Twenty-first biennial report of the State Conservation Commission of Wisconsin for the fiscal years ending June 30, 1947 and June 30, 1948. 1949

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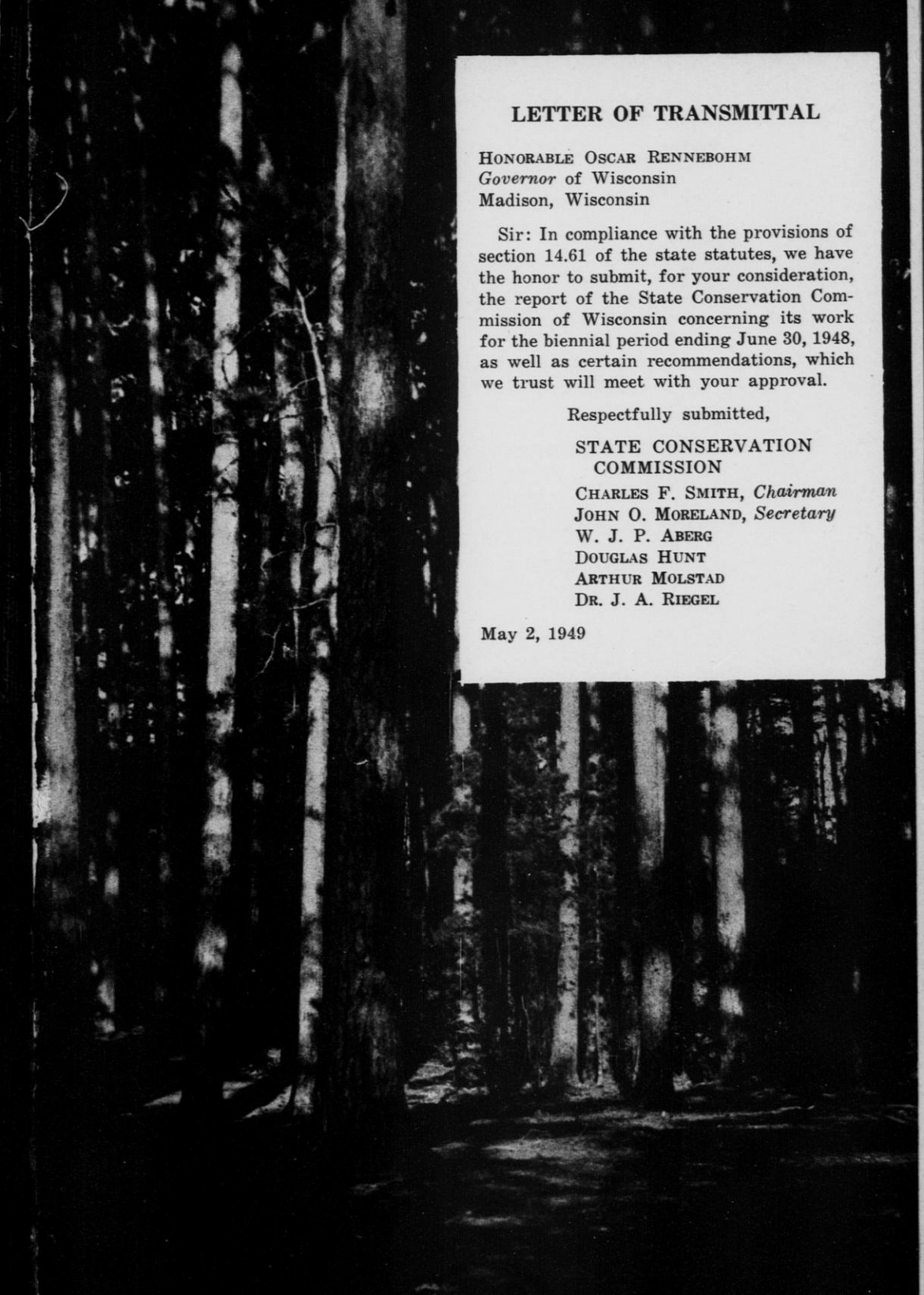
TWENTY-FIRST BIENNIAL REPORT
CONSERVATION COMMISSION
STATE OF WISCONSIN

1946 1948



LETTER OF TRANSMITTAL

HONORABLE OSCAR RENNEBOHM
Governor of Wisconsin
Madison, Wisconsin

Sir: In compliance with the provisions of section 14.61 of the state statutes, we have the honor to submit, for your consideration, the report of the State Conservation Commission of Wisconsin concerning its work for the biennial period ending June 30, 1948, as well as certain recommendations, which we trust will meet with your approval.

Respectfully submitted,

STATE CONSERVATION COMMISSION
CHARLES F. SMITH, *Chairman*
JOHN O. MORELAND, *Secretary*
W. J. P. ABERG
DOUGLAS HUNT
ARTHUR MOLSTAD
DR. J. A. RIEGEL

May 2, 1949

TABLE OF CONTENTS

TWENTY-FIRST BIENNIAL REPORT

OF THE

STATE CONSERVATION COMMISSION

OF

WISCONSIN

For the Fiscal Years Ending June 30, 1947
and June 30, 1948

MADISON, WISCONSIN
1949

CONSERVATION COMMISSION

CHARLES F. SMITH, Wausau
Chairman

JOHN O. MORELAND, Hayward
Secretary

W. J. P. ABERG, Madison

DOUGLAS HUNT, Wautoma

ARTHUR MOLSTAD, Milwaukee

DR. J. A. RIEGEL, St. Croix Falls

●

CONSERVATION DEPARTMENT

ERNEST F. SWIFT
Director

H. T. J. CRAMER
Assistant Director

GEORGE SPRECHER
Assistant Director

C. L. HARRINGTON
Forests and Parks

W. F. GRIMMER
Game Management

F. G. WILSON
Cooperative Forestry

G. S. HADLAND
Law Enforcement

NEIL LEMAY
Forest Protection

C. A. BONTLY
Finance

EDWARD SCHNEBERGER
Fish Management

LULU M. KORN
Clerical

W. T. CALHOUN
Information and Education

Administration

The purpose of the conservation act as stated in section 23.09 in the statutes is "to provide an adequate and flexible system for the protection, development and use of forests, fish and game, lakes, streams, plant life, flowers and other outdoor resources in the state of Wisconsin."

The Conservation Commission, a policy making body consisting of six members appointed by the Governor for a term of six years, is the agency charged with the responsibility of carrying out the purpose of the conservation act. The commission is authorized to make such rules and regulations, inaugurate such studies, investigations and surveys, and establish such services as it may deem necessary to redeem its responsibilities.

The policies of the commission are executed by the Conservation Director who is the administrative head of the state conservation department. Two assistant directors aid him in the administration of the department and its program.

Attached to the administration are a personnel officer and a legal counsel.

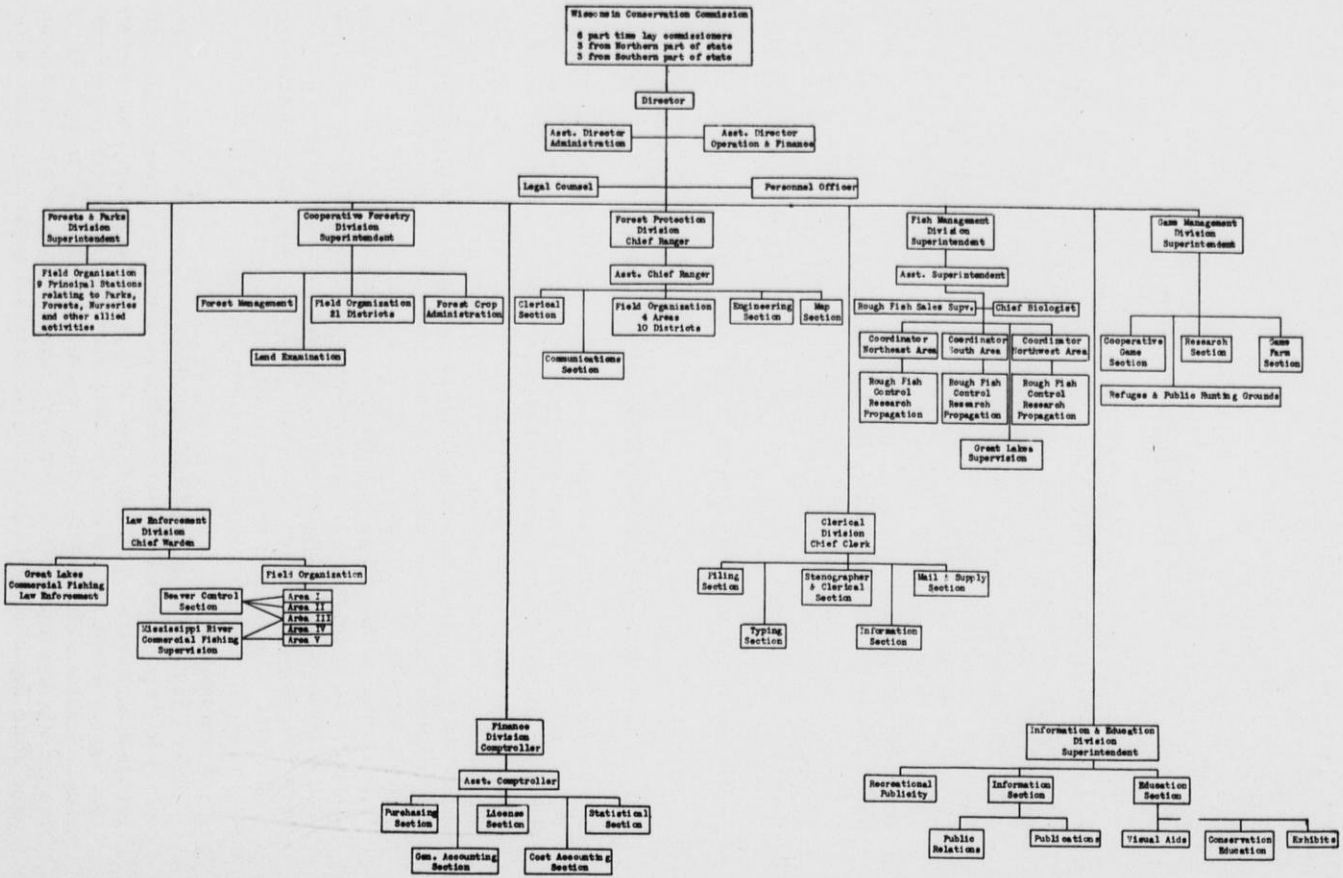
PERSONNEL OFFICER

In April 1947 the Conservation Commission established a separate personnel office. Like many other employers in both public and private business, the conservation department had experienced a growth in personnel and employment problems in the post war era. Expanded work programs demanded additional personnel. War-created gaps in the ranks had to be filled. The growing numbers of employees were spread far and wide throughout the state attached to many different conservation headquarters. It was difficult for the administration of the conservation department to maintain personal relationships with all its employees. To strive for uniform standards in employment so all employees were treated fairly and alike and to insure that the state received a fair return for monies spent on personnel, the Conservation Commission felt a modern personnel program was needed. This decision was correlated with the program of the commission to install modern business practice in all phases of administration of the department.

Under Chapter XVI of the Wisconsin Statutes the State Bureau of Personnel is given responsibility and authority for many personnel functions for state departments and employees. It is readily apparent that one central agency could not effectively administer the many specialized personnel programs required for the diversified character of employment in the various departments. Therefore, the State Personnel Board has encouraged state departments to establish decentralized personnel offices to as-

WISCONSIN CONSERVATION DEPARTMENT

Organization Chart



sist the central state bureau in administration of the overall state program contemplated by the statutes.

When the conservation department personnel office was established, the Conservation Commission and the Conservation Director outlined a broad personnel program to be carried out. Naturally this program had to be established gradually. Among the general functions assigned the personnel office was the responsibility to advise the director and assistant directors on matters pertaining to personnel and to formulate and suggest definite personnel policy to the Director and Assistant Directors. The personnel division is charged with the responsibility of providing staff personnel service to all other divisions of the department; also, to act as liaison agent between the department and the state bureau of personnel.

Among the specific functions exercised by the personnel division are the administration of a uniform job classification plan of positions for the department; duties in recruiting, examining and selection of new personnel for the department; cooperation in in-service training of employees for increased work efficiency; evaluation of employee performance; drafting personnel rules and regulations for directors' approval; maintenance of personnel records; performance of personnel and administrative research; and providing miscellaneous services to the department in disciplinary, grievance, employee morale, and health insurance matters.

Among the milestones of the last biennium in the history of the newly created personnel division was the complete reallocation of all positions in the department under Chapter 611 of the session laws of 1947 to the new state salary and classification plan; the computation of prior service records of all employees for credits under the revised state pension plan; and the introduction of a group hospitalization plan.

LEGAL COUNSEL

The legal counsel drafts commission orders; prepares recommended legislation of the department; reviews progress of conservation legislation introduced during legislative sessions; examines titles and closes land purchases; prepares legal documents and serves as consultant to departmental personnel in legal matters related to the performance of their duties; examines bounty and deer and bear damage claims; issues special permits and contracts; provides the public with legal interpretation of conservation laws through personal contact and correspondence; assists in the preparation of printed conservation laws and regulations for general distribution.

WISCONSIN CONSERVATION CONGRESS

The Wisconsin Conservation Congress consisting of 355 elected representatives of the people of the state (five from each county) became an even more effective organization for conservation during this biennium. Under the leadership of Clarence A. Searles (Chairman), W. A. Burdick (Vice-chairman) and Richard A. Hemp (Secretary), their Executive Council on December 14, 1947, set up seven study committees on deer, water-

fowl, ice-fishing, fur-bearing animals, education and rules. The resulting field surveys and reports of these committees proved the value of this form of organization.

Special mention should be made of the "Majority Report of the Deer Committee" resulting from their survey of deer yards in the winter of 1948 and progress reports of the waterfowl and fur-bearing animal committees. A revised Code of Procedure prepared by the rules committee was approved by the general Congress in June, 1948. The Congress also sent representatives to the North American Wildlife Conference and the organization meeting of the International Wildfowlers Association. Chairman Clarence A. Searles published an article "Your Democracy in Shirt Sleeves" in the April, 1948 Conservation Bulletin discussing their activities.

On June 15, 1948, the general Congress in a state-wide meeting at Madison elected new district councilors who selected Richard A. Hemp as chairman, L. C. Whiffen as vice-chairman and Ross Bennett as secretary. The committee system for action in between meetings is the most important development of this period along with assignment of a liaison worker and a budget listing for the Congress.

Forests and Parks

STATE FORESTS

State forests are normally not less than 5,000 acres in area, and are usually in excess of 10,000 acres. They are composed of lands definitely submarginal for agriculture because of low fertility, excessive stoniness, poor drainage, or rough topography. They are managed under the principle of "multiple use," of which the chief factors are:

1. The growing of timber under sustained yield management.
2. Recreation.
3. Game management.
4. Perpetuation of beneficial forest influences including water conservation, reduction of floods and prevention of erosion.

Under the principle of multiple use, forests contain special use areas such as recreation sites, wilderness or natural areas, and game refuges, within which the specified uses take precedence over timber production.

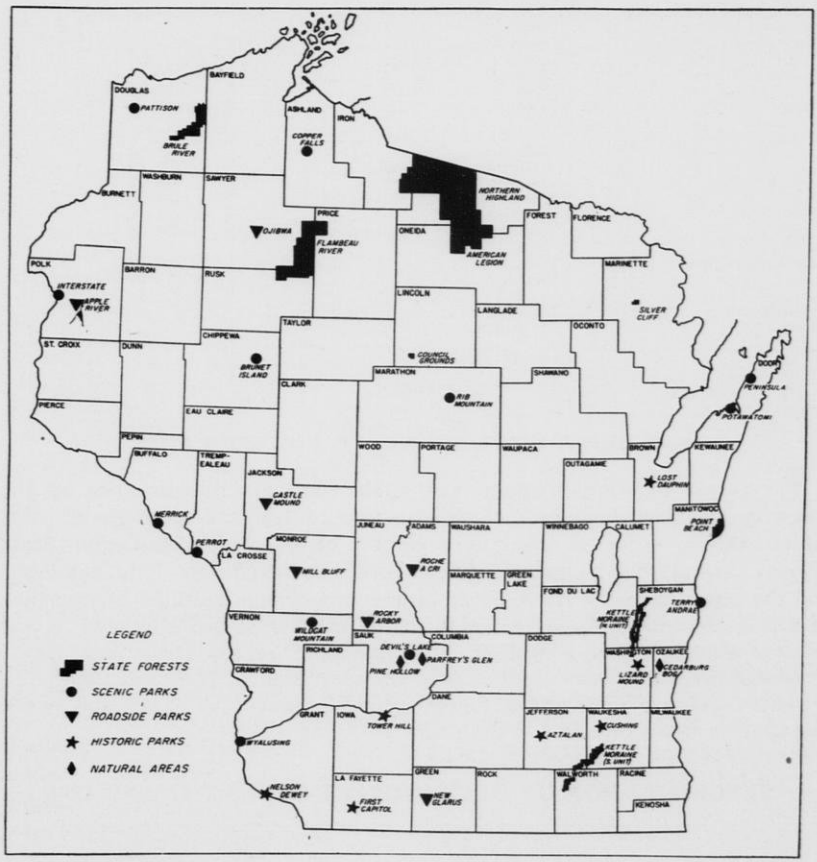
State forests differ from state parks in their greater size and their lesser outstanding scenic distinction, other than the beauty of forest and waters; and they are generally managed for the physical products of timber, game and fur, and their beneficial influences on climate and stream flow.

The eight state forests of Wisconsin now contain approximately 260,270 acres. A tabulation showing location, how reached and other information follows:

Name	Location and State Highway Connection	Dominant Features	Swimming	Camping	Electrical Outlets	Store	Address of Forest Manager	Water Frontage	Picnic Area
American Legion	Oneida Co., T.H. 47	Inland Lakes, wooded terrain	Yes	Yes	No	Nearby	Trout Lake	Many glacial lakes	Yes
Brule River	Douglas Co., T.H. 2	River scenery	Yes	Yes	No	Nearby	Brule	Brule River	Yes
Council Grounds	1 mi. W. of Merrill, Lincoln Co., T.H. 51	Pine woods, river scenery	Yes	Yes	No	Nearby	Merrill	Wis. River	Yes
Flambeau River	Sawyer Co., T.H. 13, 8, 70	Flambeau River Wilderness Forest, canoeing	No	Yes	No	Nearby	Phillips	Flambeau River	No
Kettle Moraine	N. Unit—5 mi. N. of Kewaskum, T.H. 55 and 45	Glacier formed hills and valleys	Yes	Yes	No	Nearby	Campbellsport	Mauthe Lake	Yes
	S. Unit—4 mi. N. of Eagle, T.H. 59	As above	No	Yes	No	Nearby	Eagle	None	Yes
Northern Highland	Vilas and Iron Co., T.H. 51	Glacier formed lakes, wooded terrain	Yes	Yes	No	Nearby	Trout Lake	Trout Lake, and many other lakes	Yes
Point Beach	4 mi. N. of Two Rivers, T.H. 42	Lake Michigan, sand dunes, Pine woods	Yes	Yes	No	Nearby	Two Rivers	Lake Michigan	Yes
Silver Cliff	Marinette Co., T.H. 141	Sandy pine plain	No	No	No	No	Wausaukee	None	No

STATE FOREST LAND ACQUISITION

The state forest land purchase program was accelerated over the biennium with land prices considerably higher. In some areas land owners continued to hold their property at a price which was 50% greater than department appraisals. Substantial progress was made in blocking in the state ownership in many areas in spite of this difficulty. Slightly in excess



of 6,700 acres of land were added to the state Forests during 1947 and 1948, the principal additions being to the Brule, Flambeau, and Kettle Moraine Forests.

The only major forest boundary revision over the biennium was in connection with Point Beach State forest property. The new boundary now includes land south to within about one quarter mile of Two Rivers. The over all area now within the forest consists of 2,985 acres. No further

revision should be necessary on this area. The state of Wisconsin will eventually own 6 or more miles of Lake Michigan frontage.

The table which follows shows total acreage of state-owned forest land by counties within the boundaries of the eight state forests.

STATE FOREST ACREAGE AS OF JUNE 30, 1948

Name	*County*	*Acres*	*Total Acres*
American Legion	Oneida		37,007.29
Brule River	Douglas		17,334.27
Council Grounds	Lincoln		278.17
Flambeau River	Sawyer	50,630.64	
	Rusk	8,559.28	
	Price	6,755.90	65,945.82
Kettle Moraine	Fond du Lac	2,853.37	
	Sheboygan	5,733.52	
	Northern Unit total	8,586.89	
	Jefferson	594.00	
	Walworth	508.08	
	Waukesha	3,594.18	
	Scuppernong Unit total	4,696.26	13,283.15
Northern Highland	Iron	12,358.73	
	Vilas	111,878.38	124,237.11
Point Beach	Manitowoc		1,380.25
Silver Cliff	Marinette		800.00
	TOTAL		260,266.06

REFORESTATION ON STATE FOREST LAND

The forest planting program was again somewhat handicapped by the scarcity of labor, high cost of planting operations and shortage of suitable planting stock. No trees were planted on the American Legion State Forest during this bienninum since there was insufficient help available. On the other hand the shortage of larger transplants, suitable for machine planting, accounted for a reduction in the number of trees planted on the Kettle Moraine Forest in 1948. Tree planting on the Brule and Kettle Moraine forests increased 100% over the plantings of 1945 and 1946.

The following table gives figures on the number of trees and acres, planted on state forests for the years 1947 and 1948:

REFORESTATION ON STATE FOREST LANDS 1947 AND 1948

		Acres		
	Trees	*New Planting*	*Replanting*	*Total*
American Legion				
Brule River	1,633,100	1,002.	416	1,418.0
Flambeau River	335,500	229.	46	275.0
Kettle Moraine	236,375	203.8		203.8
Northern Highland	314,000	190.4		190.4
Silver Cliff	118,000	75.0		75.0
Northern Conservation lands and Misc.	46,900	20.5	57	77.5
	2,683,875	1,720.7	519	2,239.7

SALE OF FOREST PRODUCTS

Timber sales continued over the biennium, the principal sales being on the northern Highland, Flambeau River and Brule River State Forests. Ninety percent of the volume cut was in the form of pulp wood, Aspen being the principal species.

Work has been started on the preparation of a timber management plan for each forest property. With the aid of aerial photographs and systematic sampling it is hoped that timber cutting plans of the future may be based on concrete inventory and growth information rather than on extensive estimates. Cutting recommendations have been extremely conservative.

The following tabulation shows the volumes and values of forest products cut from the state forests during 1947 and 1948.

TIMBER CUTTING 1947 AND 1948

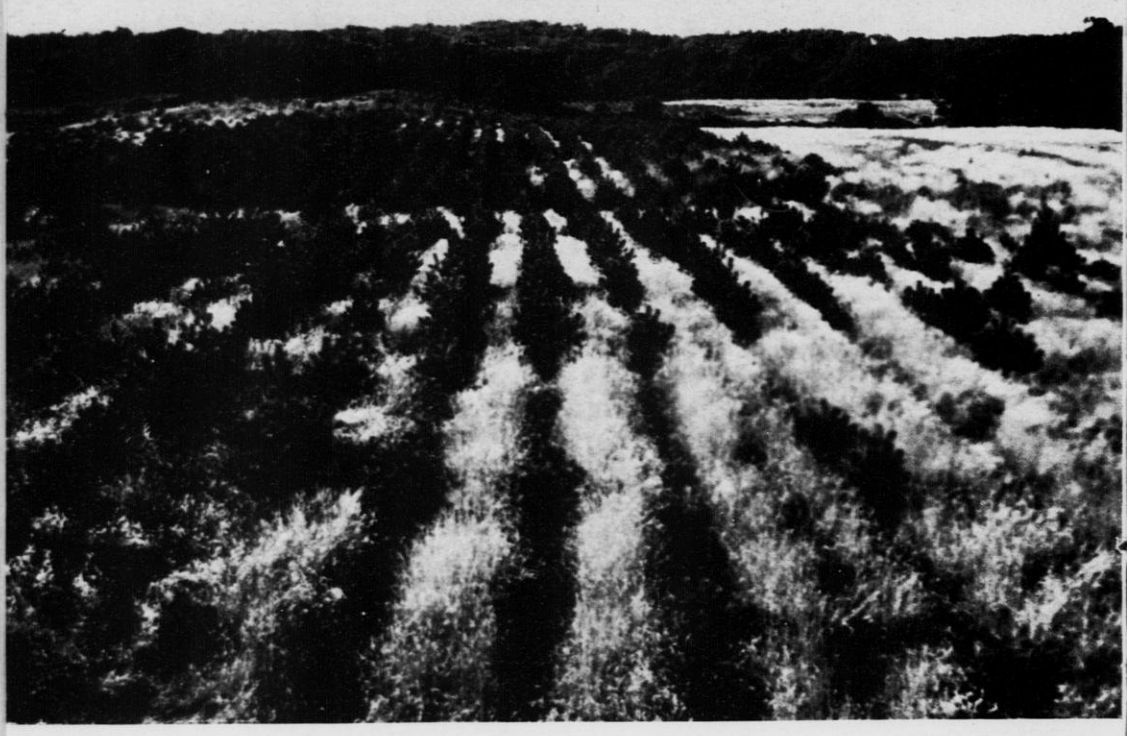
Forest	*Volume Cut*		*Cord Equivalent*	*Value*	*Acres Cut*
	Pulp Wood Bolts Cords	*Sawtimber M Bd. Ft.*			
American Legion	1,512.00	73.78	1,760	$ 2,597.14	280
Brule River	1,161.08	None	1,161	2,916.43	160
Flambeau River	4,301.27	95.98	4,493	8,352.46	720
Kettle Moraine	None	18.78	38	934.96	160
Northern Highland	3,446.42	522.61	4,492	18,571.85	807
TOTALS	10,420.77	711.15	11,944	$33,372.84	2,127

IMPROVEMENTS

Roads—In cooperation with the state Highway Commission, a much enlarged state forest road improvement program was undertaken. This was possible largely through an increase in the legislative appropriation for the construction and maintenance of roads, including fire roads, in the state parks and state forests and other public lands as defined in Chapter 24, including access roads from the state trunk highways to such lands.

More than 20 miles of road leading to the Flambeau forest in Sawyer, Rusk, and Price counties was constructed, reconstructed and surfaced. A scenic drive through the Whitewater Lake area on the south end of the Kettle Moraine forest was constructed late in 1948. Plans for the Kettle Moraine scenic drive were approved and some work started. Seventeen miles of bituminous roads were seal coated, many miles were resurfaced with gravel, all of the improvements were in addition to regular summer and winter maintenance.

Building and grounds—The facilities for recreational use on all the forests were increased. Several new picnic grounds and several new camp grounds were developed in addition to the enlargement of existing areas.



Pine plantation, Kettle Moraine State Forest.

Water supplies were developed or improved, sanitary facilities provided, more than 50 new fireplaces were constructed, and hundreds of new tables were built.

Hiking, bridle, and ski trails were improved and some miles added. The water trail program advanced, this will provide campsites, portage trails, etc. along the streams and lake wholly or partially in public forest areas adjoining land and waters.

Work advanced on the central heating plant at Trout Lake. One new residence was built and several old farm buildings were remodeled for housing of forest workmen. Ten old farm buildings on Kettle Moraine forest were sold or salvaged, almost 100 miles of old fence was removed and 5 miles of new fence constructed.

Planting site preparation continued as did plantation release as necessary.

New Equipment—Fifteen new trucks as replacements for old worn out units were purchased for use on the state forests. Plans for periodic exchange and purchase of new trucks could not be carried out during the war years. It is now hoped that provisions can be made for a reasonable annual replacement. Two new tractors for general construction and maintenance work on the forest were purchased during 1947 and 1948. This much needed equipment will add materially to the efficiency of the work.

FOREST PROTECTION

Fire losses were held to a minimum on all state forest property in spite of the fact that hazards were above normal. The accumulated precipitation deficiency over the biennium varied by locations from 9 to 20 inches. Each drought period was accompanied by generally low humidities and the wind velocity was dangerously high on numerous occasions.

An experimental spraying of D. D. T. by airplane was made on approximately 80 acres of Norway pine plantation for the control of spitle bug. At present very little new damage has taken place in the sprayed area, while adjacent areas not showing evidence of damage in prior years are beginning to show signs of damage. The work of controlling damaging forest insects should be continued when necessary.

Work continued in the study of rodent damage particularly mice in the hope of learning more about their life cycle and proper control measures.

Deer damage to young growth again ran high in some areas.

PUBLIC USE

The actual number of people using the forests for recreation purposes is at best a difficult thing to measure. On the larger forest properties with almost unlimited entrance ways, and with numerous resorts within the boundaries accurate checks are impossible. Records kept on attendance at public campsites show a steady increase since 1945. On one forest more than twice as many people used the camping facilities in 1948 as did in 1946. In addition to a large number of campsites there are picnic areas, boat landings and waysides within the forests.

On certain of the smaller properties where automatic counting devices could be installed a more accurate determination of attendance was made. The attendance records on three forest properties follow:

Name of Forest	*1947*		*1948*	
	Persons	*Cars*	*Persons*	*Cars*
Council Grounds	23,911	5,982		
Kettle Moraine	103,251	24,352	102,815	25,917
Point Beach	130,469	39,919	214,209	49,520
TOTALS	257,631	70,253	317,024	75,437

After consideration of the facts that in addition to public facilities there are hundreds of resorts within forest boundaries, that large numbers of people fish, hunt and visit the forests for reasons of scenic beauty and education, it is estimated conservatively that between 2,000,000 and 3,000,000 people visit the forests annually.

It is appreciated that further expansion of public use facilities on all forest properties is necessary. It is also suggested that the capacity of each campsite be decided upon and camping be limited in each campsite to that number. The overflow would be directed to campsites not filled to capacity since a congested campsite defeats its purpose.

It has been the custom of some campers to pre-empt the choice camping spots in certain campsites and to remain there all summer. The unfairness of such a situation is obvious. Beginning with the summer of 1949, it is contemplated that two weeks free camping be allowed after which a charge of fifty cents per day will be made.

STATE FOREST ACREAGE BY COUNTIES AND BY TOWNS

As of June 30, 1948

(Chap. 563, Laws 1947)

County	*Town*	*Town Acreage*	*County Acreage*
Douglas	Bennett	520	
	Brule	3,998	
	Highland	8,772.48	
	Solon Springs	4,043.79	17,334.27
Fond du Lac	Auburn	2,102.77	
	Osceola	750.60	2,853.37
Iron	Mercer	7,244.96	
	Sherman	5,113.77	12,358.73
Jefferson	Palmyra	594.00	594.00
Lincoln	Merrill	278.17	278.17
Manitowoc	Two Rivers	1,380.25	1,380.25
Marinette	Silver Cliff	800.00	800.00
Oneida	Lake Tomahawk	8,092.33	
	Newbold	10,757.56	
	Sugar Camp	7,605.45	
	Woodruff	10,551.95	37,007.29
Price	Flambeau	1,151.41	
	Lake	5,604.49	6,755.90
Rusk	Cedar Rapids	4,986.53	
	South Fork	3,572.75	8,559.28
Sawyer	Draper	9,337.97	
	Winter	41,292.67	50,630.64
Sheboygan	Greenbush	2,112.40	
	Mitchell	2,516.78	
	Plymouth	41.03	
	Scott	1,063.31	5,733.52
Vilas	Arbor Vitae	24,160.89	
	Boulder Junction	33,263.34	
	Cloverland	2,344.62	
	Manitowish Waters	4,277.68	
	Plum Lake	31,782.22	
	Presque Isle	5,141.38	
	St. Germain	3,250.07	
	State Line	5,738.18	
	Winchester	1,920.00	111,878.38
Walworth	LaGrange	291.00	
	Whitewater	217.08	508.08
Waukesha	Eagle	1,279.98	
	Ottawa	2,314.20	3,594.18
TOTALS		260,266.06	260,266.06

New bridge across the Bad river, Copper Falls State Park.

STATE PARKS

Another chapter in the history of state park development was written during the biennium by the legislature. This was in the form of a general parks bill more specifically known as Chapter 549 law of 1947.

It was "declared to be the policy of the legislature to acquire, improve, preserve and administer a system of areas to be known as the state parks of Wisconsin. The purpose of the state parks is to provide areas for public recreation and for public education in conservation and nature study. An area may qualify as a state park by reason of its scenery, its plants and wildlife, or its historical, archeological or geological interest."

The conservation commission was made responsible "for the selection of a balanced system of state park areas and for the acquisition, development and administration of the state parks."

The act also provided for a participation of monies from the general fund to the park program in an organized and systematic way for the first time in the history of the state. The financial provisions were as follows:

East Bluff, Devils Lake State Park.

1. "Annually, as may be determined by the conservation commission, an amount not to exceed ten per cent of the income of the conservation fund for the preceding fiscal year, but not less than $150,000 annually." (Fish and Game receipts)
2. "There is appropriated to the state conservation commission from the general fund on July 1, 1947, $75,000 and annually beginning July 1, 1948, $100,000 to be used for state parks as authorized . . .".

This act is a measure of broad and important public concern and significance. So broad and inclusive must the state park program be as required by the mandate of the 1947 law, that its implementation must necessarily be a long term program. However energetic steps have been and are being taken to comply.

PARK IMPROVEMENTS

The development for full use of presently held properties was accelerated with the provision of better essential facilities and services such as adequate potable water supplies, sanitary facilities, additional and improved camping, picnicking and beach areas, new buildings, trails, bridges, and the layout, construction and improvement of existing and new park roads.

Mauthe lake recreation area, Kettle Moraine State Forest.

New equipment including such items as trucks, tractors and mowers as well as hand tools together with the hiring of additional personnel are providing for an improvement in the over-all maintenance and service rendered the public in all the park areas.

ADDITIONS TO EXISTING PROPERTIES

Park properties that are now too small are being enlarged lest the pressure of use destroy the very qualities essential to the purpose. Privately owned parcels of land within existing park boundaries are being acquired to simplify administrative problems and to provide for more use areas. Certain lands adjacent to park properties are being acquired to provide a buffer area or to protect against extra or detracting influences.

The following parks have added acreages during the biennium:

	Acres
Devil's Lake State Park	917
Pattison State Park	34
Peninsula State Park	11
Rib Mountain State Park	4
TOTAL	966

NEW PROPERTIES ACQUIRED

Even more significant are the new park areas acquired for development over the biennium.

Ancient Aztalan—Qualifying as an area of historical and archeological interest was Aztalan—perhaps the greatest work of antiquity in Wisconsin. Located on the Crawfish river near Aztalan and Lake Mills in Jefferson county, approximately 120 acres have been acquired as the site of the ancient stockaded village called Aztalan (named for its probable Aztex or Mexican cultural origin). While only the large pyramidal mounds and traces of the village's embankment are all that remain of the actual village, ten well preserved mounds remain. Around the existing mounds, which scenically overlook the Crawfish river, facilities will be provided for parking and picnicking, and for a historical marker. It is hoped that in the future an opportunity will be afforded for at least a partial restoration of the ancient village.

Lost Dauphin—Likewise qualifying as a historical site is the Eleazer Williams home on the banks of the Fox River near De Pere in Brown county. It was here that Eleazer Williams, reputedly Louis XVII, Lost Dauphin of France, son of Louis XVI and Marie Antoinette, lived for a great part of his life. The log cabin overlooking the Fox river, with the surrounding wooded area has now been acquired, by gift, from L. W. Gillespie and wife of Green Bay, as a state historical park.

Lizard Mound Park—An unusual group of Indian mounds, over 30 in number, on the Ernst Hagner farm near West Bend in Washington county, is fully as important an archeological monument to our Indian cultural history as is Aztalan and, like Aztalan, has now been acquired as an archeological state park. The 20 acre tract that has been acquired includes conical mounds, oval, linear, bird effigies, panther effigies and one lizard effigy of exceptional form. They are prominent of height, of careful construction, ideally located on high beautifully wooded land, and are exceptionally diversified in shape or type.

Roche a Cri Roadside Park—Roche a Cri rock, one of the outstanding, castellated buttes in Wisconsin is located in Adams county. This craggy rock, from a distance looking like a ruined castle with towers, is set within a beautifully mixed wooded area through which runs Carter Creek. Its natural scenic attractions and its ideal location, just north of Friendship and Adams on heavily travelled State Highway 13, make it a desirable addition to the roadside park system.

Apple River Roadside Park is located on busy U. S. Highway 8 in Polk county. The Apple river area includes 75 acres of virgin pine and hardwoods and it's to be used jointly as a roadside park and as a timber harvest demonstration forest under the University's extension forester. Bordering the park on the east is the clear, fast flowing Apple river, making the area scenically one of the most attractive of the state's roadside parks.

Wild Cat Mountain State Park—Probably some of the best scenery of the Western and Southwestern part of the state is that along the Kickapoo

river and now within the boundary of the newest of the state's major scenic parks—Wild Cat Mountain State Park. Begun with an initial gift of 60 acres from Vernon county, another 390 acres has already been purchased, including Mt. Pisgoh and Wild Cat Mountain itself from which magnificent views are available of forested hills and intervening valleys. This new park traversed by State Highway 33 and easily accessible, includes three streams—the famed Kickapoo river, Billings Creek and Cheyenne Creek.

Natural Areas—Eligible as state parks on the basis of plants or wildlife are certain "natural areas"—areas with peculiar scientific value, virtual outdoor laboratories. Such areas are being acquired in cooperation with the University and other interested agencies. Three areas have already been acquired, Cedarburg Bog, Parfrey's Glen and Pine Hollow. The Cedarburg Bog, 600 acres on County Trunk "Y" near Cedarburg in Ozaukee County, is noted for its variety and number of wild orchids and other wild flowers. Pine hollow, at the edge of a large and recent southward addition to Devil's Lake state park, and Parfrey's Glen, just to the east of Devil's Lake Park, are areas valuable as botanical preserves and are also of geological interest as examples of glens cut in quartzite in pre-Cambrian times. These three are initial acquisitions in a new type of state park holding.

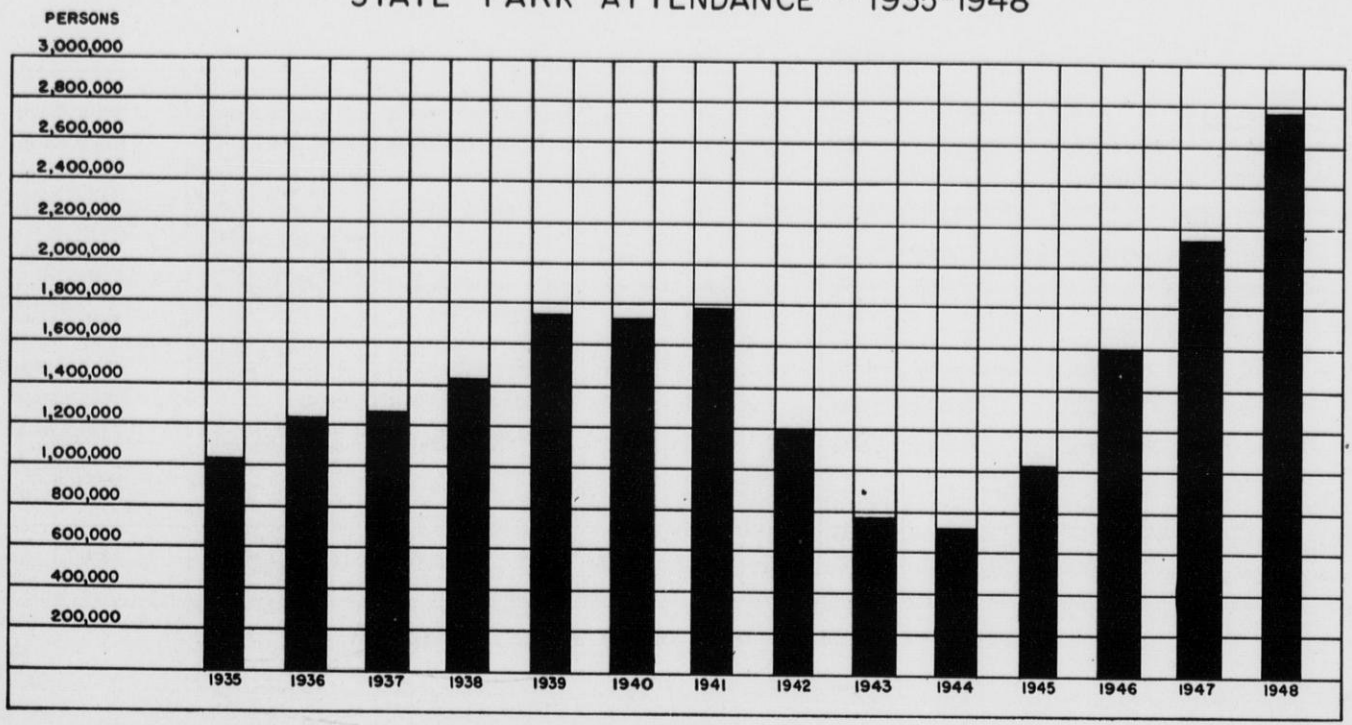
A tabulation of the state parks with existing facilities for public use their location, size and other information follows:

WISCONSIN STATE PARKS AND FORESTS

Name	Location and State Highway Connection	Dominant Features	Swimming	Camping	Electrical Outlets	Store	Address of Park or Forest Manager	Water Frontage	Number of Acres	Picnic Area
SCENIC PARKS										
Brunet Island	1 mi. W. of Cornell, T.H. 27	River Island Park	Yes	Yes	No	Nearby	Cornell	Chippewa River	179	Yes
Copper Falls	4 mi. N. of Mellen, T.H. 13	River gorge, water falls, canyons	No	Yes	No	In Park	Mellen	Bad River— Tyler's Fork	1,200	Yes
Devil's Lake	3 mi. S. of Baraboo, T. H. 123	Bluffs, mountain scenery	Yes	Yes	Yes	In Park	Baraboo	Devil's Lake	2,369	Yes
Interstate	St. Croix Falls, T.H. 8	River gorge, rocky bluffs	Yes	Yes	Yes	Nearby	St. Croix Falls	St. Croix River	581	Yes
Merrick	1 mi. N. of Fountain City, T.H. 35	A river park	Yes	Yes	No	Nearby	Fountain City	Miss. River	124	Yes
Pattison	10 mi. S. of Superior, T.H. 35	Highest waterfall in state, river gorge	Yes	Yes	No	In Park	Superior	Bad River, Interfalls Lake	1,194	Yes
Peninsula	Fish Creek, T.H. 42	Green Bay, limestone bluffs	Yes	Yes	No	Nearby	Fish Creek	Green Bay	3,651	Yes
Perrot	1 mi. N. of Trempealeau, T.H. 35	River scenery, wooded bluffs	No	Yes	No	Nearby	Trempealeau	Miss. River	937	Yes
Potawatomi	2 mi. NW. of Sturgeon Bay, T.H. 42	Sturgeon Bay, limestone bluffs	No	Yes	No	Nearby	Sturgeon Bay	Sturgeon Bay	1,046	Yes
Rib Mountain	4 mi. SW. of Wausau, T.H. 51	Highest point in state, rock outcrops	No	Yes	No	Nearby	Wausau	None	498	Yes
Terry Andrae	4 mi. S. of Sheboygan, T.H. 141	Lake Michigan, sand dunes	Yes	Yes	Yes	Nearby	Sheboygan	Lake Michigan	167	Yes
Wildcat Mountain	T.H. 33 near Ontario	Bluff lands, upper Kickapoo River	No	Yes	No	Nearby	Ontario	Kickapoo River	451	Yes
Wyalusing	4 mi. S. of Prairie du Chien, T.H. 35	Junc. Wis. and Miss. Rivers, wooded bluffs and valleys	No	Yes	No	Nearby	Wyalusing	Miss. River	1,671	Yes

WISCONSIN STATE PARKS AND FORESTS—Continued

Name	*Location and State Highway Connection*	*Dominant Features*	*Swimming*	*Camping*	*Electrical Outlets*	*Store*	*Address of Park or Forest Manager*	*Water Frontage*	*Number of Acres*	*Picnic Area*
HISTORICAL-MEMORIAL PARKS										
Cushing	Delafield, T.H. 30	Historic shaft	No	Yes	No	Nearby	Eagle	Bark River	10	Yes
First Capitol	3 mi. N. of Belmont, T.H. 151	First territorial capitol	No	No	No	Nearby	Belmont	None	2	Yes
Nelson Dewey	1 mi. N. of Cassville, T.H. 35	Home of 1st governor, river bluffs and valleys	No	Yes	No	Nearby	Cassville	Miss. River	720	Yes
Tower Hill	3 mi. S. of Spring Green, T.H. 14	Historic shot tower, river bluffs	No	Yes	No	Nearby	Spring Green	Wis. River	108	Yes
ROADSIDE PARKS										
Castle Mound	1 mi. S. of Black River Falls, T.H. 12	Roadside bluffs	No	Yes	No	Nearby	Black River Falls	None	222	Yes
Mill Bluff	4 mi. W. of Camp Douglas, T.H. 12 and 16	Rocky Bluff	Yes	Yes	No	Nearby	Black River Falls	Roadside Pond	56	Yes
New Glarus Woods	1 mi. S. of New Glarus, T.H. 69	Wooded valleys	No	Yes	No	Nearby	New Glarus	None	43	Yes
Ojibwa	1 mi. E. of Ojibwa, T.H. 70	River scenery	No	Yes	No	Nearby	Ojibwa	Chippewa River	353	Yes
Roche A Cri	T.H. 13 near Friendship	Woodlands, rocky bluffs	No	Yes	No	Nearby	Friendship	Carter Creek	37	Yes
Rocky Arbor	1 mi. NW. of Wis. Dells, T.H. 12	Rocky ledges, wooded valley	No	Yes	No	Nearby	Wis. Dells	None	227	Yes


STATE PARK ATTENDANCE — 1935-1948
PERSONS
3,000,000
2,800,000
2,600,000
2,400,000
2,200,000
2,000,000
1,800,000
1,600,000
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
1935
1936
1937
1938
1939
1940
1941
1942
1943
1944
1945
1946
1947
1948

ATTENDANCE

Although progress is reported in the development of existing properties, as improvement in facilities and services, as additions to existing properties, and as acquisition of new areas it is doubtful whether progress over the biennium has kept pace with the new and greater demands for recreational opportunities.

During the seasons of 1947 and 1948 over 4,850,000 people used the facilities provided in the state park system. This is the largest attendance in park history and an increase of 85% over the last biennium. In 1948, there were in round numbers 600,000 more visitors than in 1947, an increase of 30%. Devil's Lake park, as in the past led all other park properties in the number of visitors, the attendance over the two year period being well in excess of 1,400,000.

STATE PARK ATTENDANCE RECORD

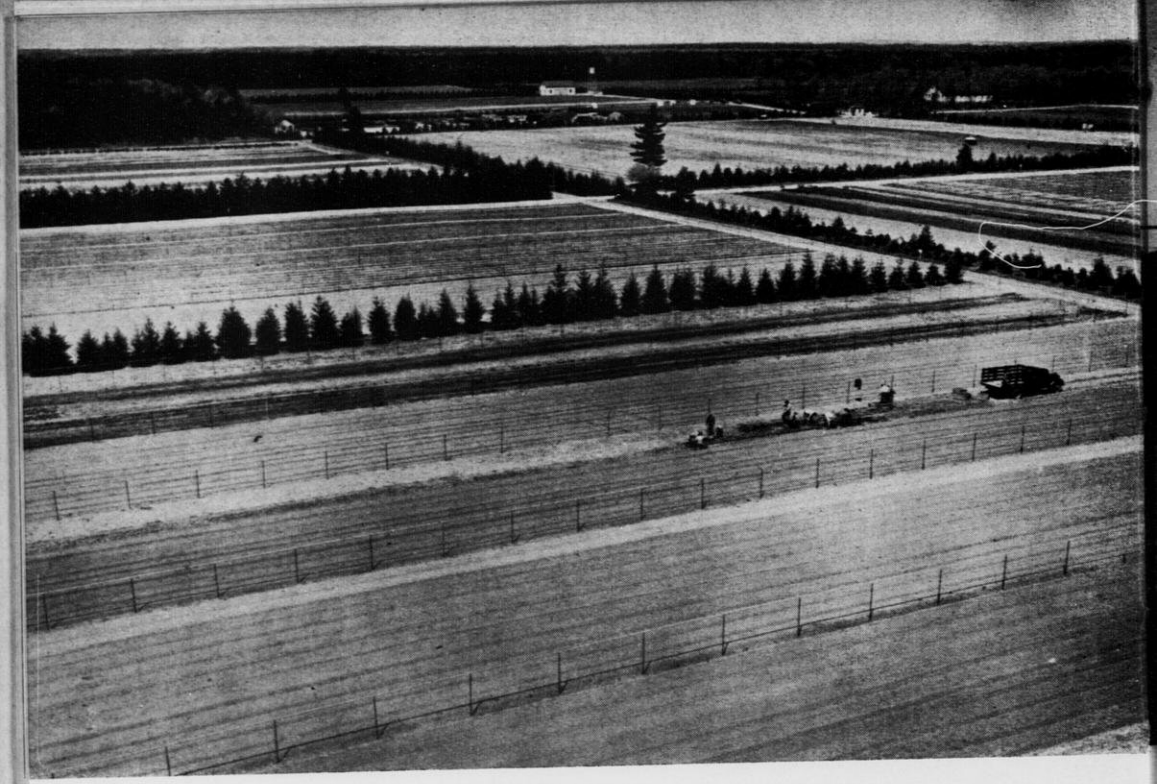
1947–1948

Name of Park	*1947*		*1948*	
	People	*Cars*	*People*	*Cars*
Brunet Island	99,889	26,102	122,612	32,031
Copper Falls	64,025	14,253	72,636	17,790
Cushing Memorial	9,293	2,938	21,489	5,413
Devil's Lake	584,830	167,330	847,179	241,754
Interstate	271,575	60,349	313,150	70,105
Merrick	86,642	21,934	124,526	32,379
Nelson Dewey Memorial	21,756	5,438	38,377	9,430
New Glarus Woods	13,453	3,850	14,484	3,885
Ojibwa	4,197	1,163	6,089	1,605
Pattison	126,597	30,286	109,972	26,881
Peninsula	321,678	85,291	444,549	113,831
Perrot	34,887	8,678	48,479	12,320
Potawatomi	133,340	39,035	171,465	43,278
Rib Mountain	99,961	29,274	122,396	36,039
Rocky Arbor	34,665	10,501	38,350	10,946
Terry Andrae	91,789	20,143	109,412	22,673
Tower Hill	44,581	12,280	39,729	10,733
Wyalusing	61,741	15,529	102,149	23,008
Total	2,104,899	554,374	2,747,043	714,101

STATE FOREST NURSERIES

Designed to encourage reforestation and the planting of trees for forestry purposes on both public and privately owned lands in Wisconsin, the conservation department has been annually producing forest planting stock since 1913. The principal demands for forest trees from the state nurseries are as follows:

1. For reforestation of publicly-owned lands.
2. For planting by farmers and other landowners.
3. For demonstration and educational purposes among schools, 4-H groups and the extension forestry projects.
4. For highway and other plantings by official public agencies.



The state-owned Griffith Forest Nursery at Wisconsin Rapids.

Distribution

Over the biennium there was a strong demand for forest planting stock. The tree nurseries, still troubled by short seed crops, destructive insects, and the years involved in growing plantable trees, were unable to meet all requests especially in certain species and sizes. In 1948 in some species, notably jack pine, black locust and American elm, more than sufficient supplies were on hand. The demand for larger size transplants and 3 year old seedlings remained brisk in spite of the greater costs. Norway pine was again the most sought after variety, followed by white pine and the spruces. Christmas tree planting continued to bring in many requests for balsam fir. Only a moderate interest was shown in jack pine and the various hardwood species. The four state operated forest nurseries produced and distributed approximately 24 million trees over the biennium. Eight hundred thousand more trees were shipped in 1948 than in the preceding year.

Stock Inventories

The tree inventories show a substantial gain over the biennium, indicating progress in the program of increasing nursery production. The white grub worm, however, accounted for considerable reductions in the stock inventories. Tens of thousands of good potentially plantable trees were again lost to this damaging pest. The 1 year old and 2 year old seed-

Preparing soil for seeding, Griffith Nursery.

lings classes are gaining in impressive numbers which is also true of the 4 year old transplants available for the spring of 1949.

The production of numerous varieties of trees, shrubs and vines for game food purposes is being stepped up. A substantial increase in the inventory is indicated for stock available for 1949 and 1950. Due to assistance from the Pittman–Robertson Act considerable more interest in the planting of these shrubs is being shown in the southern and central counties. Difficulty in securing seed is still a factor in increasing the output of some especially desirable varieties like the high bush cranberry and the black haw.

Insects and Diseases

With the exception of the devastating white grub worm, the insect and disease problems at the nurseries were amazingly few in 1948 as compared to 1947. The effects of the grub worm were particularly discouraging at both the Griffith and Gordon nurseries. At Griffith nursery control measures were attempted with Chlordane in the form of an emulsion applied through the overhead sprinkling lines at the rate of three gallons or twelve pounds of technical 45% Chlordane per acre. While no immediate results were noted, there are still hopes that control effects will extend into the future seasons. The American elm and game food shrubs were sprayed for blight with Bordeaux. Also, an early spray was put on the white pine in the nursery windbreaks and proved very effective in the control of the white pine weevil.

Transplanting seedling trees at the nursery.

Nursery and Forest Research

As in the past years research problems in forest soils, pathology and insects are being studied in cooperation with the state university and state entomologists. A new project has been initiated this year in forest genetics, with a view of eventually developing improved forests by the study of particularly desirable characteristics noted in certain strains of present growing stock. Progress has been made in the application of chemicals in weed control. At the Griffith nursery stoddard solvent, a product of the petroleum industry and extensively used in the dry cleaning business, was applied on eight acres of 1 year old seedlings with especialy gratifying results in the elimination of weeds without injury to the seedlings. This work was carried on in collaboration with the Lake States Experiment Station, Wisconsin Branch Station. Additional experimental chemical weed control trials were carried on at Hayward and Gordon in cooperation with the Pathology Department of the College of Agriculture.

"Lifting" trees at the nursery.

Improvements

An additional transplanting machine was purchased for the Hayward Nursery. This brings the total number of transplanting machines for the four nurseries up to six.

Two mechanical weeding and cultivating machines were purchased over the biennium. A small tractor, which straddles the tree beds, pulls the machine, and large areas are covered in a short time. This machine reduces the laborious and costly hand weeding about one-half.

At the Griffith nursery an additional ten acre plot was broken up and seeded to green manure in preparation for future seed and transplant beds. The underground pipe line was extended, and risers for the overhead lines were put in place. Wrought steel galvanized pipe is still difficult to secure but it is hoped that enough pipe may be accumulated by the spring of 1949 so that at least a portion of the area can be placed in production.

New trucks as replacements for old worn out units were purchased for some of the nurseries, and will be of great help in the movement of trees during the planting season, as well as in all the operations pertinent to the raising and planting of forest trees.

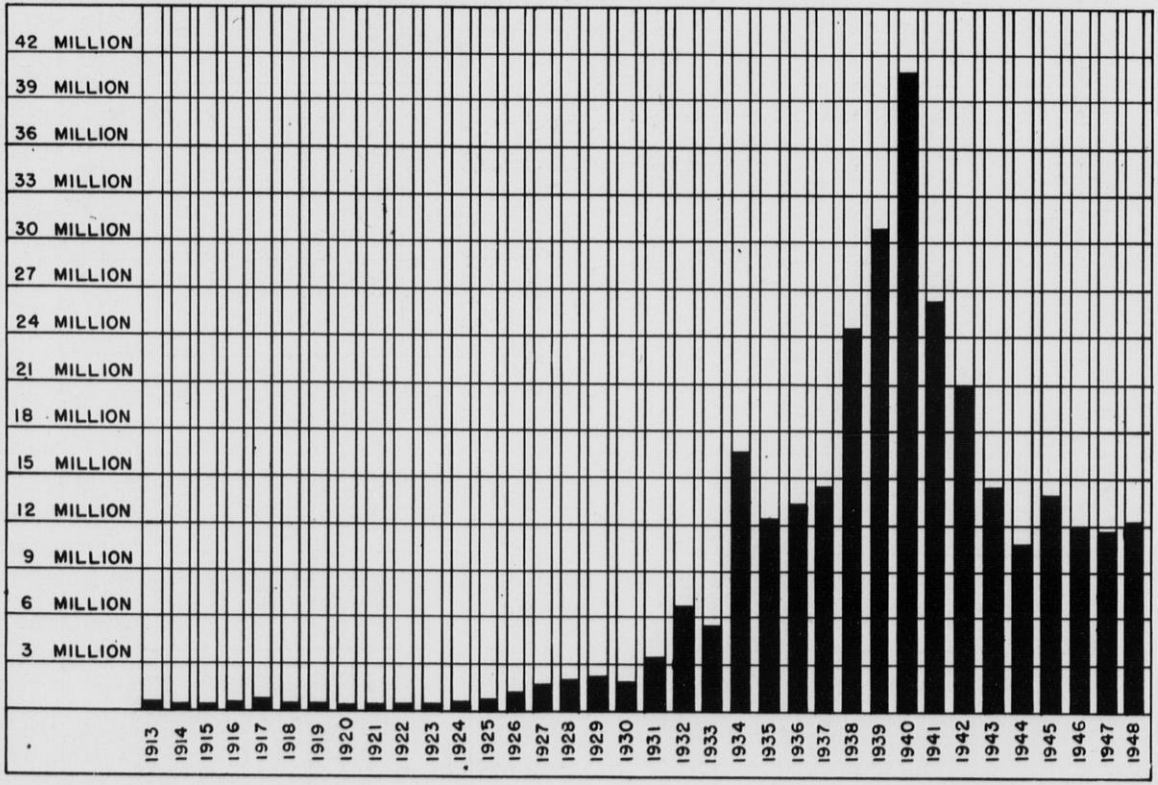
Tables on production, distribution, and planting which follow will give added detailed information.

ANNUAL OUTPUT OF STATE FOREST NURSERIES

Year	Private	Public	Totals
1911		192,300	*192,300
1912		18,000	**18,000
1913		68,500	68,500
1914	20,200	458,430	478,630
1915	77,400		77,400
1916	110,200	216,650	326,850
1917	272,105	332,525	604,630
1918	246,278	262,485	508,736
1919	200,151	309,900	510,051
1920	206,682	113,875	320,557
1921	199,601	255,925	455,526
1922	39,482	83,710	123,192
1923	177,260	176,800	354,060
1924	247,000	163,300	410,300
1925	350,538	160,700	511,238
1926	748,497	424,200	1,172,697
1927	1,038,249	579,000	1,617,249
1928	1,101,464	637,200	1,738,664
1929	1,393,267	1,022,750	2,416,017
1930	1,185,075	981,500	2,166,575
1931	1,304,250	2,050,350	3,354,600
1932	880,315	5,701,500	6,581,815
1933	822,950	4,318,050	5,141,000
1934	1,486,725	15,209,785	16,696,510
1935	1,376,189	10,737,715	12,113,904
1936	3,592,224	9,535,482	13,127,706
1937	5,811,662	8,702,429	***14,514,091
1938	6,530,124	18,775,862	***25,305,986
1939	8,775,557	21,872,280	***30,647,837
1940	12,305,025	28,352,316	***40,657,341
1941	11,085,364	15,575,351	***26,660,715
1942	11,373,445	9,417,192	***20,790,637
1943	9,612,340	4,117,192	***13,729,532
1944	7,867,220	2,160,590	***10,027,810
1945	10,080,584	3,252,224	***13,332,808
1946	8,019,675	3,858,332	***11,878,007
1947	7,077,654	4,509,653	***11,587,307
1948	6,976,387	5,399,185	***12,375,572
	122,591,139	180,003,238	302,594,377

*Stock secured from Michigan State College.
**Stock purchased.
***Includes inter-nursery shipments.

OUTPUT OF STATE FOREST NURSERIES — 1913-1948



STATE NURSERY TREE DISTRIBUTION

All Nurseries, State and County **Year of 1947**

Species	*State Forests*	*County Forests*	**Extension*	***Private*	*Highway*	****General*	*Totals*
Norway Pine	184,450	371,678	373,325	2,185,030	3,300	451,233	3,569,016
White Pine	44,995	143,110	351,875	1,295,845	2,500	190,481	2,028,806
Jack Pine	1,099,600	2,388,620	249,045	596,970	6,000	233,600	4,573,835
Norway Spruce	14,000	10,200	89,625	191,480	2,000	137,500	444,805
White Spruce	83,000	65,300	18,700	248,000	2,500	74,600	492,100
Black Locust	----------	----------	10,150	102,950	---------	15,000	128,100
American Elm	----------	200	25,200	350	---------	1,100	26,850
White Ash	79,000	1,000	3,125	50,650	---------	10,300	144,075
Balsam Fir	200	1,000	2,850	13,745	---------	2,725	20,520
Red Cedar	1,000	----------	2,300	4,350	---------	6,000	13,650
White Cedar	4,000	1,000	17,850	47,750	---------	31,925	102,525
Walnuts (Black)	1,000	----------	2,800	38,225	---------	1,000	43,025
TOTALS	1,511,245	2,982,108	1,146,845	4,775,345	16,300	1,155,464	11,587,307

*Extension—Stock distributed through the State Extension Forester, the State Club Leader and the County Agricultural Agents. This column includes the Community Forests.
**Private—Individuals purchasing under the tree application and agreement form.
***General—Trees transferred to other State Nurseries and other agencies not covered by the above headings, i.e., Gordon Nursery, Soil Conservation Service, Parks, Clubs, Institutions, etc.

STATE NURSERY TREE DISTRIBUTION

All Nurseries—State and County **Year of 1948**

Species	*State Forests*	*County Forests*	**Extension*	***Private*	*Highway*	****General*	*Total*
Norway Pine	401,625	632,495	200,980	1,456,184	21,200	677,850	3,390,334
White Pine	17,325	176,100	341,330	1,009,400	12,000	537,025	2,093,180
Jack Pine	707,600	3,166,715	392,530	883,673	5,000	14,600	5,170,118
Norway Spruce	10,750	50,650	68,455	239,575	---------	21,750	391,180
White Spruce	51,250	82,000	130,330	241,675	---------	422,175	927,430
Black Locust	2,000	----------	36,030	61,625	---------	10,300	109,955
American Elm	48,000	----------	26,980	32,400	---------	8,800	116,180
White Ash	4,975	----------	1,205	1,500	---------	11,200	18,880
Balsam Fir	----------	7,400	9,655	50,625	---------	10,000	77,680
White Cedar	500	----------	1,205	3,350	---------	2,600	7,655
Hemlock	----------	----------	55	5,225	---------	200	5,480
Black Hill Spruce	----------	----------	5,400	5,000	---------	----------	10,400
Black Walnut Seed	1,000	----------	----------	46,500	---------	4,000	51,500
Black Walnut Trees	600	----------	----------	----------	---------	5,000	5,600
TOTALS	1,245,625	4,115,360	1,214,155	4,036,732	38,200	1,725,500	12,375,572

*Extension—Extension Forester and State Club Leader.
**Private—Individuals purchasing under the tree application and agreement form.
***General—Trees given to other state nurseries and other agencies not covered by the above heading, i.e., Gordon Nursery, Soil Conservation Service, Parks, Clubs, Institutions, etc.

STATE NURSERY TREE DISTRIBUTION
BY COUNTY

All Nurseries, State and County — **Year of 1947**

County	State Forests	County Forests	*Extension	**Private	Highway	***General	Totals
Adams			11,125	230,775			241,900
Ashland				17,000			17,000
Barron			20,250	32,000			52,250
Bayfield		549,000	2,300	12,500			563,800
Brown			94,400	16,400			110,800
Buffalo			9,000	45,500		3,000	57,500
Burnett		43,400		108,500			151,900
Calumet			2,725	18,050			20,775
Chippewa		20,000	24,850	74,175			119,025
Clark		163,436	13,350	10,000		184,589	371,375
Columbia			5,650	56,700			62,350
Crawford			3,100	22,900			26,000
Dane			12,550	23,275		41,700	77,525
Dodge			4,250	6,700		1,000	11,950
Door			7,350	16,500			23,850
Douglas	1,027,100	384,000	14,200	199,620		239,775	1,864,695
Dunn			98,950	58,975		550	158,475
Eau Claire		58,500	24,050	61,350			143,900
Florence		173,000		65,650		4,000	242,650
Fond du Lac	27,800		3,450	3,500			34,750
Forest			4,550	19,400			23,950
Grant			5,100	19,075			24,175
Green			4,300	14,300			18,600
Green Lake			2,700	71,800			74,500
Iowa			4,550	11,450			16,000
Iron		202,000	1,400	17,800		7,500	228,700
Jackson	97,250	189,170	39,350	74,800	2,500		403,070
Jefferson			2,400	42,550			44,950
Juneau		150,000	89,150	110,500			349,650
Kenosha			425	7,025			7,450
Kewaunee			3,600	3,500			7,100
La Crosse			21,700	43,250		10,000	74,950
Lafayette			5,350	3,150			8,500
Langlade		180,700	17,900	39,450	6,000		244,050
Lincoln			31,500	498,650			530,150
Manitowoc	11,400		4,850	39,650		550	56,450
Marathon			42,200	97,500		19,000	158,700
Marinette	36,700	335,400	14,400	36,075	600		423,175
Marquette			5,050	186,350		24,000	215,400
Milwaukee			6,150	18,125		250	24,525
Monroe		31,050	5,900	129,850			166,800
Oconto		114,500	49,950	62,510		138,500	365,460
Oneida			18,200	205,700		1,300	225,200
Outagamie			24,220	24,900			49,120
Ozaukee			750	20,750			21,500
Pepin			2,900	23,450			26,350
Pierce			8,950	9,150		2,000	20,100
Polk			9,900	37,200			47,100
Portage			64,900	307,700		10,000	382,600
Price		29,260	17,500	24,750			71,510
Racine			1,550	8,000		1,000	10,550
Richland			12,950	26,900			39,850
Rock			6,300	23,475		1,000	30,775
Rusk		30,000	30,725	5,350		500	66,575
Sauk			16,600	161,700		2,000	180,300
Sawyer	134,000	20,000	1,700	38,900			194,600
Shawano			15,350	46,600			61,950
Sheboygan	46,000		2,050	41,525		1,300	90,875
St. Croix			7,500	41,000	1,000		49,500
Taylor		6,692	17,725	3,000			27,417

STATE NURSERY TREE DISTRIBUTION—Continued

All Nurseries, State and County **Year of 1947**

County	State Forests	County Forests	*Extension	**Private	Highway	***General	Totals
Trempealeau			8,350	64,825			73,175
Vernon			11,775	6,700			18,475
Vilas	113,000	165,000	500	131,575	6,000	200,550	616,625
Walworth			10,200	6,325			16,525
Washburn			3,500	5,000	200	12,300	21,000
Washington			14,050	19,025			33,075
Waukesha	17,995		11,450	66,615		500	96,560
Waupaca			35,000	211,675			246,675
Waushara			40,150	383,000		10,000	433,150
Winnebago			4,550	18,600		600	23,750
Wood		137,000	29,325	184,925		238,000	589,250
States of							
Illinois			3,600				3,600
Minnesota			200	200			400
Montana			300				300
North Dakota			100				100
TOTALS	1,511,245	2,982,108	1,146,845	4,775,345	16,300	1,155,464	11,587,307

*Extension—Stock distributed through the State Extension Forester, the State Club Leader and the County Agricultural Agents. This column also includes Community Forests.

**Private—Individuals purchasing under the tree application and agreement form.

***General—Trees transferred to other State Nurseries and other agencies not covered by the above headings, i. e., Gordon Nursery, Soil Conservation Service, Parks, Clubs, Institutions, etc.

STATE NURSERY TREE DISTRIBUTION
BY COUNTY

All Nurseries—State and County **Year of 1948**

County	State Forests	County Forests	*Extension	**Private	Highway	***General	Total
Adams			5,000	113,550		15,000	133,550
Ashland		13,000	2,800	6,000			21,800
Barron			1,100	26,000			27,700
Bayfield		1,045,000		15,500			1,060,500
Brown			91,075	11,950		50	103,075
Buffalo				74,350			74,350
Burnett		163,000		12,700			175,700
Calumet			2,850	10,575		3,600	17,025
Chippewa		13,000	34,050	42,650		1,500	91,200
Clark		286,400	2,975	4,400		234,000	527,775
Columbia			4,750	53,200		15,500	73,450
Crawford				2,750			2,750
Dane			13,800	26,275		23,750	63,825
Dodge			5,000	11,300		500	16,800
Door			14,300	10,400			24,700
Douglas	599,000	598,200	9,000	580,582		96,800	1,883,582
Dunn			1,000	65,700			66,700
Eau Claire		75,280	38,300	30,400			143,980
Florence		234,300	2,000	10,775			247,075
Fond du Lac	30,775		4,600	7,000		2,100	44,475
Forest			1,300	15,775		5,000	22,075
Grant			12,425	19,050			31,475
Green			4,200	26,650			30,850
Green Lake			4,600	48,900			53,500
Iowa			17,825	14,000			31,825
Iron		173,000	500	13,700	5,000	3,000	195,200
Jackson	31,900	2,000	32,650	24,800			91,350
Jefferson			5,700	14,975		1,000	21,675
Juneau	37,800	215,370	135,980	75,000			464,150
Kenosha			10,100	4,800			14,900
Kewaunee				2,500			2,500
La Crosse			35,200	34,025			69,225
Lafayette				3,000		750	3,750
Langlade		116,400	13,900	17,700	20,000		168,000
Lincoln		74,650	38,650	212,000			325,300
Manitowoc			8,500	37,525		100	46,125
Marathon			62,825	53,900		5,000	121,725
Marinette	144,900	414,000	38,700	56,175			653,775
Marquette			16,400	103,450		8,000	127,850
Milwaukee			11,000	10,600			21,600
Monroe		33,660	19,275	81,500			134,435
Oconto		197,600	18,500	45,550		50,000	311,650
Oneida		28,000	12,000	306,775		1,150	347,925
Outagamie			14,400	14,600		10,000	39,000
Ozaukee				30,800			30,800
Pepin				24,000			24,000
Pierce			12,050	24,300			36,350
Polk			6,700	32,225			38,925
Portage			49,800	245,575		1,250	296,625
Price	62,500	15,500	23,300	45,850			147,150
Racine			4,400	14,000			18,400
Richland			16,675	9,500			26,175
Rock			7,425	7,250		83,000	97,675
Rusk		13,000	23,450	7,100			43,550
Sauk			18,550	69,225		6,750	94,525
Sawyer	81,500	24,000	4,075	47,650		427,500	584,725
Shawano			16,500	172,300	4,000		192,800
Sheboygan	15,250		2,100	39,525		2,600	59,475
St. Croix			6,600	29,800			36,400
Taylor		10,000	6,700	1,500			18,200

STATE NURSERY TREE DISTRIBUTION—Continued

BY COUNTY

All Nurseries—State and County **Year of 1948**

County	State Forests	County Forests	*Extension	**Private	Highway	***General	Total
Trempealeau			10,925	66,450			77,375
Vernon			17,250	1,275		400	18,925
Vilas	201,000	250,000	21,000	142,375	9,200	255,000	878,575
Walworth			5,800	8,000		100	13,900
Washburn			2,275	17,000		5,000	24,275
Washington			6,250	8,900			15,150
Waukesha	41,000		13,300	66,950			121,250
Waupaca			91,800	125,750		4,000	221,550
Waushara			55,400	315,025		12,000	382,425
Winnebago			16,600	14,600			31,200
Wood		120,000	27,300	115,700		449,100	712,100
States of							
Alabama			150				150
Illinois			50	500		2,000	2,550
Minnesota			500				500
TOTALS	1,245,625	4,115,360	1,214,155	4,036,732	38,200	1,725,500	12,375,572

*Extension—Extension Forester and State Club Leader and County Agricultural Agents. Also includes Community Forests.

**Private—Individuals purchasing under the tree application and agreement form.

***General—Trees given to other state nurseries and other agencies not covered by the above headings, i.e., Gordon Nursery, Soil Conservation Service, Parks, Clubs, Institutions, etc.

Cooperative Forestry

FOREST CROP LAW

The total entry of lands under the provisions of Chapter 77 of the statutes has increased to 2,213,167.25 acres. This means about 55,000 land descriptions on which records must be kept. Privately owned forest crop lands, which had stabilized at around 150,000 acres for some years, increased to 182,704 acres.

During the biennium 48,480 acres were examined. This includes periodic examination of lands previously entered and lands listed on new applications for entry.

COUNTY FORESTS

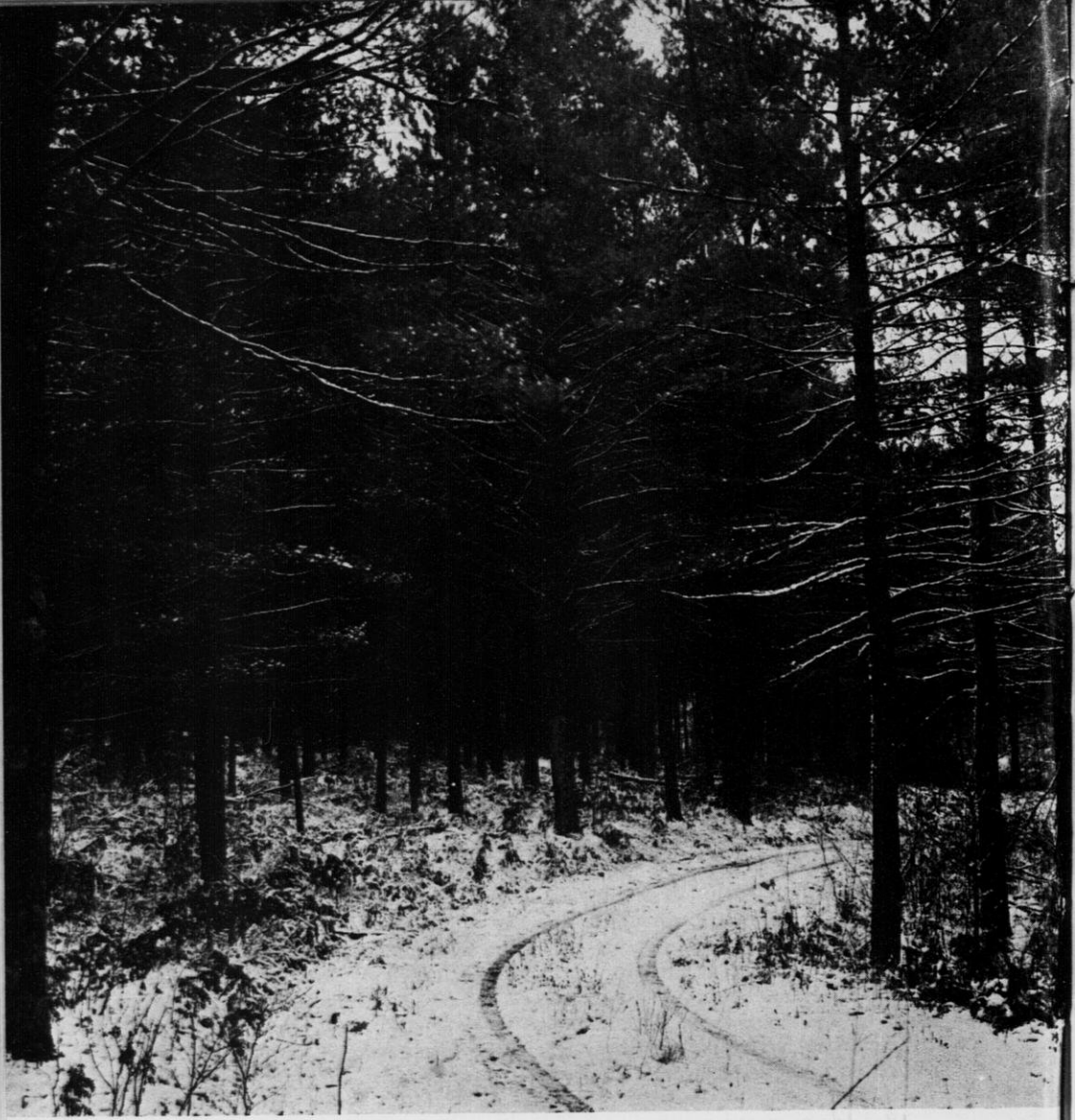
The forest crop lands of 28 northern and central counties increased from 1,971,535.33 to 2,030,462.69 acres. County land acquisition by tax deed is declining, but most of the counties are purchasing land to block their holdings. The largest class of lands purchased consisted of federal lands acquired under the Bankhead–Jones act for the purpose of retiring isolated and sub-marginal farms from agricultural use. Most of these lands were within districts closed to further agricultural development under county zoning ordinances and also within county forests. To expedite county acquisition, this division appraised 13,680 acres. These appraisals were accepted both by the federal government and the counties.

Similarly, the counties have purchased scattered forest lands granted to the state by act of Congress in 1912. Appraisal of such lands covered 3,240 acres. One county has purchased the last of the unpatented government land in the county. While some privately owned lands were purchased, the counties have centered their efforts on other classes of public lands, which paid no taxes, were too scattered for management and contributed little if anything to the local economy.

Some counties are seeking to buy the state trust fund lands within their county from the Commissioners of Public Lands. The counties are realizing income from their forests and understand the value of well managed forests. County forest acreage exceeds the total of state and national forest holdings in Wisconsin.

WORK PROGRAMS

County planting programs are increasing though available labor and nursery stock have not increased greatly since the war years. Machine planting on old fields of the sub-marginal farms purchased from the federal government has been the chief factor favoring reforestation. The counties planted 2,774 acres in 1947 and 3,368 acres in 1948. In 1947, Bayfield



Natural white pine stand, Sawyer county forest.

County ranked first with 387 acres, followed by Douglas with 301 and Marinette with 205 acres. Last year, Bayfield again held first place with 850 acres, followed by Douglas with 497 acres, while Clark County took third place with 287 acres.

Other activities included release of plantations, especially where they were overtopped by scrub oak. Several counties, notably Rusk and Lincoln, are improving or building service roads, to provide better access for forest protection or timber sales. In some cases large culverts replaced old bridges. Most of the counties are periodically reworking fire breaks around plantations.

TIMBER SALES

Markets have been good for several years, permitting the sale of less valuable species. Larger trees, left in the original logging operations and now suppressing valuable young growth, can also be removed at a profit. Foresters are now marking for cutting all of the white and Norway pine and most of the hardwood trees included in timber sales, though in some cases a diameter limit on hardwoods may safely be used. Cutting of pine is limited almost entirely to defective trees.

Mature stands of jackpine are clear cut on specified areas, since this tree reproduces best in full sunlight. In the case of spruce and balsam, the minimum size is usually set at trees which will produce three sticks of pulpwood.

For the fiscal year ending June 30, 1947, 21 counties completed 514 timber sales, with products totaling 4,218,950 board feet of sawlogs, 66,300 cords of pulpwood, plus piece products such as railway tie cuts. For the second year the cut of logs was 4,840,000 board feet. The cut of jackpine showed a slight decrease. Both years the chief item was 45,000 cords of aspen. For the second year the total volume was equivalent to 67,720 cords, which means cutting at the very conservative rate of one cord for each 30 acres of county forest. Yet it would make a pile of eight foot pulpwood sticks, four feet high and 50 miles long.

FOREST MANAGEMENT

The district foresters have compiled a forest work plan for each of the counties. All planting, cultural cutting and timber sales data are recorded and mapped. These work plans not only record past work, but also provide information for future work. Cutting has been in accord with good silviculture, but cutting programs have not been founded on adequate information.

To meet this deficiency, a beginning was made in Marinette county to secure an inventory of the forest growing stock and to determine the rate of growth. The county forestry committee financed the aerial photography of its county forest. The new modified infra-red film was used. Section corners were identified on the photographs and photo-interpretation provided acreage figures for each forest type, broken down into size and condition classes.

During the summer of 1948, field crews measured 868 one-fifth acre sample plots. Computations will lead to a complete inventory of the growing stock. Growth measurements on 2,910 sample trees will lead to determination of volume increment. Much of this increment of the more valuable species must be left to build up a normal forest. The allowable annual cut by species will be fixed and sound forest management will then be applied to this county forest of 220,000 acres.

Similar work has been initiated in northwestern Wisconsin, where the forests of Polk, Burnett and Douglas counties were flown. Photo-interpretation will lead to field work in the summer of 1949.

CO-OPERATIVE FORESTRY—FOREST CROP LANDS BY COUNTIES

July 1, 1946 to June 30, 1948

County	Private Entries					County Entries					Total Forest Crop Lands
	Prior to 1946	1947	1948	Withdrawn	Net Private Lands	Prior to 1946	1947	1948	Withdrawn	Net County Lands	
Adams	1,031.27				1,031.27						1,031.27
Ashland	1,079.76			39.81	1,039.95	36,708.31	639.98	957.73		38,306.02	39,345.97
Barron	651.52				651.52	6,959.90	280.00		1,001.23	6,238.67	6,890.19
Bayfield	935.00			15.00	920.00	147,744.44	2,392.35	2,080.39	81.41	152,135.77	153,055.77
Burnett	260.30			80.00	180.30	96,884.89	1,527.14	2,260.99		100,673.02	100,853.32
Chippewa	463.00				463.00	17,147.51	1,440.00	2,714.22	40.00	21,261.73	21,724.73
Clark	165.55				165.55	127,816.60		1,040.00	760.00	128,096.60	128,262.15
Door	921.90			272.30	649.60						649.60
Douglas	1,360.01		10,182.65	80.00	11,462.66	207,649.82	3,578.26	4,377.77	2,520.00	213,085.85	224,548.51
Eau Claire	520.00				520.00	34,935.05	1,729.11		160.00	36,504.16	37,024.16
Florence	43,338.76			220.00	43,118.76	39,495.15	1,980.00		2,581.57	38,893.58	82,012.34
Forest	22,862.32		8,717.35	1,116.00	30,463.67	10,726.16				10,726.16	41,189.83
Iron	320.00			240.00	80.00	167,964.82	915.61	921.00	20.00	169,781.43	169,861.43
Jackson	160.00	160.00			320.00	103,674.65	3,134.85	2,019.47	980.00	107,848.97	108,168.97
Juneau	280.00				280.00	11,276.25		1,779.40		13,055.65	13,335.65
Langlade	5,657.40			78.95	5,578.45	88,335.19	2,096.70	520.00	1,144.53	89,827.36	95,405.81
Lincoln	5,375.81				5,375.81	92,101.46		3,107.65		95,209.11	100,584.92
Marathon	890.00		480.00		1,370.00						1,370.00
Marinette	400.00				400.00	217,622.91	2,445.65	317.07	391.04	219,994.59	220,394.59
Marquette	55.00				55.00						55.00
Monroe						2,107.08	200.00			2,307.08	2,307.08
Oconto	463.40				463.40	39,350.97	2,345.21		440.00	41,256.18	41,719.58
Oneida	44,286.67	14,427.25		647.55	58,066.37	72,372.69	1,319.70	480.00	1,839.95	72,332.44	130,398.81
Outagamie	360.00				360.00	556.98				556.98	916.98
Polk	1,087.10			240.00	847.10	8,492.24		535.00		9,027.24	9,874.34
Portage	431.71	40.01			471.72						471.72
Price	2,094.44			182.06	1,912.38	68,507.40	2,316.96	5,931.68	1,308.00	75,448.04	77,360.42
Rusk	734.52			80.00	654.52	77,112.94	320.00	1,639.66	120.00	78,952.60	79,607.12
Sawyer	3,150.00	200.00		2,000.00	1,350.00	95,372.52	2,432.75	4,226.82	40.00	101,992.09	103,342.09
Shawano	450.74		5,128.49		5,579.23						5,579.23
Taylor	1,051.55				1,051.55	14,634.62	840.60	99.89	160.00	15,415.11	16,466.66
Vilas	483.24				483.24	30,592.87	320.00		81.62	30,831.25	31,314.49
Washburn	2,366.59			1,692.51	674.08	120,736.07	695.56	5,173.62	342.59	126,262.66	126,936.74
Waushara	80.00				80.00						80.00
Wood	6,742.43			157.00	6,585.43	34,635.84		366.51	560.00	34,442.35	41,027.78
TOTALS	150,509.99	14,827.26	24,508.49	7,141.18	182,704.56	1,971,535.33	32,950.43	40,548.87	14,571.94	2,030,462.69	2,213,167.25

FARM FORESTRY

Since most of the remaining saw timber in Wisconsin is now found in the farm woodlands, there is need to provide forestry service to secure better management of these resources. The Conservation Commission has approved a plan to cover the state with 26 cooperative forestry districts. The first ten are primarily county forestry districts, but the district foresters have always given assistance to the owners of small forest holdings.

Of the 16 farm forestry districts, the number to which foresters have been assigned has been increased from two to eight during the biennium. It is planned to activate three additional farm forestry districts during 1949.

Assistance to land owners, in selecting areas and species to be planted and in planting method instruction, has been given for many years. A recent report of the U. S. Forest Service shows that Wisconsin has been leading the other states of this region in forest planting on farms. Last year Wisconsin farmers planted 2,825,000 trees, while stock to other private owners totaled 8,030,000 trees.

Much of the work in the farm forestry districts consists of marking timber for cutting, helping to secure the highest grade of logs and in finding markets. Farm foresters work in close cooperation with the soil conservation districts. Often farm plans lead to clearing part of the woods for pasture and fencing off the remainder, to keep livestock out of the woods on the steeper slopes. As a result the land is put to its best use and the forest makes its greatest possible contribution to moisture conservation and erosion control.

Fires in the farm woodlands are still destructive, especially on the oak clad hills of southwestern Wisconsin. These fires are not so much the result of carelessness as intentional burning of leaves to maintain grass in the woods pastures. This destructive practice must be reduced by education and by town board action to control burning.

Forest Protection

Adequate forest protection is one of the prime requisites of any conservation program. Successful forest protection depends upon favorable public sentiment, wise regulation, strict enforcement, an extensive program of prevention, and an organization equipped to take prompt and definite action on all fires.

Wisconsin has experienced a constant improvement of effort, facilities, and personnel.

The forest protection division, charged with the responsibility of protecting and preserving, rather than with a program of production, does not list its accomplishments entirely in terms of tangible assets. With many fires occurring annually on forested lands of the State, it is impossible to estimate their potential possibilities for destruction of life and property in terms of numbers or in dollars and cents.

The primary objective of the forest protection division is to hold each fire to the smallest possible area and to limit the size of fires so that no more than 5% of the total number of fires will reach 10 acres in size. The total annual burn shall not exceed one-fourth of one per cent of the total area under protection.

A total of 13,604,610 acres have been included under a system of intensive fire protection and are divided into the western, northern, eastern, and central areas, covering all or parts of thirty-four counties in northern and central parts of the State. Each area unit is composed of either two or three protection districts for a total of ten.

Over the biennium, there is perhaps no single accomplishment that stands head and shoulders above the many and varied activities of the forest protection division. Progress was made generally along the lines of prevention, presuppression and suppression, with their many ramifications. Great strides were again made in fire fighting technique and water pump adaptations to motorized equipment.

During the 1947 season, suppression action was taken on 1,398 fires that burned 16,007 acres and caused damage appraised at $74,645.

The fire season started late in all districts with only four fires reported during the month of March. While 226 fires were suppressed during April, the fire hazard was not critical although frozen ground hampered fire control efforts. Conditions became dangerous during May and two fires on May 11 accounted for nearly 25% of the total area burned. Precipitation was sporadic and generally below normal during the entire spring season and by mid-summer the drought was general in all of the northern protection districts and acute in the northwestern districts. The accumulative deficiency in precipitation ranged as high as 40% by the middle of August but was temporarily abated during September, only to rise to about 40%

Forest protection headquarters, Tomahawk.

again in October. About 17% of the normal average rainfall occurred during October with one district reporting only .40 of precipitation for the entire month.

The extreme hazard prevailing during July, August and October necessitated the enactment of emergency regulations and in addition a short closure of the hunting seasons during the highest hazard period of October. The largest fire of the season started on October 11 and was not controlled until October 22 after burning 6,863 acres and accounting for 40% of the total area burned. The accumulative ill effects of the drought were aggravated by unseasonably high temperatures, extremely low humidity and winds that at times approached gale proportions. As the fire season closed with the early snows, the moisture deficiency was still very evident.

Railroads lead as the largest single cause of fire, being responsible for 31.6% of the total. A program of safeguarding dangerous portions of these right of ways to facilitate burning under favorable conditions was launched by some of the railroads during 1947. Continuation of current attempts to secure better locomotive fuels for use during the fire seasons and an emphasized fire prevention program was an important factor in securing a reduction in the total number of railroad caused fires.

Forest protection division plane.

From the standpoint of severity, 1948 was an especially bad year for forest fires in Wisconsin, possibly the worst since 1931. This is substantiated by a comparison with 1947. During 1948, there were 1825 fires or a 30.5% increase over the 1398 fires in 1947. The acres burned increased by 47% for a total of 23,574 as compared to 16,007. The additional number of fires and total acres burned increased the reported dollar damage by 27% or $95,117 as compared to $74,645.

The spring fire season opened in March and continued well into June which is normally an off month. A late summer and fall fire season was acute in August, September and October. The marked deficiency of precipitation throughout the season was largely responsible for the severity of the season. United States Weather Bureau records compiled for the May to September crop season show the state the driest since 1910 as a general condition, although some localities had the worst drought ever recorded.

In early May, the drought was serious in the northern protection districts and was alleviated only by showers in late June. The drought eased in the northern districts slightly during July and shifted into the central districts. August brought drought to practically all parts of the state and continued severe until late October. Emergency regulations were placed

Tractors with special equipment installed at Tomahawk.

into effect on two occasions and the hunting and trapping seasons were closed for a short time in October. During the year, rivers were at record lows, hydro-electric water reservoirs depleted, hydro-electric power production curtailed and brownouts returned. The 1948 drought was aggravated as it was the second consecutive year of precipitation deficiency in practically all of the forest protection districts as indicated by the following tabulation based on the precipitation records maintained at 11 stations.

Station	**Annual Average*	*1947 precipitation recorded in inches*	*Difference*	*1948 precipitation recorded in inches*	*Difference*	*Accumulated deficiency 47-48*
Brule	28.44	23.17	— 5.27	24.79	— 3.65	— 8.92
Spooner	27.16	18.30	— 8.86	19.74	— 7.42	—16.28
Mercer	30.91	26.82	— 4.09	24.23	— 6.68	—10.77
Antigo	29.86	24.81	— 5.05	23.58	— 6.28	—11.33
Wausaukee	30.28	29.12	— 1.16	25.97	— 4.31	— 5.47
Park Falls	32.80	25.80	— 7.00	21.95	—10.85	—17.85
Hayward	28.69	25.78	— 2.91	22.28	— 6.41	— 9.32
Rhinelander	30.54	23.25	— 7.29	22.19	— 8.35	—15.64
Friendship	30.77	31.04	+ .27	24.40	— 6.37	— 6.10
Black River Falls	30.21	29.87	— .34	20.98	— 9.23	— 9.57
Tomahawk	31.00	19.93	—11.07	20.88	—10.12	—21.19

*Inches of precipitation based on official records.

Coupled with this deficiency were high temperatures that reached a peak of 109° F on August 24 and adversely affected the efficiency of men and equipment. The problems encountered emphasized the need for greater reserves to meet the demands during peak periods. The three largest fires of the year occurred in marsh areas and accounted for nearly 50% of the total acreage burned.

RECORD BY YEARS

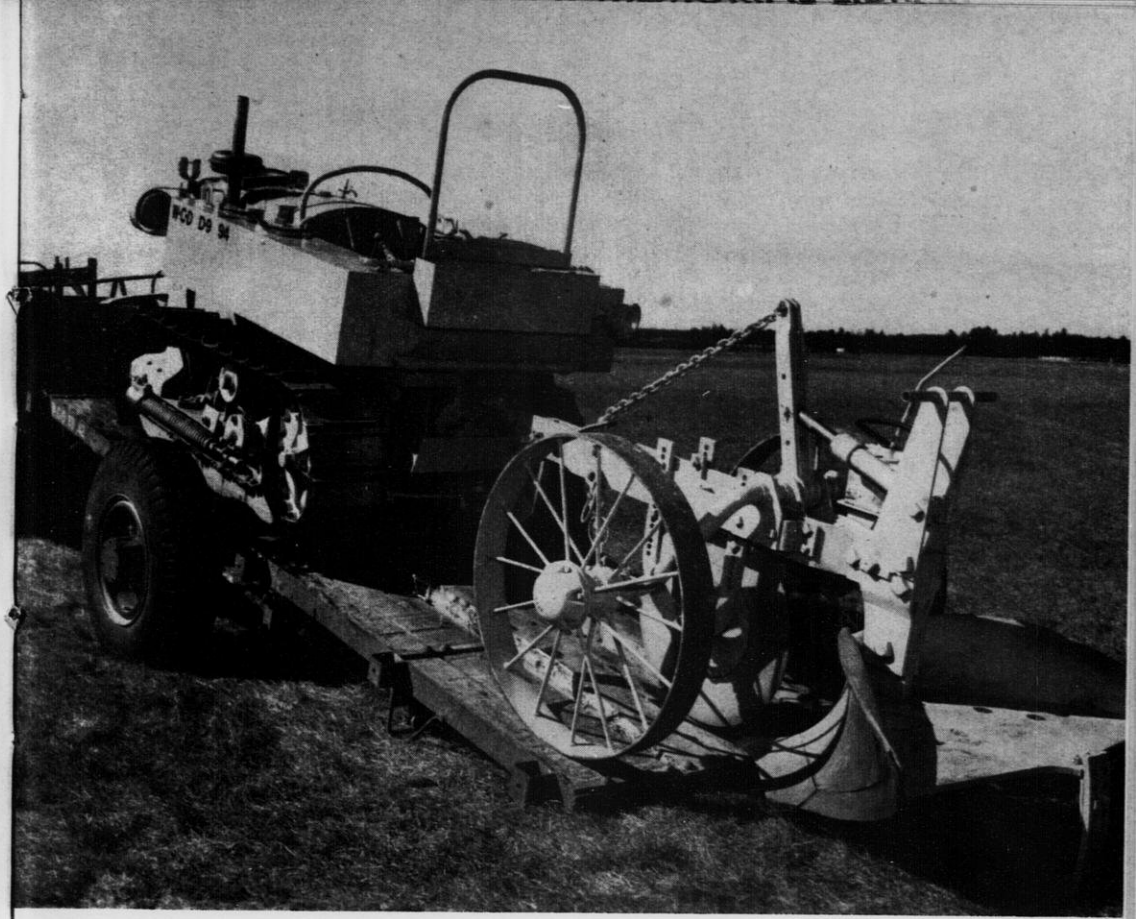
Year	Total Cost of Protection	Area under Protection in Million Acres	Cost per acre in cents	No. of Fires	Per Cent of Fires less than 10 acres	Area Burned Over	Acreage per fire	Damage
1939	$447,503.43	13.6	3.3	2,021	93.0	9,864	5	$22,157
1940	422,330.87	13.6	3.1	1,622	89.0	11,534	7	23,594
1941	443,935.87	13.6	3.3	799	97.0	1,439	2	2,854
1942	442,639.74	13.6	3.3	823	92.0	3,104	4	6,694
1943	487,692.19	13.6	3.6	962	88.0	12,814	13	40,698
1944	532,723.34	13.6	3.9	1,180	89.7	9,532	9	16,956
1945	544,580.31	13.6	4.0	742	91.9	8,971	12	43,868
1946	658,318.74	16.1	4.1	1,567	92.0	7,792	5	29,895
1947	737,784.34	16.1	4.6	1,398	94.0	16,007	11	74,645
1948	979,757.16	16.1	6.1	1,825	91.6	23,574	13	95,117

EXPENDITURES BY YEARS

Year	Contributed by State	Contributed by Federal Government	Contributed by Counties	Total Cost of Protection
1939	$402,262.04	$ 38,631.30	$ 6,610.09	$447,503.43
1940	265,899.83	136,819.52	19,611.52	422,330.87
1941	340,646.07	95,554.36	7,735.44	443,935.87
1942	326,650.01	108,898.92	7,090.81	442,639.74
1943	303,839.59	177,699.49	6,153.11	487,692.19
1944	341,376.63	188,006.98	3,339.73	532,723.34
1945	327,837.73	212,203.71	4,538.87	544,580.31
1946	330,768.20	324,069.51	3,481.03	658,318.74
1947	398,372.11	336,712.28	2,699.95	737,784.34
1948	651,897.05	315,706.76	12,153.35	979,757.16

ALLOTMENT OF EXPENDITURES BY YEARS

Year	Administrative Expense	Field Personnel	Equipment and Improvements	Fire Fighting	Total Cost
1939	$ 80,130.48	$248,446.73	$ 82,187.50	$ 36,738.72	$447,503.43
1940	73,770.73	235,375.51	75,707.61	37,477.02	422,330.87
1941	74,562.01	258,607.23	73,161.77	37,604.86	443,935.87
1942	65,452.44	326,439.34	37,169.32	13,578.64	442,639.74
1943	65,600.74	387,437.62	21,243.88	13,409.95	487,692.19
1944	51,743.30	429,997.44	33,466.03	17,516.57	532,723.34
1945	33,184.70	462,891.20	34,361.25	14,143.16	544,580.31
1946	42,548.67	556,241.98	37,006.72	22,521.37	658,318.74
1947	44,994.87	589,962.06	56,220.33	46,607.08	737,784.34
1948	63,814.05	684,653.33	120,306.37	110,983.41	979,757.16



Five-ton tilting-bed trailer used by the forest protection division in transporting equipment.

The 1948 season proved a good test for the fire control equipment and changes indicated are being provided as rapidly as possible. Airplanes played an important role and the services of private planes required to augment the radio-equipped department-owned plane. In many instances airplanes provided the only sure means of definitely locating small fires and directing ground crews to them. They also were invaluable for reconnaissance on large fires and in providing information to fire crews that could not be obtained in any other way.

Experience has proven that forest fire control needs are constantly changing and complexity of the job results in increased demands for competent supervisory personnel and skilled equipment operators. Certain types of work, such as enforcement of the slash disposal law, group fire prevention contacts, logging to secure maintenance materials, equipment repairs, etc. are given added impetus during the late fall and winter months. These activities, in addition to the assistance given to other divisions, requires the efforts of the division throughout the entire year.

The increasing importance of adequate radio installation to permit instant communication with forest fire control crews is paramount. A considerable amount of engineering and survey work has been completed, and a modern radio system, redesigned for forest fire control, will be established as rapidly as funds permit.

During this biennium, as in the past, the response of the citizens in times of need was exemplary. The press and radio provided unlimited publicity during critical periods and the restrictions placed on the public were generally accepted. Due to the prompt action of fire control forces and the public and an appreciable amount of good luck, no catastrophic fires developed and the area burned was held to an acceptable total. Wisconsin forests have again survived two bad fire seasons.

Game Management

All sections of the division, excepting the research section and including game management, propagation and stocking, and refuges and public hunting grounds, are now staffed with permanent section chiefs.

GENERAL GAME ADMINISTRATION

Total game division disbursements for the years ending June 30, 1947 and June 30, 1948 were $664,188.41 and $890,546.94 respectively. Expenditures include general game administration, hunting and trapping regulations, all propagation and stocking, exhibits, land leases and purchases, surveys and investigations, winter feeding, the administration, maintenance and development of refuges and public hunting grounds, administration of commercial game, deer and fur farms, licensed shooting preserves, game and trapping season reports, publications, all game research and miscellaneous game projects and services.

The game division now has 124 permanent employes in its four sections.

GAME REGULATIONS

In the authority conferred upon it by the 1933 legislature, the Wisconsin conservation commission continues its responsibilities for the regulation of open and closed seasons on all species of game and on all fur-bearing animals.

The people of Wisconsin do not utilize to their full interest the opportunity that they now have in presenting their opinions and recommendations at the seventy-one county fish and game hearings that are held for these express purposes. The department must have the advice and support of the people of Wisconsin, in cooperation with its game research men, managers and administrators if we are to begin to solve the many complex management problems that face all of us.

PUBLIC HUNTING AND FISHING GROUNDS SECTION

This program, expanded considerably after the war, continued to grow during the biennium. The following list shows the number of areas in operation each year as public hunting and fishing grounds:

Year	Areas	Acreage
1938	1	1,280
1939	2	21,120
1940	4	24,614
1941	4	25,971
1942	8	31,309
1943	11	32,699
1944	23	58,454
1945	31	63,959
1946	50	145,516
1947	63	192,561

As of June 30, 1948, the total acreage was 193,011, of which 40,840 acres had been purchased, and the balance leased.

Other lands open to public hunting and fishing included the Kettle Moraine forest units, Horicon marsh, the Central Wisconsin Conservation Area, and state, federal, and county forests in the northern part of the state, as well as over two million acres of forest crop lands.

The state, which had been divided previously into two administrative areas, was split now into three, with headquarters for the northern area set up at Ladysmith. Plans were made for wildlife management in state and national forests.

Major areas purchased during this time were Crex Meadows and Kiezer Lake in Burnett county, and Colburn in Adams county. Preliminary surveys were made of the Yellowstone area in Lafayette county, and the Mud Lake area in Columbia county, and plans were made for their acquisition and development as waterfowl breeding grounds under the Pittman–Robertson program.

Plans for development and management of state-owned lands in public hunting and fishing grounds were set in motion. Trees and shrubs were planted for watershed control, and for wildlife food and cover. In 1947 such plantings were made on ten state-owned areas. Dikes and water control structures were installed on the Kiezer Lake and Crex Meadows public hunting and fishing grounds in Burnett county for the purpose of improving waterfowl habitat.

In 1947, pens were built and used for the gentle-release system of stocking pheasants on most of the major pheasant hunting grounds.

Fire-fighting equipment, including back pack cans and pumpers, was purchased, and a fire-control system set up for public hunting and fishing grounds.

Public hunting grounds were patrolled during the hunting seasons to control violations, prevent damage, and for the purpose of fire control.

Surveys were made by the engineering staff on the Totogatic, Crex, Wood County, Yellowstone, and several smaller areas.

All public hunting and fishing areas were posted.

An inventory system for existing and prospective public hunting and fishing grounds was put into use for the purpose of determining future work plans.

SECTION OF COOPERATIVE GAME MANAGEMENT

Some of the more important activities that are handled by the section of cooperative game management in the game management division include: investigating and establishing licensed game farms, deer farms, fur farms and shooting preserves; winter feeding of upland game birds; compilation of game and trapping census figures, compilation of migratory bird banding data; small game damage complaints; supervise the Pittman–Robertson regional wildlife development project which is operated in close cooperation with the U. S. Soil Conservation Service; supervision of controlled hunting operations; assistance at annual conservation congress on hunting and trapping regulations, preparation of summary data on bounties paid by the counties and the state; preparation of annual game questionnaire which is used at the county conservation meetings each May; distribute conservation and game management literature and answer many letters relating to wildlife and conservation problems; assist in the publication of department bulletins relating to wildlife; supervise archery deer season program; process bird banding and scientific collector's applications for permits.

Winter Feeding—Game Birds

During the winter of 1946–47 a total of 200,000 pounds of cob and shelled corn and scratch feed plus grit was distributed to the various counties for the winter feeding of upland game birds at a cost of $4,503.00. Winter feeding activities during the winter of 1947–48 covered the distribution of 150,000 pounds of grain, plus grit, at a cost of $5,900.00 including the purchase of five acres of standing corn. The cost of corn had increased from the previous fiscal year to an average of $48.00 per ton.

The emergency feeding of upland game birds has been questioned in a number of states and several of them have made investigations as to the worth of their winter feeding program. In Wisconsin, where dairy farming and intensified agricultural practices have reduced food and cover to a minimum in many areas, the winter feeding program, we have found has many winters saved hundreds of pheasants, quail and Hungarian partridges.

Deer and Bear Damage Claims

The sum of $25,000.00 that is annually appropriated from the state's general fund by statute, for the payment of deer and bear damage claims is not sufficient to cover this expenditure and the number of claims that are filed with the conservation department are rising at a rapid rate. With the great increase in our deer herd together with ruination of the available range for their use, it is not surprising that these claims for damage to agricultural and horticultural crops is rising.

During the biennium a total of $73,533.47 was paid for claims resulting from deer and bear damage to crops and livestock. During the 1947–48 fiscal year the state emergency board was called upon for the sum of $35,000.00 in order to pay these claims.

The payments for each fiscal year by species are:

Fiscal Year	*Deer*	*Bear*	*Fiscal Total*
1946–47*	$27,521.67	$ 7,094.83	$34,616.50
1947–48**	35,326.94	3,590.03	38,916.97
	$62,848.61	$10,684.86	$73,533.47

*Includes $2,119.08 for deer proof fence construction.
**Includes $1,753.83 for deer proof fence construction.

There are pending and settled claims to be paid amounting to $26,398.05.

Game and Fur Farms

Considerable field work and investigations are made each biennium in licensing and establishing game and fur farms and shooting preserves. During this period newly established game and fur farms and shooting preserves were established as follows:

	1946	*1947*
Game Farms	17	20
Fur Farms	57	73
Shooting Preserves	4	2

These farms and preserves are licensed by the department and at the present time there are approximately 182 game farms, 39 deer farms, 562 fur farms and 70 shooting preserves. The acreage in shooting preserves amounts to about 43,000 acres.

Bounty Payments

On March 11, 1945 a new statute became effective placing a bounty on foxes with a payment of $2.50 for each adult and $1.00 for kits. One-half of the expense for this bounty comes from the conservation fund; the other one-half from the state's general fund. Statutory payments from the state's general fund for bounty payments on wolves, coyotes, wildcat, and lynx have been in effect for some time. The bounty payment on each adult wolf and coyote amounts to $20.00; for cubs of these species $10.00. A bounty payment of $5.00 is paid on wildcat and lynx.

The total numbers of animals bountied under this law for each fiscal year of the biennium and expenditures were as follows:

	Animal	*Number Bountied*	*Expenditure*
1946–47	Coyote and wolves	3,317	
	Wildcat and lynx	577	
	Red fox	19,577	
	Gray fox	6,216	
		29,687	$172,533.50
1947–48	Coyote and wolves	3,650	
	Wildcat and lynx	427	
	Red fox	18,692	
	Gray fox	4,867	
		27,636	$127,547.00
Total for biennium:	Coyote and wolves	6,967	
	Wildcat and lynx	1,004	
	Red fox	38,269	
	Gray fox	11,083	
		57,323	$300,080.50

Regional Wildlife Development Program

Just prior to the close of the 1947–48 fiscal year this section undertook a program of wildlife habitat improvement. The planting of food and cover for our wildlife, whether resident or migratory, is important in Wisconsin where intensified agricultural practices have so completely changed the environment for game. Three regions were set up each comprising from 12 to 13 counties wherein the men assigned to these counties would work with private land owners in the planting of trees and shrubs for wildlife. At the close of the fiscal year plans were made to set this program up under the Pittman–Robertson Act and to have this important project cooperate with the U. S. Soil Conservation Service on those farms that have entered into an agreement with this federal service in good soil saving practices.

Other Activities

With the return of our men from the armed services and the hiring of new personnel other game management activities could again get under way.

Each year of the biennium special permits are issued for bow hunting on the Necedah National Wildlife Refuge. In 1946–47 permits to hunt deer with bow and arrow on this federal refuge numbered 3,516. In 1947–48 no permit was necessary to hunt on the Necedah refuge, but close supervision of the deer taken was carried out in cooperation with the refuge manager and our conservation wardens. This included checking out all deer at the Necedah Ranger Station and furnishing the hunter with a transportation tag. During the 1946 season more than 3,000 bowmen hunted this area.

During the biennium, our experimental demonstration stream planting project on the Badfish Creek near Oregon, Dane county, was maintained and further developed. Several other cooperative land management projects in the southern part of the state were undertaken and completed.

Assistance was given in the preparation of the game questionnaire for the county conservation meetings held each May in the 71 counties. At the conservation congress held at Madison in June, assistance was given in the recommendations for game and fur seasons that are discussed by the county delegates at that time. Exhibits in the way of photographs and display materials were prepared for these congress meetings.

Hunter's and trapper's report cards were sorted, tabulated, compiled and printed for department and public use. The special poll of deer hunters for information relating to the kill was again carried out during this biennium.

A number of bird banding permits and scientific collector's permits were issued during the biennium. Federal permits of equal tenure must also be held for these two activities.

STATE EXPERIMENTAL GAME AND FUR FARM

Production and Distribution

	1946-1947	*1947-1948*	*Totals*
Eggs produced:			
Game birds	371,141	374,744	745,885
Reeves	300	283	583
Chukar Partridge	279	586	865
Miscellaneous	2,203	3,941	6,144
Totals	373,923	379,554	753,477
Eggs set:			
Game birds	341,454	354,097	695,551
Reeves	287	267	554
Chukar Partridge	273	475	748
Miscellaneous	1,797	1,668	3,465
Totals	343,811	356,507	700,318
Eggs shipped to cooperators:			
Game birds	20,224	18,204	38,428
Chicks hatched:			
Game birds	260,784	265,843	526,627
Reeves	130	174	304
Chukar Partridge	146	360	506
Miscellaneous	692	876	1,568
Totals	261,752	267,253	529,005
Chick distribution:			
Day-old chicks to co-op	172,705	184,506	357,211
Chicks in Farm brooders:			
Game birds	86,072	78,614	164,686
Reeves	130	174	304
Chukar Partridge	146	360	506
Miscellaneous	692	876	1,568
Totals	259,745	264,530	524,275

Stocking

Birds liberated from:			
Egg program	4,689	8,383	13,072
Day-old chick program	117,259	114,144	231,403
Farm—16-20 wk. old birds	23,784	25,001	48,785
Mature pheasants	21,466	27,032	48,498
Totals	167,198	174,560	341,758

Pheasant Egg Distribution

County	1946-1947	1947-1948	Totals
Adams		350	350
Ashland	555	285	840
Barron	735		735
Bayfield	60	30	90
Brown	900	30	930
Calumet	45		45
Chippewa	626	420	1,046
Clark	30	205	235
Columbia	385	190	575
Crawford	210	475	685
Dane	220	317	537
Dodge		30	30
Door		210	210
Douglas		430	430
Eau Claire		100	100
Fond du Lac	1,210	120	1,330
Grant	420	60	480
Green Lake	260	300	560
Jackson	670		670
Juneau		300	300
Kenosha		60	60
Kewaunee		150	150
La Crosse	100	200	300
Lafayette		1,200	1,200
Lincoln	180	60	240
Manitowoc	30		30
Marathon	720	1,500	2,220
Marinette	550	800	1,350
Marquette		480	480
Milwaukee		45	45
Monroe	200	450	650
Oconto	236	570	806
Outagamie	1,820	800	2,620
Pepin	270		270
Pierce		110	110
Polk		450	450
Price	30		30
Richland	600	850	1,450
Rock	86	110	196
Rusk	45	120	165
Sauk	571	2,595	3,166
Shawano	610	192	802
Sheboygan		30	30
St. Croix		30	30
Trempealeau	5,700		5,700
Vernon	730	1,910	2,640
Walworth		180	180
Washburn	30		30
Washington	300	900	1,200
Waukesha	350	30	380
Waupaca	380	120	500
Waushara	30	200	230
Winnebago	150	150	300
Wood	180	60	240
	20,224	18,204	38,428

Day-old Chick Distribution

County	1946-1947	1947-1948	Totals
Adams	700	700	1,400
Barron	350	5,350	5,700
Brown	2,900	2,400	5,300
Buffalo	950		950
Calumet	3,150	2,800	5,950
Chippewa	3,100	4,900	8,000
Clark	2,200	300	2,500
Columbia	4,450	3,905	8,355
Crawford	350	2,100	2,450
Dane	6,450	6,350	12,800
Dodge	7,850	7,550	15,400
Door	2,000	1,750	3,750
Dunn	5,250	3,500	8,750
Eau Claire	3,300	4,550	7,850
Fond du Lac	8,050	7,800	15,850
Grant	4,675	3,950	8,625
Green	1,550	1,400	2,950
Green Lake	4,050	5,147	9,197
Iowa	3,950	3,100	7,050
Jackson	1,750	2,100	3,850
Jefferson	4,050	4,750	8,800
Juneau	5,000	5,000	10,000
Kenosha	1,800	1,800	3,600
Kewaunee	2,100	2,450	4,550
La Crosse	1,400	1,400	2,800
Lafayette	2,400	2,150	4,550
Lincoln	2,500	2,500	5,000
Manitowoc	6,750	5,000	11,750
Marathon	5,150	8,050	13,200
Marinette	1,200	5,000	6,200
Marquette	1,700	2,200	3,900
Monroe	5,050	5,050	10,100
Oconto	4,500	4,750	9,250
Outagamie	2,400	3,600	6,000
Ozaukee	1,880	1,500	3,380
Pierce	2,600	2,400	5,000
Polk	625	2,725	3,350
Portage	2,800	2,800	5,600
Racine	2,250	2,000	4,250
Richland	22,000	1,500	3,500
Rock	1,750	4,900	6,650
Sauk	3,025	3,200	6,225
Shawano	9,600	9,150	18,750
Sheboygan	3,650	4,550	8,200
St. Croix	3,500	3,500	7,000
Taylor	850	850	1,700
Trempealeau	4,000	3,500	7,500
Vernon	3,250	2,400	5,650
Walworth	1,400	1,400	2,800
Washington	3,850	3,850	7,700
Waukesha	2,400	1,950	4,350
Waupaca	6,150	5,129	11,279
Waushara	3,000	2,600	5,600
Winnebago	600	400	1,000
Wood	500	850	1,350
	172,705	184,506	357,211

Game Bird Distribution—16–20 wk. old Pheasants

County	*1946-1947*	*1947-1948*	*Totals*
Adams	100	250	350
Ashland		15	15
Barron	300	350	650
Brown	100	450	550
Buffalo	200	250	450
Calumet	775	685	1,460
Chippewa	200	300	500
Clark	100	100	200
Columbia	925	486	1,411
Crawford	200	465	665
Dane	1,091	1,125	2,216
Dodge	600	200	800
Door	200	100	300
Douglas	250	250	500
Dunn	400	900	1,300
Eau Claire	500	550	1,050
Fond du Lac	960	955	1,915
Grant	100	320	420
Green	800	1,000	1,800
Green Lake	100	300	400
Iowa	500	400	900
Jackson	100	300	400
Jefferson	1,100	975	2,075
Juneau	200	260	460
Kenosha	500	350	850
Kewaunee	100	150	250
La Crosse	600	950	1,550
Lafayette	550	400	950
Langlade	300	100	400
Lincoln	200	100	300
Manitowoc	1,500	800	2,300
Marathon	200	150	350
Marinette	200	100	300
Marquette	240	320	560
Monroe	200	275	475
Oconto	200	150	350
Outagamie	450	650	1,100
Ozaukee	375	675	1,050
Pepin	200	200	400
Pierce	200	250	450
Polk	200	275	475
Portage	200	150	350
Racine	100	425	525
Richland	225	325	550
Rock	1,000	800	1,800
Rusk		100	100
St. Croix	220	250	470
Sauk	785	700	1,485
Shawano	200	260	460
Sheboygan	100	50	150
Taylor	200	100	300
Trempealeau	100	325	425
Vernon	200	275	475
Walworth	1,300	1,025	2,325
Washington	603	1,150	1,753
Waukesha	1,100	800	1,900
Waupaca	460	475	935
Waushara	100	475	575
Winnebago	775	400	1,175
Wood	100	35	135
	23,784	25,001	48,785

Game Bird Distribution—Mature Pheasants

County	1946-1947	1947-1948	Totals
Adams	215	344	559
Barron	264	385	649
Brown	215	570	785
Buffalo	265	275	540
Burnett	190	194	384
Calumet	300	558	858
Chippewa	375	505	880
Clark	320	308	628
Columbia	711	1,153	1,864
Crawford	295	344	639
Dane	622	778	1,400
Dodge	555	831	1,386
Door	215	286	501
Douglas	14	144	158
Dunn	375	524	899
Eau Claire	375	420	795
Fond du Lac	725	590	1,315
Grant	306	411	717
Green	410	475	885
Green Lake	350	366	716
Iowa	325	375	700
Jackson	370	375	745
Jefferson	481	725	1,206
Juneau	190	325	515
Kenosha	400	458	858
Kewaunee	215	369	584
La Crosse	455	582	1,037
Lafayette	391	567	958
Langlade	265	292	557
Lincoln	265	292	557
Manitowoc	495	585	1,080
Marathon	370	681	1,051
Marinette	265	321	586
Marquette	295	369	664
Monroe	400	399	799
Oconto	400	425	825
Outagamie	360	539	899
Ozaukee	330	431	761
Pepin	240	250	490
Pierce	370	350	720
Polk	215	319	534
Portage	315	404	719
Price		30	30
Racine	380	400	780
Richland	275	465	740
Rock	515	646	1,161
Rusk	215	208	423
St. Croix	375	350	725
Sauk	384	576	960
Shawano	530	525	1,055
Sheboygan	326	548	874
Taylor	220	258	478
Trempealeau	400	399	799
Vernon	350	351	701
Walworth	571	350	921
Washburn		181	181
Washington	355	476	831
Waukesha	731	763	1,494
Waupaca	515	487	1,002
Waushara	265	325	590
Winnebago	360	452	812
Wood	190	348	538
	21,466	27,032	48,498

Raccoon Distribution

County	1946-1947	1947-1948	Totals
Adams	14	23	37
Barron	14	16	30
Brown	15	18	33
Buffalo	15		15
Calumet	15	20	35
Chippewa	20	16	36
Clark	14	16	30
Columbia	30	39	69
Crawford	15	15	30
Dane	24	34	58
Dodge	18	18	36
Door	12	18	30
Dunn	18		18
Douglas		17	17
Eau Claire	18	18	36
Fond du Lac	20	20	40
Grant	26	26	52
Green	15	15	30
Green Lake	14	14	28
Iowa	26	24	50
Jackson	15	18	33
Jefferson	20	27	47
Juneau	15	18	33
Kenosha	15	21	36
Kewaunee	15	18	33
La Crosse	15	10	25
Lafayette	24	24	48
Langlade	14	18	32
Lincoln	12	16	28
Manitowoc	33	36	69
Marathon	27	48	75
Marinette	13	14	27
Marquette	15	15	30
Monroe	23	23	46
Oconto	15	15	30
Oneida	2		2
Outagamie	16	18	34
Ozaukee	16	16	32
Pepin	14		14
Pierce	15	16	31
Portage	15	16	31
Polk	16		16
Racine	15	15	30
Richland	27	25	52
Rock	40	41	81
Rusk	14	16	30
Sauk	27	25	52
Shawano	18	18	36
Sheboygan	15	15	30
St. Croix	15		15
Taylor	14	18	32
Trempealeau	15	18	33
Vernon	18	19	37
Walworth	15	21	36
Washington	16	16	32
Washburn	17		17
Waukesha	15	15	30
Waupaca	15	15	30
Waushara	14	14	28
Winnebago	14	18	32
Wood	15	18	33
	1,047	1,081	2,128

During the last biennium there have been some very decisive improvements in our stocking program. Through a large amount of experimental work, which was carried on by the different sections of the Game Division, the so-called gentle release system has been adopted in a number of the pheasant territories throughout our state. Under this system, the young pheasants are removed from the rearing pens and placed in these gentle release pens about ten days before being released in the wild. While being

held in these pens, the young pheasants are supplied with a small amount of scratch grain so they can harden themselves, thereby making it easier to adapt themselves to foraging after their release from the holding pen. The birds are held in these pens for a period of approximately ten to twelve days. Following this holding period, the doors at the end of the pen are raised so the birds may walk out of the pen as they see fit.

Another improvement has been the winter holding of the hen pheasants. Many of the cooperative clubs throughout the state have built a separate holding pen where part, or all, of the hens they have raised from the day-old chicks furnished them are held over winter and released the following spring for breeding purposes. Under this program the clubs have cooperated very extensively and have expended considerable sums of money to purchase feed for these birds being held.

Game Animal Stocking

The following table will show that the production and distribution of raccoon was increased considerably over the previous biennium period. This chart will also show that during the biennium we distributed 591 cottontail rabbits and 49 squirrels. These rabbits and squirrels were not produced on the Farm, but were trapped out of Milwaukee county at the request of the residents. These animals were then distributed throughout other counties in the state.

	1946-1947	*1947-1948*	*Totals*
Raccoon	1,047	1,081	2,128
Rabbits	146	445	591
Squirrels	44	5	49

Trapping Program

During the last several years the handling of the large concentration of pheasants in Milwaukee county has become a problem. Due to the fact that hunting is not allowed in Milwaukee county, it became necessary for the department to institute a trapping program which has been carried on during the winter months for several years. Each year the Game Farm has delegated several men to go to Milwaukee county and remain there during the winter months as long as they were able to entice the pheasant into traps. In this way we have removed many hundreds of surplus pheasants out of Milwaukee and liberated them throughout the other counties in our state.

These men have also been requested by the local residents to carry on a rabbit trapping program. This we have done. Below find a chart showing the number of pheasants, rabbits and squirrels which have been trapped in this biennium.

	1946-1947	*1947-1948*	*Totals*
Pheasants	541	1,012	1,553
Rabbits	146	445	591
Squirrels	44	7	51
Mallards	99		99

In addition to the game birds and animals mentioned above, an extensive Mallard duck trapping program was carried on in Milwaukee county. Following the trapping of these birds, they were released on Horicon Marsh.

Confiscation and Clearing House Section

During the biennium the clearing house section received, housed, and fed the following birds and animals until they were properly disposed of.

	1946-1947	*1947-1948*	*Totals*
Fawn	61	56	117
Mature deer	25	14	39
Raccoon	16	35	51
Rabbits	146	445	591
Squirrels	44	7	51
Beaver	4	4	8
Badger	1	1	2
Woodchuck	1		1
Wolf	1		1
Skunk	1		1
Red fox	2	2	4
Mink	2		2
Albino porcupine		1	1
Porcupine		5	5
Whistling swan	1		1
Mallard duck	1		1
Bobwhite quail	4		4
Wood duck		2	2
Pelican		1	1
	310	573	883

Aside from these birds and animals, there was also a large number of deer carcasses received and stored in our sharp freezer until proper disposition was made.

Public Relations and Education

The public relations and educational program conducted by the State Experimental Game and Fur Farm during this biennium was expanded and carried on much more extensively than it was in the preceding biennium. During the summer months, the Farm maintains both an animal and bird exhibit which is for the benefit of the public and is visited by many thousands of visitors. Aside from this, the Game and Fur Farm personnel attended forty-five meetings sponsored by the sportsmen's groups in which talks were given and moving pictures shown. There were also approximately one hundred live bird and animal exhibits shown at county fairs and sportsmen's organizations that were held not only throughout our own state, but in neighboring states such as Minnesota, Iowa, Missouri and Illinois. In addition to this, an exhibit was shown at the American Legion Convention in New York City.

Parks and Maintenance

During the biennium the maintenance crew was somewhat expanded and due to the availability of labor and materials, several new programs were placed in effect. Under this new policy, there are several projects that are being carried on pertaining to the up-keep and replacement of some of the breeding pens for the pheasants and also of the raccoon pens which

are used in the raccoon section. There have been several other projects which have been started and are being worked out by the management and gradually placed into effect as we go along. Most of these projects can be classified as long term or approximately ten-year programs. It has been definitely established that the approximate life span of these pens is ten years. It has been decided to build 250 new pheasant breeding pens each year and approximately 50 new raccoon pens. By following out this program, the State Experimental Game and Fur Farm will never be in a position where it becomes necessary to lay out a large amount of money in any one single year for the replacement of these pens. There has also been a program worked out in regard to the maintenance and replacement of a certain number of miles of fencing each year. The up-keep and painting of the various buildings also presented a problem, but a satisfactory system of painting a few buildings each year has been established.

One of the outstanding factors was the reforestation of a barren, non-productive three-acre plot of ground not desirable for agricultural purposes. The varieties selected were the white and Norway pine, and the white spruce. Replacements and spot plantings were also made of various deciduous and coniferous trees in the park, park shelter belts, and arboretum. Many of the old oaks that were gradually dying have been removed and many of them replaced with new plantings.

A large number of projects are now being worked out and put into effect under this new policy. Some of them are—crop rotation plan; fire control and protection program; installation of a new feed elevator at the bird section; expansion of the arboretum according to the plans and specifications drawn up by Mr. Allen Haukom; replacement of the old incubators with new and up-to-date models as they become available.

Pathological Laboratory Activities

1946–1947

The laboratory carried on disease control work incident to the production program on the farm, maintained a diagnostic and field service for sportsmen, wardens, department personnel and fur farmers in the state. A research program on the control of gapeworms, coccidia and cecal worms in pheasants was inaugurated. A comprehensive pheasant feeding formula experiment was undertaken, comparing a formula of our own design to that of commercial formulas.

The cooperative agreement and work on genetic studies in mink and fox carried on by the Conservation Department and the University of Wisconsin has been continued. The laboratories and farm facilities have continued to be available to the United Mink Producers Association—Great Lakes Ranch Service. This ranch service employs its own pathologist and bacteriologist.

The following is a brief resume of the activities for this period:

Farm birds treated or examined	1647	
Outside birds treated or examined	51	
Total		1698
Farm animals treated or examined	5382	
Outside animals treated or examined	477	
Total		5859
Grand Total		7557

Assistance was given in revising the following department bulletins:

Wisconsin Pheasant Raising
Muskrat Raising
Raccoon Raising

In addition, several articles were written on fur bearing animals and published in national fur journals.

The second annual Fur Institute was held in July. This program was held at this station and under the joint sponsorship of the Wisconsin Conservation Department, UMPA–Great Lakes Ranch Service, Wisconsin Department of Veterans Affairs, and the Wisconsin Fur Breeders Association. Over 600 fur breeders from ten states were in attendance for this two-day school.

A total of 34,550 cc. of autogenous Infectious Enteritis Vaccine was manufactured in the laboratory in 1947 for use in controlling this disease in raccoon raised at this station in 1947 and 1948.

A total of 70 field trips covering 12,625 miles were made of which 8 were services to fur breeders of the state and 62 were for administrative purposes, speeches, wildlife disease investigations and disease control work associated with the pheasant cooperative propagation program.

1947–1948

Inasmuch as no pathologist was employed for the last half of the biennium, no laboratory report is available for this period.

FEDERAL AID IN WILDLIFE RESTORATION PROGRAM

Following a period of manpower readjustment in the first two post-war years, and a greatly increased appropriation, all activities under the Federal Aid program for the biennium of July 1, 1946, to June 30, 1948, were expanded proportionately. The magnitude of increase in the Federal Aid allotment is best illustrated by comparing the total game division disbursement for the fiscal year ending June 30, 1946, which was $529,412.38, and the Federal Aid apportionment of $271,816.92 for the period of July 1, 1947 to June 30, 1948. The apportionment includes the state share of 25 per cent matching money. The income from the increased rate of excise taxes on arms and ammunition indicates that the income for this program will be even greater in the next biennium.

New research projects instituted in the current biennium are fox and fur studies. The development and land acquisition program includes a considerable amount of time expended in surveying the cost of development and the expected value as game areas, of several newly proposed areas, and the continuity of operating the Horicon marsh area purchased previously.

The function of the research projects is varied, but primarily is to develop workable census methods for all Wisconsin game, to study population behavior to determine and develop methods of measuring productivity, to evaluate the availability of natural game food and the carrying capacity of most habitats, to develop methods of increasing the abundance and the survival of artificially-propagated game animals, particularly pheasants, and to cooperate with all organizations interested in conservation.

Several popular articles were written by project personnel for the conservation bulletin. Wallace Grange's book, "Wisconsin Grouse Problems", which covers his work as leader of the grouse project, is in press. Reports are being drafted on the waterfowl and deer research projects.

Coordination Project

The coordination project was first put into effect on July 1, 1946, at the start of the biennium covered by this report. The objective in the establishment of this project was twofold: First, to provide organized supervision by technically-trained personnel in an ever-expanding Pittman–Robertson wildlife research program; secondly, to provide a competent administrative assistant to relieve the coordinator, who is the chief of wildlife research, of many administrative details involved in the Federal Aid program. At the time this project was initiated, the following Pittman–Robertson projects were in operation:

Deer Management Research
Food Habits Research
Fox Research
Pheasant Management Research
Quail Census
Waterfowl Management Research
Horicon Marsh Acquisition
Horicon Marsh Development

The coordinator's salary is paid from state funds, but the assistant coordinator and stenographic help are Pittman–Robertson employees. This project functioned well in its first year of operation, and was budgeted in the amount of $5,000.00.

Existing projects were expanded during the fiscal year of 1947–48, and the grouse research study was reopened. With this expansion more work was involved in the activities of the coordination project. It was again the coordinator's job to see that Federal Aid projects in the state were planned and operated effectively and productively. The assistant coordinator has the following responsibilities: Furnishing monthly reports to the regional office of the Fish and Wildlife Service on the Federal Aid program within the state; making semi-annual reimbursement claims, prepar-

ing project amendments, writing miscellaneous correspondence, and submitting financial reports and payrolls. The assistant coordinator also relieved the coordinator of any work in connection with land acquisition or development. Personnel remained the same, except for the addition of clerical help, and the budget was increased to $6,000.00.

From all indications, appropriations to all states are going to be increased tremendously, and there will be a great work load for this project as more and more projects are set up to utilize the additional funds. This will also call for a considerable expansion of the coordination project itself in order to facilitate the work of the research, land acquisition, and maintenance projects, and to provide necessary direction, planning, and accounting. A wildlife research cost summary by projects for the biennium is shown below:

WILDLIFE RESEARCH COST SUMMARY BY PROJECTS

(All figures include both the state and federal shares)

Year	*Deer 4-R*	*Waterfowl 6-R*	*Food Habits 8-R*	*Pheasant 9-R*	*Fox 12-R*	*Grouse 13-R*	*Quail 14-R*	*Fur 15-R*
1946–47	$26,327.00	$ 2,885.00	$2,072.50	$ 7,075.60	$1,898.00	----------	$2,176.00	----------
1947–48	15,334.00	12,000.00	6,000.00	12,000.00	7,000.00	$10,000.00	5,166.00	$7,000.00
Totals	$41,661.00	$14,885.00	$8,072.50	$19,075.60	$8,898.00	$10,000.00	$7,342.00	$7,000.00

Deer Research Project

The deer management research project, a Federal Aid sponsored study, has been engaged during the biennium in a number of activities related to Wisconsin's deer problem. The object of deer research activities in Wisconsin is to study and report reliably on the status of the deer and their range in Wisconsin. First, to discover the facts, and secondly, to make available the findings which will facilitate better deer management, are the main project functions. Wisconsin's deer present a problem of management that requires constant study and well-informed planning.

Food available for deer on winter range is the controlling factor in maintaining deer populations. Therefore, a study of winter deer range by classifying this range as regards natural deer foods and carrying capacity, has been one of the principal jobs of the project. It would take a large crew to check carefully all of our known deer yards annually, and because the project has not had sufficient man power available for such a check, a system of "key" yards representative of our winter range, has been worked out. This system has been set up on a 20% sample basis of all known yards. The following summary indicates the number of yards cruised during the biennium, and cites their condition regarding natural deer foods.

Table 1

SUMMARY OF WINTER RANGE SURVEYS

Year	No. of Counties Checked	Key Yards Surveyed	Total Known Yards	% Cruised	Food Conditions		
					Good	Medium	Poor
1947	19	119	437	27%	5%	26%	69%
1948	20	122	593	20%	2%	19%	79%

Since 1943 the conservation department has been feeding deer artificially on a large scale. The deer project has checked these feeding areas to determine the value of this activity, and the following are the conclusions:

1. Artificial feeding of deer on their natural winter range does not lessen the pressure on natural browse species. Range deterioration has continued despite supplemental feeding.
2. Artificial feeding concentrates deer in restricted areas where the danger of parasitic infestations and epidemic disease might well be a greater danger to our deer population than starvation.
3. Deer concentrations are generally underestimated, so it is difficult to know what volume of artificial food is necessary for each feeding area.
4. Present methods of feeding deer artificially do not prevent starvation. If artificial feeding is going to be successful, it must reach the fawns. In order to do this, artificial feed must be distributed over a much greater area, which would permit fawns to eat this food without being disturbed by hungry adults. Observations indicated that minimum distribution requirements would be to scatter artificial foods along a one-mile strip through every square mile of range that requires feeding. Certain areas where population concentrations are extreme would require a longer feeding strip.

Present funds and facilities for deer feeding purposes are far from adequate for this kind of feed distribution. The total number of square miles of critical winter deer range, with a mile-long feeding route for each square mile, which would have to be fed two or three times a week, would cost about a million dollars annually. Feeding experiments on pen-controlled deer to determine the relative values of certain natural and artificial diets, and combinations of these, were continued. Alfalfa, hay, diets supplemented with commercially-prepared deer food concentrates will satisfactorily sustain deer through a normal yarding period. Alfalfa, hay, and balsam constitute a satisfactory diet. A diet of low palatable deer browse species when fed in unlimited quantities sustained deer for two consecutive winters. Apparently a sufficient variety of even low palatable browse plants, if available in unlimited quantities, will sustain deer. The following table summarizes the diets tested and the results as determined from our findings:

Table 2

TABULATION OF DATA—DEER FEEDING EXPERIMENTS

Year	*Diet*	*No. of Days Run*	*Lbs. of Food per Cwt. of Deer per Day*	*# Per cent of Weight Loss*	*Remarks*
1947	Alfalfa hay (unlimited)	59	2. 19 lbs.	62%	Satisfactory.
1947	Alfalfa hay (limited) Balsam (unlimited)	62	2. 24 lbs.	48%	Satisfactory.
1947	Cedar (unlimited)	62	4. 97 lbs.	72%	Barely satisfactory when fed on a straight diet.
1947	Hemlock and hardwoods	55	3. 11 lbs.	83%	Unsatisfactory as fed in this experiment.
1947	Cedar (Limited) *First-choice browse	60	3. 51 lbs.	57%	Satisfactory.
1947	**Second-choice browse	52	3. 39 lbs.	80%	Unsatisfactory.
1947	***Third-choice browse	54	3. 86 lbs.	81%	Unsatisfactory.
1947	****Fourth-choice browse	63	5. 29 lbs.	55%	Satisfactory—unexpected results.
1947	Control diet. All species cedar (limited)	47	Not weighed except (cedar)	67%	Cedar limited; all other species unlimited.
1948	Alfalfa hay (unlimited)	80	2. 73 lbs.	4. 3%	Satisfactory.
1948	Alfalfa hay leavings of above diet	80	2. 09 lbs.	17. 7%	Deer forced to eat coarse stems; 25% by weight remains uneaten.
1948	Low palatability browse species Fourth-choice (1947)	75	4. 30 lbs.	12. 5%	Satisfactory. This diet checked the unexpected results of a similar diet in 1947.
1948	Alfalfa hay (limited) Balsam (unlimited)	80	3. 51 lbs.	9. 5%	Satisfactory.

*First Choice	**Second Choice	***Third Choice	****Fourth Choice
Sumac	Hard maple	Red oak	Black ash
Red maple	Choke cherry	Hazel	Norway pine
Yellow willow	Juneberry	Holly	Alder
Alt. dogwood	Yellow birch	Aspen	Elm
Basswood	R. O. dogwood	White pine	Gray dogwood
Cedar (limited)	Mt. maple	White birch	Balsam
	Hemlock		

Percentage of weight loss: Critical weights were based on 80% of the initial weight in 1947.
Percentage of loss in 1948 based on initial deer weights; critical weights based on 20% of initial weights.

A study to determine the carrying capacity for the type of winter deer range in which this enclosure is located has been conducted in conjunction with feeding experiments at Camp Rusk. Four one-acre plots were fenced, all adjoining, in the Cedar Rapids deer yard, Rusk county. The following summary indicates the browsing pressure that winter range of this type can sustain, and the reduced capacity that results from excessive pressure:

Table 3

SUMMARY OF LADD CREEK DEER ENCLOSURE STUDY

Year	*Pen No.*	**D.B.D.*	*Sustained*	*Remarks*
1946	I	75	(1 deer)	Deer released in fair condition.
1947	I	57	(1 deer)	Deer released in poor condition.
1948	I	66	(1 deer)	Deer broke out and was not replaced. Browsing conspicuous.
1946	II	134	(2 deer)	Starvation diet. Adult survived.
1947	II	122	(2 deer)	Deer released after 61 days. Pen browsed heavily.
1948	II	78	(2 deer)	Fawn released after 18 days. Adult released after 39 days. Heavy browse; high plant mortality.
1946	III	192	(3 deer)	Pen browsed heavily; fawn released after 28 days. Deer
1947	III	118	(2 deer)	lost 24% of initial weight in 59 days.
1948	III	93	(2 deer)	Deer released after 46 days. Pen browsed out; high mortality in browse plants because of overbrowsing.
1946	IV	Control	No deer	Snowshoe hare browsing is considerable. The keen
1947	IV	Control	No deer	competition between deer and hare for the same browse
1948	IV	Control	No deer	plants is noted here.

*D. B. D.—Deer Browse Days.

Deer trapping and tagging operations were carried out during the biennium, in the Flagg river deer yard, Bayfield county, and on Chambers island, in Door county. Return reports from tagging operations will give the project valuable information concerning the life history and movements of deer. Forty-one bucks, 95 does, 49 buck fawns, and 37 doe fawns were trapped, tagged, and released on these two areas in the winter of 1947. Population ratio studies conducted during the biennium reveal the following percentage composition: All bucks 17%, all does 48%, and fawns 35%. This study indicates that despite the shooting of bucks only for a number of years, our deer herd is not out of biological balance. Controlled hunting in Wisconsin became a reality when the Necedah National Wildlife Refuge was hunted on a hunter-limitation control method. Antlerless deer were removed as well as bucks. The 1946 season was followed by a similar one in 1947. Herd reduction was accomplished on this area to the extent that low palatable browse species showed some recovery. The following table summarizes the take during these two seasons:

Table 4

Year	*Kill*	*Kill per Square Mile*	*Area Open to Hunting*
1946	1,637	49.64	31,770 acres
1947	1,518	15.99	62,713 acres
			(From Bersing's report in the August 1948 cons. bulletin)

The deer research project engaged in a number of minor studies during the biennium that have revealed valuable information. On Madeline island, one of the Apostle group, hunting season information has been collected.

Chambers island of Door county, Wisconsin's most critical example of browsed-out deer range, shows only minor recovery even though approximately 75% of the deer herd was removed from the island. A special effort to evaluate the airplane for census work on deer indicates that censusing deer from the air is unsatisfactory; however, it was revealed that the airplane is a highly satisfactory method for locating winter concentration areas. The project furnished field men to assist in the forest damage survey conducted by the conservation department. This survey has been completed, and a report made available to the public.

Public relations activities required a considerable part of the project's time during the biennium. Project personnel assisted members of the conservation congress deer committee in their study of Wisconsin's deer problem. Talks on deer problems were given to many groups throughout the state. The deer controversy during the biennium has in no way become less of an issue in Wisconsin. Range conditions despite relatively easy winters, have degenerated to a critical point. Public interest, except for a small group of people, is not keen enough to encourage actual field examinations in an attempt to better understand the issues in this controversy. Uninformed persons argue long and loud against any attempt to manage deer populations for a variety of personal reasons.

Food Habits Research Project

This project was reactivated on February 1, 1947, when qualified personnel became available. The approach to food habits studies adopted, was one of taking the problems directly from the field where they could be interpreted on the basis of other studies in progress. Such an approach enhances their meaning and value; consequently, considerable time was spent by the project leader and a temporary assistant in working directly with other Pittman–Robertson projects. Food habits were determined on both predator and prey species, always keeping in mind the availability of the particular food to the animal. This led to extensive studies on deer, fox, mink, pheasant, ruffed grouse, and other species. A number of problems were attacked which involved the development of new techniques in food habits work. The reference collection of food items for facilitating identification of stomach and scat contents was considerably amplified, and the laboratory facilities for food habits work at the state experimental game and fur farm were put into an efficient operating condition.

Fox Research Project

Objectives:

1. To determine the past and present trends of red and gray fox population, numbers and distribution, by analysis of Wisconsin hunting and trapping records, and by field census methods.

2. To determine the relationship of Wisconsin foxes to their prey species, and to competing predatory species.

3. To examine such life history factors as sex and age composition, breeding habits, diseases, parasites, and other mortality causes.

Accomplishments:

1. Carcasses were collected during the winters of 1947 and 1948, and were analyzed for food habits. Food preferences of both species for the winter months were obtained. Reports on the stomach contents of 113 foxes were made by the food habits biologist.

2. A sharp decline in the population was seen in eastern Grant county in 1947. Nutritional causes for the decline have been worked out in part. Severely emaciated foxes were examined during the winter of 1947, and were dug out of dens the same spring.

3. The cyclic status of both species has been followed by means of bounty data obtained monthly since the beginning of the study. The red fox population shows a decline in the areas where abundance was greatest.

4. Weights of carcasses taken during the fall and winter show a marked increase during 1948 over those taken in 1947. The evidence obtained indicates that there are definite weight differences between winter populations and the remainder of the year. The weights obtained during the fall were heavier than those obtained during the winter, even though the former were made up mostly of juveniles.

5. Parasites were found in the intestines, lungs, and stomach of apparently normal foxes. In all cases these infestations were light. Absence of any parasites indicated an abnormal condition. Such conditions were found in foxes suffering from gastro-enteritis and malnutrition.

6. The general condition of foxes examined during 1948 was good. It was in sharp contrast to the animals examined during the winter and spring of 1947. These animals had poor pelts that were without much of any luster. Many of them were emaciated to the point of looking like skeletons.

7. Den studies were made during 1947 and 1949 to obtain data on the movements, litter sizes, and food habits of both species of foxes. Den locations for both were noted, and the preferences of each species obtained. Red foxes were able to adapt themselves to varying surroundings. The amount of brushy timber determined whether gray foxes were present. The greatest number of dens were found in or adjacent to woods.

8. The greatest concentrations of foxes were found in areas where the amount of cropland exceeded the timber land. Much of this was on the table land away from the Wisconsin and Mississippi rivers. The land near the rivers had a lower population level, although this population was more stable than the preceding one.

9. Seasonal and yearly track counts were made of the mink, opossum, raccoon, and skunk populations within a study area. These counts were to obtain possible trends in population. The study area was Clifton township in Grant county.

10. Correlations were made between changes in fox populations, and similar variations in the number of cases of rabies. The data on wild populations was very meager. The "peak" in the fox population was reached when the incidence of rabies was in a low stage. Fox populations reached a low when the number of cases of rabies was greatest.

Fur Research Project

The Pittman–Robertson fur research project was started on October 1, 1946. Wayne C. Truax, leader of the project until June 1948, established headquarters at Horicon Marsh. Controlled trapping, large muskrat populations, a variety of muskrat habitat types, and the use of marsh project facilities provide excellent opportunities for intensive studies on muskrats. The other extensive muskrat-producing areas of Dodge county and the Lake Winnebago and Fox river marshes are near by.

From the start the fur research project has enjoyed a unique popularity with fur producers in the state. Few groups are ever encountered which are so eager to benefit from the results of wildlife research. Any increased production of fur, of course, means extra profits from the thousands of dollars invested by private operators in the hope of continuing returns from fur production.

Trapping is a big business in Wisconsin as income from wild pelts sometimes exceeds one million dollars. In some cases very few muskrats are being taken on marshes which yielded abundantly a few years back. Other marsh areas produce a fur crop only sporadically, and few marshes are consistently heavy producers. One aim of the project is to find means to restore and maintain productivity of ailing marshes. To do this many basic life history studies have to be undertaken. How far and when do muskrats move? What are the sex and age ratios of different populations? Can a method be devised to tell when to stop trapping in order to maintain sufficient breeding stock? How can water be managed and manipulated for the maximum production of fur and other wildlife resources? Does a muskrat house count give a true index of fall population? What controls are needed for muskrat diseases and predators in Wisconsin? Is pollution the factor limiting production in the Fox river marshes which have had a very serious decrease in the fur take? Many more questions arise, some which may be hard to solve because of the great difficulties in working with a wild animal such as the muskrat. In two years of litter-tagging, 1,022 kits have been ear-tagged with #1 monel metal fingerling tags. The numbered tags make possible positive information about individual muskrats. Movements, longevity, and breeding data can be determined when muskrats are ear-tagged. Sex ratios and litter size are also recorded at the time of ear-tagging. In 44 entire litters captured in 1948, a sex ratio of 102 M: 100 F was found. The average number per litter was 8, and individual litters ranged from 3 to 12 in size. The large size of these litters, and the known general production of two litters per year per female, explain the large harvests at Horicon marsh. The existence of a differential mortality which caused heavy losses to female kits can be seen from the figures in Table 1. Reasons for this mortality have not been determined.

Table 1

SEX RATIOS OF MUSKRAT KITS BY WEIGHT GROUPS

Horicon Marsh 1947–1948

Weight Group	*No. of Males*	*No. of Females*	*Sex Ratio*
Under 100 Grams	412	363	113 M:100 F
Over 100 Grams	175	119	147 M:100 F

House counts to show productivity changes and distribution due to rising water levels have been made each winter. The number of houses is estimated by counting representative strips totaling 10% of the total habitat. A general summary of the muskrat productivity of Horicon marsh is shown in Table 2.

Table 2

HOUSE COUNTS AND MUSKRAT HARVEST

Horicon Marsh 1946–1947

Year	*Total Houses*	*Acres of Habitat*	*Muskrats Harvested*	*Rats Harvested Per House*	*Rats Harvested Per Acre of Habitat*
1946–7	8,964	3,150	8,029	.90	2.6
1947–8	15,362	4,200	9,535	.91	2.3

Observations from a slow flying plane have proved to be valuable in quickly estimating the potential harvest from various trapping units. This method is of most use where muskrat production is dependent largely upon marshes rather than ditch and river banks. Although almost every marsh or other water area producing muskrats has its own peculiar problems, it is believed that the studies at Horicon will reveal principles of general value to all who are interested in maximum fur production, as well as specific information of use to owners of similar types of marsh. Additional personnel and equipment now being added to the fur research project will greatly speed the solution of many problems.

Grouse Research Project

A new grouse research project was inaugurated on July 1, 1947, after being inactive since 1943. The project has had several changes in personnel, but work is continuing as planned. The principal objectives of the project are the testing and development of land management techniques for improving sharp-tailed and pinnated grouse habitat, and the gathering of data on grouse population numbers and trends. Four principal management demonstration areas have been established:

1. *Solon Springs Field Trial Area, Douglas County*

This area of 2,480 acres has been leased by the conservation department, and the boundaries brushed and posted. The area serves a twofold

purpose—the continuance of a satisfactory population and conditions for the use of grouse field trials, and the technical studies and experiments to determine the needs of sharp-tailed grouse for this type of range.

2. *Crex Meadows Public Hunting Grounds Area of 15,000 Acres in Burnett County*

The management experiments here will consist of food patches, winter feeding, birch and rose plantings, and maintaining openings where necessary.

3. *Rusk County Cooperative Grouse Management Area*

This work will be done on private farms with the cooperation of landowners to see what land management practices can be accomplished to favor to sharp-tails as well as pinnated grouse. Recommendations include maintaining mating grounds, rotating pasture, buckwheat and corn patches for fall attraction and winter feed, and regulation of harvest including illegal kill.

4. *Portage County Cooperative Area*

This is an arrangement between the local sportsmen, farmers, and the conservation department to test working relationships and land use practices which will favor the perpetuation of pinnated grouse. In many respects this experiment will be similar to the work done in Rusk county.

Aside from the work on experimental demonstration areas, the grouse project is attempting to keep tallies of statewide population trends on all grouse species. This will include mating ground counts, nest surveys, brood counts, and indices of fall population. Besides direct study by the project, a sex and age sampling by hunters is planned. Other activities include testing of the use and value of food patches, use of electric fence for protecting food patches from deer, winter feeding methods and results, food and cover planting tests, range surveys, and the possibilities of artificial propagation for special purposes. It is expected that the project with the cooperation of the Rusk County Sportsmen's Club will study the significance of the hybridization of the pinnates and sharptails. The present project leader is of the opinion that this may be an important factor in pinnate survival on marginal private range.

Special consideration is being given to the possibilities of large-scale brush control on sharptail and prairie chicken range that is being closed in by the heavy growth of trees and shrubs. Some work has already been done to keep open the field trial courses in Douglas county.

It is necessary that continual running studies be made to determine decimating factors on all grouse species.

Pheasant Research Project

The pheasant research project was originated in September 1940, and continued until the summer of 1943 by which time all personnel had entered the armed forces. After the war, as of July, 1946, the project was resumed. Dr. Irven O. Buss, former project leader, was again put in charge of this study. In August of 1946, Dr. Buss became chief of wild-

life research, and on October 1, 1946, the present project leader, Frank M. Kozlik, assumed charge of pheasant studies.

In order to increase the state's pheasant population, the conservation department proposed a spring stocking program of adult hens. Before a large scale program could be undertaken, information was needed to determine if the spring-released hens actually would breed and help produce a higher fall population. In the springs of 1946 and 1947, adult pheasants were released on the Kewaskum public hunting grounds, in Washington county, and during the breeding season hens were collected and their ovaries examined. The examination showed that these birds did lay eggs. In order to determine if the eggs actually were laid in nests and not just spilled at random, hayfields were cruised after mowing operations. Banded hens and their nests destroyed by mowers were identified as spring-released hens. Finding these nests showed that the spring-released hens did lay eggs and nest. To check further the reproductive behavior of these hens, broods were observed and the adult hens were identified again by leg bands. Although these studies showed that spring-released hens laid eggs, nested and produced young, it was further desirable to know how many of the spring-released adult hens actually would survive and reproduce. During the spring 1948, 316 adult hen pheasants were color-banded and released on Potter's marsh in Columbia county. Subsequent brood observations accounted for 97 of these hens and their broods, or a survival of 31 per cent. This figure represents the minimum survival, since undoubtedly other banded hens were present on the area, which never were seen to be tallied. Not only did a good share of these hens survive, but they also produced broods that were comparable in size to broods produced by wild hens.

Along with a program for increased stocking of hen pheasants in the spring, sportsmen in some of the northern counties in marginal pheasant range advocated an open hunting season on hen pheasants. They maintained that hens did not survive the rigorous winters, and should be harvested in the fall instead of being left to die during the winter months. During the hunting seasons of 1946 and 1947, the project checked hunters in Dunn county, one of the nine counties which had an open season on hens, to determine the effect of hen-shooting on the pheasant population. In both years the largest share (up to 73 per cent) of the birds shot were banded, released pheasants. Indications were that the wild population was so low that shooting hens would not affect it materially; however, continued shooting of hens would prevent the wild population from ever regaining the high level of the early forties. Each winter reports were received about pheasants being found dead near sanded areas on icy highways. It was inferred that these birds died from eating calcium chloride mixed with the sand. At the state experimental game and fur farm, pheasant pen experiments conducted by the project showed conclusively that birds fed calcium chloride suffered no ill effects. Neither did it have any effect on the birds' egg production, nor on egg fertility. Examination of pheasants that have been found dead near sanded highways revealed that the birds were attracted to the sanded areas for grit, and were then struck by passing cars.

Another pen experiment showed that hen pheasants begin to molt at the time their summer weight is at a minimum, and the molt is completed at the time the hens reach their maximum early winter weight. In the wild, the rate of development of the primary wing feathers of adult hens was found to be comparable to that of the hen's brood, which indicates that the onset of the post-nuptial wing molt can be correlated directly with the date the brood is hatched. Hens bringing off late broods, or not becoming broody at all, may have a high rate of mortality which occurs in domestic chickens. Thus, a delay in the hatching date schedule may not only cause a small crop of young birds, but also an increase in the mortality rate of the adult hen pheasants. During the summers of 1946–47–48, extensive brood studies by the project showed that pheasants experienced successful breeding seasons; however, the spring breeding populations have been so low that even with good reproductive success, no large increase in the pheasant population could be expected.

Quail Census Project

During the biennium, studies on the bobwhite quail have undergone both a consolidation and an expansion. Up to October 1, 1947, activities were confined largely to two study areas, and a conservation aid for each area was employed seasonally. The 10,000 acre study areas in Dunn county, and the 4,400 acre Prairie du Sac area were supervised by the chief of wildlife research and a University graduate student, respectively. On October 1, 1947, the Prairie du Sac area was placed under a biologist, and the studies were expanded to include statewide work on the species.

While the bobwhite is of limited importance to the hunter in Wisconsin, it is a convenient species from which to obtain a basic "savvy" of all nonmigratory upland game birds. This results largely from the accuracy of census that can be obtained, the ease of trapping, the existence of techniques for refined age determination, and the conspicuousness of birds in the spring. The quail study areas have shed considerable light on the basic character of bobwhite populations, and these results can be used as a yardstick for similar information on other species; this includes age and sex composition, seasonal mortality rates, hatching schedules, densities per acre, and the reactions of the species to physical environment. Under such intensive studies, a number of facts that have a direct bearing on the management of this and other species have been evolved. The most important of these, perhaps, is that small management units, unless extensively replicated and contiguous with other such areas or with good quail range, are of little value in improving quail habitat. This is due to the seasonal mobility of game birds on open ground, which tend to wander extensively in the spring and fall.

Another significant finding is the rapid annual turnover in this species which replace 80 to 85 per cent of the quail population each year. Much of this annually-expended surplus could be harvested by hunters without detriment to the number of successfully-breeding pairs the following spring, since the surplus succumbs to various causes in any case. The statewide studies have delimited the major bobwhite quail range in Wisconsin along with the approximate densities of birds. An analysis has been made

of the hatching schedule, and the nature of this related to the maturity of the birds during the gun season. A recommendation stemming from this is that the quail season should be set as late as possible to permit the later-hatched birds to reach greater maturity. Analysis of hunting on this species indicates that the gun pressure "barely touches" the bird.

Waterfowl Research Project

During the two-year period ending June 30, 1948, the waterfowl research project was reactivated following World War II. Research operations were resumed on October 1, 1946, and a single biologist, R. C. Hopkins, employed until June 30, 1947. During the second fiscal year, a permanent assistant, Felix Hartmeister, was added to the project and stationed at Grantsburg, Wisconsin, where research work was begun on the Crex Meadows and Fish Lake public hunting grounds. Temporary seasonal assistants were also hired during peak work periods of the second year.

Objectives:

During the three years preceding World War II, a waterfowl management survey completed by Mr. F. R. Zimmerman, wildlife biologist for the conservation department, indicated that Wisconsin marshes were not deficient in duck food and cover, and that it was possible Wisconsin was "burning out" its local ducks prior to the arrival of the bulk of northern migrant waterfowl during the usual type of Wisconsin waterfowl hunting seasons. With these findings in mind, the project resumed operations with the following principal objectives:

1. To determine if Wisconsin is "burning out" its locally-reared ducks.
2. To determine to what extent homing instinct applies to Wisconsin-reared ducks.
3. To determine how and when the kill of ducks takes place as indicated by checks of hunters during the hunting season.
4. To cooperate with the U. S. Fish and Wildlife Service in gathering information on sex ratios, breeding population densities, waterfowl productivity, and migration, for the purpose of coordinating all such information on a continent-wide basis.

Results and Conclusions:

Returns from 1,610 banded ducks and rails, and 34 banded Canada geese, indicated clearly that the majority of ducks banded in Wisconsin are shot in Wisconsin and Minnesota, and most of them are taken during the first week of the hunting season.

Spring banding returns of trapped ducks indicate clearly that homing instinct occurs in both adult and yearling birds; however, the extent to which this homing instinct applies to the total Wisconsin-reared waterfowl population is as yet undetermined.

An approximate 100% check of all hunters using the Horicon marsh public hunting grounds during the 1947 waterfowl hunting season gave conclusive evidence that the greatest number of ducks was shot during the first three days of the season and prior to the arrival of the bulk of the

northern flight. Data gathered from several other areas in the state gave parallel evidence of excessive hunting pressure on locally-produced ducks and early migrants, and the bulk of the northern flight was reduced but little by Wisconsin hunting.

Waterfowl breeding grounds census work showed a comparatively good breeding population of ducks on Horicon marsh, largely a refuge area, during both spring seasons, with breeding densities approximating thirty breeding pairs per square mile of marshland area. Four-hundred and ten square miles of sampling on a state-wide basis indicated an average of less than one pair of breeding ducks per square mile of area in Wisconsin.

Nesting studies at Horicon suggest that about half of the original duck nestings are destroyed by crows, raccoon, agricultural practices, or undetermined predators. Field observations on ducks remaining in Wisconsin in June reveal that from ten to twenty per cent of the flocks are composed of adult females which are without young, and apparently are nonbreeding birds.

Midsummer inventories of waterfowl on Horicon marsh indicate a low net production per pair of breeding ducks. An estimated 900 breeding ducks in the spring of 1947 had raised the population to less than 3,000 by late July, irrespective of the fact that ingress from adjacent peripheral areas unquestionably occurred with the drying up of shallow water areas near the marsh.

Artificial restocking and propagation experiments conducted on a small scale suggested the following:

1. Hand-reared mallards of average quality released on Horicon marsh produced very few returns. Some of these birds were found dead, apparently starved, before the winter freeze-up occurred. Only one out-of-state banding return was obtained.
2. The young of hand-reared mallards sired by wild mallard drakes produced a fair number of banding returns, with some birds reported as far south as the lower Mississippi river region.
3. Spring-trapped wild ducks which had the primaries plucked from one wing apparently did not breed or remain on the areas where they were stocked.
4. Wild-trapped mallard females held over winter did not breed in captivity under conditions of moderately close confinement. Some wild-trapped mallard drakes, when treated similarly, serviced hand-reared mallard females.
5. Spring-trapped wild mallard drakes apparently did not breed under captive conditions during that spring.

Following the completion of almost two years of work, it appears that the immediate concern of Wisconsin is to protect its locally-produced waterfowl by:

1. Delaying the opening of the annual autumn hunting season until such time as the bulk of the northern migrant waterfowl population is in Wisconsin.

2. Invoking measures which will curtail or lessen hunting pressure on waterfowl during the first week of the annual hunting season.
3. Promote the establishment of a system of refuges (not necessarily large areas) for the protection of waterfowl on those areas where such refuges, or the equivalent, presently are not available.

(If a listing of Pittman–Robertson fund expenditures is required, the figures are available from the finance section—See Mr. Bontly)

WINTER DEER FEEDING AND DEER YARD ACQUISITION

According to a bill incorporated into the Wisconsin statutes in 1943, the revenue received by the department from 50 cents on each deer tag sold is to be expended exclusively for the purchase and distribution of winter deer feed and for the acquisition of winter deer yards. As a result of this legislation there was set aside in 1946–47 a total of $95,725.88 and for 1947–48 a total of $104,111.03 for these purposes.

Winter Deer Feeding Expenditures

The forest protection division, because of its distribution of manpower and equipment, conducts the actual deer feeding operations. Listed below are cost schedules and a summary of feed distribution for the period.

	1946-47	*1947-48*
Salaries	$10,027.18	$ 8,672.55
Travel Expense	2,468.39	1,366.38
Rent		12.50
Telephone and Telegraph	75.14	105.37
Printing		32.53
Express and Freight	2,798.97	2,888.02
Gas and Oil	123.11	614.67
Supplies	42.14	177.56
Tools and Equipment		100.37
Building Materials	182.64	57.64
Truck Repairs	56.69	1,376.60
Equipment Rental	346.86	2,241.59
Insurance	13.02	10.03
Feed	18,188.02	55,282.21
	$34,322.16	$72,938.02

Feed Distributed	*Pounds 1946-47*	*Pounds 1947-48*
Alfalfa Hay	574,000	984,000
Concentrated Feeds	350,000	982,000
Small Grains		5,000
	924,000	1,971,000

Expenditures for Deer Yard Acquisition

During this biennium a total of 6,801.95 acres of deer yard lands were purchased with a total expenditure of $42,690.73. Of this sum $29,387.10 was spent in 1946–47 and $13,413.13 in 1947–48.

The counties in which these deer yards were acquired during the biennium from this fund are as follows:

County	*Acreage*
Ashland	1,320.00
Bayfield	320.00
Burnett	2,833.35
Iron	1,529.45
Marinette	81.50
Rusk	557.65
Sawyer	160.00
	6,801.95

The above figures indicate a total income for the biennium of both winter deer feeding and deer yard acquisition operations of $199,836.91 and an expenditure of $150,060.41.

Fish Management

INTRODUCTION

The importance of the fisheries to the economic, social, and recreational welfare of the people of this state has become more pronounced since the close of the war than in any other previous period in history. There has been a tremendously increased fishing pressure developed on all types of fishing, both sport and commercial, with the sport fishing receiving the greatest emphasis. Part of this increase is reflected in a review of the angling licenses sold during the past biennium.

	1947	*1948*
Sportsman's	22,438	27,042
Resident	575,466	703,352
Nonresident	233,938	266,357
Family—nonresident	12,055	15,334
Total angling licenses	843,897	1,012,085

The 1947 legislature adopted the universal fishing license law which provided that all residents between the ages of 18 and 65 fishing in the inland waters of this state are required to have a resident fishing license, the fee of which is $1.00. Previous to that date only those persons fishing with rod and reel or with two lines were required to have a license.

Although there was an increase in revenue from the passage of this law the additional revenue received barely met the impact of increasing costs and did not allow for expansion or the development of new projects. As a result the much hoped for and needed habitat improvement program was of necessity held in abeyance.

ADMINISTRATION

Early in 1947 it became evident that for a successful administration of the fishery program within the state it was necessary that there be better coordination, cooperation, and team work between the various sections within the fish management division. As a result thereof the administrative plan of creating area coordinators for each of the three areas was developed, approved, by the conservation commission, and put into effect in 1948. The coordinator in each of the three areas has the responsibility of administering the field work and all activities within his area and as such is better able to dovetail activities along the path to a much better unification of equipment, man power, and facilities.

In keeping with the need for training of divisional employees the general fish management school was held at Mission House College in July, 1948. Two sessions of the school were held with approximately half of the personnel attending each of the sessions, which covered a three-day period including two evening sessions. Speakers consisted of various division chiefs from within the department as well as guest speakers from related and cooperating agencies. Each session was addressed by a commissioner and the director or assistant director and there were ample periods for discussion, questions, and answers. It was felt that the school was highly successful in giving each fish management division employee a better picture of the situation and the over-all problems and jobs of the various divisions as well as his own immediate division.

During the biennium Mr. Lloyd became assistant superintendent of fish management succeeding Mr. Sprecher who is now assistant conservation director.

The division of fish management is made up of the following sections each of which is charged with certain responsibilities and duties:

Fish Propagation
Rough Fish Control
Fishery-Biology
Great Lakes Commercial Fishing
Mississippi River Survey

There are two staff members, namely, the chief biologist, and the supervisor of rough fish sales and contract fishing.

The Wisconsin fish policy was adopted by the commission on November 8, 1946, and has been impressed upon the employees of the division and every effort is made to carry out the provisions of this policy.

FISH PROPAGATION

In keeping with the terms of the fish policy, emphasis is placed on the rearing of trout to legal size and rearing of muskies and walleyes as fingerlings. Emphasis has also been placed on the production of brook trout for the streams in the northern part of the state since the admirable work of the forest protection division has protected watersheds and the stream conditions have improved so that they are again capable of producing brook trout in substantial numbers. The warmer waters of the streams of the southern part of the state are more adaptable to the brown trout and are maintained more successfully since they are able to meet more hazardous conditions. The number of rainbow trout has been reduced because experience has shown that these are very migratory in habit and do not stay in the stream where placed. They are still propagated however for use for the stocking of some of the deep lakes more suitable for trout growth. A total of 641,723 state and 13,600 federal legal trout were distributed for 1947 and 576,178 state and 1,000 federal in 1948.

The muskellunge rearing is confined to the two northern areas. A very highly successful function was accomplished with the production of 457,141 fingerlings in 1948 surpassing all previous records by far. The production

of walleyes has been disappointing in some respects particularly because of the low water and drought conditions in 1948. Natural ponds have been used extensively for the production of walleye fingerling but during 1948 activities have placed emphasis on the construction of two ponds with controllable water supply. A 22-acre pond was completed in 1947 in Barron county, through the cooperation of the Barron county sportsmen. Similarly the Vilas county sportsmen's club assisted in the development of a 19-acre pond near Winegar, Wisconsin.

Thirteen hatcheries are maintained for the production of trout with brood stock being carried only at Osceola, Crystal Springs, Wild Rose, and Nevin hatcheries. Trout operations have been handicapped because of the following factors: (1) high cost of foods, (2) employee shortages, (3) lack of funds and man power for maintenance of and improvement of facilities although several circular rearing ponds were constructed during the biennium. The installation of refrigeration units was one of the great advancements during the biennium.

ROUGH FISH CONTROL

During the past biennium rough fish control has been recognized and treated as a definite and efficient tool of fish management.

In line with this policy a re-organization of this section of the fish management division has taken place and all operational administration is now placed under the supervision of the area coordinator of each fish management area and his rough fish assistant. As the majority of rough fish control problems are centered in the southern area, that area is the only one which has a regular rough fish assistant permanently assigned at the present time. Under this plan of administration rough fish control needs can be more adequately determined and carried out without any duplication of effort or expense.

Under this plan rough fish removal operations have been assigned to areas which, for biological reasons, have been determined to be in need of such removal work, and are subject to control. Under this system such operations do not assume the commercial aspect which they did under previous policy and of course in line with this system many of the more productive waters which are not subject to control have been released to the private contract fishermen. These are waters such as large lakes, flowage lakes, and large river systems which come under the classification of waters in need of continuous removal work and therefore are considered to be more or less of a commercial proposition.

State control over contract fishing is to be overhauled and strengthened by closer and more efficient supervision methods and this method of removal work can be made invaluable in supplementing the state control program.

Efforts were made during the 1947–1948 session of the legislature to repeal Section 20.20-9 of the statutes which created the revolving fund under which rough fish removal work is financed and under the provisions of the proposed bill such program would have been financed by a direct appropriation from the conservation fund by the conservation commission annu-

ally. Unfortunately this bill was defeated and the program is still in operation under the revolving fund system.

Revenues received from the sales of rough fish under the program must necessarily decrease due to the fact that a large portion of the most productive waters has been released to private contract fishermen and it may be necessary to replenish the revolving fund each fiscal year by an appropriation from the general conservation fund. Whatever amount is needed will be dependent on the revenues received and amount of further control work needed.

Removal operations for the year 1947 were handled by nine state crews with control operation stations located at McFarland, Edgerton, Wisconsin Dells, Beaver Dam, Fond du Lac, Omro, Green Lake and West Bend. The following tabulation represents the entire rough fish removal by species taken by these crews in the year 1947:

Species	*Pounds*
Carp	3,270,823
Buffalo	127,868
White Carp	15,811
Suckers	2,600
Sheepshead	715,995
Dogfish	713
Garfish	6,114
Eelpout	22,928
Turtles	100
	4,162,952

In addition to removal operations conducted by state crews, contracts were issued to thirty-eight private commercial fishermen who operated in specified inland waters. Total rough fish removal by these operators amounted to 2,963,822 pounds for the year 1947.

Rough fish removal for the year 1948 was carried out by a total of eight state crews operating from stations located at Beaver Dam, Edgerton, Fond du Lac, McFarland, Omro, Green Lake, Oshkosh, and Wisconsin Dells. The following rough fish listed by species were removed by these state crews:

Species	*Pounds*
Carp	2,861,536
Buffalo	74,949
White Carp	28,920
Sheepshead	540,650
Dogfish	366
Garfish	3,882
Suckers	2,780
Eelpout	36,303
Turtles	488
Mud Puppies	511
	3,550,385

There were also thirty-five contract fishermen who operated in 1948 and a total of 3,716,729 pounds of rough fish was removed by these operators.

The contract commercial fishermen who operate under a contract issued by the conservation department have given very efficient and effective

assistance to the state program of rough fish control. These operators are issued a contract for rough fish removal from specified waters and operate under direct supervision of a department supervisor who is on the job at all times operations are in progress, including the weighing, shipping, and sale of fish caught. Contractors are usually required to pay a commission of from 5% to 10% of the proceeds of the sales of all rough fish to the department and these funds are used for continued removal work and to assist in the payment of supervision costs.

The number of these crews usually ranges from 35 to 40 annually and usually account for a little less than half the annual removal production.

Supervision methods have been strengthened in the past year and the general efficiency of contract fishing in general is much improved.

The following totals show the amount of rough fish removed from the inland waters of the state of Wisconsin, exclusive of the Mississippi river production taken by commercial fishermen under license, by state and contract fishermen for the period of 1947–1948 inclusive 14,393,888, and by state crews only, 370,592 individual carp fingerlings. All individual carp fingerlings removed were taken by state control crews and it is interesting to note that if each one of these had matured to a five pound fish the total would amount to 1,852,960 pounds of fish.

Rough Fish Sales

The sales of rough fish have been assigned to a staff assistant who also has been placed in charge of contract fishing and Mississippi river rough fish removal under contract.

Due to the fact that more time has been made available to devote to the development of additional markets and sales procedures this system has been highly productive and is reflected in greatly increased revenues during the past year.

New markets have been developed which have caused the drawing off of all surplus stocks and consequently have caused increased price levels to prevail throughout the past year. Although the poundage of rough fish produced the past year has been lower than the peak years it is apparent that revenues from the sales of rough fish produced will far exceed any other year in history.

A tabulation of state rough fish sales by stations for the calendar year 1948 has been made and is herewith submitted:

State Rough Fish Sales—1948

Station	Carp	Buffalo	White Carp	Sheepshead	Garfish	Eelpout	Dogfish	Suckers	Mud Puppies	Turtles	Sales Total
Beaver Dam	526,259	72,534									$ 29,037.71
Fond du Lac	22,880		2,393	462,662		6,804					27,337.38
McFarland	948,580	440	12,605	24,976				1,950			52,837.90
Newville	537,405	890									25,346.79
Omro–Green Lake	438,824			200		274					21,959.87
Oshkosh	231,282			33,127	500	30,034	60		586		20,675.28
Wisconsin Dells	466,526	15,636	16,955	9,047							27,294.18
Predator Control	10,625	120								140	135.10
	3,182,381*	89,620	31,953	530,012	500	37,112	60	1,950	586	140	$204,624.21

*Differences between removal tables and sales is accounted for by:
1. Existing inventories at beginning and end of year.
2. Disposition of unsaleable species by burial or otherwise.

Future Plans

From a study of the rough fish control problem as it pertains to carp in our inland game fish waters of various types, it becomes evident that in certain large lakes, flowages and river systems, the problem is one of continuous control or annual cropping since conditions both biological and mechanical are such that it is practically impossible to effect overfishing and resultant decline of the fishery. Rough fish control in these instances takes on all the aspects of the commercial fishery in spite of the fact that the principal value of the waters involved lies in their contribution to the sport fishery and that we wish to consider the operations as a fish management practice conducted in the interests of better game fishing.

Because of these facts, we deem it advisable in the interests of the economy of the state, to permit rough fish control operations under these circumstances to be carried on by contract fishermen, such operations to be in accordance with definite regulation and close supervision to insure proper game fish management procedures, thereby safeguarding the interests of the sport fishery.

The other bodies of water which lend themselves to complete or periodic control because they can be overfished and either complete or periodic destruction of the rough fish fishery effected, it is deemed advisable to conduct the operations on a basis of sound game fish management through careful analysis of the individual problem by scientific research surveys and efficient control practices carried on by state crews.

To adjust the present program in line with the foregoing principles and procedures, it will be necessary to release certain productive waters of the continuous control type to individual contract fishing and to adjust the present rough fish stations accordingly.

Survey and control units will then consist of the following: *Lake Management Survey Crews* will conduct lake surveys regarding game fish and remove overpopulated pan fish if necessary and any predator fish deemed too numerous for the general ecology of the lake. *Rough Fish Survey* will survey waters where rough fish removal is anticipated. *Rough Fish Control Units* will remove rough fish from waters outside the designated areas as recommended by the survey crew and also take care of waters within the permanent areas when it is deemed advisable.

FISHERY—BIOLOGY

The fishery biology policy and long-range objectives which were formulated during the previous biennium (1945–1946) have been used as guideposts for long range and immediate functional planning during the present biennium (1947–1948).

In the broadest sense, fishery research consists of fact finding and the adjustment of past knowledge to new facts which are then applied for the benefit of fishery conservation.

Prior to 1934, fish management in Wisconsin consisted almost entirely of the propagation and stocking of fish, transfer of stunted populations to other waters, rescue of stranded fish and protection by means of mul-

Camping area, Peninsula State Park.

tiple regulations. In 1934, cognizance was taken of the apparent reduction of desirable species in those infested with rough fish, principally carp, and a carp removal program was instituted. In 1937 a fishery biology section was inaugurated to act as a fact finding group. The biology section was charged with the control of diseases in hatcheries as well as carrying on inventory surveys of waters to gather information on present fish populations to be used in management, to gather basic information on life histories and ecological relationships, to develop and test various management techniques, and to conduct research on other phases of fish management.

The first approach to fish restoration was the fish hatchery. In many instances the component parts of the fish population were changed even though the total weight of fish was not increased due to the fact that individual natural waters have a fairly stable carrying capacity in pounds of fish per acre. Many mistakes were made in the past in the introduction of exotics. The basic cause of such errors in planting fish was due to the application system wherein interested individuals applied for and received fish for planting without regard for the native species already present or even the need for additional fish. The application system was stopped in the late thirties and the state started giving increased study to the actual needs of waters. At this time the quota system was adopted, based upon the number of acres of water, until such time that biological inventories are completed and recommendations are available to manage each body of water on the basis of actual needs for sustained yields. As rapidly

as management recommendations become available they are incorporated in the program. The quota system has thus been modified and improved during the last few years on the basis of available physical, chemical and biological information.

Between 1920 and 1925 tremendous numbers of rescue fish were made available by the federal government from the La Crosse station. These were fish which had become stranded in the backwaters along the Mississippi river. The majority consisted of black crappies. Since they could be obtained by individuals applying to the government and were transported free to various points of distribution, thousands of lake shore property owners, resort owners, rod and gun clubs, and other made requests. Thus the black crappie was introduced into most of the northern bass, walleye, and even pan fish waters. The black crappie was completely out of its natural range and found the environmental conditions more than ideal and began to increase rapidly. As the black crappie increased the complaints of poor fishing for walleye and bass also increased. As basic information was gathered from the biological surveys it was found that the crappie had become the dominant fish in many waters and controlling the entire fish population. On the basis of such biological data, recommendations were made that all possible effort be made to reduce the crappie populations. The crappie had become so abundant and was exerting so much control over other more desirable species that it soon became known as the "carp of the north." As a result of the biological findings, regulations were liberalized on the crappie and extensive publicity given to encourage fishermen to fish for the crappie. Especial attention was given to increasing the fishermen pressure during the ice fishing season since the crappie is one of the species which bite well during the winter. We have met with some measure of success by such a program. For example, a number of walleye lakes had experienced a constantly declining walleye population and poor fishing even with continued plantings of millions of walleye fry. By means of tremendous ice fishing pressure for crappies and a change to planting walleye fingerlings, many of these lakes are now swinging back to good walleye waters with a continuing lower and lower crappie population.

When the biology division was created the activity consisted of intensive work in the trout hatcheries combating disease. The most serious disease was red spot or furunculosis and it was not unusual during an epidemic for one hatchery to lose one-half million trout within a period of four or five weeks. Red spot is a bacterial disease that is carried through the body by the blood stream with the focal points usually being in the kidney, heart and musculature. Since no cure was known at that time, particular emphasis was placed on preventing the disease. However, some study was given to possible methods of cure. To attempt to prevent the disease it was necessary to study intensively the bacterium causing it, the method of transmittal, and the weakest point in the life cycle wherein it could be best controlled. Consequently, it was learned that the eggs could be disinfected with a solution of acriflavine. Dozens of disinfectants were tested before acriflavine was found to be the most satisfactory. Hospital type methods were used in providing chlorine barrels for sterilizing equipment. The eggs were hatched under sterile conditions and reared in tanks

and raceways which had previously been scrubbed and disinfected. On the basis of this fundamental research several of the hatcheries were thoroughly cleaned and disinfected and since have not had a return of this disease. Research has continued on the development of a cure. Earlier work with the first sulfa drugs, diathermy, serum and vaccines failed to yield a cure. Two years ago a cure was affected by the use of sulfathyozole and in 1946 the U. S. Fish and Wildlife Service cured red spot with sulfamerazine. It has been found, however, that if the treatment with sulfamerazine is not totally effective in ridding all of the trout of the causative agent of the disease, there then remains the possibility of the existence of diseased "carrier" trout in the hatcheries. Since a "carrier" state has been found to be of great importance in the spread of furunculosis among untreated trout, the possibility of the existence of such "carriers" after a sulfonamide treatment assumes great importance. Subsequent research has developed a treatment consisting of a mixture of sulfonamides which has been successful in completely ridding trout of the organisms of furunculosis, *Bacterium salmonicida*. This treatment consists of the following: The trout are fed the mixture at a rate of 12 grams of sulfamerazine plus 6 grams of sulfaguanidine per 100 pounds of trout daily for three consecutive days. On the fourth day of the treatment and for seven days thereafter the trout are fed at a level of 6 grams of sulfamerazine plus 4 grams of sulfaguanidine per 100 pounds of trout. Further research on refinements of this treatment procedure will continue.

Lake and Stream Surveys

The program of biological investigation of lakes and streams has increased tremendously during the biennium, due principally to the increase in permanent personnel which allowed such surveys to be conducted through the open water season instead of limited surveys of the past with seasonal personnel. Approximately 135 lakes and 269 streams were surveyed. The large number of streams is accounted for by the inauguration of a reconnaissance survey which is more rapid than the more complete electric seine survey. Approximately 76 streams were checked by the electric seine method and 193 by the reconnaissance method. The reconnaissance survey is new and was utilized during 1948 in two counties of the northeast area and nine counties of the southern area. On the basis of results already obtained it will require approximately five years to survey all of the trout waters in the state under this method. The objectives are more limited than the electric seine surveys, however, they are designed to provide essential information rapidly which can be used in the legal trout program. The objectives are as follows:

The initial objective of this study is to eliminate non-trout waters from the list of approved trout streams and in addition prevent loss of fish due to overstocking streams with a habitat well below average.

The second objective is to single out the better streams so that greater effort can be concentrated upon increasing production in waters more favorable to trout. The fish management division would then be able to direct the legal trout program toward a limited number of good trout streams rather than resorting to a sparse stocking over a large number of questionable streams.

A third objective is to obtain a list of streams that require most immediate attention for a comprehensive stream survey with electrical shocker as a final determination to eliminate them as trout water.

The final objective is to build up a planting guide, open to revision, for each county including a stream map showing where it is thought future plants could most profitably be made. This guide is to be used by all personnel planting fish and should eliminate mistakes that have resulted in the past.

The results of the reconnaissance type of survey in the southern area during 1948 are of considerable interest. One hundred fifty-three trout streams were investigated having a total of approximately 530 miles of trout water. The survey revealed 21% of these as average to good streams, 71% as fair to poor and 8% to be eliminated for further consideration as trout streams.

Improvements were made during the biennium in the technique of lake surveys, principally by adding additional gear such as seines and gill nets in order to more thoroughly sample the fish population. Some change in direction was instituted in setting up a priority system for surveys. The activities are now concentrated in areas which have the most lake waters, which receive the greatest number of state fish in the stocking program and which receive the greatest fishing pressure.

Disease Control

The primary aim of the trout disease control program has been to study the various trout diseases as they appear in the state hatcheries and identify, if possible, the causative agent or agents that bring about each mortality increase and finally, devise some effective method of therapy that will rid the trout and hatchery of the specific cause of the mortality increase. Twice-monthly routine checks are made of all trout hatcheries to determine the presence of disease and institute control if disease is found. The major activity continued to be on the control of furunculosis and during the biennium a method of cure using a mixture of sulfonamide drugs was developed by the division bacteriologist. A complete summary of all phases of this experimental work has been written and will be published in the near future. Research continues on refinements of the control measures used on this disease.

University Cooperative Investigations

The number of research investigations pursued cooperatively with the university has remained the same with some projects being completed and new ones inaugurated. The general fish parasite project was completed on October 1, 1948, after operating continuously since 1943. Final reports on this project are now in preparation and will be available for publication during 1949. During the five year study 12,518 fish from 194 waters were examined. It was found that 91.9% of these were parasitized. The final report has been completed which describes and figures over 40 species of larval trematodes. Several species of these were found to be lethal to fish and research into this phase has been continued under a new project entitled "The Effects of Cercarial Penetration on Fish." A study on con-

trol measures has indicated that the destruction of the majority of snails from a given area in a lake may reduce the parasite load of some species of fish as much as 46%.

The long-term investigation of the life history and habits of perch has continued. Much of the work on food habits, the general description, growth rates and some aspects of spawning behavior have been completed. Principal stress has now been placed upon the seasonal and daily migrations of the perch in Lake Mendota (10,000 acres). The winter studies indicated that perch congregate in localized areas in the deeper waters, that is, about 45 feet in depth. The summer observations indicated the apparent congregations of perch in specific locations at sunset hours. By using gill nets, photoelectric fish detectors and diving apparatus, it was found that the perch migration is a seasonal phenomenon occurring between May and October and taking place daily at the time of sunset, less intensively at sunrise. Diving observations showed that the fish moved shoreward in the hour before sunset and then cruised along the shore at a depth of approximately 18 feet until the sun had disappeared. The perch were feeding during this period. Light intensity, either acting directly or through its effects on food organisms and the feeding stimuli as such are at present considered the primary causes for this movement.

Other Activities

The lake management activities of the division were increased considerably during the biennium, due principally to an increase in supply of various chemicals used in this work.

Stewart lake (seven acres), in Dane county contained a stunted fish population which was removed in 1946 and the lake was restocked with 700 largemouth black bass fingerlings and two pairs of adult bluegill breeders. Observations in 1947 revealed large numbers of bluegill young of the year. Observations in 1948 revealed many 12 inch bass as well as numerous bluegills five inches in length. Observations will continue and a complete creel census will be inaugurated.

Weber lake in Vilas county contained a stunted pan fish and bass population which was removed by chemicals. Rainbow trout were introduced and a program of step-planting has been used. Under this planting system the population has not as yet reached the full carrying capacity of the lake. The lake is open for fishing under special regulations with accurate records maintained of all trout removed.

Three years of observations of the bass population of Punch lake, Vilas county, has indicated a cyclical trend determined by dominant year classes. These populations will continue to be studied to determine cyclical variations. Observations to date show great variation in bass fry production from year to year.

Intensive netting has been conducted on Curtis lake in Vilas county for the past three years to reduce a population of stunted perch. Removals to date total 44 pounds per acre. Little change has been observed thus far in the growth of perch, however, the number of black bass has gradually increased.

The Five Lakes project in Vilas county is unique in that it permits unlimited harvest of fish of any kind and any size, and data on this harvest are being accumulated through a very close creel check. To date the harvest in one year has amounted to as much as 13.58 pounds per acre and there have been no evident signs of depletion. The species and numbers of fish taken by angling do not increase with the results of netting operations. The creel has shifted increasingly to walleyes in the three year period of operation of the experiment.

Studies are continuing on Big Sand lake (203 acres) in Washburn county. A survey conducted in 1945 indicated that this lake had been winter killed. In 1946 a total of 320 stunted bluegills, ranging from 3.9 to 5 inches, and 29 largemouth bass were planted in the lake. The right pectoral fin was clipped at the time of planting. In June 1947 a survey was again taken using fyke nets with the results that 82 of the marked bluegills and five of the marked largemouth bass were recaptured. The size of these bluegills ranged from 7.6 to 8.4 inches. The bass that were recaptured ranged in size from 12.6 to 16.2 inches. A survey conducted in 1948 using five fyke nets set 48 hours captured one fin-clipped bass 15.5 inches, and 13 fin-clipped bluegills ranging in size from 8.5 to 9.5 inches.

During this same survey of 1948 these same nets captured 524 largemouth bass raised from natural reproduction. These fish ranged in size from 5.7 inches to 13.1 inches. The bluegills that were captured in these same operations showed a total of 1134 fish resulting from natural reproduction.

A special stream survey was made by the use of the electric shocker of all streams flowing into Lake Michigan for the purpose of determining their use by marine lampreys for spawning and also for the presence of lampreys. No adult lampreys were taken but many larval forms were preserved for identification and for use by the Great Lakes sea lamprey committee.

During the winter months of 1947 a creel census was conducted on the perch fishermen of Lake Mendota. Counts were made from the air to determine the intensity of fishing. Creel census cards with pencil and thumbtack attached were placed under the windshield wiper of the fishermen's cars. Later the cards were collected from posts and trees upon which the fishermen posted them after filling them out. A total of 1,024 cards were distributed and 923 cards or 90 per cent were returned. From the data contained on the creel census card it was found that 2,287 fishermen spent an average fishing day of 5.9 hours in which time they caught 10.9 fish. A total of 339 perch were chosen at random from the fishermen's creel and were weighed, measured and scales were taken for growth studies. The average fish taken by the angler was found to have a mean total length of 9.2 inches and a weight of 0.39 pounds.

Mississippi River

The Upper Mississippi River Conservation Committee was organized in December, 1943, for the purposes of gathering information on biological resources of the river and of making recommendations to the various state agencies for effective and uniform management of those resources. Work

of the committee has been carried on largely by two committees, one for fisheries and one for game. The Technical Committee for Fisheries has been functioning for the past five years, and it has presented a progress report at the end of each year.

Fishery investigations were divided into those in the northern section of the river from Prescott, Wisconsin, to Dubuque, Iowa, carried on jointly by Minnesota, Wisconsin, and Iowa, and those pursued in the southern section of the river from Dubuque to Caruthersville. Work in the southern section was done jointly by agencies within Iowa, Illinois, and Missouri. The U. S. Fish and Wildlife Service and U. S. Corps of Engineers have also contributed to various investigations throughout the length of the Upper Mississippi river.

Accomplishments of the Technical Fish Committee during those five years of life have included studies on the nature and value of the commercial fisheries, studies on efficiency and use of various types of gear in the river, several intensive creel census investigations, five programs of experimental or test netting, two programs of investigation into effects of winter drawdowns on fish life, and many special studies on life histories, growth rates, maturity, relative abundance of important species, fish movement, and total populations of certain backwater areas. Although results of the investigation were slow to appear, they are now accumulating at a greater rate as so frequently happens with biological studies.

In 1948 a test netting investigation was again carried out on the upper section of the river between Hastings, Minnesota, and Dubuque, Iowa, in order to make comparisons with the test netting results of 1946. The total catches during 1948 were somewhat less in volume than during 1946, possibly due to the relatively low stable water prevailing throughout the period. In some areas it was impossible to fish some types of nets, particularly the buffalo net, because of lack of current. Evidence was added to the 1946 data showing that a relative scarcity of fishes exists above Lake Pepin in comparison with the river to the south, particularly in numbers of bluegills and bass. In comparison with the river proper Lake Pepin has a less diversified fish fauna with accent on greater numbers of fewer species. Among these were carp, sauger and mooneye. In addition to the use of various pieces of test net gear a special study was made on the use of live bait and small hooks on trot lines. The gear consisted of 600 hooks in 50 hook lines, half were 5/0 hooks and half were 2/0, according to the Kirby system. The lines were fished in as many types of waters as possible with a wide variety of bait and were set floating and submerged. The catch on the experimental lines was reasonably good. Most of the take was of channel catfish with some flathead catfish and sheepshead also caught. The number of game fish taken on live baits, such as crayfish, minnows and small carp, was so small as to be almost insignificant.

During 1948 the U. S. Corps of Engineers cooperated with the survey on creel census activities by having all lock and dam tenders note the number of fishermen and boats visible from the dam daily between the hours of 2:00 and 4:00 p. m. The total number of fishermen counted at the dams in the Wisconsin portion of the river amounted to 35,195 fishing from 10,661 boats, or an average of approximately three fishermen per boat. An attempt is being made to evolve a factor or factors by means of which

the counts at the dam can be converted into an approximate estimate of the total counts for the area, and thus provide a sound estimation of the fishing pressure on the river in terms of numbers of fishermen by days or by seasons.

The compulsory report system for the commercial fishery which is now in effect in all Upper Mississippi river states is giving increasingly valuable information on fishing effort and catch in boundary waters. During 1947 Wisconsin had 1,352 commercial fishermen on the Mississippi river and the total gear of such licensed fishermen consisted of 544 hoop nets, 226 wing nets, 1,412 baskets, 218,566 hooks, 129,233 yards of gill net and 40,492 yards of seines. During 1947 the total catch of fishes amounted to 4,869,400 pounds of fish, the most important species being carp (3,272,381 lbs.), buffalo (677,066 lbs.), and catfish (376,145 lbs.). During 1948 the total catch increased somewhat and amounted to 5,483,521 pounds. The catch for the year of the most important species was as follows: Carp (4,174,069 lbs.), buffalo (642,503 lbs.), and catfish (213,918 lbs.). The total commercial catch was caught in the following percentages by various gear types: Set lines, 4.7%; seines and gill nets, 92.1%; hoop nets, 3.0%; basket traps, 0.2%. As a result of survey investigations 23 recommendations for changes in regulations governing sport and commercial fishing have been made. These have been used as the basis for hearings with interested groups along the river and have been incorporated in the fishing regulations almost in their entirety.

Minnow Bulletin

As reported during the last biennium a Tri-State minnow committee was organized in 1946 by Minnesota, Michigan, and Wisconsin and the U. S. Fish and Wildlife Service for the purpose of joint study on the minnow problem.

Wisconsin was represented on this committee by the chief biologist and one of the assistant directors, the latter being chairman. The committee assembled all existing information on the culture of bait and carried out additional specific research on the problem. This material was then analyzed and assembled into a bulletin "Propagation of Minnows and Other Bait Species", which was published in 1948. The bulletin of 113 pages provides specific information on the propagation of bait species, including suggestions on construction of a pond, selection of species, operation of the pond, disease and parasite control and control of predation. Additional methods are given on the handling of minnows and the operation of holding tanks with particular attention on causes of loss and reduction of loss. A separate section is devoted to other types of bait such as earthworms, crayfish, crickets, insect larvae, grubs and gall worms. Finally, life history data and photographs are given of the 20 most important bait fishes.

GREAT LAKES FISHERY

One of the most alarming factors in the Great Lakes fishery has been the marked decline of lake trout produced particularly in 1948, when the Lake Michigan production hit an all time low of only about one-half million pounds showing a marked decrease from 1947. Part of this decline has been attributed to the predacious sea lamprey which will be discussed later. The return of smelt in great numbers has been an encouraging factor in the fisheries of the Great Lakes with a notable run developing in Lake Superior. Attention is also called to the study of the southern Green Bay fisheries in cooperation with the Fish and Wildlife Service. An important phase of this study is the tagging of perch in southern Green Bay to study migratory habits. Approximately 10,000 perch were tagged in southern Green Bay to study the migration. However, returns have been very poor and the results disappointing. However, the tagging will be repeated in 1949.

Tabulation of the 1947 and 1948 take by species is as follows:

	1947	*1948*
Trout #1	1,695,006	1,093,058
Trout #2	911	2,130
Whitefish #1	2,414,675	1,690,661
Whitefish #2	11,220	6,318
Menominee or Pilot fish	5,320	10,700
Chubs, Longjaws, Ciscoes and Black Fin	2,636,958	2,670,942
Herring (Blue Fin)	8,295,901	11,391,227
Perch	816,509	1,003,625
Suckers or Mullets	759,432	588,377
Carp	974,941	1,032,045
Catfish	37,943	25,340
Bullheads	218,825	105,929
Smelt	450,014	505,300
Lawyers or Eelpout	66,468	77,055
Crawfish	30,096	7,238
Walleye Pike	97,230	69,676
Pickerel, Grass Pike, Great Northern Pike	17,563	19,162
Sheepshead	69,464	50,909
Dogfish	52	
Bloaters	16,390	21,670
	18,614,918	20,371,362

Sea Lamprey Control

Lake Superior—Mr. Elmer Herman, fish management area coordinator, reports that an 18 1/10 inch, 7 oz. specimen was taken from a nine pound lake trout caught in the pound nets operated by Hans Fonce of Cornucopia on July 1, 1948.

Lake Michigan—Mr. Matt Patterson, supervisor of commercial fishing operations, reports that the trap operated at Hibbard's creek from April 20 to July 21 produced 989 specimens and the greatest number caught in any one night was 221 with the water temperature at 64° F. There is apparently some correlation between temperature and the spawning run but more data are necessary to establish more definitely the relation between these two.

On June 2, 1948, former Conservation Warden A. Baie of Marinette telephoned the Madison office that thousands of sea lamprey were con-

TOTAL POUNDS OF FISH CAUGHT, IN 1947 AND 1948, IN SOUTHERN GREEN BAY, LAKE MICHIGAN, NORTHERN GREEN BAY, AND LAKE SUPERIOR

Species	*Southern Green Bay*		*Lake Michigan and Northern Green Bay*		*Lake Superior*		*Total Catch*	
	1947	*1948*	*1947*	*1948*	*1947*	*1948*	*1947*	*1948*
Lake Trout	29,051	26,659	1,148,270	513,442	517,685	552,957	1,695,006	1,093,058
Whitefish	615,957	402,276	1,190,217	582,114	608,501	706,271	2,414,675	1,690,661
Herring	3,100,956	4,426,663	553,894	673,671	4,641,051	6,290,893	8,295,901	11,391,227
Perch	653,648	830,483	162,834	173,091	27	51	816,509	1,003,625
Total	4,399,612	5,686,081	3,055,215	1,942,318	5,767,264	7,550,172	13,222,091	15,178,571

gregated below the flume of the paper mill dam. Mr. Patterson and Mr. Voskuil immediately went to the Marinette site to inspect this condition and conduct removal work. Either our arrival was much too late or the amount of lamprey present was greatly exaggerated. Messrs. Patterson and Voskuil were, however, able to remove 116 lamprey between June 2 and 4. They have made a trap to insert in the flume for future operations. The Menominee river is a boundary water stream and the mill flume is located on the Michigan side of the stream. It appears that next year's activity should have the joint effort of Michigan and Wisconsin with cooperation by the Fish and Wildlife Service. One or two men to put in the trap and take care of it through the big run in June should be sufficient man power to handle this run if it occurs again.

In the fall of each year there have been many complaints of dead lake trout that are found right after the spawning season. Mr. Glen Voskuil made an extensive field trip out of Milwaukee between November 17 and 26, 1947, and examined every trout caught by the fishermen during his lift. The table summarizes the number of fish inspected and the scarred fish found:

Classification of Lake Trout Inspected For Scars	*Trout Taken in the Nets Alive*	*Trout Taken in the Nets Dead*	*Totals*		*Per Cent*
			No.	*Pounds*	
Trout with one scar healed over	413	195	608		26.3
Trout with two or more scars—healed over	238	82	320		14.
Marketability affected—open wounds	270	223	493		21.2
Total scarred or marketability affected			1,421		61.5
Unsaleable fish			7		.3
Non-scarred trout	549	334	883		38.2
Total fish inspected			2,311	7,600	
Included in the count above— Pectoral fins missing			4		

Note: The unsaleables were those fish that were decayed to the point where they could not be of use in any way commercially.

As to future activity by Wisconsin in sea lamprey control, it can be summarized as follows:

1. The Hibbard creek trap will be operated again as it was in the past.
2. Efforts to carry on a removal program in the Menominee river will be developed and we hope that this can be a cooperative effort with the other two agencies mentioned.
3. A resurvey of streams tributary to lake Michigan for spawning runs is planned in cooperation with the local conservation wardens.
4. The conservation wardens located along Lake Superior will be alerted to the possibility of runs occurring in those streams tributary and will be asked to make regular inspections for any runs that may occur.

CONSERVATION CONGRESS

The division of fish management worked very closely with the conservation congress in both 1947 and 1948. While the previous participation has been primarily devoted to recommendations for regulations in fish and game, the interest of this body has been expanded to include other interests such as management and habitat improvement. In 1948 committees were organized to deal with various topics, three of which are particularly concerned with the division of fish management and these are, trout committee, general fishing committee, and pollution committee. In addition congress members from each county are invited to the division's county fish management meetings which are held in January and February of each year at which time fish stocking quotas, lake and stream survey plans, and other projects are discussed in considerable detail. The division finds the members very cooperative and interested in directing their efforts toward better management of the fisheries.

HABITAT IMPROVEMENT

In cooperation with the public hunting and fishing grounds section of the game management division the training school for such projects was established where the phases of stream improvement activities was demonstrated. In addition allotments have been made to start two demonstrations of stream improvement projects and one has been set up for the creek at Black Earth which is near a metropolitan area and the other site is to be selected.

COMMITTEE ON WATER POLLUTION

The statutes provide that a member of the state conservation commission or a representative of the commission serve on the committee on water pollution. The superintendent of fish management has been that member for a number of years and in February, 1948, was elected chairman of the committee. It has been necessary for the chairman to conduct a number of hearings during the year. In addition there are over 48 orders now outstanding against municipalities and industry in an effort to correct some of the pollution problems that exist in the state.

FALL SEASON ON TROUT IN STREAMS TRIBUTARY TO LAKE SUPERIOR

As a result of the cooperative survey made of the Brule river several years ago with the University of Wisconsin, it was learned that there were quantities of lake developed brook, brown, and rainbow trout that migrated up the streams in the fall after the regular fishing season closed in September. It was consequently recommended that a fall fishing season for trout be enacted in order to give fishermen an opportunity to catch some

of these fish since they were not available to capture while in Lake Superior. Michigan has enjoyed a similar season for a number of years.

Since this recommendation was in contrast and quite a deviation from the usual conservative trout season regulations, there was a hesitancy on the part of the conservation congress and the conservation commission to accept it. Nevertheless, in the fall of 1948 a season was approved on certain of the streams tributary to Lake Superior limiting the area of the stream open to the lower portions in order to keep fishermen away from the spawning grounds and the resident population of fish. The season dates extended from October 15 to November 15, with a minimum length established at 13 inches and daily bag and possession limit of five fish.

The results of this fishing season were checked by the fish management division although a detailed intensive creel census was not possible. Many interesting facts developed. In the first place the fishing was not as intensive as might have been expected. Part of this is believed to be caused by the fact that the hunting season was open and consequently there was competition to the sport. Secondly, adoption of the season was somewhat unexpected and many fishermen were unable to plan their time or vacation accordingly. Third, many of the fishermen who had become experts in fishing these streams in the spring found conditions much different in the fall and they had to learn how to fish all over again. Fourth, the fish in general were in much better condition, were fatter, and more of a finished state than the fish caught in the spring. Fifth, low water conditions made some of the streams rather unfishable particularly the Amnicon and Poplar. Hence a revision of streams is in order for subsequent seasons. Sixth, the general opinion of the sportsmen and residents of the area was that this was an excellent season which should be continued.

IN MEMORIAM

Mr. G. W. Berube was drowned on June 7, 1947, during the course of carrying on lake surveys on Lake Katherine. Mr. Berube was a young man who had recently joined the department and was a promising biologist for field work in lake studies. The division feels that a very good potential employe was lost and the state is the poorer for having lost such a promising young man.

Claude W. Gifford, one of the older rough fish control supervisors in years of service with this section, passed away on February 17, 1948, at his home in Milton, Wisconsin. Claude was one of the first men assigned to a state rough fish removal station and was first stationed at Delavan and later at the Lake Koshkonong station at Newville, where he worked up until the day of his death. He will long be remembered for his many years of faithful and conscientious service in his chosen field of rough fish removal work with the conservation department.

Law Enforcement

The law enforcement division of the conservation department is charged with the protection of the state's natural resources involving the enforcement of all conservation laws and regulations. The division consists of one chief warden with headquarters at Madison with five area field supervisors controlling the activities of one hundred wardens in the field. This area arrangement was inaugurated in 1937 because the growth of the division made closer supervision necessary.

The policy of this division is to save as much game, fish and fur as possible for the public to take legally during the regular open established seasons. For this reason the stress is now on a determined crackdown on hopeless habitual violators and an educational program that attempts at universal compliance with existing conservation laws.

A recent analysis of the arrest records shows the following groups of law violators:

1. Juveniles.
2. A large middle group which might violate wilfully or through error but usually conforms to the law.
3. Habitual violators—those persons who are making it a business to live from the sale of illegal fish, game and fur.

For the biennial ending June 30, 1946 department records reveal that 3,665 persons were arrested for violations of the fish and game laws. In the years of 1947 and 48 the arrest records reveal that there were 6,869 arrests for violations of the fish and game laws. In view of this alarming increase in violations, the division has formulated a new program placing emphasis on the education of the youth and centering our activities on apprehending the habitual violators. We believe that by the education of the youth and the apprehension of the commercial or habitual violators, the large middle group who have been violating the law by mistake or wilfully will eventually constitute a relatively minor problem. With this program we hope to develop an orderly process to have the state's resources permanently serve the entire public of the state.

On July 1, 1947 the division took on the added responsibility of the Mississippi river contract and commercial fishing section. Ten men were involved in this transfer. The commission felt that because the duties of these men were of a law enforcement nature, they should be transferred from the fish management division to the law enforcement division.

Overlooking Wisconsin and Mississippi rivers, Wyalusing State Park.

WARDENS' DUTIES

From his original status of purely a law enforcement officer the conservation warden operates on a wide field of varied conservation efforts that may apply to his area or district. He pinch hits when the need is to plant fish; when an emergency arises, he fights forest fires; he is called back into the country to consult with farmers about wild animal depredations and he is the local office of information on all conservation matters.

MODERN IMPROVEMENTS

There is a constant public demand for additional wardens but the policy of the division is to have the most effective law enforcement program with a minimum of personnel. This policy calls for the employment of the highest caliber men available to fill warden positions and to equip them with the best possible modern facilities to carry on their work. For example, it is much more economical to supply a warden with a two-way radio than it is to hire another warden—and just as effective from the law enforcement standpoint.

Twenty-five two-way FM radio sets have been installed in wardens' cars in this past biennium. This is in addition to the five original sets making a total of thirty units. These units are operated in conjunction with the

state highway traffic division, and we find that this equipment increases the efficiency of our warden force by one hundred per cent. He is constantly in touch with headquarters, so that all information can reach him at all times, thus being able to increase his percentage in the apprehension of violators where the public cooperates. By the same token he can dispense information from his automobile to the hunting and fishing public, thus providing better service for the people in this state. This equipment also provides a means whereby the area field supervisor has the necessary daily contact with his men, and as a result better supervision is obtained.

The division is making the best possible use of modern techniques applied to law enforcement. Guns and ammunition are examined by ballistics experts to determine whether or not certain ammunition has been fired from certain guns which are used in a violation. By getting this expert evidence, we are better able to prepare our cases for court and many cases are prosecuted which heretofor have not been brought into court due to lack of proper evidence. The division uses the services of the F. B. I. laboratories in the analysis of game and wild animals which determines the specie and the period of time which has elapsed since it was killed. These tests have proven highly successful in obtaining a higher percentage of convictions. A modern warden is no longer operating as an individual but is part of a highly developed law enforcement unit.

ARREST RECORDS

For the biennium ending June 30, 1948 department records reveal that 6,869 persons were arrested for violations of the game and fish laws. All fine money goes into the school fund and because of this fact the wardens' activities resulted in $155,176.22 in fines levied for conservation law violations.

DEER AND BEAR DAMAGE CLAIMS

Under a specified section of the statutes the conservation department is required to appraise and pay actual damage done by deer and bear to agricultural crops and livestock. The legislature appropriates annually from the conservation department fund $25,000 for the payment of deer and bear damage claims; however, it is necessary for the conservation department to petition the emergency board each year for more money due to the fact that the deer and bear damage claims have increased tremendously during the past few years.

As the result of wardens' surveys, deer and bear damage payments for the biennium have amounted to $93,837.78.

BEAVER CONTROL

The division has three permanent state beaver trappers on its payroll. A specified section of the law provides that whenever any property owner or lessee of any lands makes complaint in writing to the department relative to beaver damage, the department shall investigate and take action

On the open slope ski area, Rib Mountain State Park.

either by removing the beaver by dead trapping or by live trapping and restocking them in areas where they will do no harm. The beaver in the past biennium have been on the increase and as a result the damage complaints have also increased. It is the department's policy to try to keep a proper balance by having a short open season each year to keep down the beaver damage complaints and also to let enough seed stock remain, so that trappers can take advantage of a season each year.

The division has placed emphasis on the live trapping of beaver rather than the dead trapping, even though it involves more time and money, as we are of the firm conviction that we should save as many animals as we can, so that the general public can harvest these animals during the legal open season.

SPECIAL INVESTIGATIONAL SECTION

In the year 1947 the division created the above section which now consists of three seasoned enforcement officers. These men are assigned to work specifically in areas where acute enforcement problems arise and where the regular wardens are too well known to be effective. They deal entirely with the more important infringements on conservation laws. This is again in accord with the division's policy of aiming at the commercialized violators.

GREAT LAKES ENFORCEMENT (COMMERCIAL FISHING)

In addition to the enforcement problems within the land boundaries of Wisconsin, the department is charged with the enforcement of commercial fishing regulations on the Great Lakes wherein the state has jurisdiction. On Lake Michigan and Green Bay waters the department has a 43 gross ton steel patrol boat which is 50 feet long and equipped to patrol the Great Lakes water area. The water area of the Great Lakes wherein the state has enforcement jurisdiction is an area equal to approximately 1/11 of the size of the state land area.

The personnel in this section includes one supervisor who also acts as patrol boat captain and two patrol boat engineers. This patrol boat was purchased in 1941 at a cost to the state of $8,500 which was approximately one-half its original cost and at the time of purchase was only three years old. With proper care this boat will be able to give continued good service for another twenty-five years. This patrol boat was named the "Barney Devine" in memory of the former chief warden. It operates not only during the regular navigable season but through the winter months on Lake Michigan as well. To date this patrol boat and its crew have seized illegal gill nets which if placed end to end would stretch from the Illinois–Wisconsin border in Lake Michigan through the Great Lakes to the city of Superior on Lake Superior.

Information and Education

The primary function of the information and education division is to serve as a reliable source of public information in conservation matters relating to commission policies and department activities. Each year the demand for informational service increases. This has been especially true in the biennium following the close of the war. To attempt to meet this demand the methods employed are those which are accepted to best serve the public based upon what is believed to be a justifiable expenditure of funds available for this purpose.

In August 1948 the various sections engaged in informational and educational activities were organized into three sections: (1) recreational publicity, (2) information, and (3) education, and placed under the direct supervision of a superintendent of information and education. Prior to this time each of several sections operated independently under the general supervision of an assistant director. This step in organization was taken to provide full-time divisional supervision made necessary by increased activities; to facilitate coordination among the various sections directly engaged in this work and to better correlate the varied and extensive informational and educational services conducted by other divisions of the department.

The new organizational plan has only been in operation a few months as this report is written. It is expected it will expedite the work of this division as well as to point up the efforts of the whole department into a more unified program during the next biennium.

RECREATIONAL ADVERTISING

Wisconsin's recreational advertising and publicity program "to attract tourists from outside the state to this state" was in its eleventh and twelfth years of operation during the biennium. Promotional activities on a greatly accelerated basis during the second year of the biennium were implemented by the increased appropriation of $110,000 for 1947–48 as compared to $60,000 for 1946–47.

Display advertisements were scheduled to appear weekly during late April, May and June in travel pages of 28 metropolitan newspapers in Wisconsin's major zone of vacation appeal, the northcentral states, with most intensive coverage in the nearby Chicago area. Monthly ads also appeared from March through June in 12 outdoor and other magazines with large national reader coverage. A less extensive ad campaign was conducted during late August and early September to stimulate autumn vacation business.

Exhibits at out-of-state sport shows advertise Wisconsin's attractions for vacationers.

Because of the increased appropriation available in 1947–48, occasional feature sized ads and color ads were with our means for the first time. Ads of 3-column 10-inch size were scheduled to appear in special travel editions of newspapers. Magazine ads were 2-column 2-color instead of single column black-and-white as previously.

Proof of the inquiry pulling power of ads stressing Wisconsin's diversified vacation appeal is found in the 63,822 inquiries received during the 1947 season and the 79,953 requests for literature, maps, information and vacation planning assistance received during the 1948 season. June 22, 1948, set a new all-time record with 1,842 inquiries received in a single day!

As supplements to the extensive advertising program were newspaper articles and photographs featuring topics of seasonal outdoor interest regularly released throughout the biennium. Special events, festivals, pageants, summer regattas, winter frolics and the outstanding recreational attractions of the various vacation regions of our state received particular attention.

Other components essential to our well-rounded program to increase tourist patronage included prompt follow-up of all inquiries with packet

mailings of literature, fishing regulations and area guidance, lists of all regional organizations and also area literature when requested by inquirers or when necessary as a supplement to personal letters.

Colorful "woodsy" exhibits typifying outdoor Wisconsin were effectively presented at outdoor sports and travel expositions in St. Louis, Chicago, Des Moines and Minneapolis. Throngs of outdoor enthusiasts received vacation planning assistance at Wisconsin's booth and enjoyed our sound color motion pictures in exposition theaters.

Speaking engagements were filled at numerous meetings during the biennium. Profitable contacts were maintained by correspondence and by personal visits with outdoor editors, travel editors, travel agencies, motor clubs, railroads and bus lines, air lines and Lake Michigan steamship companies serving Wisconsin.

Summarized, all ethical and efficient advertising and promotional methods in keeping with available funds were employed to impress Wisconsin's outdoor recreational attractions and facilities upon the receptive minds of prospective vacation guests.

INFORMATION

Publicity

Conservation progress depends on public acceptance and conservation efforts involve information services to convey factual rehabilitation possibilities and step by step procedures to reach specific goals. Most conservation information reaches the public through day to day publicity that originates in two general ways. Press services cover conservation as part of their general function to report government news. The department makes whatever information it can available to these agencies and in addition issues weekly news releases that go to about 550 outlets.

Publicity material serves both newspapers and radio stations and much of it is used by out-of-state newspapers. Production of information services has increased through the last biennium but still has a long way to go to meet demand as there is a growing realization of the public interest in conservation affairs.

The department continued its "How's Fishing" service to the press during the last biennium, a service that carries answers from some 80 conservation wardens.

Much of conservation rests on a complicated set of natural rules and efforts continue to sketch these into simplified form for easier understanding. A step in this direction was the production of the booklet, "Some ABC's of Conservation."

Much of the news of conservation comes from the top level, the commission and department heads. More work is now being done to cover developments in the field. The latter effort is in need of considerable expansion but is time-consuming and is limited by the time that can be devoted to it.

Like in other department activities, the publicity section spends considerable time in meeting specific requests by individuals, organizations

and publications. The publicity section has also been operating as a safety division, compiling statistics on hunting accidents, and many requests come annually for this information.

Publications

The circulation of the Wisconsin Conservation Bulletin continued to increase in response to public demand. The printing for December 1948 was 44,800 copies.

For the sake of economy and efficiency, work was started to revise the Bulletin mailing list. A card was included with one issue, which recipients were invited to return if they wished to remain on the list. Revision on this basis should assure that no copies are missent, and that the Bulletin goes only to those who find it valuable enough so that they are willing to go to some trouble to obtain it.

Also in the interests of economy, second-class mailing privileges were obtained for the Bulletin, beginning with the June 1948 issue. This was made possible by recently-enacted Federal legislation promoted by the National Association of Conservation Education and Publicity. The change to second class reduced the postage rate to a fraction of its former cost; it saved Wisconsin about $300 a month on a 32-page bulletin with an edition of 37,000 copies, and correspondingly more on larger bulletins and a larger mailing list.

Various editorial changes were effected in an attempt to make the Bulletin serve the Wisconsin public more adequately. They included some changes in typography and makeup, a new cover design, and emphasis on brief and effective presentation of significant conservation information.

Activities Progress Report

This new publication was first issued on November 28, 1947 and periodically thereafter approximately once each month. Its primary purpose was to keep department personnel and key conservationists acquainted with the facts and details of project developments in all phases of the conservation program. One of its main features was a report on meetings of the Conservation Commission and this soon was expanded to include many other meetings such as those of the Wisconsin Conservation Congress.

Distribution of the Activities Progress Report during this biennium was limited to 1,700 copies or less to delegates of the Conservation Congress, daily newspapers, state legislators and interested conservationists as well as department personnel. The report was an experiment during the first six issues published during the biennium but was considered successful for the purpose intended as well as an in-service training medium and a department "house organ" to a limited extent.

Other Publications

Following an enforced lag during the war, the biennium brought increased production of other conservation publications, such as booklets and folders. Most of them were of general interest; many were tailored especially to meet the needs of two groups, school children and prospective tourists; a

few were designed to answer questions on specialties in the conservation field, such as fur farming or pheasant rearing.

Publications produced through the two year period included the WISCONSIN GAME FISH BOOKLET, WISCONSIN TROUT STREAMS, SEA LAMPREY, THE PHEASANT PROPAGATION HANDBOOK, WISCONSIN FOREST TREE NURSERY, WISCONSIN PHEASANT POPULATIONS, SOME ABC's OF CONSERVATION, AMONG THE WISCONSIN STATE PARKS AND FORESTS, WISCONSIN WILD FLOWERS (reprint), WISCONSIN WILDLIFE BIRDS (reprint), 20TH BIENNIAL REPORT BOOKLET, new folders for Wyalusing, Peninsula, Pattison state parks, and a color folder covering all state parks and forests; also the annual Wisconsin open water and ice fishing, hunting and trapping regulations and several small posters, stickers and forms.

Difficulties encountered included these: Paper was scarce during part of the biennium, and high-priced during the entire period; printing service was slow because of the demands of the postwar business boom and because of labor shortages. Although these problems remained to a considerable degree, there was substantial improvement in conditions during the two years.

EDUCATION

Visual Aids

During the past biennium the department's photographic section has attempted to organize a film library of subjects designed to effect a better understanding of the aims and accomplishments of this department. It is believed that every citizen should perhaps know more about forest production and protection, bird and animal habits, fish propagation and research, and other subjects of a similar nature, since these activities insure the future of the country's natural resources.

Scenic and recreational films have been made showing Wisconsin's fine fishing waters, state parks, canoe trips, winter sports and natural vacation areas. These reels are of interest to citizens of the state as well as the tourist public from other sections. All films and other visual aid material are offered free of charge to any interested groups, except transportation charges from and to Madison, Wisconsin.

Production and release of two new sound color films, "Protectors of the Outdoors", a law enforcement film and "Save Those Fish", a fisheries biology film was completed. Six prints of each of these films have been added to our library and are now in popular demand.

In addition several copies of five sound film subjects were purchased and made available for free distribution from our library. They are "Common Animals of the Woods", a 16 mm black and white sound film; "Grey Squirrel", 16 mm black and white sound film; "The Robin", a 16mm color sound film; "Trigger Happy Harry", a 24 minute 16mm color sound film dealing with safety in the use of firearms; "Realm of the Wild", a 16mm color sound film which has received national acclaim as one of the outstanding films of wildlife found in our National Forests.

The visual aids library now contains 377 reels of 45 different subjects, approximately 1/3 of these are colored, sound films. Reports of film, slide and display set showings totalled 11,708 for the biennium. Records of speeches delivered by department representatives are maintained in this section and show a total of 1,171 during the biennium; 845 used department movies with their talks.

The still photographic file contains over 11,000 black and white and 2,100 color transparencies of conservation subjects and scenic views about the state. Newspapers, magazines and state publications utilize these photographs, without charge. Our only requirement is the use of a department credit line with each reproduction printed.

Exhibits

Educational and public relation exhibits play an important part in the well organized conservation program. The strength of the exhibits lie in their interesting and attractive appeal and the fact the messages they impart are understood by thousands of state citzens; many who do not read or naturally are not too concerned about conservation activities.

The viewing and identifying of native game birds, animals, and fish; the opportunity to see still and motion pictures on conservation subjects; to become acquainted with conservation publications on display; also the personal contact with exhibit personnel at the booth all help to promote effective conservation education. Exhibits staged for county fairs, sportsmen clubs, and other municipal affairs also impart good public relations between sponsoring groups, the general public, and the conservation department.

The year 1947 was really the first big exhibit year after the war period, and included the following twenty-eight exhibit appearances at state events: Appleton Educational Show, All Wisconsin Sports Show at Madison, Milwaukee Centennial Sport & Travel Show, Oconto Falls Chamber of Commerce Educational Show, Jefferson County Boy Scout Show at Ft. Atkinson, School Safety Patrol Group, State Fair Park at Milwaukee, Oconto Sportsmen's Club Show, Beaver Dam School Group, Conservation Sport Show at Spooner, American Legion Sportsmen Celebration at Neillsville, American Legion Fourth of July Celebration at Evansville, Monroe County Fair at Tomah, Watertown Conservation Club Show, Neillsville American Legion Celebration, Lincoln County Fair at Merrill, Oneida County Fair at Rhinelander, Rusk County Fair at Ladysmith, Silver Lake 4-H Conservation Show at Scandinavia, Burlington Conservation Show, Clark County Fair at Neillsville, Superior Tri-County Fair, Badger State Sportsmen Show at La Crosse, Marinette County Fair at Wausaukee, Cassville Sportsmen Show, Argyle High School Educational Show, National Rabbit Fur Show at Milwaukee, Wisconsin State Teachers' Convention and exhibition at Milwaukee, and West Allis Y's Men Xmas Exhibition.

During the past year of 1948, which was the Centennial year throughout the state, there was an increased demand for department exhibit cooperation and it was necessary to turn down many show requests on account of conflicting dates. However, besides the big conservation show at the Wisconsin Centennial Exposition at West Allis State Fair Grounds, August 7 to 29, it was possible to stage thirty-seven conservation displays

within the state at rod and gun sport shows, county fairs, and community centennial celebrations during this year. These shows were: Crandon Sports and Home Show, Wisconsin Rapids Sports Show, Green Bay Sports Show, Waupaca Sports Show, Milwaukee Sentinel Sports & Vacation Show, Madison Sports & Vacation Show, Two Rivers American Legion Sports Show, Madison YMCA Indoor Circus, Sheboygan Sports & Auto Show, Beaver Dam YMCA Circus, Kenosha County Conservation Club Sports Show, Madison Centennial Parade, Delavan's Sportsman's Show, Evansville Fourth of G. I. Celebration, Cascade Centennial Exposition, Delavan Circus Centennial Parade, Wisconsin Spectacle of Music—South Milwaukee, Hollandale Community Club Festival, Northern Wisconsin District Fair—Chippewa Falls, Wisconsin Centennial Exposition—West Allis, Wisconsin Valley Fair —Wausau, Vilas County Sportsmen's Club Show at Eagle River, Rusk County Fair at Ladysmith, Tri-State Fair at Superior, Barron County Fair at Rice Lake, Polk County Fair at St. Croix Falls, Burnett County Fair at Grantsburg, Milwaukee Shade Tree Conference, Sawyer County Fair at Hayward, Sheboygan County Fair at Plymouth, Pierce County Fair at Ellsworth, VFW Potato Festival at Antigo, Vernon County Fair at Viroqua, Milwaukee State Druggist Convention, Argyle Home Coming and Fall Festival, Wisconsin State Teachers Convention at Milwaukee, West Allis Y's Men Christmas Celebration.

The highlight of the department exhibit program during the biennium was the two acre exhibit at the State Centennial Exposition at the State Fair Park, August 7–29, 1948. Here, through the cooperation of all department divisions, was presented in most effective style a real logging camp, bringing back the memories of the lumber industry that made Wisconsin famous; a miniature waterfalls in a state park and forest setting, historical dioramas, a small forest nursery, forest fire protection tower and equipment, and a display of wild animals and fish and waterfowl in their natural habitat.

Sponsoring organizations such as sportsmen clubs, county fair committees, and civic groups were obliged by commission order to pay a certain amount of the department exhibit costs—the furnishings of all evergreen and birch trim for pens and general staging, and paying one-half of department personnel traveling expenses, did not prove too excessive.

For most of the conservation shows that were staged during 1947 and 1948, the department exhibit section employed a 96 foot display of game animal and birds in a rustic northwoods setting of evergreen and white birch trim. For the larger events such as the Milwaukee Sentinel, Chippewa Falls, and Madison Sport Shows, a live game fish display was added. Educational displays, occupying from 20 to 30 foot space, and featuring commercially manufactured back-drops with large photo blow-ups, color translites, continuous slide and sound motion picture projection, and a literature and information counter, were employed for shows not calling for the more elaborate game animal and bird installations.

New exhibit equipment made possible during the biennium included one new set of animal and bird pens, one twenty foot exhibit booth, and one 1½ ton truck. Plans were made during the latter part of 1948 for a new exhibit headquarters and storage building to be located at the experimental game and fur farm at Poynette.

Governor Rennebohm and a department representative with the three top winners in the third annual Rahr conservation scrapbook contest, in which 10,000 Wisconsin boys and girls participated.

Education

During the biennium the education section continued to provide conservation information and to carry on projects and programs with interested individuals and groups. As in previous years, special attention was directed to conservation education in the schools. Thousands of requests were received from teachers and pupils who are sent publications and materials on various phases of conservation.

Since the Department of Public Instruction is charged with the responsibility of administrating the law requiring conservation education in schools, the education section works in cooperation with state superintendent's office. Conferences were held between personnel of the two departments to determine the best methods and procedure to be used.

During the biennium the supervisor of the conservation education section served as consultant for the State Resources Committee in Conservation. This committee has prepared a resource unit on soil, water, forests, wildlife, minerals and scenic resources. This unit will be a valuable aid to teachers in Wisconsin schools.

In recognition of the importance of teacher training institutions in the success of the conservation education program, conferences were held with instructors; talks and demonstrations made before student-teacher classes; motion pictures were shown, exhibits displayed and source materials recommended. As in previous years new publications were sent to the libraries of these schools. Not only department literature was supplied but also those available from other agencies as well.

The education section was represented at various educational committee meetings, conferences, institutes and conventions. As in previous years, the department participated in the exhibit and the conservation sectional meeting at the state teachers' convention in Milwaukee.

The Wisconsin Conservation Bulletin is sent to every school in the state. A special section "Conservation and the Wisconsin Teacher" is presented in each issue during the school year with the objective of providing helpful information for those teaching conservation.

A state-wide conservation scrapbook contest was conducted by the education division in cooperation with radio station WHA and the Department of Public Instruction. Thousands of Wisconsin boys and girls participated during the 1946–47 and 1947–48 school terms. Five hundred of the best scrapbooks were sent each year to the department for judging. The contest is being repeated again this year. Prizes totalling $1000.00 annually for the contest were provided by former commissioner Guido Rahr.

Junior conservation clubs and 4H, F. F. A., Boy Scouts, Girl Scouts and other youth groups engaged in conservation projects and programs were assisted by the education section through conferences with club leaders and officers; organization planning; program planning of general interest and projects of special local interest; talks; motion picture showings and in various other ways. The supervisor as in previous years, participated in special camps for rural youth.

The education section assisted in the planning and programming for several adult groups at the Trees for Tomorrow Conservation Camp at Eagle River, namely, The Citizens Conservation Camp, The Wisconsin Press-Association Meeting, The Conservation Leadership Camp for Educators, the Lake States Conference on Conservation Education and Publicity and others.

The activities of this section included talks and motion picture showings before conservation clubs, service clubs, women's organizations and other groups as in previous years.

The education section assisted in various in-service training programs conducted for department personnel.

As will be noted in the biennial report, educational activities are not limited to any one section or division of the conservation department—rangers, foresters, wardens, park custodians, fishery, game and other personnel all carry on educational work with the public in their territories.

The chief objective of the department's educational program is to bring to our citizens an understanding of the problems affecting our natural resources and the remedial activities carried on to meet these problems. To attain this objective presents a real challenge. To meet this challenge the work in this field must continue to expand in the future.

Clerical

The clerical division serves all branches of the Conservation Department and through it funnels most of the department's contacts with people who have business with the state relative to outdoor management and recreational promotion.

The division receives about 1,200 pieces of mail daily, routing it to the proper destinations and then handling the replies that much of the mail necessitates. Conservation Department personnel operates in all areas of the state and much of the contact between headquarters and field men is by mail.

One of the big jobs of the division is the duplication of a great amount of literature, such as commission orders and a varied list of reports and information services. New equipment was added during the biennium to facilitate this work and the department now operates with mimeograph, graphotype, addressograph and the general state offset press, as well as a ditto machine. With the close of the era of scarcity, wornout typewriters and other equipment have been replaced. Several gathering racks and a large stapling machine have been acquired to make it possible to assemble bulky material.

Members of the division serve as secretaries to the many activity heads of the department.

The chief clerk of the division, Lydia S. MacKenzie, formerly served as assistant secretary of the conservation commission and, as part of the clerical division, supervised the work of the license, accounting, and records activities. During the biennium these activities were reorganized.

At the request of Mrs. MacKenzie, and on recommendation of the Director, the commission in March of 1948 separated the two positions of chief clerk and assistant secretary of the commission because of the increased workload of both assignments. Mrs. MacKenzie continues as assistant secretary of the commission and Miss Lulu Korn, Tomahawk, who was chief clerk of the forest protection division, was named as chief clerk of the department's clerical division. The finance division took over all accounting, records and license work.

To assure effective, uniform performance, the clerical division operates with the aid of a clerical manual, and the fifth edition of this manual was prepared and issued in 1946 by Mrs. MacKenzie, as were all previous editions. The division manual has been used by a number of other state departments that handle heavy stenographic workloads.

The business of the clerical division has shown a rapid growth from year to year as interest in outdoor problems attract more people and as the crowd that fishes, hunts and traps swells. The increased interest has meant an overwhelming demand for information of an endless variety.

Finance

1946–47

	*Adjusted Fund Balance 7-1-46**	*Plus: Net Receipts 1946-47*	*Minus: Total 1946-47 Expenditures Through 10-31-47*	*Plus: Transfers*	*Minus: Transfers*	*Balance Forwarded To 1947-48*
Fish and Game	$ 708,248.26	$ 1,786,576.57	$ 1,768,325.58		(a)$ 25,000.00	$ 701,499.25
Deer Feeding and Deer Yard Acq.	13,928.28	95,725,88	63,709.26			45,944.90
Public Hunting and Fishing Grounds	346,134.29	213,321.13	187,400.70			372,054.72
C. W. C. A.—Black River Falls	9,364.05	27,454.64	28,578.19			8,240.50
C. W. C. A.—Meadow Valley	5,490.65	3,287.10	5,030.73			3,747.02
C. W. C. A.—Northern Cons. Lands	5,316.38	1,092.46	10.00			6,398.84
Recreational Advertising						
Rough Fish Control	24,410.43	224,416.14	197,959.36			50,867.21
Forestry:						
Forestry	511,939.02	1,607,334.06	1,127,183.73		(b) 175,094.05	
					(c) 150,000.00	666,995.30
Southern Wisconsin Forests	188,031.82		117,926.35	(c)$ 150,000.00		220,105.47
County Forestry Aids	4,905.95		179,944.78	(b) 175,094.05		55.22
Forestry Reserve Fund	300,000.00					300,000.00
Bear and Deer Damage	15,416.02		34,616.50	(a) 25,000.00		5,799.52
Raccoon Propagation	11,818.31	5,836.50	138.81			17,516.00
Parks	29,054.00	36,877.69	35,940.48			29,991.21
Total Conservation Fund	$ 2,174,057.46	$ 4,001,922.17	$ 3,746,764.47			$ 2,429,215.16

(a) Transfer for Deer and Bear Damage in accordance with statutes.
(b) County Forest Aids in accordance with statutes.
(c) Transferred to Kettle Moraine in accordance with statutes.
*Cash balance less 1945–46 and prior fiscal year expenditures made during 1946–47 and 1947–48 fiscal years adjusted to provide base for reporting complete transactions affecting one fiscal year to closing date. (NOTE: 1946-47 fiscal year books formally closed October 31, 1947.)

RECEIPTS

Fish and Game

	Gross Receipts	Less: Refunds	Net 1946-47 Receipts
Fish			
Nonresident Fishing Licenses	$ 596,379.22		
Nonresident 10 Day Family Fish. Lic.	41,803.70		
Resident Fishing Licenses	375,588.06		
Nonresident Fish Shipping Coupons	6,463.70		
Sportsmen's Licenses	46,962.00		
Miscellaneous Fishing			
Clamming Licenses	305.00		
Duplicate Licenses	1,035.75		
Fish Dealer Licenses	3,250.00		
Great Lakes Commercial Fishing Licenses	9,580.50		
Mississippi River Comm. Fishing Licenses	5,748.25		
Set Line Licenses	3,998.15		
Slat Net Licenses and Tags	1,617.50		
Sturgeon Tags	479.65		
Game			
Resident Hunting Licenses	326,953.80		
Nonresident Hunting Licenses	53,275.00		
Deer Tags	91,370.00		
Trap Tags	50,852.28		
Trapping Licenses	24,915.00		
Beaver Trapping Licenses and Pelt Tags	70.00		
Pittman-Robertson Receipts	37,108.57		
Miscellaneous Game			
Deer Farm Licenses	3,218.85		
Fur Dealer Licenses	8,969.00		
Fur Farm Licenses	8,550.77		
Game Farm Licenses	768.25		
Fur Auctioneer Licenses	250.00		
Occupational Tax—Mink	1,784.71		
Shooting Preserve Licenses	315.00		
Nonresident Archer Licenses	3,820.00		
Settlers' Hunting Licenses	470.00		
Miscellaneous			
Confiscations and Seizures	48,567.19		
Interest	1,387.94		
Guide Licenses	1,030.00		
Christmas Tree Dealer Licenses	5,522.21		
Fire Loss	1,698.90		
Taxidermist Licenses	575.00		
Sundry	35,545.94		
Less: 1946-47 Refunds		$ 13,653.32	
Total	$1,800,229.89	$ 13,653.32	$1,786,576.57

RECEIPTS

Deer Feeding and Deer Yard Acquisition Receipts

	Gross Receipts	*Less: Refunds*	*Net 1946-47 Receipts*
Deer Tags	$ 91,370.00	$ 219.00	$ 91,151.00
Sale of Deer Feed	4,574.88		4,574.88
Total	$ 95,944.88	$ 219.00	$ 95,725.88

Public Hunting and Fishing Ground Receipts

Resident Hunting Licenses	$ 181,876.00	$ 434.50	$ 181,441.50
Sportsmen's Licenses	31,955.63	76.00	31,879.63
Total	$ 213,831.63	$ 510.50	$ 213,321.13

C. W. C. A.—Black River Falls

Sale of Hay	$ 21.00		
Sale of Moss	2,221.50		
Sale of Wood, Timber and Lumber	24,887.14		
Miscellaneous	325.00		
Total	$ 27,454.64		$ 27,454.64

C. W. C. A.—Meadow Valley

Sale of Hay	$ 39.00		
Sale of Minnows	169.21		
Sale of Moss	1,952.70		
Sale of Wood, Timber and Lumber	1,038.19		
Miscellaneous	88.00		
Total	$ 3,287.10		$ 3,287.10

C. W. C. A.—Northern Conservation Lands

Sale of Hay	$ 550.55		
Sale of Wood, Timber and Lumber	540.91		
Miscellaneous	1.00		
Total	$ 1,092.46		$ 1,092.46

Rough Fish Control Receipts

Sale of Rough	$ 189,515.95		
Commissions on Sale of Rough Fish	26,735.81		
Miscellaneous	8,164.38		
Total	$ 224,416.14		$ 224,416.14

Forestry Receipts

Fire Suppression Receipts	$ 5,843.87		
4/5 Severance Tax	55,133.82		
Timber Sales	19,647.32		
2/10 Forestry Mill Tax	1,162,410.28		
Kettle Moraine Receipts	6,870.84		
State Forest Roads	24,014.20		
Sale of Equipment	19,052.89		
Miscellaneous			
Sundry Receipts	6,930.13		
Cancelled Checks	395.55		
Clarke–McNary Receipts	307,035.16		
Total	$1,607,334.06		$1,607,334.06

Bear and Deer Damage Receipts

Raccoon Propagation Receipts

Raccoon Tags	$ 6,033.00	$ 196.50	$ 5,836.50
Total	$ 6,033.00	$ 196.50	$ 5,836.50

Park Receipts

	Gross Receipts	*Less: Refunds*	*Net 1946-47 Receipts*
Rentals, Concessions, Etc.	$ 25,103.37		
Golf Receipts	11,774.32		
Total	$ 36,877.69		$ 36,877.69
GRAND TOTAL	$4,016,501.49	$ 14,579.32	$4,001,922.17

EXPENDITURES

Fish and Game

		1946-47 Expenditures Through 10-31-47
Administration		
Administrative	$ 74,129.18	
Office Rent	7,148.16	$ 81,277.34
Finance		8,567.69
Parks		113,719.12
Law Enforcement		
Enforcement	450,041.15	
Beaver Control	9,809.73	
Patrol Boat	11,324.89	471,175.77
Game Management		337,415.86
Fish Management		
Administration	16,470.56	
Propagation	371,792.63	
Biology	91,125.50	
Rough Fish Control	60,000.00	
Great Lakes Commercial Fishing	10,168.36	549,557.05
Information and Education		
Public Relations	16,117.27	
Education	4,683.53	
Exhibits	4,328.65	
Photographic	8,175.56	33,305.01
Pittman-Robertson		59,132.13
Special Revolving Funds		
Baby Trout	1,055.75	
Horicon Marsh	16,276.48	
Mississippi River Outlying Waters	3,293.57	20,625.80
Miscellaneous and Other		
Land Purchase	5,344.78	
State Retirement Pensions	3,686.10	
Compensation Awards	2,966.86	
Unemployment Compensation	5,222.78	
Board of Deposits	2,162.96	
Fire Loss	1,800.75	
Printing	42,007.83	63,192.06
Bounties		30,357.75*
Total		$1,768,325.58
Deer Feed and Deer Yard Acquisition		63,709.26
Public Hunting and Fishing Grounds		187,400.70
C. W. C. A.—Black River Falls		28,578.19
C. W. C. A.—Meadow Valley		5,030.73
C. W. C. A.—Northern Conservation Lands		10.00
Rough Fish Control		197,959.36

*Amount expended for repayment of ½ Fox Bounties to General Fund.

EXPENDITURES

Forestry

		1946-47 Expenditures
Administration		
Administrative	$ 54,616.62	
Office Rent	5,334.60	$ 59,951.22
Finance		7,425.41
Forest Protection		617,953.12
Suppression		13,095.80
State Forests and Nurseries		
State Forest and Nurseries	218,843.50	
Southern Wisconsin Forests	117,926.35	336,769.85
Cooperative Forestry		
Cooperative Forestry	75,257.06	
County Forests	179,944.78	255,201.84
Information and Education		
Public Relations	9,002.95	
Photographic	5,186.96	14,189.91
Forestry Research Products		
Forest Insect Research	6,554.14	
Blister Rust	4,350.50	
Tree Disease Control	9,398.35	
Soil Research	6,249.33	26,552.32
Land Purchase		54,233.80
Miscellaneous and Other		
Miscellaneous	3,291.21	
Compensation Awards	1,087.66	
Unemployment Compensation	10,856.39	
Timber Harvest	140.42	15,375.68
State Forest Roads		24,305.91
Total		$1,425,054.86
Bear and Deer Damage		34,616.50
Raccoon Propagation		138.81
Parks		35,940.48
GRAND TOTAL		$3,746,764.47

REFORESTATION FUND

1946–47

	Adjusted Fund Balance 7-1-46	Plus: Receipts 1946-47	Minus: Total 46-47 Expenditures Through 10-31-47	Plus: Transfers	Minus: Transfers	Balance Forwarded To 1947-48
Reforestation	$37,773.70	$29,798.26	$ 38.88			$67,533.08
Total	$37,773.70	$29,798.26	$ 38.88			$67,533.08

RECEIPTS

1946–47

Reforestation Fund

	Gross Receipts	Less: Refunds	Net 1946-47 Receipts
Nursery Stock	$ 28,325.99	$ 218.58	$ 28,107.32
Island Leases and Rentals	1,667.00		1,667.00
Interest on Bank Deposits	23.85		23.85
GRAND TOTAL REFORESTATION FUND	$ 30,016.84	$ 218.58	$ 29,798.17

EXPENDITURES

1946–47

Reforestation Fund

	1946-1947 Expenditures
Reforestation	$ 38.88
Total	$ 38.88

GENERAL FUND

1946–47

	Appropriation or Allotment	Minus: 1946-47 Expenditures	Balance
Forest Crop			
Administration	$ 3,959.31	$ 3,756.23	$ 203.08
Payment to Towns	190,000.00	189,898.30	101.70
Bounties	130,496.00	130,496.00	
Recreational Publicity	60,354.15	59,513.71	840.44
Total	$ 384,809.46	$ 383,664.24	$ 1,145.22

1947–48

	Balance Forwarded From 1946-47	Plus: Net 1947-48 Receipts	Minus: Total 1947-48 Expenditures Through 10-31-48	Plus: Transfers	Minus: Transfers	Balance Forwarded To 1948-49
Fish and Game	$ 701,499.25	$ 2,208,912.18	$ 2,143,704.81		(a)$ 6,750.44 (d) 25,000.00 (e) 165,235.00	$ 569,721.18
Deer Feeding and Deer Yard Acq.	45,944.90	104,111.03	86,351.15			63,704.78
Public Hunting and Fishing Grounds	372,054.72	226,367.99	258,897.68	(a)$ 6,750.44		346,275.47
C. W. C. A.—Black River Falls	8,240.50	23,497.97	20,798.28			10,940.19
C. W. C. A.—Meadow Valley	3,747.02	2,525.40	4,913.95			1,358.47
C. W. C. A.—Northern Cons. Lands	6,398.84	1,447.17				7,846.01
Recreational Advertising		50,000.00	49,999.82			.18
Rough Fish Control	50,867.21	188,362.86	208,740.88			30,489.19
Forestry:						
Forestry	666,995.30	1,744,406.82	1,445,919.66		(b) 150,000.00 (c) 179,944.78	635,537.68
Southern Wisconsin Forests	220,105.47		201,089.96	(b) 150,000.00		169,015.51
County Forestry Aid	55.22		179,900.59	(c) 179,944.78		99.41
Forestry Reserve Fund	300,000.00					300,000.00
Bear and Deer Damage	5,799.52	35,000.00	59,221.28	(d) 25,000.00		6,578.24
Raccoon Propagation	17,516.00	4,272.00	4,908.36			16,879.64
Parks	29,991.21	41,669.27	203,427.28	(e) 165,235.00		33,468.20
Total Conservation Fund	$ 2,429,215.16	$ 4,630,572.69	$ 4,867,873.70			$ 2,191,914.15

(a) Adjusting for Public Hunting and Fishing Grounds (Civil Action) receipts erroneously credited to Fish and Game Fund.
(b) Transferred to Kettle Moraine in accordance with statutes.
(c) County Forest Aids in accordance with statutes.
(d) Transfer for Deer and Bear Damage in accordance with statutes.
(e) Transfer for Park Purposes in accordance with statutes.

RECEIPTS

Fish and Game

	Gross Receipts	*Less: Refunds*	*Net 1947-48 Receipts*
Fish			
Nonresident Fishing Licenses	$ 683,834.39	$ 8,752.43	$ 675,081.96
Nonresident 10 Day Family Fishing Licenses	56,010.30	933.30	55,077.00
Resident Fishing Licenses	660,046.81	1,575.80	658,471.01
Nonresident Fish Shipping Coupons	4,608.30	572.10	4,036.20
Sportsmen's Licenses	67,476.00	138.00	67,338.00
Miscellaneous Fishing			
Bank Pole Licenses	93.25		93.25
Cisco Licenses	561.00		561.00
Clamming Licenses	220.00	10.00	210.00
Duplicate Licenses	596.50	* 2.00	594.50
Fish Dealer Licenses	3,250.00		3,250.00
Great Lakes Commercial Fishing Licenses	12,261.75		12,261.75
Mississippi River Comm. Fishing Licenses	4,719.75		4,719.75
Private Fish Hatchery Licenses	162.65		162.65
Set Line Licenses	3,133.15	36.00	3,097.15
Slat Net Licenses and Tags	1,931.00		1,931.00
Sturgeon Tags	719.80	.20	719.60
Game			
Resident Hunting Licenses	321,357.80	991.01	320,366.79
Nonresident Hunting Licenses	77,260.00	40.00	77,220.00
Deer Tags	99,772.00	164.50	99,607.50
Trapping Licenses	10,105.07	39.60	10,065.47
Trap Tags	17,485.81	78.18	17,407.63
Beaver Trapping Licenses and Pelt Tags	22,980.50	9,633.00	13,347.50
Pittman–Robertson Receipts	31,624.46		31,624.46
Miscellaneous Game			
Deer Farm Licenses	1,888.15	2.10	1,886.05
Duplicate Licenses	596.50	2.00	594.50
Fur Auctioneers Licenses	250.00		250.00
Fur Dealer Licenses	5,601.00		5,601.00
Fur Farm Licenses	5,891.84	9.00	5,882.84
Game Farm Licenses	746.49		746.49
Occupational Tax—Mink	2,984.00		2,984.00
Shooting Preserve Licenses	778.25		778.25
Miscellaneous			
Confiscations and Seizures	47,727.39		47,727.39
Interest	27,084.17		27,084.17
Guide Licenses	926.00	6.00	920.00
Christmas Tree Dealer Licenses	5,002.16	5.00	4,997.16
Scientist Certificates	24.00		24.00
Taxidermist Licenses	590.00		590.00
Fire Loss	823.33	122.00	701.33
Cancelled Drafts	434.91		434.91
Sundry	50,465.92		50,465.92
Total	$2,232,024.40	$ 23,112.22	$2,208,912.18

RECEIPTS

Deer Feeding and Deer Yard Acquisition Receipts

	Gross Receipts	Less: Refunds	Net 1947-48 Receipts
Deer Tags	$ 99,772.00	$ 162.50	$ 99,609.50
Sale of Deer Feed	2,514.07		2,514.07
Sale of Products—Deer Yards	2,002.46	15.00	1,987.46
Total	$ 104,288.53	$ 177.50	$ 104,111.03

Public Hunting and Fishing Ground Receipts

Resident Hunting Licenses	$ 178,510.00	$ 552.29	$ 177,957.71
Sale of Buildings	1,747.00		1,747.00
Sportsmen's Licenses	45,757.28	95.00	45,662.28
Sale of Buildings	641.00		641.00
Civil Action Receipts	360.00		360.00
Total	$ 227,015.28	$ 647.29	$ 226,367.99

C. W. C. A.—Black River Falls

Sale of Moss	$ 3,890.00		$ 3,890.00
Sale of Wood, Timber and Lumber	19,520.84		19,520.84
Miscellaneous	87.13		87.13
Total	$ 23,497.97		$ 23,497.97

C. W. C. A.—Meadow Valley

Sale of Hay	$ 30.50		$ 30.50
Sale of Moss	1,334.90		1,334.90
Sale of Wood, Timber and Lumber	575.11		575.11
Miscellaneous	584.89		584.89
Total	$ 2,525.40		$ 2,525.40

C. W. C. A.—Northern Conservation Lands

Sale of Hay	$ 886.30		$ 886.30
Sale of Wood, Timber and Lumber	500.37		500.37
Miscellaneous	60.50		60.50
Total	$ 1,447.17		$ 1,447.17

Recreational Advertising Receipts

Highway Fund—Advertising Wisconsin	$ 50,000.00		$ 50,000.00
Total	$ 50,000.00		$ 50,000.00

Rough Fish Control Receipts

Sale of Rough Fish	$ 162,019.67		$ 162,019.67
Commission on Sale of Rough Fish	16,156.18		16,156.18
Miscellaneous Receipts	10,187.01		10,187.01
Total	$ 188,362.86		$ 188,362.86

Forestry Receipts

Fire Suppression Receipts	$ 6,637.80	$	$ 6,637.80
4/5 Severance Tax	63,852.24		63,852.24
Timber Sales	1,149.63	50.00	1,099.63
2/10 Forestry Mill Tax	1,304,794.29		1,304,794.29
Kettle Moraine Receipts	10,113.60		10,113.60
State Forest Roads Receipts	22,126.76		22,126.76
Sale of Equipment	9,732.18		9,732.18
Miscellaneous			
Withdrawal of Forest Crop Lands	47.82		47.82
Timber Harvest Receipts	300.00		300.00
Sundry Receipts	11,445.92		11,445.92
Clarke-McNary Receipts	314,256.58		314,256.58
Total	$1,744,456.82	$ 50.00	$1,744,406.82

Forestry Receipts (Continued)

Bear and Deer Damage Receipts

	Gross Receipts	*Less: Refunds*	*Net 1947-48 Receipts*
Emergency Board Advance	$ 35,000.00		$ 35,000.00
Total	$ 35,000.00*		$ 35,000.00

Raccoon Propagation Receipts

Raccoon Tags	$ 4,562.75	$ 290.75	$ 4,272.00
Total	$ 4,562.75	$ 290.75	$ 4,272.00

Park Receipts

Rentals, Concessions, Etc.	$ 28,985.57		$ 28,985.57
Golf Receipts	12,683.70		12,683.70
Total	$ 41,669.27		$ 41,669.27
GRAND TOTAL	$4,654,850.45	$ 24,277.76	$4,630,572.69

*Includes $20,000.00 in 1947–48 receipts received in 1948–49.

EXPENDITURES

Fish and Game

		1947-48 Expenditures Through 10-31-48
Administration		
Administrative	$ 17,419.21	
Office Rent	8,894.54	$ 26,313.75
Clerical		72,981.84
Finance		58,458.61
Law Enforcement		
Enforcement	544,652.60	
Beaver Control	10,013.88	
Patrol Boat	15,331.15	569,997.63
Game Management		404,694.78
Fish Management		
Administration	10,237.31	
Propagation	512,914.23	
Biology	65,887.95	
Rough Fish Control	30,000.00	
Great Lakes Commercial Fishing	10,192.79	629,232.28
Information and Education		
Administration	3,163.65	
Public Relations	35,739.41	
Education	4,979.20	
Exhibits	14,466.65	
Photographic	9,161.68	67,510.59
Pittman-Robertson		125,328.90
Special Revolving Funds		
Baby Trout	2,113.70	
Horicon Marsh	14,449.64	
Miscellaneous Outlying Waters	4,153.08	20,716.42
Miscellaneous and Other		
Printing	49,436.55	
Transfer Adjustment Account	5,545.51	
Transfers to General Fund	6,000.00	
Parks	196.27	
Rivers Survey	873.04	
Land Purchase	3,609.80	
State Retirement Pensions	3,669.54	
Compensation Awards	1,584.16	
Unemployment Compensation	6,135.58	
Insurance on Bank Deposits	2,304.37	
Fire Loss	682.93	80,037.75
Bounties—Fox		27,159.75*
Wisconsin Retirement Contributions		61,272.51
Total		$2,143,704.81
Deer Feeding and Deer Yard Acquisition		86,351.15
Public Hunting and Fishing Grounds		258,897.68
C. W. C. A.—Black River Falls		20,798.28
C. W. C. A.—Meadow Valley		4,913.95
Recreational Advertising		49,999.82
Rough Fish Control		208,740.88

*Amount expended for repayment of ½ Fox Bounties to General Fund.

EXPENDITURES

Forestry

		1947-48 Expenditures Through 10-31-48
Administration		
Administrative	$ 10,611.91	
Office Rent	6,800.88	$ 17,412.79
Clerical		35,429.00
Finance		8,112.13
Forest Protection		778,926.13
Suppression		68,117.91
State Forests and Nurseries		
State Forests and Nurseries	266,257.45	
Southern Wisconsin Forests	201,089.96	467,347.41
Cooperative Forestry		
Cooperative Forestry	101,788.27	
County Forests	179,900.59	281,688.86
Information and Education		
Public Relations	11,951.27	
Photographic	9,574.77	21,526.04
Forestry Research Projects		
Forest Insect Research	8,828.66	
Blister Rust	7,521.07	
Tree Disease Control	15,102.83	
Soil Research	13,740.27	45,192.83
Land Purchase		47,965.86
Miscellaneous and Other		
Miscellaneous	3,392.03	
Transfer Adjustment Account	6,525.14	
Transfer to Reforestation Fund	18,448.40	
Compensation Awards	1,719.75	
Unemployment Compensation	12,504.82	
Timber Harvest	348.25	29,888.11
State Forest Roads		25,303.14
Total		$1,826,910.21
Bear and Deer Damage		59,221.28
Raccoon Propagation		4,908.36
Parks		203,427.28
GRAND TOTAL		$4,867,873.70

REFORESTATION FUND

1947–48

	Balance Forwarded From 46-47	*Plus: Receipts 1947-48*	*Minus: Total 47-48 Expenditures Through 10-31-48*	*Plus: Transfers*	*Minus: Transfers*	*Balance Forwarded To 1948-49*
Reforestation	$67,533.08	$72,426.78	$11,377.12			$128,582.74
Total	$67,533.08	$72,426.78	$11,377.12			$128,582.74

RECEIPTS

1947–48

Reforestation Fund

	Gross Receipts	*Less: Refunds*	*Net 1947-48 Receipts*
Nursery Stock	$ 37,425.35	$ 445.00	$ 36,980.35
Island Leases and Rentals	1,744.00		1,744.00
Interest on Bank Deposits	59.19		59.19
Timber Sales	26,294.45	25.00	26,269.45
Land	7,373.79		7,373.79
GRAND TOTAL REFORESTATION FUND	$ 72,896.78	$ 470.00	$ 72,426.78

EXPENDITURES

1947–48

Reforestation Fund

	1947-1948 Expenditures
Reforestation	$ 11,377.12
TOTAL	$ 11,377.12

GENERAL FUND

1947–48

	Appropriation or Allotment	*Minus: 1947-48 Expenditures*	*Balance*
Forest Crop			
Administration	$ 4,280.00	$ 3,539.11	$ 740.89
Payment to Towns	190,000.00	189,772.73	227.27
State Parks	84,489.63	79,202.58	5,287.05
Bounties	127,547.00	127,547.00	
Recreational Publicity	61,105.74	55,390.47	5,715.27
Wildcat Mountain	75,000.00	9,879.37	65,120.63
Total	$ 542,422.37	$ 465,331.26	$ 77,091.11