Drain oil disposal in Wisconsin. No. 63 1973

Ostrander, Ronald O.; Kleinert, Stanton J.
Madison, Wisconsin: Wisconsin Department of Natural Resources, 1973

DRAIN OIL DISPOSAL IN WISCONSIN

Technical Bulletin No. 63
DEPARTMENT OF NATURAL RESOURCES
Madison, Wisconsin
1973

ABSTRACT

Service stations handle from 55 to 65 percent of the oil drained from crankcases in Wisconsin. Of this, 97.6 percent is re-used, and 2.4 percent wasted.

DRAIN OIL DISPOSAL IN WISCONSIN

By
Ronald O. Ostrander
and
Stanton J. Kleinert

Technical Bulletin No. 63
DEPARTMENT OF NATURAL RESOURCES
Madison, Wisconsin
1973

D3402

CONTENTS

INTRODUCTION

Of the nearly 10,000,000 gallons of oil drained from crankcases in Wisconsin each year, an estimated 55 to 65 percent is handled by service station operators (1,4,6). Since limited prior surveys indicated that a major portion of drain oil is discharged to the environment (1,2,4,5), the situation could become hazardous.

METHODS

To determine how serious the problem really is in Wisconsin a comprehensive survey of drain oil disposal practices was carried out by the petroleum inspectors of the Department of Revenue in their regular visits to service stations. From September to December, 1971 the inspectors visited every operating station in the state and filled out a questionnaire at each station (Fig. 1). To encourage candid answers, the stations were not identified on the questionnaire and the operators were assured that the answers would remain strictly confidential.

Re-refiners and other operators of drain oil pickup services in Wisconsin, Minnesota and Illinois were contacted, and some plant visitations were made to more accurately determine the ultimate disposition of the drain oil. This information was used to correct questionnaires filled out by station operators who did not indicate what happened to the oil. Where comparisons could be made, good correlations were found between amounts of drain oil accumulated and the collections by re-refiners and other services.

RESULTS AND DISCUSSION

Statewide results are presented in Table 1, while results in each of the 72 counties are shown in Table 2. Figures 2 and 3 show the percentages of drain oil re-used as lube oil and as fuel oil in each county.

Examination of the data reveals the important role that economics play in the collection and re-use of drain oil. Drain oil is concentrated in centers of densest population. The state's only re-refiner is located in the Milwaukee area, while others in Illinois, Duluth and Minneapolis apparently find it economical to pick up drain oil from nearby large Wisconsin cities. Arrowhead Refinery of Duluth picks up most of the oil drained in both Superior and Ashland. Rock Oil of Stratford in Marathon County processes drain oil for re-use as fuel and dominates collections in Marathon County as well as in Wood, Portage and Waupaca Counties and even the cities as far away as Green Bay, Eau Claire, and Oshkosh. Several collectors operate in southern Wisconsin including Warden's Refinery of West Allis (lube oil), Roger's Oil of Madison (fuel oil) and Illinois based-firms (lube and fuel oil). It is encouraging to note that 33.8 percent is re-refined as lube oil, 37.2 percent is re-used as fuel oil and 7.4 percent is used as road oil.

All of the oil accumulated at many rural area stations is picked up by farmers for use in lubricating barn cleaners, etc., and to control dust and weeds. Although only 2.4 percent is not re-used this does amount to more than 120,000 gallons annually. The results indicate that a large portion of this goes to licensed disposal sites.

Although the present re-usage of drain oil in Wisconsin is far better than initially anticipated, the future does not present an encouraging picture. The annual capacity of the nation's re-refining industry stood at 300 million gallons in 1960 but has declined since then by one-half to two-thirds for a number of reasons. The industry has lost the tax advantage it once had, and increased numbers and quantities of additives in oil and gasoline make re-refining more difficult and expensive (1,2,3,4,5). The state's only re-refinery is run by the 73 year-old owner who would like to sell his business but cannot find a buyer. His brother is even older and operates as a re-refiner in Minneapolis.

Re-refiners are also going out of business in Illinois at a time when re-refining capacity should be increased.

There has been a limited exploration of the upgrading of refining technology, but capital expenditures required to put that technology to use appear to be prohibitive unless the profit structure is improved (1,4). The Institute Francais du Petrole has developed new technology which increases yield, improves product, and cuts the use of acid and clay by 80 to 90 percent with a comparable reduction in the waste disposal problem. This process has been licensed by IFP to an Italian firm which has successfully operated it for three years at Milan. Both Italy and West Germany pay re-refiners a bounty for each gallon of waste oil reprocessed. Similar considerations may be necessary in the United States if a satisfactory solution is to be found for the waste oil problem (1).

Even though a part of lube oil is burned or otherwise lost, it does not wear out, so the best use of drain oil would be recycling as lube oil. Virgin lube oils must not only be good lubricants but must also withstand heat and high pressure. Those fractions remaining in drain oil have survived the punishment and must be the most resistant molecules and, therefore, retain their greatest value as lube oil. For best conservation of our limited oil resources, re-refining, using best available technology, should be encouraged.

Since various authorities estimate that 35 to 45 percent of lube oil is sold at outlets other than service stations, this survey takes into account only part of the total problem (1,4,6). Much of this oil is purchased by individuals who drain their own crankcases and assessment of that part of the problem would be much more costly than the present survey. There is good reason to believe that dumping of drain oil by individuals is done in small amounts, at widely scattered points where biodegradation may prevent appreciable environmental impact (7). If subsequent investigations prove these assumptions to be in error, it might be necessary to set up convenient collection points and mount an educational campaign to increase public awareness of the problem and encourage individuals to turn their crankcase drainings in at the established collection points.

TABLE 1. Results of the Drain Oil Disposal Survey

	Rural Areas	Communities <20,000	Communities >20,000	Total
Total Average Monthly Accumulation	24,864	231,020	207,805	463,689
Disposition of Oil-Percent of Total				
1. Re-refined to Lube Oil	7.8	18.1	54.1	33.8
2. Re-used as Fuel Oil	7.1	41.3	36.3	37.2
3. Re-used as Road Oil	33.0	5.4	6.5	7.4
4. Farm Use	42.8	31.6	2.6	19.3
5. Dumped on Ground	6.4	3.5	0.2	2.1
6. Other	2.9	0.1	0.3	0.3
Stations Draining Oil	546	2,839	1,618	5,003
Stations Not Draining Oil	1,471	1,343	611	3,425

SUMMARY AND CONCLUSIONS

1. Service stations handle from 55 to 65 percent of the oil drained from crankcases in Wisconsin. Of this, 97.6 percent is re-used as lube oil, fuel oil, road oil or on farms. The remaining 2.4 percent is wasted but much of this is hauled to licensed disposal sites.

2. For best use of a limited resource, drain oil should be re-refined as lube oil. Increased re-refining should be encouraged.

3. A random sampling to determine the fate of oil drained by individuals is recommended so that we may have answers to this important segment of the overall problem.

LITERATURE CITED

1. **Bowen, Michael**
   1972. Waste lube oils pose disposal dilemma. Environ. Sci. and Tech. 6(1):25-26.

2. **American Petroleum Institute**
   [1970] Final report of the task force on used oil disposal. No. 4036, 44 p.

3. **Federal Excise Tax Reduction Act of 1965.**

4. **Government Executive,**
   1970. Oil on troubled waters. Govt. Exec., Feb. 1970, p. 24.

5. **Association of Petroleum Re-Refiners**
   1966. Danger spot–increased dumping of crankcase waste oil in 1966. Situation report, 6 p., Arlington, Va.

6. **Olcott, William**
   1971. Motor oil sales flow from stations to mass marketers. Nat. Petroleum News, August 1971, p. 52.

7. **U. S. Environmental Protection Agency.**
   1971. Control of oil and other hazardous materials. Training Manual, 16:1-5.

DEPARTMENT OF NATURAL RESOURCES
DRAIN OIL DISPOSAL SURVEY

A. SAMPLE LOCATION: County . . . . . ___1-2
Rural Area . . . . . ___3
Community under 20,000 . . . ___4
Community over 20,000 . . . ___5

B. DOES STATION DRAIN CRANKCASE OIL? NO___ YES___6

C. DRAIN OIL STORAGE: Underground Tanks . . . . ___7
Drums . . . . . ___8
Others (specify) . . . . . ___9

D. DRAIN OIL STORAGE CAPACITY: 110 Gallons or Less . . . ___10
111-500 Gallons . . . . . ___11
501-999 Gallons . . . . . ___12
1,000 Gallons or More . . ___13

E. AVERAGE MONTHLY ACCUMULATION DRAIN OIL:
Gallons . . . . . ____14-18

F. DISPOSITION OF OIL (PERCENT OF TOTAL):
Sold to Collector . . . . . ___19-21
Sold to Customers . . . . . ___22-24
Free Pickup by Collector . . . . . ___25-27
Pay Collector to Pickup . . . . . ___28-30
Poured on Ground . . . . . ___31-33
Poured Down Sewer . . . . . ___34-36
Hauled to Landfill Area . . . . . ___37-39
Other (Specify) . . . . . ___40-42

G. ULTIMATE DISPOSITION OF OIL (PERCENT OF TOTAL):
Reprocessed to Lubricating Oil . . . . ___43-45
Reprocessed to Fuel Oil . . . . . ___46-48
Used for Road Oil . . . . . ___49-51
Farm Use . . . . . ___52-54
Dumped on Ground . . . . . ___55-57
Other (Specify) . . . . . ___58-60

H. INFORMATION FURNISHED BY:
Station Operator . . . . . ___61
Inspector's Estimates . . . . . ___62

FIGURE 1. *Form Used to Survey Drain Oil Disposal Practices.*

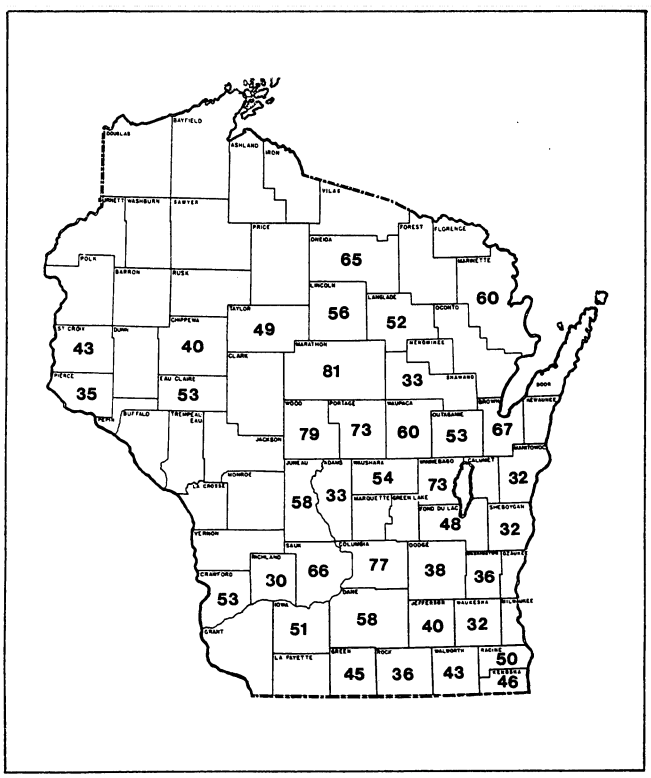

FIGURE 2. *Percent of Drain Oil Reused as Fuel Oil.* (> 30)

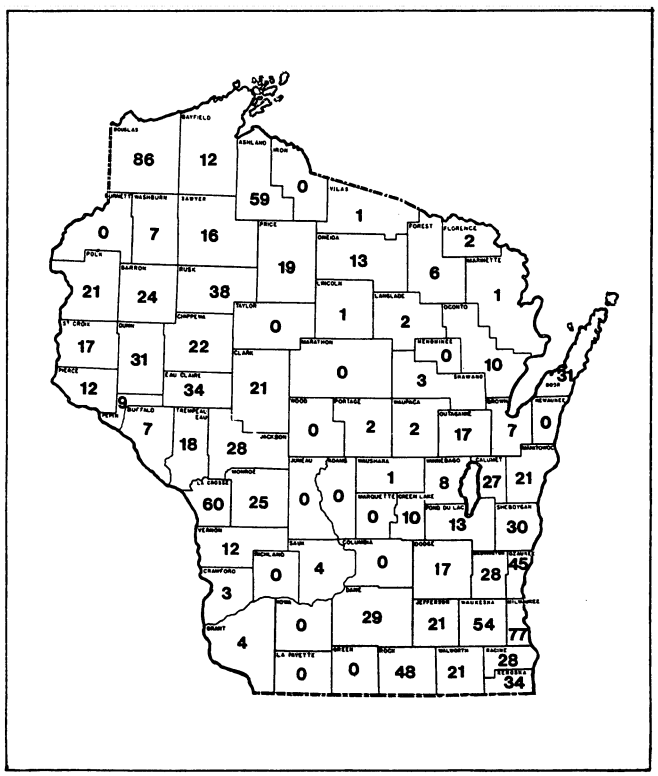

FIGURE 3. *Percent of Drain Oil Reused as Lube Oil.*

TABLE 2. Results of the Drain Oil Disposal Survey by COUNTY

County	No. of Stations Draining Oil				Monthly Accumulation-Gals				Ultimate Disposition-Percent					
		Communities				Communities			Lube	Fuel	Road			
	Rural	<20,000	>20,000	Total	Rural	<20,000	>20,000	Total	Oil	Oil	Oil	Farm	Dumped	Other
Adams	3	13		16	50	525		575		33.0	12.2	54.8		
Ashland	2	35		37	16	1,931		1,947	58.8		10.4	10.5	20.3	
Barron	6	64		70	100	4,343		4,443	24.3	17.4	6.0	42.2	10.1	
Bayfield	10	18		28	270	1,081		1,351	11.5	3.0	20.4	10.4	54.7	
Brown	9	41	97	147	303	2,995	12,142	15,440	7.0	67.1	1.1	24.0	0.6	0.2
Buffalo	2	22		24	43	1,408		1,451	7.2	3.1	33.3	51.2	5.2	
Burnett	5	20		25	146	953		1,099		5.5	42.7	27.3	10.9	13.6
Calumet	2	27		29	60	1,105		1,165	26.6	2.2	27.0	44.2		
Chippewa	4	64		68	150	4,686		4,836	22.0	40.4	5.6	23.5	8.5	
Clark	6	49		55	235	3,075		3,310	21.3	13.4	3.6	61.2	0.5	
Columbia	15	57		72	595	3,445		4,040		77.3	5.5	16.0	1.2	
Crawford	6	36		42	600	2,595		3,195	3.1	53.4	14.4	29.1		
Dane	26	74	121	221	988	6,901	17,515	25,404	28.7	57.7	2.9	9.2	1.2	0.3
Dodge	25	92		117	1,365	7,540		8,905	16.6	38.2	6.1	38.8	0.3	
Door	1	47		48	5	3,515		3,520		30.6	27.9	35.8		5.7
Douglas	9	5	40	54	206	120	4,569	4,895	85.8	0.7	4.9	1.6	7.0	
Dunn	2	41		43	215	2,980		3,195	30.5	9.7	3.6	47.6	8.6	
Eau Claire	5	23	59	87	148	2,575	6,945	9,668	33.7	53.4	2.6	8.3	1.5	0.5
Florence	3	6		9	20	405		425	2.4	2.3	48.2	40.0	7.1	
Fond du Lac	11	48	24	83	750	3,780	3,465	7,995	13.2	48.2	10.6	26.2	1.7	
Forest	4	16		20	80	730		810	6.2	25.3	22.8	9.9	35.8	
Grant	5	93		98	420	9,555		9,975	4.3	22.6	6.7	63.6	2.8	
Green		32		32		3,275		3,275		45.3		54.7		
Green Lake	11	32		43	480	2,450		2,930	9.5	23.4	6.5	51.7	8.9	
Iowa	5	35		38	90	2,918		3,008		51.4	10.1	36.9	1.6	
Iron	3	12		15	60	463		523		16.8	79.7	3.5		
Jackson	6	43		49	310	4,281		4,591	27.7	29.0	10.4	31.0	1.9	
Jefferson	10	48		58	575	4,785		5,360	21.0	39.9	4.6	34.5		
Juneau	4	38		42	295	2,745		3,040		57.5	13.0	29.5		
Kenosha	22	17	70	109	1,440	1,330	8,030	10,800	33.9	45.7	14.3	3.5	2.6	
Kewaunee	4	28		32	150	1,840		1,990		5.1	14.3	76.0	2.1	2.5
La Crosse	7	22	58	87	580	1,795	6,885	9,260	60.4	20.6	9.0	10.0		
Lafayette	1	36		37	50	2,126		2,176		7.4	9.3	72.7	10.6	
Langlade	7	29		36	410	2,250		2,660	1.5	52.4	19.4	18.8	7.9	
Lincoln	2	38		40	35	2,079		2,114	0.9	55.5	32.2	10.7	0.7	
Manitowoc	19	50	34	103	572	2,960	2,020	5,552	20.5	32.0	11.1	35.9	0.3	0.2
Marathon	16	60	52	128	520	3,760	3,500	7,780		80.0	2.0	15.6	1.2	0.4
Marinette	13	55		66	206	2,710		2,916	1.1	60.3	17.2	13.3	8.1	
Marquette	3	20		23	75	1,098		1,173		23.4	4.8	69.7	2.1	
Menomonie		3		3		30		30		33.3		66.7		
Milwaukee	1	74	598	673	25	13,600	83,324	96,949	77.2	18.7	4.0			0.1
Monroe	9	56		65	555	4,690		5,245	25.4	27.4	10.4	36.4	0.4	
Oconto	3	40		43	120	3,298		3,418	10.3	23.2	6.9	54.4	5.2	
Oneida	12	43		55	310	2,587		2,897	12.5	65.0	9.9	2.1	10.5	
Outagamie	10	49	57	116	610	4,395	7,485	12,490	17.0	53.0	5.2	23.4	0.8	0.6
Ozaukee	7	48		55	470	5,506		5,976	44.9	27.4	12.5	15.2		
Pepin	1	12		13	20	990		1,010	9.3	22.3	44.3	17.0	7.1	
Pierce	2	33		35	102	3,633		3,735	11.8	34.8	8.7	38.6	6.1	
Polk	8	42		50	171	3,309		3,480	20.8	15.7	10.5	40.1	12.9	
Portage	6	30	26	62	170	1,620	2,490	4,280	1.8	73.4	3.2	21.0	0.6	
Price	7	38		45	160	1,468		1,628	19.0	22.1	16.0	26.5	16.4	
Racine	14	23	80	127	645	4,200	10,140	14,985	27.9	49.7	15.3	4.6	1.8	0.7
Richland	8	18		26	200	1,100		1,300		30.0	0.9	69.1		
Rock	4	16	72	92	170	2,785	13,169	16,124	48.2	36.3	5.0	7.9	1.7	0.9
Rusk	3	34		37	45	1,520		1,565	37.7	3.2	14.1	37.6	7.4	
St. Croix	8	42		50	745	5,150		5,895	16.8	43.4	8.6	27.6	3.6	
Sauk	9	61		70	430	6,080		6,510	3.5	66.0	8.5	21.3	0.7	
Sawyer	15	28		43	98	1,403		1,501	15.7	21.3	29.3	6.7	27.0	
Shawano	4	55		59	325	4,089		4,414	3.4	32.7	3.4	60.5		
Sheboygan	9	45	52	106	315	3,365	3,671	7,351	29.9	32.0	9.1	28.9	0.1	
Taylor	3	31		34	40	1,430		1,470		49.3	11.2	39.5		
Trempealeau	5	51		56	270	3,980		4,250	17.5	11.9	7.5	61.9	1.2	
Vernon	6	48		54	150	3,805		3,955	11.6	0.8	6.9	78.6	2.1	
Vilas	7	31		38	155	1,250		1,405	1.2	18.7	58.8	0.3	21.0	
Walworth	6	69		75	295	7,365		7,660	25.1	42.6	6.0	22.5	1.2	2.6
Washburn	4	26		30	45	999		1,044	7.3	36.3	27.1	22.8	6.5	
Washington	19	40	5	64	1,630	3,397	370	5,397	27.8	36.1	9.3	24.1	0.9	1.7
Waukesha	27	64	104	195	1,750	7,025	15,105	23,880	53.8	32.6	4.2	8.9	0.5	
Waupaca	10	62		72	383	6,500		6,883	1.5	59.7	4.4	31.0	2.7	0.7
Waushara	7	51		58	207	3,268		3,475	0.7	54.0	9.0	32.0	4.3	
Winnebago	18	52	64	104	1,615	2,860	6,980	11,455	7.9	72.6	6.0	11.8	0.7	1.0
Wood	2	63		65	25	5,215		5,240	0.2	79.3	2.0	15.9	2.6	
					24,864	231,020	207,805	463,689						

ACKNOWLEDGMENTS

We wish to express our sincere appreciation to the Revenue Department for assistance in this survey. The work of the petroleum inspectors was the key factor in carrying out the project.

The authors are with the Surveillance Section, Bureau of Standards and Surveys, Madison.

Edited by Ruth L. Hine.

TECHNICAL BULLETINS
Currently Available From The Department of Natural Resources

No. 10 Role of refuges in muskrat management. (1954) Harold A. Mathiak and Arlyn F. Linde

No. 11 Evaluations of stocking of breeder hen and immature cock pheasants on Wisconsin public hunting grounds. (1955) Cyril Kabat, Frank M. Kozlik, Donald R. Thompson and Frederic H. Wagner

No. 13 Seasonal variation in stress resistance and survival in the hen pheasant. (1956) Cyril Kabat, R.K. Meyer, Kenneth G. Flakas and Ruth L. Hine

No. 19 The hemlock borer. (1959) Ali Hussain and R.D. Shenefelt
The European pine shoot moth and its relation to pines in Wisconsin. (1959) Daniel M. Benjamin, Philip W. Smith and Ronald L. Bachman

No. 21 Forest insect surveys within specified areas. (1960) R.D. Shenefelt and P.A. Jones

No. 22 The state park visitor: a report of the Wisconsin park and forest travel study. (1961) H. Clifton Hutchins and Edgar W. Trecker, Jr.

No. 23 Basal area and point sampling: interpretation and application. (1970) H.J. Hovind and C.E. Rieck

No. 24 Licensed shooting preserves in Wisconsin. (1962) George V. Burger

No. 26 Effects of angling regulations on a wild brook trout fishery. (1962) Robert L. Hunt, Oscar M. Brynildson and James T. McFadden

No. 28 An evaluation of pheasant stocking through the day-old-chick program in Wisconsin. (1963) Carroll D. Besadny and Frederic H. Wagner

No. 31 Evaluation of liberalized regulations on largemouth bass: Browns Lake, Wisconsin. (1964) Donald Mraz

No. 32 Characteristics of the sport fishery in some northern Wisconsin lakes. (1964) Warren Churchill and Howard Snow

No. 35 Production and angler harvest of wild brook trout in Lawrence Creek, Wisconsin. (1966) Robert L. Hunt

No. 36 Muskrat population studies at Horicon Marsh, Wisconsin. (1966) Harold A. Mathiak

No. 37 Life history of the grass pickerel in southeastern Wisconsin. (1966) Stanton J. Kleinert and Donald Mraz

No. 38 Canada goose breeding populations in Wisconsin. (1966) Richard A. Hunt and Laurence R. Jahn

No. 39 Guidelines for management of trout stream habitat in Wisconsin. (1967) Ray J. White and Oscar M. Brynildson

No. 41 Occurrence and significance of DDT and dieldrin residues in Wisconsin fish. (1968) Stanton J. Kleinert, Paul E. Degurse and Thomas L. Wirth

No. 42 Foot of angler-caught pike in Murphy Flowage. (1969) Leon Johnson

No. 43 The Lake Winnebago sauger: age, growth, reproduction, food habits and early life history. (1969) Gordon R. Priegel

No. 44 Significance of forest openings to deer in northern Wisconsin. (1969) Keith R. McCaffery and William A. Creed

No. 45 Reproduction and early life history of walleyes in the Lake Winnebago region. (1970) Gordon R. Priegel

No. 47 Evaluation of intensive freshwater drum removal in Lake Winnebago, Wisconsin, 1955-1966. (1971) Gordon R. Priegel

No. 48 Responses of a brook trout population to habitat development in Lawrence Creek. (1971) Robert L. Hunt

No. 49 Growth of known-age muskellunge in Wisconsin and validation of age and growth determination methods. (1971) Leon D. Johnson

No. 50 Harvest and feeding habits of largemouth bass in Murphy Flowage, Wisconsin. (1971) Howard E. Snow

No. 51 A guideline for portable direct current electrofishing systems. (1971) Donald W. Novotny and Gordon R. Priegel

No. 52 Mercury levels in Wisconsin fish and wildlife. (1972) Stanton J. Kleinert and Paul E. Degurse

No. 53 Chemical analyses of selected public drinking water supplies (including trace metals). (1972) Robert Baumeister

No. 54 Aquatic insects of the Pine-Popple River, Wisconsin. (1972) William L. Hilsenhoff, Jerry L. Longridge, Richard P. Narf, Kenneth J. Tennessen and Craig P. Walton

No. 55 Recreation Areas and Their Use. (1972) Melville H. Cohee

No. 56 A Ten-Year Study of Native Northern Pike in Bucks Lake, Wisconsin Including Evaluation of an 18.0-inch Size Limit. (1972) Howard E. Snow and Thomas D. Beard

No. 57 Biology and Control of Selected Aquatic Nuisances in Recreational Waters. (1972) Lloyd A. Lueschow

No. 58 Nitrate and Nitrite Variation in Ground Water. (1972) Koby T. Crabtree

No. 59 Small Area Population Projections for Wisconsin. (1972) Douglas B. King. David G. Nichols and Richard J. Timm

No. 60 A profile of Wisconsin Hunters. (1972) Lowell L. Klessig and James B. Hale

No. 61. Overwinter Drawdown: Impact on the Aquatic Vegetation in Murphy Flowage, Wisconsin (1973) Thomas D. Beard.

No. 62. Eutrophication Control: Nutrient Inactivation by Chemical Precipitation at Horseshoe Lake, Wisconsin (1973). James O. Peterson, et al.