States by the Constitution, nor prohibited by it [the Constitution] to the States, are reserved to the States respectively, or to the people.”

balance of powers between federal and tribal governments (Deloria & Wilkins, 1999; Monette, 1995, 1996; Pevar, 2012; Wilkins & Lomawaima, 2001). “In ways similar to the Tenth Amendment, Indian treaties reserve to Indian tribes all those powers specifically stated *and* all those not expressly ceded. ...Despite Congressional and state claims to the contrary, tribal sovereignty and tribal rights do not arise from congressional action” (Wilkins & Lomawaima, 2001). That said, Indian treaties are not enshrined in the Constitution like the Tenth Amendment, and may be altered without recourse. Further, the courts have been inconsistent in the recognition and protection of the reserved rights doctrine.

3.5.2 Canons of Construction

As Wilkins and Lomawaima (2001, 124) note:

“Land claims, natural resource allocation and management of water, timber, game, fish, and minerals, and environmental regulation, including pollution control and hazardous materials transportation and disposal, have frequently resulted in contention among the three sovereigns. The conflicting interests of tribes and states arise from the realities of shared boundaries, shared resources, and shared citizens.”

When these conflicts occur, the courts must do their best to sort out the tangled web of sovereign rights and interests, and to interpret the treaty provisions accurately and fairly.

Over time, the Supreme Court has developed the *canons of treaty construction* (or *Indian law canons of construction*) to address the unequal bargaining position of tribes and to recognize the trust relationship when interpreting treaties and statutes.^{56,57} First, as

Supreme Court Justice Joseph McKenna wrote in the majority opinion for *United States*

⁵⁶ The canons of treaty construction also have been called “the canons of sympathetic construction) (Canby 2009) or simply “canons of construction.”

⁵⁷ For a detailed list of these cases, see Canby (2009).

v. Winans (1905; one of the first reserved rights cases),⁵⁸ treaties should be interpreted the way tribes would have interpreted them.⁵⁹ To do so, the courts must consider more than just the treaty language as written, but also “the history of the treaty, the negotiations, and the practical construction adopted by the parties.”⁶⁰ Often these treaties were signed under intimidation and threat of force. Second, ambiguities must be resolved in favor of the tribes.⁶¹ Third, treaties and agreements are to be interpreted liberally to ensure their promises of protection (Pevar, 2009; Canby, 2015).⁶² Unless Congress offers a “clear statement” or demonstrates “unambiguous” intent to abrogate a tribe’s rights, tribal sovereignty should be protected (Newton, Anderson, et al., 2012).

The Supreme Court explained its use of these canons of construction in *Passenger*

Fishing Vessel Association (1989):

“Accordingly, it is the intention of the parties, and not solely that of the superior side, that must control any attempt to interpret the treaties. When Indians are involved, the Court has long given special meaning to this rule. It has held that the United States as the party with presumptively superior negotiating skills and superior knowledge of the language in which the treaty is recorded, has a

⁵⁸ *United States v. Winans*, 198 U.S. 371 (1905).

⁵⁹ Supreme Court Justice Joseph McKenna wrote in the majority opinion in *Winans*, “we have said we will construe a treaty with the Indians as ‘that unlettered people’ understood it, and ‘as justice and reason demand, in all cases where power is exerted by the strong over those to whom they owe care and protection,’ and counterpoise the inequality ‘by the superior justice [198 U.S. 371, 381] which looks only to the substance of the right, without regard to technical rules.’ [Choctaw Nation v. United States] [119 U.S. 1](#), 30 L. ed. 306, 7 Sup. Ct. Rep. 75; [Jones v. Meehan] [175 U.S. 1](#), 44 L. ed. 49, 20 Sup. Ct. Rep. 1. How the treaty in question was understood may be gathered from the circumstances.” Available at: <http://caselaw.lp.findlaw.com/cgi-bin/getcase.pl?court=us&vol=198&invol=371>. See also *Tulee v. Washington*, 315 U.S. 681, 684-85 (1942).

⁶⁰ *Minnesota v. Mille Lacs Band of Chippewa*, 526 U.S. 172, 196 (1999) (quoting *Choctaw Nation v. United States*, 218 U.S. 423, 432 (1943)).

⁶¹ *Carpenter v. Shaw*, 280 U.S. 363, 367 (1930); *DeCoteau v. District County Court for the 10th Judicial District*, 420 U.S. 425, 447 (1985); *Bryan v. Itasca County, Minnesota*, 426 U.S. 373, 392 (1976). As cited in Canby (2009) and Pevar (2009).

⁶² *Jones v. Meehan*, 175 U.S. 1, 10 (1899); *United States v. Shoshone Tribe*, 304 U.S. 111, 116 (1938); *Choctaw Nation v. Oklahoma*, 397 U.S. 620, 631 (1970). As cited in Canby (2009) and Pevar (2009).

responsibility to avoid taking advantage of the other side. The treaty must therefore be construed, not according to the technical meaning of its words to learned lawyers, but in the sense in which they would naturally be understood by the Indians” (cited in Pevar 2009, 51).

The courts also apply the canons of construction when interpreting federal statutes, executive orders, and federal regulations.⁶³ Newton et al. (2012, 123-124) note that the canons of construction are analogous to the Supreme Court’s canons of interpretation of the applicability of federal statutory regulation to States; but, when the two are in conflict, ideally, the Indian law canon in theory should predominate.

Nonetheless, the courts have not always applied these canons of construction consistently, or as strongly to statutes as to treaties, leading to the whittling away of tribal rights and sovereignty (Canby, 2015; Kim, 2008; Newton et al., 2012; Pevar, 2009).

According to Wilkins and Lomawaima’s critical view (2001, 141):

“Justices tend to privilege explicit rights over implied rights; but much more importantly, justices often highly privilege federal power over tribal powers, question of federal authority over questions of tribal authority, federal ‘grants’ of recognition to tribes over tribal assertions of identity arising from aboriginal sovereignty, and production of profits over efforts spent carefully delineating tribal rights.”

3.6 Application of Federal Statutes to Tribes

The Supreme Court has argued that the U.S. Government derives its authority from the “discovery” of North America by the Europeans, from the Commerce Clause (Article I, section 8, clause 3) and the Treaty Clause (Article II, section 2, clause 2) of the U.S.

⁶³ As cited in Pevar (2009), see *Montana v. Blackfeet Tribe*, 471 U.S. 759, 766 (1985); *Oneida County v. Oneida Indian Nation*, 470 U.S. 226, 247 (1985); *Ramah Navajo Chapter v. Lujan*, 117 F.3d 1455, 1461 (10th Cir. 1997); *Artichoke Joe’s California Grand Casino v. Norton*, 353 F.3d 712, 729 (9th Cir. 2003); *Connecticut v. U.S. Department of the Interior*, 228 F.3d 82, 92 (2000), cert denied, 532 U.S. 1007 (2001).

Constitution, and from the doctrine of trust responsibility. While legal scholars have challenged these justifications, as discussed above, the Supreme Court affirmed Congress' authority to legislate for tribes in all matters,⁶⁴ including: “(1) administration of tribal affairs; (2) regulation of tribal governments; (3) termination; (4) regulation of tribal membership; (5) regulation of tribal land; (6) regulation of tribal assets; (7) regulation of individual property; (8) regulation of trade and liquor; and (9) exercise of criminal jurisdiction” (Pevar, 2012). Only the Due Process and the Just Compensation Clauses of the Fifth Amendment, which are rarely used, and the trust doctrine limit congressional authority.

3.6.1 Federal Laws Specific to Tribes

The Constitution enables Congress to enact laws that are specific to tribes because of their political status under the government-to-government relationship. Contained within U.S. Code Title 25, these laws include the Indian Civil Rights Act (ICRA 1968), the Indian Self Determination and Education Assistance Act (ISDEAA 1975), the Indian Health Care Improvement Act (IHCIA 1976), The American Indian Religious Freedom Act (AIRFA 1978), the Indian Gaming Regulatory Act (IGRA 1988), and the Native American Graves and Repatriation Act (NAGRA 1990).

Tribal governments, however, are not “states” under the U.S. Constitution, and thus are not subject to the Constitution, the Bill of Rights and other constitutional amendments (Deloria & Wilkins, 1999). Rather, most tribes legislate under their own constitutions.

⁶⁴ *United States v. Jicarilla Apache Tribe*, 131 S. Ct. 2313, 2323 (2011).

3.6.2 Federal Laws of General Applicability

Congress sometimes passes legislation that expressly abrogates tribal rights or treaties. More often than not, however, Congress passes laws that do not explicitly mention tribes or treaty rights and yet impacts them. Cases involving a “federal statute of general applicability” that is silent on whether or not it applies to tribes remain a subject of much debate.⁶⁵ It raises the question, “[a]re tribes exempt from congressional laws unless they are specifically written in, or are tribes subject to congressional law unless they are specifically exempted?” (Wilkins & Lomawaima, 2001).

Ideally, under the canons of construction, any ambiguity in federal statutes should be interpreted liberally in favor of the preservation of tribal rights, particularly when the interests of the tribes’ and general public conflict, and in light of the current federal policy to promote tribal self-determination and economic self-sufficiency (Clinton, 1994; Getches et al., 1998; Obama, 2009c; Obama, 2009d). In the infamous Termination Era Supreme Court case *Federal Power Commission v. Tuscarora Indian Nation*, however, the majority asserted “general Acts of Congress apply to Indians as well as to all others in the absence of a clear expression to the contrary.”⁶⁶ In 1986, the Supreme Court in *United States V. Dion* added, “[w]hat is essential is clear evidence that Congress actually considered the conflict between its intended action on the one hand and Indian treaty

⁶⁵Federal statutes that are silent with respect to tribal governments and tribally owned businesses include, for example, Age Discrimination in Employment Act, the Fair Labor Standards Act (FLSA), the Family Medical Leave Act, and the Occupational Safety and Health Act.

⁶⁶*Federal Power Commission v. Tuscarora Indian Nation*, 362 U.S. 99, 120 (1960).

rights on the other, and chose to resolve that conflict by abrogating the treaty.”⁶⁷ This evidence also is required in non-treaty rights cases when other tribal sovereign rights may be impacted.

While the Tenth Circuit and other courts have approached the interpretation of statutory ambiguity in favor of tribes, others like the Ninth Circuit have conducted more case-specific analyses (Gus, 2014).⁶⁸ In *Donovan v. Coeur d’Alene Tribal Farm*,⁶⁹ the Ninth Circuit declared that the principle asserted in *Federal Power Commission* is subject to certain exceptions:

“A federal statute of general applicability that is silent on the issue of applicability to Indian tribes will not apply to them if: (1) the law touches “exclusive rights of self-governance in purely intramural matters”; (2) the application of the law to the tribes would “abrogate rights guaranteed by Indian treaties”; or (3) there is proof “by legislative history of some other means that Congress intended [the law] not to apply to Indians on their reservations...”

These principles, however, have resulted in “seemingly inconsistent court decisions” and may not guarantee much protection of tribal sovereignty and treaty rights, particularly if the policy behind the statute is considered of great importance (Getches, 1996; Getches et al., 1998; McAllister, 2002a; Tweedy, 2000; Canby, 2015).⁷⁰ According to Colorado law professor David H. Getches, Chief Justice William Rehnquist, who favored states’ rights, placed the Court in opposition to Federal Indian Law (Getches, 1996; McAllister, 2002b).

⁶⁷ *United States v. Dion*, 476 U.S. 734, 738-740 (1986).

⁶⁸ For example, *Donovan v. Navajo Forest Products Industries*, 692 F.2d 709 (10th Cir. 1982) (holding that OSHA could not be applied to the Navajo); *U.S. Department of Labor v. Occupational Safety & Health Review Comm’n*, 935 F.2d 182 (9th Cir. 1991) (holding that OSHA applied to the tribal sawmill on the Warm Springs Reservation).

⁶⁹ *Donovan v. Coeur d’Alene Tribal Farm*, 751 F.2d 1113, 1116 (9th Cir. 1985).

⁷⁰ See, for example, *United States v. Peterson*, 121 F.Supp.2d 1309 (D. Mont. 2000) (Congressional ban on hunting in Glacier National Park upheld over abrogation of tribal hunting right).

Previous courts have assumed that Indian governments are sovereign nations. The Rehnquist court, on the other hand, affirmed Indian government authority only when an “explicit congressional affirmation of tribal power”⁷¹ could be found.

According to the National Congress of American Indians, the Roberts Court, for the most part, has not supported tribal interests. From 2005 to 2010, the Roberts Court “has granted fewer Indian law cases, has not granted the petitions filed by Indian tribes or by the United States on behalf of an Indian tribe, and has granted review to reverse lower court decisions favorable to tribal interests” (Guest, 2012). In 2014, however, Chief Justice Roberts upheld tribal sovereign immunity against lawsuits in *Michigan v. May Mills Indian Community*,⁷² placing the deciding vote in a 5-to-4 decision (NCAI, 2014).

3.7 Tribal Self Government

3.7.1 Doctrine of Tribal Sovereignty

Long before the colonization of the United States, Indian tribes exercised their powers of sovereignty and self-governance. TallBear (2006, p. 2) underscores this point by noting, “Indian nations of North America...recognized the sovereignty of one another by making treaties and trade agreements and by forming political and military alliances.” Early in its history, European colonists and later the United States repeatedly recognized tribes as sovereign states by negotiating and signing more than 800 treaties with them (TallBear, 2006).

⁷¹ Examples of explicit exemptions would be Title 7, Civil Rights Act, and American Disabilities Act.

⁷² *Michigan v. May Mills Indian Community*, 134 S.Ct. 2024 (2014), 572 U.S___, No. 12-515, slip op. at 17 (2014).

Supreme Court Chief Justice Marshall in *Worcester v. Georgia* (1832) stated that Native American tribes are “distinct political communities, having territorial boundaries, within which their authority is exclusive;”⁷³ and, although the term “domestic, dependent nations” has been applied, “the settled doctrine of law of nations is, that a weaker power does not surrender its independence – its right to self-government – by associating with a stronger, and taking its protection.”⁷⁴

On June 18, 1934, Congress passed the Indian Reorganization Act (IRA), slowing the privatization of communal tribal lands under the Dawes Act, but leaving the resultant checkerboards of tribal or individual trust and private fee lands on many reservations untouched. Importantly, the IRA recognized tribal governments, reaffirmed their sovereignty, and to some degree restored local self-government and self-determination. It, however, also preserved oversight by the Bureau of Indian Affairs and imposed a Western-based governance system on tribes of constitutions, tribal councils and tribal chairmen. The Indian Self-Determination and Education Assistance Act of 1975 (ISDEAA; Public Law 93-638) authorized government agencies to provide grants and enter into contracts with federally recognized tribes. This gave tribes greater control over how the funds could be used within their communities. Similarly, most presidential administrations over the last four decades have acknowledged tribal sovereignty and self-

⁷³In *Worcester v. Georgia*, the Supreme Court ruled that the laws of Georgia had no force over the Cherokee Tribe because of its status as a nation. 31 U.S. (6 Pet.) 515, 557 (1832).

⁷⁴ 6 Pet. 515 (1832) at 560.

determination and “expressed their commitment to upholding trust responsibility” (Jewell, 2014; see also Section 2.1.3.1).

Today, the United States officially recognizes 566 Indian tribal governments in Alaska and the lower 48 states as having a unique political and legal relationship with the federal government (i.e., a “government-to-government” or “sovereign-to-sovereign” relationship) as set forth in the U.S. Constitution, treaties, statutes, executive orders, and court decisions. That is to say, the **“United States recognizes the ongoing right of Indian tribes to self-government and supports tribal sovereignty and self-determination”** [emphasis added] (Clinton, 2000b; Obama, 2009c). Federally recognized tribal governments are considered “dependent” sovereign nations, to quote the Roberts Court (NCAI, 2014). Their “internal affairs...are the responsibility of the tribal entity and are not to be tampered or interfered with by the United States” (Clinton, 2000b; Obama, 2009c).

The United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP), which was adopted by the UN General Assembly in 2007 and signed by President Obama in 2010, also acknowledges the political and cultural independence of indigenous people globally (Pevar, 2012). Although the UNDRIP is not enforceable under international law, the United States Government confirmed:

“[T]he Declaration’s concept of self-determination is consistent with the United States’ existing recognition of, and relationship with, federally recognized tribes as political entities that have inherent sovereign powers of self-governance. This recognition is the basis for the special legal and political relationship, including the government-to-government relationship, established between the United

States and federally recognized tribes, pursuant to which the United States supports, protects, and promotes tribal governmental authority over a broad range of internal and territorial affairs, including membership, culture, language, religion, education, information, social welfare, community and public safety, family relations, economic activities, lands and resource management, environment and entry by non-members, as well as ways and means for financing these autonomous governmental functions” (State, 2010).

3.7.2 Source and Scope of Tribal Powers

The sovereignty of tribes is both territorial (i.e., originates with its property and boundaries) and popular (i.e., originates with its citizens) and, precedes the establishment of Federal and state governments (F. S. Cohen, 1942; Monette, 1996).⁷⁵ Building on Federal case law and the concept of Federalism, Monette (1994) summarizes:

"[B]oth states and tribes pre-existed the Union as international, independent entities, (2) that they are the sources of their own sovereignty, (3) that they relinquished some measure of that sovereignty to the Union, (4) that the movement of that relinquishment was from the local entities to the central, not vice-versa, and (5) that what was not relinquished was reserved” (see also Pevar, 2012).⁷⁶

Just like state governments, tribes can form a government, establish citizenship, enact and enforce civil and criminal laws within its jurisdiction, collect taxes, regulate trade and commerce, regulate and manage its land, environment and resources, and handle

⁷⁵ *Martinez*, 436 U.S. at 56.

⁷⁶ Under the Tenth Amendment, states reserve those powers that were not delegated to the United States and that are not prohibited by the Constitution. Similarly, Indian nations retain those powers that were not relinquished under treaty, etc. In *United States v. Winans*, the Supreme Court stated that "the treaty was not a grant of rights to the Indians, but a grant of rights from them - a reservation of those not granted." *United States v. Winans*, 198 U.S. 371, 381(1905). The Supreme Court reaffirmed this doctrine of "reserved rights" in *Minnesota v. Mille Lacs Band of Chippewa Indians*, 526 U.S. 172, 207-08 (1999) (holding that Minnesota's admission to the Union under the equal footing doctrine did not extinguish the tribe's usufructuary treaty rights). See also *United States v. Wheeler*, 435 U.S. 313, 328 (1978) (as cited in Barge (2000, 1287-8), the Supreme Court asserted that "Congress has in certain ways regulated the manner and extent of the tribal power of self-government, [that] does not mean that Congress is the source of that power ...When [a tribe] exercises [the] power [to punish tribal offenders], it does so as part of its retained sovereignty and not as an arm of the Federal Government.") and *Reich v. Mashantucket Sand & Gravel*, 95 F.3d 174, 178 (2d Cir. 1996) (wherein the Second Circuit defined the "original natural rights" of tribes as "'retained' in the sense that they are not granted by the federal government, but are a function of the tribe's unique status as an aboriginal entity.")

domestic relations of its citizenry. In short, Indian tribal governments retain “all the powers of self-government of any sovereignty except insofar as those powers have been modified or repealed by act of Congress or treaty” (F. S. Cohen, 1942).⁷⁷

Because a tribe has sovereign authority, it also can establish a government entity to perform business functions. According to Atkinson and Nilles (2008, I-4 to 5), “[t]his entity can be an instrumentality of tribal government, a political subdivision of the tribe, or an agency or division of the tribe. A tribe can also form a separate business entity under federal, tribal, or state law.” Tribal governments, for example, may form tribal corporations under the Indian Reorganization Act (IRA); Section 17 of the IRA states:

“[s]uch charter may convey to the incorporate tribe the power to purchase, take by give, or bequest, or otherwise, own, hold, manage, operate, and dispose of property of every description, real and personal, including the power to purchase restricted Indian lands and to issue an exchange therefore interests in corporate property, and such powers as may be incidental to the conduct of the corporate business, not inconsistent with the law; but no authority shall be granted to sell, mortgage, or lease for a period exceeding 25 years any trust or restricted lands included in the limits of the reservation. Any charter so issued shall not be revoked or surrendered except by Act of Congress.”

Section 17 tribal corporations preserve tribal tax immunity, sovereign immunity, sovereignty and assets (Atkinson & Nilles, 2008).

⁷⁷ The Native American Rights Fund (NARF) states on its website that “[t]ribal sovereignty describes the right of federally recognized tribes to govern themselves and the existence of a government-to-government relationship with the United States. Thus a tribe is not a ward of the government, but an independent nation with the right to form its own government, adjudicate legal cases within its borders, levy taxes within its borders, establish its membership, and decide its own future fate.” NARF Web site, Frequently Asked Questions, <http://www.narf.org/pubs/faqs.html>, accessed June 29, 2004.

Indian affairs, however, are subject to the control of the federal government. This doctrine stems from two legal sources. First, the United States Constitution expressly bestows upon Congress the power to “regulate commerce with foreign nations, among the several states, and with Indian tribes.”⁷⁸ Second, it confers to the federal government the “plenary power” over treaty making with tribes, not the absolute power over tribes (F. S. Cohen, 1942; Getches et al., 1998; Monette, 1996). Notably, however, tribes are not subject to state governments unless Congress expressly delegates power to them (which is out of the scope of this dissertation).⁷⁹

3.7.3 Sovereign Immunity of the Tribes

Sovereign immunity is “a government’s immunity from being sued in its own courts without its consent” (Garner, 2001). The Eleventh Amendment of the Constitution guarantees states’ sovereign immunity against lawsuits, including those brought by Indian tribes.⁸⁰ The Federal government is also generally immune from lawsuits without its consent, but has allowed suits for torts under the Federal Tort Claims Act of 1946.

The U.S. Supreme Court has recognized common law tribal sovereign immunity in several major court cases, most recently in *Michigan v. Bay Mills Indian Community*.⁸¹ Sovereign immunity also extends, with some limitations, to tribal corporations that are

⁷⁸ Art. I, sec. 8

⁷⁹ Public Law 83-280, a relic of the Termination era, mandated five states to assert full criminal jurisdiction over Native Americans who commit crimes on reservations within those states, and allowed the rest to pass laws exerting criminal jurisdiction in Indian Country. It does not, however, divest tribes of this power.

⁸⁰ *Seminole Tribe of Florida v. Florida*, 517 U.S. 44 (1996).

⁸¹ *Michigan v. Bay Mills Indian Community*, 134 S.Ct. 2024 (2014).

run by or have a close relation to the tribal government and engage in governmental functions. It, however, does not protect tribes against lawsuits by the United States.⁸² Congress may waive a tribe's sovereign immunity through statute, although it must explicitly indicate that the enforcement mechanism applies to tribes. A tribe also may waive its immunity through contracts or by pursuing legal action (Wilkins & Lomawaima, 2001; Canby, 2015).

3.8 Role of the Bureau of Indian Affairs and Department of the Interior

Originally established under the War Department in 1824, the Bureau of Indian Affairs (BIA), as it is now called, was moved to the Department of the Interior (DOI) in 1849. The Secretary of the Interior, the Assistant Secretary for the Interior for Indian Affairs, and Bureau of Indian Affairs were delegated the authority for the “management of all Indian affairs and of all matters arising out of Indian relations” under Title 25, United States Code, section 2 (2014); see also Title 25, U.S. Code, section 9 (2014) and Title 43, U.S. Code, section 1457. Title 25 of the Code of Federal Regulations and the Indian Affairs Manual, which is still being drafted, enumerate most of the rules and guidelines under which the BIA operates (BIA, 2015b).

The mission of the BIA is “to enhance the quality of life, to promote economic opportunity, and to carry out the responsibility to protect and improve the trust assets of American Indians, Indian tribes and Alaska Natives” (BIA, 2015a). This mission is implemented through four main offices, including the: (1) Office of Indian Services; (2)

⁸² *Miccosukee Tribe v. United States*, 698 F.3d 1326 (11th Cir.2012).

Office of Justice Services; (3) Office of Trust Services; and (4) Office of Field Operations, which manages twelve regional offices and 83 reservation-level agencies (see Figure 1).⁸³ The BIA provides an array of programs and services that include “natural resource management on trust lands representing 55 million surface acres and 57 million acres of subsurface minerals estates,” as well as social services, schools, economic development, law enforcement, housing improvement, and infrastructure (e.g., roads, dams, and irrigation systems).

In its nearly 200-year history, the BIA has implemented a range of US government policies, from subjugation, assimilation, displacement, allotment, and extermination in the nineteenth century to the “Indian New Deal” in the early part of the twentieth century, from the termination of tribes and rejection of the federal trust responsibility in the 1950s to “promoting and supporting Indian Self-Determination” in 2015 (Jewell, 2014; McCarthy, 2004; Palmer, 2007; Wilkins & Lomawaima, 2001). The BIA has been the target of more than a thousand investigations, reports, commissions, and studies, as well as a great deal of criticism for “‘incompetent’ management of trust assets; excessive regulations and ‘red tape;’ ‘incompetent’ technical assistance to tribes; and ‘deficient’ performance of activities such as credit, finance, contracting, and procurement” (McCarthy, 2004, p. 6-7, citing Commission, 1977).

⁸³ “The Office of Indian Services operates the BIA's general assistance, disaster relief, Indian child welfare, tribal government, Indian Self-Determination, and reservation roads programs. The Office of Justice Services directly operates or funds law enforcement, tribal courts, and detention facilities on Federal American Indian Lands. The Office of Trust Services works with tribes and individual American Indians and Alaska Natives in the management of their trust lands, assets, and resources. Finally, the Office of Field Operations oversees 12 regional offices and 83 agencies which carry out the mission of the Bureau at the tribal level” (BIA, 2015a).



Figure 1. American Indian lands in the United States, 2014.

Source: The Bureau of Indian Affairs (BIA) Office of Trust Services (OTS) Division of Water and Power (DWP); disseminated by the BIA Geospatial Support (OTSGS) function in Lakewood, CO.

In 2000, Kevin Gover, now Assistant Secretary-Indian Affairs, expressed his profound sorrow and apologized on behalf of the Bureau of Indian Affairs because “the works of this agency have at various times profoundly harmed the communities it was meant to serve.” In his speech, Gover enumerated the forced removals of the southeastern tribes and 1,000-mile death march in the Trail of Tears, the “ethnic cleansing that befell the western tribes,” “the deliberate spread of disease,” the “cowardly killing of women and

children...on a scale so ghastly,” the “devastation of tribal economies,” “acts against children entrusted to its boarding schools,” and the “deliberate annihilation of Indian culture” through the prohibition on Indian languages, traditional religious activities, and traditional government (Gover, 2000). “And while the BIA employees of today did not commit these wrongs,” he concluded, “we acknowledge that the institution we serve did. We accept this inheritance, this legacy of racism and inhumanity. And by accepting this legacy, we accept also the moral responsibility of putting things right.”

Despite the efforts of good people to turn things around, the BIA’s troubles did not end there. The BIA has spent much of the 21st century trying to meet the requirements of the Trust Fund Management Reform Act, and was embroiled in the highly contentious *Cobell v. Norton* litigation and its fallout. Cobell and other American Indian beneficiaries filed a class action lawsuit against the BIA for mismanagement of Individual Indian Money (IIM) accounts, which accrue interest from allotted lands, and to force the government to fix the broken IIM trust system. The “unusually bitter” and “toxic tenor” of this litigation only exacerbated the relationship between tribes, Indian advocates, and the BIA (McCarthy, 2004). As a result, the agency underwent another reorganization.

Other Department of the Interior Bureaus, such as the Bureau of Land Management, Bureau of Reclamation, Fish & Wildlife Service, National Park Service, as well as other federal agencies, such as the Department of Housing and Urban Development (HUD), the Department of Health and Human Services (HHS), and the Department of Agriculture, also maintain tribal programs and services. Finally, it bears repeating that all federal agencies have a duty to consult and a trust responsibility to all tribes.

3.9 Summary

Federally recognized Indian tribes are political entities with the power of self-governance and self-determination. Although tribes granted some rights to the federal government as part of the treaty process, they retained the rights to govern their own domestic affairs, among other rights. The U.S. government has a government-to-government relationship with tribes, and a trust obligation to both tribal governments and American Indians as individuals. One expression of this trust relationship is the federal government's responsibility to consult with tribal governments on policy formulation and management decisions that may impact tribal lands, resources, and treaty rights. The Obama Administration has taken steps towards ensuring that the federal government meets its trust responsibility across all federal agencies, although the government and the courts have not always applied the trust doctrine consistently.

The federal government is also charged with protecting the public trust, which sometimes conflicts with the Trust doctrine. This is illustrated in the Supreme Court decision *Klamath Water Users*, which favored the public's interest in government transparency and accountability over the federal government's trust responsibility towards tribes. Scholars argue, however, that the federal trust responsibility should be given greater weight than the public interest when federal decision-making affects tribal sovereignty and treaty rights.

4. GIS IMPLEMENTATION BY THE BIA AND TRIBES

Adoption and use of geospatial data and technologies by American Indian tribes in the United States has grown steadily over the last three decades (e.g., SIPI, 2015; Deogawanka, 2014; Taylor et al., 2012; Bohnenstiehl and Tuwaletstiwa, 1999; PE&RS, 2001; Native Geography, 2000, 2001; ESRI, 2009; Marozas, 1993, 1996; Rattling Leaf, 2002). These technologies provide tribal governments with powerful tools for natural resource management, land acquisition, land use planning, community development, historic preservation, and emergency response.⁸⁴ Geographic information systems (GIS), in particular, have become instrumental in tribal land administration, planning and management. Since the mid-1980's, the Department of the Interior (DOI) Bureau of Indian Affairs (BIA), as the primary trustee of Indian tribes and Indian trust assets, has assisted tribes with GIS development, implementation, and training. To address internal needs and to support tribal government activities, the BIA, in cooperation with the tribes, created and maintained a spatial data library of tribal lands and resources. As the BIA's budget for these initiatives dwindled, however, tribes turned to other federal agencies, including the DOI's Bureau of Land Management (BLM), the U.S. Environmental Protection Agency (EPA), the U.S. Geological Survey (USGS), and National Aeronautical and Space Administration (NASA), as well as universities, corporations, and non-governmental organizations, for financial and technical assistance in data acquisition and GIS database development. Some moved towards independently funded GIS systems.

⁸⁴ "Indian Country" is defined at 18 U.S.C. § 1151 (1994) and, in general, is "synonymous with all lands within the exterior boundaries of an Indian reservation (Monette 1996, 111)."

Not surprisingly, conflicts over control of and access to tribal geographic information and data have arisen. Under the Freedom of Information Act (FOIA), external parties have demanded that the BIA and other federal agencies hand over tribal geographic information and data, in some cases adversely affecting tribes' land and natural resource rights and interests. While this has been a long-standing concern among tribes,⁸⁵ federal and state court decisions, as well as the sophisticated data integration and analysis capacity of GIS, have brought information control and security concerns, among others, to the forefront.

Section 4.1 briefly explains what makes geospatial technologies special through a review and synthesis of the literature on the evolution of Geographic Information Science (GIScience) and adoption of new approaches like participatory mapping and "mixed methods." It also identifies and analyzes those aspects that are most relevant to tribal GIS use and how they may be problematic.

Section 4.2 provides a history of the Bureau of Indian Affairs' efforts to implement GIS at BIA agencies and tribal governments to meet its trust responsibilities, based on my analysis of historical government documents personally obtained from the BIA, based on a review and synthesis of the published literature and government websites, and based on information obtained while serving as a participant observer at tribal GIS conferences

⁸⁵ See Indian Amendment to Freedom of Information Act: Hearings on S. 2652 before the Subcommittee on Indian Affairs of the Senate Committee on Interior and Insular Affairs, 94th Congress, 2nd Session (1976); Indian Trust Information Protection Act of 1978, S. 2773, 95th Congress, 2nd Session. (1978).

over a number of years, and while working directly for a tribal enterprise to help build their GIS database (as described in Chapter 2, Section 2.2.2). This review focuses primarily on formative years of technology development and implementation, from the early 1990s to the early 2000s, as these years have had a profound and lasting impact on tribal information operations and security.

Mark Palmer's dissertation *Creating Indigital Peripheries: The Bureau of Indian Affairs, Geographic Information Systems, and the Digitization of Indian Country* (2006), and subsequent journal publications resulting from his dissertation (Palmer, 2006, 2007, 2012; Palmer & Rundstrom, 2013), provide the only other known historical review of the BIA's GIS implementation. Palmer's analysis is based primarily on archival records from the BIA's central GIS office in Lakewood Colorado, and is placed within the conceptual framework of actor-network theory and critical GIS, a sub-discipline of critical human geography. He concludes that BIA GIS implementation is a "recycling of traditional colonial practices," building "upon past efforts to control, represent, inventory, and manage American Indians and their land" (Palmer, 2006, 4). This chapter takes a different, although complementary approach. BIA internal documents and memorandum from the perspectives of a BIA area office and Washington headquarters, as well as direct experience working for a tribe during the days of BIA GIS implementation, add additional context to the story. BIA staff also provided short snapshots in time (BIA, 2014b; Bonner et al., 1986; Getter, 1985; Getter & Bonner, 1986; Wallace & Zekowski, 2013).

Section 4.3 provides greater context for tribal GIS adoption and use, initially discussed as part of Section 4.2. Section 4.4 explores why tribes and others have expressed concerns regarding the access and potential misuse of geographic information and GIS data in Indian Country, based on a review and synthesis of the literature, which focuses almost exclusively on traditional knowledge, and based on participant observations and interviews with tribal government and BIA staff, which touches on other forms of geographic information and GIS data (as described in Chapter 2, Section 2.2.2 and Section 2.2.3).

4.1 What is Special About Geospatial Technologies?

Geospatial technologies, such as geographic information systems (GIS) and satellite remote sensing, have evolved considerably over the past five decades, experiencing several waves of significant technological, institutional, and social change. We continue to see innovations in mapping technologies (e.g., GPS-enabled mobile phones, distributed wireless sensor networks, LiDAR, intelligent 3-D multisensory detectors, 3-D interior mapping), as well as in geographic information systems (e.g., web-based mapping platforms and web Application Programming Interfaces (APIs), allowing users to combine multiple web services into new applications called “mashups”) (see Shanley et al., 2013). In contrast to other database systems, GIS organizes and displays data by geographic location. It also uniquely allows for the overlay of different data sets (or “layers”) from different sources, such as a road network, parcel boundaries, and building footprints. Moreover, it allows users to query data based on their spatial relationships; for example, a user could ask the system to automatically select the three-bedroom homes

within a two-mile radius of a particular school. In sum, GIS enables users to capture, store, manage, “visualize, question, analyze, and interpret data to understand relationships, patterns and trends” (ESRI 2015a).

The application of GIS has expanded into numerous disciplines—from forest management to hydrological modeling, from land use planning to real estate site selection, from public health surveillance to simulation of emergency evacuations. As Openshaw (1991, 624) colorfully enthused, GIS can be used “to analyze river networks on Mars on Monday, study cancer in Bristol on Tuesday, map the underclass of London on Wednesday, analyze groundwater flow in the Amazon on Thursday, and end the week by modeling retail shoppers in Los Angeles on Friday.” Each new wave of innovation has been heralded as “revolutionary and universal,” Poore and Chrisman (2006) observe; GIS is positioned as “a technology that can be applied to any purpose, in any place, at any time.” GIS allows users to assemble data and information needed to study a problem; develop and evaluate “what if” scenarios; decide on a course of action; and then implement and evaluate the chosen solution’s effectiveness over time. Proponents of GIS claim its use can lead to better decision-making (ESRI, 2015b).⁸⁶

⁸⁶ For example, the ESRI website states: “Applying geography improves the decision-making process by addressing problems and evaluating proposed solutions implemented in a holistic, comprehensive, systematic, analytic, and visual manner. GIS furnishes digital tools for abstracting and organizing data, modeling geographic processes, and visualizing information that enable leaders to make meaningful and effective decisions. With GIS, the analysis of problems can have greater depth as many layers of data relating to the physical and cultural world can be considered together.” Accessed April 15, 2015. Available at: <http://www.esri.com/news/arcuser/1008/decisions.html>

As geospatial technologies evolved, so too did our conceptions of the science of geographic information and geographic information systems. Anselin (1989) asserted that geographic information was special for two empirical reasons: (1) spatial dependence,⁸⁷ which is the basis for spatial interpolation; and (2) spatial heterogeneity.^{88,89} Goodchild (1992) took this thinking a step further and challenged the acronym “GIS,” arguing that it was more than a “tool.” He instead coined the term “GIScience” —the science of spatial thinking. In an effort to develop a semantic “theory of geographic information,” Goodchild defined geographic information “by reference to an atomic element or tuple of the form $\langle x, z \rangle$ where x denotes some location in space-time, and z denotes some set of properties associated with that location, commonly termed attributes” (Goodchild 2003, 22). Geographic information, he posited, “is specified in some universally understood method of spatiotemporal referencing, while the other concept in the pair is specified according to some convention that is understood by both sender and receiver” (Goodchild 2003, 28). Goodchild et al. (2007) later described a “general theory of geographic representation in GIS” to integrate the concepts of “discrete objects” and “continuous fields.” They explained, “humans appear more comfortable describing the world in terms of discrete objects, while many physical processes are modeled in terms of continuous fields through the solution of partial differential equations” (p. 255).

⁸⁷ Spatial dependence is described by Tobler’s ‘First Law of Geography,’ which is “All things are related but nearby things are more related than distant things” (Tobler, 1970).”

⁸⁸ In other words, the “Earth’s surface exhibits statistical non-stationarity and uncontrolled variance, such that no part of it can truly be termed a representative sample of the whole; the full extent of variation can only be discovered by exploring every part of it” (Goodchild, 2011, 2439). Thus, “the results of any analysis are always dependent on how the boundaries of the study are drawn (Longley et al., 1999, 8).”

⁸⁹ Longley et al. (1999, 8) added a third reason, “the idea of expressing geography in a series of layers suggest that each layer captures something unique to it,” although in reality, they conceded, these layers would be correlated.

The recognition of “GIScience” as an emergent field sparked considerable discussion and debate within the academic community in the early 1990s (e.g., Goodchild, 1992, 1993, 1995, 2001, 2003, 2007, 2009, 2010, 2011, 2015; Openshaw 1991, 1992, 1996; Pickles, 1999; Poore and Chrisman, 2006; Taylor and Overton, 1991; Wright et al., 1998; A. Hall, 2014). As Pickles (1999, 49) recounted, “[t]he debate ranged from GIS as a [scientific] research tool and scholarly practice (and the epistemological grounds on which these battles were fought), to debate about its fundamental assumptions and transformative capacities, to dialogue about alternative pathways for a technology that is increasingly realizing both its utopian and dystopian possibilities.”

Pickles (1999), Curry (1998), and Poore and Chrisman (2006), among many others, emphasized that a “social theory of geographic information” was needed to address the social, institutional, and ethical implications of GIS. Wood (1992) warned of hidden agendas embedded in cartography, and by extension GIS; in essence, “maps are not the purely objective, scientific representations of the Earth’s surface that many traditionally assumed, but are to some extent social constructions” (Goodchild 2015, 4). Curry (1998) highlighted issues of privacy and surveillance, warning of the potential for misuse, abuse, and oppression. Others expressed concern that GIS created inequalities because of its high cost and the training and expertise required (Pickles, 1995; Sheppard, 1993). Taylor and Overton (1991) and Openshaw (1991, 1992) exchanged volleys over GIS’s simplistic representation of the world as polygons, which fail to capture uncertainty, complexity, and the fuzziness across boundaries. Critics argued that “GIS reduce[d] places and people

to ‘dots’ and enable[d] those in power to make decisions without involving local communities” (Pavlovskaya 2009, 16).

Over time, however, these debates receded. Today, both qualitative and quantitative GIS research “are seen as different but equally powerful research strategies if used appropriately. While one focuses on the power of generalization and statistical representation, the other enables explanation, understanding, and theoretical representation” (Pavlovskaya 2009, 17). Cope and Elwood (2009) provide an extensive review of the mixed methods approach. For instance, Participatory GIS (PGIS), or alternatively, “public participation GIS”/PPGIS), which emerged in the mid-1990s, bridges the two approaches by focusing on collaborative and co-created processes, including identifying the research questions, collecting and analyzing the data, and interpreting and applying the results. PGIS also places value on diverse perspectives, ways of knowing, and storytelling, incorporating oral narrative, cognitive maps, sketch mapping, photos, audio, and more (IAPAD, 2015; Wright et al., 2009; Elwood, 2006; Sieber, 2006).⁹⁰

Within the context of indigenous communities, PGIS research has explored: “(1) land claims and land tenure; (2) resource management; (3) conflict and conflict resolution; (4) equity issues; and (5) community awareness” (Laituri, 2011). “Counter-mapping,” coined by (Peluso, 1995), emerged within PGIS in reaction to the dominant power structures of government agencies and corporations in relation to indigenous communities, as well as

⁹⁰ A related term is Public Participation GIS (PPGIS), originating from the 1996 meetings of the National Center for Geographic Information and Analysis (NCGIA).

to the “hegemonic politics inherent in the [government] maps they are countering” (Rundstrom, 2009). This bottom up approach is generally used to refer to the mapping activities of indigenous peoples, but in recent years also has been applied to other marginalized groups in developing countries. Even with PGIS projects, however, there are a number of pitfalls associated with the collection and use of indigenous geographic information and data. Some of these issues, as examined by Laituri (1998), Palmer (2007), and others, include: access, ownership, and control of the process and geographic information and data; diminishment of the complex subtleties in indigenous geographic information and data (e.g., complex land ownership and interest, spiritual values and perceptions, etc.); protection of individual and community privacy; protection of sensitive information (e.g., location of eagles’ nests); accounting for the diversity within a community (e.g., gender, age, class); political implications for local power relations (e.g., conflict and disempowerment); use and exploitation of indigenous geographic information and data for personal gain or project legitimization; scale of analysis and locational accuracy (Brown, 2004, 2005; K. J. Chambers et al., 2004; Cole, 1993; C. Dunn, 2007; Jefferson Fox, Suryanata, & Hershock, 2005; Laituri, 1998, 2011; Rambaldi, Chambers, McCall, & Jefferson Fox, 2006; Rundstrom, 1995; Turnbull, 1989; Wainwright & Robertson, 2000; Campbell, 2002; Jefferson Fox, 2002; Monmonier 1996; Rambaldi, 2004a; Rambaldi and Weiner, 2004; Thom, 1997; Turnbull, 1998; Weinstein, 1998; Wood, 2000).

Wright et al. (2009, 260-61) note, “[t]here is a tendency by the wielders of the technology to overstate the technical complexities of PGIS projects while downplaying, or not

recognizing the scale-dependent political context.” Cole (1993) asserted “that the decision-making process in designing and producing the modern editions of the Bureau of Indian Affairs maps, *American Indian Land Areas* (1971, 1987, and 1989), yielded a highly generalized federal view of Indian reservation lands at a given scale. In turn, this view has vast potential for corrupting the untutored map reader’s cognitive cartography through the creation of erroneous assumptions regarding ‘American Indian Land areas.’” Palmer (2007, 220) also warned that BIA’s “GIS implementation strategy can have homogenizing and universalizing impacts upon American Indian cultural landscapes, geographic knowledge and native languages.” These issues spurred Louis (2007), Pearce and Louis (2008), and others to propose the development of “Indigenous methodologies” for geographic research that integrate and are “sympathetic, respectful, and ethical” to indigenous voices (Coombes, Johnson, & Howitt, 2014; J. Johnson, 2012; J. T. Johnson, 2008; Louis, 2007; Pearce & Louis, 2008). This includes co-creating the research agenda and actively collaborating with the indigenous community throughout the research process, understanding and accepting Indigenous knowledge systems, being cognizant of the researcher’s own biases, sharing knowledge and products of the research back with the community for input and feedback, and giving them credit and co-authorship for their contributions (Louis, 2007).

One of the critical issues that should be addressed as part of any PPGIS/PGIS project is the matter of who owns, controls, and can have access to the geographic information and GIS data created, collected and maintained as part of these activities (e.g., Jefferson Fox et al., 2005; Laituri, 1998; Rambaldi, 2004a). As Rambaldi (2004a, p. 1) comments,

“intellectual ownership of [the language of maps] and the content of knowledge which it communicates, are critical factors in determining the success of the processes to which mapping and maps are put.” Jefferson Fox (2002) concurs, “if local people do not have control of their maps, they may not be any better off than they were before their lands were mapped.” Unfortunately, the issue of ownership and control is not always addressed. Perhaps all too commonly in PPGIS/PGIS projects, “facilitators [take] all [the] outputs with them, aerial photographs, legend, depicted community knowledge... What [is] left with the participating villagers? Nothing except the promise to come back” (Rambaldi, 2004b).

Despite these risks, Pavlovskaya underscores that the powerful visualization tools made possible by GIS draw on both qualitative and quantitative methods. It allows researchers to visually examine the data and results for errors and fitness for use. Pavlovskaya (2009, 23), however, cautions, “GIS unveils worlds to researchers, policy makers and the public, worlds made ‘true’ by the assumed legitimacy of data and visual displays.” Elwood (2009, 70) emphasizes that communities and grassroots groups can use this to their advantage; GIS “can facilitate the efforts of these organizations to insert their perspectives and priorities as authoritative representations of an actually existing reality.” GIS can support “sharing history of place, enhancing group awareness and identity, and building trust and communication between people” (Jefferson Fox et al., 2005). In a case study from western Oregon forest management, Wright et al. (2009, 265) found that the *process* [GIS technology] initiates, of communicating over a multilayered map, even in conflict-ridden setting, can become itself a tool of [constructive] change.”

4.2 Implementation of GIS by the Bureau of Indian Affairs

The launch of the first Landsat satellite in July of 1972 ushered in a new era of digital mapping for the BIA, which before had relied on image interpretation and analysis of high-altitude aerial photographs. With the technical assistance of the National Aeronautics and Space Administration (NASA) and Bureau of Land Management (BLM), the BIA used Landsat data to map the forest cover of six reservations, including Colville, Warm Springs and Quinault in the Northwest and Fort Apache and San Carlos in the Southwest. The Department of the Interior (DOI) also initiated the design and development of a Natural Resource Information System (NRIS) through a series of contracts with the large aerospace companies Rockwell, Boeing, and Raytheon. This system was piloted on the Quinault Reservation and surrounding area in Washington State. Because the software was costly to license and operate, however, it was discarded in 1976 (Palmer & Rundstrom, 2013).

Prompted by a Congressional mandate to develop habitat mitigation strategies for resource extraction on public lands, the U.S. Fish and Wildlife Service (USFWS) worked with the BIA's Branch of Forest Resources and Planning within the Northwest Area Office in Portland, OR, beginning in the late 1970s, to develop the Map Overlay and Statistical System (MOSS), a public domain, vector-based mapping software system. Over its lifetime, MOSS was part of and funded by a larger *Cooperative Strategy for Technology Transfer* initiative promoted by the DOI. At least seven agencies participated through a variety of MOUs and Inter-agency Agreements, including the BIA, BLM, Soil

Conservation Service, U.S. Forest Service (USFS), USFWS, and Army Corps of Engineers (Bonner et al., 1986; Getter, 1985; Getter & Bonner, 1986; Palmer & Rundstrom, 2013; Parker, 1986).⁹¹ The goals of this effort were to: “(1) conduct research and development (R&D) and implement appropriate GIS technologies to support the Bureaus’ missions to collect, store, retrieve, analyze, and disseminate earth science and other digital spatial data; (2) improve the understanding of the nature and management of the Nation’s energy, mineral, water, and land resources by conducting innovative interdisciplinary research that promotes applications of GIS technology to new areas or activities, and (3) continue to develop the state-of-the-art of GIS technology for more efficient and effective future applications” (Kleckner, 1986).

One interview participant recalled:

“the beginning of GIS [at the] BIA began with Robert Wright, Forester at the Hoopa Agency. A U.S. Geological Survey (USGS) employee came to BIA, talking about a computer mapping system. Between 1978 and 1980, Wright grabbed the idea, [and] got Hoopa Reservation USGS data and Hoopa timber [data] entered into the MOSS [GIS system] to do comprehensive forestry planning. Portland Area Soil Scientist Don Jones, and Portland Regional Range Conservationist Gene Eggleston supported Wright’s [work]. [Around 1981], they

⁹¹ This initiative also can be put into the context of federal wide efforts to coordinate and standardize GIS data to facilitate data exchange, as well as to reduce duplication of effort. OMB Directive No. M-83-12, issued April 4, 1983, called for “better coordination by federal agencies in federal digital cartographic data programs.” In 1983, the Office of Management and Budget (OMB) underscored the necessity of coordination by establishing the Federal Interagency Coordinating Committee on Digital Cartography (FICCDC), a pre-cursor to the current Federal Geographic Data Committee (FGDC), and assigned chairmanship to the Department of the Interior. (Hodel, 1985)

also brought GIS to the Yakama Reservation Soil and Range Inventory, which became the first large-scale [GIS] pilot project [for the] BIA. The data connection was a 300-baud (bits per second) acoustic coupler modem connection to the Fish and Wildlife Data Center in Colorado. Graphics drew on a six inch Tektronics monochrome graphics terminal.”

Between 1983 and 1986, the Don Jones, Gene Eggleston, and the BIA staff in Washington, DC established the Indian Integrated Resource Information Program (IIRIP) to provide geospatial and remote sensing support for natural resource management activities at the agency (BIA, 1993). As part of the IIRIP, the BIA Office of Trust Responsibilities contracted with the BLM, USFW, and Colorado State University (CSU) to produce the first digital geospatial base maps of reservations, selecting ten reservations located near the Northwest, Southwest, and Midwest Area offices (Marchand & Winchell, 1992). The BLM accomplished this task through a process of manually digitizing paper 1:24,000 USGS topographic series maps and other land resource maps. This effort captured a standard set of “basic themes” considered common to resource management activities on American Indian trust lands, including: (1) lakes and reservoirs; (2) U.S. Public Land Survey grid lines;⁹² (3) reservation boundaries; (4) stock tanks and springs; (5) streams; and (6) transportation network. Fifty-five additional data layers were developed, including land ownership, archaeological sites, “religious areas,” irrigation ditches, soils and soil irrigation projects, range conditions and productivity,

⁹² The Public Land Survey System (PLSS) is “a way of subdividing and describing land in the United States. All lands in the public domain are subject to subdivision by this rectangular system of surveys, which is regulated by the U.S. Department of the Interior, Bureau of Land Management (BLM).” Accessed April 19, 2015. Available at: http://nationalmap.gov/small_scale/a_plss.html.

timber type, fire fuel ratings, and oil and gas leases (BIA, 1992; Bonner et al., 1986; Bonner & Hall, 1986; Getter, 1985; Getter & Bonner, 1986; Palmer & Rundstrom, 2013; Parker, 1986).

By the end of 1987, the BIA created the Geospatial Data Services Center (GDSC) in Lakewood, Colorado, to serve “as the policy and technical arm” of the IIRIP. The GDSC developed GIS data, provided computer hardware and GIS software, ran a Help Desk, and offered training to meet the mandates of trust responsibility and to support tribal governments (BIA, 2014a). Initially, six contractors from Colorado State University and four from TGS Technology, Inc., staffed the office (Bonner & Hall, 1986). The BIA also assigned a National GIS Coordinator⁹³ at the GDSC, and hired full-time and part-time Regional GIS Coordinators⁹⁴ in at least five of the twelve BIA Area offices.⁹⁵ These individuals served as liaisons between the Geographic Data Service Center and local BIA agency offices, helped to establish geospatial technologies at BIA agencies and tribal governments, and provided technical assistance (BIA, 1993; Bonner & Hall, 1986; Ryan, 1986). All of the GIS coordinators have since retired and have not been replaced.

⁹³ The National GIS Coordinator “provides program coordination and direction for all GIS and Remote Sensing activities. This individual is responsible for the overall program management, and is authorized to provide direction with respect to the implementation of the program. The National Coordinator also manages the GIS budget, and determines the optimum uses of the program funding to achieve operational implementation.” Interestingly, “[r]esearch and development (R&D) is the sole responsibility of the National Coordinator (Ryan, 1986).”

⁹⁴ BIA GIS Area Coordinators “are responsible for the on-going operational GIS activities being conducted by their specific office, and agencies. They are to provide program coordination, and technical support for the Area. ... These individuals’ responsibilities include but are not limited to: map preparation, digitizing, data base development, analysis, and operational applications of remote sensing within their Area (Ryan 1986).

⁹⁵ In 1986, GIS Coordinators had been hired for BIA Area Offices located in Albuquerque, Billings, Portland, Minneapolis and Sacramento. Phoenix was in the process of advertising for a Coordinator for their office. (W. J. Bonner & Hall, 1986)

A primary driver for BIA GIS data collection and use was the Integrated Resource Management Planning (IRMP) program, which was initiated by the BIA Office of Trust and Economic Development in 1983 and is still in practice today (BIA, 1993, 2005, 2015c; D. Hall, 2001). The Tribal Integrated Resource Management Plan (IRMP) “is a long-range, strategic level, comprehensive plan which integrates the management actions applied to a tribe’s natural resources and other resources of value. It is a tribal policy document, based on the vision the tribe has for its resources” (BIA, 2015c). The BIA and tribes also cooperated on GIS for routine resource management. For example, in the Northwest and Midwest, they used GIS to manage and inventory their forests, harvest timber, track insect infestation, and fight forest fires. The BIA also used GIS to track and manage other valuable tribal assets, including oil and gas, minerals, water resources, fish and wildlife, and rangeland.

According to the BIA’s *Guidelines for Integrated Resource Management Planning in Indian Country*, “[i]ntegrated resource management goes beyond the natural world and incorporates social, cultural, environmental, and economic aspects of the reservation into the management scenario” (D. Hall, 1996). In principle, “each tribe will decide on the resource management philosophy which best fits its needs and develop and [sic] appropriate approach to creating its own Integrated Resource Management Plan” (D. Hall, 1996). Unfortunately, this was not always the case; for instance, Palmer (2006, 81), citing (BIA 1990a, 18), reveals the Fort Apache tribe’s “participation in the development of the Fort Apache IRMP was terminated...the [BIA Fort Apache] agency is continuing

the process without tribal participation.” Furthermore, American Indian tribes found it difficult to access the necessary maps, data, and guidance in order to successfully navigate the IRMP process (Palmer 2006, 78, citing United States Congress, 1994).

The GDSC organized a BIA coordinators and tribal representatives meeting on February 13-16, 1990 in Lakewood, CO, to ascertain “area, agency, and tribal concerns and complaints concerning the Service Center [GDSC]” and “establish a BIA wide basis upon which to develop a national strategy for the implementation of spatial data technology” (Bonner, 1990b). Participants were split into five working groups of approximately five people, each equipped with flip charts, paper, index cards, and pens. Each person independently listed and prioritized their concerns, which were then aggregated and prioritized for each table. Collectively, the groups identified 37 issues that were condensed to 11 priorities. In addition to staffing, training and budget concerns, participants underscored the difficulty in obtaining “638 contracts” (explained below) to develop tribal GIS applications because BIA funding for GIS was ad hoc. They also suggested that the GDSC staff make on-site visits “to better understand Area, field, and tribal problems” (Bonner, 1990b). Palmer and Rundstrom (2013) criticize the BIA-controlled IRMP land management and leasing program, which the GIS was designed to support, because non-Indian private companies that extracted tribal timber and other resources from reservations benefited heavily from it, because the lease payments to the tribes were “often redirected” or “lost,” and because independent assessments repeatedly found the BIA’s use of IRMP for forest management to be ineffective.

In early 1988, the BIA adopted ESRI's Arc/Info as "a Bureau standard for GIS."

According to Adams (1999, 5), the BIA also decided that:

"due to the high cost of software, hardware, maintenance, administration and data development, most tribes and local BIA Agencies could [sic] not afford to operate a GIS locally. Therefore, the GDSC moved to a centralized Arc/Info GIS, running on a Prime platform, with access for the local agency users provided via terminals connected by serial modems. Digitizers and plotters were connected via the terminal and modem to allow data entry and map production locally."

The BIA began the conversion of all MOSS databases into Arc/Info, but this process was slow. It acquired tribal-related GIS data sets in one of three ways: 1) by creating GIS data sets about reservations for internal operations and/or for the benefit of tribes; 2) by requiring that tribes share certain GIS data sets, such as reservation boundaries, which the tribes created themselves; or 3) by receiving GIS data that tribes shared voluntarily to be archived at the GDSC as "backups." These GIS datasets were created under a variety of funding and contractual arrangements. The BLM, U.S. Environmental Protection Agency (EPA), U.S. DOI Bureau of Reclamation, U.S. Geological Survey (USGS), and U.S. Forest Service (USFS) also made significant investments for tribal GIS database development, equipment and training (Bohnenstiehl & Tuwaletstiwa, 2001; Palmer & Rundstrom, 2013).

The BIA GDSC provided access to the centralized GIS database, to which tribes could connect via a dialup modem. This connection was often sluggish, making the system difficult and frustrating to use (Adams, 1999). To paraphrase one BIA GIS coordinator who commented, we couldn't afford a Cadillac that wasn't going to work, so instead we

bought a Volkswagen that was drivable.⁹⁶ Furthermore, GIS software at the time was command-line driven, resulting in a steep learning curve, and requiring expensive UNIX-based computers to run. Budget realities, the early stage of the technology, and the novelty of GIS to those planning and implementing the program made the early days of implementation and use difficult for all—BIA and tribal staff alike. The BIA only had a budget of \$7 million, and a small staff of 10 national technical staff, 12 regional staff, and a few local BIA agency and tribal staff to support GIS development at the BIA and with all the tribes. Despite these limitations, the GDSC and BIA GIS coordinators delivered GIS to tribal field offices well before the U.S. Forest Service or the U.S. Environmental Protection Agency had functioning systems, and as one interview participant noted, before NASA “arrived with the promise of buckets of money.”

Like many other government entities during this time, tribes were reluctant to spend limited resources on new, unproven, and expensive technology⁹⁷ (Adams, 1999; BIA, 2014a; Bohnenstiehl & Tuwaletstiwa, 2001; Corbett, Chapin, Gibson, & Rambaldi, 2009; Palmer, 2007). According to Bohnenstiehl and Tuwaletstiwa (2001), “tribes that had casinos or that were involved in extractive industries such as coal mining or petroleum production were the only groups that could afford the technology.” By 1989, however, the needs of large, forested reservations—such as Warm Springs, OR, Flathead, MT,

⁹⁶ For comparison, one interview participant indicated that the EPA received \$500 million, BLM received \$100 million, and UWFS received \$200 million for rollout of GIS systems, while the BIA received \$7 million.

⁹⁷ Adams (1999, 6) notes, “[t]he local MOSS/Prime system was used for less than seven months before being shut down, replaced by terminal/modem access to the GDSC’s system. This machine produced only one map product, sometimes called the “the 40,000 map.” (Rolph 1997) The Prime still sits, underneath a box of dead fluorescent light tubes and some old terminals, in a closet just outside the room it once occupied at the Colville Indian Agency.”

Colville, WA, and Umatilla, OR, Yakima, WA—outpaced the resources GDSC could provide through the centralized system. To address complaints about “a small percentage of users occupying a disproportionate amount of system disk space,” the GDSC imposed storage limits (Bonner, 1990a). The BIA initially denied a request by Warm Springs and Flathead reservations to establish their own GIS systems, but then reversed itself later that year. In 1990, Colville established a GIS system jointly with the BIA through a Cooperative Agreement, splitting costs and labor (Adams, 1999).

In 1992, the BIA issued a *Strategic Plan for the Indian Integrated Resource Information Program (IIRIP)* (BIA, 1992), developed with input from more than 200 people through a series of meetings at several Area Offices and in Washington, DC. The IIRIP (not to be confused with IRMP) provided support for digitizing additional GIS layers, maintain existing GIS databases, training, and technical assistance. The Plan acknowledged that the needs of American Indian tribes had not been incorporated into the GIS planning and implementation process, stating:

“IIRIP has passed a cross-road. Until recently, the driving force behind program direction has predominantly been found within the GDSC. User needs have frequently not been factored into GDSC decisions. User input has not been requested. Tribes have played only a small role in the program’s direction.”

The Plan highlighted the need for improved communication and a more participatory process for the future development of GIS, noting:

“[f]ailure to create and maintain quality communications between all levels of IIRIP has led to a disgruntled user community which feels it has been cut off from the decision making process. Creation of policy without adequate field participation, especially participation by tribes, runs counter to the goal of self-determination in Indian Country.”

To address these concerns, GDSC was required to improve its communication, including “respective and empathetic communication to Area [GIS] Coordinators, and Agency and Tribal employees that is always characterized by patience and active listening.” In addition, the Plan suggested that the GDSC host twice-yearly GIS Coordinators meetings and [IIRIP] User Group meetings to improve communications. The Plan called for the expansion of “the role of the user community in determining the direction the program must take” and proposed a grand vision:

“It is the vision of those who have labored to create this strategic plan that GIS and remote sensing become an integral part of management activities throughout Indian Country and, in so doing, contribute to more effective and efficient management of Native American resources. It is further envisioned that this technology will be smoothly and swiftly transferred to tribes and will then be used in a manner which is a clear example of tribal sovereignty through the support of tribal self-determination” (BIA, 1992).

Although well intentioned, this vision and many of the goals enumerated within the Plan were not fully realized.

Tribal adoption of GIS began to rise in the early 1990s. More than 152 tribal governments (or approximately 27% of federally recognized tribes) were either building or maintaining GIS databases, using ESRI’s Arc/Info, Atlas GIS, or Intergraph (Barnes, 1994; Cole, 1993, citing a 1992 BIA quarterly report). This was in part, however, due to the continuing work of the BIA to digitize the relevant 1:24,000 USGS topographic maps.⁹⁸ To improve communication as per the 1992 Strategic plan, the GDSC organized a

⁹⁸ According to Palmer and Rundstrom (2013), “[t]he maps yield locations of buildings, campgrounds, pipelines and transmission lines, roads, wells, tanks, streams, lakes, ponds, reservoirs, springs, boundaries of states, reservations, and counties, surveyed townships and sections of the U.S. Public Land Survey, and areas where land tenure was designated, particularly those places managed by other federal or state agencies.”

planning meeting in December 1993 to establish the Intertribal GIS Council (IGC). The original idea for the IGC, however, sprang from conversations started in 1991 between Bill Northover of the Yakama Nation, who was working for Confederated tribes of Umatilla at the time, and GIS staff at the Confederated Salish & Kootenai tribes and the Cherokee Nation (Wang, 2001). The planning meeting resulted in the adoption of draft articles and bylaws, and the selection of an interim board of directors. The mission of the IGC was to “promote successful use of GIS and related technologies on Native American lands, building cooperation and promoting partnerships among tribes, coordinating exchange of technical information, seeking GIS funding opportunities, and educating tribal members and staff about tools for supporting tribal land and natural and cultural resource interest.” Under the leadership of founder Bill Northover, along with the 20 tribes who helped to launch the organization, the IGC held its first conference on June 20-24, 1994, on the Flathead Indian Reservation in Pablo, Montana, with support from the First Nations Development Institute, ESRI, BIA, NASA, and the USGS. The conference was held annually thereafter at reservations around the country, focusing on GIS applications for natural resource management and improved government service delivery. A seven member Board of Directors representing tribes from across the country helped to run the organization, which was incorporated about 2000 and staffed by four employees in Pendleton, Oregon. At its peak, the IGC reached more than 500 tribes, as well as universities, foundations, federal agencies, and the private sector, and attracted more than 800 people to its conferences. Unfortunately, due to the difficult climate resulting from the 9/11 attacks, federal funding sources dried up and long-time staff left.

The remaining organizers did not collect dues as services could not longer be provided, and IGC eventually dissolved by 2003 (Barnes, 1994; Corbett et al., 2009; Wang, 2001).

As the BIA implemented and updated the IIRIP strategic plan in 1993, it struggled with how to structure the IIRIP, and hence the GDSC. The 1993 GDSC Strategic Plan asked,

“[t]hroughout the history of the IIRIP, managers and users have wrestled with the dilemma of whether the Program should be centralized or decentralized; that is, are the tribes better served with a system at one central location with data management and processing originating from one computer to the field sites, or are they better served if the data and processing are distributed on many platforms with local offices exercising direct control over their data?”

The 1993 Plan weighed the efficiencies of scale of a centralized system gained from a standardized approach to GIS data creation, application development, and contract support with the benefits of a decentralized system that gives users “a feeling of control over their data,” and “removes the stigma of an impersonal distant office applying dictums concerning their information needs.” This debate, however, was not unique to the BIA or tribal governments. Municipal and county governments, as well as large corporations, also leaned towards centralized GIS systems—at least until the technology advanced and the GIS industry as a whole moved towards a more distributed or “federated” approach. Ultimately, the report concluded that “[t]he GDSC should be structured to continue the delivery of centralized GIS/[Remote Sensing] services as long as tribes and Agencies request.⁹⁹ The GDSC must also gear itself to assist tribes and Agencies that want their data and processing capability housed locally” (Hardzinski et al.,

⁹⁹ The 1993 GDSC Strategic Plan recommended a restructuring of the GDSC from an organizational structure focused around “computer systems,” “GIS,” and “Remote Sensing” to a more sophisticated model that included “client services,” “mapping services,” “computer systems,” “database support,” and “applications development.”

1993). According to one interview participant, the GDSC “sought to work with the system that was possible, but make it user-centric as much as they could.” There was a feeling among the BIA GIS staff that they “were doing something special and innovative that would change people's lives for generations.”

During this time, the BIA also began to develop a policy regarding ownership of the GIS data. It concluded that the tribes owned the data the BIA had created for their reservations, and the data only could be released with tribal concurrence. The BIA formalized this policy in a memorandum, dated December 1994 (GDSC, 1994; Hardzinski, 2000).

With the development of faster computers and easier-to-use PC-based “Desktop GIS” software in the late-1990s, tribes began to develop their own centralized land information systems. Bohnenstiehl and Tuwaletstiwa (2001, 2) commented,

“[a]s tribes upgraded their systems with newer software and more powerful computers, it was only logical that tribes add new services to their clients. This include[d] the in-house capability to produce digital orthophotos, conduct high accuracy geodetic grade GPS surveys, and, in some cases, the ability to order, process and use satellite imagery. ... Many tribes have invested in resource and survey-grade GPS systems to enable them to survey and map with a high degree of precision in isolated, rugged areas. The more advanced users have densified their network of control points using the existing National Geodetic Survey National Spatial Reference System. This allows for aerial control surveys, cadastral surveys, and other precision surveys to be based on a single, national spatial framework.”

A shortage of tribal members with formal GIS education or training, however, resulted in the hiring of non-native employees to manage tribal GIS programs. Notably, these

individuals often brought with them outside perspectives on how GIS data should be used, accessed and shared.

The development of BIA and tribal GIS systems also was affected by a change in federal policy on two fronts. First, President Clinton issued Executive Order 12906 mandating the creation and coordination of the National Spatial Data Infrastructure (NSDI)¹⁰⁰ (Clinton, 1994), which included building partnerships with tribal governments. Second, Clinton issued an Executive memorandum accentuating the government-to-government relationship between the U.S. government and tribal governments (Clinton, 1994). This came with a parallel shift in Congressional appropriations from the BIA to Indian tribes through the implementation of new regulations for Public Law 93-638, Indian Self-Determination and Education Assistance Act, as Amended, including Title I, Pub. L. 103-413, the Indian Self-Determination Contract Reform Act of 1994. The Secretaries of the Department of the Interior and the Department of Health and Human Services (HHS) issued a joint rule¹⁰¹ allowing the two Departments to award contracts and grants to American Indian tribes to assume responsibility for some of the Departments' functions. The rule became effective August 23, 1996 (ISDEAA, Public Law 93-638, 25 CFR Part 900). The BIA inventoried the programs and functions it performed at the Central Office,

¹⁰⁰ The National Spatial Data Infrastructure is “defined as the technologies, policies, and people necessary to promote sharing of geospatial data throughout all levels of government, the private and non-profit sectors, and the academic community. The goal of this Infrastructure is to reduce duplication of effort among agencies, improve quality and reduce costs related to geographic information, to make geographic data more accessible to the public, to increase the benefits of using available data, and to establish key partnerships with states, counties, cities, tribal nations, academia and the private sector to increase data availability.” Accessed April 29, 2015. Available at: <http://www.fgdc.gov/nsdi/nsdi.html>

¹⁰¹ The rule was issued as required by section 107(a)(2)(A)(ii) of the Act.

twelve Area Offices, and Agency Offices, including all of its GIS activities, in order to determine which functions could be contracted by the tribes (BIA, 1996b).

According to the BIA *Tribal Sub-Group on Tribal Shares* meeting summaries (BIA, 1997c) and an internal memo obtained by the author to one of the Area Office Directors (1998), this new rule generated confusion about what aspects of the BIA's GIS and other operations were "inherently federal functions," and which were available to tribes to perform through direct BIA services, contracts, grants, or self-governance agreements. OMB issued guidance on inherent federal functions with respect to private commercial contractors, but Indian tribes are not commercial contractors: They have a unique government-to-government relationship with the Federal Government. One employee opined that BIA functions are inherently federal because "they come from the U.S. Constitution. The BIA also has trust functions which stem from Federal Indian relations contained in the Constitution." Another asked, "[a]t what level does the residual lie—does an Area Office have the right to say there is no residual at the Agency level?" BIA residual functions are "those functions that only BIA employees could perform if all tribes were to assume responsibilities for all BIA programs that the Act permits."¹⁰² The response, "Residual lies where the tribes decide to put it" (BIA, 1997c). Ultimately, this question of whether or not spatial data and analysis was an inherently government function was clarified in 2003 under the criteria established in OMB Circular A-76 Revised, "Performance of Commercial Activities;"¹⁰³ the acquisition and management of

¹⁰² 25 CFR 1000.94 – What Are BIA Residual Funds? Accessed April 18, 2015. Available at: <https://www.law.cornell.edu/cfr/text/25/1000.94>.

¹⁰³ https://www.whitehouse.gov/omb/circulars_a076_a76_incl_tech_correction/

spatial data is not an inherently government function, and therefore may be subject to public-private competition.

The GDSC experienced 65 percent reduction of its budget in 1995, followed by a revolving door of contractors that supported its work from 1996 onwards, including CDSI, ACS (a subsidiary of Xerox), and Lockheed-Martin Corporation (Palmer & Rundstrom, 2013; Virden, 2000). To “maintain the technical staff and their proficiencies” despite these cuts, GDSC took on reimbursable projects, such as the Land Title Mapper (LTM)¹⁰⁴ to automate and analyze records of land ownership, as well as fractionated interests for allotted lands (Virden, 2000). The BIA oversees more than 55.7 million acres of trust lands. This in turn is subdivided into more than 250,000 trust parcels, the ownership or interest of which is described in more than 3,000,000 conveyance and probate documents. Indian trust land presents an especially complicated technical problem because of the many-to-many relationships between trust land parcels and, in some cases, more than 1,000 owners per parcel (Skinner, 1999). The BIA and the BLM share responsibility for parcel mapping in Indian Country; through a Memorandum of Understanding, the BIA funds the BLM to conduct cadastral surveys on trust lands. Prior to the LTM effort, parcel maps were hand-drawn or manually digitized, which needless to say, quickly became out of date (Skinner, 1999; Zundel, 2000). The LTM could create

¹⁰⁴ In a presentation to the 2000 ESRI User Conference, Zundel (2000), explained the “LTM is a system that produces four standard land status map products: a reservation map, a township map, a tract-in-context map, and an indexed plat book with a series of township maps. LTM also produces an indexed plat book based on an individual's ownership ID number (i.e., a series of township maps with only the tracts belonging to that individual displayed). All of these map products can be customized to include various backdrop map layers (hydrography, transportation, administrative boundaries, etc.) and can display either surface or subsurface land status.” Accessed April 15, 2015. Available at: <http://www.esri.com/news/arcnews/spring00articles/bureauofindian.html>

GIS polygon topology using the legal land descriptions contained within the BIA's Land Records Information System (LRIS), a tabular database of Title Status Reports (TSRP), the official certified Federal reports on the title to trust or restricted Indian lands. The new system was prototyped and tested at the BIA Billings and Aberdeen Area Land Title Records Offices (LTRO) first, before it was to be rolled out to BIA field offices on reservations thereafter (BIA, 1997b, 1998). "Due to funding constraints and inconsistent BIA management support," however, Jones et al. (2014, 337) report, "the LTM only completed mapping of the reservations within the Rocky Mountain Region (then called the Billings Area)."

For the most part, tribes were not asked directly for their input and feedback until a subsequent BIA "road trip" to individual reservations to demo the LTM. A few technologically advanced tribes applied to be certified by the BIA to manage their own land records using the new system. The maps generated by the tribes revealed that BIA digitized land records were 5-10 years (or more) out of date, which in some instances led to heated conflicts over who could control the updating and management of reservation land records—the BIA or tribes. As land records are out of the scope of this dissertation, please see the NRC report *National Land Parcel Data: A Vision for the Future* (2007a, pp. 69-72) for a review of land records modernization in Indian Country. The LTM was eventually subsumed under the BIA's Trust Asset & Accounting Management System

(TAAMS) reform effort, which began in January 1999, and was an outcome of the Cobell settlement.¹⁰⁵

A February 2000 Memorandum to BIA Regional Directors from Terrance Virden, then Director of the BIA Office of Trust Responsibilities, foreshadowed the difficulties GDSC would face in the next decade. The Office of Trust Responsibilities (OTR), the memorandum announced, would no longer provide supplemental funding to cover the loss of over one million dollars from the GDSC's annual budget. Specifically, the memorandum stated,

“[g]iven the important of other OTR priorities such as the critical Trust Asset Accounting Management System, funds were no longer available for such discretionary activities as GIS support for field offices. Consequently, the GDSC was instructed to ‘fit’ itself into the framework of its appropriated budget, as approved in the Indian Integrated Resource Information Program and to assign staff priorities to OTR reimbursable projects” (Virden, 2000).

The GDSC was reduced to 12 contractor staff, down from 36 contractors at the height of its operations. As a result, they could no longer “distribute data on behalf of the field offices” and Help Desk support was reduced, with priority given to supporting ESRI suite of products obtained through the GIS-II and Desktop government contracts (BIA, 1995; Virden, 2000).

The GDSC's work was further complicated by the shutdown of the BIA's websites and email systems on December 6, 2001, resulting from the ongoing court case, *Cobell vs. Norton*. On behalf of Cobell, a contractor successfully broke into the Department of

¹⁰⁵ Trust Asset and Accounting Management System Webpage. Accessed April 19, 2015. Available at: http://www.doi.gov/ost/Trust_IT/taams.cfm

Interior's trust fund computer system, triggering U.S. District Judge Royce C. Lamberth to order all outside access to the trust system be closed until its security could be assured. Initially all online access to the DOI was terminated, but eventually some sites such as the U.S. Geological Survey were restored. All BIA staff were forced to use phone and fax for all communications outside the agency. The BIA website, and links to all its publications and directories, was not publicly available for nearly seven years. With the establishment of improved DOI security policies and protocols, Judge James Robertson issued an order allowing the BIA and four other offices to reconnect to the Internet on May 14, 2008 (Bartlett, 2001; Markoff, 2002).

In 2002, the BIA GDSC transitioned from providing geospatial services to managing ArcGIS licenses through a DOI-BIA ESRI Enterprise License agreement (ELA). All project-related activities stopped. In September 2006, the GSDC was closed and its functions transferred to the Indian Affairs IT Data Center in Albuquerque, New Mexico (BIA, 2014a; NRC, 2007a). Again, this transition of GIS functions from natural resource management to IT management offices paralleled national trends in local and state governments.

In October 2006, the BIA established the National Geospatial Resource Center (NGRC), which was managed by Lockheed Martin, to:

“centralize and standardize geospatial-related data sources and business processes. The NGRC [was] also intended to create a vital forum to share, engage and collaborate on geospatial information, programs, processes, techniques and available training programs throughout Indian Country. The NGRC [was] also charged with providing geospatial support services in Geo-system integration and

establishing and maintaining Enterprise Spatial Data Clearinghouse for the BIA” (Moore, 2010; Seitz, 2010; Wallace & Zekowski, 2013).

By 2009, according to Seitz (2010), the program had distributed nearly \$10.7 million in ESRI software to BIA offices and tribal government organizations.¹⁰⁶ Because the Cobell settlement included a DOI commitment to resolve long-standing trust land ownership (cadaster) issues, the NGRC focused its efforts on “Trust Tract Reconciliation,” researching and mapping over four million acres of trust land and updating the Land Status maps (i.e., tribal trust vs. fee land). This effort was conducted under the TAAMS Spatial Pilot Project, which “seeks to establish the LTM-like functionality with an interface with the TAAMS and its Title and Leasing modules and databases (Jones et al., 2014).” NGRC also provided coordination and support to the BIA’s Land Title Records Office (LTRO)¹⁰⁷ (Moore, 2010; Seitz, 2010).

In 2010,¹⁰⁸ BIA GIS functions were moved back to Lakewood, CO, this time to be housed under the new banner of Office of Trust Services Geospatial Support (OTSGS) or Branch of Geospatial Support. As of 2015, the OTSGS provides GIS software (ESRI license), training, help desk, and system support to 500 Indian Affairs staff and 1,800 tribal government employees as no cost for natural resource management on American Indian Lands, “such as irrigation flood plain analysis, forestry harvesting, wild land fire

¹⁰⁶ This included: ArcInfo (44%), ArcEditor (25%), ArcView (13%), ArcGIS Server Enterprise (3%), ArcIMS, and virtual courses (6%).

¹⁰⁷ The function of “creation and maintenance of land status maps (the representation of ownership on a map of one or more tracts of Indian land)” is in the “process of redesign and reengineering for operation within the TAAMS [Trust Asset & Accounting Management System] Title environment.” Accessed April 19, 2015. Available at: <http://www.bia.gov/WhoWeAre/BIA/OTS/DLTR/index.htm>

¹⁰⁸ The official BIA website says the transition occurred in 2010, but Jones et al (2014, 337) indicate the transition back to the Denver area occurred in 2012.

analysis, oil and gas management, and other economic analysis” (BIA, 2014a; Wallace & Zekowski, 2013). In addition, the BIA’s Southern Plains Region office launched a pilot geospatial portal “to [once again] standardize and coordinate GIS [data, analysis, and] activities across the Bureau’s regions” (Jones et al., 2014; Lockwood, 2009).

Former BIA staff, including the Geographic Information Officer of the BIA, offered a constructive critique of the BIA’s GIS activities, asserting:

“Many of the tribal GIS programs, with the support of the GDSC, have established mature spatial data systems providing substantial land and natural resource management and planning functionality to tribal governments. The BIA has not kept pace with the tribal progress in spatial system and data development primarily due to lack of understanding of the purpose and benefits derived from the use of spatial data systems in the planning and management of government services for the BIA and the tribes. In general, BIA management has considered spatial data systems to be non-essential to the delivery of trust and governmental services to Indian individuals and tribes. While the use of spatial data systems for mapping and or land-resource management exists at almost all BIA regional and at many agency offices, there has been no national or bureau-wide focus or plan on the use of spatial system technology by BIA or Departmental senior management” (Jones et al., 2014, 338).

Furthermore, Jones et al. (2014, 339-341) remark, the “BIA participated in the FGDC [Federal Geographic Data Committee] on a program-by-program basis¹⁰⁹ with little or no leadership from BIA IT organization or from BIA senior management,” this participation was “not consistent,” and it “has been the BIA’s only relationship with any national spatial data or mapping activity” (see also Lockwood, 2009). They indicate that this is slowly changing as the TAAMS Spatial Pilot Project and popular mapping applications like Google Maps capture the attention of BIA senior leadership. However, they stressed

¹⁰⁹ These programs included the BIA Land Titles and Records program and the BIA Cadastral Survey program. (Jones et al., 2014)

the need for an official plan and policy “for the use and application of mapping and GIS technologies within the Department by its bureaus and offices.”

4.3 Implementation of GIS by Tribes

American Indians have been here for thousands of years, long before the creation of the United States. They have a rich history of mapping (Cole & Sutton, 2014; Short, 2009; Warhus, 1997). In his book *Another America*, Warhus (1997, 1-3) recounts the story of Ac ko mok ki, a Blackfoot chief, who in 1800 shared his knowledge of the land with Peter Fidler, a surveyor for the Hudson Bay Company. As Ac ko mok ki recounted the oral history, he drew a corresponding map in the snow, depicting more than 200,000 square miles of North America. Warhus (1997, p. 3) underscores the depth and complexity of indigenous mapping,

“The map that Ac ko mok ki drew is an illustration of the Native American’s oral landscape. Unlike western society, maps were not created as permanent documents in Native American traditions. The features of geography were part of a much larger interconnected mental map that existed in the oral traditions. The world was perceived and experienced through one’s history, traditions, and kin, in relationships with the animal and natural resources that one depended upon, and in union with the spirits, ancestors, and religious forces with whom one shared existence. ... This indigenous knowledge was passed down in songs, stories, and rituals, and the understanding of the landscape it imparted was as sophisticated as that of any western map.”

American Indian maps record experiences and meanings. These maps also recorded the invasion of Europeans into Indian territories and its devastating impact—the loss of life from wars and disease, and the loss of territories from forced relocations and unfair treaties. At the same time, Warhus (1997, 9) observed that these maps also reflect tribes’ resilience and “efforts to keep their traditions and maintain their place in the landscapes.”

Europeans and colonial settlers thereafter, on the other hand, recast the North American landscape as something they discovered, conquered, and owned, triumphantly replacing American Indian place names with English ones. “Maps became tools of repression and appropriation,” Warhus (1997, 209) states, “in the same way that colonial militias and frontier armies forcibly removed Native Americans.” For an early history of American Indian cartography, see (Cole & Sutton, 2014; G. M. Lewis, 1998; Warhus, 1997); specifically, for an early history of state and federal government mapping in Indian Country, see (Cole & Sutton, 2014; G. M. Lewis, 1998) and the chapters therein.

In the present era, Warhus (2007, 210) writes, “Native Americans have adapted these [Western] tools to their own ends and are using them to once again assert their place, to demand that their heritage be recognized, and that their historical experience become a part of this land.” Williamson and Goes In Center (2001) optimistically noted that geospatial technologies, such as GIS and GPS, could aid tribes in addressing modern day challenges, such as climate change, resource extraction, and urban encroachment, “by empowering Native Peoples in the development and execution of their own resource strategies.” Even so, they cautioned, “because of cultural difference between Native communities and the dominant, European-influenced culture, there [sic] powerful geospatial technologies cannot be simply incorporated into a Native management framework without recognizing and bridging these cultural differences.” Antoine Provost of the Omaha Nation explained, “We continually find ourselves striving to walk in today’s high technological, fast-paced society, while gripping the endlessly rich heritage of culture” (Provost, 2001).

Early tribal GIS programs experienced growing pains similar to their counterparts in local and state governments—limited resources, limited technical expertise, insufficient training, and lack of support from decision makers (Adams, 1999; Bohnenstiehl & Tuwaletstiwa, 2001; Corbett et al., 2009; Goes In Center, 2000; He, 1995; Kahn, 1997; Marchand & Winchell, 1992; Marozas, 1996; Meyers, 1993; Rattling Leaf, 2002; Ventura, 1995). Charnel Peterson, GIS Department manager and tribal member of the Sisseton-Wahpeton Sioux tribe, noted, “Even the most earnest attempts by planners to use GIS were halted by the lack of software and equipment needed...Up until the late 1990s, the initial costs for GIS personnel and equipment seemed beyond both reason and means” (Provost, 2001).

In recounting GIS adoption on the Colville reservation, Adams (1999, 10) noted, while two or three department heads and program managers were “excited and motivated to implement GIS,” the rest “seemed reserved or uncomfortable. Some tribal managers felt that the BIA...was pushing this, and *would rather that the GIS be under tribal control [emphasis added]*.” GIS originated in the natural resource and planning departments on the Colville reservation, as it did on many other reservations; but, tensions between these two departments, and with the IT department, erupted over who controlled the GIS system and data, and who was responsible for supporting the related IT infrastructure. Similar intra- and inter-departmental struggles occurred over funding the GIS program. “[R]ecurring overall tribal budget shortfalls,” “a lack of direct interaction between the GIS program and the Council,” and the “high turnover rate of the Council members,”

Adams (1999, 22) contended, put the GIS program under constant threat of being defunded.

Over time, the Colville GIS program tried to shift from directly providing GIS services to other programs to helping other programs build and maintain their own GIS databases. Other programs, however, underestimated the cost and time required. Not surprisingly, individuals who championed GIS within these departments “found themselves increasingly too busy with other duties to continue use of their [GIS] systems, which have sat idle since” (Adams 1999, 16-16). In addition, BIA and tribal GIS staff developed applications without getting direct input from the end-users. Without a user needs assessment, Ventura (1995) notes, “users may be alienated by the process or the system, leading to personal resistance.” Lastly, outsiders conducted the GIS trainings using unfamiliar datasets, rather than allowing trainees to get “accustomed to accessing local data over the local network environment” (Adams 1999, 14). Unfortunately, these challenges were not unusual for tribes, or for non-tribal organizations for that matter, as our experience working with a tribe on GIS implementation found (see Chapter 2). In addition, GIS implementation efforts by tribes in the United States are described in detail in (He, 1995; Kahn, 1997; Mannel, Winkelman, Phelps, & Fredenberg, 2007; Smith, 2008a, 2008b). Chambers et al. (2004) provide a critical review of how Indigenous peoples are implementing GIS worldwide, based on diffusion of innovation theory.

Unlike other organizations, however, tribal GIS programs are influenced by a unique “combination of entrenched federal bureaucracy, developing nation, and large family

business” (Adams 1999, 46). As described in Section 4.2, the BIA exerted a strong influence on the development and use of GIS in Indian Country through fulfillment of its trust responsibilities. Tribes as sovereign nations also have a unique set of needs that can influence the prioritization of GIS, including asserting off-reservation hunting and fishing rights, protecting off-reservation cultural resources and sacred sites, and running casino operations. To complicate matters, Adams (1999, 46) emphasizes, “the shortage of non-governmental employment, small population, and extensive blood, marital and friend relationships built over time have resulted in an organization staffed to a high degree by people related by more than just lines in an organization chart.” Based on my own experience as a participant-observer on a reservation, as described in Chapter 2, the dynamics of family ties and interconnected relationships definitely affects GIS data development and sharing between tribal government departments. Lastly, tribal member employment is a critical issue on all reservations. “Employment preference, advancement potential, and employee race ratios,” however, have been particularly sensitive issues within tribal GIS programs, including Colville’s (Adams 1999, 29), as non-tribal members often created these programs. Based on my interviews and personal conversation, several non-Indian GIS program directors at tribes have felt indirect or direct pressure to depart once the tribal GIS programs were up and running.

Over time, tribal GIS programs have become more sophisticated in their use of geospatial technologies. Tribal governments and tribal enterprises use geospatial technologies and GIS for a wide range of applications, such as:

- Infrastructure management, including building and maintaining road networks, and water and sewer systems;
- Land use planning and community development, as needs of a growing population require new residential housing, schools, and clinics;
- Environmental protection, including monitoring water quality and availability, and monitoring changes in vegetation and trail conditions that may impact water quality; importantly, GIS can be used to defend tribal water rights in litigation;
- Resource management, including timber sale maps, from initial stand reconnaissance to sale contracts, maps of proposed timber harvest and associated road construction, range leases, oil and gas, and mining operations, environmental impact assessments;
- Fire management, including annotating fuels and debris for mitigation and removal, developing site maps of fire areas showing road access, home sites, and fire perimeters, and assessing extent of damage;
- Fish and wildlife management, such as assessing movement and mortality patterns of salmon in marine areas, recording sightings, nests and tracks of wildlife, and managing and restoring habitat; conducting biological assessments for threatened and endangered species;
- Protection of historical, archaeological, and cultural resources, including mapping and understanding traditional uses of the land, such as inventorying wild rice beds or subsistence hunting trails; in particular, tribes use GIS for management of cultural resources on “usual and accustomed” territorial lands off the reservation;

- Protection of Native American grave sites and artifacts under the Native American Graves Protection and Repatriation Act, including GIS modeling of burial mounds; and
- Land transactions, acquisitions, and leases; to protect their sovereignty and provide land for housing and commercial development, tribes are buying back the fee land on their reservations and converting it to trust land, as described in section 4.4 below.

Tribes also are being consulted on public decision-making affecting lands and resources within their traditional territories off the reservation. Although not without risk, incorporating their information into GIS may give tribes a better seat at the table in these negotiations. For specific examples of tribal GIS use, see (Berry, 2008; Bohnenstiehl & Tuwaletstiwa, 2001; Cook, 2007; Corbett et al., 2009; Deogawanka, 2014; ESRI, 2009; Goes In Center, 2000; He, 1995; Mannel et al., 2007; Marozas, 1991, 1993, 1996; Middleton, 2008; Morain, Case, & Tilley, 2001; Rattling Leaf, 2002; SIPI, 2015; Taylor et al., 2012; Wascalus, 2014; Williamson & Goes In Center, 2001). A comprehensive review of indigenous people's uses of GIS internationally is provided by (Laituri, 2011) and (K. J. Chambers et al., 2004).

Multi-tribal Networks

To fill the gap left by the Inter-Tribal GIS Council, which last met in 2001 on the Coeur D'Alene Reservation, a new tribal GIS organization emerged, called the Indigenous Mapping Network (IMN). Laura Harjo organized the first IMN conference in March 2005, which was hosted by the Cherokee Nation in Oklahoma. American Indian

academics and former IGC leaders joined forces to organize subsequent conferences. These conferences began to shift the focus of attention to some degree from the original IGC meetings. In the beginning, tribes had limited resources and GIS was expensive, so GIS activities tended to focus on providing critical government services and natural resource management. By the time of the IMN's formation, the cost of GIS had come down and tribes' comfort levels with the technology had increased; as a result, more cultural mapping activities began to emerge. In addition, with increased participation of American Indian academics and the application of critical GIS theory to indigenous mapping projects, discussions increasingly focus on how GIS systems and practices should be redesigned or re-imagined to better integrate and be sensitive to tribal culture and practices (Cole & Sutton, 2014; Coombes, Johnson, & Howitt, 2013; Coombes et al., 2014; Coombes, Johnson, & Howitt, 2012; Harjo, 2012; J. Johnson, 2012; Louis, 2004, 2007, 2012; Louis, Johnson, & Pramono, 2012; Marozas, 1993; Marozas & Goes In Center, 1998; Mohamed & Ventura, 1998, 2000; Palmer, 2012; Pearce & Louis, 2008; Rattling Leaf, 2002; Williamson & Goes In Center, 2001). Williamson and Goes In Center (2001) note "this will require the development of ways to interpret geospatial technologies in the Native context, through the use of storytelling and appropriate analogies and metaphors."

By the end of 2009, the IMN had an active social media presence thanks in large part to the efforts of Rosemarie McKeon.¹¹⁰ In 2010, the IMN hosted a Google Earth Tribal

¹¹⁰ The IMN's social media activity at its peak included: 109 participants on the IMN website's forum; 212 contributors on LinkedIn; 879 followers on Twitter; 683 friends on MySpace; 81 friends on Facebook; 25 training and storytelling videos on YouTube; and a Flickr page.

Technical Workshop, and formed an Indigenous Remote Sensing collaborative (IRSC).¹¹¹ While activity on most of the IMN's social media sites dropped off by 2011 and the main IMN webpage is no longer maintained, membership of the IMN's LinkedIn page has grown tremendously—1,781 members as of 2015—with posts from all over the world. Responsibility for organizing the annual tribal GIS conferences has shifted to the National Tribal Geographic Information Support Center¹¹² at Southwestern Indian Polytechnic Institute (SIPI), which hosted the 5th National Tribal GIS Conference on November 3-7, 2014, in Albuquerque, New Mexico (Deogawanka, 2014).¹¹³

4.4 Tribal Concerns Regarding GIS Data Access and Use

Due to cultural, historical, and spiritual differences, American Indian tribes in the United States do not share necessarily the same views towards information as the dominant society, nor do they foster “open access” information policies and practices to the same extent as promulgated by federal, state, and local governments. While, as Williamson and Goes In Center (2001, p. 167) note, “it is difficult to generalize about the beliefs and worldviews of Native Peoples of North America because the over 565 recognized tribal and Alaska Native groups are highly diverse in language, religion, and cultural practices,” many tribes and tribal members have expressed concerns regarding the collection, use, and dissemination of geospatial information and GIS data about their land and communities by outside parties.

¹¹¹ Indigenous Remote Sensing Collaborative Website: Accessed May 1, 2015. Available at: <https://www.securecms.com/IGARSS2010/CRS/IRSC.asp>.

¹¹² <http://www.tribalgis.com>.

¹¹³ National Tribal GIS Conference Flyer. Accessed April 16, 2015. Available at: http://www.tribalgis.com/images/2014Conference/TribalGISevent_Brochure_v1.1.pdf.

Tribes are concerned about the misuse of spatial information and data for several reasons, including: infringement on individual and collective privacy; inappropriate release of confidential or sensitive information; misappropriation of intellectual property/cultural property and its use for commercial gain; misinterpretation or discrediting of cultural practices; the financial impact on tribal enterprises and lease negotiations; abrogation of treaty rights and interests; abrogation of rights and sovereign authority to independently regulate activities on a tribe's lands; and, the impact on the trust relationship with the federal government (Barsh, 1999a; Hardzinski, 1999, 2000; Lum, 1999; Marchand & Winchell, 1992; Meyers, 1993; Wainwright & Robertson, 2000). "The Northern Arapaho and Eastern Shoshone," for example, "expressed concern that 'outside' researchers would come to the reservation and 'take' their knowledge, giving nothing in return" (Laituri, 1998, 3). Crystal Bond, former Cartographer at the GeoData Center for the Cherokee Nation, summed up these concerns when she commented in frustration, "[t]he dominant society has taken everything else and now they want our information too" (Bond, 2001).

4.4.1 Traditional Knowledge and Cultural Resources Information

For American Indian tribes, privacy and secrecy can be "deeply embedded cultural norms, sometimes interwoven with kinship and religion" (Harding, 2000); see also (Elizabeth A. Brandt, 1980; Brown, 2004). Land is a "sacred geography" (Lum, 1999); ownership of land and ownership of information about the land are inexorably intertwined (Barsh, 1999b). "[K]nowledge," Barsh (1999, 21) asserts, "is an intrinsic part of a single social process that mediates land use...Breaking knowledge into fragments and separating those fragments from the land truncates its scientific value,

distorts its social meaning, and undermines the balance of power within indigenous societies.” Information about and maps of archaeological sites, historic sites, cultural resource areas, and spiritually significant sites often are considered private knowledge and, as such, are rarely made public (Goodman, 2000; Laituri, 2011; Marchand & Winchell, 1992).

Tribes are often faced with the difficult choice of having to share this information with federal agencies through the consultation process when sacred or cultural sites, archeological sites, and graves could be impacted by federal decision-making (Mense, 2011; Plaut, 2009; Skibine, 2012). The federal government, however, cannot guarantee the confidentiality of this information. Public disclosure may lead to unwanted intrusion during religious ceremonies, theft of artifacts, vandalism or destruction of the site. For this reason, tribes may delay sharing information critical to protecting a site, or may reveal only that the area is sacred without explaining why. As a result, agencies may not adequately protect these important places, resulting in litigation. Mense (2011) provides at least three examples where this has occurred, including *Havasupai tribe v. United States*,¹¹⁴ *Pueblo of Sandia v. United States*,¹¹⁵ and *Muckleshoot Indian tribe v. U.S. Forest Service*.¹¹⁶ In *Havasupai*, the court blamed the tribe for failing to provide the information. The Tenth Circuit in *Pueblo of Sandia*, on the other hand admonished the U.S. Forest Service, which “should have known better that tribal customs might restrict

¹¹⁴ *Havasupai Tribe v. United States*, 753 F. Supp. 1471 (D. Ariz. 1990).

¹¹⁵ *Pueblo of Sandia v. United States*, 50 F. 3d 856 (10th Cir. 1995).

¹¹⁶ *Muckleshoot Indian Tribe v. U.S. Forest Service*, 177 F. 3d 800 (9th Cir. 1999).

the ready disclosure of specific information.” The Ninth Circuit in *Muckleshoot* found that:

“the tribe had many opportunities to reveal more information to the Forest Service. Although the Forest Service could have been more sensitive to the needs of the tribe, we are unable to conclude that the Forest Service failed to make a reasonable and good faith effort to identify historic properties.”

Mense (2011) argues that tribal secrecy should be better safeguarded through the consultation process because “traditional norms often mandate secrecy,” “native social structures may rely on secrecy,” and “cultural secrecy...allows native peoples to more clearly demarcate the bounds of their culture and to control how the outside world views their traditions.”

Moreover, American Indians’ expectations of privacy may differ from what is considered “reasonable” by the dominant society and the courts. Their expectations of privacy are not necessarily greater within a residence (structure) than in an “open field;” not every place of cultural or spiritual significance is enclosed within a building (A. Warren, 2004). Tribal members also may be concerned about competition for customary usage of the land, such as berry-picking and fuel wood collection. While working with the forestry department of a tribe, I was told by staff that tribal members would be unlikely to reveal their customary usage areas or hunting trails, let alone allow it to be mapped (see also Smith, 2008a).

Raquelle Myers, Staff Attorney for the National Indian Justice Center, identifies three contexts in which spatial information and data were inappropriately shared. First, she

witnessed “Tribal leaders sharing maps of their sacred sites in public forums, not understanding the risks posed by audience members taking pictures of the screen” (Myers, 2014). Second, she saw “academic researchers volunteering students to gather GIS data about tribal sacred sites” and then “publishing their findings without the consent [or knowledge] of the tribe.” Third, a tribe “accident[ally] turned over” more spatial data than was requested by the California Department of Transportation, “including information about several sacred site locations.” That inappropriate sharing, as Dorling and Fairbairn (1997, 69) indicate, can result in the desecration of sacred sites:

“maps can be used not only to make whole peoples disappear (through assimilation), but literally to exhibit them. Some American tourists’ maps do this and could be said to have aided, particularly in recent years, the destruction of Indian ways of life by leading thousands of tourists to their homes and sacred sites...Maps of sacred Indian sites are now being used by tourists with an ecological bent who may be causing as much damage with their feed [sic] (and their maps and their money) as their ancestors achieved with guns and disease (and, again, their maps).”

Rundstrom (1995), and other critical GIS scholars, express concern that incorporating traditional knowledge and other sensitive information into GIS may decontextualize it, potentially leading to misinterpretation and misuse (Coombes et al., 2014; Laituri, 2011; Pearce & Louis, 2008; Rundstrom, 1995). Pearce and Louis (2008), citing (Razak, 2003), comment:

“Issues of ontological and epistemological differences in cartography and map symbolization between Indigenous communities and those who design, market, and provide instruction in GT [geospatial technology] (including GIS software) generally have not been addressed. As a result, Indigenous cultural knowledge is often [sic] distorted, suppressed, and assimilated into conventional Western map. This practice of locating cultural knowledge without expressing the spatial meanings and interrelationships of that knowledge preserves ‘only a superficial cultural diversity through its products, ceremonies, and performances whose meaning will be diluted through secular decontexted performances.’”

Digitally mapping information that traditionally has been communicated orally also can be “perceived as a means of diminishing [an individual’s or group’s] importance and power within [the tribe]” (Adams, 1999). Adams (1999, 32) reported that GIS modernization efforts on the Colville Reservation resulted in “the perceived loss of control of data as others [were] allowed access via the network.” M. H. Palmer (2009) also underscored the “marginalizing and transformative impacts of technoscience that can potentially disenfranchise tribal elders.” Limiting access to sensitive cultural information and GIS data sets, therefore, may be necessary not only to protect sensitive sites and practices, but also to “reinforce the integrity of knowledge systems dependent on ritualized processes of knowledge acquisition” (Laituri, 2011; Turnbull, 1989; Kelley & Francis, 2005).

Kelley and Francis (2005) observed differences among members of a Navajo community over recording and sharing of traditional knowledge, histories, and songs:

“[s]ome Navajo elders whom we had consulted over the years have told us flatly that nothing does as much harm as revelations to non-Navajos. To reveal is to give the land away. This bald opposition to sharing information rarely appears in the written record, where one usually finds more muted critiques.

Yet other Navajos and other indigenous people have advocated placing oral tradition, including maps, into the written record—not indiscriminately, but in certain circumstances where they believe that the harm done by revelations is less than the harm done by secrecy.”

According to Hartman (2001), a collaborative effort by the Colville tribe’s Elders, Language Center, and GIS Program to preserve tribal cultural heritage using GIS also led to difficult choices about what information would be made accessible and to whom:

“Debate is ongoing regarding public access to all data because certain Tribal sites, such as burial grounds, are culturally sensitive information, that require Tribal protection. Therefore, the information continues to be preserved, but how this sensitive information will be distributed is still under consideration.”

Bohnenstiehl and Tuwaletsiwa (2001) cautioned:

“GIS databases are used to record information about cultural resources such as traditional gathering areas, ceremonial trails, shrines, and burials. This information is often confidential and/or sacred and therefore requires careful consideration about its place in a LIS. If the data are too controversial and if the safety of the knowledge cannot be guaranteed, it may be best not to include it in the LIS database.”

Smith (2008a), quoting Andrew Datko of the Bois Forte Reservation, concurred, “it is harder to keep information confidential once in digital form.” This kind of sensitive information may or may not be recorded and/or shared among tribal government departments or tribal members, although tribal departments may benefit from having access to them.

4.4.2 Land Parcel Boundaries

Although the literature focuses almost exclusively on traditional knowledge and cultural resources, these are not the only sensitive information and data sets for tribes. Individuals from all of the four tribes interviewed indicated that maps and GIS data sets of the boundaries of parcels of land, especially land trust status maps (i.e., fee parcels vs. trust parcels), are considered highly sensitive and, as such, are restricted from public access. This was initially surprising to me, coming from a Western perspective that promotes open government and open data. GIS data sets of jurisdictional boundaries and parcel boundaries are commonly accessible at county government offices under open records

laws, although sometimes the cost to obtain parcel data sets can be prohibitively expensive due to county cost-recovery policies. Tribes, however, restrict access to this data because state governments have attempted to use land status maps to assert jurisdictional authority on fee land within reservation boundaries. For example, the State of Wisconsin tried to impose state environmental regulatory standards rather than tribal standards on air or water quality within reservation boundaries. Although not verified by this author, some tribal members speculated that a 1999 FOIA request by the State of Wisconsin's Department of Natural Resources for tribal GIS data maintained by the BIA, including reservation boundaries and land status, was motivated by a desire to get tribes to relinquish their "Treatment in the Same Manner as a State" (TAS) status for the purposes of EPA environmental laws and regulation,¹¹⁷ to impose state air quality standards that were lower than the tribes on fee lands within reservation boundaries, and to unduly influence state-tribal gaming compact negotiations.

Land status maps also indicate where tribes might want to purchase fee land for conversion back to tribal trust land in order to reconstitute their reservations and retain the right to govern. Many reservations were divided into privately held allotments for individual tribal members under the General Allotment Act 1887 (also called the Dawes Act, 24 Stat. 388), which was intended to assimilate American Indians into the dominant society and make land available to white settlers and the railroads. This was done without

¹¹⁷ EPA is authorized to treat eligible federally recognized American Indian tribal governments in the same manner as a state government for implementing and managing environmental programs, under the Clean Water Act, Clean Air Act, Safe Drinking Water Act, the Toxic Substance Control Act, and Federal Insecticide, Fungicide and Rodenticide Act. See Treatment in the Same Manner as a State, US EPA American Indian Environmental Office Tribal Portal Webpage, accessed May 3, 2015. Available at: <http://www.epa.gov/tribalportal/laws/tas.htm>.

the permission of tribes, and resulted in the loss of more than 90 million acres of tribal land to non-Indians and corporations by 1934 (Pevar, 2012; Wilkins & Lomawaima, 2001; Canby, 2015). The Indian Reorganization Act of 1934 (25 U.S.C.A. Sec. 461 et seq.) halted the practice of allotment. Nonetheless, tribes are still dealing with its consequences, including the patchwork quilt of land ownership within reservation boundaries,¹¹⁸ and fractionated ownership of allotted lands. Kunesh (2014, 61) warns:

“[r]eservation status determines authority to impose taxes, impose land use rules, protect treaty fishing and hunting rights, and protect the welfare of Indian children. Whether a particular parcel has reservation status, in short, wholly impacts the cultural identity of the place and the right to govern. If a court determines that a reservation has been diminished (reduced in size) or disestablished (terminated boundaries)...the land no longer is considered Indian country...”

Maps often are offered as facile illustrations of land use and population demographics to support a claim of *de facto* diminishment, with little effort made to examine the context of the map or the whole history of the particular landscape...As instruments of dispossession, maps are political devices deployed to claim and control the land, where a sleight of a ruler an effectively evict inhabitants, extinguish their lifelines, and expend their spirits, all for the sake of commerce and exploitation.”

Tribes also buy land in neighboring counties to expand their limited land base to build new homes, schools, and businesses for their members. Section 465 of the IRA permits this conversion of fee land to trust with the approval of the Secretary of the Interior.

Conversion of fee land to trust, however, removes it from the counties’ tax rolls while

¹¹⁸ As per the Bureau of Indian Affairs FAQ webpage, accessed May 3, 2015. Available at: <http://www.bia.gov/FAQs/>.

“*Allotted lands*, which are remnants of reservations broken up during the federal allotment period of the late nineteenth and early twentieth centuries...Starting with the General Allotment Act in 1887 (also known as the Dawes Act) until the Indian Reorganization Act of 1934, allotments were conveyed to members of affected tribes and held in trust by the federal government. As allotments were taken out of trust, they became subject to state and local taxation, which resulted in thousands of acres passing out of Indian hands. Today, 10,059,290.74 million acres of individually owned lands are still held in trust for allottees and their heirs.

Restricted status, also known as restricted fee, where title to the land is held by an individual Indian person or a tribe and which can only be alienated or encumbered by the owner with the approval of the Secretary of the Interior because of limitations contained in the conveyance instrument pursuant to federal law.”

still requiring the provision of government services such as emergency response. In addition, tribes purchase off-reservation land to build casinos, which some oppose. For these reasons, a tribe's purchase of parcels of land is often met with county government and taxpayer resistance, although "the courts have consistently rejected efforts by state and local governments to overturn the secretarial determinations" (Pevar 2012, 75).

4.4.3 Reservation Boundaries

Tribes also may not share GIS data sets of their reservation boundaries, again because of conflicts with local and state governments over jurisdictional authority. Patrick Ragsdale, former Director of the Bureau of Indian Affairs, notes in his statement to the Committee on Natural Resources, U.S. House of Representatives, that "[v]arious statutes and provisions of case law make jurisdictional determination difficult" for law enforcement on or near reservations (Ragsdale, 2007). Some courts, for example, have ruled that reservation boundaries demark the extent of a tribe's inherent sovereign authority for law enforcement, even if a law enforcement officer is in fresh pursuit of a suspect who committed a crime on the reservation and then crossed the reservation border¹¹⁹ (O. Y. I. Lewis, 2011).

According to one tribe with which I worked, the original BIA-generated reservation boundary GIS data set, digitized from the USGS topography maps, contained numerous errors, and was out of date given conversions of fee land to tribal trust land. The tribe

¹¹⁹ State v. Erkisen, 241 P.3d 399 (2010), State of Washington.

preferred that outsiders acquire reservation boundaries from a neighboring county government, rather than have an outsider misinterpret the tribe's GIS data in litigation.

4.4.4 Water Availability Data

Pevar (2012, 215), citing (Owley, 2004), stresses that water “plays a vital role in the lives of tribal members and control over water resources is an essential element of tribal sovereignty.” Interview participants underscored the special sensitivity of GIS data related to water availability and quality, as it may give outside parties an unfair advantage in litigation, such as in the *Klamath* case. Reinforcing its decision in *Winters v. United States* (1908), the Supreme Court ruled in *Arizona v. California* (1963) that Indian tribes along the Colorado River had the right to irrigate their reservations sufficiently.¹²⁰ It does not matter that water rights were not mentioned at the time of a reservation's establishment, or that the tribes had not used those rights prior to irrigating the land by that point. The Court reaffirmed that there is an “implied reservation of water rights...necessary to make the reservation livable,” and to provide a “permanent home and abiding place,” both now and in the future. This is known as the *Winters* doctrine or “reserved water rights doctrine.”¹²¹ See Pevar (2012, p. 207-208) for a review of the *Winters* doctrine.

¹²⁰ *Winters v. United States*, 207 U.S. 564 (1908); *Arizona v. California*, 373 U.S. 546 (1963)

¹²¹ Nevertheless, tribes are not always able to exercise these rights fully. This is because the federal government, contrary to *Winters*, has built dams and issued water permits to neighboring non-Indians, and because tribes sometimes lack the resources to build the necessary water infrastructure (Pevar, 2012).

Conflicts arise, particularly in the West, when a non-Indian land owner within the reservation (e.g., *Colville Confederated tribes v. Walton*¹²²) or off-reservation (e.g., *Winters*) uses a significant amounts of water impacting a tribe's usage; it also occurs when a tribe begins to fully leverage its water rights, affecting neighboring non-Indians who were benefiting unknowingly (or knowingly) from the unused portions of a tribe's water rights. In the face of such conflicts, tribes must quantify the amount of water needed in order to assert their claim to water rights under *Winters*, or to sell or lease those rights (F. S. Cohen, 1942; Pevar, 2012; Wilkins & Lomawaima, 2001; Canby, 2015). GIS data can help to make this calculation. In order to determine irrigable acreage, for example, a tribe needs to assess:

“the area's soil types; cost of transporting a sufficient amount of water to that areas; the amount of water that would evaporate during transportation; the climate; the land geography; and the marketability of the crops that would be grown in that location.”

GIS also can assist with the analysis of:

“the fish and wildlife that could prosper in that climate and geography; the availability of the food needed to support the resource; the number of natural predators; and the land usage in the surrounding vicinity that might affect the survivability of the resource, especially fish and wildlife that tend to migrate to other locations” (Pevar 2012, 211-12).

In addition to the *Klamath* Supreme Court case and the cases described in the testimony given during a 1976 U.S. Senate hearing on the need for an Indian Amendment to the Freedom of Information Act (Senate, 1976b), my interviews uncovered at least one other example where tribal geographic information and/or GIS data was inappropriately shared in the midst of water rights litigation. In this instance, the State of Montana had acquired tribal GIS data through a data sharing agreement, and then shared it with the opposing

¹²² *Colville Confederated Tribe v. Walton*, 647 F.2d 42,47 (9th Cir. 1981), cert. denied 545 U.S. 1092 (1981).

counsel against the wishes of the tribe. I reached out to the tribe's GIS program director, but because of the sensitive nature of the case, they politely declined to share details. Interview participants also noted that tribal GIS data has been exposed in water rights litigation during the pre-trial discovery process.

While the federal government is obligated to protect the water reserved under the *Winters* doctrine on behalf of the tribes, it also is obligated to protect other public interests, such as national parks, national forests, and reclamation projects. Unfortunately, as per the Supreme Court decision in *Nevada v. United States* (1983),¹²³ “tribes cannot expect in those situations to receive sole or even paramount consideration” (Pevar, 2012, 219-220). Despite this, Indian tribes “cannot prevent the federal government from representing the tribe's interests in litigation” (Pevar, 2012, 218; Getches et al., 1998; Canby, 2015). The BIA manages the Water Rights Negotiation/Litigation Program and the Water Management, Planning and Pre-Development Program to assist tribes in defending, “managing, conserving, and utilizing trust water resources.”

4.4.5 Water Quality Data

Tribes also use GIS to calculate the flow and concentration of pollutants from industrial discharges or agricultural runoff, and to model and monitor water quality changes over time. Tribal environmental GIS data, including water quality data, is created through financial assistance from the EPA's Indian Environmental General Assistance Program (GAP), and EPA Direct Implementation Tribal Cooperation Agreements (DITCAs). The

¹²³ *Nevada v. United States*, 463 U.S. 110, 128 (1983).

GAP provides grant funding to build the capacity within federally recognized tribes, pueblos, and Inter-tribal consortia to implement programs administered by the EPA. DITCAs, in turn, allow tribes and Inter-tribal consortia to implement EPA environmental programs in Indian country, although the EPA retains final decision-making authority and responsibility. Collecting surface water quality data and groundwater quality data are typically performed under DITCAs, but sharing tribal data also may occur under the GAP. Acceptance of these funds requires the development of a baselines needs assessment, such as a tribal Integrated Resource Management Plan, which may be “informed by traditional ecological knowledge.” In addition, GAP requires that tribes: develop “systems to store and organize data and information collected or generated by the environmental program;” “exchang[e] and/or shar[e] data through the National Environmental Information Exchange Network;” and, at the same time, establish “written policies and procedures for protecting sensitive tribal environmental and human health data (e.g., traditional ecological knowledge and cultural resources)” (USEPA, 2013). The grant program also suggests that tribes use GAP funds “to establish programs that facilitate citizen access to compliance information, subject to confidentiality and preservation of privileged information” (USEPA 2013, p. 10 of Appendix I).¹²⁴

¹²⁴ “Tribes may use GAP funds to establish programs that facilitate citizen access to compliance information, subject to confidentiality and preservation of privileged information. Providing the public with information on the compliance status of regulated entities gives surrounding communities information on possible risks they may be facing as a result of noncompliance and arms citizens with information they can use to put pressure on noncompliant facilities to come into compliance and on regulatory agencies to address noncompliance. Without prematurely revealing information on enforcement cases or compromising confidentiality and privileged information, tribes should strive to provide public access to information on the entities regulated by environmental requirements, their compliance status, and any history of formal and informal enforcement actions taken to address noncompliance. Tribes should establish procedures for citizens to request and receive specific information via all available media within a reasonable timeframe, subject to applicable laws and policies on confidentiality, the preservation of privileged information, and other limitations on sharing information.”

Specific EPA program grants, such as the Clean Water Act Water Pollution Control Program (Section 106) and Polluted Runoff Program (Section 319) grants, also may be used for the creation of GIS data. The Clean Water Act of 1972 (CWA) allows tribes to establish and enforce emissions standards that are stronger than federal environmental standards, which in turn may put them at odds with state agencies, local municipalities, and on- and off-reservation non-Indian landowners. The 106 grants require submission of a Tribal Assessment Report, including: “(1) description of the monitoring strategy; (2) a water quality assessment; and (3) surface water quality monitoring data submitted electronically.” Tribes are encouraged to report “as much data as possible to make sure that the data are not lost if their internal management systems fails” (USEPA, 2006); according to grant guidance, however, tribes are required to report “nine basic parameters:” dissolved oxygen, pH, water temperature, turbidity, phosphorus, total nitrogen, macroinvertebrates, E. coli, and “basic habitat information” for each stream segment. The basic habitat information includes a list of items, such as land use patterns near sampling sites. EPA grants require tribes to submit their data to EPA’s Water Quality Exchange (WQX),¹²⁵ which is part of the National Environmental Information Exchange Network (NWIFC, 2015). The data is archived in STORET, “a repository for water quality, biological, and physical data,” which is “used by state environmental

¹²⁵ EPA Water Quality Exchange webpage, access May 6, 2015. Available at: <http://www.epa.gov/storet/wqx/index.html>.

agencies, EPA and other federal agencies, universities, private citizens, and many others.”¹²⁶

The EPA is also developing and piloting the Tribal-Focused Environmental Risk and Sustainability Tool (Tribal-FERST), which will “serve as a research framework to provide tribes with easy access to the best available human health and ecological science,” and which will be connected to the water quality exchange database. The system includes: fact sheets, best practices, and guidance materials; “tribal environmental data table providing quantitative information to support risk prioritization; decision-making guide integrating traditional ecological knowledge and western science; [and] a geospatial mapping component” (USEPA, 2012). The Tribal-FERST mapping tool overlays publicly available data about reservations, such as demographics, “environmental concentrations, human exposures, health risks, ecosystem services, sustainability indicators, and sources of pollution.” Tribes have the option of incorporating their own data into the system.

Some tribes conveyed their concerns that using EPA grants to create geographic information and GIS data “will force them to share all of their information, sensitive or otherwise, with the public” (Gee, 2014; USEPA, 2005). Responding to this concern, the EPA sent a letter to tribes with the intent of “clarifying access to information.” According to a presentation delivered in October 2014 by Randy Gee, EPA Region 6, Office of

¹²⁶ EPA STORET webpage, accessed May 6, 2015. Available at: <http://www.epa.gov/storet/>.

Environmental Justice and Tribal Affairs, the EPA expressed its belief that “a lack of tribal information may hinder EPA’s ability to justify and account for its programs in Indian Country to the overall detriment of the tribes.” On the other hand, he cautioned, there are “[n]o FOIA specific restrictions preventing public access to Tribal information.” He caveated this with, “EPA in general is not requesting information on sacred sites and medicinal plant locations” (Gee, 2014). Even reporting of water quantity or quality data will require submission of accompanying data such as reservation boundaries, facility locations, and so forth, which as previously noted may be of concern to tribes.

It should be noted that 40 CFR 31.42 *Retention and Access Requirements for Records* applies to all data generated using EPA Section 106 grants. With respect to access to records and the Freedom of Information Act, it states:

“(e) **Access to records—**

(1) **Records of grantees and subgrantees.** The awarding agency and the Comptroller General of the United States, or any of their authorized representatives, shall have the right of access to any pertinent books, documents, papers, or other records of grantees and subgrantees which are pertinent to the grant, in order to make audits, examinations, excerpts, and transcripts.

(2) **Expiration of right of access.** The rights of access in this section must not be limited to the required retention period but shall last as long as the records are retained.

(f) **Restrictions on public access.** The Federal Freedom of Information Act (5 U.S.C. 552) does not apply to records. Unless required by Federal, State, or local law, grantees and subgrantees are not required to permit public access to their records.”

In addition, 40 CFR 31.34 *Copyrights* states:

The Federal awarding agency reserves a royalty-free, nonexclusive, and irrevocable license to reproduce, publish or otherwise use, and to authorize others to use, for Federal Government purposes:

- (a) The copyright in any work developed under a grant, subgrant, or contract under a grant or subgrant; and
- (b) Any rights of copyright to which a grantee, subgrantee or a contractor purchases ownership with grant support.”

This language presumes that the data is created entirely with federal funding, but what happens when, as is often the case, tribes use funds from multiple sources to build their GIS database, including tribal funds? This is an area without clear statutory language or precedent from the courts.

4.4.6 Environment and Resources Data

Tribes create, use, and maintain GIS data and satellite imagery to support natural resource conservation and land management on their reservations and territories. In order to carry out their trust responsibilities, the BIA and other federal agencies administer and oversee programs to develop and protect these resources on trust lands and shared off-reservation lands. The U.S. Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS) and BIA, for example, conduct soil surveys and range inventories on reservations, respectively, collecting data about “soil productivity, erosion, stability problems, and other physical land features,” as well as land evaluations and range utilization surveys, collecting data about “vegetative cover, range condition, precipitation zones, current forage utilization,” and “recommended type and numbers of livestock to be grazed” (Senate, 1976a).

In addition, the BIA's Division of Energy and Mineral Management (DEMD) and Realty Office help tribes and individual Indian Mineral Owners to explore, develop, manage, and lease their energy and mineral resources, such as oil, natural gas, and uranium.

DEMD provides "GIS and data management support...through the implementation of the National Indian Oil and Gas Management System (NIOGEMS) at Tribal office, BIA Agency, BLM Field Office, and the Office of Natural Resources Revenue (ONRR)" (BIA, 2015d). DEMD also "provides a central data viewing location for private industry to view in confidence, with prior consent of the tribe, Indian owned data prior to entering into agreements" (BIA, 2015e). FOIA Exemption 9 may protect information regarding wells, as discussed in Chapter 5, but the environmental assessments conducted to comply with the National Environmental Policy Act may be subject to disclosure under FOIA.

Unwanted release of this information could compromise permitting, contract and lease negotiations, and other commercial activities of the tribes. Tribal trust and allotted lands may be leased under the supervision of the BIA and with approval from the Secretary of the Interior (25 U.S.C.A Sec. 415). According to Canby (2015, 454), third parties may lease tribal and allotted lands for "farming, grazing, housing and industrial developments, timber cutting, mining, and oil and gas exploration and production. Some of these uses are almost certain to cause major intrusions into the social structure of the landholding tribe." Conflicts frequently have arisen over the "abnormally low financial returns to tribes" resulting from these leases. Notably, as demonstrated in the *Cobell* settlement, the federal government lost or misplaced more than \$1.4 billion dollars that should have accrued to tribes and tribal members for leases on tribal lands.

In a letter to Senator Henry M. Jackson, Committee on Interior and Insular Affairs, U.S. Senate, dated May 17, 1976, then Deputy Assistant Secretary of the Interior expressed his deep concern that the Freedom of Information Act (FOIA) puts the BIA in a difficult position. The BIA, he stated, cannot both “obey the mandate of the Freedom of Information Act...and at the same time faithfully perform the obligations of its trust to Indians.” Enumerating several examples, he emphasized that the BIA is:

“often beset by requests for copies of these inventories [of natural resources and minerals deposits on Indian lands] by interested parties, sometimes by the very companies who will compete for the opportunity to develop these resources. Presently, the Bureau is required to disclose the results of these inventories under Freedom of Information Act requests.

Disclosure of reports such as these clearly places the tribe in a disadvantageous position in negotiation with companies for the development of these resources. In fact, many tribes in the past have depended largely upon bonus payments paid by these companies for the right to conduct exploration for these minerals. With much of the work done for them, and with access to detailed information concerning mineral deposits, these companies will not be willing to compete with each other and to pay large bonuses for exploration and prospecting permits” (Senate, 1976b).

Similarly, the Deputy Assistant Secretary continued:

“If the non-Indian ranching and agricultural interests who profit from the use of this land can demand access to land ownership records and appraisals, they will be at an enormous advantage in negotiating and bidding for the use of this land.”

Chairmen, Governors, and Counsel for eight tribes testified in a hearing before the Subcommittee on Indian Affairs, held on May 17, 1976 in Washington, DC, in support of a proposed Indian Amendment to the Freedom of Information Act (S. 2652) that would provide an exemption for “information held by a Federal agency as trustee, regarding the natural resources or other assets of Indian tribes or bands or groups of individual

members” (Senate, 1976b). The proposed amendment, however, was never passed, as discussed in Chapters 5 and 7.

In addition, information and spatial data about dams and fisheries also may be considered sensitive. Dams have ruined the migratory fisheries, especially wild salmon, for the major river systems in the Pacific Northwest and northern California. The migration systems (fish ladders, hatcheries) are marginal compared to what it once was as a result.

According to Pevar (2012, 187), “dams constructed on the Columbia River in the Northwest have destroyed more than 90 percent of the 16 million salmon that once swam in the river, fish on which many Indian tribes had depended.” Fisheries are important to many tribes for sustenance and cultural identity. Needless to say, tribes and others have pushed for the removal of dams to restore wildlife habitats and maintain hunting and fishing treaty rights (Pevar 2012, 192). This often puts them at odds with competing public interests in producing electricity, providing recreation, and building irrigation systems, resulting in contentious litigation.

4.5 Summary

Numerous entities create and maintain geographic information and GIS data pertaining to Indian tribes and their lands and resources. Most notably, the Bureau of Indian Affairs coordinates a national program for tribal GIS data development. Other entities involved with tribal geographic information and GIS data creation, maintenance and use include federal agencies such as the Bureau of Land Management (BLM), the U.S. Geological

Survey (USGS), the National Aeronautic and Space Administration (NASA), U.S. Census Bureau (Census), the U.S. Fish and Wildlife Service (USFWS), the Environmental Protection Agency (EPA), and the Indian Health Service (IHS), as well as state and county governments, universities, and private interests.

Because of the concerns enumerated above, many tribes would like to assert control over the terms within which geographic information and GIS data of their lands, resources, and communities are accessed and used, although tribes, like individuals, vary in what they believe should be kept secret or confidential, even within a tribe. If this information is created by, shared with, or funded through the Federal government, however, it may become accessible to outside parties under the U.S. Freedom of Information Act (FOIA) and related regulations, which are intended to ensure openness and accountability in government. Burning questions that arose during the 1976 hearing remain today: Should there be an Indian exemption to FOIA? If not, what of the nine current exemptions may apply? If so, what information and data should be exempted? All tribal data or just some data? Should it apply to everyone seeking tribal information or only to non-tribal members? How is the conflict between two fundamental policies resolved, Senator Domenici who introduced the FOIA amendment asked; “[w]hile the Trust Relationship is a sacred obligation to Native Americans, free and open disclosure is the very foundation, indeed, the cornerstone of a free society” (Senate, 1976b). Chapters 5 and 6 examine these issues, and Chapter 7 offers potential strategies for mitigating some of the risks of inappropriate disclosure.

5. SPATIAL DATA ACCESS AND RIGHTS

Tribal spatial information and data are created, maintained by and shared with numerous federal agencies. These include, but are not limited to the Bureau of Indian Affairs (BIA), the Bureau of Land Management (BLM), Environmental Protection Agency (EPA), the U.S. Geological Survey (USGS), the U.S. Fish and Wildlife Service (USFWS), the U.S. Forest Service (USFS), the U.S. Department of Agriculture (USDA), the National Park Service (NPS), the National Aeronautic and Space Administration (NASA), U.S. Census Bureau (Census), U.S. Department of Transportation (USDOT), and the Indian Health Service (IHS). These agencies use a wide array of spatial data to fulfill their trust obligations, including cultural and historic preservation, forestry, fish and wildlife, irrigation, safety of dams, road networks, agriculture, environmental, water rights, minerals and mining, and range management. Yet, despite confidentiality agreements between federal agencies and the tribes, spatial data about tribal lands and resources may become accessible to the public under the federal Freedom of Information Act (FOIA) and Federal Acquisition Regulations (FAR), if it is deemed an “agency record” under the “control” of the federal agency.¹²⁷ As such, it will be important to determine under what circumstances this might occur and to assess the extent to which the trust obligation imposes a federal responsibility for safeguarding this information.

Furthermore, under the Indian Self-Determination and Education Assistance Act of 1975, federally recognized tribes can undertake compacts, contracts, and cooperative

¹²⁷ In addition, tribal-related spatial data information may become accessible under state open records laws and other organizational policies depending on treaties, compacts and other agreements. This, however, is out of the scope of this dissertation.

agreements with the federal government to assume responsibility for Trust functions and other services provided to Indian tribes by the government. Tribes create and maintain spatial data using these Self-Governance Compacts (OSG)¹²⁸ and Public Law 93-638 Indian Self Determination Act Grants and Contracts,¹²⁹ as well as a variety of other institutional and funding arrangements. It is a matter of debate whether spatial data created and maintained by Tribal governments are subject to FOIA. When tribal spatial data is created in whole, or in part, with federal funding, the issue may hinge on the role of the data creator (e.g., government consultant, self-interested party seeking a government benefit), the data ownership and sharing requirements of the funding mechanism, or on the purpose for which the data is created and used (e.g., litigation, public decision-making). If, on the other hand, the spatial data is created entirely with tribal government funding, the issue may turn on whether the information is typically kept confidential and how the tribe has shared it with the federal government (e.g., “on loan”). The courts (and regulations), unfortunately, have not always provided clear or consistent answers to these issues.

Because of the concerns enumerated in Chapters 2 and 4, many American Indian tribes would like to assert ownership and control over the terms under which spatial data of their lands and resources can be accessed and used. To address these countervailing concerns, this dissertation adopts a “rights-based” model of information law and policy; as discussed by Lipton (2003), this model is organized around the concept of information control and the rights to intellectual property, privacy, and access (Litman, 2000b). The

¹²⁸ Comparable to block grants.

¹²⁹ See contract regulations Sec. 900.2 (d)(3) on records and Sec. 108 (b) (7) Model Agreement on Records and Monitoring.

basic rights of this model may be binned into two categories with regards to information: (1) access rights; and (2) control rights, including intellectual property and privacy rights. Under this model, control refers to an exclusory right, while access is regarded as a limitation or exception to control rights (Lipton 2003, 745). As Lipton (2003, 719-20) notes, finding an appropriate balance among these competing rights appears “to be at the heart of many of the important legal and policy debates that have arisen to date in relation to control of, and access to, information.” Furthermore, while other approaches to information law and policy exist, this framework is perhaps the most appropriate when considering the sovereignty and treaty rights of Indian nations and tribes.¹³⁰

Section 5.1 examines the rights of access under federal law and policy, including the Freedom of Information Act (FOIA), as well as statutes, regulations, and guidelines related to Federal data acquisition and management. Section 5.2 reviews the rights of control, including rights to privacy, intellectual property, cultural property, and national security. Chapter 7 offers potential strategies for mitigating the risks of inappropriate third party access to tribal spatial data, including policy options, contracting and licensing, data handling best practices, and ethics. It also evaluates the tradeoffs of these options.

¹³⁰ The rights-based model is not the only theoretical framework that could be used; alternative frameworks include, for example, “(a) relating information to the notion of expression and creating a “free speech”-based model for information law; (b) a “law and economics” model based on market efficiencies in relation to transactions involving information goods and focusing on the nonrivalrous “public goods” character of information” (Lipton, 2003, 709).

For a discussion of the application of state freedom of information laws to tribal information and data, see for example, W. H. Rogers (2004), who reviews the litigation between the Penobscot Indians of Maine and pulp mills over access to records maintained by the tribe and shared with the federal government. Based on treaties with the Penobscot, the Supreme Court in Maine held that the state's open records act applied to information shared with the federal government, although it did not apply to the internal operations of the tribe. The U.S. Supreme Court subsequently declined to hear the case (Hill, 2007; W. H. Rogers, 2004). Kemper (2014), on the other hand, reviews State of Arizona Freedom of Information law with respect to the National Environmental Policy Act, and tribal data about endangered species.

5.1 Rights of Access

Balancing competing rights and interests in freedom of information, privacy, national security, and intellectual property, U.S. public information policy both promotes access to information and enables a diversity of information sources in order to derive the greatest social and economic benefits (Lessig, 1999; Onsrud, 2001; Perritt, 2001). This policy is advanced through Executive orders, federal statutes and regulations. If tribal spatial data is created by, shared with, or funded through the Federal government, it may become accessible to outside parties under federal statutes, such as the Freedom of Information Act (FOIA), and other policies and regulations that are intended to ensure openness and accountability in government (Lum, 1999).

5.1.1 Open Government Policies

Beginning with his January 21, 2009 memorandum to the heads of agencies on Transparency and Open Government, the Obama Administration has promoted a series of policies and strategic plans to make government information and data more easily accessible through mobile- and web-based technologies and open source licensing, not just for the sake of transparency but also to encourage entrepreneurial use of the information for economic growth. In 2009, President Obama issued a memorandum on FOIA underscoring that it “should be administered with a clear presumption: In the face of doubt, openness prevails. ...All agencies should adopt a presumption in favor of disclosure...[and] take affirmative steps to make information public (Obama, 2009a).” Former Attorney General Holder subsequently issued FOIA Guidelines, stating that Obama’s memo had two important implications (Holder, 2009):

“First, an agency should not withhold information simply because it may do so legally...An agency should not withhold records merely because it can demonstrate, as a technical matter, that the records fall within the scope of a FOIA exemption.

Second, whenever an agency determines that it cannot make full disclosure of a requested record, it must consider whether it can make partial disclosure.”

In a reversal of Bush Administration’s policy to defend decisions to withhold records, Holder’s memo emphasized, “the Department of Justice will defend a denial of a FOIA request only if (1) the agency reasonably foresees that disclosure would harm an interest protected by one of the statutory exemptions, or (2) disclosure is prohibited by law.” Lastly, he accentuated that agencies needed to work towards a modernized, efficient and effective FOIA response system.

The Obama Administration also held a three-phase “Open Government Initiative” to solicit ideas from the public on “innovative approaches to policy, specific project suggestions, government-wide or agency specific instructions, and any relevant examples and stories relating to law, policy, technology, culture, or practice (NAPA, 2009).” The President and former Director Orszag of the Office of Management and Budget (OMB) issued memoranda establishing an Open Government Directive (Obama, 2009b; Orszag, 2009), based on “the three principles of transparency, participation, and collaboration.” Notably, OMB guidance mandated that each agency develop an Open Government Plan. It also requested that agencies publish at least three high-value data sets previously unavailable to the public and register them on the newly launched Data.gov, an online federal data clearinghouse. These objectives also are supported by OMB Circular A-130 *Revised Management of Federal Information Resources* and OMB Memorandum M-06-02 *Improving Access to and Dissemination of Government Information and Using the Federal Enterprise Architecture Data Reference Model*.

Building on these efforts, the President issued a Memorandum, *Building a 21st Century Digital Government*, on May 23, 2012 (Obama, 2013b). It called for the development and implementation of a *Digital Government Strategy*, a comprehensive government-wide strategy to leverage emerging mobile and web-technologies to improve government digital services for the public. Not quite a year later, President Obama issued Executive Order 13642, *Making Open and Machine Readable the New Default For Government Information* (May 9, 2013). “The default state of new and modernized Government information resources,” he said, “shall be open and machine readable.” Government

information shall be managed as an asset throughout its life cycle to promote interoperability and openness, and, whenever possible and legally permissible, to ensure that data are released to the public in ways that make the data easy to find, accessible, and usable” (Obama, 2013a). Pursuant to this Executive Order, OMB issued the Administration’s *Open Data Policy—Managing Information as an Asset* (Burwell, VanRoekel, Park, & Mancini, 2013). The Open Data Policy requires that agencies:

“collect or create information in a way that supports downstream information processing and dissemination activities. This includes using machine readable and open formats, data standards, and common core and extensible metadata for all new information creation and collection efforts. It also includes agencies ensuring information stewardship through the use of open licenses and review of information for privacy, confidentiality, security, and other restrictions to release. Additionally, it involves agencies building or modernizing information systems in a way that maximizes interoperability and information accessibility...”

The resulting first and second *Open Government National Action Plans* (OSTP, 2013) and *U.S. Open Data Action Plan* (OSTP, 2014) made a series of commitments and offered concrete steps agencies should take in support of the Open Data Policy.

The federal government website “Project Open Data” (<https://project-open-data.cio.gov/>), located on the open platform GitHub, provides access to the U.S. Government Policy on Open Data, as well as implementation guidance, data catalog tools, resources, and case studies. The Open Data Policy “requires agencies to list and describe all agency data that can be made publicly available (i.e. there are no valid restrictions to release) in a publicly available open data catalog using the Project Open Data metadata schema. It further requires the catalog to be human-readable and machine-readable.” Recent changes to the policy, however, now require that agencies “include ‘non-public’ datasets in their Public

Data Listing (PDL).”¹³¹ The federal non-public dataset listings are intended to make the public aware that these ‘non-public’ data sets exist and “to provide metadata [about these data sets] rather than access to the data itself.”

While the Obama Administration has taken initial steps towards ensuring the federal government meets its trust responsibility consistently across all federal agencies, as discussed in Chapter 3, it has not taken specific steps towards reforms that would protect tribal information under FOIA. Rather, both the Bureau of Indian Affairs and U.S. Environmental Protection Agency warn that if tribes do not want to run the risk of having their spatial data released under FOIA, then they should not share it with the federal government nor accept federal funding for the data’s creation. That said, in meeting the obligations of the Cobell settlement, the Department of the Interior and the Bureau of Indian Affairs have taken affirmative steps to improve internal data security measures (Gidiere, 2013, 159).

5.1.2 Freedom of Information

The U.S. Freedom of Information Act (FOIA) is defined by statute,¹³² amended by the Electronic Freedom of Information Act Amendments of 1996 (EFOIA),¹³³ the E-

¹³¹ “While the Public Data Listing is primarily intended to list datasets that are (or will be) available for public download, it can also serve as a way to publish information about non-public datasets and to provide information about accessing “restricted public” datasets. Data.gov provides a label to distinguish the access Level of datasets so that the public is aware that non-public dataset listings are only intended to provide metadata rather than access to the data itself. Metadata listings of non-public datasets on agency websites should also make this distinction clear. If an agency’s FOIA office determines that any metadata provided for these non-public datasets needs to be redacted in order to be displayed publicly, agencies should consult the Redaction Guidance page for more information.” From the Open Data Policy Website, Accessed May 18, 2015. Available at: <https://project-open-data.cio.gov/catalog/>.

¹³² 5 U.S.C. §552.

Government Act of 2002,¹³⁴ the Intelligence Authorization Act of 2002,¹³⁵ the OPEN Government Act of 2007,¹³⁶ the OPEN FOIA Act of 2009,¹³⁷ and others, promulgated regulation,¹³⁸ and interpreted by case law. Intended to foster openness and accountability in government, FOIA gives virtually all individuals and entities, regardless of reason for request,¹³⁹ a right to access federal “agency records,” unless specifically protected from disclosure by nine exemptions and three exclusions.¹⁴⁰ In addition, under EFOIA, agency records must be provided in electronic format if it exists; moreover, no distinction is made between spatial data records and other records.¹⁴¹ The E-Government Act extends this by promoting the use of the Internet and other information technologies to enhance public access to government information and increase citizen participation in government. For a history of the FOIA and related amendments, see the Department of Justice’s Guide to the Freedom of Information Act (USDOJ, 2014).

¹³³ Pub. L. 104-231, 110 Stat 3048 (1996).

¹³⁴ Pub. L. 107-347, 116 Stat. 2899 (2001).

¹³⁵ The Intelligence Authorization Act of 2002 (Pub. L. 107-306, 116 Stat. 2383 (2002)) amended FOIA to prohibit responding to FOIA requests submitted by foreign governments to U.S. intelligence agencies.

¹³⁶ The Honest Leadership and Open Government Act (Pub. L. 110-8, 121 Stat. 735 (2007)) strengthens public disclosure requirements regarding Congressional activities, such as lobbying, fundraising, and earmarks.

¹³⁷ The OPEN FOIA Act (Pub. L. 111-83, 123 Stat. 2184 (2009)) only added the statute must “specifically cite to this paragraph” under Exemption 3.

¹³⁸ 45 CFR 2.16.

¹³⁹ U.S. Dept. of Justice v. Tax Analysts, 492 US 136 (1989).

¹⁴⁰ “The basic purpose of [the] FOIA is to ensure an informed citizenry, vital to the functioning of a democratic society, needed to check against corruption and to hold the governors accountable to the governed.” *NLRB v. Robbins Tire & Rubber Co.*, 437 U.S. 214, 242 (1978); see also *NARA v. Favish*, 124 S. Ct. 1570, 1580 (2004) (emphasizing that the FOIA’s underlying purpose of allowing “citizens to know ‘what the government is up to’” is “a structural necessity in a real democracy” (quoting *United States Dep’t of Justice v. Reporters Comm. for Freedom of the Press*, 489 U.S. 749, 773 (1989))), reh’g denied, No. 02-409, 2004 WL 108633 (U.S. May 17, 2004).

¹⁴¹ As Perritt (2001, 740) notes, the Supreme Court decision in *Tax Analysts*, which will be discussed in Section 2.1.2.2, “undercuts any argument that an agency can avoid a duty to disclose electronic formats merely because the same content is available in paper formats.” See also *Petroleum Information Corp. v. United States Department of the Interior* (976 F.2d 1429 (D.C. Cir. 1992)) (affirming order that agency disclose legal land description computer database file, even though the material was available in paper form from other sources and from the agency itself).

The FOIA, which provides a right to access federal government records, was crafted to balance the countervailing tensions of the “the public's interests in the effective and efficient operations of government” and “in the prudent governmental use of limited fiscal resources” (rights of access) with “the preservation of the confidentiality of sensitive personal, commercial, and governmental information” (rights of control). The FOIA generally supports a policy of broad disclosure by the federal government, and, and its exceptions have been narrowly construed by the courts in favor of disclosure. FOIA authorizes only disclosure or nondisclosure; FOIA does not allow agencies to restrict the use of the information, to place conditions such that the information cannot be redistributed to others, or to only enable viewing but not copying of the information (Gellman, 1995).

5.1.2.1 What is an “Agency”?

The FOIA only applies to an “agency” of the U.S. Government. As defined by FOIA, which is part of the Administrative Procedure Act¹⁴² (APA), “agency” means “agency as defined in [the APA] includes any executive department, military department, Government corporation, Government controlled corporation or other establishment of the executive branch of the Government (including the Executive Office of the President), or any independent regulatory agency.”^{143,144} In addition, according to District

¹⁴² 5 U.S. C Sec 552(f).

¹⁴³ 5 U.S.C. Sec 552(f)(1).

¹⁴⁴ As interpreted by the courts, an “agency” is defined as: “The agencies, offices and departments of the Executive branch of the federal government, such as the Defense Department, the Office of Management and Budget, and the National Security Council; The independent federal regulatory agencies, such as the Federal Trade Commission or the Environmental Protection Agency and the Federal Communications

Court in *Flathead Joint Board of Control v. US DOI* (2004, 5)¹⁴⁵, citing the Supreme

Court in *Klamath Water Users* (2001, 11):

“[I]ndependent consultants with no interests of their own are included in the scope of this protection, on the principle that the agency should be able to request, in confidence, greater authority on a particular topic than its own agents possess.”

Organizations that "are neither chartered by the federal government [n]or controlled by it" do not have to comply with FOIA. Thus, the courts have repeatedly determined that FOIA is not applicable to state or local governments,¹⁴⁶ foreign governments, federal courts, Congress, corporations, non-profit organizations, or private citizens (USDOJ, 2013).¹⁴⁷ Notably, once the courts determine whether or not FOIA can be applied to an

Commission; and Federal government-controlled corporations, such as the U.S. Postal Service, the Tennessee Valley Authority, the Smithsonian Institution, the National Railroad Passenger Corporation (Amtrak) and others; Additional independent federal regulatory agencies are the Nuclear Regulatory Commission and the Federal Communications Commission (ACLU 2015).”

¹⁴⁵ *Flathead Joint Board of Control v. US Department of the Interior*, 2004 WL 601803 (D.Mont).

¹⁴⁶ U.S. Department of Justice. 2014. Procedural Requirements. In Freedom of Information Act Guide. USDOJ Website, accessed May 13, 2015. Available at:

<http://www.justice.gov/sites/default/files/oip/legacy/2014/07/23/procedural-requirements.pdf>. See *Sykes v. U.S.*, No. 11-4005, 2012 WL 5974285, at *7 (6th Cir. Nov. 29, 2012) (affirming district court dismissal of amended complaint because FOIA does not apply to state entities); *Moreno v. Curry*, No. 06-11277, 2007 WL 4467580, at *1-2 (5th Cir. Dec. 20, 2007) (unpublished disposition) (affirming district court finding that FOIA does not apply to state or municipal agencies); *Dunleavy v. New Jersey*, 251 F. App'x 80, 83 (3d Cir. 2007) (unpublished disposition) (stating that FOIA does not impose obligations on state agencies), cert. denied, 128 S. Ct. 1483 (2008); *Blankenship v. Claus*, 149 F. App'x 897, 898 (11th Cir. Sept. 7, 2005); *Lau v. Sullivan County Dist. Att'y*, 201 F.3d 431 (2d Cir. Nov. 12, 1999) (unpublished disposition); *Martinson v. DEA*, NO. 96-5262, 1997 WL 634559, at *1 (D.C. Cir. July 3, 1997); See *Philip Morris, Inc., v. Harshbarger*, 122 F.3d 58, 83 (1st Cir. 1997) ("FOIA . . . applies only to federal executive branch agencies"); *Day v. Shalala*, 23 F.3d 1052, 1064 (6th Cir. 1994) (APA "pertains to federal agencies"); *Brown v. Kelly*, 1994 U.S. App. LEXIS 9964, No. 93-5222, 1994 WL 36144, at *1 (D.C. Cir. January 27, 1994) (per curiam) (FOIA does not apply to state agencies); *St. Michael's Convalescent Hosp. v. State of California*, 643 F.2d 1369, 1373 (9th Cir. 1981) (definition of "agency" under FOIA "does not encompass state agencies or bodies"); *Johnson v. Wells*, 566 F.2d 1016, 1018 (5th Cir. 1978) [**30] (state board of parole not agency within meaning of FOIA).

¹⁴⁷ U.S. Department of Justice. 2004. Procedural Requirements. Freedom of Information Act Guide, May 2004 USDOJ Website, accessed May 13, 2015. http://www.usdoj.gov/oip/procereq.htm#N_5. See, for example, “*Forsham v. Harris*, 445 U.S. 169, 179-80(1980) (holding that private grantee of federal agency is not itself subject to FOIA); *Missouri v. United States Dep't of Interior*, 297 F.3d 745, 750 (8th Cir. 2002) ("The provision of federal resources, such as federal funding, is insufficient to transform a private organization into a federal agency."); *Irwin Mem'l Blood Bank v. Am. Nat'l Red Cross*, 640 F.2d 1051, 1057 (9th Cir. 1981) (determining that American National Red Cross is not an agency under FOIA); *Gilmore v. United States Dep't of Energy*, 4 F. Supp. 2d 912, 919-20 (N.D. Cal. 1998) (finding that privately owned laboratory that developed electronic conferencing software, for which government owned

organization, that determination will not change even though the organization's functions may vary under separate circumstances.

Although the FOIA is silent on its application to Indian tribes, I would argue that federally recognized Indian tribes, like state governments, are not an “agency” for the purposes of FOIA. As with many other courts, the U.S Court of Appeals for the Eleventh Circuit argued in *Blankenship v. Claus* (2005)¹⁴⁸ that states are not subject to FOIA because they are “the governments of the territories or possessions of the United States,” which are expressly excluded in the definition of “agency” under FOIA (5 U.S.C. Sec. 551(1)(C), 5 U.S.C. Sec 552(e)).¹⁴⁹ Similar logic may be applied to tribes. The Supreme Court in *Klamath* and the District Court in *Flathead* held that tribes are not “agencies” for the purposes of intra and inter-agency communications under FOIA Exemption 5, as discussed below. The courts also have determined that an Indian tribe “as a corporation that is not part of the Federal Government, is plainly a person within the meaning of the [Freedom of Information] Act.” Furthermore, FOIA should not be generally applicable to tribal governments,¹⁵⁰ as it is to federal agencies, because it would dilute the doctrines of tribal sovereignty, self-determination, and reserved rights, and abrogate treaty provisions.

5.1.2.2 What is an “Agency Record”?

nonexclusive license for its use, is not "a government-controlled corporation" as it is not subject to day-to-day supervision by federal government, nor are its employees or management considered government employees).”

¹⁴⁸ *Blankenship v. Claus*, 149 F. App'x 897, 898 (11th Cir. Sept. 7, 2005).

¹⁴⁹ See also Footnote 19.

¹⁵⁰ *Indian Law Resource Center v. Dept. of the Interior*, 477 F.Supp. 144, 146 (D.D.C. 1979).

FOIA only requires that “agency records” be disclosed. As defined by FOIA, a “record” is:

“(A) any information that would be an agency record subject to the requirements of this section when maintained by an agency in any format, including an electronic format; and

(B) any information described under subparagraph (A) that is maintained for an agency by an entity under Government contract, for the purposes of records management.”¹⁵¹

The courts have interpreted this to include hardcopy and electronically recorded documents, computer software, digital databases, and photographic and digital images. To be considered an “agency record” for the purposes of FOIA, the record in question must meet a two-part test articulated by the Supreme Court in *Department of Justice v. Tax Analysts*.¹⁵² First, a federal agency must have created or obtained the record prior to the FOIA request; however, agencies are not required to create a new record in order to satisfy a FOIA request. Second, a federal agency must have “control” over the record at the time of the request.^{153,154} “By control,” the Supreme Court stated, “we mean that the materials have come into the agency’s possession in the legitimate conduct of its official business.”¹⁵⁵

¹⁵¹ 5 U.S.C Sec. 552(f)(2).

¹⁵² *United States Dep't of Justice v. Tax Analysts*, 492 U.S. 136, 144-45 (1989) (holding that court opinions in agency files are agency records).

¹⁵³ “[B]y control,” the Supreme Court meant “that the materials have come into the agency's possession in the legitimate conduct of its official duties.” Further, “the control inquiry focuses on an agency's possession of the requested materials, not on its power to alter the content of the material it receives.” See also the Freedom of Information Act: A Step-by-Step Guide, American Civil Liberties Union Web site, accessed July 8, 2004. <http://archive.aclu.org/library/foia.html>.

¹⁵⁴ FOIA Guide, May 2004, U.S. Department of Justice Web site, accessed July 8, 2004. http://www.usdoj.gov/oip/procereq.htm#N_19.

¹⁵⁵ 492 U.S. at 145.

To determine the extent of federal agency “control” over a record, the D.C. Circuit court established a four-part test:

- “(1) the intent of the record's creator to retain or relinquish control over the record;
- (2) the ability of the agency to use and dispose of the record as it sees fit;
- (3) the extent to which agency personnel have read or relied upon the record; and
- (4) the degree to which the record was integrated into the agency's recordkeeping system or files.”¹⁵⁶

An agency may control a record if it has been submitted in the course of official business by a private individual or entity, although physical possession is not a guarantee of control. An agency also may have “constructive control” of the record—meaning that under certain circumstances, such as under grants and contracts, an agency can require that a private entity provide the record at any time without further consent.

5.1.2.3 Exemptions

¹⁵⁶ Procedural requirements, FOIA guide, May 2004, U.S. Department of Justice Web site, accessed July 8, 2004. http://www.usdoj.gov/oip/procereq.htm#N_19. See, e.g., Int'l Bhd. of Teamsters v. Nat'l Mediation Bd., 712 F.2d 1495, 1496 (D.C. Cir. 1983) (determining that submission of gummed-label mailing list as required by court order not sufficient to give "control" over record to agency); McErlean v. United States Dep't of Justice, No. 97-7831, 1999 WL 791680, at *11 (S.D.N.Y. Sept. 30, 1999) (finding that agency had no "control" over requested records because it assented to restrictions on their dissemination and use that were requested by confidential source who provided them); KDKA v. Thornburgh, No. 90-1536, 1992 U.S. Dist. LEXIS 22438, at **16-17 (D.D.C. Sept. 30, 1992) (concluding that Canadian Safety Board report of air crash, although possessed by National Transportation Safety Board, is not under agency "control," because of restrictions on its dissemination imposed by Convention on International Civil Aviation); Teich v. FDA, 751 F. Supp. 243, 248-49 (D.D.C. 1990) (holding that documents submitted to FDA in "legitimate conduct of its official duties" are agency records notwithstanding FDA's presubmission review regulation allowing submitters to withdraw their documents from agency's files (quoting Tax Analysts, 492 U.S. at 145)); Rush v. Dep't of State, 716 F. Supp. 598, 600 (S.D. Fla. 1989) (finding that correspondence between former ambassador and Henry Kissinger (then Assistant to the President) were agency records of Department of State as it exercised control over them); McCullough v. FDIC, No. 79-1132, 1980 U.S. Dist. LEXIS 17685, at *6 (D.D.C. July 28, 1980) (concluding that reports transmitted to agency by state regulatory authorities were agency records because "it is questionable whether [state authorities] retained control" over them); see also FOIA Update, Vol. XIII, No. 3, at 5 (advising that records subject to "protective order" issued by administrative law judge remain within agency control and are subject to FOIA).

Some level of secrecy and confidentiality is needed for government to function. The nine categories of agency records that are exempt from disclosure and three exclusions, under section 552 (b) of FOIA, are (quoted and adapted from FOIA.gov):¹⁵⁷

- **Exemption 1:** Information that is properly classified under an Executive Order as secret to protect national security or foreign policy; e.g., classified national defense or foreign policy documents, scientific and technology data that relates to national security.¹⁵⁸
- **Exemption 2:** Information related solely to internal personnel rules and practices of an agency.
- **Exemption 3:** Information that is specifically prohibited from disclosure by another federal statute, e.g., personal tax data, identifiable census data; in order to qualify, the statute must:
 - “Require that the data be withheld from the public in such a manner as to leave no discretion on the issues;
 - Establish particular criteria for withholding information or refers to particular types of matters to be withheld; or
 - Specifically cite to this exemption (if the statute is enacted after October 28, 2009, the date of enactment of the OPEN FOIA Act of 2009) (Ginsberg, 2014).”
- **Exemption 4:** Information that concerns business trade secrets or other confidential commercial or financial information obtained from a person; called *Confidential Business Information (CBI)*, e.g., trade secrets or privileged or confidential information, the disclosure of which would make it difficult for the government to obtain necessary information in the future, or the disclosure of which would harm the individual from whom the information was obtained originally.
- **Exemption 5:** Information that concerns communications within or between agencies which are protected by legal privileges, that include but are not limited to: (1) attorney-work product privilege; (2) attorney-client privilege; (3)

¹⁵⁷ Quoted and adapted from FOIA.gov FAQ Exemptions webpage, accessed May 13, 2015. Available at adapted from <http://FOIA.gov/FAQ.html#exemptions>.

¹⁵⁸ Certain information “the unauthorized disclosure of which reasonably could be expected to cause exceptionally grave damage to the national security” is classified as ‘top secret,’ whereas information that “reasonably could be expected to cause serious damage to the national security” is considered ‘secret’ and information that “reasonably could be expected to cause damage to the national security” is considered ‘confidential.’ 5 U.S.C. 552(b)(1) and Exec. Order No. 12,958, 1.3(a)(1), 60 Fed. Reg. 19825 (1995).

deliberative process privilege (4) Presidential communication privilege; e.g., memos or letters that are protected by attorney-client privilege or are compiled in preparation for a trial, materials providing advice or opinions as part of government policy decision-making process.

- **Exemption 6:** Information that, if disclosed, would constitute an unwarranted invasion of an individuals' personal privacy; e.g., personnel files, medical files.
- **Exemption 7:** Certain kinds of information compiled for law enforcement purposes.
 - (A) Could reasonably be expected to interfere with enforcement proceedings
 - (B) Would deprive a person of a right to a fair trial or an impartial adjudication
 - (C) Could reasonably be expected to constitute an unwarranted invasion of personal privacy
 - (D) Could reasonably be expected to disclose the identity of a confidential source
 - (E) Would disclose techniques and procedures for law enforcement investigations or prosecutions
 - (F) Could reasonably be expected to endanger the life or physical safety of any individual
- **Exemption 8:** Information that concerns the regulation of financial institutions; e.g., operations records of certain financial institutions, such as Trust companies, Commercial, savings, and investment banks, the Federal Reserve System.
- **Exemption 9:** Geological and geophysical information and data, including maps, on wells; e.g., oil and gas wells, groundwater inventories, amount of water or oil a well produces, maps or charts and files belonging to the Department of the Interior's Bureau of Land Management and the Department of Energy's Federal Power Commission.

Importantly, these exemptions are discretionary. Even if an agency determines that a record falls within one of these categories, an agency may still decide to release the

information. The courts, as well as the Obama Administration's Open Government directives, emphasize a narrow interpretation of the nine exemptions in favor disclosure (Gidiere, 2013; Obama, 2009a; Obama, 2009b).

Congress also provided special protection for national security and law enforcement record exclusions. For example, the Homeland Security Act of 2002, Public Law 107-296, which established the Department of Homeland Security (DHS), includes a provision that operates as an "Exemption 3 statute" under the Freedom of Information Act, 5 U.S.C. § 552(b)(3) (2000), for "critical infrastructure" information. Section 214 of the Act, which is entitled "Protection of Voluntarily Shared Critical Infrastructure Information," contains the Exemption 3 statute:

“Notwithstanding any other provision of law, critical infrastructure information...that is voluntarily submitted to a covered Federal agency for use by that agency regarding the security of critical infrastructure and protected systems, analysis, warning, interdependency study, recovery, reconstitution, or other informational purpose, when accompanied by an express statement...shall be exempt from disclosure under section 552 of title 5, United States Code (commonly referred to as the Freedom of Information Act).”¹⁵⁹

5.1.2.4 Is There a Tribal Trust Exemption to FOIA?

To meet its trust obligations, the BIA, as well as other federal agencies, regularly interact with and provide funding to tribal governments to help deliver government services and manage and protect their lands and resources. The Federal government and tribes create, maintain, use, and share spatial data about tribal communities, lands and resources as part

¹⁵⁹ Pub. L. No. 107-296, 116 Stat. 2135, § 214(a)(1)(A) (to be codified at 6 U.S.C. § 133(a)(1)(A)).

of this government-to-government relationship. Tribes may share their information and spatial data voluntarily, or be required to share it with the federal government under specific statutes, regulations, and funding arrangements. Tribes create and share spatial data voluntarily with the BIA and EPA, for example, in the development and implementation of Integrated Resource Management Plans (IRMPs).¹⁶⁰ Similarly, tribes may share appraisal information, environmental data, and maps voluntarily with the BIA in order to facilitate the process for transferring fee to trust land. Although reluctantly, tribes also may share information and spatial data about cultural resources and sacred sites with the US Forest Service, Army Corps of Engineers, and other agencies as part of the consultation process (described in Chapter 3). While tribes are not required to do so, it may be in the tribe's interest to share this information if they wish to defend their treaty rights and governing authority, and protect their lands and resources.

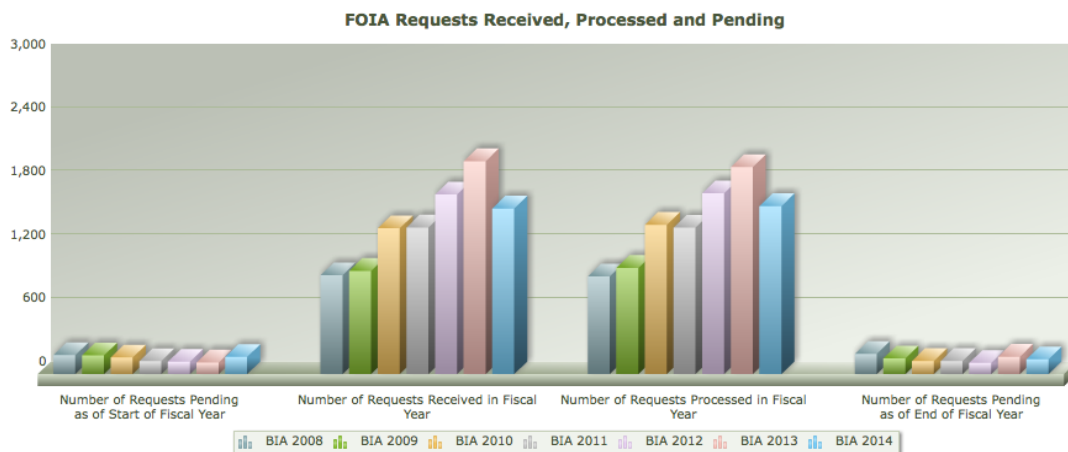
Second, tribes may be required to share information with the federal government under specific statutes and regulations, and/or when they use federal funding in whole, or in part, to create spatial data. For instance, the EPA is required to make information collected under the Clean Water Act (CWA) and Clean Air Act (CAA) grants,¹⁶¹ available to the public, unless considered confidential business information. Similarly, the EPA must disclose environmental impact statements created under the National

¹⁶⁰ IRMPs, which are produced by tribes with the assistance of the BIA, are intended to “link the natural environment (scientific data and concepts) and social realities (human, cultural, and traditional values) to create resource policies that support a healthy ecosystem while taking into account a community’s cultural, economic, and social goals” (BIA, 2001, 2005).

¹⁶¹ Clean Water Act, 33 U.S.C. Sec. 1318(b); Clean Air Act, 42 U.S.C. Sec. 7414(c).

Environmental Policy Act (NEPA) (Gidiere, 2013). Once in the possession of the federal government, this information may be at risk of disclosure under FOIA.

The BIA received and processed nearly 10,000 FOIA requests between FY2008 and FY2014 (see Figure 2). External parties, as well as tribes and tribal members, made these requests. Each year during the period from FY008 to FY2014, the BIA released between 62 and 75% of the requested record, redacting the majority of the rest before release. From FY2008 to FY2014, the BIA withheld or redacted records primarily based on Exemptions 6 and 7(C), which relate to privacy, and to a lesser degree on Exemptions on 3, 4, and 5. Use of Exemptions 1, 2, 8, and 9 were marginal (see Table 1). Only 72 records total from FY2008 to FY2014 were not considered agency records for the purposes of FOIA (see Figure 3).



(7) Total Active Results

Show | Hide

Agency	Component	Year	Number of Requests Pending as of Start of Fiscal Year	Number of Requests Received in Fiscal Year	Number of Requests Processed in Fiscal Year	Number of Requests Pending as of End of Fiscal Year
DOI	BIA	2008	179	934	923	190
	BIA	2009	176	975	1004	147
	BIA	2010	156	1378	1410	124
	BIA	2011	122	1385	1383	124
	BIA	2012	117	1696	1708	105
	BIA	2013	109	2011	1956	164
	BIA	2014	162	1564	1587	139
Total			1021	9943	9971	993

Figure 2. BIA FOIA requests received, processed and pending from FY2008–FY2014.

Source: Created by author using U.S. Government’s FOIA Data tool.¹⁶²

¹⁶² U.S. Government FOIA Data tool, accessed May 12, 2015. Available at: <http://www.foia.gov/data.html>.

Agency	Component	Year	Request Pending on Start	Request Received in FY	Request Processed in FY	Request Pending for Next	Released in Full ratio	Released in Part ratio	Denied in Full ratio	Not Agency Record
DOI	BIA	2008	179	934	923	190	0.6407	0.3350	0.0244	20
DOI	BIA	2009	176	975	1004	147	0.6496	0.3268	0.0236	5
DOI	BIA	2010	156	1378	1410	124	0.6670	0.3028	0.0302	22
DOI	BIA	2011	122	1385	1383	124	0.7491	0.2233	0.0276	15
DOI	BIA	2012	117	1696	1708	105	0.7078	0.2596	0.0326	3
DOI	BIA	2013	109	2011	1956	164	0.6744	0.2972	0.0284	4
DOI	BIA	2014	162	1564	1587	139	0.6232	0.3223	0.0544	3
Total			1021	9943	9971	993	N/A	N/A	N/A	72

Figure 3. BIA FOIA requests released in full, in part, denied, or “Not Agency Record” from FY2008–FY2014.

Source: Created by author using U.S. Government’s FOIA Data tool.

Exemption	Ex. 1	Ex. 2	Ex. 3	Ex. 4	Ex. 5	Ex. 6	Ex.7(c)	Ex. 8	Ex. 9
Total Number of Times Used by BIA	1	7	17	139	166	1,156	849	0	3

Table 1. Total number of times the BIA withheld an agency record using one of the nine FOIA exemptions.

Source: Calculated by author based on annual Department of Interior FOIA reports from FY2008–FY2014.¹⁶³

¹⁶³ DOI Annual FOIA Reports. Last accessed May 18, 2015. Available at: <http://www.doi.gov/foia/DOI-FOIA-Annual-Reports.cfm>.

We then must ask, is there a Tribal exemption to FOIA based on the fiduciary duty arising from the trust obligation of the federal government? Citing the Restatement (Second) of Trusts (1957), McCarthy (2004) emphasizes that a “trustee is under a duty to the beneficiary not to disclose to a third person information which he has acquired as trustee where he should know that the effect of such disclosure would be detrimental to the interest of the beneficiary. However, in the pivotal case *Department of the Interior and Bureau of Indian Affairs, Petitioners v. Klamath Water Users Protective Association* (99-1871), decided on March 5, 2001, the United States Supreme Court declined to recognize an “Indian trust responsibility” exception to FOIA. The Court ruled that six documents shared voluntarily by the Hoopa Valley, Karuk and Yurok tribes with the federal government, at the government’s request in support of a water rights case, were not exempt from the Freedom of Information Act under Exemption 5, a provision that protects intra-agency and inter-agency records from public inspection. Three of the documents related directly to the water plan. The unanimous Court opinion, delivered by Justice Souter, upheld the decision of the Ninth Circuit.

Although in keeping with the Court’s history of narrowly interpreting FOIA to encourage public disclosure, this decision has had a negative impact on the trust relationship between the federal government and tribes. It has caused a ripple effect, sparking new conflicts over access to government-held tribal information and spatial data (e.g., see court cases *Flathead*, *Citizens Progressive Alliance*, *Merit Energy*, *Starkey*, and *Utah*, described in sec. 5.1.2.5 below). Federal agencies have expressed concerns that this ruling erodes tribes’ willingness to share information and hence, may impede the federal

government's ability to perform its trust obligations (e.g., ACOE, 2001; Gee, 2014). The Army Corps of Engineers, for instance, commented in meeting notes:

“as a result of the Klamath decision, many meetings with tribes that were held after the ruling were not documented with meeting notes. This became a problem as well. ...at some meetings between agencies and tribes, tribal staff have taken notes, reviewed the contents to ensure that they are comfortable with the information, then sent the [redacted] notes to the agency” (ACOE, 2001).

This ruling brought to the forefront the double-edged sword of the trust relationship and illustrates the tension between the federal government's two roles—public decision-maker and tribal trustee.

The intent of the Freedom of Information Act, as originally conceived, is to provide access to the process of government decision-making.¹⁶⁴ The FOIA requires that government records be made accessible to the public unless the information falls within one (or more) of the nine the narrowly construed exemptions (see Section 5.1.2.3).¹⁶⁵ According to the Supreme Court, to meet the criteria under Exemption 5, a record had to satisfy two conditions: 1) “its source must be a government agency,” and 2) “it must fall within the ambit of a privilege against discovery under judicial standards that would govern litigation against the agency that holds the document.”¹⁶⁶ Because the tribes “communicat[ed] with the [BIA] with their own, albeit entirely legitimate, interests in mind,” the Court asserted, they did not qualify as disinterested consultants, who might

¹⁶⁴ 5 U.S.C. § 552, as amended by P.L.104-231, 110 Stat. 3048 (1996).

¹⁶⁵ The Government carries the burden of proof in a court of law.

¹⁶⁶ Syllabus, *supra* note 4, at 2. Condition two incorporates both the privilege for attorney work product and the privilege for deliberative process, which covers documents reflecting advisory opinions, recommendations, and the like that are part of the process of policy formulation.

function “just as an [agency] employee would be expected to do.”¹⁶⁷ In other words, the tribes had an interest separate and distinct from the government. Therefore, the Court concluded, the documents in question originated with the tribes, not with the government.¹⁶⁸ Finding that the first condition of the two-part test was not met, the Supreme Court did not go on to address the second: essentially, would disclosure impair the government’s fiduciary trust obligations to the tribes?¹⁶⁹

In its arguments, the DOI pointed out that the tribal documents were submitted to the BIA rather than to the Bureau of Reclamation, therefore reinforcing its claim for confidentiality. Arguably, this should not make a difference as all federal agencies stem from the same sovereign. Although the literature is limited on the subject,¹⁷⁰ I would assert that all federal agencies have a trust responsibility towards Indian tribes. Many, like the EPA, have explicitly recognized this.¹⁷¹ The DOI also asserted that in order to receive candid advice and information from tribes, which is “integral to the government’s performance of its trust responsibilities,” the DOI’s Departmental Manual provides that

¹⁶⁷ The Court incorrectly implied that the tribes were “seeking a Government benefit at the expense of other applicants.” The tribes were not seeking a benefit, rather the protection of reserved rights. *DOI v. Klamath Water Users Protective Ass’n*, 121 S.Ct 1060, 1068 n.4 (2001) [Hereinafter Supreme Court].

¹⁶⁸ Some courts of appeals have held that documents prepared for a government agency by an outside consultant can qualify as an “intra-agency” memorandum. Interestingly, here, the Supreme Court avoids explicitly answering whether a consultant-generated document would be exempt.

¹⁶⁹ Carlton, J. UW-Madison, Advanced Federal Indian Law Class, private discussions. (2002) Also, B. Haskins, Land Tenure Center (2001) and D. Lavidure, UW-Madison Federal Indian Law Class (2001).

¹⁷⁰ Refer to Chambers, R. P., *A Study of Administrative Conflicts of Interest in the Protection of Indian Natural Resources* (1971); Goodman, E., *Protecting Habitat for Off-Reservation Tribal Hunting and Fishing Rights: Tribal Co-management as a Reserved Right* 30 *Envtl. L.* 279 (2000); Royster, J. V., *Equivocal Obligations: The Federal-Tribal Trust Relationship and Conflicts of Interest in the Development of Mineral Resources* 71 *NDLR* 327 (1995); Shepherd, H., *Conflict Comes to Roost! The Bureau of Reclamation and the Federal Indian Trust Responsibility*. 31 *Envtl. L.* 901. See also *Pyramid Lake Paiute Tribe of Indians v. United States Dep’t of Navy*, 898 F.2d 1410 (9th Cir. 1990) and subsequent cases.

¹⁷¹ Albeit, as Trust, supra note 2, at 169, points out, the substantive mandate on what those fiduciary obligations are remains unclear.

“[i]nformation received shall be deemed confidential, unless otherwise provided by applicable law, regulations, or Administration policy, if disclosure would negatively impact upon a trust resource or compromise the trustee’s legal position.”

While the Court acknowledged that a lack of confidentiality might chill frank federal-tribal communications and would interfere with the Government’s ability to fulfill its trust obligations, it refused to apply Exemption 5, declaring that this would be tantamount to an “Indian Trust” exemption for which there is no statutory basis. In a footnote, the Court briefly dismisses the 1976 and 1978 attempts at amending FOIA¹⁷² to protect federal-tribal communications. (See *Indian Amendment to Freedom of Information Act: Hearings on S. 2652 before the Subcommittee on Indian Affairs of the Senate Committee on Interior and Insular Affairs, 94th Congress, 2nd Session (1976)*; and *Indian Trust Information Protection Act of 1978, S. 2773, 95th Congress, 2nd Session. (1978)*). The Court reasoned that because a Tribal Amendment to FOIA was not passed, Congress did not intend to have such an exemption. But, the legislative history in this instance does not provide necessarily a clear and unambiguous indication of Congress’ intent to modify Indian rights. According to John Echohawk,¹⁷³ formerly of the Native American Rights Fund, who participated in the efforts to amend FOIA in the 1970s, these attempts to create a tribal FOIA amendment were not rejected by Congress (Senate, 1976a, 1976b). Rather, those advocating such amendments ceased because they were assured that the

¹⁷² Indian Amendment to Freedom of Information Act: Hearings on S. 2652 before the Subcommittee on Indian Affairs of the Senate Committee on Interior and Insular Affairs, 94th Congress, 2nd Session (1976); Indian Trust Information Protection Act of 1978, S. 2773, 95th Congress, 2nd Session. (1978). [Hereinafter Hearings].

¹⁷³ EchoHawk, J. Native American Rights Fund, private communication (2002).

current statutes and case law adequately protected this information. In fact, during the hearings before the Subcommittee on Indian Affairs regarding the 1976 Indian Amendment to the Freedom of Information Act (S. 2652), tribal counsels expressed the belief that tribal information fit within at least two FOIA exemptions (4 and 5) and that an amendment to FOIA merely would clarify and bolster this interpretation.

In light of this ambiguity, the Court's assumption ignores the *Canons of Statutory Construction* (discussed in Chapter 3), which are invoked when determining the impact of a particular statute on the rights of Indian tribes or members. Although perhaps debatable, the Canons assert that ambiguity be resolved in favor of the preservation of Indian rights, particularly when the interests of the tribes and general public conflict.¹⁷⁴

The *Klamath Water Users* decision brings to the forefront the double-edged sword of the trust relationship and illustrates the tension between the Government as decision-maker and Government as trustee. One expression of the fiduciary trust obligation is the government-to-government consultation between tribes and agencies during natural resource policy development. Waldron (2001) faults the *Klamath* decision for running counter to policy set forth in numerous Executive Orders, Department of Interior (DOI) Secretarial Orders, the DOI manual and other agency guidelines, which largely compel confidentiality in agency-tribal communications. Arguably, all federal agencies have a

¹⁷⁴ Clinton, R. N., Newton, N. J., and M.E. Price. *American Indian Law: Case Materials*. 3rd Edition. The Michie Company., Charlottesville, Virginia, (1991), at 205, 229.

trust obligation to Indian tribes. However, a variety of goals, mandates, and conflicting public interests often take precedence to trust responsibilities (M. C. Wood, 1994, 779). Legal scholars insist, however, that under the trust doctrine, conflict-of-interest situations, particularly acute in the natural resources, should be handled such that tribes' interests are prioritized (e.g., M. C. Wood, 1994).

The FOIA puts Indian tribes and federal agencies in an awkward position. Under the precedent set by the *Klamath* decision, sensitive federal-tribal communications are not necessarily protected from disclosure under Exemption 5 of FOIA. According to Gidiere (2013, 246):

“[t]he Court’s holding is not a per se rule against interagency status for communications between tribes and federal agencies. But, in order to invoke Exemption 5 in a future case, an agency must closely scrutinize the purpose of the tribal communication at issue. If the purpose of the communication is to advocate an interest of the tribe over interests of others, then *Klamath Water Users* will prevent the use of Exemption 5.”

Needless to say, litigation intensified as a result of the *Klamath* decision; the number of BIA FOIA cases increased, spawning additional lawsuits.¹⁷⁵ Federal agencies, as a result, are not able to guarantee confidentiality.^{176,177} Subsequently, tribes may decline

¹⁷⁵ See, for example, Figures 2 and 3; Also several cases shortly on the heels of *Klamath*, such as *State of Utah v. US Department of Interior* (10th Cir. Court of Appeals 2001), *Merit Energy Company v. Department of Interior* (D.C. Colorado 2001), and *Bishop Paiute Tribe v. County of Inyo* (9th Cir. 2002).

¹⁷⁶ For example, Secretarial Order No. 3206 American Indian Tribal Rights, Federal-Tribal Trust Responsibilities, and the Endangered Species Act, issued by the Secretary of the Interior and the Secretary of Commerce pursuant to the Endangered Species Act of 1973, 16 U.S.C. §1531, states:

“Principle 5. The Departments Shall Make Available to Indian tribes Information Related to Tribal Trust Resources and Indian Lands, And, to facilitate the Mutual Exchange of Information, Shall Strive to Protect Sensitive Tribal Information from Disclosure. To further tribal self-government and the promotion of healthy ecosystems, the Departments recognize the critical need for Indian

consultation with federal agencies, even when policies under consideration may affect trust resources (Plaut, 2009). Rather than participating in the decision-making process, tribes have “challenge[d] any objectionable final policy in the courts...claiming that the [agencies] breached their fiduciary duties” by failing to incorporate tribal knowledge into the planning process and hence failing to protect trust resources adequately (Waldron 2001, 181). In at least one case, when a tribe “withheld important details such as which parts of the area were sacred, and how the tribe used the area,” “a federal district court concluded that any insufficiency of the agency’s cultural impacts analysis or land management decision was the tribe’s fault (Plaut, 2009).”¹⁷⁸ This, in turn, may foster an adversarial environment between the tribes and federal agencies. Clearly, a restriction on the flow of information may impact government-to-government consultation and alter planning processes.

Furthermore, according to the court in *Soucie v. David* (448 F.2d 1067, 1077 (D.C. Cir 1971)), the countervailing public and private interests in secrecy covered by the FOIA exemptions include interests in effective and efficient government. Government

tribes to possess complete and accurate information related to Indian lands and tribal trust resources. To the extent consistent with the provisions of the Privacy Act, the Freedom of Information Act (FOIA) and the Departments’ abilities to continue to assert FOIA exemptions with regard to FOIA requests, the Departments shall make available to an Indian tribe all information held by the Departments which is related to its Indian lands and tribal trust resources. In the course of the mutual exchange of information, the Departments shall protect, to the maximum extent practicable, tribal information which has been disclosed to or collected by the Departments. The Departments shall promptly notify and, when appropriate, consult with affected tribes regarding all requests for tribal information relating to the administration of the Act.”

The Klamath decision, as discussed above, runs counter to the policy set forth in numerous Executive Orders, DOI Secretarial Orders, the DOI manual and other agency guidelines, which before Klamath, largely compelled confidentiality in agency-tribal communications.

¹⁷⁷ See, for example, *Pharmaceutical Mfrs. Ass’n v. Weinberger*, 411 F. Supp. 576, 579 (D.D.C. 1976) (nothing that “promises of confidentiality do not transcend the disclosure principles of the FOIA”).

¹⁷⁸ *Havasupai Tribe v. United States*, 752 F. Supp. 1471, 1496 at 1500.

efficiency and effectiveness, however, may suffer as a result of the *Klamath* decision. Tribes naturally will be reluctant to share information. Time and money may be wasted as both the federal government and tribes compile duplicative data sets. Moreover, the information collected by tribes and federal government may not be in agreement, as is sometimes the case with competing spatial data sets, potentially leading to erroneous assessments, conflict over whose data is correct, and impaired decisions.

Even more chilling, according to Labin (2001), is the possibility that *Klamath* may severely limit tribes' ability to bring breach of trust claims (breach of fiduciary duty) against the United States if they are harmed by the disclosure of confidential tribal records; she states:

“[I]f...the United States must disclose documents, no matter what harm is caused to tribes, it may essentially be relieving the United States of its duty to behave as a trustee at all. It may be argued that since Congress has authorized the United States to disclose documents, no matter how badly the tribes are hurt by that disclosure, there will be no remedy for the tribes.”¹⁷⁹

Hill (2007) provides an analysis of *Klamath Water Users* (Hill, 2007), and Guiao (2012) describes the historical, social and political dynamics underlying the Klamath water rights dispute.

5.1.2.5 Which Exemptions May Apply to Tribal Spatial Data?

The courts, when considering FOIA cases, have balanced the need to protect tribal information and spatial data with the U.S. statutes and policies that support the general

¹⁷⁹ Tracy Labin, “Where Have Ethics and the Trust Gone for Indians? The Water Rights Example”, unpublished (Native American Rights Fund), at 133. Brief reference to it was found in Sheppard 31 *Envtl. L.* 901 (2001), 137.

public's right to know. This section briefly describes the exemptions most likely to be applicable to tribal spatial data, including 3, 4, 5, 6, and 9. It also examines a few selected, illustrative court cases in which these exemptions have been applied to either tribal spatial data or the kinds of information and data that would be of concern to tribes. It is important to understand not only why the courts have decided to apply these exemptions in particular cases, but also why they have rejected these applications. Exemption 1 (classified information), Exemption 7 (law enforcement information), and Exemption 8 (financial institutions information) may be applicable to some tribal information, but will not be discussed here; these exemptions do not apply to the sensitive spatial data prioritized in Chapter 4. Exemption 9 is rarely used by the EPA, USGS or DOI (Gidiere 2013, 276).

Tribal governments, for example, may want to protect the locations of eagles' nests, salmon spawning areas, and other threatened or endangered species habitat, as discussed in Chapter 3. Based on the ruling in *Maricopa Audubon Society v. U.S. Forest Service* (1997),¹⁸⁰ however, exemptions 2, 4, 5, and 6 may not be applicable. Exemption 2 is applied to information related solely to internal personnel rules and practices of an agency. In *Maricopa Audubon Society*, the Ninth Circuit rejected the application of Exemption 2 to the locations of nest sites of northern goshawk within a national forest because the Forest Service:

“failed to demonstrate how the nest sites of northern goshawks relate ‘solely,’ or even predominately, ‘to the internal personnel rules and practices of an agency’ as

¹⁸⁰ *Maricopa Audubon Society v. U.S. Forest Service*, 108 F.3d 1082 (9th Cir. 1997). Accessed May 14, 2015. Available on Findlaw at: <http://caselaw.findlaw.com/us-9th-circuit/1061784.html>.

required by the provisions of exemption 2...Under the approach taken by the Service, almost all information collected or created by the government would be exempt from disclosure. ...[Similarly,] [i]n *Audubon Society v. United States Forest Service*, 104 F.3d 1201 (10th Cir.1997), the Tenth Circuit held that even under the broadest available interpretation, the statutory language of exemption 2 simply does not encompass maps that identify the locations of [Mexican spotted owl]. See *id.* at 1203-05.”

Further, the Ninth Circuit disallowed the preferential sharing of locations of nests sites of northern goshawk, even when the requester, in this case the Audubon Society, had a mission to protect the goshawks (Gidiere, 2013). It did not matter that the requester was willing to sign a confidentiality agreement. “Once the information is disclosed to Audubon,” the Court stated, “it must also be disclosed to all members of the public who request it.” In 2011, the Supreme Court clarified Exemption 2 in *Milner v. Department of Navy*, stating that “personnel rules and practices” are merely the rules and practices of human resources. In other words, “the type of trivial administrative information in which the public should have little interest and which would be burdensome for an agency to produce” (Gidiere, 2013).

Exemption 3

Exemption 3 applies to information that is specifically prohibited from disclosure by another federal statute. In *Reporters Committee for Freedom of the Press v. Department of Justice* (1989),¹⁸¹ the D.C. Circuit asserted that the court “must find a congressional purpose to exempt matters from disclosure in the actual words of the statute...not in the legislative history of the claimed withholding statute, nor in an agency’s interpretation of the statute.” The statute must at least “explicitly deal with public disclosure.” In

¹⁸¹ *Reporters Committee for Freedom of the Press v. Department of Justice*, 816 F.2d 730 at 735.

Maricopa Audubon Society, the Department of Interior (DOI) attempted to argue that the locations of critical pygmy owl habitat were protected from release under Exemption 3 through the Endangered Species Act (ESA), which recommended “prudent” management of the information. The court in *National Association of Home Builders v. Norton*¹⁸² rejected this argument (USDOJ, 2014). “[T]here is nothing in the Endangered Species Act,” the court said, “that refers to withholding information.” Other statutes that *do not* qualify under Exemption 3 can be found in the Department of Justice Guide to FOIA (USDOJ 2013, Exemption 3, 63-67).¹⁸³ It is important to note that the Copyright Act does not fall within Exemption 3 under FOIA.¹⁸⁴

In a valiant effort, the DOI also argued that Exemptions 4, 5, and 6 were applicable. But, the court rejected each of these assertions as well, based on the circumstances of the case. With regards to exemption 4, the court held that the information was not “commercial” because a state statute prevented the state agency that had created the spatial database from selling the data. Receiving grant money in exchange for the database, the court commented, is essentially a “quid-pro-quo exchange between governmental entities” and “does not constitute a commercial transaction.”¹⁸⁵ Gidiere (2013, 283) remarks, “[t]his analysis leaves open the possibility that Exemption 4 could apply to species information supplied to a federal agency by [an entity that] has a demonstrable commercial interest in the data—for example, because it sells some version of the data to the public.”

¹⁸² *National Association of Home Builders v. Norton*, 309 F.3d 26 (D.C. Cir. 2002).

¹⁸³ DOJ Guide to FOIA Exemption 3 (2013). Accessed May 15, 2015. Available at: <http://www.justice.gov/sites/default/files/oip/legacy/2014/07/23/exemption3.pdf#p63>.

¹⁸⁴ *Reporters Committee for Freedom of the Press v. Department of Justice*, 816 F.2d 730 at 735.

¹⁸⁵ *National Association of Home Builders v. Norton*, 309 F.3d 26 (D.C. Cir. 2002) at II(B).

Furthermore, the court disallowed the application of Exemption 5, which “shelters documents reflecting advisory opinions, recommendations and deliberations comprising part of a process by which governmental decisions and policies are formulated.”¹⁸⁶ While the information was deemed to be “predecisional,” it was not also “deliberative.” “The privilege is designed to protect agency policy-oriented judgments and the processes by which policies are formulated,” the court contended, “rather than ‘purely factual, investigative matters.’”¹⁸⁷ Lastly, the privacy concerns of the private landowners, who were worried about herds of trespassing birdwatchers, was not sufficient to withhold the locations under Exemption 6. Kemper (2014) provides a thoughtful review of FOIA with respect to the Endangered Species Act and tribal management of jaguars (Kemper, 2014).

In response to these cases, Congress passed Section 207 of the *National Park Omnibus Management Act of 1998*, which applies to sensitive information collected as part of the National Park System Resource Inventory (16 U.S.C. Sec. 5937).¹⁸⁸ It allows for the protection of:

- (1) “information [and maps] concerning the nature and specific location of a National Park System resource which is endangered, threatened, rare, or commercially valuable,
- (2) of mineral or paleontological objects within units of the National Park System, or
- (3) of objects of cultural patrimony within units of the National Park System.”

¹⁸⁶ *Petroleum Info.*, 976 F.2d at 1433.

¹⁸⁷ *Id.* at 1435 (citing *EPA v. Mink*, 410 U.S. 73, 89, 93 S.Ct. 827, 836-37, 35 L.Ed.2d 119 (1973)).

¹⁸⁸ Confidentiality of Information, Legal Information Institute, Cornell University Law School, accessed May 14, 2015. Available at: <https://www.law.cornell.edu/uscode/text/16/5937>.

This information may not be disclosed under FOIA unless the Secretary of the Interior determines that

“disclosure of the information would further the purposes of the unit of the National Park System in which the resource or object is located and would not create an unreasonable risk of harm, theft, or destruction of the resource or object, including individual organic or inorganic specimens.”

Section 207 was subsequently successfully applied to protect the locations of goshawk nests in *Southwest Center for Biological Diversity v. Department of Agriculture* (2002).¹⁸⁹

Many other statutes qualify to be withheld under FOIA Exemption 3 (Gidiere 2013, 296-315; USDOJ 2013, 10-63). Those that are perhaps most pertinent to tribes may include:

- Statutes relating to the Erodible Land and Wetland Conservation and Reserve Program (U.S.C. Sec. 3844(b)), managed by the U.S. Department of Agriculture, and to the programs under the Fisheries Research and Monitoring Division (16 U.S.C. Sec 1881(a)) of the National Oceanic and Atmospheric Administration (NOAA) afford Exemption 3 confidentiality protections for environmental and fisheries data collected as part of these programs.
- The *National Historic Preservation Act* (NHPA) (16 U.S.C. Sec 470w-3) permits a federal agency or other public official to withhold from FOIA disclosure “information about the location, character, or ownership of a historic resource if the Secretary and the agency determine that disclosure may: (1) cause a

¹⁸⁹ *Southwest Center for Biological Diversity v. Department of Agriculture*, 170 F. Supp. 2d 931 (D. Ariz. 2000), aff’d, 314 F.3d 1060 (9th Cir. 2002).

significant invasion of privacy; (2) risk harm to the historic resources; or (3) impede the use of a traditional religious site by practitioners.”¹⁹⁰

- The *Archaeological Resource Protection Act* (ARPA) (16 U.S.C. Sec. 470hh) preserves the confidentiality of information about the nature and location of archeological resources “for which the excavation or removal requires a permit or other permission under this chapter,” unless the disclosure would not create a risk of harm to the site and resources.¹⁹¹
- The National Indian Gaming Commission “shall preserve any and all information received,” which could include tribal gaming revenue reports, audits, and maps, unless a violation warrants sharing the information with the appropriate law enforcement officials (26 U.S.C. Sec 61.03).

The National Historic Preservation Act, Archaeological Resource Protection Act, and the National Parks Omnibus Act [16 U.S.C. 5937], provide some flexibility in protecting sensitive information, including tribal historic, archeological, cultural resources, respectively, from public disclosure. In addition, “the 2008 Farm Bill provides specific authority to the USDA Forest Service in Section 3056 of the Cultural and Heritage Cooperation Authority (25 U.S.C. 32A Section 3056) to protect tribal information from release under the Freedom of Information Act (ACHP, 2014).” These four statutes, combined with the Executive Order 13007 on Indian Sacred Sites issued by President

¹⁹⁰ Access to Information, Legal Information Institute Website, Cornell University Law School, Accessed on May 14, 2015. Available at: <https://www.law.cornell.edu/uscode/text/16/470w-3>.

¹⁹¹ Confidentiality of information concerning nature and location of archeological resources. Legal Information Institute Website, Cornell University Law School, Accessed on May 14, 2015. Available at: <https://www.law.cornell.edu/uscode/text/16/470hh>.

Clinton, the American Indian Religious Freedom Act (AIRFA),¹⁹² and the Native American Graves Protection and Repatriation Act¹⁹³ (NAGPRA)(25 U.S.C. 3001 et seq. and 43 CFR 10), may provide coverage for some, but not all, sacred site information. NAGPRA and AIRFA, however, are not statutes covered under FOIA Exemption 3.

Unfortunately, an American Indian or tribe would have to provide the sacred-site information before an agency can evaluate whether the site qualifies under NHPA,¹⁹⁴ ARPA, or NAGRPA. The agency cannot make a promise of confidentiality unless and until the site is deemed eligible. According to the National Park Service's NAGRPA Compliance Guide (USNPS, p. 24):

“It is important to be candid with Indian tribe and Native Hawaiian organization representatives about the limited protection that can be given to sensitive information. During consultation, NPS officials should not request more information than is needed to decide whether remains or objects fit into NAGPRA categories, to make determinations of cultural affiliation, or to support other decisions regarding the disposition or repatriation of Native American human remains, funerary objects, sacred objects, and objects of cultural patrimony.”

Mense (2011) asserts “[t]his mandate creates a Catch-22 for such tribes, because often the traditions that render any particular piece of land culturally important are secret, and thus a tribe must pick between protecting (1) the sacred land, or (2) the sacred information related to that land” (Mense, 2011). Mense (2011) argues that tribal secrecy should be

¹⁹² 42 U.S.C.A. 1996.

¹⁹³ “The law and regulations address the rights of lineal descendants, Indian tribes, and Native Hawaiian organizations to Native American human remains, funerary objects, sacred objects, and objects of cultural patrimony. They require Federal agencies and institutions that receive Federal funds to provide information about Native American human remains, funerary objects, sacred objects, and objects of cultural patrimony to lineal descendants, Indian tribes, and Native Hawaiian organizations and, upon presentation of a valid request, return these cultural items to them.”

¹⁹⁴ The National Park Service developed a set of criteria for evaluating traditional cultural resources (TCR), accessed May 16, 2015. Available at: <http://ncptt.nps.gov/articles/c2a/guidelines-for-traditional-cultural-properties/>.

safeguarded because “traditional norms often mandate secrecy,” “native social structures may rely on secrecy,” and “cultural secrecy...allows native peoples to more clearly demarcate the bounds of their culture and to control how the outside world views their traditions.”

Plaut (2009), Mense (2011), and Skibine (2012) review the law and regulations that affect sacred sites, and discuss the challenges and risks of protecting this information from disclosure to the public. Skibine (2012) specifically focuses on the American Indian Religious Freedom Act (AIRFA), which as interpreted by several courts does not provide much protection (See also DOD, DOI, USDA, DOE, & ACHP, 2014; Mense, 2011. Plaut (2009) concentrates on the National Environmental Policy Act (NEPA), NHPA, ARPA, and NAGPRA. Mense (2011) places the protection of cultural heritage in the United States within the context of international law.

In 2012, five federal agencies signed a memorandum of understanding “to improve the protection of and Indian access to sacred sites through interagency coordination and collaboration.” These include the DOI, USDA, Department of Defense, Department of Energy, and the Advisory Council on Historic Preservation (ACHP). The purpose of this MOU is fivefold: (1) “to improve training and guidance for federal staff regarding sacred sites and how to collaborate effectively with tribes on sacred site issues”; (2) “developing best management practices and agency and tribal capacity;” (3) “identifying and analyzing mechanisms for, and developing recommendations related to, the confidentiality of information about sacred sites”; (4) increasing outreach to the public

and non-Federal partners about maintaining the integrity of sacred sites and the need for public stewardship”; and (5) “reviewing the legal authorities related to sacred sites and identifying and making recommendations to address impediments to the protection of sacred sites.”

This group recently published: (1) *Indian Sacred Sites Draft Information Paper*, a basic tutorial; (2) *Draft Policy Statement on Confidentiality of Indian Sacred Sites*, a draft policy statement on confidentiality that agencies may adopt (ACHP, 2014); and a *Progress Report on the Implementation of the Memorandum of Understanding Regarding Interagency Coordination and Collaboration for the Protection of Indian Sacred Sites* (DOD et al., 2014, 24).¹⁹⁵ Not surprisingly, the working group found that:

“practices and protocols vary significantly from agency to agency. There is no single Federal authority for managing practices and protocols concerning sacred sites with tribes; however, most agencies rely on a limited number of authorities for their work.”

Agencies with regional and local field offices with regular oversight and protection of sacred sites “have different, often closer, relationships with tribes and different protocols for consultation on sacred sites than agencies” that do not have close contact.

Importantly, the working group found that “[n]o federal law creates a private right of action against the Federal Government for destroying or impacting sacred sites. Cases can be brought under the Administrative Procedure Act regarding compliance with NEPA and NHPA.”

¹⁹⁵ Interagency Coordination and Collaboration for the Protection of Indian Sacred Sites. U.S. Forest Service Tribal Relations. U.S. Forest Service Website, accessed April 21, 2015. Available at: <http://www.fs.fed.us/spf/tribalrelations/sacredsitesmou.shtml>.

Exemption 4

Exemption 4 protects business trade secrets, confidential commercial or financial information, or privileged commercial or financial information obtained from “an individual, partnership, corporation, association, or public or private organization other than an agency.”¹⁹⁶ For the purposes of FOIA, the D.C. Circuit Court narrowly defined “trade secret” in *Public Citizen Health Research Group v. Food and Drug Administration*¹⁹⁷ as “a secret, commercially valuable plan, formula, process, or device that is used for the making, preparing, compounding, or processing of trade commodities and that can be said to be the end product of either innovation or substantial effort.”

Other courts have upheld this definition. To be considered “commercial business information” under Exemption 4, the information must be: (1) commercial or financial in nature; (2) obtained from a person; and (3) kept confidential. Whether or not natural resources information qualifies as commercial information has been a matter of some debate, and is dependent on the facts of each case (Gidiere, 2013; Hammitt, Rotenberg, Verdi, & Zaid, 2008; USDOJ, 2014).

In *National Parks and Conservation Association v. Morton*,¹⁹⁸ the D.C. Circuit Court developed a two-part test known for evaluating what information is “confidential”; the court stated:

“commercial or financial matter is ‘confidential’ for the purposes of the Exemption [4] if disclosure of the information is likely to have either of the following effects:

¹⁹⁶ 5 U.S.C. 551(2).

¹⁹⁷ *Pub. Citizen Health Research Group. V. Food and Drug Administration*, 704 F.2d 1280, 1289-90 (D.C. Cir. 1983).

¹⁹⁸ *National Parks and Conservation Association v. Morton*, 498 F.2d 765 (D.C. Cir. 1974) at 770.

- (1) to impair the Government's ability to obtain necessary information in the future [which is called the "impairment prong"]; or
- (2) to cause substantial harm to the competitive position of the person from whom the information was obtained [which is called the "competitive harm prong"]."

With respect to the competitive harm prong, one need not demonstrate *actual* competitive harm, but rather having actual competitors and a high risk of substantial injury resulting from the disclosure. This is supported by affidavit testimony providing sufficient evidence to be persuasive, but a "sophisticated economic analysis" is not required (Gidiere 2013, 238). D.C. Circuit Court of Appeals clarified the interpretation of the impairment prong in *Critical Mass Energy Project v. Nuclear Regulator Commission*¹⁹⁹ by making a distinction between information that is voluntarily submitted to the government versus information that is required by the government; however, this distinction is not universally applied by the courts and did not help the tribe in *Klamath* (Gidiere, 2013, 240).

The BIA successfully has withheld information about tribal water rights and the terms of land leases using Exemption 4. In *Flathead Joint Board of Control v. USDOJ* (309 F.Supp.2d 1217), decided on Feb. 3, 2004 by the US District Court, D. Montana, Missoula Division, the Montana State irrigation district, which was in the process of negotiating with the tribes over state's water rights, sought access to federally held information regarding water rights on the reservations under FOIA. The District Court said that an American Indian tribe is a "person" for the purposes of Exemption 4. It also

¹⁹⁹ *Critical Mass Energy Project v. Nuclear Regulator Commission*, 975 F.2d 871, 879 (D.C. Cir. 1992).

concluded that the information was “commercial or financial information” and thus exempt from disclosure via FOIA Exemption 4. The court stated:

“[t]here is no doubt that water rights themselves are an object of commerce. They are a property interest that is bought and sold. There are usually limited water rights available. Therefore, information about the quantity available to a single holder, a holder’s use or proprietary data, or other similar information would be commercial information, used in negotiating real estate transactions, water leasing, and other commercial dealings. In the tribes’ case, this includes protecting a healthy fishery and the economic benefits that flow therefrom. The more difficult question here is to what extent the tools and strategies related to creating this commercial information are also themselves, commercial information.”

The District Court continued, making a distinction between information’s nature (public sector) and function (commercial):

“In *National Association of Home Builders* (NAHB), the court made a distinction between information’s nature, that is, created by the government, and its function, having some commercial purpose preventing its disclosure (NAHB, 309 F.3d, at 39). In this case, the nature of the information is not commercial, if, according to NAHB, information produced by a government is not. But the information leads to negotiation over a very valuable asset, and successful negotiations on the part of the tribes will result in the tribes having more of this valuable asset. Therefore, the information that creates the tribes’ negotiating position, supports their claims, and results in maximizing the tribes position is all commercial information in function.”

The Department of the Interior categorized the documents it withheld from disclosure under Exemption 4 into four groups:

1. “Information developed for the purpose of quantifying the tribes’ instream water rights for fishing purposes;
2. Information regarding the development and use of computer models of the reservation’s water resources and the tribes’ water needs;
3. Information regarding the development of the tribes’ water rights claims for, and strategy in, the Montana Proceedings; and
4. Information regarding tribal budgets and funding proposals for the tribe’s efforts to prepare for the Montana proceedings.”

Categories 1 and 2 specifically applied to spatial information and data. The District Court determined that the Government did not need to disclose the tribes' and BIA's quantification methods and data for assessing the tribes' fishing water rights. The computer models of the reservation's water resources and the tribes' water needs specifically related to the tribes' water rights was similarly protected, but the "other information related more generally to the [HYDROSS] computer model and what it does" was not.

In *Starkey v. United States Department of the Interior and Bureau of Indian Affairs*²⁰⁰, the U.S. District Court for the Southern District of California held that information about wells and water on the La Posta Band of Mission Indians' trust lands could be withheld under FOIA Exemption 4. The owner of a ranch adjacent to the trust and fee land held by the tribe sought the documents out of concern for the expansion of the tribe's sand mining operation and conversion of the tribe's fee parcel to trust. First, the Court found that:

"water is precious, a limited resource and is commercial or financial 'because it defines the amount of water on the reservation...Release of the ground water [related information]...would cause competitive harm to the band because the tribe does not have an adjudicated water right and the release of the withheld information would adversely affect the Band's ability to negotiate its water rights or to litigate that issue."

Second, the Court confirmed that the information about "confidential pricing, water and well resources, and [sand] mining operations" was confidential because disclosure

²⁰⁰ *Starkey v. United States Department of the Interior and Bureau of Indian Affairs*, 238 F. Supp. 2d 1188, 1195 (S.D. Cal. 2002).

“would give [] competitors unfair advantage in undercutting prices, structuring their transactions, and marketing the recruitment of customers.”

In addition, the U.S. District Court determined Exemption 3 through the Archaeological Resources Protection Act could be applied to some, but not all, of the information (described above). First, it concluded that ARPA applied both to the trust property as well as to the fee property because “the fee property is alienable only with the approval of the Secretary [of the Interior], the fee property falls within the scope of ‘Indian lands,’ as defined in 16 U.S. C. Sec 470bb.”²⁰¹ Second, because the San Diego County Department of Planning and Land Use had already made several of the archaeological resource sites public in a report, the court ordered the disclosure of two of the tribe’s maps that had been shared with the federal government. For this, the Court relied on the reasoning provided in *CNA Financial Corporation v. Donovan*,²⁰² that if the documents “‘are [already] in the public domain, the submitter is unable to make any claim to confidentiality,’ and the documents must be disclosed.” The U.S. District court, however, also held that “the descriptions of the objects and comments on their condition are exempt from disclosure under ARPA because these documents are not in the public domain.”

²⁰¹ “While the ARPA specifically encompasses the trust property...it also applied to the fee property because it is ‘subject to a restriction against alienation imposed by the United States.’ 16 U.S. C. Sec. 470bb(4). Title 23, Code of Federal Regulations, Section 1522.22(b) provides in pertinent part: “Any other land owned by an Indian tribe may only be conveyed where specific statutory authority exists and then only with the approval of the Secretary unless the Act of Congress authorizing sale provides that approval is unnecessary.”

²⁰² *CNA Financial Corporation v. Donovan*, 265 U.S. App. D.C. 248, 830 F.2d 1132 (D.C. Cir. 1987).

In *Utah v. United States Department of the Interior*,²⁰³ the State of Utah brought a FOIA suit against the BIA, which withheld records concerning the lease of Indian trust property. The Skull Valley Band of Goshute Indians sought to lease land to utility companies that sought to store 40,000 tons of spent nuclear fuel on the tribe's land "next to two-dozen tribal members who live on the small reservation" (Anonymous, 2006). The Tenth Circuit Court of Appeals agreed that the core terms of the lease fell within the purview of Exemption 4 "trade secrets." The court restated the testimony of Leon D. Bear, Chairman of the Skull Valley Band of Goshute Indians:

"In his affidavit, Mr. Bear states his concern that if the redacted lease information is disclosed, it will give the Band's 'competitors valuable information which they could use to negotiate lower payments, and to structure waivers of sovereign immunity, termination provisions, tribal taxes, tribal regulations, and other provisions." Id. at 286. Mr. Bear describes his competitors as "[o]ther Indian tribes, non-Indian groups and organizations, and governments." Id. He also notes that the Band would be in a weaker position at the bargaining table in negotiating any future deals since its potential partners would know the financial and legal details of the Band's prior business agreements. Id. at 286-87. Finally, he fears that "[r]elease of the withheld information would severely undercut the Band's future business transactions" because the Band would be unable to offer potential partners any assurance of confidentiality. Id".

Importantly, several tribal members of the Skull Valley Band of Goshute Indians joined the lawsuit with the State of Utah to seek access to the leasing information in their efforts to oppose storage of nuclear fuel on their reservation. The Indigenous Environmental Network and Honor the Earth also participated in the resistance (Anonymous, 2006). As

²⁰³ *Utah v. USDOJ*, 256 F.3d 967 (10th Cir. 2001). Accessed 2002, and May 13, 2015. Available at: <http://openjurist.org/256/f3d/967/state-of-utah-v-united-states-department-of-the-interior>.

of 2015, the facility has yet to be licensed by the BIA and U.S. Bureau of Land Management.²⁰⁴

In addition to *Klamath Water Users, Merit Energy Company v. United States Department of the Interior*²⁰⁵ is an important case to consider carefully. The Merit Energy Company tried to compel disclosure of documentation from the Minerals Management Service (MMS) within the DOI relating to the computation of royalties assessed on the production of oil and gas on the Jicarilla Apache Tribal Reservation in northern New Mexico. The MMS shared management duties with the tribe through a cooperative agreement under the Federal Oil and Gas Royalty Management Act (FOGRAMA) (30 U.S.C. Sec 1732). Merit had purchased a working interest in oil and gas on the reservation. The DOI and MMSs argued that the materials satisfied both standards for confidentiality under Exemption 4—impairment of the government’s ability to obtain information in the future; and harm to the competitive position of the tribe. Importantly, the DOI supported this claim with the fact that the Tribal records were barred from release to the public under the Tribal Code (Jicarilla Apache Tribal Code Sec 19-3-1). The U.S. District Court for the District of Colorado found that the materials were in fact confidential business information, but questioned the confidentiality of the documents as its determination was based on the origin of the information. Although the DOI and

²⁰⁴ See, for example, The Skull Valley Indian, Native American Encyclopedia, October 16, 2013. Last accessed May 15, 2015. Available at: <http://nativeamericanencyclopedia.com/skull-valley-band-goshute-indians-utah/>.

²⁰⁵ *Merit Energy Company v. United States Department of the Interior*, 180 F. Supp. 2d 1184 (D. Colo. 2001). Last accessed May 15, 2015. Available at: <http://law.justia.com/cases/federal/district-courts/FSupp2/180/1184/2475232/>.

MMS argued that the tribe owned the data, the Court disagreed based on the terms of the cooperative agreement; it stated (at 1189):

“[I]n this case the tribe assumed certain duties related to the administration of oil and gas royalties pursuant to the cooperative agreement entered into with MMS. Such cooperative agreements under FOGRAMA allow tribes ‘to share oil or gas royalty management information, [and] to carry out inspection, auditing, investigation or enforcement ... activities under this chapter in cooperation with the Secretary’ (30 U.S.C. § 1732(a)). Under a cooperative agreement, ‘each Indian tribe shall, upon request, have access to all royalty accounting information in the possession of the Secretary respecting the production, removal, or sale of oil or gas from leases on Indian lands under the jurisdiction of such tribe’ (30 U.S.C. § 1732(b) (2)). Absent a cooperative agreement, DOI and MMS would still be obligated to compile the contested royalty management materials in the course of its trust obligations to administer oil and gas resources on the Reservation (30 C.F.R. § 201.100, *supra.*).

This seriously undercuts not only Defendants' contention that the withheld information is confidential, but that the information ever ‘belonged’ to the tribe. Once the Interior Secretary enters into a cooperative agreement, FOGRAMA grants tribes broad access to data regarding royalties, including ‘[t]rade secrets, proprietary and other confidential information.’ 30 U.S.C. § 1733(a). Nonetheless, FOGRAMA does not entitle the tribe to claim as confidential or proprietary materials accumulated by the tribe that would otherwise be submitted by lessees directly to the agency.’ In order for the Secretary, the States and Indian tribes to assist one another in the common goal of an effective and efficient royalty management system, States and Indian tribes must share information with the Secretary both fully and in a timely manner.” H.R.Rep. No. 97-859, at 37 (1982), *reprinted in* 1982 U.S.C.C.A.N. 4268, 4291.

In creating cooperative agreements and making this information available to tribes, Congress did not abrogate FOIA. To the contrary, when tribes acquire royalty information in the course of a cooperative agreement, FOGRAMA binds them to the same FOIA disclosure requirements as federal agencies.”

Citing the reasoning in *Klamath Water Users*, the Court also rejected the use of Exemption 5. This case serves as cautionary tale for tribes that may wish to protect their information and spatial data but enter into compacts, contracts, or cooperative agreements with the Federal government.

Exemption 5

Exemption 5 includes information that concerns communications within or between agencies that are protected by legal privileges, including but are not limited to: (1) attorney-work product privilege; (2) attorney-client privilege; (3) deliberative process privilege; and (4) Presidential communication privilege (USDOJ, 2014).²⁰⁶ Based on the test established in *Klamath*, the information under review “must thus satisfy two conditions: [1] its source must be a Government agency, and [2] it must fall within the ambit of a privilege against discovery under judicial standards that would govern litigation against the agency that holds it.” In addition to federal agencies, the source of the information may be a “temporary consultant” to an agency; “courts have allowed agencies to protect advice generated by a wide range of outside experts, regardless of whether these experts provided their assistance pursuant to a contract, on a volunteer basis, or in some other capacity, creating what courts frequently refer to as the ‘consultant corollary’ to the Exemption 5 threshold” (USDOJ, 2014, 359-361).

However, as discussed previously in Section 5.1.2.4, the U.S. Supreme Court rejected the application of Exemption 5 to tribal water rights documents that had been shared by the tribes with the Department of the Interior as part of administrative decision-making. The Court stated:

The Department does not attempt to argue that Congress specifically envisioned that Exemption 5 would cover communications pursuant to the Indian trust responsibility, or any other trust responsibility. Although as a general rule we are

²⁰⁶ Exemption 5. US DOJ Guide to FOIA, accessed May 16, 2015. Available at: http://www.justice.gov/sites/default/files/oip/legacy/2014/07/23/exemption5_1.pdf.

hesitant to construe statutes in light of legislative inaction (see *Bob Jones Univ. v. United States*, 461 U.S. 574, 600, 76 L. Ed. 2d 157, 103 S. Ct. 2017 (1983)), we note that Congress has twice considered specific proposals to protect Indian trust information (see Indian Amendment to Freedom of Information Act: Hearings on S. 2652 before the Subcommittee on Indian Affairs of the Senate Committee on Interior and Insular Affairs, 94th Cong., 2d Sess. (1976); Indian Trust Information Protection Act of 1978, S. 2773, 95th Cong., 2d Sess. (1978)). We do so because these proposals confirm the commonsense reading that we give Exemption 5 today, as well as to emphasize that nobody in the Federal Government should be surprised by this reading.²⁰⁷

Thus, in this instance, the records did not qualify for attorney work-product or deliberative process privilege protection (USDOJ, 2014, 361). Gidiere (2013, 246) asserts that while “[t]he Court’s holding is not a per se rule against interagency status for communications between tribes and federal agencies,” an agency will not be able to use Exemption 5, “if the communication is to advocate an interest of the tribe over the interests of others” seeking a government benefit.²⁰⁸

In *Citizens Progressive Alliance v. BIA*,²⁰⁹ the U.S. District Court of New Mexico ruled that information regarding the water rights claims of the Southern Ute Indian tribe and Ute Mountain tribe did not have to be disclosed under FOIA because it fell within “inter-

²⁰⁷ Dep’t of The Interior and Bureau of Indian Affairs v. Klamath Water Users Protective Ass’n, 532 U.S. 1, 16 n.7 (2001).

²⁰⁸ Interestingly, according to the US DOJ Guide to FOIA (2013, 365), “there has been some disagreement in the cases on the issue of whether representatives of state and local governments engaged in joint regulatory operations classify as consultants to federal agencies. In one instance, the District Court for the District of Columbia held that a local government was not a consultant because it was acting as a co-regulator with a federal agency, and not in an advisory capacity. On a different case, however, this same court held that communications from state officials working with FEMA to coordinate Hurricane Katrina evacuation plans could be protected under the Exemption 5 threshold.” (People for the American Way Foundation, 516 F.Supp. 2d at 39, see also *Citizens for Pa.’s Future v. U.S. Dep’t of Interior*, No. 03-4498 (3d Cir. July 30, 2004); and *Citizens for Responsibility and Ethics in Washington*, 514 F. Supp. 2d at 44-45; see also *National Association of Home Builders v. Norton*, 309 F.3d 26, 39 (D.C. Cir. 2002)).

²⁰⁹ *Citizens Progressive Alliance v. BIA*, 241 F.Supp.2d 1342 (2002). Last accessed May 16, 2015. Available at: <http://law.justia.com/cases/federal/district-courts/FSupp2/241/1342/2578115/>.

agency or intra-agency communication” under Exemption 5. The plaintiff Steve Cone made a FOIA request for four documents, including three memoranda and letters, and a “preliminary assessment of the Southern Ute tribe’s water rights claims prepared for the BIA by Keller-Bliesner Engineering,” which included “descriptions of the potential areas for irrigation project development with the associated potential claims for each area on the Southern Ute Reservation.” Distinguishing this case factually from *Klamath Water Users*, the Court applied the “consultant corollary” of Exemption 5. Keller-Bliesner Engineering had prepared the report while serving as a consultant to the BIA. The firm, the Court said, did not advocate the position or interests of Keller-Bliesner Engineering, “but rather ‘discusses a range of options on dealing with the claims from the animas, La Plata, and Dolores Rivers for the Southern Ute and Ute Mountain Ute tribes,’ and includes ‘an analysis of the relative merits of each (at 1355-56).’” Further, the contract for the production of the report stipulated its confidentiality and the report itself specified that “[t]he information provided herein is intended for use by the BIA and the tribe in preparing a negotiating position for water rights.” Thus, the Court concluded, the document was shielded from discovery, as it was “prepared in anticipation of litigation or trial.”

Exemption 6

Exemption 6, which is fundamentally incorporated into the Privacy Act, allows for agencies to withhold “[1] personnel and [2] medical files and [3] similar files the disclosure of which would constitute a clearly unwarranted invasion of personal privacy.” Nevertheless, this exemption balances the individual’s privacy interest with “the public’s

understanding of the operations of government activities.”²¹⁰ Tribal government personnel and medical files easily fall within Exemption 6. Plaut (2009) argues that Exemption 6 potentially could be applied to “information on the location and use of a sacred site,” as individual “Native practitioners would be identifying where they perform religious ceremonies and the nature of ceremonies. This information is deeply personal, much more so than a name and address.” Moreover, making this information public also could lead to tourists overwhelming the site and invading the individual and collective privacy of tribal members practicing their religious ceremonies.²¹¹

The BIA also attempted to apply Exemption 6 to tribal land status and reservation boundary GIS data. As noted in Chapter 2, the Wisconsin Department of Natural Resources (DNR) Bureau of Air Management made an attempt in February 1997 to obtain tribal GIS data through a request to the BIA Great Lakes Agency and Minneapolis Area Office (MAO). Before *Klamath Water Users*, the BIA’s Geospatial Data Services Center (GDSC) had maintained a policy that the spatial data maintained by the BIA was owned by the tribes, and could be released only with concurrence of the Tribal government. This policy was described in 30 BIA Manual Supplement 10 (1990, 3) for Integrated Resource Management Planning, which states “[d]ata which any party to the Agreement considers to be sensitive in nature, shall have restricted access within GIS

²¹⁰ Forest Service Employees for Environmental Ethics, 524 F.3d 1024.

²¹¹ Plaut (2009) cites “Church of Scientology of Texas v. IRS, 816 F. Supp. 1138, 1155 (W.D. Tex. 1993); O’Reilly supra note 61, Sec. 16.41, at 43 (noting that in weighing privacy interests courts must look not only at how the particular requester would use the information, but at “the uses to which [the information] could be put if released to any member of the public.”).”

(BIA, 1990b).” It also was formalized in 1994 in the GDSC’s memorandum on Data Distribution Policy (GDSC, 1994). The memo states:

“It has long been the policy of this office that data are distributed to outside entities (vendors, other governmental agencies) only after specific instructions to do so have been received from one of two sources: the respective Area Director or the Tribal Chairman. ... This procedure has been promulgated to address the concerns of our clients relative to data security. It has been agreed by all Area GIS Coordinators that the requirements are reasonable and prudent. Notes: In addition to the above, Area Directors and/or the tribes may feel that additional measures limiting release may be warranted. In some cases, Area Director and Tribal Chair signatures can be required for release. Data releases may also be restricted to certain individuals or departments. The GDSC will gladly accept any such limitations on data release upon receipt of written direction to do so (GDSC, 1994).”

This policy is echoed in a December 1994 memorandum on BIA’s plans to upload data to the National Geospatial Data Clearinghouse, an early implementation of the National Spatial Data Infrastructure (Bonner, 1994).

In March, the BIA MAO Acting Director responded to the DNR request, suggesting that the DNR needed to first ask the tribes for permission to access the data, as per the BIA’s policy. His letter states:

“In order to fulfill our trust obligations to the tribes, and maintain the government-to-government relationship between the United States and the Tribal governments, the Minneapolis Area Office acts as a broker or clearinghouse for data requests to the GDSC to avoid unintentional release of data sets... this office follows a policy of sharing data with outside organizations only with an authorizing memorandum from the Area Director coupled with the Tribal concurrence. Obviously some data sets are published and readily available in both analog and digital formats. Others contain sensitive information to varying degrees, such as individual [land] ownership or cultural resources data. This office considers data requests on a case-by-case basis, and works closely with the appropriate Tribal government to ensure that Tribal interests and the United States’ trust responsibility are maintained (Nelson, 1997).”

In June, the BIA MAO Director responded to a second request by the DNR for the data, reaffirming that the “electronic files created in a geographic information system...are the property of the individual tribes.” The letter recommended again that the DNR contact the tribes for permission (Morrin, 1997). The DNR did as instructed, but was rebuffed or ignored by ten of the eleven tribes for not approaching them “in good faith” (see Chapter 2).

On October 31, 1997 the Wisconsin Department of Natural Resources (DNR) Bureau of Air Management submitted a formal FOIA request to the BIA’s Great Lakes Agency and the Minneapolis Area Office (MAO) for:

“electronic Geographic Information Systems (GIS) data showing boundaries and classification of [Indian Tribal lands] located in Wisconsin that are within the jurisdiction of the Great Lakes Agency (Burkholder, 1997)...

The Wisconsin Department of Natural Resources is in the process of compiling information on Tribal owned lands including on and off reservation lands that are held in trust by the U.S. government, and other such lands commonly referred to as Indian Country. This information is needed by the Department for determining jurisdiction related to air permitting issues under the federal Clean Air Act.”

The BIA had compiled the reservation boundary and tribal land status maps from a variety of sources, including USGS topographic maps, state and county agencies, BIA land records, and the tribes. The BIA MAO informed the tribes of the DNR’s data request and sought their input and expertise before issuing a formal response. The BIA also consulted with the BIA’s Office of the Field Solicitor. Based on FOIA Exemptions 4, 5 and 6, the BIA denied the request. The DNR appealed the request in February 1998, where it languished until shortly after the *Klamath Water Users* decision.

On June 8, 2001, the BIA FOIA Appeals Office in Washington, D.C., granted the Wisconsin DNR's request. In a letter to George E. Meyer, former Secretary of the Wisconsin DNR, the FOIA Appeals Officer wrote (Wolf, 2001):

“The GIS data related to the boundaries and classification of the lands was created by BIA personnel with input from the tribes. Furthermore, BIA is in possession of this data; and it was collected by BIA to assist in carrying out its trust responsibilities to the tribes. Since the Department obtained and controlled the GIS data related to boundaries and classification of the lands, the Department concludes that this information is an agency record.”²¹²

Having determined that the GIS data in question was an agency record for the purposes of FOIA, the DOI Appeals Office dismissed the BIA's claim that release of the data would cause an “unwarranted invasion of the individual's privacy.” “Since the State of Wisconsin did not request the names or addresses of any of the subject landowners,” the letter states, “the GIS data related to boundaries and classification of the lands cannot be identified as applying to a particular individual.” Thus, FOIA exemption 6 was not applied to the tribes' GIS data (Mouritsen, 2001; Wolf, 2001).

The Appeals Officer also rejected the application of Exemption 4 with little analysis, stating simply that “[s]ince the GIS data related to boundaries and classification of the lands does not constitute a trade secret or commercial financial information, the information does not qualify for withholding under exemption (4) of the FOIA.” He concluded that Exemption 5 did not apply, first, because “the GIS data related to

²¹² “The data maintained in the [BIA's] GIS system pertaining to boundaries and classifications of Indian Tribal lands is compiled from USGS maps and BIA land records. After Department of the Interior (Department) personnel compiled the data, personnel in BIA's Great Lakes Agency forwarded it to the Indian Tribes within its jurisdiction (hereinafter “The Tribes”) to correct it for errors. Once the Indian Tribes made corrections, they returned the GIS data related to boundaries and classification of the lands to BIA's Great Lakes Agency. BIA's Great Lakes Agency has advised us that it maintained this data to assist it in carrying out its trust responsibilities to the Indian Tribes to manage resources on Indian-owned land” (Mouritsen, 2001).

boundaries and classification of the lands is factual information that is not intertwined with the Department’s decision making process, it is not deliberative in nature, and consequently it cannot be withheld under the [deliberative privilege] of exemption (5);” and, second, because the “Great Lakes Agency was not in possession of negotiating a contract involving GIS data related to boundaries and classification of lands, the[confidential information] privilege of exemption (5) could not be used as a basis to withhold the data.”

5.1.2.6 FOIA Regulations

The Freedom of Information Act for the Department of the Interior is implemented through 43 Code of Federal Regulations, Subtitle A, Part 2.²¹³ Subpart F - *Handling of Confidential Information* (7 Fed. Reg. 76906, Dec 31, 2012)²¹⁴ outlines the steps that the agency and departments, including the BIA, must take to ensure the proper handling of confidential information under the FOIA. If the information is requested under FOIA, the agency will notify the individual or organization that submitted the information and solicit a “detailed written statement” specifying the reasons for withholding it. If a tribe or other entity, for example, submits confidential business information to the BIA or Department of the Interior (DOI), it must specify (Sec. 2.31):

- “Whether the Government required the information to be submitted, and if so, how substantial competitive or business harm would likely result from the release;
- Whether the submitter provided the information voluntarily and, if so, how the information fits into a category of information that the submitter does not

²¹³ 43 CFR Part 2 <http://www.ecfr.gov/cgi-bin/text-idx?c=ecfr&sid=0fc3ab3499768eebc2e3691c8cf88dec&rgn=div5&view=text&node=43:1.1.1.1.2&idno=43>.

²¹⁴ FOIA Guidelines, USDO, accessed May 17, 2015. Available at: <http://www.ecfr.gov/cgi-bin/text-idx?rgn=div5&node=43:1.1.1.1.2#sp43.1.2.f>.

- customarily release to the public; and
- A certification that the information is confidential, has not been disclosed to the public by the submitter, and is not routinely available to the public from other sources.”

But, the guide cautions, “the bureau, not the submitter, is responsible for deciding whether the information will be released or withheld (Sec. 2.32).” The bureau’s only obligation is to notify the submitter of the decision and the reasons behind it.

5.1.3 Federal Data Acquisition and Management

Whether organizations receiving federal grants and contracts constitute an “agency” for the purposes of FOIA is a matter of some debate. In 1980, the U.S. Supreme Court held:²¹⁵

“that written data generated, owned, and possessed by a privately controlled organization receiving federal study grants are not ‘agency records’ within the meaning of [the FOIA] when copies of those data have not been obtained by a federal agency subject to FOIA. Federal participation in the generation of the data by means of a grant from [an executive department] does not make the private organization a federal “agency” within the terms of [the FOIA]. Nor does this federal funding in combination with a federal right of access render the data “agency records” of [the department], which is a federal “agency” under the terms of [the FOIA].

According to the 9th Circuit in *Missouri v. Department of the Interior* (2004),²¹⁶ federal funding “is insufficient to transform a private organization into a federal agency” for the purposes of FOIA. However, under the Shelby Amendment and OMB Circular A-110, discussed in section 5.1.3.3, some federal research grantees may be required to disclose

²¹⁵ Salt Inst. V. Thompson, 2004 WL 2674496 at 3.; See also *Forsham v. Harris*, 445 U.S. 169 (1980).

²¹⁶ *Missouri v. Department of the Interior*, 297 F. 3d 745, 750 (8th Cir. 2002); see also *Gilmore v. Department of Energy*, 4 F. Supp. 2d 912, 917.

their data in response to a FOIA request (Gidiere, 2013). In *Salt Inst. V. Thomson* (2004),²¹⁷ the court stated:

“[In] response to a Freedom of Information Act (FOIA) request for research data relating to published research findings produced under an award for research data relating to published research findings produced under an award that were used by the Federal Government in developing an agency action that has the force and effect of law, the Federal awarding agency shall request, and the recipient shall provide, within a reasonable time, the research data so that they can be made available to the public through the procedures established under the FOIA.”

In addition, the Open Government Act of 2007 (Pub. L. No. 110-175, 121 Stat. 2524, Section 9) amended subsection (f)(2) of the Freedom of Information Act to expand the definition of “record” to include the unique situation when a contractor serves as data archive for government records:

“(A) any information that would be an agency record subject to the requirements of this section when maintained by an agency in any format, including an electronic format; and
(B) any information described under subparagraph (A) that is maintained for an agency by an entity under Government contract, for the purposes of records management.”

Agencies are instructed to continue to use the test established by the Supreme Court in *Tax Analysts*.

Many other statutes, regulations, and policies may be applicable to spatial data about Tribal lands and resources created in whole, or in part, with federal funding and/or shared with federal agencies—either by the tribes themselves or academic research institutions. For example, “[f]ederal assistance agreements law makes clear that federal agencies have full rights to information and data generated from activities financed by assistance

²¹⁷ *Salt Inst. V. Thomson*, 204 WL 2674496, at 3 (E.D. Va. Nov. 15, 2004).

agreements (Grumbles & Jorgensen, 2005).” These include, for example, EPA’s General Assistance Program (GAP) grants, cooperative agreements, Clean Water Act grants, and Clear Air grants, as discussed in Chapter 4. This section highlights a few examples, including the Indian Self-Determination and Education Assistance Act, As Amended (Sec. 5.1.3.1); the Indian Land Consolidation Program (Sec. 5.1.3.2); OMB Circular No. A-110, Federally Funded Research Grants (Sec. 5.1.3.3); the Information Quality Assurance Act (Sec. 5.1.3.4); Federal Activities Inventory Reform Act and OMB Circular No. A-76 (Sec. 5.1.3.5); and, OMB Circular No. A-16 National Spatial Data Infrastructure (Sec. 5.1.3.6).

At the time of the writing of this dissertation, however, the BIA still has not made several sections of its online manual available, including Grants and Cooperative Agreements (BIAM Part 24 Chapters 1-3), Geospatial (Part 58), Information Policy (Part 62), Information Planning (Part 63), Information Development (Part 65), Information Operations (Parts 68-69), although there are placeholders for these sections on the Indian Affairs AIM website.²¹⁸

5.1.3.1 Indian Self-Determination and Education Assistance Act

According to the U.S. Supreme Court in *Cherokee Nation of Oklahoma v. United States*,²¹⁹ ISDEAA contracts:

²¹⁸ Indian Affairs Manual. Last accessed May 17, 2015. Available at: <http://www.bia.gov/WhatWeDo/Knowledge/Directives/IAM/index.htm>.

²¹⁹ On March 1, 2005, the Supreme Court issued its decision in two consolidated cases, *Cherokee Nation of Oklahoma v. Leavitt* and *Leavitt v. Cherokee Nation of Oklahoma*. 02-1472 and 03-853, Available at:

“effectively entitles a tribe to step into the shoes of a federal agency in receiving federal funds and administering government services...Unlike a typical procurement contractor, a tribe that elects to enter into a self-determination contract under ISDA does not commit to supply a specific level of services in exchange for an agreed-upon payment. Instead, the tribe, like the federal agency before it, undertakes to deliver federal services within the limits of funds awarded to it and has no obligation to ‘continue performance that requires an expenditure of funds in excess of the amount of funds awarded...the ISDA deems employees of contracting tribes to be part of the Department of Health and Human Services [or the BIA] for the purposes of the Federal Tort Claims Act while carrying out the services. See 25 U.S.C. 450f(d).”

Recognizing the unique federal-tribal government-to-government relationship, ISDEAA self-determination contracts (known as “638 contracts”) are not to be construed as standard government procurement contracts (25 U.S.C. 450b(j)). In fact, ISDEAA, Title V, section 510, explicitly exempts ISDEAA self-determination contracts and self-governance compacts from federal acquisition regulations, “except as may be mutually agreed to by the parties” (see also Title I and IV) (OMB, 1996).

For the purposes of ISDEAA self-governance compacts and self-determination contracts, as per Sec. 900.2, the Freedom of Information Act “does not apply to records maintained solely by Indian tribes and tribal organizations.” In addition, the regulations state:

“Access to records maintained by the Secretary is governed by the Freedom of Information Act (5 U.S.C. 552) and other applicable Federal law. Except for previously provided copies of tribal records that the Secretary demonstrates are clearly required to be maintained as part of the record keeping systems of the DHHS or the DOI, or both, records of the contractors (including archived records) shall not be considered Federal records for the purpose of the Freedom of Information Act” (OMB, 1996).

When created and maintained under the ISDEAA, tribal government and tribal organization records are also not considered agency records for the purposes of the Privacy Act (Section 108(b)). Unless required by statute, “there are no mandatory reporting requirements” (Sec. 900.65); program narrative and data reports are negotiated between the tribe and the BIA or Indian Health Services.

5.1.3.2 Indian Land Consolidation Act and Program

The intent of the BIA’s Indian Land Consolidation Program (ILCP), as authorized under the ILCA (25 U.S.C. 24), is to acquire fractionated ownership interests in land order to consolidate them into tribal ownership for better management, reduced administrative costs, and increased opportunities for tribal land use and businesses. According to McCarthy (2004, 33):

“Congress has specified certain types of Indian land ownership information that must be released to certain types of requesters. The Indian Land Consolidation Act (“ILCA”) provides that the BIA shall make available certain information about Indian landowners to certain categorical requesters, including other Indian owners of interests in trust or restricted lands within the same reservation; the tribe that exercises jurisdiction over the land; and prospective applicants for the leasing, use, or consolidation of interests in trust or restricted lands.”²²⁰

5.1.3.3 OMB Circular A-110, Federally Funded Research Grants

Partially overturning the landmark Supreme Court decision *Forsham v. Harris*,²²¹ the Omnibus Consolidated Emergency Supplemental Appropriations Act for Fiscal Year 1999 (known as the Shelby Amendment) mandates that research data created by private

²²⁰ 25 U.S.C. Sec. 2001.

²²¹ 445 U.S. 169 (1980) (holding that data created and maintained by private research institutions with federal grants were not subject to FOIA).

research institutions using federal awards should be made accessible under FOIA.²²²

Under OMB Circular A-110, "Uniform Administrative Requirements for Grants and Agreements With Institutions of Higher Education, Hospitals, and Other Non-Profit Organizations, As Further Amended 1999," institutions like universities and non-profit organizations that receive federal research grants may in some circumstances be subject to FOIA. Specifically, under Section 36(c)(Intangible Property), the Federal Government has the right to:

"(1) obtain, reproduce, publish or otherwise use the data first produced under an award; and (2) authorize others to receive, reproduce, publish, or otherwise use such data for Federal purposes."

In addition, under 36(d)(1):

"in response to a Freedom of Information Act (FOIA) request for research data relating to published research findings produced under an award that were used by the Federal Government in developing an agency action that has the force and effect of law, the Federal awarding agency shall request, and the recipient shall provide, within a reasonable time, the research data so that they can be made available to the public through the procedures established under the FOIA."

This is limited by "trade secrets, commercial information, and materials necessary to be held confidential by a researcher until they are published, or similar information which is protected under law."²²³

²²² Omnibus Consolidated and Emergency Supplemental Appropriations Act for Fiscal Year 1999, Pub. L. No. 105-277, 112 Stat. 2681 (1998).

²²³ See OMB Circular A-110, "Uniform Administrative Requirements for Grants and Agreements with Institutions of Higher Education, Hospitals, and Other Non-Profit Organizations," 64 Fed. Reg. 54,926 (Oct. 8, 1999); see also [FOIA Update](#), Vol. XIX, No. 4, at 2 (discussing grantee records subject to FOIA under Circular A-110's definition of "research data").

Circular A-110 does not apply to grants to local and state governments, and is silent on the subject of tribes. One might assume, by analogy, that A-110 does not apply to tribal governments; however, “federal agencies may apply the provisions of this circular to commercial organizations, foreign governments, organizations under the jurisdiction of foreign governments, and international organizations.” More importantly, universities that are using federal grants to conduct research about tribes or on reservations may be subject to these OMB guidelines.

On February 22, 2013, President Obama’s Science Advisor, Dr. John Holdren, Office of Science and Technology Policy, issued a Memorandum, “Increasing Access to the Results of Federally Funded Research” (Holdren, 2013). It reiterates the Administration’s commitment to make “the direct results of federally funded scientific research...available to and useful for public, industry, and the scientific community, “including peer-reviewed publications and “digital data.” Among other things, it tasks agencies with developing a strategy for “measuring and, as necessary, enforcing compliance with its plan” to support increased public access to research results, as per OMB circular (e.g., A-21 and A-11).

5.1.3.4 Information Quality Act and Guidelines

The Information Quality Act (IQA) (also known as the “Data Quality Act”), Section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001 (sec. 515, P.L.106-554), amended the Paperwork Reduction Act (Ch. 35, Title 44, US Code) and requires that the OMB must issue guidelines that “provide policy and procedural guidance to Federal Agencies for ensuring and maximizing the quality, objectivity,

utility, and integrity of information (including statistical information) disseminated by Federal agencies” (NRC, 2004, 133-134). Furthermore, individual agencies also must issue their own guidelines, which include “administrative mechanisms to challenge the quality of the information disseminated by the government and for ‘correcting’ information that does not meet the guidelines.”²²⁴ The IQA only applies to “agency initiated or sponsored distribution of information to the public. ...The definition excludes distributions limited to government employees or agency contractors or grantees; intra- or interagency use or sharing of government information; and responses to requests for agency records under the Freedom of Information Act and other open government laws” (Gellman, 2015).

According to OMB guidelines, the IQA is applicable to a third party if it accepts federal funding through a grant or contract and is directed by the sponsoring agency to disseminate the resulting data. If, on the other hand, the federal grant is for research purposes only and the grantee has discretion as to whether or not to publish the data, then the IQA is not applicable (OMB, 2002b). Guidelines issued by the Department of the Interior state that:

“[i]f the Department relies upon technical, scientific, or economic information submitted or developed by a third party, that information is subject to the appropriate standards of objectivity and utility. The standards of these Information Quality Guidelines apply not only to information that the Department generates, but also to information which can be verified that other parties provide to the Department, if the Department disseminates or relies upon this information. In instances where the information is relied upon but is not verifiable, the source must be made transparent to the public” (USDOJ, 2004).

²²⁴ Agency Information Quality Guidelines, White House Websites, accessed May 17, 2015. Available at: https://www.whitehouse.gov/omb/inforeg_agency_info_quality_links/.

The BIA IQA guidelines confirms

“this policy applies to all information disseminated by [Indian Affairs], including information that [Indian Affairs] receives from tribal governments or tribal organizations operating [Indian Affairs] programs under grants, contracts or compacts (including but not limited to those authorized by the Indian Self Determination and Education Assistance Act, as amended (25 U.S.C. 450 et seq.)) and thereafter disseminates.”

However, the BIA Information Quality Guidelines (2009, IAM Part 10 Chapter 3,

1.3(C))²²⁵ also state that:

“[i]f access to data and methods cannot occur due to compelling interests such as privacy, trade secrets, intellectual property, Tribal sovereignty, Trust responsibilities, existing or pending litigation and other confidentiality protections, Indian Affairs will, to the extent practicable, verify information and document that verification steps were taken.”

Similarly, the Government Performance and Results Act (GRPA) and the related

Program Assessment Rating Tool (PART) also may require public access to tribal spatial data created under a federal grant or contract, or shared with a federal agency. “GRPA provides a framework under which federal agencies prepare strategic plans, performance plans, and performance reports that set goals and report on the extent to which they are achieved,” while “PART is a systematic method of assessing performance of program activities, focusing on their contribution to an agency’s achievement of its strategic and program performance goals.” These link performance to management and budget decisions (OMB, 2005).

The relevance of IQA appears to be diminishing over time. The court, according to Gellman (2015), “have shown little interest in entertaining IQA complaints” and have

²²⁵ BIA IQA Guide (2009), Accessed May 17, 2015. Available at: <http://www.bia.gov/cs/groups/public/documents/text/idc002704.pdf>.

“used different grounds to evade making substantive decisions in IQA litigation.” The appeals court in *Salt Institute v. Leavitt* found the IQA “did not create ‘a legal right to access information or to correctness’” (Gellman, 2015).

5.1.3.5 Federal Activities Inventory Reform Act and OMB Circular A-76

OMB Circular A-76 Revised (2003)²²⁶, which implements the Federal Activities Inventory Reform (FAIR) Act, requires agencies to justify engaging in “commercial” activities, which are those that are not “inherently governmental.” In September 2011, the Office of Management and Budget’s Office of Federal Procurement Policy issued a final policy letter (11-1, Performance of Inherently Governmental and Critical Functions)²²⁷ that provides guidance on managing the performance of “inherently governmental function.” In accordance with the Federal Activities Inventory Reform Act (10 U.S.C. Sec. 2883), the letter defines “inherently governmental function” as “a function that is so intimately related to the public interest as to require performance by Federal Government employees.” The new definition under this policy was then propagated throughout the Federal Acquisition Regulation (FAR). Strommer and Dean (2011) highlighted that this policy makes “no mention of the Indian Self-Determination and Education Assistance Act (ISDEAA) or Indian tribes operating programs under the Act and thus failed to address the difference between the delegation of governmental functions to commercial contractors and the delegation of federal functions to tribes under the ISDEAA.” They

²²⁶ OMB Circular A-76 Revised, accessed May 17, 2015. Available at: https://www.whitehouse.gov/omb/circulars_a076_a76_incl_tech_correction/.

²²⁷ Federal Register, Vol. 76, No. 176, 56227-56242.

emphasize, however, that tribal contracts under the provisions of the “are not subject to OMB guidelines applicable to commercial contracts” (Strommer & Dean, 2011).

As discussed earlier, this policy does not mention the Indian Self-Determination and Education Assistance Act, as Amended (ISDEAA) (Public Law 93-638; 25 CFR 900), nor does it discuss Indian tribes operating programs under the ISDEAA. It is unclear, therefore, “how the difference between the delegation of government functions to commercial contractors and the delegation of federal functions to tribes” under the ISDEAA are to be handled under A-76 (Strommer & Dean, 2011). Strommer and Dean (2011) noted that tribes expressed concern to the OMB over the lack of clarity in the OMB Final Policy Letter relating to performance guidance of inherently governmental and critical functions. The OMB responded that “[t]he policy letter is not intended to modify or otherwise affect any rights or limitations imposed by the ISDEAA on a Tribal government’s ability to assume responsibility for an inherently Federal function as that term is used under the Act.”

As discussed in Chapter 4, under the criteria established in OMB Circular A-76 Revised, the acquisition and management of spatial data is not an inherently government function, and therefore may be subject to public-private competition. In addition, this circular does not dictate whether data should be acquired with unrestricted or restricted rights (NRC, 2004).

5.1.3.6 OMB Circular A-16 Revised, National Spatial Data Infrastructure

OMB Circular A-16 Revised,²²⁸ along with Executive Order 13286,²²⁹ provides for the “improvements in coordination and use of spatial data,” by encouraging the development of a National Spatial Data Infrastructure (NSDI) and by promoting wide spread access to spatial data. But, this circular also recognizes proprietary rights by making a distinction between federally funded and privately funded data (e.g., NRC, 2004; Onsrud, 2005).

In addition, Executive Order 12906, amended by Executive Order 13286 in 2003,²³⁰ and OMB Circular A-16 Revised (2002), discussed below, provide for the “improvements in coordination and use of spatial data” and encourage the development of the National Spatial Data Infrastructure (NSDI) in cooperation with state, local, and tribal governments, and the private sector.²³¹ The NSDI is defined as “the technologies, policies, and people necessary to promote sharing of spatial data throughout all levels of government, the private and non-profit sectors, and the academic community.”²³² This order requires that agencies within the executive branch of the federal government “adopt a plan, in consultation with the Federal Geographic Data Committee (FGDC),

²²⁸ Daniels, Mitchell E. Jr., Memorandum to the Heads of Executive Departments and Establishments, regarding Revised Circular No. A-16, issued August 19, 2002, accessed July 10, 2004 http://www.whitehouse.gov/omb/circulars/a016/a016_rev.html#5.

²²⁹ [Executive Order 13286](#), published in the March 5, 2003, edition of the Federal Register, Volume 68, Number 43, pp. 10619-10633 amended Executive Order 12906.

²³⁰ Executive Order 12906: Coordinating Geographic Data Acquisition and Access: the National Spatial Data Infrastructure, signed by President Bill Clinton on April 11, 1994, launched the initiative to create the NSDI. President George W. Bush amended EO 12906 by issuance of Executive Order 13286 on March 5, 2003. FGDC website, accessed May 19, 2015. Available at: https://www.fgdc.gov/policyandplanning/executive_order.

²³¹ Executive Order 12906 Coordinating Geographic Data Acquisition and Access: The National Spatial Data Infrastructure, published April 13, 1994, Federal Register 59(71):17671-17674; Executive Order 13286, published March 5, 2003, Federal Register 68(43):10619-10633; OMB Circular No. A-16, 48 CFR Parts 27 and 52.

²³² Federal Geographic Data Committee (FGDC) Web Site, accessed July 10, 2015. <http://www.fgdc.gov/nsdi/nsdi.html>.

establishing procedures to make spatial data available to the public, to the extent permitted by law, current policies, and relevant OMB circulars, including OMB Circular A-130 ‘Management of Federal Information Resources’ and any implementing bulletins” (see for example, Perritt 2001, 733). It also called for the establishment of a National Geospatial Clearinghouse, spatial data standards, and a National Geospatial Data Framework. This order, however, “does not impose any requirements on tribal governments.” In addition, A-130 specifically directs agencies to “[e]nsure that Federal information system requirements do not unnecessarily restrict the prerogatives of state, local and tribal governments” (Onsrud, 2005; see also Onsrud and Lopez, 1994, 1998).

The OMB Circular A-16 Revised “Coordination of Geographic Information and Related Spatial Data Activities,” establishes a “coordinated approach to electronically develop the National Spatial Data Infrastructure [and associated standards,] and establishes the Federal Geographic Data Committee.” The A-16 *Supplemental Guidance*, endorsed by the Office of Management and Budget in 2010 (M-11-03), clarifies OMB Circular A-16 and provides the implementation strategy for the National Geospatial Data Asset Portfolio (NGDA).²³³ This circular applies to “[a]ll spatial data and geographic information systems activities – financed directly or indirectly, in whole or in part, by federal funds;” although the “spatial data activities of tribal governments not paid for by federal funds, as specifically determined by the tribal governments,” are exempt from the provision within this Circular.

²³³ FGDC website, accessed May 19, 2015. Available May 19, 2015:
<https://www.fgdc.gov/policyandplanning/a-16/omb-circular-a16-supplemental-guidance>.

5.1.3.7 Federal Acquisition Regulations

Federal Acquisition Regulations (FARs) govern federal government data acquisition.²³⁴

FARs that govern contracts to which the federal government is a party specify that when the federal government has funded the creation of data, it should be able to distribute it to the public. That said, an organization that receives federal funding to create data is not automatically considered an “agency” subject to FOIA, “absent extensive, detailed, and virtually day-to-day supervision” (Gidiere, 2013).²³⁵ Rights in data and copyrights under federal contracts are specified by 48 CFR 27.4.

For Indian Self-Determination and Education Assistance Act Program grants, for example, record keeping and reporting requirements are governed by 25 CFR Part 275, Uniform Administrative Requirements for Grants.²³⁶ As discussed in Chapter 4, records retention and access requirements under EPA grants are stipulated in 40 CFR, Section 31.42. Section 31.34 allows the government to use and publicly disseminate any work developed under a grant or contract:

“The Federal awarding agency reserves a royalty-free, non-exclusive, and irrevocable license to reproduce, publish or otherwise use, and to authorize others to use, for Federal Government purposes: (a) The copyright in any work developed under a grant, subgrant, or contract under a grant or subcontract; and

²³⁴ 48 CFR. Available at <https://www.acquisition.gov/>.

²³⁵ When a private entity substantially funds the creation of data, it should be able to impose restrictions on government’s use and distribution of that data to the public (NRC, 2005, 127-129; see also Onsrud, 2005).

²³⁶ 25 CFR Part 276, Accessed May 18, 2015. Available at: http://www.ecfr.gov/cgi-bin/text-idx?SID=fd00188001f863d07f8b5dc3f8fa9b88&mc=true&tpl=/ecfrbrowse/Title25/25cfr276_main_02.tpl As per Sec. 276.5, “The Secretary of the Interior and the Comptroller General of the United States, or any of their duly authorized representatives shall have access to any books, documents, papers, and records of the grantees and their subgrantees which are pertinent to a specific grant program for the purpose of making audit, examination, excerpts, transcripts and copies at government expense.”

(b) Any rights of copyright to which a grantee, subgrantee or a contractor purchases ownership with grant support.”

5.1.4 Accountability and Judicial Review of Agency Actions

When specific information forms the basis of a government policy, regulation or other action, such as federal rule-making, it must be made accessible for public and judicial review. However, if a tribe or other organization uses a contract to restrict public access to the information, then the agency may be forced to collect the data itself or the agency’s action may be overturned (e.g., Bolton, 2004; Federal Advisory Committee Act, 5 U.S.C. Appendix I; Administrative Procedure Act; NRC, 2004, pp. 131-132).

5.1.5 Discovery

Spatial data about tribal lands and resources also may be released to the public as part of the discovery process during litigation. Discovery is a pre-trial procedure in which each party may obtain evidence from the other through requests or subpoenas. This may include the production of documents. In *United States v. Asarco*,²³⁷ for example, the U.S. District Court in Idaho forced the Couer d’Alene tribe to release its GIS database during litigation with the Asarco mining company. The tribe developed the GIS database as part of the administrative assessment process required by the Environmental Response, Compensation, and Liability Act (CERCLA), in order to assess the damages and hold the mining company responsible for response costs associated with the Bunker Hill facility. The mining company requested access to the GIS database itself, but the tribe claimed it was proprietary. The court disagreed, “it is basically undisputed that the database is a

²³⁷ *United States v. Asarco*, 28 F. Supp. 2d 1180 (D. Idaho March 31, 1998), vacated 214 F.3d 1104 (9th Cir. 2000).

critical part of the assessment process being completed by the Trustees; [and] that such database is not work product.” It did not matter that the “database was expensive to develop and create,” the court still held that it should be released for the marginal cost of making a copy (Speich, 2001).

5.2 Rights of Control

Privacy rights, intellectual property rights, and national security are control rights that counter-balance the rights of access. A right to privacy under the federal Privacy Act only will protect federally held spatial data that pertains to individual tribal members, but not to an Indian tribe collectively. However, this section will touch briefly on the idea of collective privacy and on the privacy norms of Indian tribes in order to better understand their concerns regarding unwanted public access to their spatial data. Rights to intellectual property, on the other hand, might be used to a limited degree to offset the rights of access under federal statutes and regulations. Spatial data pertinent to national security concerns as defined by federal statutes, regulations, and the courts also might be protected.

5.2.1 Rights of Privacy

5.2.1.1 Individual Privacy

Federal constitutional law and at least twenty-three different federal statutes, as well as state statutory law, protect privacy rights in the United States. The federal Privacy Act of 1974 (5 U.S. C. Sec. 552a) prohibits federal agencies from disclosing records that contain personally identifiable information about individuals, unless otherwise authorized. It does not apply to local or state governments or private sector organizations. Similar to FOIA,

the Privacy Act includes twelve exceptions for records not covered by the requirements of the statute. These include: (a) records for law enforcement and prosecution purposes; (2) records required to be disclosed under FOIA; (3) records disclosed for “routine use” if “compatible” with the agency’s original purpose for the information; (4) disclosure to the Census Bureau; (5) for Congressional investigations; (6) disclosure to the Comptroller General; (6) disclosure for court orders, etc. (Solove & Schwartz, 2015; Soma, Rynerson, & Kitaev, 2014).

When a BIA contract specifies the creation and operation of a “system of records,” the tribe (or other contractor) must comply with the regulation specified in 43 CFR 2.53. This means the contract shall, consistent with the Department’s authority, apply the requirements of the Privacy Act (5 U.S.C. 553a) and associated regulations to that system of records. A “system of records” is defined as “a group of any records under the control of any agency from which information is retrieved by the name of an individual or by some identifying number, symbol, or other identifying particular assigned to the individual.” The Privacy Act generally prohibits federal agencies from disclosing any record that are contained in a system of records. Privacy as it relates to Fourth Amendment surveillance will be reviewed in Chapter 6.

It bears repeating that tribal member expectations of privacy may differ from what is considered “reasonable” by the dominant society. Tribes and their members need and expect “privacy in public spaces.” For example, their expectations of privacy are not

necessarily greater within a residence (structure) than in an “open field”²³⁸—not every place of cultural or spiritual significance is enclosed within a building (Warren, 2004). Nonetheless, courts in the United States have frequently held that an individual’s expectation of privacy in public spaces is minimal at best. Scassa (2011) argues that “[a]lthough one’s right of privacy in public space must give way to the right of other participants in that same space to observe what goes on around them, it by no means follows that one’s right of privacy must give way with respect to data collected and recorded by public and private sector actors for a variety of specific purposes. Further, consent to the collection of discrete particles is not necessarily consent to their matching and mining, or their transfer to other parties” (Scassa, 2011; see also Gellman, 2011, 2012a, 2012b; Kar et al., 2013). Location privacy (or “territorial” or “spatial privacy”) characterizes a person’s interest in privacy at a specific geographic location—such as one’s home—or in connecting a series of locations over time. What makes a place private under U.S. law, however, is not the place itself, but rather the connection with information about an individual. (Chapter 6 provides a discussion of privacy in the context of satellite surveillance.)

5.2.1.2 Group Privacy

As discussed in Chapter 2, an Indian tribe, which asserts a separate identity from the dominant society, may have a sense of privacy as a whole community, not just as individual tribal members. Within some tribes, the individual is not elevated above the community as within dominant society. Peladeau (1994) comments, “[i]n pure traditional

²³⁸ The Supreme Court held in *Oliver v. United States*, 466 U.S. 170, 177 (1984) that a person does not have a “reasonable expectation of privacy” in activities conducted in open field.

decision making, there is no abstract universal criteria and no case is only individual: each one will be weighted against a large and undefined set of interests and values constitutive of the very fabric of the community.”

Tribal governments and their members vary in what they believe should be kept confidential. As Williamson and Goes In Center (2001, 167) recognize, “it is difficult to generalize about the beliefs and worldviews of Native Peoples of North America because the over 565 recognized tribal and Alaska Native groups are highly diverse in language, religion, and cultural practices.” But, for some, the right to secrecy (i.e., the right to withhold information), as well as the right to control information about their community and the right to expect confidentiality, are as important as the right to be left alone. For Indian tribes privacy and secrecy can be “deeply embedded cultural norms, sometimes interwoven with kinship and religion” (Harding, 2000; see also Elizabeth A. Brandt, 1980; Brown, 2003). Several authors have reviewed the concept of privacy and secrecy within the context of indigenous cultures (e.g., Brandt, 1980; Brown, 1998; Burgess, 1981; Herdt, 1990; Marcus, 1995; Moreland, 1991; Peladeau, 1994; Roberts and Gregor, 1971; Tefft, 1980) and have explored the relationship between secrecy and power (e.g., Brandt, 1980; Shils 1975).

Secrecy can be “a deeply embedded cultural norm” among some Indian nations and tribes; some tribes consider cultural and sacred knowledge to be “limited goods that cannot be shared and disseminated without a corresponding loss in power, significance,

and meaning” (Harding, 2000, 69; see also Brown, 1998). For example, among the Zuni, “kinship and religion are interdependent with privacy” (Roberts and Gregor 1971, 215).²³⁹ It would be wrong to assume, however, that within tribes all members have the same access to all information (Elizabeth A. Brandt, 1980). Harding (2000, 74) comments that “behind the veil of secrecy is a realm of relatively secure meanings – a place where foreign scrutiny is minimized and where external cultural influence is limited. It is within the freedom of this private space that cultural boundaries can be defined and cultural identity strengthened.” Moreover, secrecy is a rebuke of state authority and an assertion of control over the representation and interpretation of their culture (e.g., Harding, 2000; Thom, 1997).

The incorporation of tribal knowledge into spatial data is particularly problematic in this regard as this technology has often been criticized as “a techno-representation readily controlled by the powerful, a tool that reinforces and legitimates state authority” (Campbell, 2002, 193; see also Elwood, 2000; Dorling and Fairbairn, 1997, 70-71). Furthermore, Campbell (2002, 200), citing Rundstrom (1995), notes, “the geographic knowledge of indigenous peoples is cultural. As such, the dependence of the GIS on binary thinking and the idea that ambiguity is a liability, together with the failure to appreciate that [indigenous knowledge] is a distinct epistemological form of knowledge,

²³⁹ Brandt (1980, 130) notes, “A major consequence of internal secrecy is the establishment of status hierarchies based on access to knowledge communicated only in oral form. Pueblo communities contain a number of small-group cultures that store, retrieve, and transmit different kinds of information. ... There is relatively little overlap or information leakage between the groups. Since Pueblo governing systems are linked in important ways with these small-group cultures, the establishment of status hierarchies based on secret information in the possession of one group rather than another can have important political consequences.”

results in the distortion and misrepresentation of [indigenous knowledge].” Wainwright and Robertson (2000) illustrate this point with their presentation of a conflict that erupted between the Mendota Mdewakanton Dakota indigenous community and the State of Minnesota in the late 1990’s over a highway reroute proposal that called for the destruction of a cluster of oak trees sacred to the Dakota. At the center of this case was a struggle over what information and spatial data should be collected, how it should be represented, and who had the authority to interpret it. Wainwright and Robertson assert that this process only served to legitimize state power and decision-making. Finally, spatial maps can be a tool for assimilation (e.g., replacing tribal place names with English names as part of a rural addressing project) (Rundstrom, 1995), or undesired exhibition (e.g., tourists’ maps that depict the locations of archaeological and sites of spiritual significance) (Dorling and Fairbairn, 1997).

Many tribes are reluctant to share tribal spatial data with federal agencies. This apprehension stems from a number of concerns, as discussed in Chapter 4, including the proprietary or sensitive nature of the information; the financial impact; the regulatory impact; the potential for privacy infringement; the impact on their status as sovereign nations; and, the impact on their trust relationship with the federal government (e.g., Lum, 1999; Hardzinski, 1999). Foremost, sharing data requires trust, particularly of the federal government (e.g., Tobias, 1997; Weinstein, 1998). Weinstein (1998) notes, in the context of First Nations of Canada, “[i]n the lengthy history of powerlessness with government resource agencies, aboriginal communities frequently relied on the uniqueness of their knowledge for empowerment. For people with this history, the

significance of transfer of knowledge outside the oral traditional should not be taken lightly, let alone depositing it within the databanks of the other camp.”²⁴⁰ As succinctly expressed by Crystal Bond, Cartographer for the Cherokee Nation, everything else has been taken and now the dominant society wants Indian nations’ information too. Madsen (1995) takes this a step further. Citing several examples, including Burma, Sudan, Mexico, Iraq, and Canada, Madsen argues that information privacy is necessary to ensure community security of native peoples.

As discussed in Chapter 4, spatial data sets that may be commonly accessible under local or state open records laws, such as land parcels or jurisdictional boundaries, may be considered highly confidential by some Indian tribes. Furthermore, maps and information of archaeological sites, historic sites, cultural resource areas, and spiritually significant sites often are considered private knowledge and, as such, are rarely made public (Marchand and Winchell, 1994, p. 51; see also Goodman, 2000); in some circumstances, this sensitive information might not be recorded or might not be shared among tribal government departments or tribal members although other tribal departments may benefit from access to them. Thus, while Indian tribes cannot claim a collective right to privacy under U.S. law,²⁴¹ tribal civil law and tribal courts may handle privacy differently (Moreland, 1991).²⁴²

²⁴⁰ Crystal Bond, Cartographer at the Cherokee Nation GeoData Center, Tahlequah, Oklahoma. Private communications, July 2001.

²⁴¹ It may be worth noting, as Madsen (1994) points out, that “the United Nations has taken a first step in recognizing the privacy rights of indigenous peoples, i.e., their “right to be let alone.” The UN Draft Declaration on the Rights of Indigenous People, adopted in 1993 at the eleventh session of the Economic and Social Council’s Commission on Human Rights recognizes “the urgent need to respect and promote the

5.2.2 Rights of Intellectual Property

Rights of intellectual property may be used as a form of control over access to tribal spatial data and maps. Intellectual property rights protect the ownership of the work of an individual or legal entity, but they do not provide a “defensive shield” against unauthorized use; rather, they give the owner the right to seek enforcement of these rights through the courts. The primary types of intellectual property are trade secret law, copyright law, trademark laws, and patent law (LaFrance, 2011). Some of these rights “provide substantial protection for many data sets that lack the creativity requisite for protection under copyright” (Onsrud, 1998, 34; Onsrud & Lopez, 1998). While the Copyright Act does not fall within Exemption 3 under FOIA, trade secrets and confidential business information are protected under Exemption 4.

5.2.2.1 Trade Secrets

Forty-seven states and the District of Columbia have enacted the Uniform Trade Secrets Act (“UTSA”),²⁴³ which defines trade secret as:

- “information, including a formula, pattern, compilation; program, device, method, technique, or process,
- that derives independent economic value, actual or potential, from not being generally known to or readily ascertainable through appropriate means by other persons who might obtain economic value from its disclosure or use; and
- is the subject of efforts that are reasonable under the circumstances to maintain its secrecy.”

inherent rights and characteristics of indigenous peoples, especially their rights to their lands, territories and resources.”

²⁴² Moreland (1991) recommends that Indian nations enact their own privacy statutes that would apply within the boundaries of their jurisdictions.

²⁴³ Uniform Law Commission website, accessed May 20, 2105. Available at:

<http://www.uniformlaws.org/LegislativeFactSheet.aspx?title=Trade%20Secrets%20Act>.

Sections 757 and 758 of the Restatement of Torts (1939) established the fundamental principles of trade secret law, which has been adopted by U.S. courts. In order to assert a trade secret claim, the information must fall within the scope of what trade secrets are designed to protect. It also must not be publicly available. The trade secret holder must take reasonable steps to ensure that the information is not disclosed. FOIA's Exemption 4, as discussed above, protects "trade secrets and commercial or financial information obtained from a person and privileged or confidential."²⁴⁴ In *Public Citizen Health Research Group v. Food and Drug Administration*, the D.C. Circuit defined trade secret as "a secret, commercially valuable plan, formula, process, or device that is used for the making, preparing, compounding, or processing of trade commodities and that can be said to be the end product of either innovation or substantial effort."²⁴⁵ The limited case law with respect to trade secrets and Exemption 4 generally rely on this definition (Gidiere, 2013). Long (2012) offers a thorough review of trade secrets and FOIA.

5.2.2.2 Copyright

Copyright may provide one means of protecting tribal spatial data, although the extent to which copyright can protect spatial data generally is a matter of debate, as is perhaps the legitimacy of state, local, and tribal government-held copyright.²⁴⁶ U.S. Copyright

²⁴⁴ *Tax Analysts*, 117 F.3d at 613.

²⁴⁵ *Public Citizen Health Research Group v. Food and Drug Administration*, 704 F.3d 144, 151 (D.C. Cir. 2001).

²⁴⁶ The U.S. Copyright Act does not explicitly prevent state and local governments from holding copyright in public records (NRC, 1999). Thus, many state and local governments have asserted copyright, and subsequently charged for their SPATIAL data. Some legal scholars would argue, however, that state and local governments are not legally entitled to hold copyright in government records, nor should they as a matter of public policy (Onsrud, 2001; Perritt, 2001). Government-held copyright, Perritt asserts, imposes constraints on publishing and disseminating public information and thus it "collides" with First Amendment rights. What is more, government information is collected with public funds to fulfill a public

springs from the Constitution, which gives Congress the power “[t]o promote the progress of science and the useful arts [emphasis added], by securing for a limited time to authors and inventors the exclusive right to their respective writings and discoveries.”²⁴⁷ According to Lessig (1999, 133), this does not authorize Congress to bestow “property” in writings and discoveries in the traditional sense of the word, but rather permits “only an exclusive right over them for a limited time.” Indeed, U.S. Copyright attempts to strike a balance between the rights and interests of authors and those of the general public. By offering limited legal protection to original works of authorship, copyright creates an economic incentive for the production and dissemination of these works. Conversely, ensuring ‘public access’²⁴⁸ to a diversity of information sources enables a democratic and educated society and provides the ‘raw material’ upon which other works might be built (Onsrud, 2001). Ideally, neither the author of a work nor the public should reap “all of the benefits that flow from the creation of a new, original work of authorship” (Litman, 2000a, 15).

In order for a work to qualify for copyright protection, original works of authorship must be “fixed in a tangible medium²⁴⁹ of expression, now known or later developed, from which [the works] can be perceived, reproduced, or otherwise communicated, either directly or with the aid of a machine or device.” Furthermore, works must have at least a

purpose. Therefore, these scholars contend, copyright incentive is not required; governments will continue to collect information without copyright; they are mandated to do so (Onsrud, 2001, Perritt, 2001).

²⁴⁷ *U.S. Constitution*, Art. 1, § 8, cl. 8; 17 U.S.C. § 100 et seq.

²⁴⁸ In Chapter 3, footnote 4, NRC (2000, 97) defines public access to mean access “to versions of a work that have been published and distributed, placed in publicly accessible collections...or otherwise made available through normal channels.” It does not “access to specific copies of a work.”

²⁴⁹ “[F]ixed in a tangible medium” can prove problematic when considering electronic information.

“modicum of creativity.” One may copyright an *expression* of an idea, but not the idea itself. Under U.S. Copyright, independent creation of a comparable work is permitted (LaFrance, 2011; Hough & Ray, 2000; Onsrud, 2001). Thus, Michelangelo might have copyrighted his *Pietà* sculpture of mother and child, but he could not have prevented others from sculpting a similar theme.

Comprised of a bundle of rights, copyright confers on the author the exclusive right: 1) to reproduce the work; 2) to generate derivative works; 3) to distribute it; and 4) to display or perform it in public.²⁵⁰ Any or all of these rights may be separated from the bundle and conveyed to a new owner through an “assignment” or a “license” agreement (Hough & Ray, 2000; Onsrud, 2001).²⁵¹

Federal statute implements U.S. Copyright exclusively. The Copyright Act of 1976 and subsequent revisions are the culmination of decades of wrangling between special interest groups, concerned primarily in maintaining the status quo or in extending their rights at the expense of future stakeholders and the public. As such, the Act is a tangled web, difficult to interpret and even harder to apply. When attempting to apply statutes, the courts 1) look to the ‘plain language’ of the law; 2) weigh Congressional intent and legislative history; and finally 3) consider common law. The language of the Act is complex and often imprecise. Congressional intent is clouded by the fact that lobbyists drafted the statutes. Consequently, the courts have relied heavily on previous judicial interpretation, resulting in a convoluted and sometimes contradictory body of case law

²⁵⁰ 17 U.S.C. § 106.

²⁵¹ An assignment transfers all of these rights in copyright to a new owner unconditionally and A license transfers some of the rights in copyright, either exclusively or non-exclusively.

(e.g., LaFrance, 2011; Hoffman, 2001; Litman, 2000a, 903). It is no surprise, therefore, that copyright is considered one of the more complex areas of the law (next to federal law as it applies to tribes!).

The U.S. Copyright Act does not extend protection to “any work of the United States Government,”²⁵² but “the United States Government is not precluded from receiving and holding copyrights transferred to it by assignment, bequest, or otherwise” (17 U.S.C. Sec. 105 2012). Thus, federal agencies are not permitted to impose copyright restriction on their work products. Federal government information is regarded as a “national resource,” best left in the public domain for all to use. This is expressed at the federal level in “a strong freedom of information law, no government copyright, fees limited to recouping the cost of dissemination, and no restrictions on reuse” (Weiss and Backlund, 1997, 307). Two cases involving Tax Analysts, a non-profit publishing organization, and the United States Department of Justice (DOJ), directly and indirectly address the issue of electronic access to government records.

Copyright, however, offers only “thin protection” for the factual information contained within a spatial database (LaFrance, 2011). The question of whether copyright may be extended to spatial data is a topic of debate. A tension exists between basic principles: maps are explicitly protected by copyright, but facts are not, nor are ideas, procedures, processes, systems, and organizing principles. Thus, while maps as a whole might be

²⁵² 17 U.S.C. § 105.

protected, many maps contain unprotected factual elements and standard arrangements that may be extracted.

Determining what is protected expression and what are unprotected facts is often a difficult task in regards to spatial data, datasets, and databases. As Scassa (2014), points out:

“[c]omplex and digitized data sets and consistently evolving real-time data are inherently more difficult to categorize as works in which copyright subsists. Certainly, it becomes much more difficult to conceptualize the organization of data within a database as reflecting a particular arrangement. It is also more difficult to identify authorship in complex-non-finite collections of data. Finally, where the compilation as a whole is not copied [or static] but rather just selected live-streamed data [e.g., real-time stream gauge data], it becomes more difficult to argue that something other than facts is being taken.”

Factual data are not protected under copyright law. Electronic datasets and databases fall under “factual compilations;”²⁵³ copyright only rests in a compilation’s creative selection and arrangement. Four federal court cases, discussed below, illustrate the tension between a desire by data producers to protect their time and investment and the public’s interest in promoting science and the useful arts.²⁵⁴ Ultimately, there is no *sui generis* (or “sweat of the brow”) intellectual property protection for databases in the United States.

²⁵³ Factual compilations are defined as “the collection and assembling of pre-existing materials or data that are selected, coordinated, or arranged in such a way that the resulting work constitutes an original work of authorship” (17 U.S.C., § 101).

²⁵⁴ In addition, in *Computer Associates Int’l v. Altai*, the federal Court of Appeals developed a “filtration” technique in order to sift through the constituent parts of software and software interfaces. First, the Court ejected those components that were not protected by copyright, including: facts and ideas, information in the public domain, code or procedures implemented for the sake of efficiency (i.e., no other reasonable way to accomplish task), and parameters governed by external requirements (e.g., hardware specifications). Second, the court considered the remaining components to determine if they were copyrightable. In *Altai*, the software interface in question could not be copyrighted.

In *Feist Publications, Inc. v. Rural Telephone Service Co.*,²⁵⁵ the U.S. Supreme Court acknowledged that an “author typically chooses which facts to include, in what order to place them, and how to arrange the data so that readers may use them effectively.” Copyright, therefore, may extend to the creative “selection, coordination, and arrangement” of factual compilations.²⁵⁶ However, labor, time, and money, or ‘sweat of the brow’ arguments, do not confer copyright in the United States. Only the creative elements in a work are protected and no more. Nonetheless, this may be enough to shield a work from wholesale copying.

In *Key Publications*,²⁵⁷ the Second Circuit, in agreement with Feist, enumerated three criteria for determining if a compilation is original for the purposes of copyright:

- “(1) the collection and assembly of preexisting data;
 - (2) the selection, coordination, or arrangement of the data contained in that work;
- and
- (3) a resulting work that is original by virtue of the selection, coordination, or arrangement of the data contained in the work.”

The Court then clarified the third condition in *Matthew Bender & Co v. West*. Evaluation of the creativity found in the selection, coordination, or arrangement of the data “is a function of

- (i) the total number of options available,
- (ii) external factors that limit the viability of certain options and render others non-creative, and
- (iii) prior uses that render certain selections ‘garden variety.’”

²⁵⁵ *Feist Publications v. Rural Tel. Serv. Co.*, 499 U.S. 340, 111 s. Ct. 1292, 113 L. Ed. 2d 358 (1991).

²⁵⁶ “Where the quantum of originality is slight and the resulting copyright is ‘thin,’ infringement will be established only by very close copying because the majority of the work is unprotectable.” *Beaudin v. Ben & Jerry’s Homemade, Inc.* 95 F.3d 1, 2 (2d Cir. 1996).

²⁵⁷ *Key Publications Inc. V. Chinatown Today Pub. Enters, Inc.* 945 F.2d 509 (2d Cir. 1991).

The data itself still remains in the public domain. Copyright does not prevent some degree of copying that would constitute a “fair use.” Others may use the information and data, but cannot substantially copy either the selection or arrangement of the data.

The Second Circuit in *N.Y. Mercantile Exchange v. Intercontinental Exchange*²⁵⁸ (2007) held that real-time data are not subject to copyright protection under the “merger doctrine.” Scassa (2014) explains, “where an idea and its expression are so closely merged that there is no other reasonable way to express the idea, there will be no copyright monopoly.” If the goal is to produce accurate data, then it will be difficult to demonstrate that it is “sufficiently different from any other reasonable calculation.”

The U.S. Copyright Act does not explicitly preclude local, state, or tribal governments from holding copyright. At least 28 states have passed statutes allowing local and state government entities to assert copyright (Thomas, 2011).²⁵⁹ In *County of Suffolk, N.Y. v. First Am. Real Estate Solutions*,²⁶⁰ the 2nd Circuit ruled, “states and their subdivisions are not excluded from protection under the [Copyright] Act” (see also *Microdecisions, Inc. v. Skinner*, at p. 876).²⁶¹ While some local and state governments have claimed copyright in their spatial data, which tribes may do as well, it is uncertain whether these claims can be enforced. Given the already “weak copyright claims in data,” Scassa (2014) comments,

²⁵⁸ *N.Y. Mercantile Exchange v. Intercontinental Exchange*, 389 F.Supp. 2d 527 (S.D.N.Y. 2005).

²⁵⁹ The State of California, for example, “explicitly recognize the authority of public officials or agencies to copyright specific public records that they have created.” *County of Santa Clara*, 170 Cal. App. 4th 1301, 133, 89 Cal. Rptr. 3d 374, 397.

²⁶⁰ *County of Suffolk, N.Y. v. First Am. Real Estate Solutions*, 261 F.3d 179, 187 (2d Cir. 2001).

²⁶¹ *Microdecisions, Inc. v. Skinner* (2004) 889 S.2d 871, 875; see *County of Suffolk, New York v. First American Real Estate Solutions* (2001) 261 F.3d 179, 188; *Building Officials & Code Adm’rs, Inc. v. Code Tech, Inc.* (1980) 628 F.2d 730, 735-736).

“the public status of a rights holder might weight against a finding of even a thin copyright protection” (see also Gellman, 1995). In *County of Santa Clara v. California First Amendment Coalition*²⁶² (2009), the Court of Appeals concluded that there was “no statutory basis either for copyrighting [the GIS basemap database] or for conditioning its release on a license agreement” under United States copyright law based on the state’s open records law. Weighing the public interest in disclosure over the interest in non-disclosure, the court mandated the release of the data under the state public records law.

5.2.2.3 Cultural Property

The concept of cultural property is much debated in the literature. Some have called for new forms of “cultural copyright.” Others have questioned whether it is appropriate to apply intellectual property rights to indigenous knowledge (Biagioli, Jaszi, & Woodmansee, 2001; Barsh, 1999a, 2001; Brown, 1998, 2004, 2005; Carr, 2012; Fletcher, 2004-2005; Gordon, 2013; Graber & Burri-Nenova, 2008; Harding, 2000; Hughes, 2012; Jaszi, 2009; Lian, 2012; Paterson & Karjala, 2003; Storther, 2014). As discussed in Chapter 2, Paterson and Karjala (2003, 633-635) point out that indigenous peoples are faced with a difficult dilemma: either they are “forced to commodify their own cultural property and thereby perhaps misappropriate its position in the indigenous community”—“diminishing the inherent spirituality or dignity of native heritage”—or they must “renounce commoditization, thus allowing other non-indigenous people to appropriate indigenous cultural traditions.” Scassa (2012) notes that Western IP systems are not well

²⁶² *County of Santa Clara v. California First Amendment Coalition*, H031658 (Cal. App. 4th 2009); see also *Microdecisions, Inc. v. Skinner*.

suited for traditional knowledge. In Western IP systems, “[t]he creator obtains a monopoly on the exploitation of the work for a fixed period of time, after which it falls into the public domain,” whereas in traditional cultures, Scassa et al. (2012) explain, “authorship cannot be attributed to a single individual, where norms around property and improper uses are embedded within the culture and where their exploitation by a single individual would run counter to cultural norms and expectations.” If American Indians cannot commodify their culture, Carpenter et al. (2010) contend, however, “some other nonindigenous entrepreneur will surely take their place, risking not only the quality of the goods that may be produced but also potentially diluting the goods’ association with tribal origins, and concomitantly denying indigenous peoples the opportunity to participate in the profits” (Carpenter, Katyal, & Riley, 2010). Here commodification is defined as “the conversion of intangible cultural property into items of economic worth that can be traded for commercial gain by such means as license, rental, or sale” (Barsh, 1999a; Brown, 2004, 2010).

In their article “In Defense of Property,” Carpenter et al. (2009) provide an extensive review of the literature, and the ongoing scholarly debate between leaving traditional knowledge in the public domain and applying intellectual property rights to protect it. They espouse group property, “situate[ing] indigenous cultural property claims, particularly those of American Indians, in the interests of ‘peoples’ rather than ‘persons.’” Further, they assert that individual ownership rights should be subordinated to stewardship, that is to say “an ongoing duty of care toward cultural resources in the absence of a title.” Brown (2010) concurs, “the concept of property—long defined

primarily by such principles as transferability and rights of exclusion and control—should be broadened to encompass the robust idea of stewardship...[it] renders property more compatible with the indigenous view of things.” Brown pushes back, however, warning that while “some forms of propertization may empower individuals and, by implication, groups, ...[there is] an inexorable tendency to treat property as fungible and alienable.” He cites, as an example, the disastrous consequences of the General Allotment Act of 1887, which converted communally held tribal land into alienable private parcels (Brown, 2006). He also highlights the important role of public domain traditional knowledge databases, which indigenous communities have used to successfully invalidate industrial patents (Brown, 2010). Coombe (2011, 85), quoting Watts (2000, 37), eloquently states:

[w]e should strive to avoid the same reductionist forms of critique in our considerations of global intellectual property politics. Simple allegations of essentialism (strategic or otherwise), sitings of social construction, and accusations of romanticism reveal a profound lack of political sensitivity to the fields of power and leverage in which peoples struggle for recognition, resources and opportunity: ‘community is important because it is typically seen as a locus of *knowledge*; a site of *regulation* and management; a source of *identity* and a repository of *tradition*; the embodiment of various *institutions* (say, property rights), which necessarily turn on questions of representation, power, authority, governance, and accountability; an object of *state control*; and a theatre of *resistance* and struggle (of social movements and potentially of *alternative visions of development*).’”

Several organizations, including the United Nations Education, Scientific and Cultural Organization (UNESCO), the World Trade Organization (WTO), the World Intellectual Property Organization (WIPO), and the International Labor Organization (ILO), have crafted international agreements in an attempt to protect the rights of indigenous communities. As discussed in Chapter 3, the United Nations Declaration on the Rights of

Indigenous Peoples (UNDRIP), which was adopted by the UN General Assembly in 2007 and signed by President Obama in 2010, acknowledges the political and cultural independence of indigenous people globally (Pevar, 2012). Article II (2) asserts that:

“States shall provide redress through effective mechanisms, which may include restitution, developed in conjunction with indigenous peoples with respect to their cultural, intellectual, religious and spiritual property taken without their free, prior and informed consent or in violation of their laws, traditions, and customs.”

And Article 31 (1) states that:

“Indigenous people have the right to maintain, control, protect, and develop their cultural heritage, traditional knowledge and traditional cultural expressions, as well as the manifestations of their sciences, technologies and cultures, including human and genetic resources, seeds, medicines, knowledge of the properties of fauna and flora, oral traditions, literatures, designs, sports and traditional games and visual and performing arts. They also have the right to maintain, control, protect and develop their intellectual property over such cultural heritage, traditional knowledge, and traditional cultural expression.”

The UNDRIP, however, is not enforceable under international law. Furthermore, the UNESCO and WIPO efforts have not been well coordinated, and offer “contradictory policy protection frameworks” (Eschenfelder, 2009; Graber & Burri-Nenova, 2008; Scassa et al., 2012). Cox et al. (2010) at Harvard Berkman Center of Internet & Society developed a tutorial on Traditional Knowledge and the legal instruments used to protect it around the world. The Intellectual Property Issues in Cultural Heritage research project provides a list of publications and other resources on cultural property issues (IPinCH, 2015).²⁶³

²⁶³ IPinCH is “an international collaboration of archaeologist, Indigenous organizations, lawyers, anthropologists, ethicists, policy makers, and others, working to explore and facilitate fair and equitable exchange of knowledge relating to heritage.” It is “concerned with the theoretical, ethical, and practical implications of commodification, appropriation, and other flows of knowledge about the past, and how these may affect communities, researchers, and other stakeholders.” Retrieved from <http://www.sfu.ca/ipinch/about/project-description> on June 7, 2015.

5.2.3 Other Control Mechanisms

In light of the limitations discussed above, copyright protection for tribal spatial data may be bolstered if used in conjunction with copyright-like controls, such as contracts, end-user license agreements, pricing and royalties for use of the data, and restrictions on disclosure. Contract and licensing is another avenue for consideration. A contract is “an agreement to exchange property or services [such as intellectual property, like software, copyrights, patents, trademarks, etc.] that is legally enforceable in a court of law” (Ferrera et al. 2001, 91). A license, on the other hand, is “the grant of a limited right in the use of intellectual property, such as trademarks and other designations of origin, rights under copyright, patented inventions, trade secrets and other confidential information, or the grant, in the case of publicity rights, in the use of the name, likeness, portrait or other aspects of one’s ‘persona.’”²⁶⁴ Some institutions in the financial industry also go so far as to conduct background checks on data subscribers (USCO, 1997). Tribes may use contracts to restrict dissemination of and access to spatial data, specify how the data may be used and by whom, and establish enforcement mechanisms and remedies. For example, terms of use, end user licenses may prohibit users from downloading, storing, reproducing, transmitting, displaying, copying, or distributing the information. Or they may prohibit users from extracting data for other purposes than originally intended (LaFrance, 2011). Thomas (2011, 21-23) offers several examples of contract language used by public entities to protect their data. For general discussions on contracts

²⁶⁴ Contract law is governed by statute and common law. Of note, the Uniform Commercial Code (UCC), which governs the sale and leasing of goods, has been adopted by all fifty states due to the efforts of the National Conference of Commissioners on Uniform State Laws (NCCUSL), and the Uniform Computer Information Transactions Act (UCITA), which governs licensing, is likely to be adopted by states in some form.

and licensing of spatial data, refer to Scassa (2014), Thomas (2011), Cho (2005), NRC (2004), and Onsrud (2005).

Nevertheless, these strategies too may not provide ironclad protection from public access under FOIA and other federal statutes and regulations (e.g., NRC, 2004, pp. 122-131; Perritt, 2001, pp. 757-758). For example, in *Assessment Technologies of WI v. WIREdata*,²⁶⁵ the Seventh Circuit held that extracting the raw data that WIREdata sought from the Market Drive copyrighted software database did not violate federal copyright law, and that there was no copyright restriction on WIREdata receiving a simple, electronic version of the database. In the related case *WIREdata v. Sussex*,²⁶⁶ the Wisconsin Supreme court held that use of independent contractors for data collection and maintenance did not relieve the municipalities' liability for providing government data under Wisconsin's open records law (Shanley, 2009). The court in *Microdecisions v. Skinner*,²⁶⁷ involving GIS data, found that Florida public records law "overrides a government agency's ability to claim a copyright in its work unless the legislature has expressly authorized a public records exemption."

In addition, it is a matter of some debate whether contract or license restrictions placed on non-copyrightable data may be pre-empted by the Copyright Act. Federal copyright law preempts any state law that may create equivalent rights (17 U.S.C. Sec 301). According to Thomas (2011), "[a]lthough some courts have refused to enforce contracts that provide

²⁶⁵ *Assessment Technologies of WI v. WIREdata*, 350 F.3d 640 (7th Cir. 2003).

²⁶⁶ *WIREdata v. Sussex*.

²⁶⁷ *Microdecisions v. Skinner*, 889 So. 2d 871 (Fla. 2d DCA 2004).

copyright-like protection to facts or unoriginal databases in the belief that the Copyright Act preempts such contracts, the majority view appears to be that such contractual clauses are not preempted and are enforceable.”

Tribes also could use digital rights management (DRM) technologies to protect their spatial data. In essence, a copyright holder may “place a digital ‘fence’ around any data provided the requester” (Thomas, 2011), thereby preventing the copying and redistribution of their work through technological measures. The Digital Millennium Copyright Act (DMCA) of 1998 prohibits the circumvention of DRM technologies used to protect copyrighted works from unauthorized use. However, DMCA exempts libraries, archives, and educational institutions. It also does not prohibit fair use (LaFrance, 2011).

5.2.4 National Security

Under certain circumstances, federal national security statutes and policies might provide a means for Indian nations to assert limited control over certain spatial data that they share with the federal government. Homeland security statutes have expanded what information can be withheld from disclosure. Heightened concerns over national security and homeland security have prompted recent changes to FOIA. In order to safeguard national security and support law enforcement activities, Attorney General John Ashcroft issued a FOIA Memorandum in October 2001, which emphasizes the need to protect sensitive institutional, commercial, and personal interests that are contained within

federal agency records.²⁶⁸ In addition, FOIA now departs from the general practice of non-discretionary access; under the Intelligence Authorization Act of 2003, agencies of the “intelligence community” are prohibited from “disclosing records in response to any FOIA request that is made by any foreign government or international governmental organization, either directly or through a representative.”²⁶⁹ This would include agencies such as the Central Intelligence Agency, National Security Agency, as well as some parts of the Federal Bureau of Investigation and the Department of Homeland Security. Furthermore, the federal Homeland Security Act of 2002 (P.L. 107-296), which establishes the Department of Homeland Security (DHS), includes a provision that exempts disclosure of “critical infrastructure information” obtained by a federal agency, i.e., Exemption 3 of FOIA, 5 U.S.C. § 552(b)(3) (2000).

5.3 Summary

The federal Freedom of Information Act, along with many other statutes and regulations, support a policy of broad disclosure of information by the federal government. Tribes are not agencies for the purposes of FOIA. However, if spatial information and data of tribal lands and resources is created in whole, or in part, with federal funding under a compact, contract, or cooperative agreement, shared with, or created and maintained by the federal government may be at risk for disclosure to the public under the federal Freedom of Information Act and other federal regulations. Disclosure is limited by 9 exemptions,

²⁶⁸ *FOIA Post*, "New Attorney General FOIA Memorandum Issued" (posted 10/15/01).

²⁶⁹ Pub. L. No. 107-306, 116 Stat. 2383, § 312 (codified at 5 U.S.C.A. § 552(a)(3)(A), (E) (West Supp. 2004)); see also *FOIA Post*, "FOIA Amended by Intelligence Authorization Act" (posted 12/23/02) (advising that "for any FOIA request that by its nature appears as if it might have been made by or on behalf of a non-U.S. governmental entity, a covered agency may inquire into the particular circumstances of the requester in order to properly implement this new FOIA provision").

although these are discretionary. Tribal information and spatial data related to the National Historic Preservation Act and Archaeological Resource Protection Act, among other statutes, may be protected under FOIA Exemption 3, whereas confidential tribal business information, such as information about water rights and lease terms, may be protected potentially under Exemption 4. Tribes may demonstrate the confidentiality of their spatial data by asserting copyright, in combination with copyright-controls, such as end-user license agreements and terms of use, which restrict redistribution, and digital rights management.

The Supreme Court in *Klamath Water Users* the application of Exemption 5 to tribal information shared with the federal government. The Court also explicitly rejected an “Indian trust responsibility” exemption to FOIA. While this is in keeping with the Court’s history of narrowly interpreting FOIA to encourage public disclosure, it has had a deleterious effect on the federal-tribe trust relationship. Tribal information also may become public under discovery or judicial review of agency actions.

Fundamental issues are at stake – Indian tribes’ rights and interests in their natural resources and federal agency’s decision-making processes that affect these resources. The incorporation of tribal expertise and information into environmental planning and policy formulation, however, is critical if Indian tribes’ rights and interests are to be protected.²⁷⁰ If information is withheld, Lum (1999, 3) and others assert, federal agency decision makers may deduce incorrectly that natural and cultural resources are

²⁷⁰ We must be careful that the incorporation of indigenous knowledge in the planning process in fact leads to empowerment, and is not merely a repackaging and legitimization of state and corporate domination.

insignificant (Lum, 1999; Plaut, 2009; Skibine, 2012). Yet, once these communications become part of federal agency record, they are at risk for disclosure under the FOIA.

6. HIGH-RESOLUTION COMMERCIAL SATELLITE IMAGERY PRIVACY AND ACCESS

6.1 Introduction

A number of high-resolution commercial land remote sensing satellites have been deployed in the last decade, producing images with spatial resolutions as small as 31 centimeters, and frequencies as high as every 90 minutes. Future commercial satellites may support even higher spatial and temporal resolutions. The United States, however, is not alone in developing remote sensing technology. Other countries, including Canada, France, Israel, Japan, China, Brazil, India, and Australia, have Earth observation satellites.

Concerned about their privacy and security as individuals, as communities, and as sovereign governments, some American Indian tribes are apprehensive about the progress of commercial remote sensing satellites, particularly in combination with web-services like Google Earth, Maps, and StreetView, and the resulting widespread access to high-resolution imagery of their lands and resources. In many respects, these concerns are analogous to those expressed regarding privacy and security by developing nations in the 1970s and 1980s regarding the U.S. government's Landsat remote sensing program (Bing et al., 1983; von der Dunk, 2013; Williams, 2005), by Israel in the late 1990s, by India with the launch of Google Earth and Microsoft's Virtual Earth (Bokhari & Bokhari,

2005), and to some degree by China with satellite monitoring of carbon emissions from deforestation and forest degradation (Busby, 2010).

Davies et al. (1999) emphasize that remote sensing satellites:

“could create some inequalities in power, with sensing countries able to collect information on (usually poorer) sensed countries, which might be exploited to economic effect in resource extraction agreements. ‘Sovereignty’ concerns regarding remote sensing go beyond simple information equality...remote sensing may be perceived as a violation of, or control over, another’s land. ...Despite these sovereignty concerns, advocates of “open skies” policy prevailed. Not one of the fifteen Remote Sensing Principles in General Assembly Resolution 41/65 suggests that sensing States must obtain prior approval in order to acquire or disseminate data (see also Greenburg, 1983; Polter, 1976).

Monserrat Filho (2001), citing jurist Winter Gerd, asserts “sensed countries failed in negotiating with other countries because they gave up their position of full sovereignty without assuring data free access to the other states.” U.S. commercial high-resolution satellite operators, he contends, ignored UN Principle XII and “created their own procedures.”

During my interviews, some tribal members expressed concern that this information, when collected without an Indian tribe’s knowledge or permission, might impinge on what is arguably a tribe’s sovereignty and collective sense of privacy, and may be used to abrogate a tribe’s land and resource rights (e.g., W. Madsen, 1995). Thus, some tribal members and tribes have expressed a desire to assert control over the terms within which high-resolution satellite imagery of their lands and resources is acquired, disclosed and used. Imposing restrictions, however, may be difficult to achieve, particularly given the

United States' long-standing domestic position of open access, the potentially high cost and difficulty of preventing data and imagery gathering, and the access guarantees afforded nations by the U.S. commercial systems operating licenses.

On the other hand, benefits might be achieved by negotiating access to the data and imagery under the terms and conditions of commercial remote sensing licenses, by working with the Bureau of Indian Affairs (BIA), as the primary trustee of Indian tribes and Indian Trust assets, to acquire the data and imagery, and by developing the ability and expertise to use the technology. Within the context of the United States, a strategy for tribes may be to develop and support robust remote sensing and geographic information system (GIS) capabilities within tribal governments. As noted in Chapter 4, GIS and satellite imagery already have become invaluable tools for tribal land and resource management.

Section 6.2 briefly summarizes the state of the technology for commercial high resolution satellite remote sensing. Building on Chapters 2 and 4, section 6.3 discusses the privacy and security concerns expressed by some American Indian tribe's with regards to remotely sensed high-resolution satellite imagery (Sec. 6.3.1), the limitations of high-resolution satellite imagery (Sec. 6.3.2), and the right to privacy as it applies to aerial surveillance, and by analogy, as it might apply to remote sensing satellites (Sec. 6.3.3). Section 6.4 explores what steps tribe might take to balance tribal sovereignty and collective privacy against the prevailing national standards of open access. Finally,

Section 6.5 discusses what tribes have to gain from these technologies. Chapter 7 will review briefly other emerging sensing technologies and their potential implications.

6.2 Commercial High-Resolution Satellite Imagery

The Landsat program was the world's first civil government remote sensing program, and perhaps one of the most influential. Designed to collect multispectral digital images for monitoring land cover changes on the Earth's surface, Landsat was at the leading edge of technology for non-military earth-observation satellites until the mid-to-late 1980s when France and India also launched remote sensing satellites, SPOT and IRS respectively. These developments spurred the U.S. Congress to “[weigh] the priorities of commerce and competitiveness against those of national security” and to enact “the Land Remote Sensing Policy Act of 1992, which opened the door to licensing of U.S. commercial remote sensing satellites” (Baker et al. 2001, 146). This act, in combination with Presidential Decision Directive 23: *U.S. Policy on Foreign Access to Remote Sensing Space Capabilities* (PDD-23), dated March 9, 1994, authorized U.S. companies to proceed with the deployment of commercial remote sensing satellites.

More than two decades later, U.S. national policy continues to support a competitive U.S. commercial remote sensing space industry. In June 2002, the National Geospatial Intelligence Agency (NGA) was mandated to rely on commercial systems for their imaging needs (Tenet 2002). On April 25, 2003, this policy was extended to civil agencies under the Bush Administration's U.S. Commercial Remote Sensing Policy, which supersedes PDD-23 (Bush, 2003). This policy directed civil agencies to use

commercial satellite imagery and services and broadly states that “the United States Government will rely to the maximum practical extent on U.S. commercial remote sensing space capabilities for filling imagery and geospatial needs for military, intelligence, foreign policy, homeland security, and civil users.”

The National and Commercial Space Programs Act (NCSPA) (51 U.S.C. § 60101, et seq as amended),²⁷¹ which Congress passed in 2010, “provides no person who is subject to the jurisdiction or control of the U.S. may operate any private remote sensing space system without a license, and authorized the Secretary of Commerce to license private sector parties to operate private remote sensing space systems.” The U.S. Geological Survey (USGS), the National Oceanic and Atmospheric Administration (NOAA), and the National Geospatial Intelligence Agency (NGA), as well as other federal agencies, jointly implement the NCSPA through 15 CFR Part 960.²⁷² O’Connell (2011) provides a review of U.S. government policy as it relates to commercial remote sensing satellites.

The end of the twentieth century heralded IKONOS, developed by Space Imaging International, as the first of the high-resolution satellites to become operational. The first satellite failed to reach orbit, but the second successfully launched not long after in September 1999. Sale of IKONOS images began on January 1, 2001. IKONOS offers 4-m multispectral and 0.8-m panchromatic (black and white) bands, which may be combined in a process called “pan-sharpening” to produce multispectral (color) images

²⁷¹ http://www.nesdis.noaa.gov/CRSRA/files/National_and_Commercial_Space_Programs_Act_60101.pdf.

²⁷² USGS Website for Commercial Remote Sensing Space Policy: <http://crssp.usgs.gov/>.

with an effective resolution of 1-m. Furthermore, IKONOS was designed to be highly maneuverable, thus enabling it to acquire new targets within seconds and allowing it “to follow meandering features,” such as power lines or rivers (DigitalGlobe, 2015; Lillesand and Kiefer, 2000; Baker et al., 2001).

Other high-resolution remote sensing satellites soon followed. DigitalGlobe’s QuickBird, launched in 2001, provided 0.61-m (2 ft.) panchromatic and 2.44-m (8 ft.) multispectral imagery. QuickBird produced its last image on December 17, 2014 and re-entered the Earth’s atmosphere on January 27, 2015 (DigitalGlobe, 2015). DigitalGlobe subsequently launched WorldView-1 in 2007, WorldView-2 in 2009, and WorldView-3 in 2014 (David, 2014). WorldView-3 brought with it expanded capabilities, such as penetrating fog, haze, and smoke and “direct access tasking from and image transmissions to customer sites.” WorldView-1 is currently descending towards end of mission life. Orbital Imaging, spun off from Orbital Science Corporation in 1997, purchased Space Imaging and changed its name to GeoEye in 2006, and launched a series of satellites called OrbView-2 (1997-2010) and OrbView-3 (2003-2007), and GeoEye-1 (2008-Present). GeoEye-1 exclusively provides Google with imagery. In another restructuring of the U.S. commercial remote sensing industry, GeoEye merged with DigitalGlobe in 2013 (W. Walsh, 2013). Table 2 provides the spatial and temporal resolutions for four of the highest resolution commercial Earth observation satellites for civilian use.

Internationally, the French Space Agency (Centre national d’études spatiales) through Spot Image (now Astrium) launched a series of SPOT satellites beginning in 1986 to

most recently in 2014. SPOT 5 offers 2.5 to 5 meters in panchromatic and 10 meters in multispectral mode, while SPOT 5 and 6 have 1.5 m panchromatic and 6-m multispectral resolution. SPOT 7 is now owned by Azerbaijan's space agency Azersky. The Italian Space Agency's COSMO-SkyMed, as well as the joint German Airspace Center (DLR) and EADS Astrium's twin satellites TerraSar-X and TanDEM-X, provide radar observations of the Earth. Many other countries also have land imaging satellite systems, including Canada, India, Israel, South Korea, Japan, and China. Several authors provide comprehensive reviews of land imaging satellites and their capabilities, (Aardt, 2010; Campbell & Salomon, 2010; Kerski & Clark, 2012; Stoney, 2008).

New breeds of satellites have emerged, including "Smallsats" and "CubeSats" Most notably, Planet Labs, a young startup company founded in 2012, launched a network of 71 suitcase-sized satellites they called a flock of "Doves." While these smallsats do not have the highest spatial resolution at 3-5 meters, they do have a high temporal frequency by virtue of having a large constellation of satellites. The Doves can capture the same place on Earth every 90 minutes (PlanetLabs, 2015). Google recently purchased the smallsat company, Skybox Imaging (Foust, 2014b). Although Skybox's SkySat-1 only has a resolution of 90 centimeters per pixel, it uniquely can take high-definition video for up to 90 second (Foust, 2014a). Skybox satellites can "clearly discern features such as the size of car windshields, road markings and car colors [and models]," but "cannot capture details as small as license plate numbers or [be used to identify] someone's face—yet" (Wanshel, 2014). To see how well people can be imaged at 90 centimeters, see the Skybox images

published in the June 2013 issue of *Wired* magazine online (Samuels, 2013) (example images may be viewed at <http://www.wired.com/2013/06/startup-skybox/>).

Today, these and other remote sensing satellites are producing high-resolution imagery of American Indian lands and resources with enough detail to permit the counting of individual trees or illegal trash dumps. Future commercial remote sensing satellites promise to observe the Earth in even greater detail. Although Worldview-3 currently produces 31-cm panchromatic imagery, their license permits 25-cm (David, 2014). DigitalGlobe is actively lobbying to change federal regulations so that they can observe down to 10 cm (Wanshel, 2014). Worldview-4 is scheduled to launch in mid-2016.

Satellite	Company	Panchromatic	Multispectral	Other Bands	Revisit Freq.
Pleiades 1A, AB	Spot Image	50 cm (19.6 in)	2-m		26 days
Worldview-2	DigitalGlobe	46 cm (18 in)	1.85-m (6 ft.)	Near-IR	1.1 days
GeoEye-1	DigitalGlobe	41 cm (16 in)	1.65-m (5.4 ft.)		< 3 days
Worldview-3	DigitalGlobe	31 cm (12 in)	1.24-m (4 ft.)	3.7 m (12 ft. 2 in.) shortwave IR; 30 m CAVIS (98 ft.)	< 1 day
Doves	Planet Labs		3 to 5-m		90 min.

Table 2. Highest-resolution commercial remote sensing satellites for civilian use in 2015.

WorldView-2 has near-infrared, while WorldView-3 also has eight-band multispectral, shortwave IR for penetrating haze, fog, dust and smoke, and 12 CAVIS (clouds, aerosols, vapors, ice, and snow) bands to map clouds, ice, and snow, and correct for aerosol and

water vapor.

Source: Digital Globe, 2015.

To complement these services, high volume data storage firms and cloud services like Amazon allow customers to find, view, select and download aerial and satellite imagery easily over the Internet at competitive prices (Baker et al., 2001). Google and Skybox, for instance, plan to create a “cloud for the Earth,” combining satellite imagery with publicly available data in a unique cloud service to compete with Amazon’s (Meyer, 2014; Wanshel, 2014). In addition, these companies will offer big data analytics, producing “algorithmically harvested” intelligence.

6.3 Tribal Concerns Raised by High-Resolution Satellite Imagery

High-resolution satellite imagery can be used to assess rangeland stocking and capacity, forest condition and yield potential, mining productivity, oil reserve capacity, and land uses, such as agriculture and development. It also can be used to assess the extent and severity of disaster, floods, wildfires, and tornado tracks. A significant amount of detail in residential, commercial and industrial land uses can be distinguished in high-resolution multispectral images (Jensen, 2000, 415-16). These images can be used to classify rangeland vegetation and to determine carrying capacity, forage and browse utilization, readiness for grazing, and the number of livestock (Lillesand and Kiefer, 2000, 247). Alternatively, they can be used to identify and measure the amount of acreage that is actively being used for crop production, as well as the amount of agricultural lands that remain dormant and presently “out-of-service.” Satellite imagery, in combination with

geographic information systems (GIS) and other spatial technologies, can be an invaluable tool for developing tribes' Integrated Resource Management Plans (IRMPs) and other key management strategies and documents (e.g., Bohnenstiehl and Tuwaletstiwa 1999, Goes In Center 2000, Rattling Leaf 2002).

However, the same image data also can be used readily by non-Tribal entities and organizations to identify environmental impacts on Indian lands, or to measure the accuracy of reported irrigation use in water adjudication cases (e.g., Pearce 1999). Outsider access to this kind of information might compromise a tribe's bargaining power when leasing lands to outsiders, as discussed in Chapter 4. For example, representatives of a non-tribal logging firm could obtain high-resolution satellite image data of Indian lands and resources, thus enabling them to determine timber resource locations, crown size and density, slope, aspect and even species distribution for 100% of the proposed timber sale. Armed with satellite imagery, in combination with the sampled cruise data provided by the Bureau of Indian Affairs (BIA) as part of the timber sale RFP, representatives from non-tribal logging firms might bid on sales more effectively than tribal representatives, who are equipped only with sampled cruise data, during the negotiation of a timber harvesting contract.

Satellite imagery also can be used in predictive modeling to detect the locations of undiscovered archaeological, burial and ancient cultural sites (e.g., He, 1995) or to assess and monitor sensitive environmental areas (Jensen, 2000, 465), and predict the locations of sensitive animal and plant communities, such as eagle habitat or the locations of

culturally significant medicinal plants and non-timber forest products. Tribes traditionally have restricted access to this kind of spatial information and data so as to prevent intrusion, vandalism, theft and inappropriate use of their natural, cultural, and religious resources (e.g., Marchand and Winchell, 1994, 50). See Chapter 4 for a review of sensitive tribal spatial datasets.

6.4 Limitations of High-Resolution Satellite Imagery

While GeoEye-1, WorldView-2, and the Doves may not quite record enough detail to identify the arrangement of individual stones in a small shrine, WorldView-3 is capable of distinguishing features such as “manholes and mailboxes.” Unless one knew what to look for, they may be hard pressed to discern sacred and archaeological sites in the first generation of high-resolution commercial satellite imagery. That may not be the case, however, in the next generation. If people are standing in an open area, such as a parking lot or open field, they can be seen in commercial satellite imagery; but it likely will be difficult to distinguish the gender and age of the individual, or to identify them.

With over fourteen years of experience as an archaeologist and GIS specialist for a tribal government, Bill Whatley, knows what to look for in terms of ancient Puebloan sites and shines. Despite this expertise, extensive experience with satellite imagery, and knowledge of the exact locations of these sites, he found it extremely difficult to find these sites within satellite imagery at 0.6-m resolution, let alone to identify details or structural features. Of course, larger structures can be discerned and multispectral imagery can be used to identify trails, agricultural fields, field house sites, and trash middens, etc., but

only if they are located within open view of the satellite and not obscured by timber over story. Ultimately, however, tribes and tribal Elders will need to determine for themselves whether high-resolution commercial satellite imagery violates their sense of private knowledge of archeological and sacred sites.

Over time, commercial high-resolution satellites, as well as emerging technologies like camera-equipped unmanned aerial vehicles (UAVs) and pervasive aerial surveillance from planes, which are technically similar to satellite image acquisition, may provide significantly better spatial, spectral, and temporal resolutions, not to mention live video. This imagery, combined with sophisticated pattern recognition algorithms and cloud services, potentially will be more intrusive to tribes' privacy, as well as their environmental and economic security. These new technologies will be discussed in Chapter 7.

Tribes may achieve benefits of these technologies, on the other hand, by negotiating access to the satellite imagery under the terms and conditions of commercial remote sensing licenses, either by going directly to the remote sensing company or by working with the Bureau of Indian Affairs (BIA), as the primary trustee of Indian tribes and Indian trust assets, to obtain imagery and data. The BIA, for example, could either leverage its collective buying power to acquire imagery at a competitive rate on behalf of the tribes and/or call upon the National Geospatial-Intelligence Agency (NGA)'s Commercial Imagery Program, which assists all federal agencies with the acquisition and use of high-resolution imagery from U.S. data providers, like Digital Globe. Under terms of the

NGA's NextView contract, the BIA, in turn, could provide this imagery to those tribes it is working with in an official capacity (NASA, 2015).

6.5 Rights of Privacy and Remotely Sensed Imagery

Over the past several decades, computers, the Internet, geographic information systems, global positioning systems (GPS), location-aware smartphones, imaging sensors, land imaging satellites, and other emerging technologies have dramatically altered our “reasonable expectation of privacy,” stretching the scope of privacy concerns beyond the original notion of a house and “curtilage.” Unfortunately, the courts, which heretofore have been ill-equipped to deal with new technologies, have been left to muddle through it. While the courts have not dealt explicitly with the issue of commercial satellite observation and privacy, scholars have examined cases involving aerial surveillance and sensory enhancing technologies to predict how the courts might approach the topic with respect to the Fourth Amendment (Geer, 1991; Steele, 1991; Kelly, 1995; Curry, 1998; Picker, 2001; McShain, 2002; Monmonier, 2002; Arbus, 2003; Heydt, 2003; B. Craig, 2007; Knoedler, 2012; Leary, 2012; Walsh, 2012; Sklansky, 2014).

6.5.1 Government Surveillance and the Fourth Amendment

The courts have oscillated between two different approaches when applying privacy rights to the conflicts new technologies generate. The first is a means-based approach, wherein the court employs the Fourth Amendment by determining whether “the actions of the government... [are] physically like those used in making a ‘traditional’ search of a

house” (Curry, 1998, 112-113; Kelly, 1995, 730; Iraola, 2002). The second approach taken by the Court is an ends-based approach, wherein the courts consider “the impact [bestowing privacy rights would have] on the values that the Constitution was designed to protect” (Curry, 1998, 112-113). The Supreme Court established a two-part test to evaluate whether Fourth Amendment rights have been violated: (1) whether “the individual has shown that ‘he seeks to preserve something as private,’” and (2) whether “the individual’s expectation [of privacy], view objectively, is justifiable under the circumstances” (e.g., *Katz v. United States*, *United States v. Knotts*).²⁷³ In other words, the Court explained, the second prong is “whether the individual’s subjective expectation of privacy is one that society is prepared to recognize as reasonable.”

The Supreme Court has typically condoned warrantless aerial searches by government entities (e.g., *Dow Chemical Company v. United States*,²⁷⁴ *California v. Ciraolo*,²⁷⁵ *Florida v. Riley*,²⁷⁶ and *United States v. Penny-Feeney*²⁷⁷). In *Ciraolo*, for example, the Supreme Court examined “whether the Fourth Amendment [was] violated by aerial observation without a warrant from an altitude of 1,000 feet of a fenced-in backyard within the curtilage of a home.” Harkening back to the Trespass Doctrine, the Court ruled that passive aerial surveillance was not physically intrusive nor did it cause hazard to

²⁷³ *United States v. Knotts*, 460 U.S. 276, 280-281 (1983), quoting *Katz v. United States*, 389 U.S. 347, 353 (1967). Available at: <http://caselaw.lp.findlaw.com/cgi-bin/getcase.pl?navby=case&court=us&vol=389&invol=347>.

²⁷⁴ *Dow Chem. Co v. United States*, 476 U.S. 227.

²⁷⁵ *California v. Ciraolo I*, 476 U.S. 207 (1986). Available at: <http://caselaw.lp.findlaw.com/cgi-bin/getcase.pl?navby=case&court=us&vol=476&invol=207>.

²⁷⁶ *Florida v. Riley*, 488 U.S. 445 (1989). Available at: <http://caselaw.lp.findlaw.com/scripts/getcase.pl?court=US&vol=488&invol=445>.

²⁷⁷ *United States v. Penny-Feeney*, 984 F.2d 1053 (U.S. Court of Appeals 9th Cir. 1993). Available at: <http://openjurist.org/984/f2d/1053/united-states-v-feeney>.

persons or property on the surface (B. Craig, 2007; Knoedler, 2012).²⁷⁸ Thus, Fourth Amendment rights to privacy were not violated. This reasoning, by analogy, also might be applied to satellite imaging.

When considering aerial surveillance, the Supreme Court has focused its inquiry on the location of the observation. Residences and areas around residences²⁷⁹ enjoy a greater expectation of privacy than commercial sites, while outdoor, “open fields” and “areas within a public vantage point” are granted little if any privacy protection. Other factors considered when determining if Fourth Amendment rights have been violated include “the level of vision-enhancement, the altitude where the search took place, the frequency and duration of the surveillance, and any precautionary measures taken by the subject to avoid a loss of privacy” (Kelly, 1995, 735; see also Steele, 1991). Knoedler (2012) provides an in-depth review of the courts’ four-step analysis for curtilage, including proximity, enclosure, intended use, and steps taken to exclude others.

Under *Open Fields* and *Plain View* doctrines, open fields and areas exposed to public view are not protected against warrantless environmental (regulatory) or law enforcement aerial surveillance. The Court reasoned that individuals do not have a “reasonable expectation of privacy,” even though an individual might go to considerable lengths to exclude others on the ground (i.e., fences, no trespassing signs, security systems and the

²⁷⁸ In addition, the U.S. Supreme Court has “limited the aerial rights of landowners,” comparing “airspace to a public highway” (B. Craig 2007).

²⁷⁹ The Supreme Court considers “the proximity of the area to the home, whether the home’s enclosure envelops the area claimed as curtilage, the use of the area, and the actions taken to restrict public observation of the area.”

like are irrelevant to aerial searches; e.g., *Dow Chemical Co. v United States, Oliver v. United States*).²⁸⁰ Aerial surveillance conducted within public navigable airspace and with vision-enhancing technology²⁸¹ in many cases has been deemed “reasonable” (e.g., Kelly, 1995; Steele, 1991). Thus, despite that tribal members’ expectations of privacy are not necessarily greater within a residence than in an “open field” (i.e., not every place of cultural or spiritual significance to tribes is enclosed within a building) (A. Warren, 2004), and despite that some tribal governments prohibit non-Indians from accessing off-highway portions of their reservations, the courts are unlikely to find these factors sufficient to prohibit government aerial or satellite surveillance.

High-resolution commercial land imaging satellites provide unprecedented surveillance capabilities. Nevertheless, the “sensory enhancement” provided by these systems may not be relevant to the courts in light of *Dow Chemical*. The color photographs at issue in *Dow* were acquired at altitudes as low as 1,200 feet, providing a considerable amount of detail. Despite the use of a high-precision camera, the Supreme Court ruled that EPA’s warrantless aerial search of the Dow Chemical plant was not prohibited by the Fourth Amendment. Finally, in *Dow Chemical* and *Riley*, the Supreme Court distinguished between aerial surveillance and satellite observation in that the former is widely available to the public while the latter is not. In dicta, the Court suggested that if it were presented

²⁸⁰ *Oliver v. United States*, 466 U.S. 170 (1984).

²⁸¹ The “mere fact that human vision is enhanced somewhat...does not give rise to constitutional problems.” *Dow Chemical*.

with a search conducted by remote sensing satellite, it might reach a different finding due to what the Court characterized as the “exotic nature” of satellite technology.²⁸²

Curry (1998, 118) and Litman (2000b) criticize the Court for taking a ‘rationalist’ approach, for looking at society as an aggregate in its determination of what is “reasonable,” and for embracing the inevitability of technological “progress.”

Gabrynowicz (1996) also underscores that “the *Dow* decisions fails to address the rapidly changing reality of sophisticated technology and limits Fourth Amendment analysis to an ever-increasing exercise in drawing lines between quantitative variables rather than protecting substantive rights.” Further, if a commercial aerial or satellite operator is not working for the government, then the issues presented in *Dow* and the Fourth Amendment, described above, may not apply. As the U.S. Supreme Court noted in *Dow*, “[s]tate tort law governing unfair competition does not define the limits of the Fourth Amendment.”²⁸³

²⁸² The Court in *Dow* stated, “[i]t may well be, as the Government concedes, that surveillance of private property by using highly sophisticated surveillance equipment not generally available to the public, such as satellite technology, might be constitutionally proscribed absent a warrant.” *Dow*, at 239. But, Justice Powell, in dissent, noted, “[t]he Court disregards the fact that photographs taken by the sophisticated camera used in this case can be significantly enlarged without loss of acuity. As explained in n. 4, supra, the technique used in taking these pictures facilitates stereoscopic examination, which provides the viewer of the photographs with depth perception. Moreover, if the photographs were taken on transparent slides, they could be projected on a large screen. These possibilities illustrate the intrusive nature of aerial surveillance ignored by the Court today. The only Fourth Amendment limitation on such surveillance under today’s decision apparently is based on the means of surveillance. The Court holds that *Dow* had no reasonable expectation of privacy from surveillance accomplished by means of a \$ 22,000 mapping camera, but that it does have a reasonable expectation of privacy from satellite surveillance and photography. This type of distinction is heretofore wholly unknown in Fourth Amendment jurisprudence.” *Dow*, N12 at 251.

²⁸³ *Dow Chemical Co. v. United States*, 476 U.S. 227 (1986) at 234.

The Supreme Courts' holding in *Kyllo v. United States* held that the use of thermal imaging, reversing three decades of established precedent on Fourth Amendment searches. In a 5-4 decision, the Supreme Court held that “where...the Government uses a device that is not in general public use, to explore details of the home that would previously have been unknowable without physical intrusion, the surveillance is a ‘search’ and is presumptively unreasonable without a warrant.”²⁸⁴ Knoedler (2012) notes this “open-ended statement creates confusion as to what new devices could be utilized for surveillance purposes, as technology is ever increasing.”

By the standard established under *Kyllo*, the courts will likely rule that government use of high-resolution commercial satellite imagery—now commonly available—would not constitute a search under the Fourth Amendment (B. Craig, 2007; Leary, 2012). In 2015, the public can easily access high-resolution satellite imagery through web-based services like Google Earth and Maps and ESRI ArcGIS Explorer Online, as well as search engine providers such as Bing and Yahoo. It is still an open question, however, whether or not we may assert a “reasonable” expectation of privacy from pervasive high-resolution satellite surveillance, or from new sensing capabilities that, in the words of the Court, would “leave the homeowner at the mercy of advancing technology—including imaging technology that could discern all human activity in the home.” Certainly, many communities around the country, not only tribes, have expressed privacy concerns regarding aerial and satellite imagery (e.g., perceived and actual increased risk of home invasions), and in some cases removed imagery from local government websites (e.g.,

²⁸⁴ *Kyllo v. United States*, 533 U.S. 27 (2001) at 40.

City of Mequon, Wisconsin, described in Shanley 2007) or stopped using it for regulatory purposes (e.g., Town of Riverhead, New York, described in Knoedler 2012).²⁸⁵ In *Kyllo*, the Court reiterated, “[t]he Fourth Amendment’s protection of the home has never been tied to measurement of the quality or quantity of information obtained... We have said that the Fourth Amendment draws ‘a firm line at the entrance to the house.’” Justice Stevens, however, dissented, arguing, “a rule that is designed to protect individuals from the overly intrusive use of sense-enhancing equipment should not be limited to a home.”

In *United States v. Jones*,²⁸⁶ the U.S. Supreme Court held that government’s use of global positioning system satellites (GPS) to track a drug-suspect’s car on public highways over time constituted a search pursuant to the Fourth Amendment. While the Court was unanimous in its decision, it split 5-4 in its reasoning. Justice Scalia, writing for the majority opinion, applied a property-based approach; the GPS transmitter physically attached to the car constituted trespass. Justice Alito, in his concurring opinion, rejected the trespass test and instead applied the “reasonable expectation of privacy” approach. Alito noted “[s]hort-term monitoring of a person’s movements on public streets accords with expectations of privacy,” although “the use of longer term GPS monitoring in investigations of most offenses impinges on expectations of privacy.” He continues:

“Prolonged surveillance reveals types of information not revealed by short-term surveillance, such as what a person does repeatedly, what he does not do, and

²⁸⁵ In 2007, the Seventh Circuit Court of Appeals commented, “should government someday decide to institute programs of mass surveillance... it will be time... to decide whether the Fourth Amendment should be interpreted to treat such surveillance as a search.” On May 7, 2015, the 2nd Circuit Court of Appeals ruled that the National Security Agency’s “sweeping surveillance” violated the USA Patriot Act. This may be a signal that it’s time for the Supreme Court to decide whether government’s use of imaging technologies for security and regulation is constitutional.

²⁸⁶ *United States v. Jones*, 132 S. Ct. 945, 556 (2012)

what he does ensemble. These types of information can each reveal more about a person than does any individual trip viewed in isolation. Repeated visits to a church, a gym, a bar, or a bookie tell a story not told by any single visit, as does one's not visiting any of these places over the course of a month. . . . A person who knows all of another's travels can deduce whether he is a weekly church goer, a heavy drinker, a regular at the gym, an unfaithful husband, an outpatient receiving medical treatment, an associate of particular individuals or political groups – and not just one such fact about a person, but all such facts.”²⁸⁷

Justice Scalia, in response, expressed frustration over the “thorny problems” introduced by the concurrence, but “he conceded that the Court would need to face those problems if it confronted a satellite monitoring case that did not involve a physically installed transmitter” (Sklansky, 2014, 953).

Justice Sotomayor, in her solo concurring opinion, emphasized “Katz's reasonable-expectation-of-privacy test augmented, but did not displace or diminish, the common-law trespassory test that preceded it.” She agreed with Alito’s assessment of expectation of privacy, but also warned that even short term monitoring could reveal private facts, including:

“trips to the psychiatrist, the plastic surgeon, the abortion clinic, the AIDS treatment center, the strip club, the criminal defense attorney, the by-the-hour motel, the union meeting, the mosque, synagogue or church, the gay bar and on and on.”

Sklansky summarizes:

“[t]he upshot of Jones is . . . that ‘reasonable expectation of privacy’ may or may not depend . . . on how long surveillance is conducted and on what kind of crime is being investigated; and that at least one Justice wants to reconsider the well-entrenched but highly unpopular assumption that information voluntarily shared with third parties loses any Fourth Amendment protection” (Sklansky, 2014).

²⁸⁷ U.S. v. Maynard, 615 F.3d 544 (U.S., D.C. Circ., C.A.)p. 562; U.S. v. Jones, 565 U.S. ___, (2012), Alito, J., concurring.

The *Jones* case raises significant issues about privacy in public. In addition, Sotomoyor's comments also elevate the concern that the most significant infringement on privacy comes not from government, but from the private sector; she states,

"People disclose the phone numbers that they dial or text to their cellular providers, the URLs that they visit and the e-mail addresses with which they correspond to their Internet service providers, and the books, groceries and medications they purchase to online retailers . . . I would not assume that all information voluntarily disclosed to some member of the public for a limited purpose is, for that reason alone, disentitled to Fourth Amendment protection."²⁸⁸

Several authors provide comprehensive analysis of *Jones* and the resulting Mosaic theory under the Fourth Amendment (Gellman, 2012a, 2012b; Kerr, 2012; Leary, 2012; Raigrodski, 2013; Sklansky, 2014; C. E. Walsh, 2012).

6.5.2 Commercial Aerial Surveillance

The United States does not have comprehensive federal privacy law. With the exception of a set of narrowly focused federal privacy laws, the private sector is largely unregulated. Although Fourth Amendment law may provide some insight into how the courts will characterize satellite surveillance by commercial operators, the courts will not introduce Fourth Amendment law when considering commercial aerial or satellite surveillance. Privacy is traditionally protected by common law torts (Friedman 2002, Gabrynowicz 1996). Craig (2007) suggests that "potential causes of action associated with online satellite and aerial images include: (1) trespass; (2) nuisance; (3) invasion of privacy; (4) strict products liability; (5) violation of 42 U.S.C. Sec. 1983; (6) patent infringement; and (7) other miscellaneous actions." Satellite imaging does not create a

²⁸⁸ United States v. Jones, 565 U.S. ___, 132 S. Ct. 945, 957 (2012) (Sotomayor, J., concurring).

nuisance nor trespass private property, he contends, but it may present an “unreasonable intrusion upon the seclusion of another.”

In 2003, the Los Angeles Superior Court considered whether commercial aerial imagery of Barbara Streisand’s Malibu residence, collected by the California Coastal Records Project²⁸⁹ and posted publicly to the Internet, “invades her right to privacy, violates the ‘anti-paparazzi’ statute, seeks to profit from her name, and threatens her security.” The court in *Streisand v. Adelman* found that Streisand did not have a reasonable expectation of privacy. Even so, the “unpublished trial court opinion [] does not carry any significant legal authority” (B. Craig, 2007). Further, Streisand had allowed a national magazine to publish photos of the interior of her home, weakening her case. The court also took into consideration that the individual taking the imagery was doing so voluntarily as a public good: documenting the erosion of the coastline.

Alternatively, trade secret law, which was addressed by the Fifth Circuit Court in *E.I. duPont deNemours & Co. v. Christopher*,²⁹⁰ might provide some recourse. In *Christopher*, DuPont sued for trade secret misappropriation after its competitors took aerial photographs of DuPont’s plant from navigable airspace. The Fifth Circuit sided with DuPont, noting “to require DuPont to put a roof over the unfinished plant to guard its secret would impose an enormous expense.” The court determined that DuPont’s

²⁸⁹ California Coastal Records Project Website, Last accessed May 23, 2015. Available at: <http://www.californiacoastline.org/> A link to the complete set of court documents can be found on this webpage.

²⁹⁰ *E.I. duPont deNemours & Co. v. Christopher*, 431 F.2d 1012 (U.S. court of Appeals 5th Cir. 1970). Available at: <http://cyber.law.harvard.edu/people/ffisher/1970%20Dupont.pdf>

security measures were reasonable, in spite of the fact that they failed to protect the facility from aerial observation.

Leary (2012, 7) specifically discusses *Jones* in the context of current and future commercial high-resolution satellite capabilities, and argues that “neither *Jones* nor *Katz* approaches respond adequately to reality.” She emphasizes that “people cannot demonstrate subjective expectations of privacy because companies like Google never afford them the opportunity to demonstrate such expectations by opting out of the imaging.” Craig (2007) concurs, noting that “privacy statements from Google, Microsoft, and others fail to put into place safeguards against those who might use satellite and aerial images for non-legitimate purposes.” Therefore, Leary contends, “[i]f no physical trespass occurs [as with satellite observations], then the trespass approach provides no protection. If no opportunity to demonstrate a privacy expectation exists, then *Katz* also fails to protect.”

6.6 Potential Strategies

Commercial high-resolution remote sensing satellites convey a wealth of detailed spatial information heretofore unobtainable by many. Some Indian tribes want to minimize the potential for outsider exploitation, manipulation and control by restricting access to this imagery and data. However, U.S. space law and policy and international customary remote sensing space law traditionally have supported open access and encouraged proactive dissemination of the information (e.g., Gabrynowicz 1999a and 1999b, Wagner

1998). Furthermore, as discussed in the previous section, it is uncertain whether U.S. courts will extend privacy protections to satellite surveillance.

Indian tribes could try to prevent the collection and distribution of high-resolution satellite imagery of their territories through political channels, but these efforts are unlikely to be effective for reasons discussed below. Even so, tribes may at least be able to acquire the same imagery themselves and learn what is being observed.

6.6.1 Is Preventing Image Gathering an Option?

Some tribal members have asked what options might be available to prevent the acquisition of satellite data and images of their territories. One suggested approach is a total prohibition of data gathering based on the precedent set by Section 1064 of the National Defense Authorization Act for Fiscal Year 1997, which prohibits U.S. commercial operators from selling satellite imagery of Israel at a better resolution than what is available from commercial sources in other countries. At the time of the bill's enactment, this meant that U.S. satellite companies could not collect or distribute 1-m resolution imagery of Israel's territories (Hanley 2000, Hardin 2000, Sietzen 2000).

Another option is contained in the 1992 Land Remote Sensing Act, which gives the U.S. Department of Commerce the legal authority to restrict the collection and distribution of commercial satellite imagery, i.e., "shutter control," "when national security, international obligations, or foreign policy interests may be compromised" (e.g., Hoversten 2001, Prober 2003). As a practical matter, identifying a U.S. national security,

international obligation or foreign policy interest that would justify imposing “shutter control” over a Tribal territory would be difficult. Moreover, a 2006 inter-agency memorandum of understanding (MOU) between the Departments of Commerce, State, Defense, Interior, and the Intelligence Community states that shutter control should be imposed for the smallest area and for the shortest time necessary (Licensing of Private Land Remote-Sensing Space Systems, 15 CFR Part 960, Final Rule). However, it also requires that “alternatives to prohibitions on collection and/or distribution of data shall be considered such as delaying the transmission or distribution of data, restricting the field of view of the system, encryption of the data if available, or other means to control the use of the data.”

Through political channels, tribes could try to achieve a similar prevention of image gathering as achieved by Israel, although such efforts are unlikely to be successful for the following reasons. First, as Florini and Dehqanzada (2001, 440) comment, “[a]lthough the law [regarding Israel] would seem to set a precedent for bilateral controls on access to satellite imagery, it is unlikely to be repeated.” Foreign satellites have achieved better resolutions, rendering the Israeli restriction on U.S. companies irrelevant. Controls, like the Wassenaar Arrangement on Export Controls for Conventional Arms and Dual-Use Goods and Technologies, are based on the assumptions that suppliers are limited and all parties will cooperate (Florini and Dehqanzada 2001). But, as demonstrated by ImageSat International, not all satellite firms will be cooperative; ImageSat International, an Israeli commercial operator, announced that it will only serve government customers and has

ceased to allow the general public to have access to its satellite and archived imagery. Thus, bilateral or multilateral agreements may not be a viable option for tribes. Second, the cost of monitoring and enforcing data and image gathering prohibitions would be astronomical, particularly as tribes would have to deal with satellite operators from a growing number of countries, including Australia, China, Brazil, France, India, Italy, Japan, and Russia.

Future prohibitions might be subject to First Amendment considerations. If the media becomes involved in covering contentious disputes between tribes and other entities, for example, conflicts over treaty rights, environmental quality standards, water rights litigation, or the protection of cultural significant sites, then the media likely would raise First Amendment objections to data and image gathering prohibitions as being a newsgathering prohibition. Finally, some would argue that the internal affairs of nations, be they tribes or other countries, should not be exempt from external accountability (e.g., Brown, 2003, 37; Harding, 2000). Collective privacy, some warn, could be employed to shield governmental abuse.

6.6.2 Is a Tribe a “Sensed State”?

Unlike aerial systems, U.S. Federal Law expressly gives nations, including the United States, guaranteed access to U.S. commercial satellite data and imagery of their territories. These guarantees are derived from long-recognized international legal principles that have been incorporated by Congress into U.S. Federal law. U.S. commercial operators are required to abide by these principles under the conditions of

their operating licenses. Notably, these principles recognize the right of satellite operators to gather and distribute data from space without the prior consent of a “sensed state.” In turn, a sensed state cannot be denied access to data and imagery of its territory. The sensing state or U.S. commercial operator must make the “unenhanced data” available at “reasonable terms and conditions” in a timely fashion.

The question then arises whether an American Indian tribe may be considered a “sensed state” for remote sensing purposes. According to Office of Commercial Remote Sensing Regulatory Affairs within the National Oceanic and Atmospheric Administration (NOAA), the definition of a “sensed state” is not provided in the United Nations Principles Relating to Remote Sensing of the Earth from Outer Space,²⁹¹ the 1992 Land Remote Sensing Policy Act (LRSPA), NOAA commercial remote sensing satellite licensing regulations, or the commercial remote sensing operator licenses (Robinson, 2011). The language in the licenses on this point is as follows:

“Subject to the terms and conditions of this License, the Licensee shall make available to the government of any country, including the United States, unenhanced data collected by the System concerning the territory under the jurisdiction of such government, as soon as such data are commercially available and on reasonable commercially terms and conditions. Upon receiving an unenhanced data request from a government seeking to exercise its rights as a “sensed state” as defined within the Act, the Licensee shall consult with NOAA” (W. Warren, 2011).

Even if a tribe was to be considered a “sensed state,” it can not require a sensing state or a U.S. commercial operator to obtain prior consent before imaging a its territories. On the other hand, if an Indian tribe is not considered a “sensed state” for the purposes of remote

²⁹¹ <http://www.un.org/documents/ga/res/41/a41r065.htm>.

sensing law, it would still be guaranteed access to imagery and data of its territory on “reasonable” terms because U.S. territory is included in the access guarantee.

That said satellite operators do not have to alert a “sensed state” that imagery of its territory has been collected. While the regulations and statutes are silent as to what triggers the obligation to make the data available, as a practical matter tribes should make “regular, consistent, formal [written requests] to the appropriate officials of sensing States and companies” (Gabrynowicz 2004). Gabrynowicz (2005, 334) notes:

“equilibrium between the technological and economic power of sensing States and the legitimate rights and interests of the sensed States still needs to be ensured...To address this concern, correct the imbalance,...sensed States can establish evidence of State practice that enhances and protects their right to access data. Just as continued satellite flight strengthens the custom that nations have the freedom to use space, continued, regular claims to data gathered from space can establish a countervailing custom that strengthens the right to access it.”

NOAA licenses require commercial high-resolution satellite operators to inform NOAA if they receive any request for unenhanced data, as per Title II of the Land Remote Sensing Policy Act of 1992 (as amended by the Commercial Space Act of 1998) (Vincent, 2004). Surprisingly, in response to an email inquiry by the author in 2004, NOAA stated “to the best of our knowledge, neither NOAA nor any company has received any such request” (Vincent, 2004). In 2011, NOAA responded again to a follow up inquiry by the author that “no ‘sensed state’ has requested or been denied imagery under the sensed state provision” (Robinson, 2011). William L. Warren, GeoEye’s Executive Vice President, General Counsel & Corporate Secretary, confirmed that as of March 2011, GeoEye had not received any requests from “sensed states” either.

Tribes, or the BIA on tribes' behalf, could make regular, consistent, formal inquiries of all remote sensing operators—foreign and American—to assess what imagery and data has been collected of their territories. In some cases, this may not be necessary.

DigitalGlobe, for example, makes their image library available for perusal on their website. Unfortunately, tribes are not legally entitled to find out who has obtained data and imagery of their territories or for what reason because it is considered confidential business information. With this information in hand, Indian tribes and the BIA could negotiate “reasonable terms and conditions” to obtain the data.

6.6.3 Application of Equity Principles

If need be, Indian tribes may be able to draw relief from equity principles to acquire the data at a reduced cost; these principles are interwoven into the 1967 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, the United Nations Principles Relating to Remote Sensing of the Earth from Outer Space, and the entire body of space law (e.g., Gabrynowicz, 1999b). Principle IV states specifically:

“These activities shall be conducted on the basis of respect for the principle of full and permanent sovereignty of all States and peoples over their own wealth and natural resources, with due regard to the rights and interests, in accordance with international law, of other States and entities under their jurisdiction. Such activities shall not be conducted in a manner detrimental to the legitimate rights and interests of the sensed State.”

Opinion is divided, however, on whether the UN Principles add to the body of international law, although certainly it is part of international custom (Christol, 1982; DeSaurssure, 1989; Williams, 2005). Von der Dunk (2013, 254) notes that Principle IV is in principle a protection of ‘privacy of states,’ but that protection is limited. It “would

have to be elaborated by means of more detailed requirements and obligations to actually give the sensed states what they were looking for—but this never transpired,” he argues. The language in the Principles—“on a non-discriminatory basis and on reasonable cost terms,” states, “clarifies that the sensed state effectively does not even have a ‘prior right’ to data concerning its own territory, let alone semi-exclusive rights, rights of access for free, or the right to prohibit generation of the data at all.” Further, he found that countries and commercial operators simply interpreted the principles as they saw fit, “without much coherence or even regard for the original intentions behind the UN Principles.” Williams (2005), citing Professor Christol, notes that “the right of the sensing State to engage in this activity without the prior consent of the sensed State remains unresolved by the Principles; however, [Christol] feels it is perhaps too late now to impose treaty restraints on those practices” (Williams, 2005). Williams suggests that States may be amenable to non-binding “codes of conduct that could be enshrined in United Nations Assembly Resolutions.”

Black’s Law Dictionary defines “equity” as: “(1) fairness; (2) the body of principles constituting what is fair and right; (3) the recourse to principles of justice to correct or supplement the law as applied to particular circumstances.” Equity, for instance, was applied by the district court in *Cobell v. Norton*.²⁹² The D.C. Circuit Court stated, “[t]he district court then, retains substantial latitude, much more so than in the typical agency case, to fashion an equitable remedy because the underlying lawsuit is both an Indian case and a trust case in which the trustees have egregiously breached their fiduciary

²⁹² *Cobell v. Norton*, 310 F.Supp. 2d 77 (D.D.C. 2004).

duties.”²⁹³ Albeit, the D.C. Circuit determined that the district court had overstepped this discretion (Gidiere 2013, 159). It also should be noted that DigitalGlobe is already voluntarily providing its data and imagery to tribes under civil government licensing arrangements.

6.7 Discussion

Although not an ideal solution, tribes may, in part, mitigate the privacy risks presented by high-resolution satellite imagery by developing robust GIS and remote sensing capabilities within tribal governments. These programs can maximize the use of the high-resolution satellite data to increase the accuracy and effectiveness of a tribe’s ability to manage its own lands and resources or to counter any unwarranted assertions about their lands by outsiders. As Meyers (1993, 37) affirms, a “tribe is its own best advocate, and as situations involving negotiations with government agencies arise... advanced technology will allow the tribe to assume a leading role in negotiations and management decisions;” these new technologies, she states, may “allow the tribe a greater measure of control in its own destiny.”

6.7.1 Acquiring Data and Imagery

In summary, tribes and the BIA could make regular, consistent, formal inquiries of all remote sensing operators to assess what imagery and data has been collected on the territory under their jurisdiction. Then, tribes and the BIA could negotiate “reasonable

²⁹³ Cobell v. Norton, 391 F.3d 251, 257-58 (D.C. Cir. 2004).

terms and conditions” to obtain the data and imagery in a timely fashion, if so desired, potentially at a reduced cost or free of charge.

6.7.2 Benefits of Remotely Sensed Imagery

For over a decade, William Whatley had the privilege of directing a tribal-based GIS and natural resource management program for an extremely traditional and conservative tribe located in the Southwestern United States. This tribe appoints Tribal Council members, who hold their positions for life. Many of the tribe’s secular and traditional leaders had not received a significant amount of “organized public education,” even though most were wise and extremely knowledgeable about their lands, resources and culture. As a result, technical proposals and reports often ended up on shelves because they were not appropriate for use by such a traditional society. The technical maps, he said, were often confusing and the tables of data were meaningless and stale.

High-resolution satellite imagery, however, provided an ideal means of conveying project information. Tribal leaders could see their own homes, fields or the meadow where they shot a large buck the previous year. By overlaying GIS data on to the satellite imagery, tribal leaders readily became “georeferenced” and more involved in the decision making process. Without it, they would not have been comfortable in contributing their valuable knowledge and wisdom. As a result, this foreboding technology was transformed into a “comfort technology” that enabled input that would have been excluded previously.

Furthermore, one of the most strategic applications of high-resolution satellite imagery is its ability to equip tribal leaders with detailed information regarding the lands and resources of neighboring entities. In short, not only can the high-resolution satellite image data capture valuable information about the resources located on tribal lands, it can just as easily be used to capture the same information about the resources located on lands neighboring a reservation. This type of application can be especially important if the adjacent lands constitute a tribe's "ancestral domain" and as such, contain sacred sites, traditional hunting grounds or traditional resource gathering areas. Some tribes already are using high-resolution imagery effectively to strengthen their management influence over "off-reservation" ancestral lands, such as those presently administered by the U.S. Forest Service (USFS). One such example is the Warm Springs' Geo Vision program, which has assumed a proactive role in managing wildfire and other resource impacts on ancestral lands.

More importantly, with high-resolution imagery in hand, tribal leaders may sit with confidence at the negotiating table, even when it is the BIA seated across from them. In some circumstances, tribes are better equipped with data and imagery than their federal counterparts. Having such imagery would allow tribes to check the management activities and compliance of the BIA, as well as other federal agencies. For example, a tribal GIS program using high-resolution satellite imagery can determine the geo-spatial impacts of BIA sponsored projects on tribal lands to determine whether the "reported impacts" are accurate, or whether they are in error. This type of application can be valuable for determining whether a tribe has been granted adequate compensation for the use of its

trust resources, such as timber or sand and gravel. Likewise, high-resolution satellite imagery can be used for monitoring and/or capturing resource information from fee-simple in-holdings located within a reservation boundary. This type of application could be valuable for the conduct of environmental assessments or for determining encroachment upon tribal trust lands.

6.8 Summary

Numerous tribes and tribal programs have adopted high-resolution satellite imagery within their GIS departments for resource and land use planning, and the benefits have been mostly positive; it has equipped them with a useful tool to map, assess and manage their lands and resources. As it would appear that U.S. law is unlikely to provide tribes any significant protection from satellite surveillance, understanding what can and cannot be detected may be a useful starting defense to mitigate some of the risk, and may build some technical capacity useful to tribes for other purposes.

Over time, higher resolution satellites and other imaging capabilities will be able to discern smaller objects, and in fact, modeling already allows one to identify the potential locations of cultural and archaeological sites. The implications of emerging sensing technologies, such as drones, will be discussed in Chapter 7.

7. ALTERNATIVE APPROACHES AND TRADE-OFFS

Ownership, control of and access to tribal spatial information and data are long-standing issues for American Indian tribes in the United States. Federal court decisions, federal policies and regulations that promote open government, the sophisticated data integration and analysis capacity of GIS software, and advances in satellite remote sensing have brought these concerns to the forefront. Fundamental issues are at stake, including Indian tribes' rights and interests in their information and resources, federal agencies' authority and decision-making processes that affect those resources, and the public's right to know. The incorporation of tribal expertise and data into federal environmental planning and policy formulation is critical if tribes' rights and interests are to be protected. If federal agencies and other cooperating organizations are unable to guarantee confidentiality, however, tribes will be reluctant to share this information. In turn, the federal government's ability to perform its trust obligation will be impeded, and tribes' rights and interests may be abrogated.

Due to cultural, historical, and spiritual differences, American Indian tribes in the United States may treat information and spatial data access and sharing differently than the dominant society. Moreover, tribal members expectations of privacy may differ from what is considered "reasonable" by the federal courts. They may expect privacy in public, as places of cultural or spiritual significance are often in "open fields." tribes are concerned about the misuse of their spatial information and data for several reasons, including: infringement on individual and collective privacy; inappropriate release of

confidential or sensitive information; misappropriation of intellectual property/cultural property and its use for commercial gain; misinterpretation or discrediting of cultural practices; the financial impact on tribal enterprises and lease negotiations; abrogation of treaty rights and interests; abrogation of rights and sovereign authority to independently regulate activities on a tribe's lands; and, the impact on the trust relationship with the federal government.

Many kinds of tribal spatial data may be considered sensitive. Most recognize that locations and information about sacred sites and cultural resources, such as traditional place names, gathering areas, ceremonial trails, shrines, and burials, are highly sensitive. Endangered and threatened species data also are considered sensitive by tribes, as well as by many other organizations. On the other hand, most non-Indians do not realize that tribal spatial data about land parcel boundaries and ownership status, reservation boundaries, water availability and quality, oil and gas resources, mineral resources, rangeland and forest resources, and other environmental datasets may be considered equally sensitive by tribal governments. Unwanted access to spatial data by third parties, as demonstrated in Chapter 4, not only may intrude on the privacy of tribal members, individually and collectively, but also may abrogate a tribal government's treaty rights and interests, weaken its sovereign authority to regulate and enforce its own laws, and diminish its economic viability.

Tribes share their information and spatial data with the federal government as part of their day-to-day operations under federal compacts, contracts, and cooperative

agreements, as part of the consultation process, and in preparation for litigation. Tribal information and spatial data, when shared with the federal government, is not necessarily protected from public disclosure under the Freedom of Information Act (FOIA), as examined in Chapter 5. The U.S. Supreme Court in *Klamath Water Users* held that an “Indian trust exemption” does not exist. Further, if this data forms the basis of a government policy, regulation or other action, it will be made accessible for public and judicial review. Spatial data about tribal lands and resources also may be released to the public as part of the discovery process during litigation.

In order to gain greater protections from unwanted access to and misuse of their spatial information and data, Indian tribes and their members would benefit from pursuing a multi-pronged approach. No single approach will be sufficient. The potential outcomes of these approaches may be evaluated using a number of criteria (or values), foremost of which is the effectiveness with which the approach mitigates the misuse of tribal spatial data. Other values that could be considered include protecting or securing sovereignty, trust, cultural integrity, religious freedom, privacy and security, equity and fairness, federal and tribal governments’ accountability, freedom of speech, and political viability. Each tribe will need to determine for itself the values it wants to uphold with respect to spatial data access and use, and the approaches that best fit those values. For the purposes of this document, I focus on the primary goal—protection from unwanted access or misuse—and assume that this is a necessary precursor to these outcomes.

In addition to the legal approaches discussed in previous chapters and summarized in sections 7.1.1-7.1.4, tribes could use administrative mechanisms (section 7.1.2), policy changes (sections 7.1.5-7.1.6), and ethical best practices (section 7.2) to protect sensitive information. Technical approaches that may enhance information security are discussed briefly in section 7.2, although these are mostly designed to prevent leakage, theft, or corruption of data, not sanctioned access. Section 7.4 examines the tradeoffs tribe's face in protecting sensitive information, focusing on the potential benefits of tribal government transparency. Section 7.5 concludes with a brief discussion on emerging spatial technologies and their potential implications for tribes.

7.1 Policy Options

Through tribal community input, tribes could (a) develop general criteria to assess the sensitivity of information and spatial data, which would apply regardless of the technology used; (b) use that criteria to identify the most sensitive and valuable information to be protected; and (3) enact tribal ordinances that appropriately specify what information is to be made public and what is to be kept confidential. Tribes also may wish to assert copyright in their spatial databases, in combination with contracts and licensing, terms of use, and digital rights management, as appropriate. Concomitantly, tribes may develop and implement administrative best practices, policies and standard operating procedures for handling sensitive spatial data and imagery. Developing codes of ethical conduct and training are equally important tools.

On a national scale, tribes may wish to consider proposing an amendment to the Freedom of Information Act exempting particularly sensitive tribal information and data, although this was attempted in the mid-to-late 1970s and again in 2004. When considering using outside funding for the creation and maintenance of tribal spatial data, tribes may want to carefully assess the associated data access policies, procedures, and regulations, particularly for federal grants, contracts and cooperative agreements. In addition, tribes may want to be cautious about creating spatial data in collaboration with federally funded research organizations if the data may be subject to public disclosure under OMB Circular 110, as discussed in Chapter 5.

Further, U.S. law is unlikely to provide tribes with any significant protection from satellite surveillance, based on the analysis of U.S. and international space law provided in Chapter 6. However, understanding what can and cannot be detected may be a useful starting defense. Tribes and the BIA could make regular, consistent, formal inquiries of all remote sensing operators to assess what imagery and data has been collected on the territory under their jurisdiction. Then, Indian tribes and the BIA could negotiate “reasonable terms and conditions” to obtain the data and imagery in a timely fashion, if so desired, potentially at a reduced cost.

7.1.1 Tribal Freedom of Information and Privacy Statutes

In order to control access to tribal information and spatial data, tribes could exercise their sovereignty by enacting tribal “freedom of information” (or “records management”) and

privacy laws, just as states do. State open records laws, which do not apply to tribes (Saharko, 2006), differ somewhat from the federal Freedom of Information Act. In general, state laws give state and local governments more leeway in withholding specific government records. Maine, for instance, lists as many as 20 exceptions to its Freedom of Information Law (Onsrud, 2001). In addition, Perritt (2001, 741) comments that “state court interpretation of similar language in such state statutes [is not] necessarily the same as federal court interpretation of FOIA.” Similarly, tribes may craft and tribal courts may interpret their own freedom of information laws differently than state and federal governments (Kemper, 2014). In *Navajo Nation v. Crockett* (No. SC-CV-14-94, 1996), for example, the Navajo Supreme Court evaluated “whether tribal employees had been ‘fired for copying and removing’ certain documents, among other issues” under Navajo common law (Kemper, 2014). The Court applied the traditional Navajo principles of respect, “avoiding harm to others,” and “freedom with responsibility” to the case, holding, in part:

“The documents distributed at the meeting were never made public or put in the ‘wrong hands,’ nor was there evidence of disruption or disharmony in the office as a result...[the] interest to not disclose demoralizing or disruptive information is not an adequate interest to outweigh an individual’s right to free speech.”

Fletcher (2005) analyzes tribal court jurisprudence and constitutional law with respect to balancing free speech and restrictions on sharing tribal biological knowledge. Peladeau (1994), writing in the context of First Nations in Canada, also recommends the adoption of tribal data protection codes and fair information practices as a necessary step towards self-government.

Some tribes have incorporated code that addresses “Freedom of Information” into their Constitutions and By-Laws (e.g., Constitution and By-Laws of the Oglala Sioux tribes and the Pine Ridge Indian Reservation of South Dakota, Cherokee Nation of Oklahoma).²⁹⁴ Other tribes have passed statutes or resolutions, such as the Cherokee Nation Freedom of Information and Rights of Privacy Act and the Oneida Nation Records Management Law (Resolution #BC-8-30-95-D). Generally, these statutes declare that the federal FOIA and state open records laws do not apply to tribal government records, and specify what tribal information and data are to be made available strictly to enrolled tribal members, or to the public, and specify what is to be kept confidential. For example, the Tulalip tribes of Washington’s zoning ordinance states that “[a] map indicating the location of sites that are confidential and known only to Tribal members shall also be held by the Tulalip Tribes, subject only to [closed-door] review by the Planning Commission, Board of Directors or Tribal Court in the event of appeals.” Other tribes have found this a difficult issue around which to build consensus.

Lewerenz (2008) describes the “constitutional crisis” that led to the enactment of the Cherokee Freedom of Information Act in 2001, including a contested election and possible criminal wrongdoing by tribal government officials. The act ensures timely access to government records for *enrolled Cherokee tribal members*, but not the general

²⁹⁴ For example, Oglala Sioux Tribe, Ch. 21 Law & Order Code, Ch. 20 - Records Management, Ch. 21 – Freedom of Information, and the Oglala Sioux Tribe Water Quality Management Code Chapter 1, Part 1, 1-1-103. Public and Confidential Records; Cherokee Freedom of Information Act of 2001, The Cherokee Code: Published by Order of the Tribal Council of the Eastern Band of Cherokee Indians, Ch. 70 – Skeletal Remains and Burial Site Preservation, Division 2: Tribal Historic Preservation Office, Sec. 70-202. Registry [of historic properties locations]; Skokomish Tribal Code Tribal Records and Freedom Of Information Act (Reserved) S.T.C. 2.09; Susanville Indian Rancheria Constitution and Bylaws, Bylaws Article I – Rights of Members, Section 2 – Right to Review [tribal and financial records]; and Tulalip Tribe of Washington Codes and Regulations, Ordinance 80 - Tulalip Zoning 24.4 Confidentiality. For these and other tribal codes, see www.narf.org.

public. It identifies a small set of exemptions, and penalizes officials for “willfully and maliciously” failing to comply. Lewerenz (2008) cautions, however, that:

“in 2006, citing the Privileges and Immunities Clause of the U.S. Constitution, the Third U.S. Circuit court of appeals upheld a ruling that allowed out-of-state residents to seek government records in Delaware, even though that state’s open-records law limited access to citizens in Delaware.²⁹⁵ As a result, it is unlikely that any state will be allowed to limit access to government records only to its citizens. Although the U.S. Supreme court has found that federal law requires states to extend full faith and credit to the government acts, such as issuing marriage licenses and vehicle tags, of tribal governments, it is unclear whether the Court could require tribal governments to serve requests from nonmembers under the Privileges and Immunities Clause. It is, therefore, unclear whether any court could force the Cherokee [or other tribes] to make [tribal government] records available to nonmembers.”

Arguably, non-Indian employees and non-Indian residents on fee lands within reservation boundaries may be impacted by tribal government decision-making, and thus have an interest in obtaining copies of records.

Tribes also may want to consider developing a Uniform Law regime for information and spatial data access and protection. The Uniform Law Commission (ULC) provides states with non-partisan, well-drafted legislation that brings stability among the laws of the states. The ULC has handled tribal uniform law issues in the past, including the Model Tribal Secured Transaction Act and Model Tribal Probate Code, and has broad experience in developing information practice and privacy laws among the states. Given the inherent conflicts of interest between tribes and ULC, however, tribes could instead work through tribal organizations, such as the Native American Rights Fund, the Tribal Law and Policy Institute (Tribal Court Clearinghouse)²⁹⁶ and the National Congress of

²⁹⁵ Lee v. Minner, 458 F.3d 194 (3d Cir. 2006)

²⁹⁶ Tribal Court Clearinghouse <http://www.tribal-institute.org/>

American Indians, to collaboratively develop a model tribal freedom of information law, privacy law, and regulations. Each tribe then could choose to customize and adopt the model law as appropriate to meet their specific needs.²⁹⁷

Establishing records management and privacy statutes gives tribes more control over their information and spatial data. Tribal open records laws, like state open records laws, do not necessarily prevent the release of tribal information and spatial data if it is shared with the federal government. However, they do demonstrate a tribe's intent and effort to keep their information confidential for the purposes of FOIA exemption 4.

7.1.2 Data Handling Policies and Practices

The Tribal Council, Elders, tribal departments, organizations, and the community as a whole should be engaged in the decision-making process about what information and spatial data is considered sensitive, and how that data should be handled and protected. Some tribal GIS coordinators have taken 2-3 years to conduct this evaluation process, meeting with several tribal groups and listening to individual tribal members interests and concerns at tribal events, ceremonies, and meetings.

A few organizations have proposed guidelines for balancing access to spatial data with respect to privacy, security, and proprietary concerns, most notably the Federal Geographic Data Committee's (FGDC) *Guidelines for Providing appropriate Access to*

²⁹⁷ Onsrud (2015) notes that “[w]hile some legal instrument standardization has caused problems in the area of widespread handling of information (e.g., standard click licenses resulting in weakened bargaining positions and few choices for negotiation by public and university libraries), other legal instrument standardization has resulted in legal solutions for widespread handling of information (e.g., Creative Commons licenses and the infrastructure supporting their use).”

Spatial Data in Response to Security Concerns (FGDC, 2005), the RAND Corporation's *Mapping the Risks: Assessing the Homeland Security Implications of Publicly Available Spatial Information* (Baker et al., 2004), the Minnesota Governor's Council on Geographic Information's *Making the Most of Geospatial Data Exchange: A Guide for Data Distribution* (CGI, 2003), and the Open Data Consortium Project's *Model Data Distribution Policy* (Joffee, 2005). Each of these documents provides a step-by-step process for creating a spatial data policy, including questions to be considered and a decision tree. These could be adapted, as appropriate, in the development of tribal data policy and data handling procedures and protocols.

Data policies, for example, will need to address data ownership, what data is publicly accessible and what is to be kept confidential, who may access the data (e.g., restricted to certain individuals, tribal members, the general public), privacy and security restrictions, terms of use, data distribution and limitations, and disclaimer of liability. In establishing what spatial data should be safeguarded, tribes may wish to adapt the three criteria proposed by the FGDC (2005) for their own purposes:

- Risk to security: What are potential risks of disclosing the spatial data to the tribe's sovereignty, treaty rights and interests, cultural integrity, privacy, sacred and cultural sites, social and economic well-being, etc.?
- Uniqueness of the information: "If the data contain information that pose a [] risk, is this sensitive information difficult to observe and not available from open sources?"
- Net benefit of disseminating data: "If the sensitive information poses a risk and is unique to the geospatial data, do the [risks] of disseminating the data outweigh the [] benefits of data dissemination?"

If the spatial data contains sensitive information, it may be modified or redacted before being released, or it can be withheld (and if warranted, outdated or misinformation may be provided).

An “information steward” and oversight body, such as the tribe’s law office, could be assigned to handle outside requests for tribal information and data (e.g., from local, state or federal agencies, private sector). When a request is received, the tribal government agency may alert the information steward, who then forwards the request to tribal law office for review. The tribal law office makes a recommendation regarding whether or not to disclose the spatial data, or some portion thereof, to a Tribal Secretary or similar designate within tribal leadership for review. The tribal agency is then notified in writing of the final decision. Having a designated information steward prevents outside parties from calling multiple offices in order to find the one office willing to release the sensitive tribal data. This approach, however, may not be appropriate for some tribes, which may be reluctant to establish more rules and regulations. It also may negatively impact traditional ways of information exchange, particularly for oral histories, and information and places of religious and cultural significance shared by elders.

A few articles and guidebooks describe in general terms various means of protecting the traditional knowledge and intellectual property of indigenous peoples (Jefferson Fox et al., 2005; Rambaldi et al., 2006; Tobias, 2000), and specifically for protecting health data, genetic resources and biopiracy (FNIGC, 2014, 2015; Schnarch, 2004; Tobias, 2000; Emery, 2000; Hansen and VanFleet, 2003). These documents offer best practices procedures and protocols for data handling, and encourage the implementation of

professional codes of ethics. Of note, the First Nations Principles of OCAP (ownership, control, access, and possession) provides guidance for decision-making with regards to “why, how, and by whom information is collected, used or shared.” The First Nations Information Governance Centre states, “[t]he right of First Nations to own, control, access, and possess information about their peoples is fundamentally tied to self-determination and to the preservation and development of their culture” (FNIGC, 2015). The OCAP website (<http://fnigc.ca/ocap.html>) provides video tutorials, as well as guidance materials on ethical data collection, control, and access protocols (FNIGC, 2014), as does the Participatory GIS Network website (<http://www.ppgis.net/code.htm>).

Four years after developing a data access policy in collaboration with GIS Coordinator from two tribal governments, as discussed in Chapter 2, I asked them to assess the effectiveness of the policy, and share any challenges they faced in implementing it. Only one of the two tribes formally adopted the policy as a statute. Overall, their GIS coordinator indicated the strengths of the policy outweighed any weakness. He felt the policy provided “clearly defined access” at four levels: public, restricted, confidential, and classified. The employee training and code of conduct informed employees of their ethical responsibilities with respect to data handling, and gentle reminders were needed only occasionally. Requiring contractors and university researchers (e.g., bark beetle and soil data) to agree to sign a data license agreement and follow strict terms of use has “been very beneficial for putting everyone on the same page.”

The tribe initially had envisioned having a “tribal information steward” to oversee access to all tribal information and data, but this position transformed into more of a public

relations role. It's a bit fuzzy, he said, especially in the tribal community system where there are "politics and families involved." He noted that while this may not be as efficient, it is more in line with traditional information sharing practices. Further, with more than 60 installations of GIS across the tribal departments, his office sometimes finds it difficult to keep track of tribal staff's GIS activities ("Fisheries, Forestry, Planning, Everywhere!"). His office continually needs to remind other departments, employees, and new staff of the data policy. Tribal departments also may have different opinions about how to classify the spatial data's level of access, but there is no clear line of enforcement. The data policy, he says, "states that there is disciplinary action but the IT department does not have authority over a fisheries biologist. So far, this hasn't been a huge problem."

7.1.3 Ownership, Contracts and Licensing

As discussed in Chapter 5, the "thin" copyright protection for tribal spatial databases may be bolstered if used in conjunction with copyright-like controls, such as contracts, end-user license agreements, terms of use, and if appropriate, pricing and royalties for use of the data. Tribes may use these tools to assign ownership, restrict access to and dissemination of spatial data, specify how the data may be used and by whom, and establish enforcement mechanisms and remedies. If a tribe hires a contractor, for example, to build a GIS database or conduct a GIS-related project, the contract should assign ownership to the tribe for all materials shared by or produced for the tribe as part of the contract. For example, contract language could include:

All contractor services and work products produced pursuant to this contract is work for hire. All original work product, intellectual property, information

gathered, analyzed, produced or otherwise gained by the contractor under this contract is the exclusive property of the [tribe]. The [tribe] shall hold unrestricted authority to publish disclose, distribute, and otherwise use, in whole or part. The contractor waives any and all rights relating to the original work product created pursuant to the contract, including without limitation, any and all rights arising under 17 U.S.C. Sec 106A or any other rights or identification of authorship or rights of approval, restriction or limitation on use of subsequent modifications.

In addition, the contract should stipulate confidentiality requirements, such as:

The contractor shall perpetually keep all information and work products collected, compiled or generated from this contract confidential and shall not discuss or disclose the subject or products of this contract to a third party without the prior express written permission of [the tribe].

All [tribe] designated confidential reports, information or data given to or prepared or assembled by the contractor under this contract shall not be made available to any individual or organization by the contractor without the prior written approval of the [tribe Council] or their designee.

Contracts also should specify that contractors would not hold an interest or acquire an interest, direct or indirect, which could conflict in any degree with the performance of services, nor hire a sub-contractor without the express permission of the tribe.

End user licenses may grant to the user a “revocable, nonexclusive and nontransferable license to use the [tribe’s] digital data listed.” The license, if so desired, may prohibit users from downloading, storing, reproducing, transmitting, displaying, copying, or distributing the information. For example, a limited license may allow an individual (or contractor) the opportunity to use tribal spatial data for a specified period of time and purpose to complete a project, but prohibit:

“any unauthorized data disclosure to a third party, including transfer, possession of any copy, modification, or portion of the data to another party. The contractor shall be responsible for all direct and consequential damages resulting from unauthorized data disclosure to third parties.”

In addition, terms may prohibit outsiders from using the spatial data commercially, or prevent users from extracting data for purposes other than originally intended—e.g., derivative works (LaFrance, 2011; Scassa et al., 2012). At the end of a project or grant, all digital and hard copy data should be transferred to the tribe for sole ownership, and deleted from the other entity's system.

One way to prevent tribal spatial data from being redistributed by tribal members to outside parties is to require that all data recipients sign a data license agreement that restricts data redistribution; however, this may require more bureaucratic overhead, for example, in working with the lawyers to develop the agreement and in taking time to explain the agreement to tribal members. It also may be politically controversial and difficult to track and enforce.

In combination with licensing, tribes can use digital rights management (DRM) technologies to protect their spatial data. The Open Geospatial Consortium defines DRM as “a technology for describing, identifying, trading, protecting, monitoring and tracking all forms of rights usages over both tangible and intangible information assets including management of rights-holders relationships.”²⁹⁸ In essence, a copyright holder may “place a digital ‘fence’ around any data provided the requester” (Thomas, 2011), thereby preventing the copying and redistribution of their work through technological measures. The Digital Millennium Copyright Act (DMCA) of 1998 prohibits the circumvention of DRM technologies used to protect copyrighted works from unauthorized use. However, DMCA exempts libraries, archives, and educational institutions. It also does not prohibit

²⁹⁸ OGC Webpage, accessed May 25, 2015. Available at: <http://www.opengeospatial.org/pressroom/pressreleases/383>

fair use (LaFrance, 2011). The Federal Geographic Data Committee provides guidance on Digital Rights Management for geospatial data (FGDC, OGC, & GeoData Alliance, 2006).

For more sensitive data, a strong license could require special handling, such as storing the data in a locked safe or on a computer that is not connected to the Internet. Terms also could require that data users work only in a supervised room, designated specifically for that purpose. For the most sensitive information, it may not even be appropriate to record or map it. As one Tribal Historic Preservation Officer instructed me, some information only may be committed to memory.

Tribes potentially could limit federal agency control over tribal spatial data for the purposes of FOIA, in part, by demonstrating that the information is routinely kept confidential through contracts and licensing wherein ownership and control remains with the tribes. The argument that tribal spatial data is confidential business information for the purposes of FOIA perhaps may be strengthened if created and maintained by a tribal corporation, rather than the tribal government. Nevertheless, these strategies may not provide ironclad protection from public access under FOIA and other federal statutes and regulations, as discussed in Chapter 5. It is a matter of debate whether contract or license restrictions placed on factual data may be pre-empted by the Copyright Act. Federal copyright law preempts any state [or tribal] law that may create equivalent rights (Title 17, U.S. Code, section 301). Thomas (2011) notes, however, that “[a]lthough some courts have refused to enforce contracts that provide copyright-like protection to facts or unoriginal databases in the belief that the Copyright Act preempts such contracts, the

majority view appears to be that such contractual clauses are not preempted and are enforceable.” However, as Lum (1999) points out, federal administrative rule-making will not exempt disclosure and confidentiality agreements may not withstand judicial scrutiny under FOIA. Finally, using contracts and license agreements may lead to increased overhead and a cumbersome bureaucracy as these agreements will need to be negotiated and enforced. In practice, it may be useful for tribes to use several such mechanisms to form multi-layered protection.

On the flip side, tribes should pay close attention to the licensing and terms of use of the software and mobile apps they use to generate, map and visualize their spatial data.

Scassa et al. (2012), for instance, warns:

“the standard Google license provides that while IP rights in information layered upon Google service such as Map Maker remains with the contributor, the company holds an irrevocable worldwide license to use or disseminate the information, and to create derivative works based on the information.”

Critics also have complained that these commercial mapping platforms may allow companies to in some ways profit from the local knowledge of communities (Meier, 2012; Scassa et al., 2012).

7.1.4 FOIA Exemptions

While the Obama Administration has taken steps towards ensuring the federal government meets its trust responsibility consistently across all federal agencies, as discussed in Chapter 3, it has not taken specific steps towards reforms that would protect tribal information and spatial data under FOIA. Further, in *Klamath Water Users Protective*, the United States Supreme Court declined to recognize an “Indian trust

responsibility” exception to FOIA. In light of this, both the Bureau of Indian Affairs and U.S. Environmental Protection Agency, as well as other agencies, warn that if tribes do not want to risk having their spatial data publicly disclosed under FOIA, then they should not share it with the federal government nor accept federal funding for the data’s creation.

When tribal spatial data is created in whole, or in part, with federal funding, disclosure may hinge on the role of the data creator (e.g., government consultant, self-interested party seeking a government benefit), the data ownership and sharing requirements of the funding mechanism (e.g., Clean Water Act grant data sharing requirements), or on the purpose for which the data is created or used (e.g., litigation, public decision-making). If, on the other hand, the spatial data is created entirely with tribal government funding but shared with the federal government, public disclosure may turn on whether the tribe routinely keeps the information confidential (e.g., through tribal statute, contracts and licensing), whether the spatial data can be classified as confidential business information (CBI) for the purposes of FOIA, and how the tribe has shared it with the federal government (e.g., voluntarily, involuntarily, “on loan”). The courts and federal regulations, unfortunately, have not always provided clear or consistent answers to these issues.

A federal agency may control a record for the purposes of FOIA if it has been submitted in the course of official business by a tribal government or other entity, although physical possession is not a guarantee of control. Alternatively, an agency also may have “constructive control” of the record—meaning that under certain circumstances, such as

under certain federal grants and contracts, an agency can require that a tribe or other private entity provide the record at any time without further consent. Tribes could consider providing federal agencies access to view their spatial data through a password protected web-mapping service, with the data physical stored on tribal servers. However, according to the D.C. Circuit control over a record also may be established based on “the extent to which agency personnel have read or relied upon the record.”

Based on *Klamath Water Users*, it is unlikely, although not impossible, that tribal spatial data can be protected from public disclosure under FOIA Exemption 5. Yet, other exemptions may be applicable. Exemption 3 may provide limited protections for information covered under specific statutes, like National Historic Preservation Act (NHPA), Archaeological Resource Protection Act (ARPA), and the Indian Mineral Development Act (IMDA). Exemption 6 covers systems of records for which the privacy of individual tribal members may be at issue.

Exemption 4 protects trade secrets and confidential business information. Tribal governments may demonstrate that spatial data is confidential through passage of tribal records management/open records laws that exempt sensitive data, data handling policies and protocols, and contracts and licensing agreements. When the tribe shares its information and spatial data with a federal agency, it should clearly mark it as confidential; while this may be problematic for spatial databases, the confidentiality of the information certainly should be mentioned in the metadata. Information related to tribal water rights and land leases, as discussed in Chapter 5, have been deemed commercial in nature for the purposes of Exemption 4. Mann (2005) highlights, however,

that for some types of information, it may be difficult to demonstrate the information was kept secret if “collectively held” by the tribe and “handed down from generation to generation.” In addition, if the spatial data is publicly available elsewhere, such as a county government, it will be difficult to defend a claim of confidentiality.

Ultimately, the nine exemptions are discretionary. Even if an agency determines that a record falls within one of these categories, an agency may still decide to release a tribe’s spatial data. As Gidiere (2013, 334) notes, FOIA “does not provide a cause of action for improper release, only improper withholding.”²⁹⁹ Instead, tribes may challenge a release of confidential business information through a “reverse FOIA” action under the Administrative Procedures Act (APA). Gidiere (2013, 334-346) provides a useful review of the reverse FOIA action, as well as the environmental and natural resource statutes that specifically address confidential business information, such as the Toxic Substances Control Act.³⁰⁰

The courts, as well as the Obama Administration’s Open Government directives, emphasize a narrow interpretation of the nine exemptions in favor disclosure (Gidiere, 2013; Obama, 2009a; Obama, 2009b). Thus, when considering using outside funding for the creation and maintenance of tribal spatial data, tribes should carefully assess the associated data access policies, procedures, or regulations, particularly for federal grants, contracts and cooperative agreements. In addition, tribes should be cautious about creating spatial data in collaboration with federally funded research organizations, if the

²⁹⁹ Campaign for Family Farms v. Glickman, 200 F.3d 1180, 1184-85 (8th Cir. 2000)

³⁰⁰ Toxic Substances Control Act (15 U.S.C. Sec. 2613)

data may be subject to public disclosure under OMB Circular 110, as described in Chapter 5.

7.1.5 FOIA Amendment

Under the Trust reform movement sparked by the *Cobell v. Norton* litigation, the Native American Rights Fund (NARF), the United South and Eastern Tribes Incorporated (USET), and other tribal organizations, potentially could revive efforts to amend FOIA to protect federal government-held tribal information and spatial data. The United South and Eastern Tribes Incorporated, an inter-tribal organization with 26 federally recognized Tribal Nations, demonstrated support for this idea by passing Resolution No. 2003:016 *Confidentiality of Tribal Communications*, which states:

“the Klamath decision denies the United States the ability to use the FOIA to shield from public disclosure privileged information shared within the U.S. –Indian trust relationship. Therefore, be it resolved that the USET Board of Directors call upon Congress to correct the ruling in Klamath by affirming that the United States shall keep confidential any communication between it and any Indian or Indian nation.”

The question then becomes: what tribal information should be protected? Several scholars have weighed in on this question. Royster (2006), for example, recommends that Congress enact an Indian trust exemption specifically to

“protect information exchanged between the federal government and an Indian tribe in connection with or in anticipation of litigation or settlement negotiations. Confidential commercial or financial information is already protected under Exemption 4, but the same protection should surely extend to legal theories, analyses, and strategies. The federal trust responsibility must extend to legal advice and consultation with the beneficiary tribes.”

Plaut (2009), on the other hand, argues that Congress should pass an exemption for sacred-site information “to encourage individuals to provide this information to the

government,” just as Exemption 4 encourages the submission of confidential business information that otherwise would not be shared.

At least four attempts have been made to amend FOIA to create some form of a Tribal Trust exemption. On May 17, 1976, the U.S. Senate Subcommittee on Indian Affairs held a hearing to explore the need for an Indian Amendment to the Freedom of Information Act (as described in Chapter 4, Sec 4.4.6) (Senate, 1976a, 1976b). The draft language would have added a tenth exemption to FOIA for: “(10) information held by a Federal agency as trustee, regarding the natural resources or other assets of Indian tribes or bands or groups of individual members thereof.” Committee Chairman Senator Abourezk from South Dakota acknowledged that third party requests under FOIA put federal agencies “in the anomalous position [] of being forced to violate its fiduciary relationship with the tribes.” The Department of Interior and the Ford Administration strongly supported the proposed amendment, but James Frey, Assistant Director for Legislative Reference, Office of Management and Budget, recommended “that in lieu of S. 2652 legislation be enacted which would provide separate statutory authority for a special limited exemption to the Act similar to that proposed in s. 2652. Draft legislation to accomplish this purpose will be proposed by the Department of the Interior in the near future” (Senate, 1976a).

Two years later, on March 21, 1978, Sen. Abourezk introduced a new bill, S. 2773, the Indian Trust Information Protection Act (Abourezk, 1978). According to the summary provided by the Congressional Research Service, the bill, if passed, would have prohibited:

“the release of any information held, obtained, or prepared by the Federal Government in the discharge of its Federal trust responsibility to the Indian people except: (1) in the case of information pertaining to an Indian tribe, to an official of an Indian tribe authorized by the tribe to receive such information (2) in the case of information pertaining to an individual Indian, to the individual Indian to whom the information pertains; (3) in the case of information pertaining to an Indian tribe, to any member of the tribe, provided, that the release of the information is not inconsistent with the Federal trust responsibility; (4) to either House of Congress; (5) in the case of information pertaining to an Indian tribe or individual, to any person where the chief executive officer or tribal council by resolution authorizes the release of the information, or where the individual Indian makes such authorization; (6) when the information has previously been lawfully made public; (7) when the information was provided in an application for funds under a Federal grant or contract; or (8) to any Federal department, agency, or employee or agent thereof where the information is required in furtherance of official duties.”

It also would have established “criminal penalties for the violation of the provisions of this Act.” The bill was referred to the Senate Select Committee on Indian Affairs, but no other senator co-sponsored it and no further action was taken. It may be worth noting that in the same year, the Supreme Court ruled in several seminal Indian law cases, including *Oliphant v. Suquamish Indian Tribe*, *United States v. Wheeler*, *Santa Clara Pueblo v. Martinez*, and *United States v. John*.³⁰¹

On February 4, 2004, Senator Ben Nighthorse Campbell introduced the *Federal Acknowledgement Process Reform Act of 2004* (S. 297),³⁰² section 7 of which proposed to exempt from the Freedom of Information Act:

“any action of the Assistant Secretary with respect to a petition for acknowledgment under this Act, and the Assistant Secretary shall have no obligation to provide all or any portion of a petition, or to provide information regarding the contents of a

³⁰¹ *Oliphant v. Suquamish Indian Tribe*, 435 U.S. 191 (1978); *United States v. Wheeler*, 435 U.S. 313 (1978); *Santa Clara Pueblo v. Martinez* 436 U.S. 49 (1978); and *United States v. John*, 437 U.S. 634 (1978).

³⁰² Federal Acknowledgment Process Reform Act of 2004. Available at: <http://thomas.loc.gov/cgi-bin/bdquery/z?d108:s.00297>; The Committee report is available at: <http://thomas.loc.gov/cgi-bin/cpquery/R?cp108:FLD010:@1%28sr403%29>.

petition, to any person or entity, until such time as (1) the petition has been fully documented; and (2) the Assistant Secretary has published a notice in accordance with section 4(c)(1)(A).”

This language, however, was struck from the bill after letters of protest from the American Library Association, the Electronic Privacy Information Center, National Security Archive, OMB Watch, Project on Government Oversight, American Association of Law Libraries, the New Mexico Foundation for Open Government, the American Society of Newspaper Editors, and many others (McDermott et al., 2004). The bill as a whole did not pass for other reasons. Similarly, a proposed amendment to Title IV of the Indian Self-Determination and Education Assistance Act (H.R. 3994) in 2007 to support tribal involvement in national wildlife refuges included an exemption of the Freedom of Information Act for tribes (Section 406(g)(1)). The National Wildlife Refuge Association and affiliate “Friends” groups sent letters of protest (Hirsche, 2007).

A tribal amendment to FOIA will raise other related issues, such as whether the processes of tribal governments should be relied upon to allow individual tribal members to access tribal government information. The trust relationship with the federal government encompasses Indian people as well as their governments. Individual members of tribes will want to have access to tribal government information. If a trust amendment to the FOIA is passed, it could potentially limit tribal members’ ability to access tribal information and spatial data through the federal government. The dilemma before the federal government then is whether, under its trust obligation, Indian tribes should have the authority to limit the availability of this information to tribal members. Finally, it has been suggested that tribes sue Congress for a breach of the trust responsibility on the

grounds that Congress has failed to act to protect tribes' interests by releasing tribal information and data under the FOIA.

7.1.6 United Nations Principles

As discussed in Chapters 3 and 5, the United Nations Education, Scientific and Cultural Organization (UNESCO), the World Trade Organization (WTO), the World Intellectual Property Organization (WIPO), and the International Labor Organization (ILO) have crafted international agreements to protect the rights of indigenous communities. The United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP), which was adopted by the UN General Assembly in 2007 and signed by President Obama in 2010, acknowledges the political and cultural independence of indigenous people globally (Pevar, 2012). It, however, is not yet enforceable under international law.

7.2 Ethical Best Practices

Some tribes, as discussed above, have developed codes of conduct with respect to data handling that tribal government employees must sign and follow. Tribes also can offer their staff training in proper data handling best practices, with occasional reminders. In addition, tribes may want to develop and implement statutes and policies for handling research on reservations, including data collected or created as part of a collaborative research process with academic institutions (e.g., Colville Tribal Law and Order Code, Title 6 – Regulatory Provisions, Ch. 6-6 Research Regulation; Ho-Chunk Nation Code (HCC), 3 HCC 3 - Tribal Research Code; Law and Order Code of the Rosebud Sioux tribes, Cultural Resources Management Code; for online copies, see www.narf.org). This may include the establishment of a tribal research review board that vets and approves all

research within a reservation or community. It also may include the development of contractual research documents to protect a tribe's intellectual property rights (Louis, 2007). Scassa et al. (2012) cautions that, under Western IP systems, the researcher who publishes tribal oral histories, stories and information in a book or article, who records this information through photography, audio or video records, or who enters the information into a GIS may hold the copyright in the resulting work (see also K. Madsen, 2008).

The First Nations in Canada also have developed ethical research guidelines (FNIGC, 2014, 2015; Schnarch, 2004; Tobias, 2000), which “are founded upon [sovereignty,] a community's right to own and control its traditional knowledge, its right to access research results and its right to possess research data” (Scassa et al., 2012). The Yorta Yorta Nation in Australia developed a GIS Protocol specifying, “the ownership and copyright of cultural data and Indigenous knowledge contained in the GIS database is always held by the Yorta Yorta person from whom it was collected.” It also states that the Yorta Yorta Nation “has the right to determine the contents of the GIS database, the accessibility to the database, and the way in which the data and information are to be accessed, presented, and delivered” (Veland, Lynch, Bischoff-Mattson, Joachim, & Johnson, 2014).

Scholars and practitioners in the field of participatory mapping have developed a set of “practical ethics” to address indigenous and local community concerns about “helicopter researchers” that swoop in to a community for a short period of time, extract local knowledge and data, and leave nothing in return (Jefferson Fox et al., 2005; Louis, 2004,

2007). The PGIS/PPGIS ethical guidelines (<http://www.ppgis.net/code.htm>) are “not meant to be exhaustive, as each culture and situation may have its own moral imperatives. It is the obligation of the individuals to make their best judgment to ensure good practice.” The guide emphasizes that communities should be engaged in the research throughout the entire process, from developing the research questions and planning the project (e.g., who identifies the problem, who participates, and who decides who participates?) to mapping (e.g., who controls the process, whose knowledge and reality is expressed, who owns the legend?), from analysis of the data (e.g., who interprets the data?) to publishing the results (e.g., who owns the maps, who has access to the information, and who can use it and for what?) (Rambaldi, 2004b; Rambaldi et al., 2006).

Taking ethical practices a step further, native scholars have proposed “alternative ways of thinking about the research process” through the use of “Indigenous methodologies” to decolonize research and protect Indigenous peoples from “further misrepresentation, misinterpretation, fragmentation, mystification, commodification, and simplification of Indigenous knowledges” (Louis, 2007). These methods embody sympathy, respect, humility, generosity, patience, and ethics. They result in collaborative, co-created, and potentially co-authored research. They embrace indigenous epistemologies. They facilitate two-way information sharing and feedback (J. Johnson, 2012; J. T. Johnson, 2008; Louis, 2007, 2012; Louis et al., 2012; Palmer, 2009, 2012; Pearce & Louis, 2008; Smith, 1999). The Indigenous Peoples Specialty Group (IPSG) of the American Association of Geographers (AAG) collaboratively developed a list of questions to help

researchers carefully think through the ethical issues before conducting geographic research in partnership with indigenous communities (Louis and Grossman, 2010). Research, Louis and Grossman (2010) emphasize, should “assist [indigenous communities] in the protection of their rights and security;” and benefits should accrue to “both the general body of knowledge, and the communities being researched.”

Additional ethical frameworks have been established in related fields, such as citizen science (Shirk et al., 2012) and community-based participatory research (Wing, 2002). Many related professional associations also adhere to codes of ethics, including the Urban and Regional Information Systems Association (URISA, 2003, GIS Code of Ethics; http://www.urisa.org/ethics/code_of_ethics.htm), International Society of Ethnobiology (<http://www.ethnobiology.net/what-we-do/core-programs/ise-ethics-program/code-of-ethics/>), American Library Association (<http://www.ala.org/advocacy/proethics/codeofethics/codeethics>), Society for American Archivist – SAA cultural property working group (<http://www2.archivists.org/news/2012/saa-council-adopts-revised-code-of-ethics-for-archivists-approves-two-new-roundtables>). Kar et al. (2013) offer several links to ethical guidelines for location data and privacy, as well as references on privacy policies. All of these ethical frameworks, however, assume that the data seeker acknowledges and is willing to practice professional ethics; unfortunately, this may not always be the case.

7.3 Technical Options

Tribes could employ a technological solution to potentially circumvent some of the criteria for agency “control” under the FOIA, or at least erect technical procedures that may defer casual acquisition of tribal information. For example, tribes, in collaboration with federal agencies, could develop a set of mutually agreed upon methodologies to analyze their data and report only on the results, rather than sharing the entire datasets (ACOE, 2001). As suggested in Chapter 5, tribes also could store their spatial data on tribal servers and provide limited access to federal agencies for viewing, but not downloading the data, through a password protected, online web mapping service. These approaches, however, are not guaranteed to prevent disclosure under FOIA. Agency control, in the four part test established by the D.C. Circuit, may depend on the “extent to which agency personnel have read or relied upon the record” for decision-making.

Other commonly used techniques for protecting sensitive data include “data limitation,” “data alteration or obfuscation,” and encryption. Data limitation may include providing only a small subset of the data, electronically redacting the sensitive information, de-identification of individuals, collapsing categories, withholding certain variables, aggregating (or “cloaking”) the data to a lower scale than originally recorded (e.g., township level or higher), and other changes. It may be problematic, however, if federal decision-making is dependent on aggregated tribal data, as aggregation can suppress variance or unique circumstances, introducing uncertainty into the analysis (NRC, 2007b, 50). Attribute data also could be stored separately from the associated location (polygon and point) data.

Data alteration or obfuscation degrades the quality of the information through the introduction of “inaccuracy (eliminates connection between reality and gathered information), imprecision (lack of specificity in the information), and vagueness (boundary cases are included while describing location information)” (Kar et al., 2013). These approaches may include transforming street addresses into coordinates through different levels of “geocoding,” swapping the attributes of one person or object into that of another, conversion of data structure (e.g., vector to raster representation) and perturbing or geographical “masking” data. The risks, however, are that geo-coding may be reverse engineered. Masking may unintentionally assign a “displaced point” to an actual sensitive site. Again, these methods introduce uncertainties that will impact the analysis of the data (Cottrill, 2011; Kwan & Schmitz, 2002; NRC, 2007b).

Another option may be to provide users with a way to submit queries to the data and see the results of the spatial analysis, but not access the actual data itself. Kar et al. (2013) describe, for example, a “*location anonymizer* [that] blurs location information based on user-specified privacy requirements before storing them in a database, which is queried by the *privacy-aware query processor* to provide cloaked location information to other service providers.” Kar et al. (2013), Cottrill (2011), NRC (2007b), and VanWey et al. (2005) provide useful reviews of many of these techniques, along with their tradeoffs (see also Kwan & Schmitz, 2002; Leitner & Curtis, 2005; Myers, 2014). Cottrill (2011), in particular, provides a useful table comparing numerous technological methods for privacy protections, including benefits, constraints, and references.

Security of the physical environment and implementation of industry standard IT data security protocols and best practices also are essential for protecting tribal information and spatial data, but are outside the scope of this dissertation. IT security managers must keep track of new and emerging cyber threats on a daily basis. The Bureau of Indian Affairs Manual for the Information Resources Management Program (Part 60 Chapter 1) provides information on authorities and regulations related to government information security. The Federal Trade Commission provides up-to-date information and resources on IT data security on its Data Security website (<https://www.ftc.gov/tips-advice/business-center/privacy-and-security/data-security>).

7.4 Trade-Offs

7.4.1 Reducing Data Disputes Through Collaboration

Conflicts over the potential impacts of human activities and development on land, water, and natural resources often revolve around complex technical and scientific data, including maps. Amy (1987, 54-55) notes that the entities in conflict, be they government agencies, tribes, environmentalists, and developers, “rarely question the quality or accuracy of their own research” and data. By sharing data rather than restricting access to it, he contends, “each side is exposed to new information developed by the other side, and becomes more aware of the inadequacies of their own data and methods.” Instead of focusing on two separate sets of data and analyses, tribes and other entities may achieve a better outcome by collaborating on the spatial data collection, analysis, and modeling in support of joint problem-solving.

7.4.2 Federal and Tribal Government Transparency and Accountability

While some tribal governments would like to assert total control over who has access to tribal information and spatial data, ostensibly to protect the tribes' rights and interests, others, perhaps controversially, have argued that promoting transparency may be equally as important for protecting those rights and interests. McDermott et al. (2004) emphasize the importance of FOIA in "uncovering federal abuses of tribal rights," particularly during the tribal recognition process. She cites two examples; first, the Navajo Nation made a FOIA request to the Department of the Interior (DOI) that "revealed an *ex parte* meeting with former Interior Secretary Donald Hodel;" second, the Indian Law Resource Center made a FOIA request on behalf of Hopi traditional Elders that "uncovered abuses of power by John Boyden, counsel to the recognized Hopi tribe" (McDermott et al., 2004). Allowing the BIA to withhold tribal-federal communications under FOIA exemptions, Hill (2007) contends, may:

"shield from public scrutiny corruption within the agency, or worse, a failure by the agency to live up to its trust obligations."

Transparency, on the other hand, allows tribal members and the public "to scrutinize the Department [of the Interior] and the BIA in their dealings with Indian tribes."

Tribal government transparency also may be needed in order to ensure tribal government accountability to Elders and tribal members (Leonard, 1997). The federal government, after all, is obligated under the trust relationship to consider the rights and interests of individual tribal members, not just their governing bodies. Some contend that tribal governments, like state governments, should provide tribal members with access to the

majority of their records under tribal open records laws, with only limited exceptions (Hill, 2007), and at the same time, protect the privacy of tribal members and tribal government employees (Monette, 2005). For example, journalists working for tribally owned newspapers have tried to obtain information and report allegations of misconduct and fraud or mismanagement on the part of tribal government officials, only to have their jobs on the reservation and those of their families threatened (Hamby, 2005). The Cherokee Nation passed freedom of the press and freedom of information laws in 2000, after Chief Joe Byrd refused to release spending records and attempted to fire marshals sent by the Cherokee Judicial Appeals Tribunal to retrieve them (Agent, 2006). In 2014, 700 tribal members protested proposed amendments to rollback the Cherokee Nation's Freedom of Information and Governmental Records Act (Chavez, 2014). One Cherokee Nation citizen and former attorney for the tribe noted, "There are some legitimate reasons that we wish we didn't have a Freedom of Information Act, for example, for business deals... There is a 'balancing act'... The tribal government needs to be accountable to its citizens and allow them the ability to request records."

Moreover, tribal members and tribal grassroots organizations sometimes oppose tribal government decision-making and actions, claiming mismanagement on the part of the tribal government and/or the cooperating federal agency. The Skull Valley Band of Goshute Indians is located on a reservation in east-central Tooele County at Skull Valley, Utah. The tribal government sought to lease land to Private Fuel Storage (PFS), a corporation representing multiple nuclear companies. PFS wanted to store 40,000 tons of spent nuclear fuel on the tribe's land "next to two-dozen tribal members who live on the

small reservation” (Anonymous, 2006). Several tribal members of the Skull Valley Band of Goshute Indians joined the State of Utah in a lawsuit seeking access to the tribal trust lease information withheld by the BIA, as part of their efforts to prevent the storage of nuclear fuel on their reservation. The Indigenous Environmental Network and Honor the Earth also participated in the resistance (Anonymous, 2006). As discussed in Chapter 5, however, the Tenth Circuit Court of Appeals did not allow the release of the confidential leasing information to either to the State of Utah or to the tribal members.³⁰³

Some of these tribal organizations are using maps and GIS data to evaluate the situation and hold their tribal governments accountable. In an effort to fight the installment of a “temporary” nuclear waste site on the Mescalero Apache reservation in southern New Mexico, a Mescalero Apache non-profit group called Apaches Against Nuclear Waste used GIS to assess the proximity of the proposed nuclear waste sites to places of archaeological and cultural significance (Tano, 2015). Opposing the decisions of the tribe’s President Wendell Chino, Mescalero Apache member Rufina Marie Laws, who founded the group said,

“The Mescalero Apache people have been diabolically and deliberately excluded. At the same time, the tribe is actively being obligated to agreements and contracts without the input and consensus of the people. Many tribal members are opposed to siting nuclear waste storage on our homeland, for they believe it will be a violation of our sacred land and sacred mountain, Sierra Blanca” (Hanson, 1995).

³⁰³ Utah v. USDO, 256 F.3d 967 (10th Cir. 2001). Accessed 2002, and May 13, 2015. Available at: <http://openjurist.org/256/f3d/967/state-of-utah-v-united-states-department-of-the-interior>.

The group eventually evolved into Humans Against Nuclear Waste Dumps (HANDS), and Laws went on to found the Nuclear Information and Resource Service (NIRS). For a in depth discussion of the legal and social implications of this case, see (Leonard, 1997).

Most notably, Diné Citizens Against Ruining our Environment (Diné CARE), a tribal grassroots organization, formed in order to protect the forests of the Chuska Mountains and Defiance Plateau, located within the Navajo Nation along the northern Arizona-New Mexico border, from what they considered to be “unmitigated timber cutting and mismanagement.” In 1991, this organization contested the Navajo Nation government’s forest policy as well as the sawmill’s viability. The Navajo forest operation, Diné CARE contended, was not sustainable; it was not making sufficient efforts to mitigate damage and erosion or to replant and regenerate the forest. In order to defend this claim, Diné CARE mapped the forest. After four years of struggle, Diné CARE succeeded in stopping the logging operation (Diné CARE, 2005a). Arguably, the mapping effort was a critical factor in their success.

Then, in an effort to develop a long-term restoration plan for the Sanostee Restoration Project for the Chuska Mountain forest, Diné CARE utilized GIS technology and remotely sensed imagery to map the forest. The Diné CARE website notes:

“Local people, living close to the land, herding sheep and gathering ceremonial sacred herbs, have contended that cumulative impacts of timber cutting have already caused extensive damage. With this in mind, our goal is to document precisely the condition of the forest and to offer the community a plan for commercial logging alternatives. This includes forest and watershed restoration and regeneration, identification of roads for closure and protection areas based upon endangered species, archeology and sacred sites. ... Our primary measurable objective is to have the land cover map complete and ready for use in consultation with community members” (Diné CARE, 2005b).

In a parallel effort, Diné CARE also worked to mitigate the effects of uranium mining on the Navajo Nation, including excessive radiation levels in Navajo residences and significantly increased cancer rates among the Navajo population. While in 1991 the Navajo Nation enacted a statute that prevented mining on all Navajo lands, the Navajo Nation Council's Resources Committee “consider[ed] a loophole that [would] give them the ability to approve two new leases for uranium mining, to a company called Hydro Resources, Incorporated (HRI).” Diné CARE, as well as many Navajo communities, organizations and individuals worked to oppose this new perceived threat to their reservation. Again, they used GIS technologies to document the continued effects of uranium mines on the Navajo people in order halt the efforts of the Resources Committee and “to amend the Surface Mining Control and Reclamation Act (SMCRA) to include better reclamation standards, and the Radiation Exposure Compensation Act (RECA) to make compensation standards less.” GIS technology enabled them “to examine the relationship among health afflictions, mining activity and environmental factors...[and to] enable greater public participation and involve concerned individuals” (Diné CARE, 2005c).

The GIS data used in these projects was not obtained from the Navajo government, but rather from direct data collection on the ground and the acquisition of data from outside sources, with the assistance of university staff. An important question at hand is whether projects such as these would be possible if tribal members and tribal grassroots organizations could not obtain maps, GIS data, and other forms of spatial information

about their lands and resources from the federal government; in other words, what recourse would tribal members and tribal grassroots organizations have if their tribal governments were in some way able to prevent everyone, including tribal members, from accessing federally held tribal information and spatial data under federal statutes and regulations, such as FOIA? This poses a complex problem.

7.4.3 Preservation of Sensitive Sites Through Awareness and Education

Tribes are also often faced with the difficult choice of having to share their sensitive information with federal agencies through the consultation process—when their treaty rights and interests, sacred or cultural sites, archeological sites, or graves could be impacted by federal decision-making (Mense, 2011; Plaut, 2009; Skibine, 2012). Public disclosure of the information under FOIA, however, may lead to unwanted intrusion during religious ceremonies, theft of artifacts, vandalism or destruction of the site. Thus tribes may not respond to federal inquiry, or provide little if any information. Without the information and data, however, federal agencies may not be able to protect tribal rights and interest, potentially leading to the abrogation of those rights and interest and litigation. This has occurred in at least three instances, as discussed in Chapter 5, including *Havasupai tribe v. United States*, *Pueblo of Sandia v. United States*, and *Muckleshoot Indian tribe v. U.S. Forest Service* (Lum, 1999; Mense, 2011). “What we can learn from [these cases],” Lum (1999) summarizes, “is that (1) agency decision makers may wrongly conclude that cultural sites are insignificant if information pertaining to them is withheld, and (2) the courts may not reverse such administrative evaluations, even if they are subsequently demonstrated to be inaccurate.” Kelley and

Francis (2005) further argue that not sharing this information results in continued outsider ignorance of native culture, and “miss[es] an opportunity to counter the dismissive attitude of many non-Indians toward the information content of indigenous oral tradition.”

The Shivwits Indian tribe, which is a part of the Paiute Indian tribe of Utah, attempted to protect a traditional solar calendar, located in an isolated region of southern Utah, after being revealed during large-scale power line environmental impact assessment (EIA) (Stoffle et al., 2008). Believing silence would protect the site, the tribal government asked federal agencies to keep its location confidential. Sadly, after 25 years, the area has become a:

“massive utility corridor involving three major power lines and a series of underground gas lines... virtually all of the corridor has been disturbed and surrounding roads have been cut and upgraded to form a braided network of roads. ... off-road recreationalists continue to create new roads. These illegal wildcat trails have obliterated most of the pilgrimage trail and impacted the solar calendar by increasing access to the site” (Stoffle et al., 2008).

Researchers returned to the site, only to find that graffiti and trash defaced the cave containing the solar calendar, and “offerings placed by generations of Indian pilgrims near the front of the cave have been sifted by pot hunters.” All artifacts were stolen. To stop the further degradation of this site, the tribe decided to break its silence. Instead the tribe took steps to reduce access, restore the site, and educate visitors with “minimally culturally accurate and sensitive” signage. This also allowed them to defend against “yet another proposal for constructing an underground utility pipe” nearby.

7.5 Potential Implications of Emerging Technologies

Emerging spatial and sensing technologies may present new challenges and opportunities for tribes. We have witnessed an exponential growth in mobile technology usage—with 2.3 billion mobile-broadband subscriptions and almost 7 billion mobile-cellular subscriptions globally in 2014 (ITU, 2014). The next generation of mobile phones is equipped with altimeter sensors to detect elevation or location within a building, and possibly other sensors, such as to measure noise, light, sound, and air quality, or to track one's health and fitness (Shanley et al., 2013). In addition, the development of location-based social media in recent years, as Sui and Goodchild (2011) note, has created stronger links between physical location and cyberspace. It is providing new spaces for individuals to connect with each other across geographies and interests—as with the Indigenous Mapping Network, for groups to mobilize grassroots action, and for data scientists to track crowd behavior and forecast emergent crises.

Perhaps the most disruptive change has come from the expanding role of the public in generating and using geographic information. It has been fueled by the development of freely available and user-friendly online platforms, the adoption of GPS-enabled smartphones, the popularity of social networking sites, and the growing recognition “the crowd” can tackle large and complex problems (Shanley et al., 2013; Goodchild, 2007, 2010; Shilton et al., 2009). This paradigm shift towards crowdsourcing and collaborative mapping is blurring our conceptions of “expert” and “amateur” (Elwood et al., 2012; Goodchild, 2009; Rana and Joliveau, 2009). It is also shifting information production and distribution from governments to individuals. Members of the public may now easily

collect data on or near reservations, upload it to the Internet, and share with their social networks in near-real time. At the same time, these tools enable tribes and tribal grassroots groups to mobilize their members to collect data at a larger geographic extent, greater geographic resolution, and finer temporal precision than might otherwise be possible with limited tribal government budgets and staff time.

It is now “technically possible to know where everything is, at all times” (Goodchild, 2009). Goodchild (2015) notes:

“It is now possible to capture the third spatial dimension; to represent and analyze change through time; to describe the motions of objects; and to represent and visualize uncertainty. Methods of access to geographic information have improved enormously, and there are now vast repositories of online information that can be searched and accessed remotely.”

For good or for bad, we are moving toward a future of real-time, continuous monitoring of the world (Goodchild, 2010). Powerful big data analytics allow these enormous, heterogeneous datasets to be processed and curated, finding new patterns and predicting emerging trends. Cloud based services also will allow individuals to easily store and access these vast data repositories. Online web-mapping systems allow users “to connect virtually to any sensor or streaming data source, including social media,” “to process the data in real time,” and “to monitor multiple, dynamic events and automatically update [their] maps and databases” (ESRI, 2015b). These advances may bring increased benefits

for disaster response and public health tracking, but also may spark new conflicts over jurisdictional boundaries and rights and interests in resources.

While commercial remote sensing companies are pushing for higher resolutions, more immediate threats may come from unmanned aerial vehicles (UAVs or “drones”) and airborne surveillance companies. Persistent Surveillance Systems (PSS), for example, currently monitors ten cities with Cessna aircraft flying at 10,000 feet and equipped with specialized cameras for law enforcement purposes (Farivar, 2014).³⁰⁴ The ACLU (2011) warns that:

“[b]ecause of their potential for pervasive [and continuous] use in ordinary law enforcement operations and capacity for revealing far more than the naked eye, drones pose a more serious threat to privacy than do manned flights. There are good reasons to believe that they may implicate Fourth Amendment rights in ways that manned flights do not.”

Just as with mobile phones, drones will likely serve as platforms for numerous forms of sensors and tracking devices, which will be applied in a variety of novel ways. The FAA, however, has not yet issued specific regulations for UAV operations in the United States. Non-recreational use of drones is currently prohibited without authorization from the Federal Aviation Administration. Information about drones, policy guidance, rules and regulations may be found on the FAA’s website (https://www.faa.gov/uas/regulations_policies/); see also (Bury, 2015; Gabrynowicz, 1996). On the other hand, tribes may use UAVs to monitor livestock and rangeland, locate the extent of wildfires and floods, conduct surveys of oil, gas, and minerals (e.g.,

³⁰⁴ Imagery obtained by aircraft do not have the same data access issues as satellites. Data ownership is a contractual matter between the aircraft operator and the entity that hired it to acquire the data.

geomagnetic surveys), map archaeological sites, and assess other environmental conditions. Jozuka (2015), for example, describes how drones may be used by indigenous communities to regain control of their traditional territories and fight resource extraction through mining and deforestation.

7.6 Conclusion

This research has explored issues of data sovereignty and privacy in the context of American Indian tribes and their relationship with the federal government. Fletcher (2005) writes:

“Indian tribes are much more than merely governments. Tribes are, without limitation, social organizations, family structures, community social control mechanisms, and protectors of tribal culture, tribal law, tribal sovereignty, both individual and collective and fundamental rights, and both individual and collective property rights[, and individual and collective privacy rights.]”

Fundamental issues are at stake, including Indian tribes’ rights and interests in their knowledge and resources, federal agencies’ authority and decision-making processes that affect that information and resources, and the public’s right to know. To build trust and more effective working relationships, federal agencies and other organizations working with American Indian tribes will need to understand these issues and to develop guidelines for the appropriate handling, protection and use of spatial data as part of these collaborations.

Tribes may mitigate some of the risks and strengthen their sovereignty and self-determination by building the internal capacity to understand and use spatial technologies

to their advantage, and by keeping abreast of new spatial and sensing technologies and their potential implications. Governor Norman Cooyate, Pueblo of Zuni, emphasizes,

“Good decisions based on high quality data [can] strengthen tribal sovereignty”

(Cooyate, 2007). Bohnenstiehl and Tuwaletsiwa (2001) state:

“[a]s is the case in any organization, the recruitment of qualified people is of paramount importance to tribal LIS [Land Information System] operations and in many operations non-native personnel serve in managerial roles; although this is changing. The future of tribal geospatial technology lies in developing an integrated LIS, housed in one department with a staff of qualified surveyors, GIS, GPS and photogrammetric technicians, that incorporates satellite imagery, and is funded entirely with tribal money (so as to avoid any Freedom of Information Act issues).”

Tribes also may negotiate access to satellite imagery and data under the terms and conditions of commercial remote sensing licenses, by working with the Bureau of Indian Affairs (BIA) and other agencies and with the commercial satellite operators. Tribes will need to use a combination of political, policy, legal, technical, and ethical approaches strategically to mitigate the risks of unwanted disclosure of their spatial data, particularly when it is shared with or funded by the federal government. The law and public policy continues to reflect cultural biases that Native attorneys will have to try to reverse. At the same time, it will be equally important to promote and ensure tribal government transparency through the enactment of tribal freedom of information/records management laws, enabling appropriate access to tribal information and spatial data for enrolled tribal members.

Future research will need to examine the implications of FOIA in the context of Native Hawaiian and Alaskan Native communities, which operate are under different legal

frameworks. In addition, limited research exists on the implications of sharing spatial data with local and state governments, which may lead to the unwanted disclosure of tribal information and spatial data under state open records laws. Greater attention is also needed on tribal adoption of freedom of information laws and their interpretation under tribal jurisprudence. Comparative studies of the overall effectiveness of different data handling practices (e.g., educating the public versus silence) for protecting sensitive spatial data, such as locations of endangered species, also are needed, both in the context of tribes and states. Lastly, the emerging spatial technologies described above will have both a positive and negative impact on tribes. New strategies will need to be developed to address these new opportunities and risks.

REFERENCES

- Aardt, J. A. N. v. (2010). Remote Sensing Systems for Operational and Research Use *Manual of Geospatial Science and Technology* (pp. 319-362).
- Abourezk, J. (1978). United States Senate. S. 2773, Indian Trust Information Protection Act.
- ACHP. (2014). *Draft Policy Statement on Confidentiality of Indian Sacred Sites*. Washington, DC: Advisory Council on Historic Preservation. Retrieved from <http://www.fs.fed.us/spf/tribalrelations/documents/sacredsites/draft/SacredSitesMOUDraftPolicyStatementConfidentialitySacredSites.pdf>.
- ACLU. (2011). Protecting Privacy from Aerial Surveillance: Recommendations for Government Use of Drone Aircraft (pp. 1-22). Washington, DC: American Civil Liberties Union.
- ACOE. (2001). Notes from Upper Rio Grande Basin Water Operations Review Interdisciplinary NEPA Team Meeting; October 11, 2001. Albuquerque, NM: Army Corps of Engineers. Retrieved November 14, 2008 from <http://www.spa.vsace.army.mil/urgwops/mtgnotes/IDteam10-01.pdf>.
- Adams, S. I. (1999). *GIS on the Rez: A Case Study on GIS Implementation on the Colville Indian Reservation*. (Master of Arts), University of Washington, Seattle, Washington.
- Administrative Procedure Act (APA) (1946). Pub. L. 79-404, 60 Stat. 237, enacted June 11, 1946.
- Agent, D. (2006, Fall). Constitutional Crisis spurs Cherokee reform of press freedoms, *Cherokee Advocate*. Retrieved from <http://www.rcfp.org/americanindian/crisis.html>.
- AIPC. (1977). *Chapter Four: Trust Responsibility*. American Indian Policy Center. Washington, D.C. Retrieved from http://www.doi.gov/cobell/commission/upload/6-1-AmIndianPolicyComm_FinRpt_Chp-4-Trust-Responsibility_May1977.pdf.
- Alderman, E., & Kennedy, C. (1995). *The right to privacy*. New York: Knopf.
- Amy, D. J. (1987). *The Politics of Environmental Mediation*. New York, NY: Columbia University Press.
- Anonymous. (2001). *Possible Scenarios for Tribal/Federal Data Sharing and Access*. BIA.
- Anonymous. (2006). Private Fuel Storage Targets High-Level Radioactive Waste Dump at Skull Valley Goshute Indian Reservation, Utah. Retrieved from <http://www.nirs.org/radwaste/scullvalley/skullvalley.htm>
- Anonymous. (2010, Jan 2010). GIS Program developing consistent maps, *Confederated Umatilla Journal*, p. 3. Retrieved from <http://search.proquest.com.ezproxy.library.wisc.edu/docview/363344146?accountid=465>
http://sfx.wisconsin.edu/wisc?url_ver=Z39.88-2004&rft_val_fmt=info:ofi/fmt:kev:mtx:journal&genre=unknown&sid=ProQ:ProQ%3Aethnicnewswatch&atitle=GIS+Program+developing+consistent+maps&title=Confederated+Umatilla+Journal&issn=&date=2010-01-

- [01&volume=13&issue=1&spage=3&au=Anonymous&isbn=&jtitle=Confederate+Umatilla+Journal&bttitle=&rft_id=info:eric/&rft_id=info:doi/](#)
- Anselin, L. (1989). What is special about spatial data? Alternative perspectives on spatial data analysis. Technical paper 89-4. Santa Barbara, NCGIA.
- Arbus, M. (2003). A Legal U-Turn: The Rehnquist Court Changes Direction and Steers Back to the Privacy Norms of the Warren Era. 89 Va. L. Rev. 1729.
- Atkinson, K. J., & Nilles, K. M. (2008). *Tribal Business Structure Handbook*. Washington, DC: The Office of the Assistant Secretary -- Indian Affairs and Tribal Self-Governance Project of the Tulalip tribes. Retrieved from <http://www.bia.gov/cs/groups/xieed/documents/document/idc-022678.pdf>.
- Biagioli, M., Jaszi, P., & Woodmansee, M. (Eds.). (2001). *Making and Unmaking Intellectual Property: Creative Production in Legal and Cultural Perspective*. Chicago: University of Chicago Press.
- Baker, J.C., O'Connell, K.M., and Williamson, R.A. (eds.). (2001). Commercial Observation Satellites: At the Leading Edge of Global Transparency (Santa Monica, CA: RAND and ASPRS).
- Baker, J. C., Lachman, B. E., Frelinger, D. R., O'Connell, K., Hou, A. C., Tseng, M. S., Yost, C. (2004). *Mapping the Risks: Assessing the Homeland Security Implications of Publicly Available Geospatial Data*. Washington, DC: RAND National Defense Research Institute, Prepared for the National Geospatial-Intelligence Agency. Retrieved from http://www.rand.org/content/dam/rand/pubs/monographs/2004/RAND_MG142.pdf.
- Bardach, E. (2012). *A Practical Guide for Policy Analysis: The Eightfold Path to More Effective Problem Solving* (Fourth ed.). Los Angeles, CA: Sage.
- Barnes, S. (1994). Native Americans Establish Intertribal GIS Council. *GeoInfo Systems*, 4, 19.
- Barsh, R. L. (1999a). How do you patent a landscape? The perils of dichotomizing cultural and intellectual property. *International Journal of Cultural Property*, 8, 14-47.
- Barsh, R. L. (1999b). How Do You Patent a Landscape? The Perils of Dichotomizing Cultural and Intellectual Property. *International Journal of Cultural Property*, 8, 14-47.
- Barsh, R. L. (2001). *Who Steals Indigenous Knowledge?* Paper presented at the American Society of International Law Proceedings.
- Bartlett, K. (2001). USGS Internet Block. *GeoTimes*, 3. Retrieved from GeoTimes website: <http://www.geotimes.org/current/WebExtra1106.html>.
- Berry, K. A. (2008). Introduction: Mainstreaming Indigenous Geography. [Article]. *American Indian Culture & Research Journal*, 32(3), 1-3.
- BIA. (1990a). *First and Second Quarterly Reports*. Lakewood, CO: BIA Geographic Data Services Center.
- BIA. (1990b). *The Indian Affairs Manual*. Washington, DC: U.S. Department of the Interior.
- BIA. (1992). *Strategic Plan for the Indian Integrated Resource Information Program. March 15, 1992*. Washington, DC: BIA.

- BIA. (1993). *Strategic Implementation Plan for the Geographic Data Service Center. Submitted March 31, 1993*. Lakewood, CO: BIA.
- BIA. (1995). *The GIS II Contract Guide & The Desktop Products Guide for tribes*. Lakewood, CO: Geospatial Data Service Center.
- BIA. (1996a). *Final 1997 Self-Governance Negotiation Guidance for BIA Programs*. Washington, DC: Bureau of Indian Affairs.
- BIA. (1996b). *Public Law 93-638, Indian Self-Determination and Education Assistance Act, as Amended*. Washington, DC: DOI. Retrieved from <http://www.bia.gov/cs/groups/mywcsp/documents/collection/idc017334.pdf>.
- BIA. (1997a). *GIS Database Organization Guidelines*. Lakewood, CO: Geographic Data Service Center.
- BIA. (1997b). *Land Title Mapper Progress Report*. Lakewood, CO: Bureau of Indian Affairs.
- BIA. (1997c). *Meeting Summary: Tribal Sub-Group on Tribal Shares, December 17, 1997*. Washington, DC: BIA. Retrieved from <http://www.doi.gov/bia/decnotes3.html>.
- BIA. (1998). *Land Title Mapper Progress Report*. Lakewood, CO: Bureau of Indian Affairs.
- BIA. (2000). Bureau of Indian Affairs Government-to-Government Consultation Policy. Accessed on February 25, 2003. Available at <http://www.doi.gov/oait/docs/g2gpolicy.htm>.
- BIA. (2001). *Guidelines for Integrated Resource Management Planning in Indian Country*. Washington, DC. Retrieved from <http://www.bia.gov/WhoWeAre/BIA/OTS/DFWFM/IRMP/index.htm>.
- BIA. (2003). Department of Interior Bureau of Indian Affairs FY 2003 Annual Performance Plan and FY 2001 Annual Performance Report. Accessed on February 25, 2003. Available at <http://www.doi.gov>.
- BIA. (2005). *A Tribal Executive's guide to Integrated Resource Management Planning*. Washington, DC: Bureau of Indian Affairs. Retrieved from <http://www.bia.gov/WhoWeAre/BIA/OTS/DFWFM/IRMP/index.htm>.
- BIA. (2008). *BIA Modernization Recommendations from the TBAC Meeting, March 13, 2008*. Washington, DC: USDOJ. Retrieved from http://www.ncai.org/BIA_Moderization_Initiatives.129.0.html.
- BIA. (2013). FAQs. Retrieved March 11, 2013, 2013, from <http://www.bia.gov/FAQs/index.htm>.
- BIA. (2014a). Geospatial Background and History. Retrieved April 16, 2015, from <http://www.bia.gov/WhatWeDo/ServiceOverview/Geospatial/BackgroundandHistory/index.htm>.
- BIA. (2014b). *Indian Lands of the United States*. Lakewood, CO: U.S. Department of the Interior. Retrieved from <http://www.bia.gov/cs/groups/public/documents/text/idc013422.pdf>.
- BIA. (2015a). Bureau of Indian Affairs Mission Statement. Retrieved April 4, 2015, from <http://www.bia.gov/WhoWeAre/BIA/index.htm>.

- BIA. (2015b). *The Indian Affairs Manual*. Washington, DC: U.S. Department of the Interior. Retrieved from <http://www.bia.gov/WhatWeDo/Knowledge/Directives/IAM/index.htm>.
- BIA. (2015c). Integrated Resource Management Planning – IRMP. Retrieved April 17, 2015, from <http://www.bia.gov/WhoWeAre/BIA/OTS/DFWFM/IRMP/index.htm>.
- BIA. (2015d). *Oil and Gas Outlook in Indian Country*. Washington, DC: US DOI Bureau of Indian Affairs. Retrieved from <http://www.bia.gov/cs/groups/xieed/documents/document/idc1-024535.pdf>.
- BIA. (2015e). Tribal Energy and Mineral Data. Accessed June 2, 2015. Available at: <http://bia.gov/WhoWeAre/AS-IA/IEED/DEMD/TT/MTD/index.htm>.
- Biernacki, P., & Waldorf, D. (1981). Snoball sampling: Problems and techniques of chain referral sampling. *Sociological Methods & Research*, 10(2), 141-163.
- Bing, J., Forsberg, P. and Nygaard, E. (1983). Part II Legal Problems Related to Transborder Data Flows. In *An Exploration of Legal Issues in Information and Communication Technologies* (Paris, France: OECD), v. 8.
- Bloustein, E. J. (1978). *Individual and Group Privacy*. New Brunswick, N.J.: Transaction Books.
- Blumenthal, D., Campbell, E. G., Gokhale, M., Yucel, R., Clarridge, B., & Hilgartner, S., Holtzman, Neil A. (2006). Data Withholding in Genetics and the Other Life Science: Prevalence and Predictors. *Academic Medicine*, 81(2), 137-145.
- Bohnenstiehl, K. R., and Tuwaletsiwa, P. J. (1999). The Hopi tribe Land Information System: Managing Large Areas Using Remote Sensing & GIS. In *Proceedings of the Nineteenth Annual ESRI User Conference, 1999* (San Diego, CA: ESRI).
- Bohnenstiehl, K. R., & Tuwaletsiwa, P. J. (2001). Native American Uses of Geospatial Technology. *PE&RS*, 67(2), 3.
- Bokhari, M., & Bokhari, Y. (2005). Spatial Data Security Relevance (A Sensed State Prospective). 1-6. Retrieved from http://classwiki.iac.gatech.edu/images/2/24/Spatial_Data_Security_Relevance_De c1105_Final.doc.
- Bolton, J. (2004). Memorandum for Heads of Dept and Agencies, Issuance of OMB's "Final Information Quality Bulletin for Peer Review." Dec 16, 2004.
- Bond, C. (2001, July 10). Cartographer for the Cherokee Nation GeoData Center, Tahlequah, Oklahoma. Personal Communication.
- Bonner, W. J. (1990a). *Memorandum 90-004 to Tribal and BIA User Community re ARC/INFO Workspace Size Limits, August 13, 1990*. Golden, CO: BIA Geographic Data Service Center.
- Bonner, W. J. (1990b). *Memorandum on Summation of Information from Coordinator's Meeting, February 22, 1990*. Golden, CO: BIA Geospatial Data Services Center.
- Bonner, W. J. (1994). *Memorandum re a National Geospatial Data Clearinghouse Release Request*. Washington, DC: Bureau of Indian Affairs.
- Bonner, W. J., Getter, J. R., Szajgin, J., & Bagwell, L. V. (1986, June 2-5). *Regression Models for Predicting AMS Digitizing Times for Land Resource Maps*. Paper presented at the Proceedings of the Third National MOSS Users Workshop, June 2-5, 1986, Fort Collins, Colorado.

- Bonner, W. J., & Hall, D. (1986). *Indian Integrated Resource Information Program Status Report: May 1986*. Washington, DC: BIA Office of Trust Responsibilities.
- Brandt, Eric (1995). Mapping Native Lands: Spatial Data Technology Finds a Home in Indian Country. *Winds of Change, Winter 1995*.
- Brandt, Elizabeth A. (1980). On Secrecy and the Control of Knowledge: Taos Pueblo. In S. K. Tefft (Ed.), *Secrecy: A Cross-Cultural Perspective*. New York, NY: Human Science Press.
- Brown, M. F. (1998). Can Culture be Copyrighted? *Current Anthropology*, 39(2), 193-222.
- Brown, M. F. (2003). *Who Owns Native Culture?* (Cambridge, Massachusetts: Harvard University Press).
- Brown, M. F. (2004). *Who Owns Native Culture?* Cambridge, MA: Harvard University Press.
- Brown, M. F. (2005). Heritage Trouble: Recent Work on the Protection of Intangible Cultural Property. *International Journal of Cultural Property*, 12, 40-61.
- Brown, M. F. (2006). Why Property and Democracy are Not Always Allies. *St. Louis University Law Review*, 50(3), 843-849.
- Brown, M. F. (2010). Culture, Property, and Peoplehood: A comment on Carpenter, Katyal, and Riley's "In Defense of Property". *International Journal of Cultural Property*, 17, 569-579.
- Burgess, D. (1981). Tarahumara Folklore: A Study in Cultural Secrecy. *Southwest Folklore*, 5:11-22.
- Burkholder, M. (1997). *Request for Information on Tribal Lands Pursuant to the Freedom of Information Act, dated October 31, 1997*. Madison, WI: Wisconsin Department of Natural Resources.
- Burwell, S. M., VanRoekel, S., Park, T., & Mancini, D. J. (2013). *Memorandum for the Heads of Executive Departments and Agencies on Open Data Policy--Managing Information as an Asset*. (M-13-13). Washington, DC: Office of Management and Budget. Retrieved from <https://http://www.whitehouse.gov/sites/default/files/omb/memoranda/2013/m-13-13.pdf>.
- Bury, M. W. (2015). *Memorandum re: Media Use of UAS, May 5, 2015*. Washington, DC: Federal Aviation Administration. Retrieved from https://http://www.faa.gov/about/office_org/headquarters_offices/agc/pol_adjudication/agc200/interpretations/data/interps/2015/Williams-AFS-80-%282015%29_Legal_Interpretation.pdf.
- Busby, J. W. (2010). *China and Climate Change: A Strategy for U.S. Engagement* (pp. 1-50). Washington, DC: Resources for the Future.
- Bush, G. W. (2003). *U.S. Commercial Remote Sensing Policy*. Washington, DC: Executive Office of the President. Retrieved from https://http://www.whitehouse.gov/files/documents/ostp/press_release_files/factsheet_commercial_remote_sensing_policy_april_25_2003.pdf.
- California v. Ciraolo. 106 S. Ct. 1809 (1986).
- Campbell, H., & Masser, I. (1995). *GIS and Organizations. How Effective are GIS in Practice*. London: Taylor & Francis.

- Campbell, J. B., & Salomon, V. V. (2010). Remote Sensing - A Look at the Future *Manual of Geospatial Science and Technology* (pp. 487-512).
- Campbell, J.R. (2002). Interdisciplinary research and GIS: Why local and indigenous knowledge are discounted. In *Participating in Development: Approaches to indigenous knowledge*, ASA Monographs 39, eds. Sillitoe, P., Bicker, A., and Pottier, J., 189-205. New York: Routledge.
- Canby, W. C. (2015). *American Indian Law in a Nutshell* (Sixth Edition ed.). St. Paul Minnesota: WEST Thomson Reuters.
- Carpenter, K. A., Katyal, S. K., & Riley, A. R. (2009). In Defense Of Property. *Yale Law Journal*, 118, 118-222.
- Carpenter, K. A., Katyal, S. K., & Riley, A. R. (2010). Clarifying Cultural Property. *International Journal of Cultural Property*, 17, 581-598.
- Carr, G. (2012). Protecting Intangible Cultural Resources: Alternatives to Intellectual Property Law. *Mich. J. Race & L.*, 28, 363-390.
- CGI. (2003). *Making the Most of Geospatial Data Exchange: A Guide for Data Distribution*. Minneapolis, MN: Minnesota's Governor's Council on Geographic Information. Retrieved from <http://www.gis.state.mn.us/pdf/GeoDataExchange.pdf>.
- Chambers, K. J., Corbett, J., Keller, C. P., & Wood, C. J. B. (2004). Indigenous Knowledge, Mapping, and GIS: A Diffusion of Innovation Perspective. *Cartographica*, 39(3), 19-31.
- Chambers, R. (1992). Rural Appraisal: Rapid, Relaxed and Participatory. *IDS Discussion Paper 331*, 68.
- Chambers, R. P. (1971). *A Study of Administrative Conflicts of Interest In the Protection of Indian Natural Resources*. (53-766). Washington, DC: US Government Printing Office.
- Chambers, R. P. (2013). Enforcing the Federal Trust Responsibility: Presentation to the Secretarial Commission on Indian Trust Administration and Reform. Washington, DC: Sonosky, Chambers, Sachse, Enderson and Perry, LLP.
- Chavez, W. (2014, July 1, 2014). Citizens Protest FOIA/GRA Amendments, *Cherokee Phoenix*.
- Cho, G. (1998). *Geographic Information Systems and the Law: Mapping the Legal Frontiers*. New York, New York: John Wiley and Sons.
- Cho, G. (2005). *Geographic Information Science: Mastering the Legal Issues*. West Sussex, England: Wiley.
- Christol, C. Q. (1982). The 1986 Remote Sensing Principles: Emerging or Existing Law?
- Clifford, N., French, S., & Valentine, G. (Eds.). (2010). *Key Methods in Geography* (Second ed.). Los Angeles, CA: Sage.
- Clinton, W. (1994). *Executive Memorandum on Government-to-Government Relations With Native American Tribal Governments (April 29, 1994)*. (FR Doc. 94-10877). Washington, DC: Federal Register. Retrieved from <http://www.epa.gov/tp/pdf/president-clinton-94.pdf>.
- Clinton, W. (1994). *Executive Order 12906, Coordinating Geographic Data Acquisition and Access: The National Spatial Data Infrastructure*. (EO 12906). Washington,

- D.C. Retrieved from <http://www.archives.gov/federal-register/executive-orders/pdf/12906.pdf>.
- Clinton, W. (1996). *Executive Order No. 13007 Indian Sacred Sites, May 24, 1996*. Washington, D.C.: Federal Register. Retrieved from <http://www.achp.gov/EO13007.html>.
- Clinton, W. (2000a). *Statement on Signing the Executive Order on Consultation and Coordination With Indian Tribal Governments*. Washington, DC: Federal Register. Retrieved from <http://www.gpo.gov/fdsys/pkg/WCPD-2000-11-13/pdf/WCPD-2000-11-13-Pg2806-2.pdf>.
- Clinton, W. (2000b). *Executive Order 13175 -- Consultation and Coordination With Indian Tribal Governments (November 9, 2000)*. Washington, DC: Federal Register. 65(218):67249-67252. Retrieved from <http://www.gpo.gov/fdsys/pkg/WCPD-2000-11-13/pdf/WCPD-2000-11-13-Pg2806-2.pdf>.
- Cohen, A. (2011). The Obama Administration and the American Indian. *The Atlantic*. Retrieved from The Atlantic website: <http://www.theatlantic.com/national/archive/2011/12/the-obama-administration-and-the-american-indian/249816/>.
- Cohen, F. S. (1942). *Handbook of Federal Indian Law* (3rd Edition ed.). Washington, DC: United States Government Printing Office.
- Cole, D. G. (1993). One Cartographic View of American Indian Land Areas. *Cartographica*, 45-57.
- Cole, D. G., & Sutton, I. (2014). *Mapping Native America: Cartographic Interactions Between Indigenous Peoples, Government, and Academia*. (Vol. I: Cartography and Government). Lexington, Kentucky: CreateSpace Independent Publishing Platform.
- Commission, AIPR (1977). *Final Report of the American Indian Policy Review Commission, Submitted to Congress May 17, 1977*. Washington, DC: United States Congress. Retrieved from <http://eric.ed.gov/?id=ED164229>.
- Congress, U. S. (1994). *Integrated resource management act: hearing before the Committee on Indian Affairs, United States*. Washington, D.C.: Committee on Indian Affairs.
- Congress, U. S. (2009). *S.J. Res. 14 - To acknowledge a long history of official depredations and ill-conceived policies by the Federal Government regarding Indian tribes and offer an apology to all Native Peoples, April 30, 2009*. Washington, D.C.: GPO.
- Cooyate, G. N. (2007). *Strengthening Sovereignty Through Data & Information Sharing*. Paper presented at the Crime Data Conference, Pueblo of Zuni. http://www.aidainc.net/2007_crimedataconf/presentations/Norman_Cooyate.pdf
- Cook, W. (2007, April 05). Tribal officials looking to update land ownership database, *Wind River News*, p. 3. Retrieved from <http://search.proquest.com.ezproxy.library.wisc.edu/docview/362728551?accountid=465>
http://sfx.wisconsin.edu/wisc?url_ver=Z39.88-2004&rft_val_fmt=info:ofi/fmt:kev:mtx:journal&genre=unknown&sid=ProQ:Pro

- <http://www.ethnicnewswatch.com/tribal-officials-looking-to-update-land-ownership-database.html>&title=Wind+River+News&issn=&date=2007-04-05&volume=30&issue=14&spage=3&au=Cook%2C+Walter&isbn=&jtitle=Wind+River+News&bttitle=&rft_id=info:eric/&rft_id=info:doi/
- Coombe, R. (2011). In M. Biagioli, P. Jaszi & M. Woodmansee (Eds.), *Making and Unmaking Intellectual Property: Creative Production in Legal and Cultural Perspective* (pp. 480). Chicago, IL: The University of Chicago Press. Retrieved from <http://sciencetechnologystudies.org/system/files/v26n2BookReview3.pdf>.
- Coombes, B., Johnson, J. T., & Howitt, R. (2012). Indigenous Geographies I: Mere Resource conflicts? The complexities in Indigenous land and environmental claims. *Progress in Human Geography*, 36(6), 810-821.
- Coombes, B., Johnson, J. T., & Howitt, R. (2013). Indigenous Geographies II: The aspirational spaces in postcolonial politics - reconciliation, belonging and social provision. *Progress in Human Geography*, 37(5), 691-700.
- Coombes, B., Johnson, J. T., & Howitt, R. (2014). Indigenous geographies III: Methodological innovation and the unsettling of participatory research. *Progress in Human Geography*, 38(6), 845-854.
- Cope, Meghan and Elwood, Sarah (eds.) (2009). *Qualitative GIS: A Mixed Methods Approach*. Los Angeles: Sage. 182 pages.
- Corbett, J. M., Chapin, M., Gibson, L., & Rambaldi, G. (2009). Indigenous Mapping. In R. Kitchen (Ed.), *International Encyclopedia of Human Geography* (pp. 377-383). Oxford, UK: Elsevier Science and Technology.
- Cottrill, C. D. (2011). Location Privacy: Who Protects? *URISA Journal*, 23(2), 49-59.
- Cox, E., Baker, A., Rothstein, A., & Weiler, M. (2010). Module 8: Traditional knowledge. *Copyright for Librarians*. Retrieved April 23, 2015, from http://cyber.law.harvard.edu/copyrightforlibrarians/Module_8:_Traditional_Knowledge
- Cragin, M. H., Palmer, C. L., Carlons, J. R., & Witt, M. (2010). Data sharing, small science and institutional repositories. *Philosophical Transactions of the Royal Society-Series A: Mathematical, Physical and Engineering Sciences*, 368(1926), 4023-4038.
- Craig, B. (2007). Online Satellite and Aerial Images: Issues and Analysis. *North Dakota Law Review*, 83, 548-578.
- Craig, W. J. (2005). The White Knights of Spatial Data Infrastructures: The Role and Motivation of Key Individuals. *URISA Journal*, 16(5-13).
- Craig, W. J., Harris, T. M., & Weiner, D. (Eds.). (2002). *Community Participation and Geographic Information Systems*. New York, New York: Taylor & Francis.
- Craiglia, M., & Masser, I. (2003). Access to Geographic Information: A European Perspective. *URISA Journal*, 15, 51-60.
- Crampton, J. W. (2003). Cartographic Rationality and the Politics of Geosurveillance and Security. *Cartography and Geographic Information Science*, 30(2), 135-148.
- Curry, M. R. (1998). *Digital places: living with geographic information technologies*. London; New York: Routledge.
- David, L. (2014). WorldView-3! Seeing Through Smoke, Into Water and Earth. *Apogeo Spatial, Fall 2014*. Retrieved from <http://apogeospatial.com/worldview-3/>.

- Davies, C., Hoban, S., & Penhoet, B. (1999). Moving Pictures: How Satellites, the Internet, and International Environmental Law Can Help Promote Sustainable Development. *Stetson Law Review*, 28.
- de Man, E. (2003). Cultural and Institutional Conditions for Using Geographic Information. *URISA Journal*, 15, 29033.
- Deloria, V., & Lytle, C. M. (1983). *American Indians, American Justice*. Austin, Texas: University of Texas Press.
- Deloria, V., & Wilkins, D. E. (1999). *Tribes, Treaties, And Constitutional Tribulations*. Austin, TX: University of Texas Press.
- Deogawanka, S. (2014). How GIS is Being Used to Help Native Americans. Retrieved from <http://www.gislounge.com/gis-used-help-native-americans/>.
- DeSaurssure, H. (1989). Remote Sensing Satellite Regulation by National and International Law. *Rutgers computer & Tech. L. J.*, 15.
- Diamond, J. L., Levin, L. C., & Madden, M. S. (2007). *Understanding Torts*. New York, New York: Lexis.
- DigitalGlobe. (2015). Satellite Information, May 22, 1025, from <https://http://www.digitalglobe.com/resources/satellite-information>
- Diné CARE. (2005a). "The Navajo Nation's Forests." Dine CARE Website. Retrieved on September 10, 2005 from <http://dinecare.indigenousnative.org/forestry.html>.
- Diné CARE. (2005b). "A Forest Mapping Project." Dine CARE Website. Accessed September 10, 2005. <http://dinecare.indigenousnative.org/GIS.html>.
- Diné CARE. (2005c). "Uranium Radiation Dangers on the Navajo Nation". Dine CARE Website. Accessed September 10, 2005. <http://dinecare.indigenousnative.org/uranium.html>.
- DOD, DOI, USDA, DOE, & ACHP. (2014). *Progress Report on the Implementation of the Memorandum of Understanding Regarding Interagency Coordination and Collaboration for the Protection of Indian Sacred Sites*. Washington, DC: Government Printing Office.
- DOI. (2011). *Policy on Consultation with Indian tribes, May 17, 2011*. Washington, DC: Federal Register.
- DOI. (2013). Secretarial Commission on Indian Trust Administration and Reform. Retrieved August 15, 2013, 2013, from <http://www.doi.gov/cobell/commission/index.cfm>
- DOI. (2014). *Secretary Jewell Issues Secretarial Order Affirming American Indian Trust Responsibilities*. Washington, DC: U.S. Department of the Interior. Retrieved from <http://www.doi.gov/news/pressreleases/secretary-jewell-issues-secretarial-order-affirming-american-indian-trust-responsibilities.cfm>
- Dorling, D., & Fairbairn, D. (1997). *Mapping: ways of representing the world*. Harlow, Essex, England: Addison, Wesley, Longman Ltd.
- Dow Chemical Co. v. United States, 476 U.S. 227 (1986) or 106 S. Ct. 1819 (1986).
- Dunn, C. (2007). Participatory GIS -- a people's GIS? *Progress in Human Geography*, 31(5), 616-637.
- Dunn, W. N. (1981). *Public Policy Analysis* Englewood Cliffs, NJ: Prentice Hall.
- EagleWoman, A. (2010). A Constitutional Crisis When the U.S. Supreme Court Acts in a Legislative Manner? An Essay Offering a Perspective on Judicial Activism in

- Federal and Civil Procedure Pleading Standards. *Penn State Law Review*, 114: 41-50.
- E.I. DuPont deNemours & Co. v. Christopher, 431 F.2d 1012, 1017 (5th Cir. 1970).
- Electronic Freedom of Information Act, 5 U.S.C. § 552(a)(3)(B).
- Elwood, S. (2000). "Information for Change: The Social and Political Impacts of Geographic Information Technologies." University of Minnesota.
- Elwood, S. (2006). Negotiating Knowledge Production: The Everyday Inclusions, Exclusions, and Contradictions of Participatory GIS Research. *The Professional Geographer*, 58(2):197.
- Elwood, S. (2008). Grassroots as Stakeholders in Spatial Data Infrastructures: Challenges and Opportunities for Local Data Development and Sharing. *International Journal of Geographical Information Science*, 22(1), 71-90.
- Elwood, S. (2009). Representations in Community-Based GIS. In Cope, Meghan and Elwood, Sarah. (eds.). *Qualitative GIS: A Mixed Methods Approach*. Los Angeles: Sage. Pp. 57-74.
- Elwood, S., Goodchild, M.F., and Sui, D.D. (2012). Researching volunteered geographic information: Spatial data, geographic research, and new social practice, *Annals of the Association of American Geographers*, 102(3): 571-590. Website: <http://dx.doi.org/10.1080/00045608.2011.595657>.
- Emery, A. R. (2000). *Integrating Indigenous Knowledge in Project Planning and Implementation*. Washington, D.C.: International Labor Organization, World Bank, Canadian International Development Agency, KIVU Nature Inc.
- EOP. (2009). *List of Federal Tribal Consultation Statutes, Orders, Regulations, Rules, Policies, Manuals, Protocols and Guidance, January 2009*. Washington, DC: The White House. Retrieved from http://www.achp.gov/docs/fed_consultation_authorities_2-09_ACHP_version.pdf.
- EOP. (2012). *Continuing The Progress in Tribal Communities: 2012 White House Tribal Nations Conference*. Washington, DC: The White House. Retrieved from http://www.whitehouse.gov/sites/default/files/wh_tnc_accomplishments_report_final.pdf.pdf.
- Eschenfelder, K. R. (2009). Book Review of Intellectual Property and Traditional Cultural Expressions in a Digital Environment. Retrieved from <http://kreschen.wordpress.com>.
- ESRI. (2009). *Tribal/Indigenous Program of the 2009 ESRI User Conference: Protecting Tribal Lands and Resources, Gathering Community Knowledge, GIS for Tribal Government, Preserving Indigenous Culture*. Paper presented at the ESRI User Conference, Redlands, CA.
- ESRI. (2009). Tribal GIS: GIS Best Practices. July 2009. Accessed April 15, 2015. Available at: <http://www.esri.com/library/bestpractices/tribal-gis.pdf>.
- ESRI. (2015a). What is GIS? Webpage. Accessed April 13, 2015. Available at: <http://www.esri.com/what-is-gis/>
- ESRI. (2015b). A Spatial Perspective: Integrating GIS into the Decision-Making Process. Accessed April 15, 2015. Available at <http://www.esri.com/news/arcuser/1008/decisions.html>

- Farivar, C. (2014). The airborne panopticon: How plane-mounted cameras watch entire cities. Retrieved from Ars Technica website: <http://arstechnica.com/tech-policy/2014/07/a-tivo-for-crime-how-always-recording-airborne-cameras-watch-entire-cities/>.
- Ferrera, G. R., Lichtenstein, S. D., Reder, M.E., August, R., and Schiano, W.T. (2001). *Cyberlaw: Text and Cases*. Mason, OH: South-Western College Publishing.
- FGDC. (1999). *NSGIC/FGDC Framework Survey; Tribal*. Washington, DC: Federal Geographic Data Committee, US Department of the Interior. Retrieved from http://www.fgdc.gov/framework/survey_results/samples/html/tribla.html.
- FGDC. (2005). *Guidelines for Providing Appropriate Access to Geospatial Data in Response to Security Concerns*. Washington, DC: Federal Geographic Data Committee. Retrieved from <https://http://www.fgdc.gov/policyandplanning/AccessGuidelines.pdf>.
- FGDC, OGC, & GeoDataAlliance. (2006). *Geospatial Digital Rights Management, Final Report*. Washington, DC: Federal Geographic Data Committee, Geodata Alliance, and Open Geospatial Consortium. Retrieved from <https://http://www.fgdc.gov/grants/2003CAP/FinalReports/151-03-2-VA-FinalReport.pdf>.
- Flaherty, D.H. (1989). *Protecting Privacy in Surveillance Societies: The Federal Republic of Germany, Sweden, France, Canada, and the United States* (Chapel Hill, North Carolina: University of North Carolina Press).
- Flathead Joint Board of Control v. US Department of the Interior, 2004 WL 601803 (309 F.Supp.2d 1217). Decided Feb. 3, 2004 by US District Court, D. Montana, Missoula Division.
- Fletcher, M. L. M. (2004-2005). Theoretical Restrictions on Sharing of Indigenous Biological Knowledge: Implications for Freedom of Speech in Tribal Law. *Kansas Journal of Law & Public Policy*, 14(3), 525-560.
- Florida v. Riley. 488 U.S. 445 (1988).
- Florini, A.M. and Dehqanzada, Y.A. (2001). The Global Politics of Commercial Observation Satellites In Baker, J.C., O'Connell, K.M., and Williamson, R.A. (eds.). *Commercial Observation Satellites: At the Leading Edge of Global Transparency* (Santa Monica, CA: RAND and ASPRS).
- FNIGC. (2014). *Ownership, Control, Access and Possession (OCAP™): The Path to First Nations Information Governance*. Ottawa, Canada: The First Nations Information Governance Centre. Retrieved from http://fnigc.ca/sites/default/files/docs/ocap_path_to_fn_information_governance_en_final.pdf.
- FNIGC. (2015). The First Nations Principles of OCAP, from <http://fnigc.ca/ocap.html>.
- Foucault, M. (1977). *Discipline and punish*. Translated by Alan Sheridan. New York, New York: Vintage Books.
- Foust, J. (2014a). The commercial remote sensing boom. Retrieved from The Space Review website: <http://www.thespacereview.com/article/2534/1>.
- Foust, J. (2014b). Small satellites, small launchers, big business. Retrieved from The Space Review website: <http://www.thespacereview.com/article/2577/1>.

- Fox, Jefferson (2002). Siam Mapped and Mapping in Cambodia: Boundaries, sovereignty, and indigenous conceptions of space. *Society and Natural Resources* 15:65-78.
- Fox, Jefferson (2015). From "Economic Man" to Behavioral Economics. Retrieved from <https://hbr.org/2015/05/from-economic-man-to-behavioral-economics>
- Fox, Jefferson, Suryanata, K., & Hershock, P. (2005). *Mapping Communities: Ethics, Values, Practice*. Honolulu, Hawaii: East-West Center.
- Fox, Justin. (2015). "From 'Economic Man' to Behavioral Economics." In Harvard Business Review Blog. Cambridge, MA: Harvard Business Review.
- Friedman, J. (2002/2003). Student Note: Prying Eyes in the Sky: Visual Aerial Surveillance of Private Residences as a Tort. 4 Colum. Sci. & Tech. L. Rev. 4.
- Friere, P. (1968). *Pedagogy of the Oppressed*. New York, New York: The Seabury Press.
- Gabriele, M. D. (2001). How Open Will the Skies Really Be? In Baker, J.C., O'Connell, K.M., and Williamson, R.A. (eds.). *Commercial Observation Satellites: At the Leading Edge of Global Transparency*. Santa Monica, CA: RAND and ASPRS.
- Gabrynowicz, J. I. (1996). Commercial High-Altitude Unpiloted Aerial Remote Sensing: Some Legal Considerations. *Photogrammetric Engineering & Remote Sensing*, 62(3), 275-278.
- Gabrynowicz, J. I. (1999a). Expanding Global Remote Sensing Services: Three Fundamental Considerations, In Proceedings of the Workshop on Space Law in the Twenty-First Century (UN).
- Gabrynowicz, J.I. (1999b). Defining Data Availability for Commercial Remote Sensing Systems: Under United States Federal Law.
- Gabrynowicz, J. I. (2004). *Geospatial Today*. (March-April 2004): 43-44.
- Gabrynowicz, J. I. (2005). *Position Paper*. Paper presented at the Proceedings United Nations/Brazil Workshop on Space Law: Dissemination and Developing International and National Space Law: The Latin American and Caribbean Perspective, New York, New York.
- Galanda, G. S. (2010). The Federal Indian Consultation Right: A Frontline Defense Against Tribal Sovereignty Incursion. *Federal Indian Lawyer, Special Issue*(Fall 2010).
- Galla, J., Buckley, D., & Koett, R. (1997). *GIS Implementation at the Squamish Nation*. Paper presented at the GIS'97 Natural Resource Symposium, Vancouver, B.C., Canada.
- Garner, B. A. (2001). *Black's Law Dictionary* (Second Pocket Edition ed.). St. Paul, Minnesota: West Group.
- GDSC. (1994). *Data Distribution Policy*. Lakewood, CO: BIA Geographic Data Service Center.
- Gee, R. (2014, October 20-24). *Overview of Tribal Quality Assurance/Quality Control Work in EPA Region 6, Presentation*. Paper presented at the 2014 Quality Assurance Conference, Dallas, TX.
- Geer, K. (1991). The Constitutionality of Remote Sensing Satellite Surveillance in Warrantless Environmental Inspections. *Fordham Envtl. L. Rep* 3: 43.
- Gellman, R. (1995). Twin Evils: Government Copyright and Copyright-like Controls Over Government Information. *Syracuse Law Review*, 45, 1-68.

- Gellman, R. (2011). Location Privacy: Is Privacy in Public a Contradiction in Terms? Retrieved from <https://geodatapolicy.wordpress.com/2011/02/21/is-privacy-in-public-a-contradiction-in-terms/>.
- Gellman, R. (2012a). Legislating Privacy after U.S. v. Jones: Can Congress Limit Government Use of New Surveillance Technologies. Retrieved from <http://wilsoncommonslib.org/2012/01/25/285/>.
- Gellman, R. (2012b). Nader, Onassis, and Jones: Privacy in Public and Limits of the Private Sector. Retrieved from <http://wilsoncommonslib.org/2012/02/09/nader-onassis-and-jones-privacy-in-public-and-limits-on-the-private-sector/>.
- Gellman, R. (2015). Crowdsourcing, Citizen Science, and the Law: Legal Issues Affecting Federal Agencies. Washington, DC: Commons Lab of the Wilson Center.
- Getches, D. H. (1996). Conquering the Cultural Frontier: The New Subjectivism of the Supreme Court in Indian Law. *California Law Review*, 84(6), 1573-1655.
- Getches, D. H., Wilkinson, C. F., & Williams, R. A. J. (1998). *Cases and Materials on Federal Indian Law* (Fourth Edition ed.). St. Paul, MN: West Group.
- Getter, J. R. (1985). *Indian Integrated Resource Information Program (IIRIP)*. Paper presented at the Geographic Information Systems in Government, Springfield, Virginia.
- Getter, J. R., & Bonner, W. J. (1986). *GIS in Support of the Indian Integrated Resource Information Program*. Paper presented at the Geographic Information System Workshop, Atlanta, Georgia.
- Gidiere, P. S. (2013). *The federal information manual : how the government collects, manages, and discloses information under FOIA and other statutes* (Second ed.). Chicago, IL: American Bar Association.
- Ginsberg, W. (2014). *The Freedom of Information Act (FOIA): Background, Legislation, and Policy Issues*. Washington, DC: Congressional Research Service. Retrieved from <http://fas.org/sgp/crs/secretary/R42817.pdf>.
- GIS Technology Implementation Planning Committee (1985). *Department of the Interior GIS Implementation Planning Report*. Washington, DC: US DOI.
- Goes In Center, J. (2000a). *Native Geography*. Redlands, CA: ESRI.
- Goes in Center, J. (2000b). The Role of GIS in Aboriginal Resource Management, Retrieved on March 10, 2001 from http://www.innovativegis.com/jgic_bio.html.
- Goodchild, M. F. (1992). Geographical Information Science. *International Journal of Geographical Information Systems* 6:31-45.
- Goodchild, M.F. (1993). Ten years ahead: Dobson's automated geography in 1993. *The Professional Geographer*. 45:444-5.
- Goodchild, M. F. (1995). GIS and geographical research. In Pickles, J. (ed.) *Ground Truth: The Social Implications of GIS*. New York: Guilford Press: 31-50.
- Goodchild, M. F. (2001). A Geographer Looks at Spatial Information Theory. D.R. Montello (Ed.) *COSIT 2001, LNCS 2205*, pp. 1-3.
- Goodchild, M. F. (2003). Chapter 2: The Nature and Value of Geographic Information. In *Foundations of Geographic Information Science*. Duckham, Matt, Goodchild, Michael F., and Worboys, Michael F. (eds.). London, UK: CRC Press: Taylor & Francis Group. Pp., 19-31. 272 pages. ISBN 9780415307260.

- Goodchild, M. F. (2007). Citizens as voluntary sensors: Spatial data infrastructure in the world of Web 2.0, *International Journal of Spatial Data Infrastructure Research*, 2: 24-32.
- Goodchild, M. F., Yuan, M., and Covas, T. J. (2007). Towards a general theory of geographic representation in GIS. *International Journal of Geographic Information Science*. 21(3): 239-260.
- Goodchild, M. F. (2009). Geographic information systems and science: today and tomorrow. *Procedia Earth and Planetary Science*, 1, 1037-1043.
- Goodchild, M. F. (2010). Twenty Years of Progress: GIScience in 2010. *Journal of Spatial Information Science*, 1, 3-20.
- Goodchild, M. F. (2011). Challenges in geographical information science. Proceedings of the Royal Society. 467 (April 2011): 2431-2443. Doi: 10:1098/rspa.2011.0114.
- Goodchild, M. F. (2015). Two Decades on: Critical GIScience since 1993. *Canadian Geographer*, 59(7), 3-11.
- Goodchild, M. F., Egenhofer, J. M., & Fegas, R. (1998). Interoperating GISs: Report of the Specialist Meeting. Santa Barbara, CA: NCGIA: Varenus Project.
- Goodman, E. (2000). Protecting Habitat for Off-Reservation Tribal Hunting and Fishing Rights: Tribal Comanagement as a Reserved Right. *Environmental Law*, 30(Spring, 2000), 279-291.
- Gordon, V. (2013). Appropriation without Representation - the Limited role of Indigenous Groups in WIPO's Intergovernmental Committee on Intellectual Property and Genetic Resources, Traditional Knowledge and Folklore. *Vanderbilt Journal of Entertainment and Technology Law*, 16, 629-668.
- Gover, K. (2000). *Remarks of Kevin Gover, Assistant Secretary-Indian Affairs, Department of the Interior, at the Ceremony Acknowledging the 175th Anniversary of the Establishment of the Bureau of Indian Affairs, September 8, 2000*. Washington, DC: U.S. Department of the Interior. Retrieved from <http://www.tahtonka.com/apology.html>.
- Graber, C. B., & Burri-Nenova, M. (Eds.). (2008). *Intellectual Property and Traditional Cultural Expressions in a Digital Environment*. Cheltenham, UK: Edward Elgar.
- Greenburg, D. A. (1983). Third Party Access to Data Obtained via Remote Sensing: International Legal Theory Versus Economic and Political Reality. *Case W. Res. J. Int'l L.*, 15.
- Griswold v. Connecticut, 381 U.S. 479 (1965).
- Grumbles, B. H., & Jorgensen, C. J. (2005). *Records, Information, and data generated under EPA Assistance Agreements*. Washington, DC: US Environmental Protection Agency.
- GSA. (2015). Privacy Policy and Procedures. Retrieved April 27, 2015, from <http://www.gsa.gov/portal/content/104246>.
- Guest, R. (2012). Tribal Supreme Court Project: Ten Year Report (Ot01-Ot10). *American Indian Law Journal* 1(1): 28-78.
- Guiao, R. C. (2012). How Tribal Water Rights are Won in the West: Three Case Studies from the Northwest. *American Indian Law Review*, 37(1), 283-322. doi: 10.2307/41940647.

- Gus, J. (2014). Gaming Sovereignty? A Plea for Protecting Worker's Rights While Preserving Tribal Sovereignty. *California Law Review*, 102(6).
- Hall, A. (2014). "Gi Science, Not Giscience." *Journal of Spatial Information Science*, 9: 129-31.
- Hall, D. (1996). *Guidelines for Integrated Resource Management Planning in Indian Country*. Washington, DC: BIA Office of Trust Responsibilities.
- Hall, D. (2001). *Guidelines for Integrated Resource Management in Indian Country*. Washington, DC: BIA Office of Trust Responsibilities.
- Hamby, Chris. (2005). Native American press freedom: a developing story. August 8, 2005. First Amendment Center Online, Available at <http://www.firstamendmentcenter.org/news.aspx?id=15639>
- Hammitt, H. A., Rotenberg, M., Verdi, J. A., & Zaid, M. S. (Eds.). (2008). *Litigation Under the Federal Open Government Laws 2008*. Washington, DC: EPIC Publications.
- Hanley, C. (2000). Regulating Commercial Remote Sensing Satellites Over Israel: A Black Hole in the Open Skies Doctrine? *Administrative Law Review* 52: 423.
- Hansen, S. A. and VanFleet, J.W. (2003). *Traditional Knowledge and Intellectual Property: A Handbook on Issues and Options for Traditional Knowledge Holders in Protecting their Intellectual Property and Maintaining Biological Diversity*. New York: American Association for the Advancement of Science.
- Hanson, R. (1995). Indian Burial Grounds for Nuclear Waste. *Multinational Monitor*. Retrieved from http://www.multinationalmonitor.org/hyper/issues/1995/09/mm0995_07.html.
- Hardin, R. W. (2000). Remote Sensing Satellite Market Pits Industry Against U.S. Policy. OE Reports, accessed June 24, 2004. <http://www.spie.org/app/Publications/magazines/oearchive/may/may99/cover1.html>.
- Harding, S. (2000). *Cultural Secrecy and the Protection of Cultural Property*. Washington, DC: Society of American Archaeology.
- Hardzinski, C. (1999, April 20). GIS Coordinator for Midwest Regional Office, Bureau of Indian Affairs.
- Hardzinski, C. (2000). *Challenges to GIS Use in Indian Country*. Paper presented at the Wisconsin Land Information Association Annual Conference, Lake Geneva, Wisconsin.
- Hardzinski, C., Westerfield, G., Crowder, C., Henefeld, L., Marenger, D., & Raber, S. (1993). *Strategic Implementation Plan for the Geographic Data Service Center*. Lakewood, CO: BIA GDCS.
- Harjo, L. L. (2012). *Muscogee (Creek) Nation: Blueprint for a seven generation plan*. University of Southern California, Ann Arbor. Retrieved from <http://search.proquest.com.ezproxy.library.wisc.edu/docview/1026571029?accountid=465>
http://sfx.wisconsin.edu/wisc?url_ver=Z39.88-2004&rft_val_fmt=info:ofi/fmt:kev:mtx:dissertation&genre=dissertations+%26+theses&sid=ProQ:ProQuest+Dissertations+%26+Theses+Global&atitle=&title=Muscogee+%28Creek%29+Nation%3A+Blueprint+for+a+seven+generation+plan&

- [issn=&date=2012-01-01&volume=&issue=&spage=&au=Harjo%2C+Laura+Lea&isbn=9781267443410&jtitle=&btittle=&rft_id=info:eric/&rft_id=info:doi/](#) ProQuest Dissertations & Theses Global database.
- Harley, J. B. (1988). 2000. *Secrecy and silences: the hidden agenda of state cartography in early modern Europe*. 40(111-130).
- Hartman, J. (2001). GIS and Preservation of Tribal Culture. *Native Geography*, 2, 20-21.
- Harvey, F. (2003a). Developing Geographic Information Infrastructures for Local Government: The Role of Trust. *Canadian Geographer*, 47(1), 28-36.
- Harvey, F. (2003b). *How Do Local Governments Share and Coordinate Geographic Information? Results from Research in the United States*. Paper presented at the Proceedings of the 21st International Cartographic Conference (ICC), Durban, South Africa.
http://icaci.org/files/documents/ICC_proceedings/ICC2003/Papers/217.pdf.
- Harvey, F., & Tulloch, D. (2000). *How do Local Government Share and Coordinate Geographic Information? Results from Research in the United States*. Paper presented at the 10th EC GIS & GIS Workshop, ESDI State of the Art, Warsaw, Poland. http://www.ec-gis.org/Workshops/10ec-gis/papers/25june_harvey.pdf.
- Harvey, F., & Tulloch, D. (2006). Local government data sharing: Evaluating the foundations of spatial data infrastructures. *International Journal of Geographic Information Science*, 20(7), 743-768.
- Haskew, D. C. (2000). Federal Consultation With Indian tribes: The Foundation of Enlightened Policy Decisions, or Another Badge of Shame? *American Indian Law Review*, 24, 21-31.
- He, P. (1995). *GIS Implementation Experience in Wisconsin Winnebago Nation*. Paper presented at the ESRI Annual User Conference, San Diego, CA.
<http://proceedings.esri.com/library/userconf/proc95/to300/p293.html>.
- Herd, G. (1990). Secret Societies and Secret Collectives. *Oceania* 60(4): 360-381.
- International Institute for Indigenous Resource Management (IIIRM). 2002. Intellectual Property Workshop. Available at <http://www.iiirm.org/publications/Articles%20Reports%20Papers/Articles%20Dream%20Weaver%20Files/articles.htm>.
- Heydt, N. J. (2003). Justice in a Changed World: The Fourth Amendment Heats Up: The Constitutionality of Thermal Imaging and Sense-Enhancing Technology – *Kyllo v. United States*. 29 Wm. Mitchell L. Rev. 981.
- Hilgartner, S., & Brandt-Rauf, S. I. (1994). Data Access, Ownership and Control: Toward Empirical Studies of Access Practices. *Knowledge: Creation, Diffusion, Utilization*, 15(4), 355-372.
- Hilgartner, S. (1997). *Access to data and IP: Scientific exchange in genome research*. Paper presented at the IP rights and research tools in molecular biology: Summary of a workshop held at the National Academy of Science, February 15-16, Washington, DC.
- Hill, S. (2007). Sunshine in Indian Country: A Pro-FOIA View of Klamath Water Users. *American Indian Law Review*, 32(2007/2008).

- Hirsche, E. M. (2007, November 26). [Re: H.R. 3994, Indian Self-Determination and Education Assistance Act].
- Hodel, D. P. (1985). *Memorandum on Coordination of Digital Cartography Activities, June 28, 1985*. Washington, DC: USDOJ Office of the Secretary.
- Holder, E. (2009). *Memorandum for Heads of Executive Departments and Agencies concerning the Freedom of Information Act*. Washington, DC: Office of the Attorney General, US Department of Justice. Retrieved from <http://www.justice.gov/sites/default/files/ag/legacy/2009/06/24/foia-memo-march2009.pdf>.
- Holdren, J. (2013). *Increasing Access to the Research Results of Federally Funded Scientific Research*. Washington, DC: EOP Office of Science and Technology Policy. Retrieved from http://www.whitehouse.gov/sites/default/files/microsites/ostp/ostp_public_access_memo_2013.pdf.
- Hough, G.A., and Ray, C. (2000). Publishing What You Need to Know About Copyrights and Contracts. *General Practice, Solo & Small Firm Section*, 17(3):1-8. <http://www.abanet.org/genpractice/magazine/am2000/am00hough.html> (Accessed October 31, 2001).
- Hoversten, M. R. (2001). U.S. National Security and Government Regulation of Commercial Remote Sensing From Outer Space. 50 A. F. L. Rev. 253.
- Huberman, A. M., & Miles, M. B. (Eds.). (2002). *The Qualitative Researcher's Companion*. Thousand Oaks, CA: Sage.
- Hughes, J. (2012). Traditional Knowledge, Cultural Expression, and the Siren's Call of Property. *San Diego Law Review*, 49, 1215-1266.
- Hutt, S., & Lavalley, J. (2005). Tribal Consultation: Best Practices in Historic Preservation. (May 2005), 1-69. Retrieved from http://www.nathpo.org/PDF/Tribal_Consultation.pdf.
- IAPAD. (2015). Integrated Approaches to Participatory Development Homepage. Accessed April 15, 2015. Available at: <http://www.iapad.org/>.
- IPinCH. (2015). Intellectual Property Issues in Cultural Heritage: Theory, Practice, Policy and Ethics Website. Retrieved from <http://www.sfu.ca/ipinch/> on June 7, 2015.
- Iraola, R. (2002). Dedication to the Small Town Attorney: New Detection Technologies and the Fourth Amendment, S.D. L. Rev 47:8.
- ISDEAA, Public Law 93-638, 25 CFR Part 900. (1996). Indian Self-Determination and Education Assistance Act, as Amended. U.S. Department of the Interior, Bureau of Indian Affairs.
- ITU. (2014). International Telecommunications Union. The World in 2014: ICT Facts and Figures. Accessed April 13, 2015. Available at <http://www.itu.int/en/ITU-D/Statistics/Documents/facts/ICTFactsFigures2014-e.pdf>.
- Jaszi, P. (2009). Traditional Culture: A Step Forward for Protection in Indonesia. *Digital Commons @ American University Washington College*, 1-127.
- Jensen, John R. (2000). Remote Sensing of the Environment: Earth Resources Perspective, Clarke, K.C. (ed.) (New York: Prentice Hall).

- Jensen, J. (2012). First Americans and the Federal Government: Tribal Consultation, Agriculture, and a New Government-to-Government Relationship at the Start of the Twenty-First Century. *Drake Journal of Agricultural Law*, 17(Summer, 2012).
- Jewell, S. (2014). *Order No. 3335: Reaffirmation of the Federal Trust Responsibility to Federally Recognized Indian Tribes and Individual Indian Beneficiaries* Pablo, Montana and Washington, DC: U.S. Department of the Interior. Retrieved from <http://www.doi.gov/news/loader.cfm?csModule=security/getfile&pageid=561791>.
- Joffe, B. (2005). *Open Data Consortium Project*. Paper presented at the 2005 ESRI Annual User Conference San Diego, CA. <http://proceedings.esri.com/library/userconf/proc05/papers/pap2484.pdf>.
- Johnson, J. (2012). Place-based learning and knowing: critical pedagogies grounded in Indigeneity. *GeoJournal*, 77(6), 829-836. doi: 10.1007/s10708-010-9379-1.
- Johnson, J. T. (2008). Kitchen Table Discourse: Negotiating the “Tricky Ground” of Indigenous Research. [Article]. *Part of special issue: Mainstreaming Indigenous Geographies*, 32(3), 127-137.
- Johnson, L. B. (1968). *Special Message to Congress on the Problems of the American Indian: The Forgotten American*, March 6, 1968. Gerhard Peters and John T. Woodley. Retrieved from <http://www.presidency.ucsb.edu/ws/?pid=28709>.
- Jones, Q. M., Moore, R. F., & Lockwood, D. (2014). Answers to Questions on the BIA's Mapping and GIS Efforts Independent of and in Cooperation with the Tribes. In D. Cole & I. Sutton (Eds.), *Mapping Native America: Cartographic Interactions Between Indigenous Peoples, Government and Academia* (Vol. I: Cartography and Government, pp. 336-341). Lexington, KY: CreateSpace Independent Publishing Platform.
- Jozuka, E. (2015). How Drones could Help an Indigenous Community Fight Mining and Deforestation. *Motherboard*. Retrieved from <http://motherboard.vice.com/read/how-drones-could-help-an-indigenous-community-fight-mining-and-deforestation>.
- Juliano, A. C. (2003). Conflicted Justice: The Department of Justice's Conflict of Interest in Representing Native American Tribes. *Georgia Law Review*, 37(Summer, 2003).
- Kahn, H. J. (1997). *A Comparative Study of Tribal Implementations of Geographic Information Systems in Wisconsin*. (Master of Science), University of Wisconsin-Madison, Madison, WI.
- Kalton, G., & Anderson, D. W. (1986). Sampling rare populations. *Journal of the Royal Statistical Society Series A (General)*, 149(1), 65-82.
- Kar, B., Crowsey, R. C., & Zale, J. J. (2013). The Myth of Location Privacy in the United States: Surveyed Attitude Versus Current Practices. *Professional Geographer*, 65(1), 47-64. doi: 10.1080/00330124.2012.658725.
- Karjala, D. (1995). Copyright in Electronic Maps. *Jurimetrics*, 35(4), 395-416.
- Katz v. United States. 389 U.S. 347 (1967).
- Kelley, K., & Francis, H. (2005). Traditional Navajo Maps and Wayfinding. [Article]. *American Indian Culture & Research Journal*, 29(2), 85-111.

- Kelly, K.C. (1995). Warrantless Satellite Surveillance: Will Our 4th Amendment Privacy Rights Be Lost in Space? *J. Marshall J. Computer & Info. L.* 13: 729.
- Kemper, K. R. (2014). Environmental Information Policy and Secrets About Jaguars: Why Trusting Arizona tribes Is the Best Strategy for Jaguar Protection. *Arizona Journal of Environmental Law & Policy*, 4(1), 187-236.
- Kerr, O. S. (2012). The Mosaic Theory of the Fourth Amendment. *Mich. L. Rev.*, 111.
- Kerski, J. J., & Clark, J. (2012). *The GIS Guide to Public Domain Data*. Redlands, CA: ESRI Press.
- Kim, Y. (2008). *Statutory Interpretation: General Principles and Recent Trends*. (97-589). Washington, DC: Congressional Research Service. Retrieved from <https://openers.com/document/97-589/>.
- Klamath Water Users Protective Ass'n, Plaintiff-Appellant, v. United States Department of the Interior and Bureau of Indian Affairs, 189 F.3d 1034, at 1040 (9th Cir 1999), cert. granted, 121 S.Ct. 28 (2000).
- Kleckner, R. L. (1986). *Memorandum from Chairman, IDCCC GIS Task Force on 5-year GIS Research Plan*. Washington, DC: US DOI.
- Knoedler, E. (2012). Satellites and Municipalities: One Town's Use of Google Earth for Residential Surveillance. *Touro Law Review*, 28.
- Kunesh, P. H. (2014). Mapping the Legal Frontier of Indian Policy in the United States. In D. G. Cole & I. Sutton (Eds.), *Mapping Native America: Cartographic Interactions Between Indigenous Peoples, Government, and Academia*. (Vol. I: Cartography and Government, pp. 442). Lexington, Kentucky: CreateSpace Independent Publishing Platform.
- Kwan, M.-P., & Schmitz, B. C. (2002). *Privacy Protection and Accuracy of Spatial Information: How Effective are Geographical Masks?* Paper presented at the Conference on Geographical Information Science, Boulder, Colorado. <http://campus.esri.com/campus/library/bibliography/RecordDetail.cfm?ID=24981>.
- Kyllo v. United States, 533 U.S. 27 (2001).
- Labin, T. (2001). "Where Have Ethics and the Trust Gone for Indians? The Water Rights Example", unpublished (Native American Rights Fund), p. 133. Brief reference to it found in Sheppard 31 *Envtl. L.* 901, 137.
- LaFrance, M. (2011). *Copyright Law in a Nutshell*. St. Paul, MN: Thomson Reuters.
- Laituri, M. (1998). *Marginal Societies and Geographic Information Systems*. Paper presented at the Empowerment, Marginalization, and Public Participation GIS Meeting, October 14-17, 1998, Santa Barbara, CA. <http://www.ncgia.ucsb.edu/varenius/ppgis/papers/laituri.html>.
- Laituri, M. (2011). Indigenous People's Issues and Indigenous Uses of GIS. In T. Nyerges, H. Couclelis & R. B. McMaster (Eds.), *The SAGE Handbook of GIS and Society* (pp. 202-221). Los Angeles, CA: SAGE.
- Lasswell, H. D. (1970). The Emerging Conception of the Policy Sciences. *Policy Sciences*, 1, 3-14.
- Lear, P. W. and Jones, C.D. (1999). Access to Indian Land and Title Records: Freedom of Information, Privacy, and Related Issues.

- Leary, M. G. (2012). The Missed Opportunity of *United States v. Jones*: Commercial Erosion of Fourth Amendment Protection in a Post-Google Earth World. *University of Pennsylvania Journal of Constitutional Law*, 15.
- Leitner, M., & Curtis, A. (2005). Cartographic Guidelines for Geographically Masking the Locations of Confidential Point Data. *Cartographic Perspectives*, 49, 22-39.
- Leonard, L. (1997). Sovereignty, Self-Determination, and Environmental Justice in Mescalero Apache's Decision to Store Nuclear Waste. *Boston College Environmental Affairs Law Review*, 24(3).
- Lessig, L. (1999). *Code and Other Laws of Cyberspace*. New York: Basic Books.
- Lewerenz, D. (2008). The Cherokee Nation Freedom of Information Act: Context and Analysis for an Open-Records Law in Indian Country. Paper presented at the annual meeting of the Association for Education in Journalism and Mass Communication, Marriott Downtown, Chicago, IL. Retrieved from http://citation.allacademic.com/meta/p272626_index.html.
- Lewis, G. M. (1998). *Cartographic Encounters: Perspectives on Native American Mapmaking and Map Use*. Chicago, IL: University of Chicago Press.
- Lewis, O. Y. I. (2011). Tribal Law Enforcement Stops at the Reservation Boundary.
- Lian, X. (2012). Contemporary Observation on International Protection of Cultural Property. *Contemporary Readings L. & Soc. Just*, 4, 855-865.
- Licensing of Private Land Remote-Sensing Space Systems; Interim Final Rule, 15 CFR Part 960.
- Lillesand, T.M., and Kiefer, R.W. 2000. Remote Sensing and Image Interpretation, 4th Edition (New York: John Wiley & Sons, Inc.).
- Lindh, K., & Haider, J. (2010). Development and the Documentation of Indigenous Knowledge: Good Intentions in Bad Company? *Libri*, 60(March), 1-14.
- Lipton, J. (2003). A Framework for Information Law and Policy. *Oregon Law Review* 82: 695.
- Litman, J. (2000a). *Digital Copyright*. Amherst, New York: Prometheus Books.
- Litman, J. (2000b). Information Privacy, Information Property, *Stan L. Rev.* 52: 1283.
- Lockwood, D. (2009). *BIA Development of a Geospatial Portal Program*. Paper presented at the ESRI Federal User's Conference, Washington, DC. http://proceedings.esri.com/library/userconf/feduc09/papers/lockwood_080219_finalgeospatial_portal.pdf.
- Long, P. (2012). Can Government and Industry Conspire to Thwart FOIA? A Critical Analysis of Critical Mass III. *Journal of High Technology Law*, 13.
- Longley, P.A., Goodchild, M.F., Maguire, D. J., and Rhind, D.W. (1999). *Geographic Information Systems and Science*. Third Edition. Hoboken, NJ: Wiley.
- Louis, R. P. (2004). Indigenous Hawaiian Cartographer: In Search of Common Ground. *Cartographic Perspectives*, 48(Spring), 7-23.
- Louis, R. P. (2007). Can You Hear Us Now? Voices from the Margin: Using Indigenous Methodologies in Geographic Research. *Geographical Research*, 45(2), 130-139. doi: 10.1111/j.1745-5871.2007.00443.x.
- Louis, R. P. (2012). Timely, tasteful, rigorous, and relevant. *The Canadian Geographer/Le Géographe canadien*, 56(2), 288-289. doi: 10.1111/j.1541-0064.2012.00431.x.

- Louis, R. P., & Grossman, Z. (2010). Declaration of Key Questions about Research Ethics with Indigenous Communities. Chicago, IL: AAG Indigenous Peoples Specialty Group. Retrieved from <http://www.indigenousgeography.net/ipsdg.shtm>, accessed June 7, 2015.
- Louis, R. P., Johnson, J. T., & Pramono, A. H. (2012). Introduction: Indigenous Cartographies and Counter-Mapping. *Cartographica: The International Journal for Geographic Information and Geovisualization*, 47(2), 77-79. doi: 10.3138/carto.47.2.77.
- Lum, A. L. (1999). *Sacred Sites and Sacred Secrets: Accommodating confidentiality under the Freedom of Information Act*. Paper presented at the Contemporary Issues in Cultural Resource Protection, Tempe, AZ.
- Madsen, K. (2008). Indigenous Research, Publishing, and Intellectual Property. *American Indian Culture & Research Journal*, 32(3), 89-105.
- Madsen, W. (1995). *Protecting Indigenous Peoples' Privacy from "Eyes in the Sky"*. Paper presented at the Proceedings of the Conference on Law and Information Policy for Spatial Databases, October 28-29, 1994, Orono, Maine. 223-231. <http://www.spatial.maine.edu/tempe/madsen.html>, accessed June 20, 2004.
- Mann, H. (2005). Intellectual Property Rights, Biodiversity and Indigenous Knowledge: A Critical Analysis in the Canadian Context. *International and Environmental Law and Policy*, 1-19.
- Mannel, S., Winkelman, K., Phelps, S., & Fredenberg, M. (2007). Applications of a GIS Program to Tribal Research: Its Benefits, Challenges and Extensions to the Community. *Journal of Geoscience Education*, 55(6), 574-580.
- Marchand, M., & Winchell, R. (1992). Tribal implementation of GIS: A case study of planning applications with the Colville Confederated tribes. *American Indian Culture and Research Journal*, 16(4), 175-183.
- Marchand, M., and Winchell, R. (1994). Tribal Implementation of GIS, *Cultural Survival Quarterly* (Winter 1994): 49-51.
- Marcus, G. E. (1995). Censorship in the Heart of Difference: Cultural Property, Indigenous Peoples' Movements, and Challenges to Western Liberal Thought. In *Censorship and Silence: Practices of Cultural Regulation*. Post, R. C., ed., pp. 221-242.
- Markoff, J. (2002). U.S. Agency's Computers Didn't Protect Indian Fund. *New York Times*, 3. Retrieved from February 26, 2002 website: <http://www.nytimes.com/2002/02/26/technology/26INDI.html?pagewanted=print>
- Marozas, B. A. (1991). The Role of geographic information systems in American Indian land and water rights litigation. *American Indian Culture & Research Journal*, 15(3), 77-93.
- Marozas, B. A. (1993). *A culturally relevant solution for the implementation of geographic information systems in Indian Country*. Paper presented at the Proceedings of the Thirteenth Annual ESRI User Conference, Palm Springs, CA.
- Marozas, B. A. (1996). *Enhancing Tribal Integrated Resource Management Plans by Integrating Traditional Knowledge with Geographic Information System Technology*. Paper presented at the GIS'96, Vancouver, British Columbia, Canada.

- Marozas, B. A., & Goes In Center, J. (1998). *Using Spatial Information Technology To Fuse Traditional Native and Modern Resource Management Strategies*. Paper presented at the Circles of Wisdom Historical Reminders, Contemporary Issues, US Global Change Research Program, Native Peoples, Native Homelands, Climate change Workshop, Albuquerque, NM.
- McAllister, B. (2002a, March 31, 2002.). CU Prof: Supreme Court Hurting Indians. *Denver Post Capitol*.
- McCarthy, R. (2004). The Bureau of Indian Affairs and the Federal Trust Obligation to American Indians. *BYU Journal of Public Law*, 19(2004).
- McDermott, P., Johnson, R. H., Sobel, D. L., Fuchs, M., Dalglish, L., Harshaw, K. G., . . . Fisher, J. (2004, July 8). Coalition Letter to Senators Campbell and Inouye re: S. 297, Federal Acknowledgement Process Reform Act of 2003.
- McShain, H. K. (2002). Not Quite Bradbury's Fahrenheit 451: The Uncertain Future of Sense-Enhancing Technology in the Aftermath of United States v. Kyllo. 105 W. Va. L. Rev. 1.
- Meier, P. (2012). Google Inc. + World Bank = empowering citizen cartographers? Retrieved from <http://irevolution.net/2012/01/20/google-inc-world-bank-empowering-citizen-cartographers/>.
- Mense, A. (2011). Note 5: We could Tell You, But Then We'd Have to Kill You: How Indigenous Cultural Secrecy Impedes the Protection of Natural Cultural Heritage in the United States. *Chicago-Kent Journal of International and Comparative Law*, 11, 1-20.
- Meyer, R. (2014). Google Owns a Satellite Now. Retrieved from <http://www.theatlantic.com/technology/archive/2014/06/why-google-bought-satellite-startup-skybox/371531/>
- Meyers, R. (1993). Technology Serves Traditional Values: The Nez Perce tribe is Applying Contemporary Science and Technology to Managing its Natural Resources. *Cultural Survival Quarterly*, 17(1 (Spring 1993)), 35-37.
- Middleton, E. R. (2008). *"We Were Here, We Are Here, We Will Always Be Here": A Political Ecology of Healing in Mountain Maidu Country*. (Doctor of Philosophy), University of California, Berkeley, CA.
- Miller, R. J. (2005). The Doctrine of Discovery in American Indian Law. *Idaho Law Review* 42(1): 69-76.
- Mohamed, M., & Ventura, S. J. (1998). Use Of Information Technologies To Model Indigenous Tenure Concepts. *The Land*, 2(3), 81-100.
- Mohamed, M., & Ventura, S. J. (2000). Use of Geomatics and Rapid Appraisal for Mapping and Documenting Indigenous Tenure Systems. *Society and Natural Resources* 13(223-2236).
- Monette, R. (1994). A New Federalism for Indian tribes: The Relationship Between the United States and tribes in Light of Republican Democracy and Our Federalism. *Toledo L. Review*, 25.
- Monette, R. (1995). Governing Private Property in Indian Country: The Double-Edged Sword of the Trust Relationship and Trust Responsibility Arising Out of Early Supreme Court Opinions and the General Allotment Act. *New Mexico Law Review*, 25(1 (Winter 1995)), 35-64.

- Monette, R. (1996). Treating tribes as States under Federal Statutes in the Environmental Arena: Where Laws of Nature and Natural Laws Collide. *Vermont Law Review*, 21(1 (Fall 1996)), 111-144.
- Monette, R. (2005). Associate Professor, University of Wisconsin Law School. Private communication, September 12.
- Monmonier, M.S. (1996). *How to Lie with Maps*, 2nd ed. Chicago and London: University of Chicago Press.
- Monmonier, M. S. (2002). *Spying with maps: surveillance technologies and the future of privacy*. Chicago: University of Chicago Press.
- Monmonier, M. S. (2010). *[No] dig, [no] fly, [no] go: how maps restrict and control*. Chicago: The University of Chicago Press.
- Monserrat Filho, J. (2001). Why Isn't There an International Convention on Remote Sensing? Retrieved from <http://www.sbda.org.br/revista/Anterior/1718.htm> - 8.
- Moore, R. F. (2010). Geospatial Agenda in Indian Affairs. Presentation at 2010 ESRI User Conference. Retrieved April 16, 2015, , 2015, from <http://www.slideshare.net/rmckeon/geospatial-agenda-in-indian-affairs>.
- Morain, S., Case, J., & Tilley, K. (2001). Special Issue: Uses of Geospatial Technology by Tribal Government. *Photogrammetric Engineering & Remote Sensing*, 67(2 (February)).
- Moreland, J. W. (1991). American Indians and the Right to Privacy: A Psycho-Legal Investigation of the Unauthorized Publication of Portraits of American Indians. *American Indian Law Review*, 15(2), 237-277.
- Morrin, L. S. (1997). *Letter to Marty Burkholder, Wisconsin Department of Natural Resources re: tribal GIS data*. Minneapolis, MN: BIA Great Lakes Agency.
- Mouritsen, K. E. (2001). Memorandum to Assistant Secretary—Policy, Management and Budget from Karen E. Mouritsen, Acting Assistant Solicitor, Branch of General Legal Services-Division of General Law re: Freedom of Information Action Appeal of George E. Meyer (No. 98-075). Office of the Solicitor, U.S. Department of the Interior. June 5, 2001.
- Myers, R. (2014). *Considerations for Tribal Communities in the Collection and Security of Sensitive GIS Data*. National Indian Justice Center. Retrieved from <http://www.nijc.org/pdfs/TTAP/GISandTribalCulturalProperty.pdf>.
- Native Geography Magazine. 2000. Redlands, CA: ESRI, Inc. Available at <http://www.conservationpatial.org/native/native1.html>.
- Native Geography Magazine. 2001. Redlands, CA: ESRI, Inc.
- NAPA. (2009). Open Government Dialogue. Retrieved May 12, 2015, from <http://opengov.ideascale.com/a/index?id=4049>.
- NARF. (2013). Answers to Frequently Asked Questions. Retrieved March 11, 2013, 2013, from <http://www.narf.org/pubs/misc/faqs.html>.
- NASA. (2015). NGA Commercial Archive Data: Access to High-Resolution Data for NASA Earth Science Investigators. NASA Goddard Website. Retrieved from <http://cad4nasa.gsfc.nasa.gov/>.
- NCAI. (2014). Supreme Court Upholds Tribal Sovereign Immunity in Michigan v. Bay Mills. Washington, DC: National Congress of American Indians. Retrieved June

- 6, 2015, from <http://www.ncai.org/news/articles/2014/05/27/supreme-court-upholds-tribal-sovereign-immunity-in-michigan-v-bay-mills>.
- NCITAR. (2013a). *Conflict of Interest Protocols*. Washington, D.C.: National Commission on Indian Trust Administration and Reform, U.S. Department of the Interior. Retrieved from <http://www.doi.gov/cobell/commission/upload/ITC-conflict-of-interest-protocols-Draft-v2-9-x12.pdf>.
- NCITAR. (2013b). *The Federal Trust Responsibility: Draft 3-1*. Washington, DC: DOI. Retrieved from <http://www.doi.gov/cobell/commission/upload/3-1-Draft-Trust-Responsibility-Statement.pdf>.
- Nelson, S. H. (1997). *Letter to Ms. Beth Doolittle, Wisconsin DNR Bureau of Air Management re: GIS FOIA Request*. Minneapolis, WI: Bureau of Indian Affairs.
- Newland, B. (2013). A Retrospective on Federal Indian Policy During President Obama's First Term. *Indian Country Today*. Retrieved from Indian Country Today website: <http://indiancountrytodaymedianetwork.com/opinion/retrospective-federal-indian-policy-during-president-obama%E2%80%99s-first-term-147085>.
- Newton, N. J., Anderson, R., & others. (2012). *Felix Cohen's Handbook of Federal Indian Law* (2012 ed. ed.).
- Nissenbaum, H. F. (2010). *Privacy in Context: Technology, Policy, and the Integrity of Social Life*. Stanford, Calif: Stanford Law Books.
- Nixon, R. (1970). *President Nixon, Special Message to Congress on Indian Affairs, July 8, 1970*. Washington, DC. Retrieved from <http://www.epa.gov/owindian/pdf/president-nixon70.pdf>.
- NRC. (1999). A Question of Balance: Private Rights and the Public Interest in Scientific and Technical Databases. National Research Council. Committee for a Study on Promoting Access to Scientific and Technical Data for the Public Interest, Commission on Physical Sciences, Mathematics, and Applications (CPSA) Washington, D.C.: National Academy Press. Available at www.nap.edu/books/0309068258/html.
- NRC. (2000). *The Digital Dilemma: Intellectual Property in the Information Age*. National Research Council Committee on Intellectual Property Rights in the Emerging Information Infrastructure, Commission on Physical Sciences, Mathematics, and Applications. Washington, D.C.: National Academy Press. Retrieved from <http://www.nap.edu/books/0309064996/html>
- NRC. (2004). *Licensing geographic data and services*. National Research Council. Washington, D.C.: The National Academies Press.
- NRC. (2007a). 4.2 Indian Country Parcel Data *National Land Parcel Data: A Vision for the Future* (pp. 69-72). Washington, DC: National Academies Press.
- NRC. (2007b). *Putting People on the Map; Protecting Confidentiality with Linked Social-Spatial Data*. Washington, DC: National Academies Press.
- NWIFC. (2015). *Northwest Indian Fisheries Commission Exchange Network Success Story*. Washington, DC: National Environmental Information Exchange Network.
- O'Connell, K. (2011). *Alternative Futures: United States Commercial Satellite Imagery in 2020*. Washington, DC: Department of Commerce Commercial Remote Sensing Regulatory Affairs. Retrieved from <http://nsarchive.gwu.edu/NSAEBB/NSAEBB404/docs/37.pdf>.

- Obama, B. (2009a). *Presidential Memorandum for Heads of Executive Department and Agencies Concerning the Freedom of Information Act*, 74 *Fed. Reg.* 4683 (Jan. 21, 2009). Washington, DC: Executive Office of the President. Retrieved from <http://www.justice.gov/sites/default/files/oip/legacy/2014/07/23/presidential-foia.pdf>.
- Obama, B. (2009b). *Presidential Memorandum for the Heads of Executive Departments and Agencies concerning Transparency and Open Government*. Washington, DC: Executive Office of the President. Retrieved from <http://www.gpo.gov/fdsys/pkg/FR-2009-01-26/pdf/E9-1777.pdf>.
- Obama, B. (2009c). Remarks by the President During the Opening of the Tribal Nations Conference & Interactive Discussion with Tribal Leaders. *Briefing Room*. Retrieved from The White House website: <http://www.whitehouse.gov/the-press-office/remarks-president-during-opening-tribal-nations-conference-interactive-discussion-w>.
- Obama, B. (2009d). *Tribal Consultation: Memorandum for the Heads of Executive Departments and Agencies*. Washington, DC: Federal Register. Retrieved from <http://www.epa.gov/tp/pdf/tribal-consultation-memorandum-09.pdf>.
- Obama, B. (2013a). *Executive Order 13634, Making Open and Machine Readable the New Default for Government Information, May 9, 2013*. (78 FR 28111). Washington, DC: Executive Office of the President. Retrieved from <https://federalregister.gov/a/2013-11533> and <http://www.whitehouse.gov/the-press-office/2013/05/09/executive-order-making-open-and-machine-readable-new-default-government->.
- Obama, B. (2013b). *Executive Order 13647 Establishing the White House Council on Native American Affairs (June 26, 2013)*. (FR Doc. 2013-15942). Washington, DC: Federal Register. Retrieved from <http://www.gpo.gov/fdsys/pkg/FR-2013-07-01/pdf/2013-15942.pdf>.
- OMB. (1996). *Public Law 93-638: Indian Self-Determination and Education Assistance Act, As Amended: Regulations - Final Rule (25 CFR Part 900)*. Washington, DC: Office of Management and Budget. Retrieved from <http://www.bia.gov/cs/groups/mywvsp/documents/collection/idc017334.pdf>.
- OMB. (2002a). *Circular No. A-16 Revised, Coordination of Geographic Information and Related Spatial Data Activities: The National Spatial Data Infrastructure*. (Circular No. A-16 Revised). Washington, D.C.: Federal Geographic Data Committee. Retrieved from http://www.whitehouse.gov/omb/circulars_a016_rev_appc.
- OMB. (2002b). *Guidelines for Ensuring and Maximizing the Quality, Objectivity, Utility, and Integrity of Information Disseminated by Federal Agencies*, 67 *Federal Register* 8452 (Feb. 22, 2002). Washington, DC: Office of Management and Budget. Retrieved from <http://www.whitehouse.gov/sites/default/files/omb/assets/omb/fedreg/reproducibl e2.pdf>.
- OMB. (2005). *Guidance for Completing the Program Assessment Rating Tool*, March 2005. Washington, D.C: Office of Management and Budget. Available at www.whitehouse.gov/omb/part/fy2005/2005_guidance.doc

- OMB. (2010). *M-11-03, Issuance of OMB Circular A-16 Supplemental Guidance*. Washington, D.C. Retrieved from <http://www.whitehouse.gov/sites/default/files/omb/memoranda/2011/m11-03.pdf>.
- OMB. (2013a). *M-13-13 Memorandum on Open Data Policy - Managing Information as an Asset*. Washington, DC: OMB. Retrieved from <http://project-open-data.github.io/policy-memo/>.
- OMB. (2013b). *Supplemental Guidance on the Implementation of M-13-13 "Open Data Policy – Managing Information as an Asset"*. Washington, DC: Office of Management and Budget. Retrieved from <http://project-open-data.github.io/implementation-guide/>.
- Onsrud, H. J. (1994). Paper presented at the Proceedings of the Conference on Law and Information Policy for Spatial Databases, October 28-29, 1994, Orono, Maine.
- Onsrud, H.J. (1998). Access to Geographic Information in the United States. Free accessibility of geo-information in the Netherlands, the United States, and the European Community, Proceedings, Oct 2., Delft, Netherlands, 33-41.
- Onsrud, H. J. (2001). *Legal Access as a Necessary Prerequisite to Participatory Processes*. Varenius Project PPGIS. Santa Barbara, CA.
- Onsrud, H.J. (2005). SIE525 Information Systems Law Webcast, Lectures & PowerPoint Overheads. University of Maine-Orono. Available at <http://www.spatial.maine.edu/~onsrud/GISlaw.htm>.
- Onsrud, H. J. (2015). Personal communication regarding uniform law regime, May 31, 2015. Email on file with the author.
- Onsrud, H.J., Johnson, J. P., and X. Lopez. (1994). Protecting Personal Privacy in Using Geographic Information Systems, Photogrammetric Engineering and Remote Sensing, LX(9): 1083-1095.
- Onsrud, H.J., and Lopez, X.R. (1998). Intellectual Property Rights in Disseminating Digital Geographic Data, Products, and Services: Conflicts and Commonalities among European Union and United States Approaches. In eds. Masser, I., and Salge, F., *European Geographic Information Infrastructures: Opportunities and Pitfalls*. London: Taylor and Francis, 153-167.
- Onsrud, H. J., Azad, B., Brown, M., Nedovic-Budic, Z., Calkins, H., Godschalk, D., Wiggins, L. (1995). *Experiences in Acquisition, Implementation, and Use of GIS in U.S. Local Governments: A sampler of Academic Studies and Findings*. Paper presented at the Proceedings of the 1995 Annual Urban and Regional Information Systems Association, San Antonio, Texas.
- Onsrud, H. J., & Rushton, G. (1996). Institutions Sharing Geographic Information (pp. 1-41): NCGIA.
- Openshaw, S., & Goddard, J. (1987). Some implications of the commodification of information and the emerging information economy for applied geographic analysis. *Environment and Planning A*, 19, 1428-1438.
- Openshaw, S. (1991). A View on the crisis in geography: Or using GIS to put Humpty-Dumpty back together again. *Environment and Planning A*. 23:621-29.
- Openshaw, S. (1992). Further thoughts on geography and GIS: a reply. *Environment and Planning A*. 24:463-6.

- Openshaw, S. (1996). GIS and Society: a lot of fuss about very little that matters and not enough about that which does! In Harris, T., Weiner, D. (eds.). *GIS and Society: the social implications of how people, space, and environment are represented in GIS*. Scientific report for the Initiative-19 Specialist Meeting, 2-5 March 1996, Koininia Retreat Center, South Haven. NCGIA Technical Report 96-7. D.54-D.58. Santa Barbara, NCGIA.
- Orszag, P. R. (2009). *Memorandum for the Heads of Executive Departments and Agencies concerning the Open Government Directive* (M-10-06). Washington, DC: Office of Management and Budget. Retrieved from <https://http://www.whitehouse.gov/open/documents/open-government-directive>.
- OSTP. (2013). *Second U.S. Open Government National Action Plan, December 5, 2013*. Washington, DC: White House Office of Science and Technology Policy. Retrieved from https://http://www.whitehouse.gov/sites/default/files/docs/us_national_action_plan_6p.pdf.
- OSTP. (2014). *U.S. Open Data Action Plan, May 9, 2014*. Washington, DC: White House Office of Science and Technology Policy. Retrieved from https://http://www.whitehouse.gov/sites/default/files/microsites/ostp/us_open_data_action_plan.pdf.
- Owley, J. (2004). Tribal Sovereignty over Water Quality. *J. Land Use & Environmental Law*, 61, 61-62.
- Palmer, M. H. (2006). Creating indigital peripheries: The Bureau of Indian Affairs, geographic information systems, and the digitization of Indian Country. In R. Rundstrom (Ed.): ProQuest, UMI Dissertations Publishing.
- Palmer, M. H. (2012). Theorizing Indigital Geographic Information Networks. *Cartographica: The International Journal for Geographic Information and Geovisualization*, 47(2), 80-91. doi: 10.3138/carto.47.2.80.
- Palmer, M. H., & Rundstrom, R. (2013). GIS, Internal Colonialism, and the U.S. Bureau of Indian Affairs. [Article]. *Annals of the Association of American Geographers*, 103(5), 1142-1159. doi: 10.1080/00045608.2012.720233.
- Palmer, M. H. (2007). Cut from the Same Cloth: The United States Bureau of Indian Affairs, Geographic Information Systems, and Cultural Assimilation. Chapter XIII. In Dyson, E.L., Hendricks, M., and Grant, S. (Eds.), *Information Technology and Indigenous People* (pp. 220-231). Hershey, PA: Idea Group Inc.
- Palmer, M. H. (2009). Engaging with indigital geographic information networks. *Futures*, 41(1), 33-40. doi: 10.1016/j.futures.2008.07.006.
- Palmer, M. H. (2012). Cartographic Encounters at the Bureau of Indian Affairs Geographic Information System Center of Calculation. *American Indian Culture and Research Journal*(2), 75-102.
- Parker, D. (1986). *Memorandum 1268 (D-400): Draft Amended Cooperative Strategy for Technology Transfer Document, Dated January 27, 1986*. Denver, CO: US DOI Bureau of Land Management.
- Parsons, W. (1995). *Public Policy: An Introduction to the Theory and Practice of Policy Analysis*. Northampton, MA: Edward Elgar.

- Paterson, R. K., & Karjala, D. S. (2003). Legal Rights in Indigenous Cultural Heritage. *Cardozo J. International & Comp. Law*, 11:633.
- Pavlovskaya, M. (2009). Non-Quantitative GIS. In *Qualitative GIS: A Mixed Methods Approach*. Cope, M. and Ellwood, S. (eds.). Los Angeles: Sage.
- PE&RS. (2001). Focus Issue: Native American Contributions in Remote Sensing. *Photogrammetric Engineering & Remote Sensing*, 67(2): 134-198.
- Pearce, M. J. (1999). Analytic Geography in Western Water Management. *Natural Resources and Environment* (Spring 1999) 13: 537-576.
- Pearce, M. W., & Louis, R. P. (2008). Mapping Indigenous Depth of Place. [Article]. *Part of special issue: Mainstreaming Indigenous Geographies*, 32(3), 107-126.
- Peladeau, P. (1994). Native Government: Little Big Brother. *The International Privacy Bulletin* 2(2): 14-15.
- Peluso, N. L. (1995). Whose Woods are These? Counter-Mapping Forest Territories in Kalimantan, Indonesia. *Antipode*, 4(27), 383-406. doi: 10.1111/j.1467-8330.1995.tb00286.x.
- Perritt, H. H. (2001). *Law and the Information Superhighway* (Second ed.). New York: Aspen Law & Business.
- Peterson, C. (2001). Going Spatial--Sisseton-Wahpeton Sioux tribe. *ESRI's Native Geography*, 2, 4-6.
- Pevar, S. L. (2009). The Federal-Tribal Trust Relationship: Its origin, nature, and scope. In C. D. o. W. Resources (Ed.), *California Water Plan Update* (Vol. Vol 4 Reference Guide, pp. 6). California: State of California.
- Pevar, S. L. (2012). *The Rights of Indians and Tribes* (Fourth Edition ed.). New York, New York: Oxford University Press, Inc.
- Pfister, K. (1997). *State of Wisconsin Request for Information on Tribal Lands, Letter from Kara Pfister, BIA Field Solicitor, to Robin Jaeger, Superintendent, Great Lakes Agency, BIA, Dated November 17, 1997*. Ft. Snelling, Minnesota: US DOI Office of the Field Solicitor.
- Pfister, K. (2000). *State of Wisconsin Request for Information on Tribal Lands, Letter from Kara Pfister, BIA Field Solicitor, to Robin Jaeger, Superintendent, Great Lakes Agency, BIA, Dated June 30, 2000*. Ft. Snelling, Minnesota: US DOI Office of the Solicitor.
- Picker, C.B. (2001). A View from 40,000 Feet: International Law and the Invisible Hand of Technology, *Cardozo L. Rev.* 23: 149.
- Pickles, J. (1999). Arguments, debates, and dialogues: the GIS-social theory debate and the concern for alternatives. In *Geographic Information Systems: Principles and Technical Issues, Volume 1. Second Edition*. Longley, P.A., Goodchild, M. F., Maguire, D.J., and Rhind, D.W. (eds.). New York: Wiley & Sons, Inc.
- PlanetLabs. (2015). Satellites. Retrieved May 22, 2015, from <http://www.planet.com/>.
- Plaut, E. (2009). Comment: Tribal-Agency Confidentiality: A Catch-22 For Sacred Site Management. *Ecology Law Quarterly* 36, 137-163.
- Polter, D. M. (1976). Remote Sensing and State Sovereignty. *J. Space L.*, 4, 99.
- Poore, Barbara S. and Chrisman, Nicholas R. (2006). Order from Noise: Toward a Social Theory of Geographic Information. *Annals of the Association of American Geographers*, 96(3): 508-523.

- Post, R. C. (1989). The Social Foundations of Privacy: Community and Self in Common Law Tort. *California Law Review*, 77.
- Prober, R. (2003). Shutter Control: Confronting Tomorrow's Technology with Yesterday's Regulations. 19 *J. L. & Politics* 203.
- Prosser, W. L. (1977). Restatement (second) of torts. *American Law Institute*, 652A-652I.
- Provost, A. (2001). Tribe's Environmental Protection Office Goes GIS. *ESRI's Native Geography*, 2, 3.
- Pryor, G. (2009). Multi-scale data sharing in the life sciences: Some lessons for policy makers. *The International Journal of Digital Curation*, 4(3), 71-82.
- Ragsdale, W. P. (2007). Statement of W. Patrick Ragsdale, Director, Bureau of Indian Affairs, Department of the Interior Before the Committee on Natural Resources, U.S. House of Representatives Oversight Field Hearing in Lower Brule, South Dakota on The Needs and Challenges of Tribal Law Enforcement on Indian Reservations. Washington, DC: US Department of Interior. Retrieved from http://www.doi.gov/ocl/hearings/110/TribalLawEnforcement_060107.cfm.
- Raigrodski, D. (2013). Property, Privacy and Power: Rethinking the Fourth Amendment in the Wake of US v Jones. *The Boston University Public Interest Law Journal*, 22.
- Rambaldi, G. (2004a). "Ethics in PPGIS," Open Forum on Participatory Geographic Information Systems and Technologies, September 25, 2004. Email communication on file with author.
- Rambaldi, G. (2004b). *Who Owns the Map Legend?* Paper presented at the 7th International Conference on GIS for Developing Countries, 10-12 May, 2004, Johor Malaysia.
- Rambaldi, G. and Weiner, D. (2004). Track on International Perspectives: Summary Proceedings. Presented at the 3rd International Conference on Public Participation GIS, University of Wisconsin-Madison, 18-20 July 2004, Madison, Wisconsin. Available at www.iapad.org/publications/ppspatial/PPGIS_2004_Intl_track_summary.pdf.
- Rambaldi, G., Chambers, R., McCall, M., & Fox, J. (2006). Practical ethics for PGIS practitioners, facilitators, technology intermediaries and researchers. *EJSDC*, 25(2), 1-11.
- Rana, S., and Joliveau, T. (2009). NeoGeography: An extension of mainstream geography for everyone made by everyone? Editorial: special issue on neogeography, *Journal of Location Based Services*, 3(2):75-81.
- Rattling Leaf, J. (2002). *Interactive Mapping with GIS Data, Space Imagery, and Lakota Culture*. Paper presented at the Proceedings of the Twenty-Second Annual ESRI User Conference, San Diego, CA.
- Razak, V. M. (2003). Can Indigenous Culture Survive the Future? *Futures*, 35(907-915).
- Reiman, J. (1995). Driving to the Panopticon: A Philosophical Exploration of the Risks to Privacy Posed by the Highway Technology of the Future. *Santa Clara Computer and Technology Law Journal*, 11(1), 27-44.
- Roberts, J. M., & Gregor, T. (1971). Privacy: A Cultural View. In J. R. Penncock & J. W. Chapman (Eds.), *Privacy* (pp. 199-225). New York, New York: Atherton Press.

- Robertson, L. G. (2001). Native Americans and the Law: Native Americans Under Current United States Law. Retrieved from <http://thorpe.ou.edu/guide/robertson.html>.
- Robinson, A. (2011). Email from Alan Robinson, Acting Director, NOAA/NESDIS/Commercial Remote Sensing Regulatory Affairs (March 29, 2011).
- Rogers, C. (2002). Native American Consultation in Resource Development on Federal Lands. *Colorado Lawyer*, 31(1).
- Rogers, W. H. (2004). Treatment as tribe, Treatment as State: The Penobscot Indians and the Clean Water Act. *Alabama Law Review*(55), 815-853.
- Royster, J. V. (1995). Equivocal Obligations: The Federal-Tribal Trust Relationship and Conflicts of Interest In the Development of Mineral Resources. *North Dakota Law Review*, 71, 327.
- Royster, J. V. (2006). Indian Water and the Federal Trust: Some Proposals for Federal Action. *Natural Resources Journal*, 46.
- Rundstrom, R. A. (1995). GIS, Indigenous Peoples, and Epistemological Diversity. *Cartography & Geographic Information Science*, 22(1), 45-57.
- Rundstrom, R. (2009). Counter-Mapping. In N. J. Thrift & R. Kitchen (Eds.), *International Encyclopedia of Human Geography* (pp. 314-318). Oxford, UK: Elsevier Science & Technology.
- Ryan, F. (1986). *Memorandum to BIA Area Directors Re: GIS Program Coordination and Tracking*. Washington, DC: US DOI Office of the Assistant Secretary - Indian Affairs.
- Saharko, P. (2006). A reporter's guide to American Indian Law. Reporters Committee for the Freedom of the Press (Fall 2006). Retrieved on June 6, 2015 from <http://www.rcfp.org/node/103220>.
- Salazar, K. (2009). *Order NO. 3292 Individual Indian Trust Management*. Washington, DC: U.S. Department of the Interior. Retrieved from <http://www.doi.gov/cobell/commission/upload/2009-12-08-Order-3292.pdf>.
- Salazar, K. (2011). *Order No. 3317, Department of the Interior Policy on Consultation with Indian tribes, December 1, 2011*. Washington, DC: Department of the Interior. Retrieved from <http://www.bia.gov/cs/groups/public/documents/text/idc015809.pdf>.
- Samuels, D. (2013). Inside a Startup's Plan to Turn a Swarm of DIY Satellites into An All-Seeing Eye. *Wired Magazine*. Retrieved from Wired website: <http://www.wired.com/2013/06/startup-skybox/>.
- Scassa, T. (2011). Information Privacy in Public Space: Location Data, Data Protection and the Reasonable Expectation of Privacy. *Canadian Journal of Law and Technology*, 7.
- Scassa, T. (2014). Public Transit Data Through an Intellectual Property Lens: Lessons About Open Data. *Fordham Urban Law Journal*, 41.
- Scassa, T., Engler, N. J., & Taylor, D. R. F. (2012). Legal Issues in Mapping Traditional Knowledge: Digital Cartography in the Canadian North. *The Cartographic Journal*, 1-11.

- Schnarch, B. (2004). Ownership, Control, Access, and Possession (OCAP) or Self-Determination Applied to Research: A Critical Analysis of Contemporary First Nations Research and Some Options for First Nations Communities. *Journal of Aboriginal Health*, 1(1), 1-37.
- Schroeder, P. (1998). *Asserting New Rights to Know, Toward Community Self-Discovery*. Paper presented at the Proceedings of Empowerment, Marginalization and Public Participation GIS, Santa Barbara, CA.
<http://www.ncgia.ucsb.edu/varenius/ppgis/papers/schroeder.html>.
- Scott, J. C. (1998). *Seeing Like A State: How Certain Schemes to Improve the Human Condition Have Failed*. New Haven, CT: Yale University Press.
- Seitz, K. (2010). National Geospatial Resource Center (NGRC): A Capabilities Brief. Presentation to ESRI 2010 User Conference, from
<http://www.slideshare.net/rmckeeon/national-geospatial-resource-center-ngrc-a-capabilities-brief>.
- Senate, U. S. (1976a). Indian Amendment to Freedom of Information Act. Hearing Before the Subcommittee on Indian Affairs of the Committee on Interior and Insular Affairs, United States Senate, Ninety-Fourth Congress, Second Session, on S. 2652. A Bill to Amend Section 552 of Title 5, United States Code, To Provide an Exemption to the Requirements of that Section Relating to the Availability of Information. May 17, 1976. Washington, DC: US Government Printing Office.
- Senate, U. S. (1976b). *S. 2652, Indian Amendment to Freedom of Information Act*. Washington, DC: U.S. Government Printing Office. Retrieved from
<http://www.loc.gov/law/find/hearings/pdf/00143459937.pdf>.
- Shanley, L., Ventura, S., Galetka, S. and Helgeson, J. (2007). Privacy and Internet Access to Public Land Records. Presentation at 2007 URISA Annual Conference, Washington, DC.
- Shanley, L. A. (2009). *The WIREdata Case and its Implications for Wisconsin Geospatial Data*. Madison, WI: Wisconsin State Cartographer's Office. Retrieved from
http://www.sco.wisc.edu/images/stories/publications/WIREdata_and_its_implications_for_WI_geospatial_data_2009.pdf.
- Shanley, L. A., Burns, R., Bastian, Z., and Robson, E. S. (2013). Tweeting Up a Storm: The Promise and Perils of Crisis Mapping. *PE&RS*. October 2013. Pp. 865-879.
- Shepherd, H. (2001). Conflict Comes to Roost! The Bureau of Reclamation and the Federal Indian Trust Responsibility. *Environmental Law*, 31(Fall 2001).
- Sheppard, E.S. (1993). Automated geography: What kind of geography for what kind of society? *The Professional Geographer*, 45:457-60.
- Sheppard, E.S. (1995). "GIS and Society: Towards a Research Agenda." *Cartography and Geographic Information Systems/Science* 22, no. 1: 5-16.
- Shils, E. (1975). *Center and Periphery: Essays in Macrosociology*. Accessed at
http://www.amazon.com/Center-Periphery-Essays-MacRosociology-Selected/dp/0226753174/ref=la_B001HNZ298_1_1/177-3780775-9740309?s=books&ie=UTF8&qid=1433293975&sr=1-1

- Shilton, K. (2009). Four billion little brothers? Privacy, mobile phones, and ubiquitous data collection. *Commun. ACM*, 52(11), 48-53.
<http://dl.acm.org/authorize?stats?260140>.
- Shirk, J. L., Ballard, H. L., Widema, C. C., Phillips, T., Wiggins, A., Jordan, R., . . . Bonney, R. (2012). Public Participation in Scientific Research: a Framework for Deliberate Design. *Ecology and Society*, 17(2).
- Short, J. R. (2009). *Cartographic Encounters: Indigenous Peoples and the Exploration of the New World*. Chicago, IL: University of Chicago Press.
- Sieber, R. (2006). Public Participation and Geographic Information Systems: A Literature Review and Framework. *Annals of the American Association of Geographers*, 96(3):491-507.
- Sietzen, F. (2000). Spy Satellite Image Business Booms. SPACE.com, Published May 1, 2000. Accessed June 24, 2004.
http://www.space.com/business/technology/business/commercial_remote_sense_000427.html.
- Silverman, D. (2011). *Interpreting Qualitative Data* (Fourth Edition ed.). Thousand Oaks, CA: Sage.
- SIPI. (2015). Tribal GIS. Southwestern Polytechnic Institute homepage and linked resources. Retrieved May 1, 2015, from <http://www.tribalgis.com/>.
- Skibine, A. T. (2012). Towards a Balanced Approach for the Protection of Native American Sites. *Michigan Journal Race & Law*, 17(Spring, 2012), 269-307.
- Skinner, R. (1999). BIA Land Title Mapper. Presentation at the 1999 ESRI User Conference. Retrieved April 17, 2015, from
<http://proceedings.esri.com/library/userconf/proc99/proceed/abstracts/a946.htm>.
- Sklansky, D. A. (2014). Too Much Information: How Not to Think About Privacy and the Fourth Amendment. *California Law Review*, 102.
- Smith, L. (1999). *Decolonizing Methodologies: Research and Indigenous Peoples*. London, UK: Zed Books.
- Smith, L. (2008a). Indigenous Geography, GIS, and Land-Use Planning on the Bois Forte Reservation. *Part of special issue: Mainstreaming Indigenous Geographies*, 32(3), 139-151.
- Smith, L. (2008b). Tribal Self-Determination through GIS? An Examination of Three Minnesota tribes. In L. Smith (Ed.).
- Solove, D. J., & Schwartz, P. M. (2011). *Privacy, information, and technology*. New York: Wolters Kluwer Law & Business.
- Solove, D. J., & Schwartz, P. M. (2015). *Privacy Law Fundamentals*. Portsmouth, NH: IAPP.
- Soma, J. T., Rynerson, S. D., & Kitaev, E. (2014). *Privacy Law in a Nutshell*. St. Paul, MN: Reuters Thompson.
- Speich, J. (2001). Comment: The Legal Implications of Geographic Information Systems. *Alb. L.J. Science & Tech.*, 11, 359.
- State, U. S. Dept. of. (2010). *Announcement of U.S. Support for the United Nations Declaration on the Rights of Indigenous Peoples*. Washington, DC. Retrieved from <http://www.state.gov/documents/organization/184099.pdf>.

- Steele, L.J. (1991). The View from on High: Satellite Remote Sensing Technology and the Fourth Amendment, *High Tech. L.J.* 6: 323.
- Stevens, A. (2008). A Different Way of Knowing: Tools and Strategies for Managing Indigenous Knowledge. *Libri*, 58, 25-33.
- Stoffle, R., Rogers, G., Grayman, F., Benson, G. B., Vlack, K. V., & Medwied-Savage, J. (2008). Timescapes in conflict: cumulative impacts on a solar calendar. *Impact Assessment and Project Appraisal*, 26(3), 209-218. doi: 10.3152/146155108x333262.
- Stoney, W. E. (2008). ASPRA Guide to Land Imaging Satellites. Bethesda, MD: The Imaging and Geospatial Information Society.
- Storther, G. (2014). Resolving Cultural Property Disputes in the Shadow of the Law. *Harvard Negotiation Law Review*, 19, 334-376.
- Strahilevitz, L. J. (2011). Collective Privacy. In M. Nussbaum & S. Levmore (Eds.), *The Offensive Internet: Speech, Privacy, and Reputation* (pp. 217-236). Cambridge, MA: Harvard University Press.
- Strahilevitz, L. J. (2013). Toward a Positive Theory of Privacy Law. *University of Chicago Public Law & Legal Theory Working Paper No. 421*, 36.
- Strommer, G., & Dean, B. (2011). General Memorandum 11-117: OMB Issues Final Policy Letter Defining "Inherently Government Function". Retrieved from Hobbs, Strauss, Dean and Walker Webpage website: <http://www.hsdwlaw.com/general-memorandum-11-117>.
- Sui, D., and Goodchild, M.F. (2011). The convergence of GIS and social media: Challenges for GIScience, *International Journal of Geographical Information Science*, 25(11): 1737-1748.
- TallBear, K. M. (2006). *Understanding The Federal/Tribal Relationship and Barriers to Including tribes in Environmental Decision-Making*. Environmental Protection. International Institute for Indigenous Resource Management. Denver, Colorado. Retrieved from <http://www.iiirm.org/publications/Articles Reports Papers/Environmental Protection/unders~1.pdf>.
- Tano, M. (2015). Email from Merv Tano, President, International Institute for Indigenous Resource Management.
- Taylor, P.J. and Overton, M. (1991). Further thoughts on geography and GIs: A preemptive strike? *Environment and Planning A* 23(1): 1087-1094.
- Taylor, A., Gadsden, D., Kerski, J. J., & Warren, H. (Eds.). (2012). *Tribal GIS: Supporting Native American Decision Making*. Redlands, CA: ESRI Press.
- Tefft, S. K., ed. (1980). *Secrecy: A Cross-Cultural Perspective*. New York: Human Sciences Press.
- Tenet, G. J. 2002. Memorandum for: Director, National Imagery and Mapping Agency; Subject: Expanded Use of US Commercial Space Imagery; Dated 7 June 2002. From George J. Tenet, Director of the Central Intelligence Agency.
- Thom, B. (1997). Co-Management, Negotiation, Litigation: Questions of Power in Traditional Use Studies. Annual Meetings of the Society for Applied Anthropology, Seattle Washington, March 1997. Available at <http://www.home.istar.ca/%7Ebthom/sfaa.htm>.

- Thomas, L. (2011). Legal Arrangements for the Use and Control of Real-Time Data. *Transit Cooperative Research Program Legal Research Digest*, 37(June 2011), 1-55.
- Title 17, U.S. Code, section 301 (17 U.S.C. 301).
- Title 18, U.S. Code, section 1151 (18 U.S.C. 1151).
- Title 25, U.S. Code, section 2 (25 U.S.C. 2, 2014).
- Title 25, U.S. Code, section 9 (25 U.S.C. 9, 2014).
- Title 25, U.S. Code, section 71 (25 U.S.C. 71).
- Title 43, U.S. Code, section 1457 (43 U.S.C. 1457).
- Tobias, T. N. (1997). *Chief Kerry's Moose: A guidebook to land use and occupancy mapping, research design and data collection*. Vancouver, Canada: Ecotrust, Union of BC Indian Chiefs.
www.ecotrust.org/publications/Chief_Kerrys_Moose.pdf
- Tobias, T. N. (2000). *Chief Kerry's Moose: A Guidebook to Land Use and Occupancy Mapping, Research Design and Data Collection*. British Columbia, Canada: Union of BC Indian Chiefs and Ecotrust Canada. Retrieved from
<http://www.fws.gov/nativeamerican/pdf/tek-chief-kerry.pdf>.
- Tobler, W. R. (1970). A computer movie: simulation of population change in the Detroit Region. *Economic Geography* 46: 234-40.
- Tsosie, R. A. (2003). The Conflict Between the "Public Trust" and the "Indian Trust" Doctrines: Federal Public Land Policy and Native Nations. *Tulsa Law Review*, 29(Winter 2003), 271-311.
- Turnbull, D. (1989). *Maps are Territories, Science is an Atlas*. Chicago, IL: University of Chicago Press.
- Turnbull, D. (1998). Mapping encounters and (en)countering maps: A critical examination of cartographic resistance. *Knowledge and Society Research in Science and Technologies Studies: Knowledge Systems*, 14-44.
- Tweedy, A. (2000). The Liberal Forces Driving the Supreme Court's Divestment and Debasement of Tribal Sovereignty. *Buffalo Public Interest Law Journal*, 18.
- UN. (2007). *United Nations Declaration on the Rights of Indigenous Peoples*. Geneva, Switzerland: United Nations.
- United States. v. Penny-Feeney. 773 F. Supp. 220 (D. Haw. 1991).
- URISA. (2003). A GIS Code of Ethics. Urban and Regional Information Systems Association, April 2003. http://www.urisa.org/ethics/code_of_ethics.htm.
- USCO. (1997). Report on Legal Protections for Databases. Washington, DC: US Copyright Office. Retrieved May 18, 2015, from
<http://www.copyright.gov/reports/dbase.html>.
- USDA. (2010). *Action Plan for Tribal Consultation and Collaboration*. Washington, DC: US Department of Agriculture. Retrieved from
<http://www.usda.gov/documents/ConsultationPlan.pdf>.
- USDOJ. (2004). *DOI Information Quality Guidelines*. Washington, DC: Department of the Interior. Retrieved from
http://www.doi.gov/ocio/information_management/upload/515Guides.pdf.

- USDOJ. (2012). *Final Report: Examination, Evaluation and Recommendations for Support Functions*. Washington, DC: U.S. Department of the Interior - Indian Affairs.
- USDOJ. (2013). *Final Report of the Commission on Indian Trust Administration and Reform*. Washington, DC: U.S. Department of the Interior.
- USDOJ. (2013). *Procedural Requirements United States Department of Justice Guide to Freedom of Information Act* (September 4, 2013 ed., pp. 74). Washington, DC: US Department of Justice.
- USDOJ. (2014). *United States Department of Justice Guide to the Freedom of Information Act*. Washington, DC: United States Department of Justice. Retrieved from <http://www.justice.gov/oip/doj-guide-freedom-information-act-0>.
- USEPA. (2005). *Exchange Network Business Plan, March 14, 2005* Washington, DC: Network Planning Action Team, US Environmental Protection Agency. Retrieved from http://www.exchangenetwork.net/operations/npat_report.pdf.
- USEPA. (2006). *Final Guidance on Awards of Grants to Indian tribes under Section 106 of the Clean Water Act: For Fiscal Years 2007 and Beyond*. Washington, DC: Office of Water, Office of Watershed Management, US EPA. Retrieved from http://water.epa.gov/grants_funding/cwsrf/upload/2006_10_20_cwfinance_final-tribal-guidance.pdf.
- USEPA. (2011). *EPA Policy on Consultation and Coordination with Indian tribes, May 4, 2011*. Washington, DC: US Environmental Protection Agency Office of Research and Development. Retrieved from <http://www.epa.gov/indian/pdf/cons-and-coord-with-indian-tribes-policy.pdf>.
- USEPA. (2012). *Tribal-FERST: Supporting Sustainable and Healthy American Indian tribes*. Washington, DC: US Environmental Protection Agency Office of Research and Development. Retrieved from http://www.epa.gov/nerlpage/documents/Tribal-FERST_Factsheet.pdf.
- USEPA. (2013). *Indian Environmental General Assistance Program: Guidance on the Award and Management of General Assistance Agreements for tribes and Intertribal Consortia*. Washington, DC: American Indian Environmental Office, Office of International and Tribal Affairs, US EPA. Retrieved from <http://www.epa.gov/indian/GAP-guidance-final.pdf>.
- USFS. (2014). *Draft Policy Statement on Confidentiality of Indian Sacred Sites*. Washington, DC: US Forest Service. Retrieved from <http://www.fs.fed.us/spf/tribalrelations/documents/sacredsites/draft/SacredSitesMoudraftPolicyStatementConfidentialitySacredSites.pdf>.
- USNPS. *Guidance for National Park Service Compliance with the Native American Graves Protection and Repatriation Act*. Washington, DC: US National Park Service. Retrieved from http://www.nps.gov/archeology/sites/print/AppendixR_020806.doc.
- van den Hoven, J. (2001). Privacy and the Varieties of Informational Wrongdoing. In R. A. Spinello & H. T. Tavani (Eds.), *Readings in CyberEthics* (pp. 488-500). Sudbury, MA: Jones and Bartlett Publishers.

- van den Toorn, W., & de Man, E. (2004). Anticipating Cultural Factors of GDI. In R. Groot & J. McLaughlin (Eds.), *Geospatial Data Infrastructure: Concepts, Cases, and Good Principles*. Oxford, UK: Oxford University Press.
- Van House, N. A., Butler, M. H., Schiff, L. R. (1998). *Cooperative Knowledge Work and Practices of Trust: Sharing Environmental Planning Data Sets*. Paper presented at the CSC '98: The ACM Conference On Computer Supported Cooperative Work. Proceedings, Seattle, WA.
- VanWey, L. K., Rindfuss, R. R., Gutmann, M. P., Entwisle, B., & Balk, D. L. (2005). Confidentiality and Spatially Explicit Data: Concerns and Challenges. *PNAS*, *102*(43), 15337-15342.
- Veland, S., Lynch, A., Bischoff-Mattson, Z., Joachim, L. E. E., & Johnson, N. (2014). All Strings Attached: Negotiating Relationships of Geographic Information Science. *Geographical Research*, *52*(3), 296-308. doi: 10.1111/1745-5871.12070.
- Ventura, S. J. (1990). Conversion of Automated Geographic Data to Decision Making Information: The Dane County, Wisconsin Land Conservation Department Example. *Photogrammetric Engineering & Remote Sensing*, *56*(4), 511-516.
- Ventura, S. J. (1995). The Use of Geographic Information Systems in Local Government. *Public Administration Review*, *55*(5), 461-467.
- Vincent, K. (2004). Email from Katy Vincent, International Relations Specialist, NOAA/NESDIS International and Interagency Affairs (27 Oct 2004).
- Viriden, T. (2000). *Memorandum to BIA Regional Directors on Geographic Data Service Center, February 3, 2000*. Washington, DC: USDOJ.
- Vogeli, C., Yucel, R., Bendavid, E., Jones, L. M., Anderson, M., S., Seashore Louis, K., & Campbell, E. G. (2006). Data Withholding and the Next Generation of Scientists: Results of a National Survey. *Academic Medicine*, *81*(2), 128-136.
- von der Dunk, F. G. (2013). Chapter 10: Outer Space Law Principles and Privacy. In R. Purdy & D. Leung (Eds.), *Evidence from Earth Observation Satellites: Emerging Legal Issues, Studies in Space Law* (7 ed., pp. 243-258). Leiden, The Netherlands: Martinus Nijhoff Publishers.
- Wagner, C.S. (1998). *International Agreements on Cooperation in Remote Sensing and Earth Observation* (Santa Monica, CA: RAND).
<http://www.rand.org/publications/MR/MR972/>.
- Wainwright, J., & Robertson, M. (2000). *Who Deems What is Sacred? Assessing Cultural Resources Through (Post) Colonial Highway Politics*. Unpublished draft, on file with author.
- Waldron, S.T. (2001). Trust in the Balance: The Interplay of FOIA's Exemption 5, Agency-Tribal Consultative Mandates, and the Trust Responsibility, *Vermont Law Review* *26* (Fall 2001): 149-182.
- Wallace, C., & Zekowski, J. (2013). *History of GIS in the BIA (Informal document distributed during the 2013 Annual ESRI International User Conference in San Diego, CA)*. Lakewood, CO: BIA Office of Trust Services Geospatial Support.
- Walsh, C. E. (2012). Surveillance Technology and the Loss of Something a Lot Like Privacy: An Examination of the Mosaic Theory and the Limits of the Fourth Amendment. *St. Thomas Law Review*, *24*.

- Walsh, W. (2013). DigitalGlobe wraps up acquisition of GeoEye. Retrieved from <http://defensesystems.com/articles/2013/02/01/digitalglobe-closes-acquisition-of-geoeye.aspx>.
- Wang, B. (2001). A Liaison Between Tribal GIS and Government Agencies: Intertribal GIS Council. *Native Geography*, 2, 8-10.
- Wanshel, E. (2014). Google's Satellites Could Soon See Your Face From Space. Retrieved from <http://motherboard.vice.com/read/googles-satellites-could-soon-see-your-face-from-space>.
- Warhus, M. (1997). *Another America: Native American Maps and the History of Our Land*. New York, New York: St. Martin's Press.
- Warren, A. (2004, June 14). Personal communication with author.
- Warren, W. (2011, March 21, 2011). Letter re: GeoEye's Commercial License and Sensed States.
- Wascalus, J. (2014, October). GIS tech helps tribes tackle planning and projects. *Community Dividend*, 2-3.
- Watts, M. (2000). Contested Communities, Malignant Markets, and Gilded Governance: Justice, Resource Extraction, and Conservation in the Tropics. In C. Zerner (Ed.), *People, Plants and Justice: The Politics of Nature Conservation* (pp. 21-51). New York: Columbia University Press.
- Wehn de Montalvo, U. (2003). *Mapping the Determinants of Spatial Data Sharing*. Burlington, VT: Ashgate Publishing Co.
- Weimer, D. L., & Vining, A. R. (2011). *Policy Analysis: Concepts and Practice* (Fifth ed.). Boston, MA: Longman.
- Weinstein, M. S. (1998). Sharing Information or Captured Heritage: Access to Community Geographic Knowledge and the State's Responsibility to Protect Aboriginal Rights in British Columbia. Prepared for Crossing Boundaries, the Seventh Conference of the International Association for the Study of Common Property, Vancouver, British Columbia. 9-14 June 1998. Aboriginal Mapping Network Website. Retrieved on May 15, 2015 from <http://www.nativemaps.org/StoriesNewsReviews/Reviews/abstracts/Weinstein1.html>.
- Weiss, P.N., and Backlund, P. (1997). International Information Policy in Conflict: Open and Unrestricted Access versus Government Commercialization. In Kahin, B. and C. Nesson (Eds.), *Borders in Cyberspace* (Cambridge: MIT Press) 300-321.
- Wilkins, D. E., & Lomawaima, K. T. (2001). *Uneven Ground: American Indian Sovereignty and Federal Law*. Norman, OK: University of Oklahoma Press.
- Wilkinson, C. F. (1980). The Public Trust Doctrine in Public Land Law. *University of California Davis Law Review*, 14.
- Williams, M. (2005). *Position Paper*. Paper presented at the Proceedings United Nations/Brazil Workshop on Space Law: Dissemination and Developing International and National Space Law: The Latin American and Caribbean Perspective, New York, New York.
- Williamson, R. A., & Goes In Center, J. (2001). Using Geospatial Technologies to Enhance and Sustain Resource Planning on Native Lands. *Photogrammetric Engineering & Remote Sensing*, 67(2), 167-169.

- Wing, S. (2002). Social Responsibility and Research Ethics in Community-Driven Studies of Industrialized Hog Production. *Environmental Health Perspectives*, 110(5), 437-444.
- Wolf, W. W. (2001). *Letter to George E. Meyer, Secretary, Wisconsin Department of Natural Resources re: FOIA Request*. Washington, DC: Bureau of Indian Affairs, FOIA Appeals Office.
- Wood, B. W. (2000.) GIS as a Tool for Territorial Negotiations. *IBRU Boundary and Security Bulletin* 8(3): 72-78.
- Wood, D. (1992). *The Power of Maps*. New York, NY: The Guildford Press.
- Wood, M. C. (1994). Indian Land and the Promise of Native Sovereignty: The Trust Doctrine Revisited. *Utah Law Review*, 4(1994), 1471-1596.
- Wood, M. C. (1995). Protecting the Attributes of Native Sovereignty: A New Trust Paradigm for Federal Actions Affecting Tribal Lands and Resources. *Utah Law Review*, 1(1995), 109-237.
- Wood, M. C. (2003). Indian Trust Responsibility: Protecting Tribal Lands and Resources through Claims of Injunctive Relief against Federal Agencies. *Tulsa Law Review*, 39(2, Article 5), 355-368.
- Wright, D. J., Duncan, S.L., and Lach, D. (2009). Social Power and GIS Technology: A Review and Assessment of Approaches for Natural Resource Management. *Annals of the Association of American Geographers*. 99(2): 254-272.
- Wright, D.M., Goodchild, M. F, and Proctor, J. (1998). Demystifying the persistent ambiguity of GIS as “tool” versus science. *Annals of the American Association of Geographers* 87:346-62.
- Zundel, M. (2000). Bureau of Indian Affairs Produces Current Land Status Maps with GIS. *ArcNews Online* Spring 2000. Retrieved April 17, 2015 from <http://www.esri.com/news/arcnews/spring00articles/bureauofindian.html>.