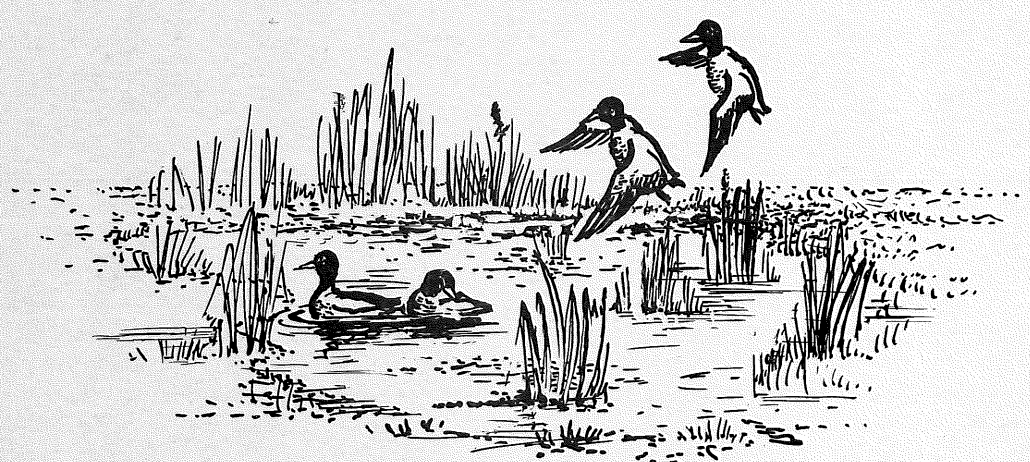
Wildlife Management Plan

WETLANDS
of the
CHIPPEWA National Forest
MINNESOTA



FOREST SERVICE—U.S. DEPARTMENT OF AGRICULTURE cooperating with BUREAU OF SPORT FISHERIES AND WILDLIFE—U.S. DEPARTMENT OF INTERIOR and MINNESOTA DEPARTMENT OF CONSERVATION

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The Minnesota Department of Conservation participated in the initial planning of the inventory. L. R. Jahn of the Wildlife Management Institute was helpful in all phases of the work. The project was initiated and generally supervised by J. E. Mathisen, Wildlife Staff Assistant on the Chippewa National Forest.

PREFACE

The objective of this wetlands management plan is to provide basic information and guidelines needed for a development program on the Chippewa National Forest, Minnesota. It describes the various wetland types, their importance, and their potential for habitat improvement, based on a wetland inventory completed in the spring of 1965.

The wetland resource is vital to the American public. Wetland habitats can be improved; the response by wildlife, especially waterfowl, is immediate and measurable. Impoundments will reduce flood hazards by holding water in the upper parts of watersheds. Yields of fish, waterfowl, other wildlife, and wild rice can be increased substantially. The wild rice resource is one of the economically important industries to the local people. Annual crops of wild rice provide them substantial incomes from harvesting, processing, and marketing this delicacy to local and distant consumers.

Waterfowl and other migratory birds are important to the national economy. Originating in a fixed geographic locality, they provide recreational opportunities for people all the way along the waterfowl flyways.

The Chippewa National Forest could become a model demonstration area to stimulate and guide similar efforts on other public, or private lands. Here are public lands, intensively managed for multiple use; wood, water, outdoor recreation, and wildlife.

One of the greatest contributions that the Chippewa National Forest can make toward meeting public needs is through development of the Forest's wetland resource.

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WETLANDS OF THE

CHIPPEWA NATIONAL FOREST

MINNESOTA

THE NEED

Highest waterfowl breeding densities have occurred geographically in the Prairie Provinces of Canada. The general woodland habitat, has been assigned a relatively unimportant position from the standpoint of waterfowl production. Recently, however, the woodland habitat has received a "second look" as drainage of prairie wetlands continues to remove prime production habitat from the waterfowl flyways. Periodic droughts in the low-rainfall prairie region, compounded by the effects of drainage, have had catastrophic effects on waterfowl populations. Wetlands within the wooded region, however, have not been drained to the same extent as in agricultural areas, and water tables and run-off do not fluctuate as in the prairies. The difference between production from the two zones is less than originally thought.

The Chippewa National Forest occupies an important position in the Mississippi Flyway. It lies immediately adjacent to the prairie pothole region and is characterized by a great variety and abundance of lakes and wetlands. Many of these wetlands are now unattractive to waterfowl. They can be substantially improved through management and development.

Wetlands associated with larger lakes can also be improved for fish spawning. Controlling water levels in suitable wetlands is effective in providing spawning habitat for northern pike, for example.

Wetland development involves other resources and activities on the Forest. Chief among these are recreation, flood control, wild rice production, fisheries, furbearers and the aesthetic value associated with wildlife of all kinds. Wetland improvement is often compatible with other Forest uses, in many cases beneficial.

THE INVENTORY

The inventory and evaluation of wetlands on the Chippewa were accomplished in accordance with an approved plan. Specific techniques are described in the Wetland Inventory and Evaluation Plan (Appendix).

The inventory consisted of mapping, measuring, and classifying wetlands on the 642,138 acres of National Forest land within the Chippewa National Forest. Plans are to complete a similar survey of the 671,649 acres of private as well as other public lands within the Forest.

Acetate overlays were made on aerial photos showing location, type, and size of wetlands (Figure 1). Wetlands were typed according to the classification system established by the U. S. Fish and Wildlife Service (Figures 2-11). Field checking was done to determine accuracy of photo interpretation, and to determine waterfowl breeding-pair use of wetlands.

Every wetland over 2 acres was given a number. Potential impoundment sites, acquisition needs, and other data were recorded. Full use was made of existing data, such as the timber management inventory and the National Forest Recreation Survey. The location and acreage of wetland Types 6 (Shrub Swamp), and 7 (Wooded Swamp) were already available from the 1960 timber management inventory. Inventory data on lakes over 10 acres had been compiled as part of the National Forest Recreation Survey.

THE WETLAND RESOURCE

A summary of wetland composition on the Forest's eight Ranger Districts is presented in Table 1 (Appendix). It includes only wetlands in excess of 2 acres. Smaller potholes, although important for duck production, are difficult to inventory. An additional 2,500, acres, mostly Type 2, were estimated to occur.

There are 642,138 acres of government land administered by the Chippewa National Forest. Of this, 154,141 acres, or 24 percent, are designated as wetlands. There are 8.2 wetlands, or 161.6 acres, per square mile. In addition, there are 332,513 acres of lakes, 10 acres or larger in size, within the Forest. Of this total, 45,600 acres adjacent to National Forest lands are classed as primary waterfowl production habitat. There is also an additional 1,446 acres of stream habitat. Lake and stream data are presented in Table 2 (Appendix).

Primary waterfowl production habitat, as it presently exists, comprises the acreage of Type 3, 4, and 5, the peripheral zone of lakes (one-eighth mile strip), and streams. The acres of these types in National Forest ownership follow:

PRIMARY PRODUCTION HABITAT

Type	Shallow Marsh (3)	Deep Marsh (4)	Open Water (5)	Lake-Shore	Streams	Total
Acres	4,042	3,026	1,209	45,600	1,446	55,323

Secondary habitat includes wetland Types 2, 6, and 8. Much of this can be improved through management. A substantial acreage is in these types, as follows:

SECONDARY PRODUCTION HABITAT

Type	Sedge Meadow (2)	Shrub Swamp (6)	Bog (8)	Total
Acres	23,982	38,023	4,251	66,256

The remaining 79,608 acres of Type 7 (Wooded Swamp) is of minor significance for waterfowl, except that much of the temporary run-off occurs in this type during the waterfowl courtship period. It is preferred mallard habitat under these conditions. This type is important to many upland-game species, such as deer, woodcock, and grouse.

Approximately 27 percent of the wetland acreage is primary production habitat and requires only limited development. Secondary habitat comprises 34 percent and provides the major opportunity for improvement and management to bring it into sustained production. Opportunities for development are limited in the 39 percent of wetlands in wooded swamp. Little development or improvement work has been planned in this type.

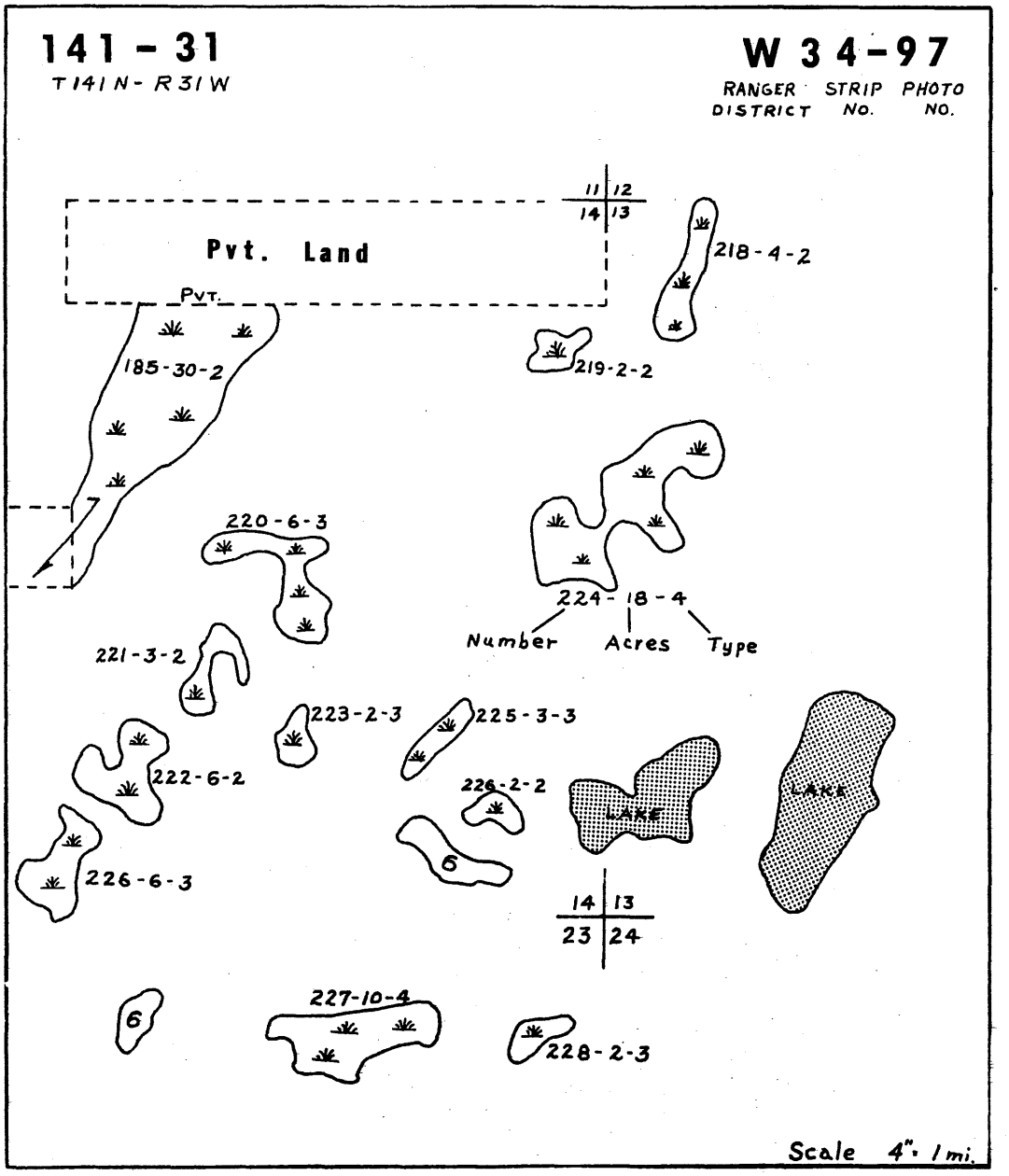

Figure 1. Sample Aerial Photo Overlay. National Forest ownership was inventoried to determine distribution and composition of wetlands. Overlays of aerial photos show location, size, and type of each wetland. The inventory provides the basis for an accelerated development program.

Figure 2. Type 2-Sedge Meadows. Little or no open water. Usually of little importance to waterfowl without management. Impounding water or blasting potholes will increase value considerably. Management potential is high. Sedge meadows in conjunction with lakes make excellent pike spawning areas if they can be flooded. Chippewa National Forest has 24,000 acres of this type.

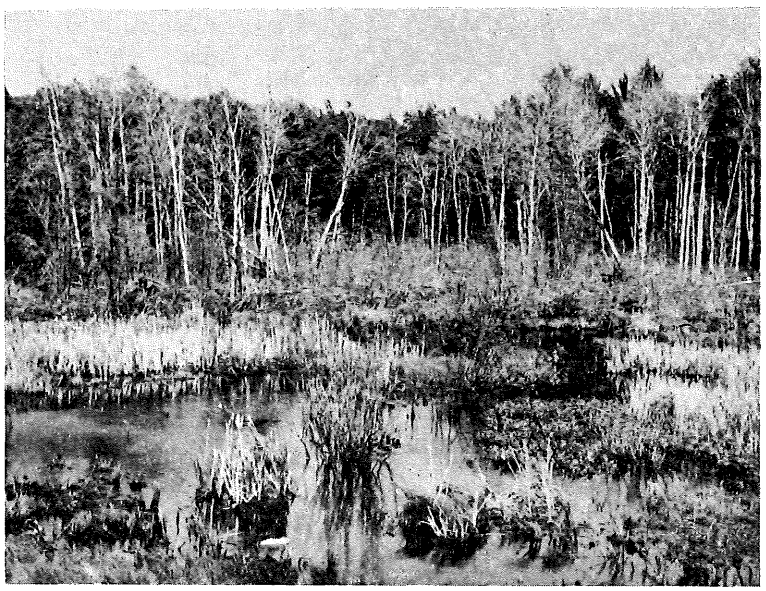

Figure 3. Type 3-Shallow Marsh. In most years they retain water until mid-summer, but frequently dry up before brood-rearing is completed. Used extensively by breeding pairs. This type can sometimes be improved by water level control to increase depth. Often used as pike spawning habitat if connected to pike lakes. There are 4,042 acres of this type on the Chippewa.

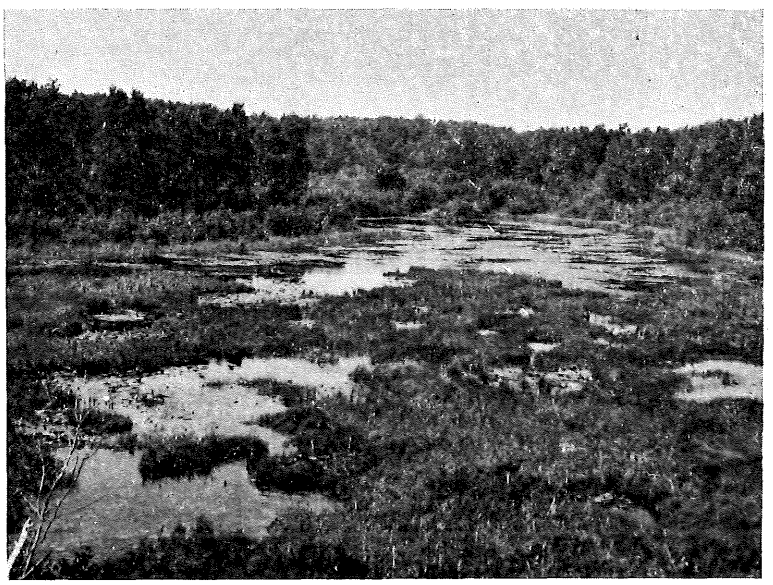

Figure 4. Type 4-Deep Marshes. Wetlands containing surface water through August. This type is especially important as brood-rearing and feeding habitat. Water level management is usually not required except for periodic drawdown when possible. Duck nesting boxes and platforms will increase the productivity of this type. The Chippewa has 3,026 acres of deep marsh.

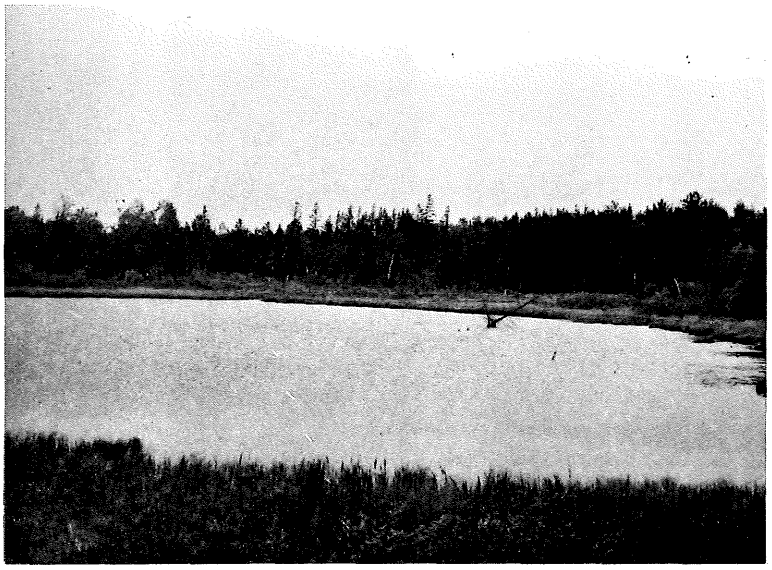

Figure 5. Type 5-Open Water. Emergent vegetation is restricted to a narrow belt around the edge which may be a floating mat composed of sedges. This type is often used by broods, although brood cover is not usually well interspersed. Open water areas over 10 acres in size are classed as lakes. There are 1,209 acres on the Chippewa National Forest.

Figure 6. Type 6-Shrub Swamps. Waterfowl use is low unless open areas occur within the dense thickets. Removing portions of dense growth by blasting, burning, or other means will improve this type for waterfowl. Increasing water depth by damming will convert this to a more productive wetland for waterfowl and fish. Chippewa has 38,023 acres.

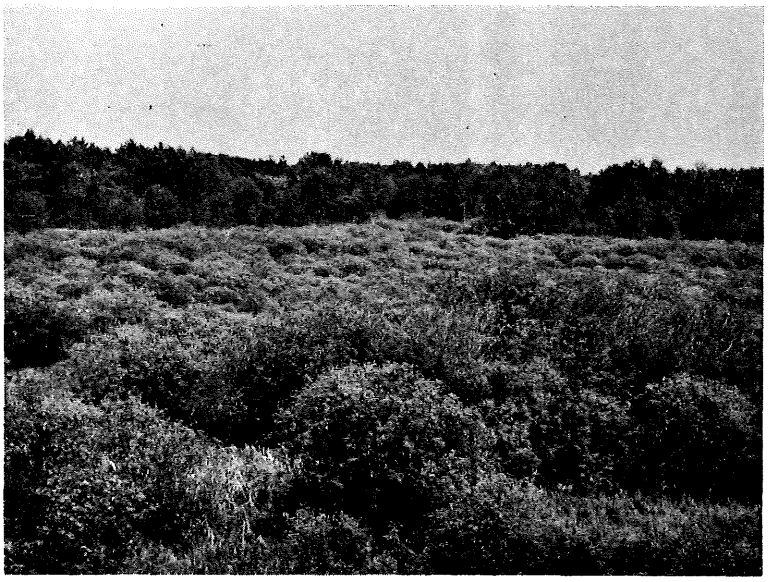

Figure 7. Type 7-Wooded Swamps. Two general timber types are involved, conifer swamp and lowland hardwoods. The wooded swamps are usually of limited value as waterfowl production habitat, although some mated pair use is evident in the spring. Management potential is limited. There are 79,608 acres on the Chippewa N.F.

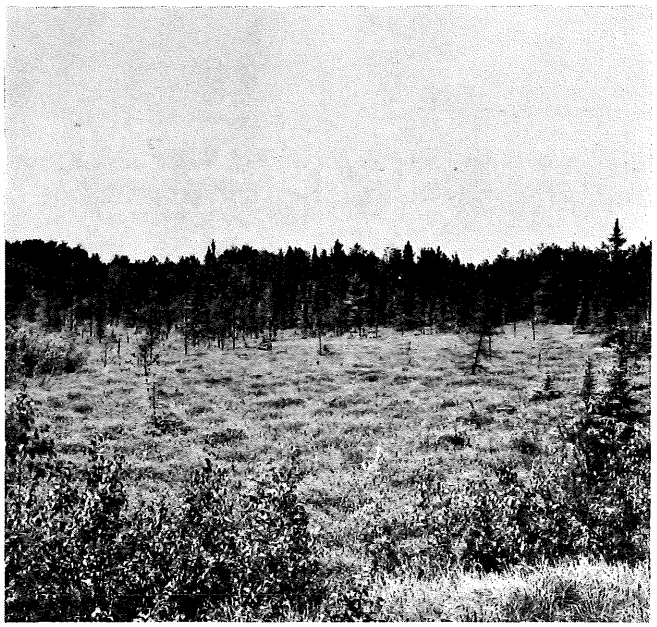

Figure 8. Type 8-Bogs. This type has low waterfowl value and management potential is limited. One important exception is the ring-necked duck which often breeds in bog types if open water is present. The Chippewa has 4,251 acres.

Figure 9. Lakes. The major portion of lakes provides little production habitat. A narrow band around the edge is used for brood-rearing if emergents are present. Wild rice production is important. There are 570 miles of lakeshore administered by the Chippewa National Forest.

Figure 10. Streams. Slow moving streams and associated ox-bows are often used as brood-rearing habitat. Wood ducks, in particular, are attracted to woodland streams. There are 241 miles of streams flowing through National Forest lands on the Chippewa.

Figure 11. Woodland Pothole. Wetlands less than 2 acres in size were not inventoried, although they are important units of habitat in wet years.

THE WATERFOWL RESOURCE [1/]

Species Composition: Knowledge of the species composition of the breeding waterfowl population is essential in a development program because of the variability in habitat requirements of the species.

The present status of the various species was determined by combining data from several sources. Visibility and timing biases are probably involved, but are considered minor. The wetland inventory crew provided field observations on 510 breeding pairs. State Biologists working on selected lakes and game management areas within the Forest provided another 138 observations; 29 pairs were observed on the Dora Lake Administrative Study area, bringing the total observations on breeding pairs to 677. The relative abundance of the six major species is shown below:

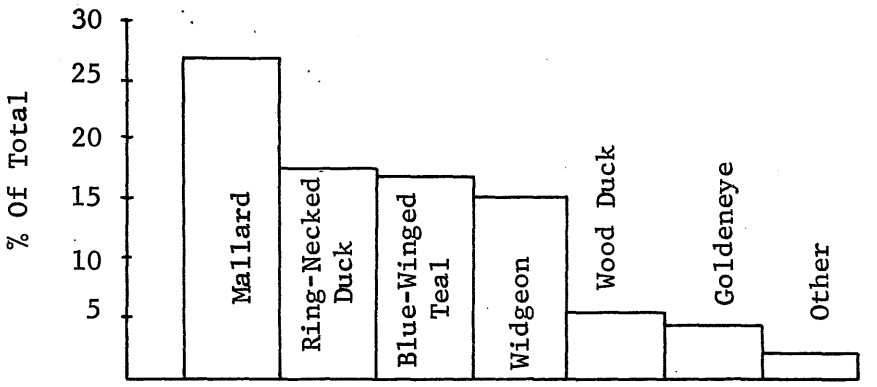

Figure 12. Species Composition of Waterfowl on the Chippewa National Forest. Based on brood counts on selected lakes, 1965.

Breeding Population: Breeding-pair counts taken in 1965 by the inventory crew, State Biologist, and the Forest Biologist can also be used to estimate the waterfowl breeding population. Pair use on the three major types of habitat is indicated below:

Type of Habitat	Pairs Observed/Unit of Habitat	Habitat Available (N. F. Lands Only)	Estimated Population
Lake Shoreline	7 prs./mile	570 miles	4,000
Streams	6 prs./mile	241 miles	1,400
Wetlands (Types 3, 4 & 5)	47 prs./100 acres (50% occupied)	8,277 acres	2,000
		Total pairs	7,400
		Ducklings	22,200

1/ For a detailed discussion and analysis of this material refer to: Mathisen, John; 1965, The Breeding Population of Waterfowl on the Chippewa National Forest, Unpublished Report presented at the 27th Midwest Wildlife Conference.

Expanding these data to include National Forest ownership would indicate a breeding population in 1965 of approximately 7,400 pairs. In addition, an unknown and probably substantial number were using the temporary wetlands. This was an important segment of breeding-pair habitat in 1965 because of the heavy spring precipitation and run-off. The primary wetlands would undoubtedly have received more intensive use had there been fewer temporary water areas, raising the population estimate considerably. Waterfowl populations in the Mississippi Flyway also were generally low in 1965. The indicated pairs would produce approximately 22,200 ducklings, assuming 50 percent nesting success and an average brood size of 6 ducklings. An estimate of the total breeding population for the entire Forest area can be estimated when inventory data are available for non Forest Service land. It will probably increase the estimate by about 60 percent based on land ownership. It should be emphasized that these figures are presented only to indicate the general magnitude of the waterfowl population. Actual numbers will vary considerably from year to year. Further studies may indicate the need for adjusting the data presented here.

Habitat Requirements: Waterfowl require a variety of habitat types for optimum production. (Figure 13) Most species are highly territorialistic, and the "space factor" for establishing breeding territories can be a limiting factor. Nesting sites vary with the species. Mallards, for example, are extremely adaptable and nest successfully in a variety of situations, including artificial structures. Wood ducks and goldeneyes, however, normally nest in tree cavities. Ringnecks prefer sedge mats, and are particularly attracted to small islands. Blue-winged teal and widgeon nest in grassy, open upland sites.

Brood habitat of good quality must be in close proximity to territorial and nesting sites for maximum productivity. Wetlands utilized for brooding purposes must retain open water through the brood-rearing period. Habitat suitable for courtship and nesting can be a trap for ducks if permanent brood habitat is not available within the "community" of wetlands.

IMPROVING THE WETLAND HABITAT

Improving wetland habitat for wildlife production is not a new endeavor on the Chippewa National Forest. All types of development described in this plan (with the one exception of prescribed burning in shrub swamps) have been accomplished during recent years. They have been primarily demonstrational because of financial limitations, yet they provide the experience and basic knowledge for an accelerated program. The various types of development techniques are described below (Figures 14-19):

Impoundments: Low head, low hazard dams can be constructed to convert sedge meadows and shrub swamps to productive marshes. In many cases abandoned beaver flowages can be economically reclaimed with a simple spillway and dike. Impoundments are especially productive because of their potential for water level manipulation and drawdown allowing the control of aquatic vegetation and the release of basic soil nutrients.

Impoundments will provide most of the habitat needs for many species. The response of waterfowl to new impoundments is well documented and encouraging.

Pike Spawning Areas: This type of development is also an impoundment although managed differently. Complete drawdown is essential during the summer to promote regrowth of semi-aquatic vegetation. Spawning areas already developed on the Chippewa produce thousands of northern pike annually with a moderate investment. In most cases, spawning areas will provide habitat for ducks as well as fish.

Blasting: Blasting with ammonium nitrate-fuel oil mixture is an economical and effective method of producing surface water for courtship and breeding purposes. Sedge meadows and shrub swamps lacking impoundment potential can be improved in this manner. Blasting potholes in the vicinity of deep marshes and open water areas will increase their production. Blasting and impounding water in a coordinated and carefully planned manner can produce extremely productive water complexes or communities. A good example is the Dora Lake Multiple Use Demonstration Area where breeding pair activity was increased from essentially none to at least 29 pairs. The response occurred immediately after development.

Long-term studies on the Tamarac National Wildlife Refuge, Minnesota, have shown 90 percent occupancy of reclaimed potholes by breeding pairs. Blasted potholes in a Maine marsh increased the breeding-pair population from 4 pairs to 14 pairs.

Prescribed Burning: The conversion of dense shrub swamps to more productive and manageable types can be accomplished by prescribed burning. Burning also releases nutrients, making highly productive habitat for waterfowl. Herbicides can be used also to open up vegetation-choked marshes.

Nesting Boxes: Providing nesting boxes for wood ducks and goldeneyes is an effective method of increasing the productivity of these two important species. Breeding density and increased nesting success of goldeneyes have been documented by the Minnesota Conservation Department on the Blackduck District of the Chippewa.

Goldeneyes annually occupy 70 percent of the nesting boxes placed on Chippewa lakes. The occupancy of wood duck boxes is also well documented from other areas. Wood ducks and goldeneyes account for 11 percent of the breeding population on the Chippewa.

Nesting Islands and Platforms: Studies have indicated the importance of islands and platforms for nesting waterfowl. Many of the open water wetlands have a floating sedge mat as a perimeter. Pieces of this mat can be removed and anchored in open water to provide nesting sites. This management technique is especially important for the ring-necked duck, an important breeder on the Chippewa. The technique is new and has not been fully evaluated in terms of increased production. Artificial platforms placed over water provide predator-free nesting sites for mallards. They are economical to construct and are readily used.

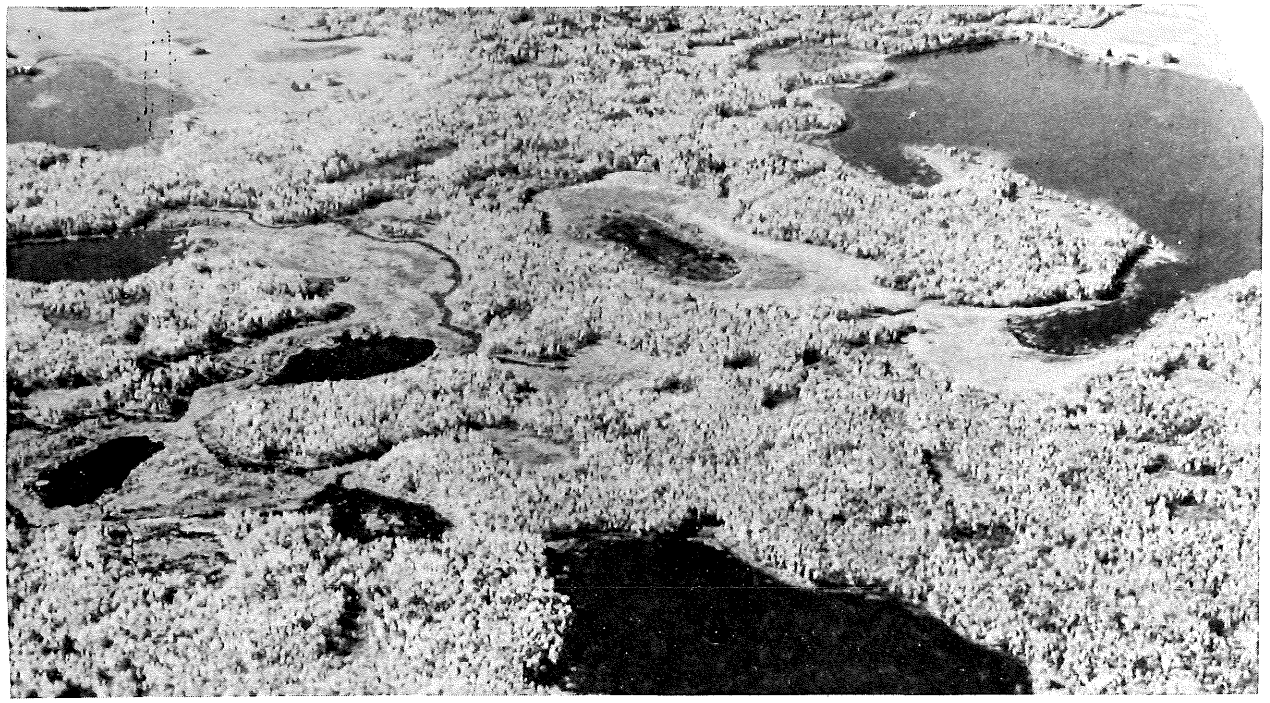

Figure 13. Waterfowl require a variety of wetland types. Habitat management will provide the conditions necessary for optimum production. The wetland inventory shows where development is needed.

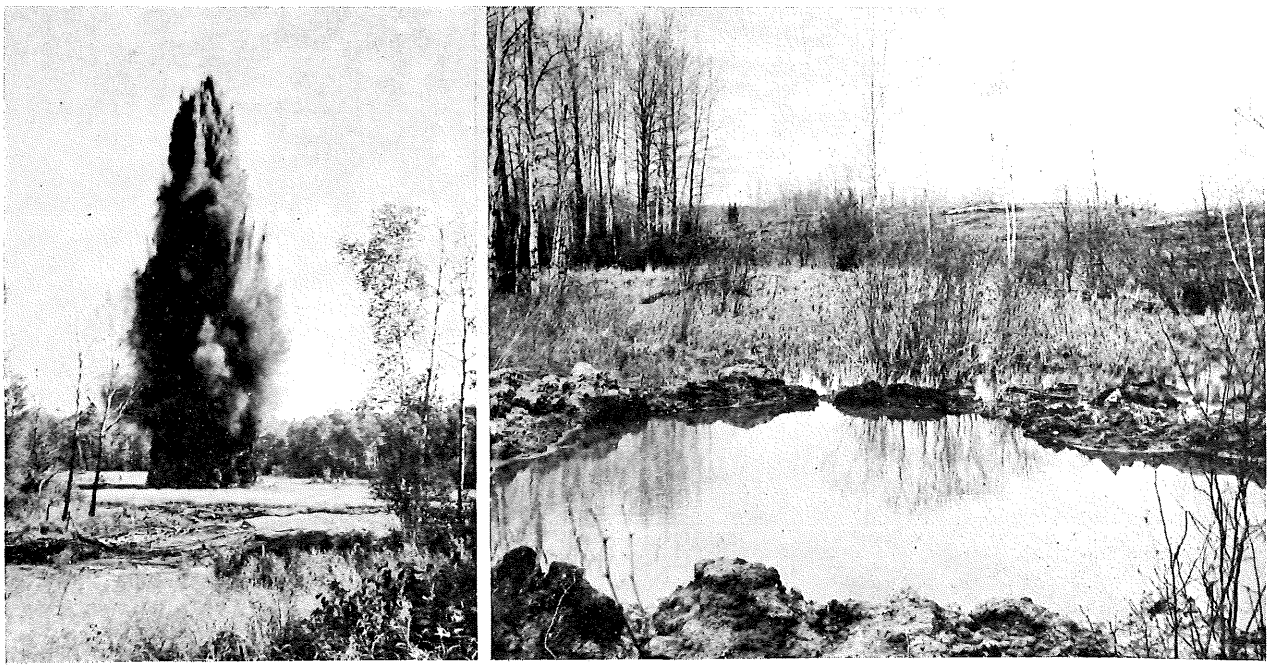

Figure 14-15. Blasting: This improvement technique provides additional breeding territories for waterfowl. There are almost 24,000 acres that can be improved in this manner on the Chippewa National Forest.

Figure 16. Impoundments: Dams to convert sedge meadows and shrub swamps to more productive types. There are 150 impoundment sites involving 9,500 acres on the Chippewa National Forest.

Figure 17. Nesting Boxes: Readily used by goldeneye and wood duck, which comprise 11 percent of the population. They increase nesting success and reduce mortality.

Figure 18. Nesting Islands: Sedge mat islands provide nesting sites for ring-necked ducks. Pieces of the floating mat are removed and anchored in open water.

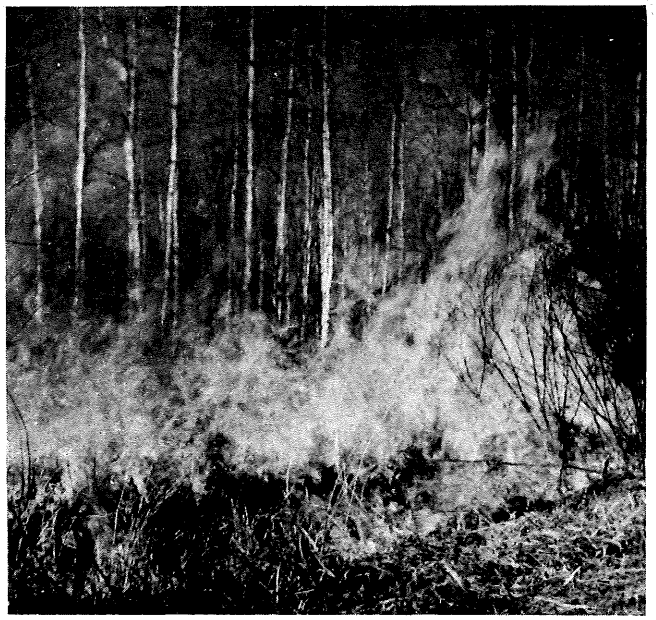

Figure 19. Prescribed Burning: Removing dense stands of shrubs in swamps by controlled burning increases their potential for waterfowl.

OTHER BENEFITS OF DEVELOPMENT

In addition to the primary objective of increasing waterfowl and fish populations, there are other benefits to be derived from the development of wetlands. (Figures 20-21)

Other Wildlife: Additional water areas produced by flooding and blasting will improve habitat conditions for a number of important fur-bearing mammals and upland game species. The Bald Eagle, our national emblem and perhaps a vanishing species will benefit from wetland development. The Chippewa National Forest is a major nesting area for this species. Aquatic environment is an essential habitat requirement.

Flood Control: Impoundments will retain surface water on the watershed improving ground water conditions and preventing the immediate discharge of spring precipitation and run-off, helping to alleviate downstream flooding.

Fire Control: The flooding of sedge meadows for waterfowl impoundments will reduce the most hazardous fire condition on the Forest, and will reduce the need for meadow burning as a fire prevention measure. Blasted potholes can serve as water sources for firefighting. They have already served for prescribed burnings.

Wild Rice: Some impoundments will provide additional areas for wild rice production, a million dollar a year business on the Chippewa. Wild rice can be seeded in suitable areas and improve the area for ducks as well. In an average year, about 40-50 pounds of green rice is harvested per acre and can be sold for $.50-$1.00 per pound. Rice harvesting is regulated by the State. Permits are issued to the public.

Figure 20. Wetland development will result in increased waterfowl production, providing additional recreation opportunities in the Mississippi Flyway.

Figure 21. Many resources will benefit from development. Wild rice is a crop which provides substantial income to local residents.

DEVELOPMENT POTENTIAL

Criteria for Development: The following criteria were used for estimating development potential and cost. The data are based on the factual information provided by the wetland inventory and the experience to date on improvement projects within the Chippewa National Forest.

The average cost per acre for impoundments is $55, except for the larger areas where the per-acre cost is usually reduced. The amount and acreage of impoundments and pike-spawning areas are based on known potential sites. Some of these may be dropped after further consideration, but other sites will undoubtedly be found.

Blasting potential is based on all Type 2 acreage (Sedge Meadows), minus those which can be flooded by impoundments. In addition, 20 percent of Type 6 (Shrub Swamp) acreage is considered suitable for blasting. One 15 x 35-foot hole per acre at a cost of $16 is considered sufficient.

The potential for nesting box development was estimated by assuming that every 2 acres of Type 4 and 5 (including acres produced by impoundments) would accommodate one box, and each mile of lake and stream shoreline would accommodate 5 boxes. Cost per box is $10 including installation.

Approximately 50 percent of the Shrub Swamp (Type 6) acreage is considered suitable for prescribed burning, at $15 per acre.

There is an estimated potential of 1,000 floating nesting islands at $10 each, and 500 nesting platforms at $25 each, including installation.

Overhead cost is estimated at 20 percent of the project cost.

Ranger District Impacts: The distribution of project work on a Ranger District basis is shown in Table 3 (Appendix). The greatest potential for wetland development is on the Bena and Remer Ranger Districts (Figure 22). Primary habitat is low in relation to secondary habitat on the Bena District in particular, indicating a high priority area for development. Blackduck and Cass Lake Districts have the lowest potential with present landownership, although there is a real need for additional primary habitat. Dora Lake District should receive high priority for development. The potential is high; the need is great.

Cut Foot Sioux and Walker Districts have the most productive situation for habitat types, although there is much opportunity for improvement. Marcell District also has a good representation of primary habitat, but many of the lakes are deep and rocky with sparse shoreline vegetation. This indicates the need for additional brood habitat. Approximately 12 percent of the secondary habitat on Marcell District is Bog (Type 8), basically unproductive. Many of the Open Water (Type 5) wetlands are also associated with bogs and lack basic fertility. Additional production units are needed.

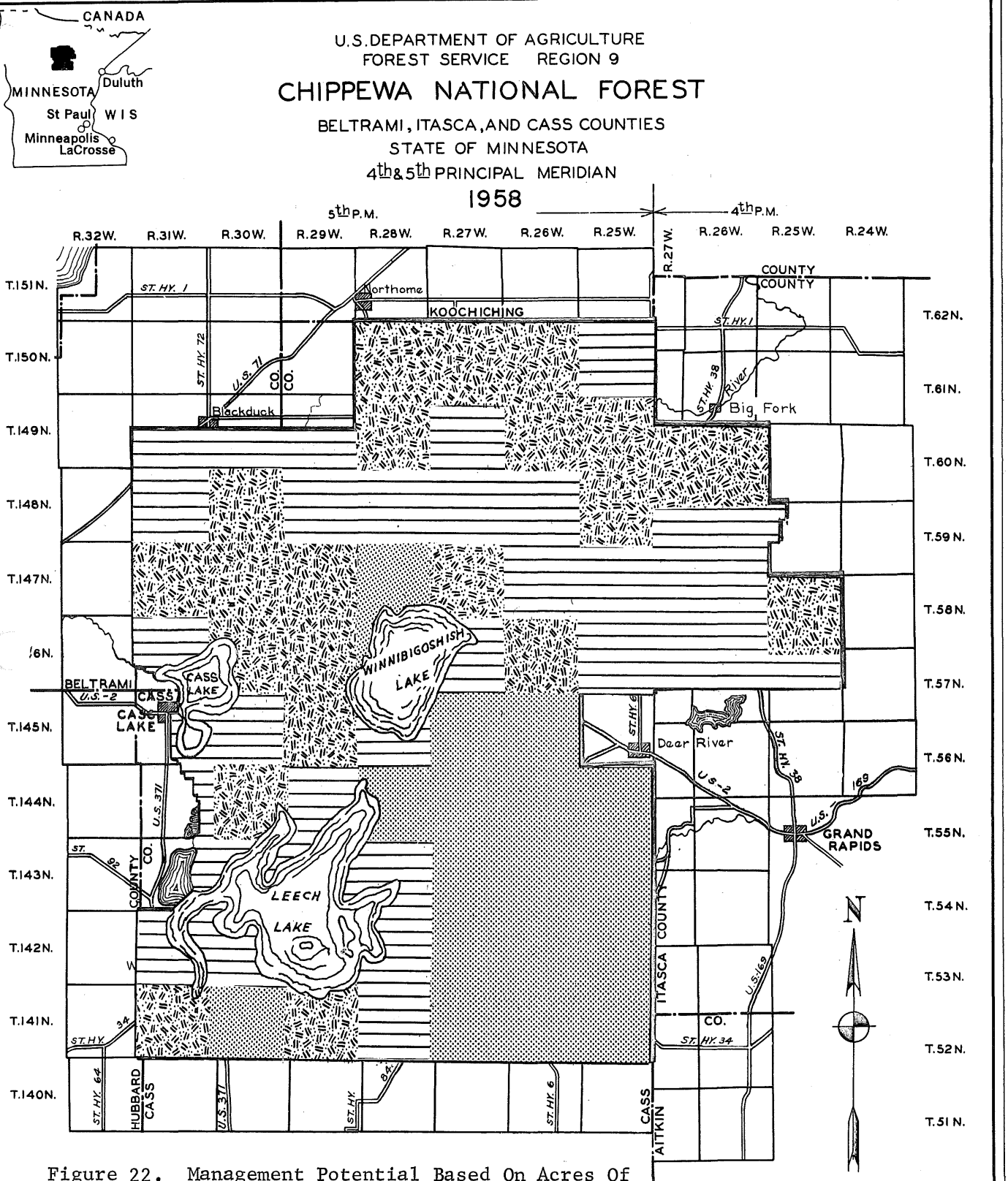

Figure 22. Management Potential Based On Acres Of National Forest Wetlands Per Township

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CALCULATED RESPONSE OF WATERFOWL

If the developments are provided as planned, what response by waterfowl can be expected? How many additional ducks can the Chippewa accomodate as a result of habitat improvement? Answers can be estimated by applying the breeding-pair figures observed on existing wetlands, and the known response on selected development sites, to the additional acres and units provided by management.

The expected intensity of use resulting from practices applied directly to wetlands is indicated below:

Type Of Development	Expected Annual Use	Units Available For Improvement	Breeding-Pairs Accommodated at Various Levels of Occupancy		
			50%	70%	100%
Impoundment	47 prs./100 acres	7,500 acres	1,700	2,500	3,500
Blasting	1 pr./Pothole	23,700 acres	11,800	16,600	23,700
Burning	47 prs./100 acres	18,900 acres	4,400	5,900	8,900
		Total Pairs	17,900	25,000	36,100
		Ducklings	53,700	75,000	108,300

The improvements would accommodate the additional breeding pairs of waterfowl as indicated. The rate of occupancy will vary with the total Flyway population, water conditions, and other factors. About 50 percent of the wetlands containing surface water were occupied in 1965. Duckling yield is based on 50 percent nesting success and an average brood of six.

In addition to the above response, nesting success and breeding-pair density will be increased by nesting boxes, islands and platforms. The magnitude of this response is difficult to predict, but if overall nesting success is increased by only 10 percent, a significant increase in duckling production will result. The estimated returns from this type of habitat improvement are indicated below:

Type of Development	Expected Occupancy	Units Available For Improvement	Breeding Pairs Accommodated
Goldeneye Houses	70%	5,680	4,000
Wood Duck Houses	25%	5,000	1,200
Islands & Platforms	50%	1,500	750
		Est. Total Pairs	6,000
		Ducklings	18,000

WETLAND DEVELOPMENT PROGRAM

There are 50,000 acres of wetland on the Chippewa National Forest that can be improved for waterfowl. This is roughly 76 percent of the 66,256 acres of secondary habitat presently producing little or nothing in the way of wildlife. The overall development cost of such a program is approximately 1.3 million, or $27 per acre (Appendix 3).

Present wetland acquisition programs in Minnesota, by various public agencies, are costing an average of $55 per acre. Average cost of development has been an additional $45 per acre.2/ This would bring the total cost to about $100 per acre. The Chippewa project will result in improvement of 50,000 acres of waterfowl habitat. The cost of acquiring and improving similar habitat is calculated to be 5 million dollars.

Although the dollar value of a duck is difficult to determine, in terms of what a hunter is willing to pay, an estimate can be applied on the basis of an average cost of the shooting preserve duck, which is $5.00. This could be considered "market value." Using this figure, the potential annual value of waterfowl resulting from habitat improvement would be between $358,000 and $631,000. Assuming improvements will last 20 years, and duck production remained constant, the waterfowl value to the hunter would fall between 7.1 and 12.6 million dollars.

The potential value of the increased wild rice crop can also be estimated. Assuming that only 20 percent of the 7,500 acres of developed impoundments will produce wild rice, the average annual harvest would be 60,000 pounds (40 pounds per acre). If the average price for green rice remains at about 50 cents per pound, the annual crop would be worth $30,000 to the local harvesters. In 20 years the impoundments will have provided an income of $600,000. The "finished" rice will retail to the consumer for $2.00 - $4.00 per pound, depending on the supply. The economic value to the area would amount to about $100,000 annually--the value of the finished product.

Other important benefits are difficult to measure. Increased fish production, fur-animal harvest, flood control, and fire control are all secondary benefits. Total marsh value in New York is estimated at $20 per acre annually.

The essential element in all of these figures is that expenditures for habitat management (1.34 million dollars) will pay off in waterfowl and rice values received (at least 7 million dollars) and other tangible public benefits. The inventory has provided a sound basis for an efficient management program, well within the policy and mission of the Forest Service--U. S. Department of Agriculture.

2/ These higher development costs include a number of management techniques not included within the scope of the Chippewa National Forest program.

A P P E N D I X

TABLE 1

Composition of Wetlands on the Chippewa National Forest, Minnesota

District	Type 2 Sedge Meadow		Type 3 Shallow Marsh		Type 4 Deep Marsh		Type 5 Open Water		Type 6 Shrub Swamp		Type 8 Bog		Total		Type 7 Wooded Swamp
	No.	Acres	No.	Acres	No.	Acres	No.	Acres	No.	Acres	No.	Acres	No.	Acres	Acres
Bena	330	8,597	46	517	7	55	8	38	305	5,430	18	377	714	15,014	10,339
Blackduck	136	1,310	17	115	17	121	24	117	352	4,188	40	753	586	6,604	10,216
Cass Lake	202	2,315	39	288	11	84	10	43	329	3,028	30	244	621	6,002	3,921
Cut Foot Sioux	121	2,439	61	1,308	19	200	21	95	300	3,240	15	187	537	7,468	13,362
Dora Lake	96	1,579	15	168	18	188	28	138	437	7,000	14	241	608	9,314	14,453
Marcell	219	1,855	40	249	55	461	80	316	374	4,488	78	833	846	8,202	11,839
Remer	227	2,696	62	558	20	1,361	27	111	688	8,874	64	1,313	1,088	14,913	13,556
Walker	344	3,191	93	839	79	556	77	351	261	1,775	48	303	902	7,015	1,922
TOTAL	1,675	23,982	373	4,042	226	3,026	275	1,209	3,046	38,023	307	4,251	5,902	74,533	79,608
Percent		32.2		5.4		4.0		1.6		51.0		5.7			
Average Size		14.3		10.8		13.4		4.4		12.5		13.8		12.6	

TABLE 2

Lake and Stream Inventory-Waterfowl Production Habitat

Chippewa National Forest, Minnesota

District	Bena	Black-duck	Cass Lake	Cut Foot Sioux	Dora Lake	Marcell	Remer	Walker	Forest Totals
Number Lakes	28	122	87	122	109	377	121	270	1,217
Acreage of Lakes	55,238	11,542	67,871	42,947	8,566	34,606	15,578	96,165	332,513
N. F. Shoreline Miles	38	38	79	107	24	158	53	73	570
Number Streams	10	18	9	33	22	35	32	8	155
N. F. Stream Miles	18	24	16	38	60	26	51	8	241
Production Habitat (Ac.) - Lakes*	3,040	3,040	6,320	8,560	1,920	12,640	4,240	5,840	45,600
Production Habitat (Ac.) - Streams**	108	144	96	228	360	156	306	48	1,446

* One-eight mile strip, regardless of type of shoreline. Eighty acres per mile of shoreline.

** Average stream width estimated at 50 ft. Six acres per mile of stream.

TABLE 3

Development Potential and Estimate of Costs

Chippewa National Forest, Minnesota

District	Impoundments*			Blasting		Nest Boxes		Prescribed Burning		Nesting Islands**		Over-Head (20%)	Total Devel. Cost
	No.	Acres	Cost	Acres	Cost	No.	Cost	Acres	Cost	No.	Cost	Cost	$
Bena	21	2,720	39,600	8,963	144,000	680	6,800	2,715	40,700	170	2,750	46,700	280,550
Blackduck	3	480	26,400	1,840	29,400	660	6,600	2,000	30,000	260	3,500	18,800	114,700
Cass Lake	13	433	23,800	2,482	39,700	800	8,000	1,500	22,500	260	3,500	19,100	116,600
Cut Foot Sioux	11	447	24,600	2,640	42,200	1,100	11,000	1,620	24,300	170	2,750	20,770	125,620
Dora Lake	31	1,185	65,200	526	8,500	1,470	14,700	3,500	52,500	160	2,500	28,480	171,880
Marcell	38	1,010	55,600	1,900	30,400	1,800	18,000	2,244	33,600	160	2,500	27,800	167,900
Remer	20	2,707	58,900	2,663	42,600	2,600	26,000	4,400	70,400	160	2,500	39,900	240,300
Walker	13	518	28,500	2,691	43,000	1,570	15,700	887	13,300	160	2,500	20,400	123,400
TOTAL	150	9,500	322,600	23,705	379,800	10,680	106,800	18,866	287,300	1,500	22,500	221,950	1,340,950

* Includes pike spawning areas.

** Includes nesting platforms.

WETLAND INVENTORY AND EVALUATION PLAN

CHIPPEWA NATIONAL FOREST

Introduction

The Chippewa National Forest is characterized by a great variety and abundance of wetland types. This characteristic, along with its geographic location in the Mississippi Flyway, make it an important waterfowl production area. J. H. Stoudt pointed out that, "During the drought of the 1930's there is no doubt but that a shift of prairie nesting waterfowl occurred into the lake region of Minnesota." It is, therefore, reasonable to assume that the Chippewa will become even more important to waterfowl as conditions become less suitable on the prairie through drainage.

Management and improvement of wetlands for waterfowl and fish production are important facets of the wildlife function on this Forest. Certain types of wetlands associated with larger lakes provide spawning habitat for northern pike. These areas are critical to fisheries management, and are often adaptable to improvement.

"Inventory" is a key word in National Forest resource management. Projects, plans, and long-range program direction are best accomplished if based on an inventory reflecting potential and existing resource values. Inventory is an essential tool in multiple use, and is a requisite for effective integration of resource management.

Wetland types, like timber types, vary in their management potential and importance. An inventory is needed to provide basic data for planning future action programs, and to delineate areas where habitat improvement can yield the greatest dividends.

What The Inventory Will Show

1. Composition of wetland types on the Forest; acres and numbers of each type, broken down by Ranger District, size classes, types and value to waterfowl. Will show acreage suitable for improvement.

2. Broad areas of high, medium and low value will be delineated, based on an evaluation scheme. Can later be intensified in specific areas.

3. The survey document will describe wetland types, indicating which types are most important to waterfowl, which have the greatest management potential, and what arrangement of types is most productive (wetland complex). This will aid in project work planning and provide better direction and more efficient use of funds.

4. Sites suitable for specific management practices will be located and tabulated.

5. Relative performance potential of wetland types in terms of waterfowl use and production will be determined.

Objectives

1. To inventory and locate wetlands of importance for waterfowl, furbearers, fish, and wild rice production.

2. To evaluate and classify wetlands by physical and biological characteristics and management potential.

3. To determine the wetland development potential and establish priorities for habitat improvement on the Chippewa.

Basic Wetland Types

The U. S. Fish and Wildlife Service wetland classification system will be utilized. This system includes eight wetland types in the freshwater marsh category. Seven of these will be considered on the Chippewa. They are described below with comments on their value.

Type 1 - Seasonally Flooded Basin. This type will not be considered due to the impossibility of locating them on aerial photographs and their relative unimportance in this zone.

Type 2 - Sedge Meadows. Little or no open water, almost solid sedges and grasses; annuals may occur on drier portions. Water table at or below the surface during most of the growing season. Usually of little importance to waterfowl without management. Impounding water or blasting holes will increase value considerably. Management potential is high. Sedge meadows in conjunction with lakes make excellent pike spawning areas if they can be flooded.

Type 3 - Shallow Marsh. Wetlands containing approximately 12 inches of water. In most years they retain water until midsummer, but frequently dry up before brood rearing is completed. Dominant vegetation includes rushes, sedges, cattails, reed and burreed. Used extensively as breeding and feeding habitat; not usually dependable as brood habitat except in wet years. This type can sometimes be improved by placing water level control to increase depth. This type is often used as pike spawning habitat if connected to pike lakes.

Type 4 - Deep Marshes. Wetlands containing 1 to 3 feet of water through August. Vegetation includes islands of cattails, reeds, bulrushes, spike rushes and wild rice. This type is especially important as brood rearing and feeding habitat. Water level management is usually

not required except for periodic drawdown when possible. Duck nesting boxes will increase the productivity of this type. Natural tree cavities should be preserved.

Type 5 - Open Water. Water depth is variable, but less than 10 feet. Emergent vegetation is restricted to a narrow belt around the edge. Vegetation includes pondweeds, water lilies, coontail and wild rice. The edge may be a floating mat composed of sedges. This type is often used by broods, although brood cover is not usually well interspersed (as in Type 4 wetlands). This type is also important for holding and attracting ducks during migration. Tree nesting ducks can be encouraged to nest by placing boxes and preserving tree cavities. Open water areas less than 10 acres will be classed as type 5 areas. Water areas larger than 10 acres will be classed as lakes.

Type 6 - Shrub Swamps. Soil usually water logged and often periodically covered with 6 inches or more of water. Typical vegetation includes alder, willow, buttonbush and dogwood. Waterfowl use is low unless open areas occur within the dense thickets. Removing portions of dense growth by blasting, burning or other means will improve this type for waterfowl. Increasing water depth by damming will convert this to a more productive wetland for both waterfowl and fish.

Type 7 - Wooded Swamps. Soil waterlogged to within a few inches of the surface and often covered with a foot or more of water during periods of heavy run-off and/or precipitation. Two general timber types are involved, conifer swamp and lowland hardwoods. The conifer swamp species include tamarack, black spruce and white cedar. Ground cover is usually a dense mat of sphagnum. The lowland hardwood type is characterized by black ash and frequently supports beds of duckweeds, smartweeds and other herbs. The wooded swamps are usually of limited value as waterfowl production habitat, although some mated pair use is evident in the spring, especially mallards and wood ducks. Management potential is limited.

Type 8 - Bogs. A floating, spongy mat composed of sphagnum, leatherleaf, Labrador tea and other heaths. Open water may or may not be present. Water usually highly acid and deeply stained. This type has low waterfowl value and management potential is limited. One important exception is the ring-necked duck which often breeds in bog types if open water is present. Wildlife use should be the primary value assigned to this type.

Lakes - The major portion of large lakes provide little in the way of production habitat. A narrow band around the edge is often used for brood rearing if emergents are present. This is especially for diving ducks. Maintaining nest cavities or placing along shorelines of lakes increase their waterfowl value.

Streams - Slow moving streams and associated ox-bows are often used as brood-rearing habitat. Wood ducks, in particular, are attracted to woodland streams. Type 2 wetlands are often associated with woodland streams on the Chippewa.

Methods and Procedures

The basic inventory unit will be the Ranger District. The 1959 aerial photos will be the primary working tool. The 1947 flights and the township type maps will supplement the 1959 photos. These photos have generalized wetlands typed to a minimum of 2½ acres and government ownership is outlined. The 1964 Planimetric Series Quadrangle maps will be fully utilized as they are made available to the Forest.

Open water areas exceeding 10 acres in size will be classed as lakes, and treated separately. The duck production zone of larger lakes will be limited to an off-shore strip of one-eighth mile. Lake and stream data are summarized in NFRS report (9/30/60) and will be correlated with this inventory.

Location of beaver dams, both active and abandoned, will be obtained from various sources and recorded as part of the inventory. Location of primary wild rice producing areas will also be included.

The following will be the procedure used for classifying and counting wetlands.

1. Each flight strip in the District will be examined, starting at the northeast corner and working south and west until the District is completed.

2. All wetlands, except shrub swamps and timbered swamps, will be outlined on an acetate overlay. Each wetland will be numbered consecutively on each District. Acreage will be determined by dot-count method. Data on the overlay will include wetland number, size and type, in that order. Example: 35-15-2 (wetland 35, 15 acres, type 2.) If type cannot be determined from the photo, the first two figures will be underlined, indicating that it will be checked in the field.

3. Acreage by types will be recorded. If type cannot be determined from photo, the wetland will be listed separately for field checking, showing wetland number, acreage and photo number.

4. In some cases it may be necessary to outline additional types or change existing types. This will be done on the overlay.

5. Any potential development sites, such as impoundments or pike spawning areas, encountered during photo interpretation, will be recorded. Data recorded will be wetland number, photo number, legal description and type of development. These sites will be checked in the field for development potential.

6. Wetlands that cannot be classified from photos will be field checked. Other wetlands conveniently located will be checked for accuracy in photo interpretation during field work. Detailed physical and biological data pertaining to the wetland will be recorded.

7. Data for field checked wetlands will be added to the inventory and photo overlay.

8. When a District is completed, the acreage of Type 6 (Shrub Swamps) will be extracted from the timber management inventory (designated as "L" on photos) and added to the wetland inventory. Acreage of Type 7 (Wooded Swamps) will also be taken from the T.M. inventory (unproductive lowland, lowland hardwoods, conifer swamp, black spruce and tamarack).

9. Lake and stream data will be taken from NFRS report (9/30/60). Acreage of duck production habitat will be computed from shoreline miles.

10. Data pertaining to beaver dam locations, known wetland development sites and wild rice areas will be summarized for the District and incorporated into the inventory.

Evaluation of Wetlands

In order to estimate the magnitude of increase in seasonal duck use that can be accomplished through wetland development on the Forest, it will be necessary to assemble information on seasonal waterfowl use for the different types of wetlands. While there are a number of characteristics that determine the value of wetlands, "performance" in terms of actual waterfowl use for breeding and migration serves as a valuable index of habitat value. Interpretations of seasonal use will be made in relation to the relative size of the waterfowl population.

The relative performance potential of various wetland types will be determined by field sampling. These data will be collected during the field checking phase of the inventory and also during random travels throughout the Forest. Supplementary information available from other sources will be incorporated. Other sources include:

1. Dora Lake Administrative Study (An Evaluation of Reclaimed Potholes for Waterfowl Production).

2. Annual waterfowl brood census.

3. Studies on Big Rice Pond and surrounding wetlands, by Division of Research and Planning.

4. Waterfowl surveys on Mud-Goose, Morph Meadow and Big Rice Lake Game Management Areas, by Division of Game and Fish.

5. Tamarac National Wildlife Refuge, by the Bureau of Sport Fisheries and Wildlife.

Since breeding habitat is critical, the evaluation will be made primarily on the basis of use by breeding pairs. With the number of breeding pairs estimated, duckling production can be calculated by applying average nesting success and brood size figures.

Pairs, lone drakes, and small flocks will be recorded during the mating period (May 1 to June 15, depending somewhat on phenology). Data to be recorded include:

Date

Wetland type, size and location (by number, if possible)

Occupied or unoccupied

Species and number of waterfowl

Type of use -

a. Breeding season, for ducks: mated pair, lone male, lone female, grouped ducks by flock size and sex, brood age and size.

b. Migration season: numbers of different species of waterfowl.

Random observations on all types of use will be recorded throughout the year. When sufficient data have been collected, the sample of waterfowl use will be used in conjunction with aquatic acreages obtained from the wetland inventory to estimate how many additional breeding ducks can be accommodated on the Forest through appropriate wetland development.

The Wetland Inventory Summary

The final product of the wetland inventory will be a document containing a summary and analysis of the data collected. This document will contain statistical information and recommendations necessary for efficient management of the Chippewa's wetland resources. It will be called a Wetland Development Plan.

Data will be organized on the basis of Ranger Districts, showing:

1. Total numbers and acres of wetlands.

2. Relative abundance of wetland types.

3. Distribution of types by size classes.

4. Lake and stream data.

5. Areas where management potential appears to be greatest, based on the relative abundance and distribution of various wetland types.

6. Acres suitable for various types of development and the location of critical areas, including a listing of impoundment sites and beaver dams. Acquisition of key tracts necessary to complete priority developments will also be shown.

7. Relative performance potential of wetland types in terms of waterfowl use and production.

8. Expansion of population data to total wetland acres and production potential of the Chippewa National Forest based on wetlands development.

9. Development potential of the Chippewa National Forest for wild rice production.

Included will be a discussion of wetland types and their relation to wildlife and fish production. Specific recommendations will be made for the development and preservation of wetlands in relation to the anticipated wildlife program on the Forest.

Responsibility and Cost

The wetland inventory will be a responsibility of the Forest Wildlife Biologist. Advice and assistance on technical aspects of wetland classification are available from the Regional Office, Bureau of Sport Fisheries and Wildlife. Lake States Forest Experiment Station has offered assistance on statistical problems.

Other Forest personnel may participate in the classification, depending on the extent of project financing and job priorities. If funds are available it would be desirable to employ a student in wildlife management for the summer period to work full time on the inventory.

An effort was made to estimate approximate costs by applying the inventory procedure to a typical township (T141N, R30W). This township contains 9,640 acres of government ownership. It required approximately five hours to delineate and type wetlands from the photos, and would require an additional 8 hours of field time to check the unknowns and make other field observations.

Assuming this is an average township, it would require approximately 100 man-days to complete the Forest. Additional time will, of course, be required for statistical treatment and tabulating of data. An inventory of the gross Forest area would require about 250 man-days.

There will be no major equipment or materials to purchase. Transportation requirements are estimated at 8,000 miles. Total cost of the wetlands survey of National Forest lands is $5,200.00.

A SUPPLEMENT TO
"WETLANDS OF THE CHIPPEWA NATIONAL FOREST"

This report is a supplement to the wildlife management plan, Wetlands of the Chippewa National Forest. The wetland inventory and data reported in the initial plan included only those lands under National Forest control and management, an area of 642,138 acres. An additional 671,649 acres within the boundary of the Chippewa are under state, county and private ownership. The inventory was extended to include these lands. The same procedures and methods of delineating and measuring wetlands were utilized except that Type 7 (wooded swamp) wetlands were not included and the acreage of Type 6 (shrub swamp) wetlands were estimated, based on proportional land ownership. The same over-lays were used, and non-National Forest wetlands were traced in red, making them distinctive from the National Forest ownership. No attempt was made to separate the wetlands by type of ownership other than National Forest and non-National Forest.

Results

The results of the extended inventory are presented in the following tables. Data are presented for the non-National Forest wetlands and the combined ownership by Ranger Districts. Complete data for National Forest wetlands can be found in Wetlands of the Chippewa National Forest. Data are also available on a township basis, but not presented in detail here.

National Forest wetlands comprise 43.2 percent of the total wetland acreage which is less than proportional to National Forest land ownership (49 percent). There is a greater acreage of primary wetland types (Types 3, 4, & 5) under National Forest ownership (53 percent of total). There is a greater proportion of sedge meadow and bog wetlands in non-National Forest ownership (largely State of Minnesota lands).

The additional data did not produce major changes in wetland composition from that reported in the initial plan. It is now possible, however, to more precisely identify those land areas in need of additional surface water on a priority basis. Wetland "complexes" can now be incorporated into the planning of development projects. This item will become fully implemented when research now underway by the Northern Prairie Wildlife Research Center provides more precise knowledge on the relationship of wetland types to waterfowl production.

The criteria used to determine development potential in Wetlands of the Chippewa National Forest can also be applied to the additional wetland acres. Application of these standards increases the development potential on the Forest by 88,000 acres, bringing the total to 138,000 acres.

JOHN MATHISEN
Forest Biologist
April 21, 1966

TABLE I

Composition of Wetlands - All Ownership Combined

District	Type 2 Sedge Meadow		Type 3 Shallow Marsh		Type 4 Deep Marsh		Type 5 Open Water		Type 6 Shrub Swamp		Type 8 Bog		Total	
	No.	Acres	No.	Acres	No.	Acres	No.	Acres	No.	Acres	No.	Acres	No.	Acres
Bena	377	22,820	54	826	18	382	14	71	736	13,197	28	3,854	1,227	41,150
Blackduck	350	4,119	25	158	38	488	42	259	1,104	13,214	63	2,053	1,622	20,291
Cass Lake	229	5,407	47	680	17	173	15	76	499	4,732	34	871	841	11,939
Cut Foot Sioux	173	4,100	73	1,567	27	326	40	208	690	7,153	34	697	1,037	14,050
Dora Lake	154	3,547	20	465	29	297	43	237	999	15,996	20	439	1,265	20,981
Marcell	298	3,635	50	355	84	700	120	464	704	8,457	91	1,061	1,347	14,672
Remer	308	6,218	90	1,153	47	2,857	45	236	1,408	18,234	79	1,908	1,977	30,606
Walker	583	9,612	146	1,631	140	1,009	131	666	754	5,133	70	726	1,824	18,777
TOTAL	2,472	59,458	505	6,835	400	6,232	450	2,217	6,894	86,116	419	11,609	11140	172,466
Percent		34.5		4.0		3.6		1.3		50.0		6.7		
Average Size		24.0		13.5		15.6		4.9		12.5		27.7		15.1

TABLE 2

Composition of Wetlands Non-National Forest Ownership

District	Type 2 Sedge Meadow		Type 3 Shallow Marsh		Type 4 Deep Marsh		Type 5 Open Water		Type 6 Shrub Swamp		Type 8 Bog		Total	
	No.	Acres	No.	Acres	No.	Acres	No.	Acres	No.	Acres	No.	Acres	No.	Acres
Bena	47	14,223	8	309	11	327	6	33	431	7,767	10	3,477	513	26,136
Blackduck	214	2,809	8	43	21	367	18	142	752	9,026	23	1,300	1,036	13,687
Cass Lake	27	3,092	8	392	6	89	5	33	170	1,704	4	627	220	5,937
Cut Foot Sioux	52	1,661	12	259	8	126	19	113	390	3,913	19	510	500	6,582
Dora Lake	58	1,968	5	297	11	109	15	99	562	8,996	6	198	657	11,667
Marcell	79	1,780	10	106	29	239	40	148	330	3,969	13	228	501	6,470
Remer	81	3,522	28	595	27	1,496	18	125	720	9,360	15	595	889	15,693
Walker	239	6,421	53	792	61	453	54	315	493	3,358	22	423	922	11,762
TOTAL	797	35,476	132	2,793	174	3,206	175	1,008	3,848	48,093	112	7,358	5,238	97,934
Percent		36.2		2.8		3.3		1.0		49.1		7.5		
Average Size		44.5		21.1		18.4		5.8		12.5		65.7		18.7

TABLE 3

Primary Production Habitat
(Acres)

	Shallow Marsh (3)	Deep Marsh (4)	Open Water (5)	Lake-shore	Stream	Total
National Forest	4,042	3,026	1,209	45,600	1,446	55,323
Other	2,793	3,206	1,008	96,400	2,130	105,537
TOTAL	6,835	6,232	2,217	142,000	3,576	160,860

TABLE 4

Secondary Production Habitat
(Acres)

	Sedge Meadow (2)	Shrub Swamp (6)	Bog (8)	Total
National Forest	23,982	38,023	4,251	66,256
Other	35,476	48,093	7,358	90,927
TOTAL	59,458	86,116	11,609	157,183

TABLE 5

MISCELLANEOUS DATA

	Land Status		Wetland Acres/Sq.Mile		Lake Shoreline		Streams	
	Acres	Sq.Miles	Total*	Primary**	Miles	Acres***	Miles	Acres
National Forest	642,138	1,003	74.3	8.2	570	45,600	241	1,446
Other	671,649	1,049	93.3	6.7	1,205	96,400	355	2,130
TOTAL	1,313,787	2,052	84.0	7.4	1,775	142,000	596	3,576

* Type 7 not included
** Types 3, 4, and 5
*** One-eighth mile shoreline strip