

**WHITEFISH MANAGEMENT PLAN**

**DEPARTMENT OF INLAND FISHERIES AND WILDLIFE  
DIVISION OF FISHERIES AND HATCHERIES**

**PREPARED BY  
DAVID J. BASLEY  
REGIONAL FISHERIES BIOLOGIST  
REGION G**

**DECEMBER 2001**

## LAKE WHITEFISH HISTORY

### **Description**

The lake whitefish is technically named Coregonus clupeaformis for its herring-like features. These fish are dark brown to black on the back becoming silvery on the sides and silvery white below. The fins are generally black or black tipped and scales are large. Whitefish are a member of the Salmonid family having the presence of a small adipose fin located on the back between the dorsal and caudal fins. Unlike trout and salmon, however, the mouth is small and toothless in adults.

### **Distribution**

Lake whitefish are widely distributed across the Canadian provinces from New Brunswick and Labrador through British Columbia and the Northwest Territories. In the United States, it is found in the Great Lakes region and then north and east along the United States and Canadian border into Maine. Maine populations are now concentrated in headwater lakes of the Allagash and Penobscot River drainages in the north-central part of the state. Lakes in the St. Croix drainage in Washington County are also noted for whitefish populations. Distribution in southern and western Maine is limited to only four lakes. One of them, Sebago Lake, is among a great number of lakes that has seen its population of lake whitefish dwindle to relic numbers.

### **Habitat Requirements**

Lake whitefish are usually regarded as schooling fishes. They thrive best in deep, oligotrophic lakes with large volumes of cold, well-oxygenated water. It is rarely seen in streams except to spawn. Spawning takes place in late October through November or December. Spawning runs last 5-7 nights, much like a smelt. The existence of an early, open water fishable stream population of lake whitefish in the upper eight miles of Kezar Lake outlet has been documented. This may be a feeding excursion from Kezar Lake rather than a spawning run, since the whitefish are feeding heavily on an abundant nymph population present in the river. These whitefish are last seen below Kezar Lake outlet dam, not reappearing in the river until the following spring.

### **Reproduction**

Lake whitefish spawn during the period from mid-October through December. Fish may spawn in lake inlets that have moderate current and clean gravel or rocky substrate. In many lakes that have no suitable inlet tributaries, they spawn just as successfully in the shallows of wind-swept rocky shores.

The lake whitefish is perhaps the most prolific of Maine's coldwater sport fish – a female weighing one pound may lay as many as 10,000 eggs. Whitefish spawn at night in large groups of paired males and females displaying in a frenzied ritual of darting and splashing at the water's surface. Eggs are fertilized and broadcast in mid-water where they settle to the bottom among crevasses to hatch without parental care in April or May.

Fall trap net sampling at Clear Lake (640 acres) in T10R11 WELS, Piscataquis County during consecutive years 1995-2000, suggest that spawning movements may not be random within the lake. In 1995, 99 lake whitefish were fitted with a metal jaw tag for future identification and released back into the lake at a central location. Of 25 jaw tagged whitefish recaptured from 1996-2000, 72% were taken at the site of their initial capture in 1995.

An unusual trait, which is rarely found in other species but frequently, seen among whitefish is the tendency to form dwarfed populations. Dwarf whitefish mature at age I or II, seldom live more than 5 years and weigh only a few ounces. Initially discovered in 1957 during routine lake surveys, dwarf lake whitefish populations have since been found in 29 Maine waters.

Recent genetic studies of Maine lake whitefish by fisheries scientists at Laval University in Quebec using nuclear DNA analysis support earlier findings that Maine is a contact site of three distinct glacial lineages of whitefish. One whitefish lineage has been only found at South and Round Ponds in Greenwood, Oxford County. A pure strain of another lineage is only found in Clear Lake, Ross Lake and Cliff Lake, all in Piscataquis County where it occurs as normal size fish. A third strain occurs as both dwarf and normal forms in Crescent Pond, T9R15 WELS, Piscataquis County and East Lake, a border water with Quebec in T17R14 WELS, Aroostook County, and as the dwarf form only in Cliff Lake.

New scientific findings at Laval identified various Maine lakes containing a single whitefish population of either dwarf or normal size having a genetic composition of both Atlantic and Acadian lineage. Apparently, where ecological conditions have allowed for successful natural hybridization, contact between the two lineages has not always resulted in a dwarf and normal form being present in the same lake

Where dwarf and normal forms are found in the same lake, exclusively in the St. John River drainage, they represent a continuum of both morphological and genetic differentiation. Each lake represents a unique snapshot in time in the evolutionary process of creating a new species. Knowledge of the evolutionary history, ecology and population genetics of these whitefish pairs strongly supports the view that favorable ecological conditions and divergent natural selection are promoting a separation of form and structure and reproductive isolation.

### **Food Habits**

A study of the diet of larval lake whitefish at Cliff Lake by Laval University found that a specific species of zooplankton was dominate for the first 3 weeks after hatching. After the fourth week of hatching, this species was replaced by several other species of zooplankton found in high occurrence.

As young fish move into deeper water, the diet resembles that of adults with more aquatic insect larvae, mollusks and midge larvae supplementing plankton. Larger size whitefish are known to feed frequently on small fishes such as smelts, sticklebacks and minnows as proved by remains found in stomachs of specimens taken from a number of Maine lakes.

### **Age, Growth and Maturity**

Lake whitefish are among Maine's more long-lived sport fish, normally living 10 or more years and weighing 1-3 pounds. The largest lake whitefish on record for Maine waters is a specimen weighing 7 pounds 8 ounces taken by an angler trolling a Mooselook wobbler at Sebago Lake in 1958.

As is typical of fish displaying a long-lived characteristic, growth is fairly rapid until the onset of sexual maturity whereupon growth slows depending on population abundance, food source, and competition with other species.

The following table compares the average length at each age of lake whitefish taken at Clear Lake.

CLEAR LAKE – AVERAGE LENGTH IN INCHES AT EACH AGE (SAMPLE SIZE IN PARENTHESIS)											
Year	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1990			14.3 (9)	14.0 (28)	14.3 (12)						
1992				14.9 (2)	14.9 (14)	14.9 (9)					
1994					15.1 (11)	15.3 (14)	15.1 (7)	15.4 (1)			
1995					15.6 (1)	15.4 (4)	15.3 (29)	16.1 (35)	16.3 (21)	16.3 (7)	
1996							16.0 (9)	15.9 (5)	16.5 (14)	16.5 (4)	17.2 (3)
1997							16.4 (1)	16.4 (5)	16.9 (15)	16.9 (9)	17.2 (19)
1998	11.6 (43)						15.9 (2)	16.7 (5)	17.0 (28)	16.9 (7)	17.5 (16)
1999	12.7 (4)	13.7 (16)						16.4 (2)	17.1 (9)	17.6 (5)	18.0 (6)
2000		14.7 (8)	14.8 (29)						16.5 (4)	16.9 (1)	17.4 (5)

The fish were sampled 8 of 11 years during the period 1990-2000. The samples were obtained by trap nets (7 years) and by gill net (1 year). Fish were aged from scale samples taken in the field. Growth at Clear Lake is considered to be average for lake whitefish in northern Maine waters.

Normally, female lake whitefish in Maine waters will mature at ages IV-VI. Many first time male spawners mature at age III. Repeat fall trap net sampling at Clear Lake during the years 1995 through 2000 suggests that strong year classes may dominate a population and contribute to natural reproduction for several years before being replaced by several younger dominant year classes. (See Clear Lake Trap Net Table).

As mentioned previously, 99 sexually mature whitefish were fitted with jaw tags in the fall of 1995. Based upon tag returns from 24 of fish captured in subsequent years of trap netting: 29% spawned the following year (2 males, 5 females); 8% skipped 1 year (1 male, 1 female); 33% skipped 2 years (5 males, 3 females); and 29% skipped 3 years between spawning (1 male, 6 females). One female fish spawned the next consecutive year and skipped 2 years. It should be noted, however, that these fish were ages VII and older at the time of being tagged.

## LAKE WHITEFISH MANAGEMENT HISTORY

The lake whitefish, native to many of Maine's best fishing lakes, is a popular species in the winter sport fishery of northern and eastern Maine. As ice fishing popularity increased in the decades of the 1970's and 1980's, anglers discovered whitefish are scrappy, physically attractive and delicious to eat. Where they provide a principal fishery, whitefish are often more eagerly sought by winter anglers than lake trout, brook trout and landlocked salmon. The round whitefish, Prosopium cylindraceum, a smaller "cousin" of the lake whitefish does not share these qualities and is seldom caught by anglers (see Appendix A for more information on the round whitefish).

At the turn of the century, the lake whitefish was an important item in the fish markets of southern Maine and the rest of New England. In Maine, the species is no longer fished commercially, but important commercial fisheries occur in the Great Lakes, Scandinavia, Canada and Eurasia, where it is associated with a variety of other whitefish species that are of high food value.

The lake whitefish deserves some mention for its contribution, though perhaps minor, to the development of Maine's logging industry. Up until at least 1900, lake whitefish were caught and shipped in quantity, either frozen or pickled in salt, as a winter food supplement for logging camps in the back country of northwestern Maine.

The lake whitefish was also used as food by frontier families in the Ashland area in Aroostook County that made annual trips to the Musquacook Lakes to net, snare or spear whitefish as they ascended tributaries in dense numbers to spawn during November. Whitefish were also taken by gill net during the summer and pickled or smoked and stored in barrels.

Until 1955, when the use of gill nets in all waters was made unlawful, a November gill net fishery of unknown proportions existed on a number of waters, including Eastern Grand Lake (East Grand), Western Grand Lake (West Grand), Hot Brook Lakes, Baskahegan Lake, Pocumpus Lake (Pocumcus), Junior Lake (in Washington County), Mattawamkeag Lake, and First Debsconeag Lake and Thoroughfare leading to the West Branch of the Penobscot River.

One account of whitefish given in the Report of the Commissioners of Inland Fisheries and Game, 1867, provides an excellent insight into the early fisheries for this species, its habits, and sporting qualities: *"In the Fish River region, in Moosehead Lake, in Schoodic Grand, they pronounce the whitefish the best of the fishes. On the Schoodic, they refer to Pocumpus and Grand Lakes, where the water is flowing from three to five feet deep, and the bottom sandy and gravelly. In November each year small quantities of them are taken here with the spear. One night Mr. B.W. French of Calais, set a net thirty feet long at this thoroughfare, and in the morning had a barrel of whitefish. In Moosehead Lake they sometimes take a fly. In June last we saw one taken with the fly near Mt. Kineo, by Artemas Libby, Esq. of Augusta. It weighed a pound and a half. Two trout weighing a pound each were taken at the same cast. They can be taken with the hook at any season of the year in deep water. Almost any bait will answer, but the best is a piece of a small fish. The most of them are taken in the winter. The greatest success is attained by sinking through a hole in the ice, at the end of a line, a "cusk" thoroughly gashed up with a knife. This remains there one day, and tolls a great many whitefish around. They are then taken by the smallest baits on small hooks. One winter many of these Moosehead whitefish were sold in Augusta, and their weight was so uniformly one pound that they received the name of "pound fish", and the trouble of weighing was dispensed with by the mutual consent of "seller and buyer."*

During the early years of Maine's development of a fish hatchery program, the lake whitefish was experimented with and stocked in a number of waters throughout the state. Many of these waters are unlikely habitat for whitefish. In 1902, for example, a total of 125,000 lake whitefish fry was reared at the Caribou Hatchery (no longer in existence) and planted in Prestile Stream, Cross Lake, Madawaska Lake, Little Huston Pond, Nickerson Lake and the Aroostook River. In 1881, lake whitefish fry were stocked in the Rangeley Lakes. Two were collected from Umbagog Lake in 1905 but none have been seen since. Sources of eggs were from Lake Winnepesaukee, New Hampshire and the State of Michigan (perhaps Lake Michigan).

Population declines occurred earlier in several lakes, including Moosehead and the Fish River Chain of Lakes. Whether man's earlier exploitation of the lake whitefish population had anything to do with their present abundance cannot be proved. Populations continue to decline more recently in other Maine lakes such as Sebago, the Musquacooks, Spider and Big Eagle. Water level changes, introduction of competing and/or prey species, or other unknown natural phenomenon may be contributing factors.

Lake whitefish and rainbow smelt are known to have overlapping life histories, having pelagic fry, juveniles that are found near the bottom of the thermocline and adults that dwell near the lake bottom. Speculation that declines may be associated with rainbow smelt interactions has been supported by several scientific findings.

Changes in the winter angling for lake whitefish in Lake Simcoe, Ontario were noted from 1961-83. Lake Simcoe is a large (179,148 acres), deep (135 feet) water body in south-central Ontario. Smelts were first reported in Lake Simcoe in 1961, reached a peak in 1973 and now vary up to ½ the abundance observed in 1973. Lake whitefish declined due to complete reproductive failure during the period of rapid smelt population growth. Competition between their fry or predation by adult smelt on larval whitefish, or both is the suspected cause, although predation appears to be of lesser importance. Recent stockings of hatchery-reared yearling lake whitefish have survived and grown well in Lake Simcoe to support the winter sport fishery, indicating that the reproductive failure occurs due to mortality prior to the yearling stage. Stocking of lake trout since 1975 has increased the abundance of this species and appears to have resulted in lower densities of rainbow smelt leading to reestablishment of lake whitefish recruitment but at a low level.

Twelve Mile Lake located in south-central Ontario has a surface area of 1,144 acres and a maximum depth of 79 feet. Rainbow smelts became established in the late 1950's and became abundant in the 1960's to support a spring dip net fishery. Vulnerability of the Twelve Mile Lake whitefish population to smelt predation may have been enhanced due to high exploitation of whitefish during the 1960's. Daily harvests of 20 fish per angler were common in the winter fishery. Also, there was a dip net fishery for spawning whitefish through 1976 when low numbers of spawning adults ended this fishery. Subsequently, the number of eggs and fry produced may have been too low to withstand the added stress of smelt predation. There has been little or no recruitment of juvenile whitefish to the population since 1975.

In Twelve Mile Lake, peak hatching of lake whitefish coincided with peak smelt spawning activity. As smelt feeding increased with the end of the spawning run, newly hatched whitefish were extremely attractive for predation because of their availability and large size relative to other prey. They were considered especially vulnerable because whitefish fry and adult smelt occupy the same location in early spring and the small size of the lake offers little refugia for whitefish

larvae. A complete failure of a lake whitefish age class was predicted in Twelve Mile Lake in 1984 from data collected in the field being applied to a predation simulation model.

Recovery of lake whitefish populations in the Great Lakes has been aided by lake trout and salmon stockings that have reduced the abundance of alewives, rainbow smelts and white perch. Many fisheries scientists managing these lakes believe that when populations of these latter species decline, recruitment of lake whitefish increases. This may reflect the situation at Clear Lake where the whitefish population has remained high despite an illegal introduction of smelt in the 1980's and where a lake trout stocking program has been ongoing since 1994.

The status of the lake whitefish as a food and sportfish in Maine waned considerably after the early 1900's until the late 1950's and the advent of snowmobiles and increased interest in ice fishing. With this increased activity by winter sportsmen, Maine biologists and wardens began to check more anglers with large catches of lake whitefish and it was suggested that perhaps some regulation of the harvest of this species was in order. In 1972, fish and wildlife regulations were amended to include a whitefish general law bag and possession limit of 8 fish, with no size or weight limit restriction.

A proliferation of logging roads, more comfortable snow sleds and improved fishing equipment have made previously remote waters more attractive to winter anglers. Increases in winter angler pressure and more interest in catching whitefish led to the creation of a special regulation to reduce the daily bag and possession limit to 3 fish in 1992. This regulation was recommended on principal fishery waters where deemed appropriate by regional biologists. A regulation to prevent the use of live fish as bait in waters having lake whitefish populations in the absence of rainbow smelts has also been recommended, as has a moratorium on the legal introduction of smelts for forage in waters supporting lake whitefish.

In 2001, the Department was petitioned to have this regulation implemented as the general law for whitefish with a special higher bag limit allowed on waters where public desire to harvest more fish does not interfere with a need to conserve the resource.

Reduced bag and possession limits on waters where lake whitefish populations were abundant at the time of implementation seem to have been successful in protecting the sport fishery. On waters where a decline in the fishery was occurring or had already occurred, the regulations have failed to maintain or increase whitefish numbers. Whitefish populations in these waters may be so low as to not respond to any management strategy short of planting hatchery-reared fish to rebuild the standing stock, perhaps in concert with more restrictive regulation.

To date, length limit restrictions have not been implemented as a means to regulate the harvest of whitefish. Observed population structure of wild populations does not lend itself well to length limit restrictions. It is common for the fishery to be dominated by several consecutive age classes that may vary in length by less than 1 inch as seen at Clear Lake. These are in turn seemingly separated by several consecutive weak age classes. Data from scientific research, however, suggest that this is a natural phenomenon of lightly exploited lake whitefish populations and that good recruitment can be stimulated by exploitation. Maine case histories of lake whitefish declines suggest that when changes in the natural habitat or the introduction of competitive or prey species such as rainbow smelt occur in addition to high exploitation, the combined impact may be too great to expect the young fish to have the resiliency to replace older age classes of adults.

Sport fishery surveys conducted over many years on many lakes suggest that anglers tend to have a self-imposed minimum length limit at or near 16 inches on waters where lake whitefish are abundant. As bag limits are reduced, anglers typically select for larger fish in the creel that has resulted in a de facto minimum length limit.

## PAST MANAGEMENT GOALS

The goal presented in the 1996 Management Plan update was to determine the supply of lake whitefish while maintaining use-opportunity and fishing quality at current levels. Fall trap netting and winter clerk surveys on two principal fishery waters in Region G have not been successful in providing reliable estimates on the standing stock of harvest size lake whitefish. Although lake whitefish have been successfully captured in trap nets, more intensive sampling effort will be necessary to trap a greater portion of the population for mark and recapture studies. Investigations of Maine lake whitefish populations by fisheries scientists at Laval University as referenced in the 1996 update have targeted genetic research rather than the management of standing stocks.

**Abundance Objectives: Maintain all present populations that support principal fisheries at or above current levels of abundance.** During the past five years, the number of lakes supporting principal fisheries declined from 19 to 18 (-5%) and the number of acres declined from 115,109 acres to 80,903 acres (-30%). The reduction in numbers of waters masks the severity of loss of principal fisheries that is more accurately depicted by a 30% loss in acreage.

In Region A, the decline in the lake whitefish fishery at Sebago Lake (28,771 acres) has continued unabated resulting in a loss of 99% of principal fishery waters in the most populous region of the state. Evaluation of principal fisheries in Region C resulted in the addition of a single water (2201 acres) providing a winter fishery only. In Region F, a similar review of whitefish waters resulted in two waters (6,624 acres) deleted as principal fisheries and three waters added (4,959 acres). Caucomgomoc Lake (5,081 acres) no longer supports a lake whitefish sport fishery. Elimination of this one water is a 27% reduction in principal fishery acreage in Region E. Region G has also seen its number of principal fishery waters reduced from five to four with the loss of the sport fishery in Spider Lake (890 acres). Elimination of this lake results in a 2% loss of principal fishery acreage in this region. Trends in the lake whitefish sport fishery at Big Eagle Lake (9,500 acres) and Churchill Lake (3,720 acres) suggest that within the next five-year planning period, these two waters may also be removed from the list of principal fisheries. This would be a 50% reduction in the number of principal fishery waters in Region G and a 79% loss in acreage.

**Attempt to increase abundance in lakes that once supported principal fisheries.** The lake whitefish population in Sebago Lake is so reduced that it is not likely to benefit from liberal fishing regulations now being proposed to control lake trout numbers. Reconstruction of Churchill Dam in 1998 has improved the opportunity to better regulate the water level in Big Eagle and Churchill Lakes. Increased production of lake whitefish may result from the higher fall water level remaining stable throughout the winter months. The special bag limit regulation of 3 whitefish has not been successful in increasing populations on waters that had their principal fishery severely reduced prior to this regulation being enacted.

**Implement a hatchery-rearing program for lake whitefish as space and funding become available.** Two applications to the Maine Outdoor Heritage Fund proposing expansion of an existing state hatchery to raise lake whitefish have not received support for funding. In 1998, 125 lake whitefish were stocked in Second Musquacook Lake in Region G. These fish were the result of an experimental attempt by IF&W to raise whitefish at existing state facilities. Loss of 30% of acreage supporting principal whitefish fisheries in the last five years and the probability of an additional 16% loss in the next five years graphically illustrates the immediate need for a lake whitefish hatchery program.

**Harvest objective: To be determined.** Several winter creel surveys have been conducted on principal fisheries waters in Region G in the years since 1995. Information collected suggests that annual whitefish harvest should not exceed 0.5 pounds per acre on fisheries supported by wild populations.

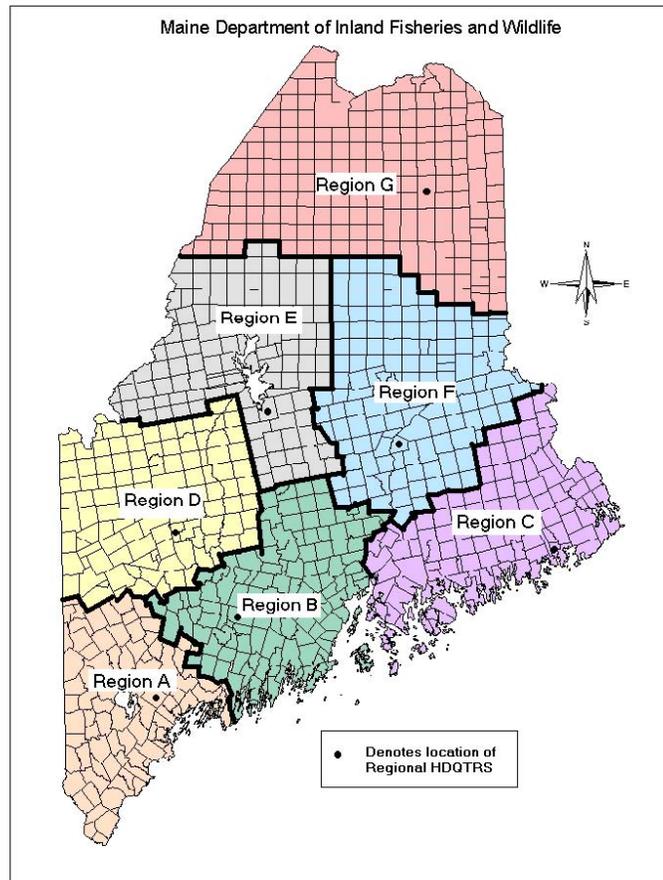
**Fishing Quality Objective: Provide for approximately 16,100 angler days of use in the winter fishery with an average size of in the creel at or near 17.5 inches and 1.9 pounds. Success and catch rates will vary with population abundance and the extent of use.** Winter use of 37,293 angler days in 1999 exceeded the objective established in 1996. Average size of whitefish harvested has been measured at 16.6 inches and 1.6 pounds.

## OPPORTUNITY

The data in this plan are presented on the basis of the Department's seven fisheries management regions, which are aggregations of townships (Figure 1).

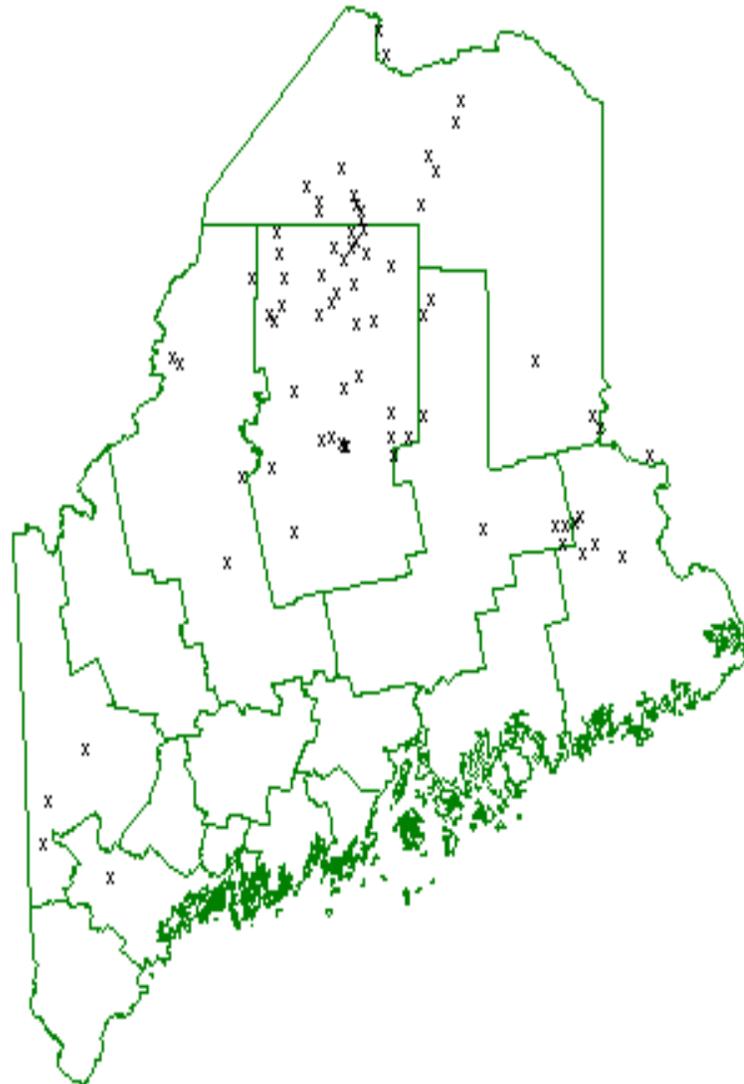
Lake whitefish populations are considered to be present in 75 lakes comprising 335,296 acres (Figure 2, Table 1). These waters are distributed in Regions A, C, E, F and G. Populations are not known to naturally exist in Regions B and D. Present habitat accounts for the addition of two lakes (11,425 acres), one each in Regions A and C where new whitefish populations have been discovered. Lake whitefish are no longer considered present in three lakes (8,058 acres), one in Region E and two in Region F. These lakes contained only relic populations and will not be considered as habitat in the current plan.

Populations are considered completely dwarfed in 11 lakes (4,767 acres) and 17 lakes (42,340 acres) are believed to support dwarfed and normal size lake whitefish.



**Figure 1. Maine Department of Inland Fisheries & Wildlife Fisheries Management Regions**

Principal sport fisheries have been determined to exist in 18 lakes (80,903 acres). One lake in Region C (2,201 acres) is considered to have a principal fishery in winter only and one lake in Region E (1,222 acres) is only open to summer fishing. Maine's three northern Fishery Management Regions account for 83% of the total number and 79% of the total acreage of principal fishery habitat. For the purpose of decision making, this plan addresses only those habitats known to provide a principal fishery. Statewide sport fishing opportunity for lake whitefish has been reduced by 30% with the loss of 3 fisheries in Regions A, E and G. The loss of Sebago Lake has severely diminished the fishery in Region A by 99%. The only fishery in this region now exists in South and Round Ponds (284 acres) in Greenwood, Oxford County.



**Figure 2. Species Distribution of Lake Whitefish in Maine Lakes Year 2000 Update**

Region E has had opportunity reduced by 26% with the loss of Caucomgomoc Lake (5,081 acres). The elimination of Spider Lake (890 acres) as a principal fishery has reduced opportunity by 5% in Region G. A continued trend in the decline of the sport fishery in Big Eagle (9,500 acres) and Churchill Lakes (3,720 acres) through the present planning period will further reduce opportunity in Region G by 79%, leaving only Clear Lake (614 acres) and Ross Lake (2,892 acres) as principal fishery waters.

Region F has increased opportunity with an additional lake but has seen acreage drop 6% as two waters in the last planning period have been replaced by two other waters now considered to support principal fisheries. Only Region C in Downeast Maine has increased winter opportunity with the addition of one lake as a principal fishery.

**Table 1. Distribution of Lake Whitefish by Management Region.<sup>1</sup>**

REGION	ALL LAKE WHITEFISH LAKES			PRINCIPAL FISHERY LAKES		
	NUMBER OF LAKES	NUMBER OF LAKES AS PERCENT OF TOTAL	AREA OF LAKES (ACREAGE)	NUMBER OF LAKES	NUMBER OF LAKES AS PERCENT OF TOTAL	AREA OF LAKES (ACREAGE)
<b>A</b>	4	5	32,775	1	6	284
<b>C</b>	3	4	26,846	2	11	16,541
<b>E</b>	23	31	144,064	4	22	18,842
<b>F</b>	17	23	88,463	7	39	28,510
<b>G</b>	28	37	43,148	4	22	16,726
<b>STATE</b>	<b>75</b>	<b>100</b>	<b>335,296</b>	<b>18</b>	<b>100</b>	<b>80,903</b>

**Table 2. Occurrence of Principal Lake Whitefish Fisheries in Maine Lakes by Lake Type and Management Region**

MANAGEMENT REGION	OLIGOTROPHIC LAKES		MESOTROPHIC LAKES		EUTROPHIC LAKES		TOTAL	
	NUMBER	ACRES	NUMBER	ACRES	NUMBER	ACRES	NUMBER	ACRES
<b>A</b>	1	284	0	0	0	0	1	284
<b>C</b>	1	14,340	0	0	1	2,201	2	16,541
<b>E</b>	4	18,842	0	0	0	0	4	18,842
<b>F</b>	6	23,134	1	5,376	0	0	7	28,510
<b>G</b>	4	16,726	0	0	0	0	4	16,726
<b>STATE</b>	<b>16</b>	<b>73,326</b>	<b>1</b>	<b>5,376</b>	<b>1</b>	<b>2,201</b>	<b>18</b>	<b>80,903</b>

<sup>1</sup> Regions B and D do not have lake whitefish populations.

**Table 3. Occurrence of Principal Lake Whitefish Fisheries in Maine Lakes by Management Type and Management Region**

MANAGEMENT REGION	COLDWATER		WARMWATER		COMBINATION		TOTAL INVENTORY	
	NUMBER OF LAKES	ACRES OF LAKES						
<b>A</b>	0	0	0	0	1	284	1	284
<b>C</b>	0	0	0	0	2	16,541	2	16,541
<b>E</b>	4	18,842	0	0	0	0	4	18,842
<b>F</b>	4	5,490	0	0	3	23,020	7	28,510
<b>G</b>	4	16,726	0	0	0	0	4	16,726
<b>STATE</b>	<b>12</b>	<b>41,058</b>	<b>0</b>	<b>0</b>	<b>6</b>	<b>39,845</b>	<b>18</b>	<b>80,903</b>

**Table 4. Angler Use Estimate for Lake Whitefish Lakes by Season and Management Region. Estimates Were Derived From the 1999 Ice Fishing Survey.**

REGION	SEASON	TOTAL ANGLER-DAYS	NUMBER OF ANGLER-DAYS AS PERCENT OF TOTAL	ANGLER-DAYS/ACRE
<b>A*</b>	Winter	9,828	26	0.34
<b>C</b>	Winter	5,537	15	0.33
<b>E</b>	Winter	10,439	28	0.59
<b>F</b>	Winter	3,004	8	0.11
<b>G</b>	Winter	8,645	23	0.52
<b>STATE</b>	<b>Winter</b>	<b>37,293</b>	<b>100</b>	<b>0.47</b>

\* Includes acreage from Sebago Lake which was a principal fishery at the time the survey was administered.

**Table 5. Mean Catch Rate (Legals Kept Plus Released/Angler Day) and Harvest Rate (Legals Kept/Angler Day) of Lake Whitefish Angled in the Winter From Maine Lakes Providing a Principal Fishery. Means are Weighted Means of Mean Rates Obtained From all Creel Surveys Conducted From 1996 to 2000. N is the Number of Surveys.**

MANAGEMENT REGION	CATCH RATE		HARVEST RATE	
	N	MEAN	N	MEAN
<b>C</b>	2	0.11	2	0.11
<b>F</b>	1	0.03	1	0.03
<b>G</b>	8	0.37	8	0.29
<b>STATE</b>	<b>11</b>	<b>0.29</b>	<b>11</b>	<b>0.23</b>

**Table 6. Mean Catch Rate (Legals Kept Plus Released/Angler Day) and Harvest Rate (Legals Kept/Angler Day) of Lake Whitefish Angled in the Winter From Maine Lakes That Formerly Supported Principal Fisheries. Means are Weighted Means of Mean Rates Obtained From all Creel Surveys Conducted From 1996 to 2000. N is the Number of Surveys.**

MANAGEMENT REGION	CATCH RATE		HARVEST RATE	
	N	MEAN	N	MEAN
E	1	0.06	1	0.06
G	5	0.03	5	0.03
STATE	6	0.04	6	0.04

**Table 7. Mean Length (Inches) and Weight (Pounds) of Angled Lake Whitefish During the Winter From Maine Lakes Providing a Principal Fishery. Means are Weighted Means of Means Obtained by Averaging Data From all Creel Surveys Conducted From 1996 to 2000. N is the Number of Surveys.**

MANAGEMENT REGION	LENGTH		WEIGHT	
	N	MEAN	N	MEAN
C	2	16.8	2	1.6
F	1	15.4	1	1.1
G	8	16.7	8	1.6
STATE	11	16.6	11	1.6

Lake Whitefish are typically found in Maine's deeper, well-oxygenated lakes. Oligotrophic habitat accounts for 16 of the principal fishery waters (90%). A single mesotrophic lake (7%) and a single eutrophic lake (3%) make up the remaining waters.

Whitefish sport fisheries are nearly evenly split between coldwater fisheries management, 51%, and combination warmwater/coldwater species management, 49% (Table 3).

All sport fisheries for lake whitefish are presently dependent on natural reproduction. It was stated in the 1996 Management Plan that without a stocking program for hatchery-reared whitefish, it was doubtful that existing principal sport fisheries and use opportunity could be maintained. Information in the present document has proven the validity of this statement.

Fishing for lake whitefish has been primarily associated with winter angling. As such, all but one principal fishery water (1,222 acres) are open to ice fishing.

## DEMAND

Statewide demand (angler use) for lake whitefish is considered low. Results from the Department's 1983 Angler Questionnaire Survey ranks winter angler preference for whitefish behind all other coldwater species and only ahead of yellow perch and sunfish. Open water anglers rated whitefish ahead of only the Arctic charr and burbot for coldwater species. This low preference of open water anglers for lake whitefish is again evident in the 1999 Open Water Fishing Survey where only 11% of the anglers rated the opportunity to catch this species as important to them on their fishing trip, placing whitefish ahead of crappie, yellow perch and burbot.

Angling for lake whitefish is considered to occur primarily in the winter season and in association with lake trout and salmon fishing. Estimates presented in the "Maine Open Water Fishing Survey, Summer, 1999 are felt to be unreliably high; consequently this assessment of demand is based on the winter fishery only.

Data from the Department's Ice Fishing Survey, Winter, 1999 (Table 4) indicate that demand on lakes declined by 55% in 1999. Statewide winter use in 1994 was 83,079 angler days compared to 37, 293 in 1999. Use declined in all regions with Region A and F experiencing the largest declines.

Although it is no longer considered a principal fishery for this planning period, Sebago Lake was considered a principal fishery at the time the 1999 Ice Fishing Survey was administered and use data from Sebago are included in Region A totals. Demand for lake whitefish is likely to become insignificant in Region A during the next 5 years having opportunity reduced to a single water of 284 acres.

The trend in winter angler use has been declining since peaking in the mid to late 1980's in favor of other winter activities, especially snowmobiling. Poor ice conditions that have prevailed for several winters in Regions A and C may have contributed, as well, to the reduction in angler use.

Regions E and G attracted the greatest demand in angler days per acre. This is considered to reflect the high value and demand that northern Maine anglers place on whitefish sport fisheries. Such demand is masked in angler preference rankings presented in statewide opinion surveys.

## FISHING QUALITY

Creel surveys conducted by Department personnel showed the number of lake whitefish caught per angler day by winter anglers increased from 0.13 during the period 1990-95 to 0.29 from 1996-2000 (Table 5). During these same time periods, winter harvest rates also increased from 0.10 to 0.23 whitefish per angler day. These statewide averages may be masking a declining trend in the fishery over the past 5 years in 2 of the 3 management Regions having data. Only Region G saw an increase in catch and harvest rates. A lack of creel survey data from principal fishery waters except in Region G makes it difficult to track the actual statewide trend in the whitefish sport fishery. In planning periods when creel surveys have been conducted on premier waters, data may be skewed upward because of the notable lack of waters supporting principal fisheries for lake whitefish in contrast to the greater number of waters that exist for other salmonid fisheries. Similarly, the trend may be skewed downward when data are not available from these premier waters or when data are available from only a few regional waters supporting principal fisheries.

Catch and harvest data from lakes that formerly supported a principal fishery clearly illustrate declining sport fisheries in waters that have had recruitment failure in their whitefish populations (Table 6). Fishing regulations have been unsuccessful in improving these fisheries.

The average size of lake whitefish harvested essentially remained unchanged over the previous 5-year period. For all surveys conducted from 1996-2000 winter anglers harvested whitefish that were 16.6 inches long and weighed 1.6 pounds compared to 16.9 inches and 1.6 pounds in 1995. Fish ranged in size from 15.4 inches and 1.1 pounds in Region F to 16.8 inches and 1.6 pounds in Region C (Table 7).

At present, winter catch and harvest in lakes are approximately 23,000 and 10,000 lake whitefish, respectively (Table 8). The winter catch increased by 20% and the harvest declined by 21% since 1994. This trend may reflect angler response to reduced bag limits as well as a change in angler attitude toward conserving Maine's fishery resources. Total winter harvest of lake whitefish was estimated at 0.21 pounds per acre in 1999.

**Table 8. Estimated Catch and Harvest of Lake Whitefish Angled in the Winter From Maine Lakes Providing a Principal Fishery by Season and Management Region. Estimates Were Derived From 1998 1999 Angler Questionnaires and From Creel Surveys Conducted From 1996 to 2000.**

MANAGEMENT REGION	NUMBER OF LEGALS CAUGHT	NUMBER OF LEGALS KEPT	HARVEST PER ACRE	
			NUMBER	POUNDS
A*	174	174	0.006	0.01
C	5,960	4,322	0.26	0.42
E	10,037	3,137	0.18	0.28
F	2,370	1,046	0.04	0.04
G	4,879	1,708	0.10	0.16
<b>STATEWIDE</b>	<b>23,420</b>	<b>10,387</b>	<b>0.13</b>	<b>0.21</b>

\* Includes acreage from Sebago Lake which was a principal fishery water at the time the questionnaire was administered.

## APPENDIX A

## ROUND WHITEFISH HISTORY

### **Description**

Round whitefish, Prosopium cylindraceum, are noticeably cylindrical in body shape. They are dark brown on the back fading to silvery sides and silvery-white below. Pectoral and pelvic fins are typically light orange in color. Scales are large. An adipose fin, characteristic of members of the Salmonid family, is located on the back between the dorsal and caudal fins. The mouth is small and toothless as adults.

### **Distribution**

Round whitefish are distributed along the United States and Canadian border from the Great Lakes east through northern Maine. In Canada, it ranges into northern New Brunswick, Labrador and Quebec and the far northern portion of the prairie provinces into the Northwest Territories and Alaska.

They are primarily distributed in the Kennebec, Penobscot, and St. John River drainages of north-central and northern Maine. Populations also exist in headwaters of the St. Croix drainage in northern Hancock and Washington Counties (Figure 1).

Round whitefish occur in 4 of Maine's 7 fishery management regions (Table 1). They have been found in 65 lakes totaling 211,327 surface acres. Region G has the greatest number of lakes whereas Region E, containing Moosehead Lake, has the highest acreage.

### **Habitat Requirements**

Round whitefish are most common in deep, oligotrophic lakes but have more tolerance of marginal habitats than lake whitefish and are found in a greater number of mesotrophic lakes. A resident population of round whitefish is known to exist in the St. John River of northern Maine.

### **Reproduction**

Spawning generally takes place in November and December in the gravelly shallows of lakes, at river mouths or in rivers and streams. Incubation of eggs and hatching of fry is similar in time to that of lake whitefish with fry emerging at or near ice out in Maine lakes.

### **Food Habits**

Round whitefish are bottom-feeding fish. Stomach contents from samples collected in Maine lakes include plankton, caddis fly larvae, midge larvae and small mollusks such as fingernail clams.

### **Age, Growth and Maturity**

Round whitefish are relatively long-lived with individuals up to 8 years of age common in most lake populations. Growth tends to be slower than that of lake whitefish with few individuals seen greater than 18 inches. Lengths usually range between 10-14 inches. Female

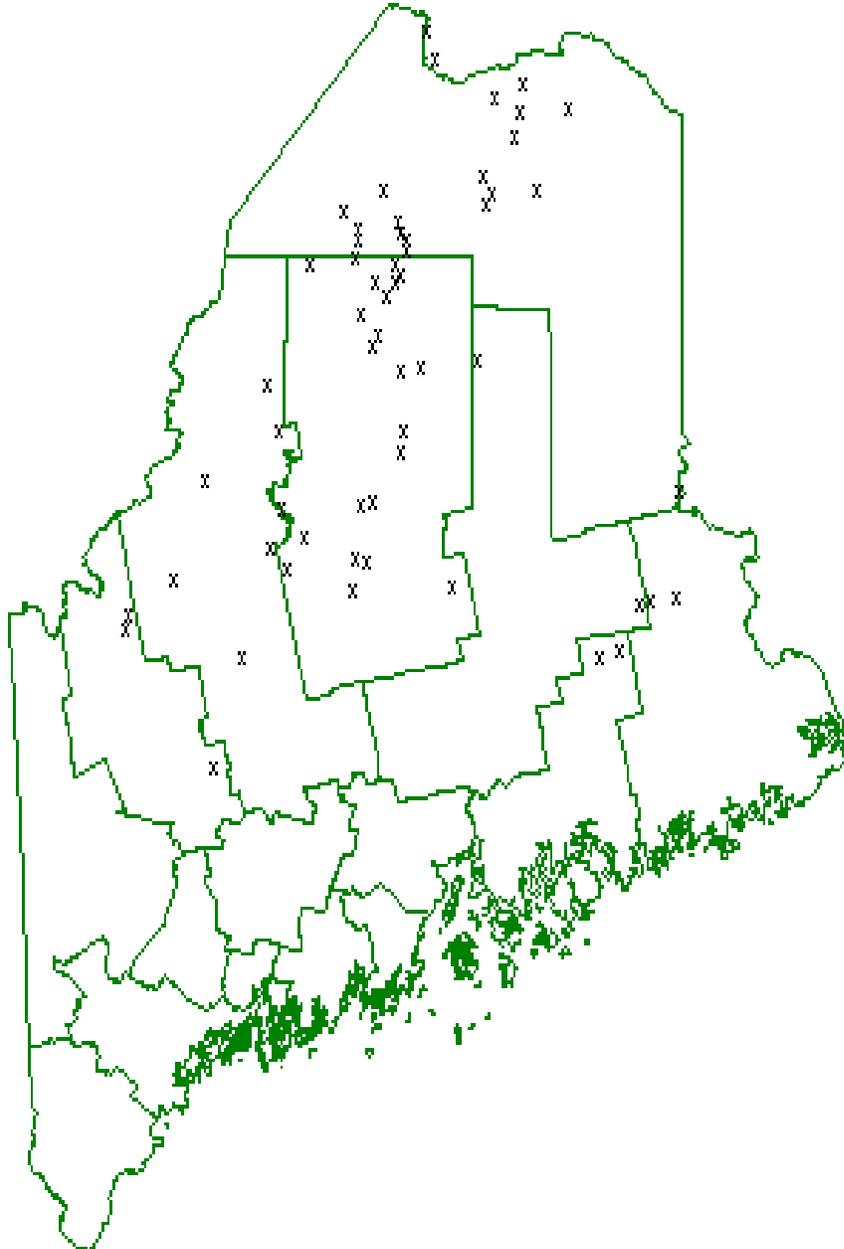


Figure 1. The Distribution of Round Whitefish in Maine Lakes, Year 2000 Update.

**Table 1. Distribution of Round Whitefish by Management Region**

MANAGEMENT REGION	NUMBER OF LAKES	AREA OF LAKES (ACREAGE)
C	4	1,848
D	5	6,126
E	18	111,460
F	10	40,996
G	28	50,897
<b>STATE</b>	<b>65</b>	<b>211,327</b>

round whitefish in northern Maine will attain sexual maturity typically at ages IV-VI. Many first time male spawners mature at age III.

The following table compares the range of lengths at each age of round whitefish taken at Beau Lake, T19R11, Aroostook County. Growth at Beau Lake is considered average for round whitefish in northern Maine waters.

Beau Lake – Average Length in Inches at Each Age (Sample Size)								
II	III	IV	V	VI	VII	VIII	X	XII
7.9	8.9	10.5	11.0	11.7	12.0	13.2	14.0	14.7
(5)	(12)	(11)	(4)	(6)	(5)	(5)	(1)	(1)

## **ROUND WHITEFISH MANAGEMENT HISTORY**

Round whitefish are a minor contributor to sport fishing in the state of Maine. Even where populations are abundant, these fish are seldom caught and rarely pursued by anglers, perhaps in large part due to their benthic feeding behavior. It is rare, even, to have them caught by winter anglers fishing small baits or jigging for smelts near the lake bottom. There are exceptions that include an early June fishery in Glazier Lake, T18R10 WELS, Aroostook County and spring fishing in the Kennebec, St. John and Fish Rivers. As a point of interest, biologists in Region G were requested to delay the artificial lure only regulation on Soldier Pond, a wide spot in the Fish River, until June 1 to allow anglers an opportunity to fish for round whitefish with bait.

Their greatest contribution to the sport fishery may be to serve as a forage fish for larger gamefish. However, Maine biologists have observed few round whitefish in the diet of other fish.

## **APPENDIX A**

### **COLDWATER WORKING GROUP INPUT**

**WHITEFISH MEETING SUMMARY**  
**December 13, 2001**  
**Jeff's Catering, Brewer**

**Issues:**

- ✓ Decline in the number of whitefish waters, specifically Lake Whitefish waters.
- ✓ Whitefish interactions with other species: effects on whitefish; effects on other species, introduction of species exotic to the particular whitefish water..
- ✓ Possibility of utilizing a hatchery program to restore/rehabilitate whitefish populations.
- ✓ Designate lake whitefish waters, i.e. waters wherein the primary management goal would be the health of the whitefish population/fishery, i.e. "We can't manage for everything in the same water".
- ✓ Possibility of reclamation as part of a whitefish restoration/rehabilitation program.
- ✓ Utilization of other methodologies in a whitefish restoration/rehabilitation program, such as, regulations to protect whitefish, regulations designed to target competing/predatory species.
- ✓ Effort/harvest as factors in declining whitefish populations.

**Goals:**

Maintain existing principal fisheries for whitefish in Maine.  
Identify and rehabilitate failed/failing lake whitefish populations, as appropriate.

**Objectives:**

- A. Maintain whitefish principal fisheries in 18 lakes.
- B. Inventory all whitefish populations and categorize them as:
  1. Populations supporting ongoing principal fisheries
  2. Failing but restorable populations
  3. Relict populations
    - a. With no record of ever having supported a principal fishery
    - b. Historically but no longer a principal fishery
- C. Investigate the factors that contribute to declining lake whitefish populations/fisheries.
- D. Develop/alter/retain/implement management programs designed to maintain existing whitefish principal fisheries
- E. Develop and implement restoration/rehabilitation programs on    \*\* waters.

\*\*Number to be determined based on outcome of inventory and available DIFW resources.

## SUMMARY

### CW-Working Group Meeting 12March2002

#### Whitefish Portion, only

1. Presentation of Whitefish Goals and Objectives and DIFW “review”. Although the basic premise of the whitefish goals and objectives were acceptable to the group, two significant suggestions for substantive changes were made:
  - a. Provisions should be made to allow for expansion of the range of lake whitefish into new waters, where fisheries heretofore did not occur. This goal should be secondary to the primary goals of maintaining principal fisheries in areas where they now occur and restoring/ rehabilitating populations that formerly supported principal fisheries for lake whitefish.
  - b. It has been suggested that since this species is in decline, consequently achieving the PRIMARY goals of the whitefish plan should be a high priority in the Department’s strategic management plan for fisheries.

**PRIORITIZED WHITEFISH MANAGEMENT OBJECTIVES**

DESCRIPTION OF STATEWIDE OBJECTIVES	Rankings (Coldwater Group)
Identify and investigate factors that have contributed to declining populations for lake whitefish.	1
Maintain lake whitefish principal fisheries in 18 waters.	2
Develop and implement restoration and/or rehabilitation programs for lake whitefish sport fisheries where use opportunity has declined.	3
Inventory and categorize all lake whitefish populations.	4

**PRIORITIZED WHITEFISH MANAGEMENT PROBLEMS**

Description of Management Problems	Final Rank
Use opportunity for lake whitefish sport fisheries continues to decline.	1
The Fisheries Division lacks sufficient staff and financial resources to implement the strategies necessary to achieve all of the objectives of the Management Plan.	1
The degree to which the Department's hatchery system can support lake whitefish hatching and rearing program is unknown.	1
Existing data on the population dynamics and abundance of lake whitefish in Maine are not adequate to permit the most effective management of the species.	4
An accurate and comprehensive statewide inventory of historic lake whitefish populations/sport fisheries is lacking.	5
Information describing angler use, catch and harvest of lake whitefish during ice and open water seasons on Maine's principal fisheries is not adequate to permit the most effective management of the species.	5
Whitefish habitat will be degraded or destroyed if land and water uses are not managed effectively and environmental laws are not strictly enforced.	7

**PRIORITIZED WHITEFISH MANAGEMENT OBJECTIVES, COLDWATER WORK GROUP**

DESCRIPTION OF STATEWIDE OBJECTIVES	Rankings Coldwater Group
Identify and investigate factors that have contributed to declining populations for lake whitefish.	1
Maintain lake whitefish principal fisheries in 18 waters.	2
Develop and implement restoration and/or rehabilitation programs for lake whitefish sport fisheries where use opportunity has declined.	3
Inventory and categorize all lake whitefish populations.	4

**CONCEPT PLAN FOR IMPLEMENTATION OF LAKE WHITEFISH MANAGEMENT OBJECTIVES (2001-2016)**

PRIORITIZED LAKE WHITEFISH MANAGEMENT OBJECTIVES, (COLDWATER WORK GROUP)	Rank	Region A Contribution			Region B Contribution			Region C Contribution			Region D Contribution			Region E Contribution			Region F Contribution			Region G Contribution			Statewide Totals		
		Exst	Prop	Dfct	Exst	Prop	Dfct																		
Identify and investigate factors that have contributed to declining populations for lake whitefish.	1																								
Maintain lake whitefish principal fisheries in 18 waters.	2	1	1	0	0	0	0	2	2	0	0	0	0	4	4	0	7	7	0	4	4	0	18	18	0
Develop and implement restoration and/or rehabilitation programs for lake whitefish sport fisheries where use opportunity has declined.	3																								
Inventory and categorize all lake whitefish populations.	4																								

**Exst = Existing;**  
**Prop = Proposed;**  
**Dfct = Deficit (Proposed – Existing).**