LAKE TROUT MANAGEMENT PLAN

DEPARTMENT OF INLAND FISHERIES AND WILDLIFE
DIVISION OF FISHERIES AND HATCHERIES

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LAKE TROUT LIFE HISTORY

Description

The lake trout (*Salvelinus namaycush*) lacks the distinctive coloration of its close relative, the eastern brook trout. Lake trout are usually either dark green or grayish brown in color, with white or pale yellow bean-shaped spots. In clear waters lake trout are often so silvery that the white spots are difficult to see. In stained waters they are very dark, almost black. Generally, a narrow border of white is present along the anterior margins of the pectoral, pelvic, and anal fins. This is most pronounced during spawning; however, at no time is this border as accentuated as it is on the fins of the brook trout. Lake trout fins are not orange or orange-red, like those of the brook trout.

Distribution

Lake trout are distributed throughout Canada. In the United States their natural range was restricted to northern New England, the Great Lakes, New York, Pennsylvania, Michigan, Minnesota, Montana, Idaho, and Alaska. In Maine they were originally found in about 100 lakes throughout the State. However, lake trout have been successfully reared in hatcheries. Consequently, their range has been extended considerably in the United States. In Maine they have been introduced into waters from Aroostook County in the north, to York County in the south. Throughout their native range lake trout are known by a wide variety of common names. In Maine they are called togue, whereas in other parts of the country and Canada they are referred to as mackinaw, salmon trout, lakers, grey trout, namaycush, Great Falls char, or mountain trout.

Habitat Requirements

Although lake trout are found in river systems and shallow lakes throughout northern Canada, their typical habitat consists of large, deep, coldwater lakes with irregular bottom contours and rocky shorelines. During the winter and spring, and again in the fall, when water temperatures are cool, lake trout are often found in shallow water around the shore. When surface waters warm in late spring and summer, they retreat to deeper water. Because lake trout require good water quality, they are most abundant in lakes with large volumes of deep water where temperatures remain 60°F or less throughout the year, and where levels of dissolved oxygen exceed 6 parts per million. Suitable spawning habitat is essential for self-sustaining populations through natural reproduction.

Reproduction

Lake trout spawn in the fall during the period from mid-October to mid-November. In northern Maine waters spawning occurs in October, and in southern Maine waters it occurs as late as November. Lake trout prepare to spawn as surface water temperatures cool below 60^{o} F. Mature fish typically congregate near exposed, shallow shoals or rocky shorelines. Spawning occurs at night, at depths usually less than six feet, and sometimes only a few inches. They often spawn within 30 feet of shore over broken ledge, large rocks, boulders and/or rubble ranging in size from 5 inches to 25 inches in diameter. Eggs are broadcast over the bottom where they settle and become sheltered in the crevices among the rocks.

Suckers, eels, bullheads, some aquatic insects, and crayfish will prey on lake trout eggs. However, the effects of this predation are probably of minor consequence if other environmental factors remain favorable. Lakes with large lake trout populations, where suitable spawning habitat is abundant, and where winter lake levels remain constant, have the best potential to maintain stable populations.

Eggs spawned in the fall incubate over winter under the ice, and hatch in 5 to 6 months, usually in April. The young remain among the crevices in the rocks until they absorb their yolk sacs. When they are able to swim and take food they move out into deep water.

Food Habits

During the lake trout's early years of life, its diet consists mainly of insects and crustaceans. In many Canadian waters the opossum shrimp *Mysis relicta* is an important food item for young lake trout. Individuals begin to feed on fish when they attain lengths of 8 to 10 inches. Once lake trout begin to feed on fish, they can adapt their food habits to utilize many sources of forage. Their growth and condition is dependent upon the type and abundance of forage available. In Maine, lake trout historically fed on whitefish, suckers, minnows, sunfish, slimy sculpins, white and yellow perch, cusk, and sticklebacks. It is important to note that smelts did not occur in waters with Maine's native lake trout populations. Where smelts have been introduced; however, lake trout feed on this species almost to the exclusion of all other forage, no matter how abundant other suitable species seem to be. It is not known whether this phenomenon is the result of a preference for smelt by lake trout, or simply a matter of smelts being easier prey.

When forage fish are not abundant, lake trout will feed on plankton and insects throughout their lives. Under these conditions growth is usually slow. Individuals in these populations do not attain the large sizes observed in populations that feed on fish, and they often mature at smaller sizes. Many people believe that these lake trout are of higher quality for eating than those that feed on smelts or other forage fish.

Although food habit studies do not indicate that small lake trout comprise a significant food item in the diet of adult fish, lake trout will prey upon their young, and especially upon newly stocked lake trout for a short period after stocking before the young fish have an opportunity to disperse throughout a lake.

Age, Growth, and Maturity

The lake trout is the second largest member of the salmon and trout family. In 1961, a lake trout weighing 102 pounds was caught in a gill net in Lake Athabasoc, Canada. The North American rod and reel record is 72¼ pounds, taken in 1995 from Great Bear Lake, Northwest Territories, Canada. The largest lake trout taken recreationally from United States waters weighed 61½ pounds. It was caught in Michigan waters of Lake Superior. Maine's rod and reel record fish of 31½ pounds was caught in 1958 in Beech Hill Pond, Hancock County. But such large fish are exceptions, rather than the rule. In most waters, even those where lake trout live under optimum conditions, most adults do not commonly attain weights over 5 pounds.

For the first 6 years of their lives lake trout grow at a rate of 2 to 4 inches per year. However, as individuals mature their growth rate slows, often to an inch or less per year beyond age 7 or 8. Males usually mature at younger ages and smaller sizes than females. There is considerable variation in both age and size at first spawning among Maine's lake trout populations. Some males mature as early as age 5 at lengths of 16 inches, but most will not

mature until age 6 at lengths from 16 to 18 inches. Females will mature as early as age 6, and sometimes at lengths of 18 inches, but most do not mature until age 7 or 8 at lengths of 20 inches and longer. Although males may spawn every year, females often spawn only once over a 2 or 3 year period.

The life span of the lake trout also varies considerably, but the species is the longest-lived of all salmonids. Individuals over 20 years in age are not uncommon in Maine, and fish over 25 years old have been recorded.

LAKE TROUT MANAGEMENT HISTORY

The lake trout is one of Maine's most popular and important coldwater game fish species. It utilizes a variety of forage species, and can exist with other game fish populations. In the winter, they provide good action throughout the entire ice-fishing season, and can be caught by inexperienced as well as veteran anglers. For a short period after ice-out in the spring lake trout can be taken near the surface with light tackle. After that they move into deep water where, until recently, special angling techniques have been required to provide fishing success. Advances in fishing technology, especially depth finders and downriggers, have improved chances for successful summer lake trout fishing for many people. Their excellence as a food fish, relative freedom from disease and parasites, adaptability to suitable environments, attractiveness as potential trophy game fish, and responsiveness to management are all qualities that make lake trout a valuable native Maine fishery resource. Over the past 50 years much has been learned about managing this species.

Protecting Wild Stocks

Wherever self-sustaining populations of lake trout occur fishery management emphasizes protecting these wild fish resources. Due to undocumented stockings that occurred throughout the early 1900's, it is impossible to determine the exact natural distribution of lake trout in Maine. Over the years, stocking has certainly increased their distribution and abundance throughout the State, and has created self-sustaining populations in waters where none occurred naturally. A review of all stocking records to date, and careful consideration of the location of waters stocked with lake trout in relation to other lake trout waters where no stocking records exist, indicates that 30 waters, totaling 37,061 acres, have never been stocked or influenced by fish stocked either upstream or downstream in the drainage. These are Maine's last pure wild populations. They represent 22% of the total number of Maine's present lake trout waters, but only 10% of the total acreage.

In order to protect the genetic integrity of these lake trout, a Fish and Wildlife Department policy recommends no stocking of other predators, competitors, or prey in any of their waters. Other recommendations in the policy include protecting the aquatic and riparian habitat that supports these populations, routinely monitoring water quality in these waters, and preparing regulations appropriate to insure both spawning escapement and protection of older age classes in each population. The policy also recommends, as funding permits, a systematic program of genetic analysis of each native wild population to determine the degree of genetic variability among the populations.

Stocking

Lake trout have been stocked to maintain populations where natural reproduction is inadequate to maintain satisfactory fisheries, or to create new fisheries through introductions into waters with suitable habitat. Both management techniques have been successful. When stocked in suitable habitat in appropriate numbers and at appropriate sizes, lake trout can compete successfully with non-sport species and provide satisfactory fisheries in the presence of other game fish, both coldwater and warmwater. This adaptability has been especially important in the southern and central parts of Maine where lake trout fisheries have been created by introductions into waters where they did not naturally occur.

Over the years production of lake trout in Maine hatcheries has varied in response to the availability of acceptable brood stock and/or eggs, as well as to the management programs and recommendations of regional fisheries biologists. In the 1930's and 1940's, as many as 1,065,000 lake trout fry, plus 24,000 spring yearlings, were stocked annually in 15 to 20 different waters. Through the 1950's, the number of fry stocked decreased and the number of spring yearlings increased as fishery management studies indicated that spring yearlings provided better returns to anglers. By 1960, all routine lake trout stocking involved spring yearlings. That year, 203,000 lake trout were stocked in 24 lakes. Through the 1960's and into the early 1970's, annual stockings increased to more than 400,000 spring yearlings in more than 50 lakes throughout the state.

Since the late 1970's, improvements in the size and condition of spring yearlings reared in Maine hatcheries, combined with improvements in the transportation and methods of stocking fish, greatly increased post-stocking survival, and the number of fish stocked each year has decreased in response to the improvements observed. In 1980, about 200,000 spring yearlings were stocked in 55 lakes; by 1985 only 58,000 were stocked in 41 lakes; and by 1990, 31,400 in 43 lakes. This trend continued through the 1990's. During the period 1991-95, an average of 38,500 spring yearlings per year were stocked in 37 waters, but from 1998-2000 an average of 28,350 spring yearlings per year were stocked in 21 waters.

Over the years, the lake trout reared in Maine's hatcheries have originated from many sources. Eggs have been procured from out of state, most recently from New York in order to obtain a deep spawning strain from the Finger Lakes to use in deep lakes like Sebago, where severe over winter drawdowns occur. Most lake trout for Maine stocking programs; however, have originated from brood stock created from eggs taken in the wild from Maine lakes, most notably Allagash Lake, Cold Stream Pond, and Lower Wilson Pond. At the present time, due to the low annual demand for spring yearling lake trout, and the modest demand for lake trout eggs to create splake, the lake trout-brook trout hybrid, plans call for continuing to use captive brood stock developed from the wild in Maine waters.

Management experience indicates that, in addition to stocking lake trout at appropriate sizes, stocking them at rates commensurate with the ability of individual waters to grow them is essential if stocked fish are to produce satisfactory fisheries, and not adversely influence management for other coldwater species that are present. Lake trout are now stocked as spring yearlings that average about 7¼ inches (about 7½ per pound) at the time of stocking. Stocking occurs while surface water temperatures are still cool, usually in May. The amount of suitable and productive habitat available during the summer must be considered in stocking lake trout. In the summer, water less than 40 feet deep is usually too warm for lake trout, and water deeper than 100 feet is not very productive. Therefore stocking is based on the area in a lake with depths between 40 and 100 feet deep. Up to 5 spring yearlings are stocked per acre of water with these depths. Factors that also influence the number stocked in each water include forage abundance, the presence of predators, and the potential for competition between lake trout and other salmonids managed in the same body of water. Although most waters are stocked annually, in recent years there has been some movement toward less frequent stocking in order to avoid stockpiling these relatively slow-growing fish and to avoid negative impacts that stockpiling has on growth and condition of all predators in a body of water.

Regulations

For many years Maine's lake trout populations were managed and maintained with liberal fishing regulations. However, during the past 50 years increases in leisure time and angler mobility, improvements in access to many areas, and improvements in fishing gear and techniques have contributed to increases in the amount of fishing for lake trout and harvests of the species. Statewide, "general law" regulations have changed in response to this. Since 1950, when a 25-fish bag and possession limit was in effect, bag limits have been reduced 5 different times. The present general law bag limit permitting only 2 lake trout per day dates back to 1982.

Under most conditions, the lake trout is a relatively slow-growing, late-maturing fish. As more was learned about the growth and maturity characteristics of Maine populations, longer minimum length limits were recognized as necessary to maintain or increase the number of mature spawners. Although a 14-inch general law length limit prevailed in Maine until 1978, in 1972 a special 18-inch minimum length limit was established for Moosehead Lake to aid the recovery of its wild lake trout population. Higher length limits followed on many other waters throughout the state, including a 20-inch minimum length limit at Hopkins Pond in Hancock County to help restore an over-exploited wild population there. The general law length limit was increased from 14 inches to 16 inches, beginning in the winter of 1978 for ice fishing seasons, and in the summer of 1979 for open water fishing seasons. In 1982, the general law length limit was increased again to the present 18-inch minimum length for both the ice and open water fishing seasons.

The present general law regulations have been very successful in maintaining most of Maine's lake trout populations, in some cases a little too successful. Increased spawning escapement resulting from the 18-inch limit established in 1982 produced more wild fish in some waters, resulting in large numbers of young wild fish, which "stockpiled" under the 18-inch minimum length. This has had a negative impact on the available forage, usually smelts. In some waters it has even affected the management of other species. In response to this, decreases in length limits, often combined with increases in bag limits, have been used to encourage harvesting the overabundance and help restore a balance within each lake trout population, as well as a balance between predators and their prey in each water.

Standing Stocks and Harvest Management

Sufficient data are not available to allow a useful estimate of the number of legal-size lake trout that are present in Maine waters. Recent population studies in Maine, and the results of studies elsewhere in the United States and Canada, indicate that even the best lake trout habitat often supports no more than one lake trout 18 inches and larger per surface acre of water.

It appears that the abundance of fish of this size typically ranges between 0.4 and 0.8 lake trout per acre, depending on such factors as the quality of the habitat, the presence of other sport fish, the extent of stocking, and the amount of exploitation by recreational fishing. Therefore, successful lake trout management requires carefully considering the ability of each population to sustain harvests and maintaining annual harvests within acceptable limits.

Canadian studies, and observations from heavily fished Maine lake trout waters, indicate that annual yields in excess of 0.45 pounds per acre from wild populations cannot be sustained without jeopardizing many of these populations. Depending on the size and age class structure of the population, acceptable annual harvest rates may be lower than 0.45 pounds per acre, and

sometimes even lower than 0.25 pounds per acre. Populations with an abundance of mature wild fish demonstrating slow growth should be harvested at lower rates than those with large standing crops of small fish or those with fast growth.

Higher annual yields, perhaps as high as 1.0 pound per acre in some waters, might be expected from populations sustained by stocking. However, if establishing a self-sustaining population is the objective of stocking, harvest should probably not exceed an annual rate of 0.45 pounds per acre. Sound management of all lake trout populations, whether wild or stocked, must carefully consider the capacity of individual waters to produce sport fish and sustain harvests of all species on an annual basis. For both wild and stocked populations, harvest rates at less than maximum sustainable levels should, in time, lead to increases in the number of older-age lake trout. This would eventually result in more larger-than-average-size (i.e. trophy) fish **if** suitable forage were available and not a limiting factor.

Habitat Protection

Because lake trout prefer the deep, coldwater lakes with excellent water quality at all depths, in order to maintain lake trout populations it is important to protect their habitat. This begins with protecting watersheds and shoreline areas to prevent influences that would degrade water quality. As lake trout spawn in the fall in very shallow water, it is essential to protect this spawning habitat if self-sustaining populations are to be maintained. Dams are present on the outlets of 63 (46%) of Maine's 137 lake trout waters. Of these 63 dams, 54 hold several feet or more water, enough to influence the success of lake trout that spawn in shallow water along the shore. In order to generate hydroelectric power, and/or to make room to capture the following spring's runoff, storage from most waters with dams is withdrawn during the winter months. The Fish and Wildlife Department has a long-standing policy that advocates protecting lake trout spawning by establishing and specifying water levels adequate to cover spawning areas that have been identified. To assure the success of natural reproduction, the policy recommends that withdrawals to this level should be completed prior to spawning in October. Throughout the following winter the water level may be managed to both rise and fall, provided it does not drop below the elevation established for spawning. To date, there are active fall drawdowns agreements at 29 (54%) of the 54 dams on lake trout waters.

A deep-spawning strain of lake trout from the Finger Lakes in New York has been introduced into a few Maine lakes where winter water level fluctuations were an important concern, in hopes that these fish would maintain their deep-spawning characteristics. Although these fish have reproduced successfully in some waters where they have been introduced, most notably in Sebago Lake, to date deep spawning has yet to be documented in Maine. In fact, in Sebago Lake these fish have spawned very successfully close to shore at depths ranging from 6 to 16 feet.

Forage Introductions

Forage enhancement successes utilizing the opossum shrimp (*Mysis relicta*) were widely reported in fishery literature in the early 1970's. At that time it was noted that these macro invertebrates utilized detritus as a food source and therefore recycled nutrients in providing excellent food for trout and salmon. Studies since that time have revealed that in their new habitats these invertebrates also consumed large zooplankton species such as Cladocerans. Many introductions, especially in very deep, single basin lakes in the western United States, had disastrous ecological consequences.

In waters where the two species occur together naturally, the opossum shrimp is very important in the diet of Canadian lake trout. Therefore, in the mid 1970's opossum shrimp were introduced into several Maine lakes as a source of forage for young lake trout. It was hoped that by living in the deepest water of these lakes, and feeding on accumulations of detritus there, they would improve lake trout growth and survival and help to increase production in our nutrient-poor lakes. Success at establishing a self-sustaining population of opossum shrimp has been achieved only at Moosehead Lake. The importance of this forage to young lake trout in Moosehead; however, has yet to be determined. Winter food habit studies to date have not found opossum shrimp in the stomachs of legal-size ($\geq$14 inches) lake trout harvested by ice fisherman. Summer netting studies of lake trout as small as 8 inches indicate only occasional use of opossum shrimp. Other species, such as cusk and smelts, appear to utilize them more frequently, but they are not a major component of their diets.

Recent studies of the opossum shrimp in Moosehead Lake indicate that, although present throughout the lake, they are not very abundant. Apparently, Moosehead's physical, chemical, and biological characteristics have not been conducive for this invertebrate to become very abundant or produce any of the devastating effects that have been observed as the result of introductions in western states. Nevertheless, prudence dictates that until the role of the opossum shrimp in Moosehead Lake's ecosystem is fully understood, there should be no further introductions of *Mysis relicta* into Maine waters.

It is likely that smelts did not occur naturally in most, if not all of Maine's native lake trout waters. Based on food habit studies of lake trout from Canadian waters without smelts, from Maine waters before smelts were introduced, and from Maine waters presently without smelt, lake trout rely on a variety of indigenous species as forage. Most notable among these is the lake whitefish. However, as the distribution of smelts increased after the late 1800's, it became common knowledge that where smelts were abundant in lake trout waters, lake trout always appeared in excellent condition. Where smelts were absent, or present only in low abundance, lake trout often appeared long and lean, with large heads. Because of this smelts have been widely introduced, both legally and illegally, into most Maine lake trout waters to enhance the forage base, often with little or no consideration given to the environmental consequences.

At present smelts are found in 123 (93%) of Maine's 137 lake trout waters. Of the 14 waters remaining without smelts, 12 are located in the remote areas of northwestern and northern Maine. There is evidence that lake trout which depend on smelts as their principal forage mature at larger sizes and older ages than those that prey on traditional indigenous foods. As lake trout will survive on other forage fish species, smelts should not be introduced to any of the remaining 14 lake trout waters where they are not present, at least until the environmental consequences of such introductions are more fully understood.

Where smelt populations have declined, it has been a common management practice to augment these populations by stocking adults or eggs obtained from other waters. Because of the potential for introducing diseases and parasites by moving adults, especially the parasite *Glugea hertwigi*, a Fishery Division policy prescribes that only eggs, which can be treated for *Glugea*, may be transplanted. Smelt eggs are transferred to augment existing populations in the short term, or to establish or enhance spawning runs. However, when low smelt abundance is a chronic problem, continued stocking of smelts is a questionable management practice. In that situation the problem of low smelt abundance should be addressed by first identifying, then correcting the factors, which limit smelt abundance. For instance, if too many predators rely on smelts as their forage base, the solution is to manage the predators appropriately, and not to rely on an artificial feeding program that maintains both predator and prey populations at levels above the natural ability of the body of water to produce and sustain either.

Age and Growth

Growth can be defined as an increase in size, either length or weight, over time. Therefore, determining fish growth rates requires knowledge of the age of the fish. An easy and usually reliable method of obtaining growth information from Maine lake trout has been through stocking hatchery-reared fish that were marked by fin excision prior to their release. For the past 30 years, all lake trout stocked in Maine have been marked both to distinguish them from wild fish, and to assist in determining their age.

The age of unmarked, wild fish can be determined using a variety of methods. Determining ages from scales samples is perhaps the most common method of aging most salmonids. However, the annual growth patterns on lake trout scales do not lend themselves to easy interpretation, especially for mature fish age 6 and older. Otoliths, calcareous structures located within the inner ear of fish, provide a far more reliable means of determining lake trout ages. Utilizing otoliths to determine lake trout ages in Maine began in the mid 1980's.

The following table compares the average length at each age of 844 wild lake trout and 560 stocked lake trout sampled in Moosehead Lake. The wild lake trout were sampled during the 12-year period 1989-2000. All were aged using their otoliths. The stocked fish were sampled over a 21-year period 1971-1991, and all ages were determined on the basis of the marks (fin clips) the fish received prior to stocking. Although growth at Moosehead is a little slower than has been observed on other Maine waters, it is certainly typical of a northern Maine lake trout population.

	Moosehead Lake – Average Length in Inches at Each Age (Sample Size)													
	I	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**IX**	**X**	**XI**	**XII**	**XIII**	**XIV**
Wild	5.8 (7)	9.4 (130)	12.5 (166)	14.4 (226)	16.1 (137)	17.5 (77)	18.9 (36)	20.0 (9)	19.6 (14)	21.1 (10)	20.5 (11)	21.0 (17)	23.2 (3)	25.0 (1)
Stocked	6.9 (3)	9.1 (8)	11.8 (30)	16.0 (40)	18.4 (102)	18.9 (156)	19.5 (114)	20.0 (53)	20.9 (27)	22.1 (13)	21.3 (11)	23.1 (3)	-	-

Stocked fish are generally larger at each age than the wild fish. Fish raised for a year in the hatchery environment have a distinct size advantage over fish that must fend for themselves in the wild. Annual growth for both stocked and wild fish is faster prior to maturity, which usually occurs between ages 5 and 8. From age 1 through age 5, wild lake trout in Moosehead grew an average of 2.6 inches per year. After age 5, their average annual growth slowed to slightly less

than an inch per year. Likewise, from age 1 through age 5, lake trout stocked in Moosehead grew an average of 2.9 inches per year. After age 5, their average annual growth slowed to about 0.7 inches per year.

Growth information comparing wild lake trout sampled from Sebago Lake in 1996 with stocked lake trout sampled during the period 1974-1980 reveals a trend similar to that observed at Moosehead Lake. At Sebago; however, the average lengths of both wild and stocked fish at each age are generally a couple of inches longer than the length of Moosehead Lake lake trout.

SEBAGO LAKE – AVERAGE LENGTH IN INCHES AT EACH AGE (SAMPLE SIZE)									
	I	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**IX**
Wild	7.4 (1)	11.9 (7)	14.3 (11)	16.5 (11)	18.4 (25)	19.5 (15)	20.3 (3)	21.3 (2)	18.8 (1)
Stocked	-	-	15.9 (N/A)	17.0 (N/A)	18.3 (N/A)	21.3 (N/A)	22.2 (N/A)	24.4 (N/A)	27.0 (N/A)

These tables indicating average lake trout lengths at each age do not show the very wide variation in lengths that occurs in lake trout at any given age, and growth rates vary a great deal among individuals. Furthermore, the variation in length at each age ranges from as little as 4 inches, to as much as 8 inches, and even more in some populations. Because of this, the oldest lake trout caught are not always the largest ones.

In most lake trout populations the majority of adults appear destined to grow no longer than 21 to 24 inches. However, in each population a few individuals appear to have the potential to attain a much larger size. To do so they must feed more aggressively. Therefore, they are also the most likely to get caught and removed from the population before they have an opportunity to attain all of their potential growth. Nevertheless, a few do escape fishing during their early years, and these become the real trophies that are reported each season.

Condition

The condition of a fish is a description or measure of its relative plumpness or robustness, usually in relation to an established standard. Determining the condition of a fish requires knowing the weight of each individual for which a length is available, regardless of age. For each species a standard can be developed that represents all populations over its natural range, all populations in a particular region, or a population in an individual body of water at a particular point in time.

An equation to determine the standard weight of lake trout that can be expected at any length has been calculated using information from hundreds of lake trout of all sizes from 58 typical North American lake trout populations. Lengths and weights from populations in 9 American states and 5 Canadian provinces were used, including 15 Maine lake trout populations. Here in Maine, as throughout their range, lake trout vary widely in condition, depending on the productivity of their habitat, their abundance in a population, and most importantly, the type and amount of forage available to them. Populations with a wide range in condition were represented in Maine's contribution.

The following table indicates the standard weights that can be expected, on the average, at each length in populations that demonstrate the range of lake trout condition in Maine, as well as the standard weights calculated at each length using the equation for all lake trout population in North America (Standard weight in pounds calculated for each length).

	STANDARD WEIGHT IN POUNDS CALCULATED FOR EACH LENGTH										
	18”	**19”**	**20”**	**21”**	**22”**	**23”**	**24”**	**25”**	**26”**	**28”**	**30”**
Maine Low (Embden Lake)	1.86	2.18	2.53	2.92	3.35	3.81	4.31	4.86	5.45	6.76	8.27
Maine Average (15 waters)	1.91	2.27	2.67	3.11	3.61	4.15	4.75	5.41	6.12	7.74	9.64
Maine High (Spider Lake)	2.15	2.55	2.98	3.47	4.01	4.60	5.25	5.95	6.72	8.45	10.46
North American Standard (58 waters)	1.98	2.36	2.79	3.27	3.80	4.39	5.04	5.76	6.54	8.32	10.41

The information in this table can be useful in assessing the condition of lake trout in any Maine population. It can also be useful in determining lengths that might be appropriate if management for larger-than-average lake trout is an objective. In this latter case, it is apparent that a fishery to produce lake trout averaging over 5 pounds involves fish from 24 to 26 inches and longer in length. Taking into account the growth of lake trout in Maine, in most waters such a fishery would involve lake trout that, even with the fastest growth, would be 8 to 10 years old, and older.

PAST MANAGEMENT GOALS

Goals established in the 1996 Management Plan update called for maintaining the distribution and the abundance of lake trout in Maine, providing for existing use while maintaining or improving fishing quality, and increasing the opportunity to catch larger-than-average lake trout in selected waters. In 1996, specific management objectives were established for abundance, fishing quality, and harvests.

Abundance: *Maintain all present lake trout populations that support principal fisheries at or above current levels of abundance.* Management during the past 5 years has not increased the abundance of lake trout on a statewide basis. Since 1995, the number waters identified as principal fisheries has decreased from 130 to 111, and their total acreage has decreased by more than 59,000 acres. Decreases occurred in all areas except eastern Maine. The most significant decreases occurred in southern Maine, where ten principal fisheries (6,492 acres) have been lost, in west central Maine, where five principal fisheries (40,484 acres) have been lost, and in northern Maine, where three principal fisheries (8,332 acres) have been lost. However, none of these decreases reflect the loss of a wild, self-sustaining fishery. Rather, all reflect changes in the management of previously stocked waters where lake trout fisheries were not meeting objectives, and where habitat conditions were better suited for another species, such as the splake, to provide better fishing for anglers.

Fishing Quality: *(1) Maintain regional average sizes for lake trout harvested at a statewide average of 20 inches and 2.5 pounds, with success and catch rates varying among regions depending on population abundance and use at each water.* Management during the past 5 years has achieved the goal of accommodating use and at the same time maintaining or improving fish quality. Fishing quality, in terms of catch rates and average sizes of lake trout harvested, remains consistent with the objectives outlined in 1996.

(2) Add two waters to the five existing "trophy" fisheries, where lake trout harvested average 6 pounds or more. Management during the past 5 years has added three waters to the previous five with special regulations designed to provide size quality fishing opportunities. However, in many cases the minimum length limits that were established were not high enough, therefore the average size of the fish harvested from all waters has not exceeded 6 pounds.

(3) Identify and maintain or establish at least one "high quality" lake trout water per region, with fishing regulations appropriate to maintain or create a fishery for lake trout that average 4 pounds or larger. Although fishery management during the past 5 years has maintained high quality fisheries in each region, it has not required special regulations beyond existing general law to produce lake trout that averaged 4 pounds or better in certain waters.

Harvest: *Limit the harvest of lake trout from all principal fisheries to a statewide average that does not exceed 0.5 pounds per acre per year. In principal fisheries open to fishing both winter and summer, winter harvests should not exceed 50% of the total annual harvests.* Based on the results of surveys conducted on individual waters from 1996 through 2000, a statewide average for lake trout harvests has not exceeded 0.5 pounds per acre per year. And in most waters winter harvests have not exceeded 50% of total annual harvests. However, there is considerable variation in these statistics among waters and among regions, and it is likely that a harvest rate of more than 0.5 pounds per acre per year, and a winter harvest greater than 50% of the annual harvest, has occurred on some waters, especially smaller ones where use is high.

Of all strategies outlined in past lake trout plans, obtaining use, catch and harvest data from typical lake trout fisheries throughout the State, especially on an annual basis, remains the most difficult to fulfill. This information is essential if Maine's lake trout fisheries are to be assessed adequately and managed appropriately.

OPPORTUNITY

In this section, and elsewhere in the plan, data are presented on the basis of the Department's seven Fishery Management Regions (Figure 1).

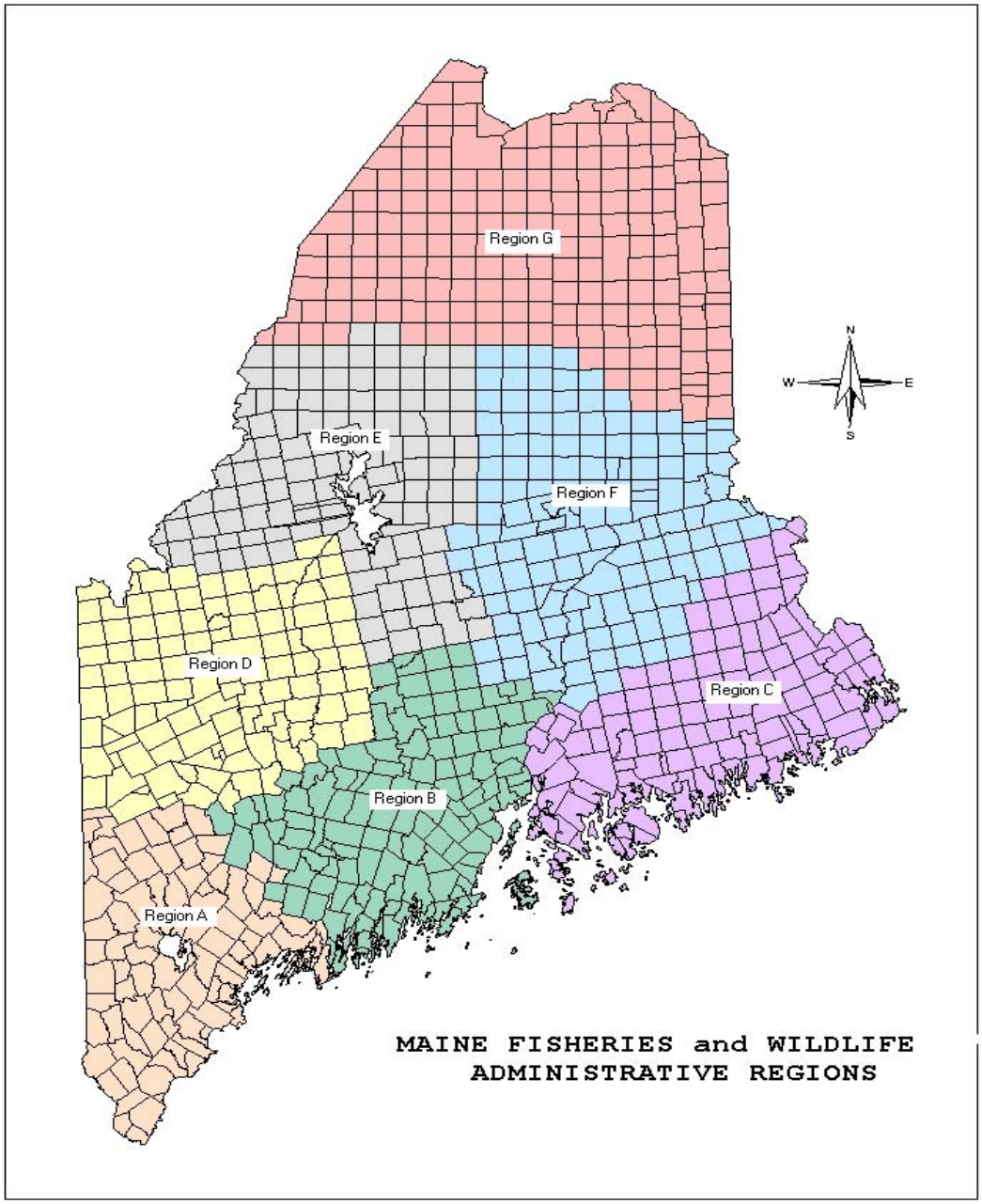

Figure 1. Fishery Administrative Regions

Lake trout populations presently occur in 137 lakes and ponds, with a combined area of 389,003 acres (Table 1). These waters represent only 7% of all 2,076 Maine lakes and ponds that have been inventoried, but 41% of the total area of all surveyed waters. The northern three Fishery Management Regions (Regions E, F, and G) account for 61% of Maine's 137 lake trout waters, and 72% of their total area. When water temperatures are cold, lake trout can be found in the tributaries to and outlets of the lakes where they occur. In Maine; however, no populations live exclusively in flowing water. Therefore all management is concentrated on lakes and ponds.

Maine lake trout waters average 2,839 acres in area, indicating that the species typically occurs in larger lakes. This average is influenced significantly by Maine's largest lakes with lake trout, which include Moosehead (74,890 acres), Sebago (28,771 acres), Chesuncook (26,200 acres), the Pemadumcook Chain (18,300 acres), East Grand (16,070 acres), and West Grand (14,340 acres). These six waters comprise a total of 178,571 acres, or 46% of the total lake area in Maine with lake trout. Excluding them, the average size of the remaining 131 lakes and ponds with lake trout is still 1,606 acres. Nevertheless, lake trout populations are also found in four waters less than 100 acres in area.

Table 1. Number and acres of Maine lake trout waters, by Fisheries Management Region

REGION	ALL INVENTORIED LAKES		PRINCIPAL FISHERIES FOR LAKE TROUT		OTHER LAKES WITH LAKE TROUT	
	NUMBER	ACRES	NUMBER	ACRES	NUMBER	ACRES
A	297	91,047	6	40,725	7	9,288
B	273	100,338	7	11,089	2	639
C	274	138,017	13	29,213	2	2,274
D	261	107,536	16	17,524	1	64
E	420	224,326	28	116,916	5	36,114
F	272	189,486	14	65,485	5	8,310
G	279	94,597	27	39,450	4	11,912
STATE	**2,076**	**945,347**	**111**	**320,402**	**26**	**68,601**

Management is most intensive on the 111 waters, totaling 320,402 acres, where lake trout are actively sought by anglers, and where they contribute significantly to the catch. For planning purposes only these principal fisheries will be considered. They are distributed throughout Maine (Figure 2). Three northern Regions account for the majority of both the number (62%) and

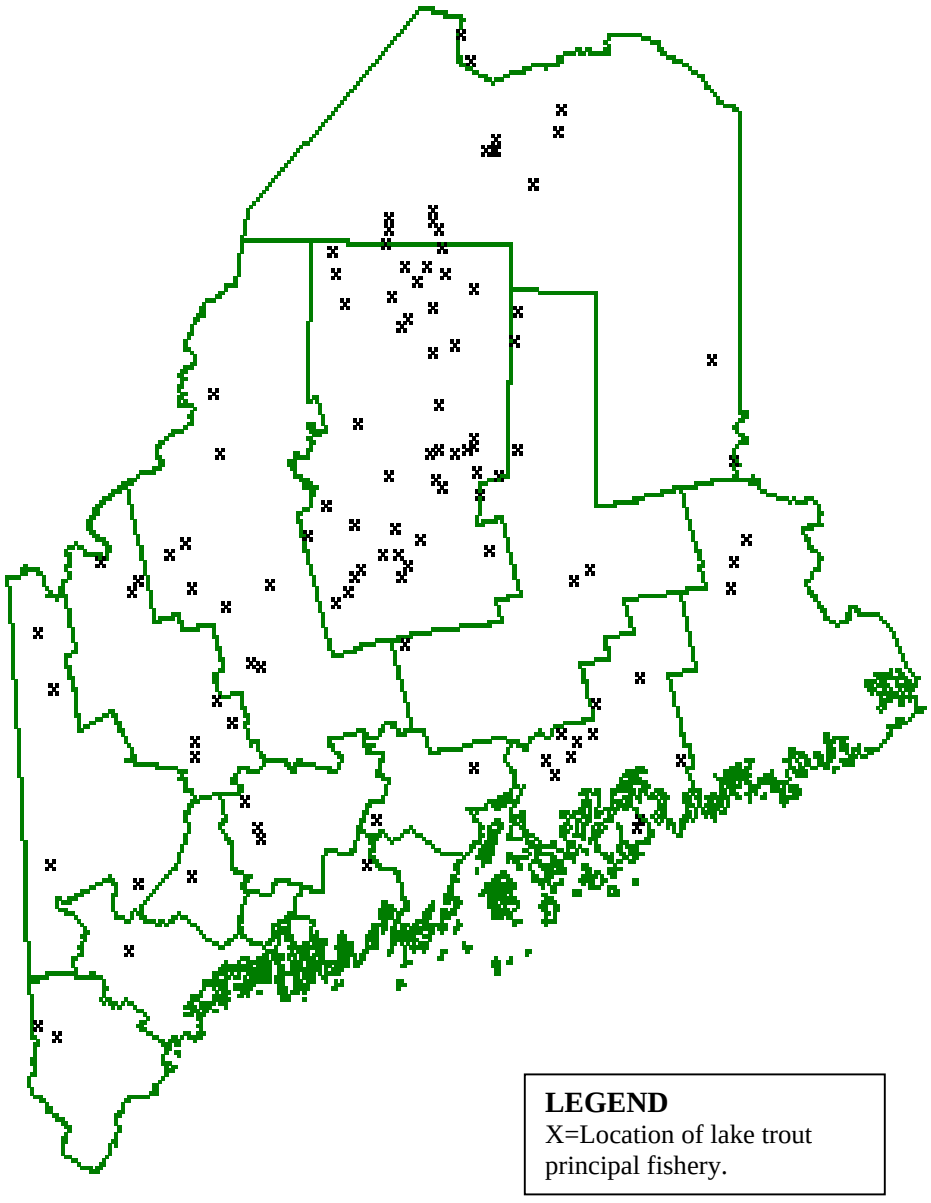

Figure 2. The Distribution of Lake Trout Principal Fisheries in Maine.

acreage (69%) of principal fisheries for lake trout. Although the 111 waters supporting principal fisheries average only slightly larger in area (2,887 acres) than the 26 other waters in which lake trout occur incidentally (2,638 acres), their average depth is almost 11 feet deeper than the other waters. Therefore the principal fisheries represent the best lake trout habitat in Maine.

Due to the habitat requirements and preferences of lake trout, 93% of the waters with principal fisheries are classified as oligotrophic, that is, they are characterized by having a large

percentage of total lake volume comprised of deep, cold, well-oxygenated water (Table 2). The remaining 7% are found in what is usually considered the marginal habitat of mesotrophic lakes. Although oligotrophic lakes are best suited for lake trout management, and most often produce the best fisheries, the present distribution of the species indicates that other types of lakes can be managed successfully to produce satisfactory fisheries.

Table 2. Occurrence of Principal Fisheries for Lake Trout by Fisheries Management Region and by Lake Trophic Type

REGION	OLIGOTROPHIC		EUTROPHIC		MESOTROPHIC		TOTAL	
	NUMBER OF LAKES	ACRES OF LAKES	NUMBER OF LAKES	ACRES OF LAKES	NUMBER OF LAKES	ACRES OF LAKES	NUMBER OF LAKES	ACRES OF LAKES
A	5	39,825	0	0	1	900	6	40,725
B	3	3,410	0	0	4	7,679	7	11,089
C	13	29,213	0	0	0	0	13	29,213
D	16	17,524	0	0	0	0	16	17,524
E	28	116,916	0	0	0	0	28	116,916
F	12	64,730	0	0	2	755	14	65,485
G	26	38,752	0	0	1	698	27	39,450
STATE	**103**	**310,370**	**0**	**0**	**8**	**10,032**	**111**	**320,402**

A majority of the lakes supporting principal fisheries for lake trout are managed only for coldwater species (Table 3). However, 28 are also managed for warm water species, usually smallmouth bass, white perch, and/or chain pickerel. The lake trout's preference for deep, cold water isolates the species from these competitors and potential predators. Thus lake trout can survive and provide fisheries in waters with competition that might limit severely the production of other less tolerant coldwater species, such as the brook trout. Most lake trout fisheries in combination management lakes occur in the lower elevation regions of southern, central, and eastern Maine, especially in Regions A, B, C, and F where warm water species are more widely distributed and abundant.

Lake trout waters are not distributed evenly throughout Maine. One factor influencing the opportunity to fish for lake trout is the distribution of lakes supporting principal fisheries for the species (Table 4). Southern and west central Maine (Regions A and E) have the greatest percentages of lake trout water in relation to total lake area, followed by east central and northern Maine (Regions F and G). The high percentage of lake trout water in southern Maine can be attributed to Sebago Lake, which represents nearly a third of the total area of all inventoried waters in Region A. Likewise, in west central Maine (Region E), Moosehead Lake represents one third of all inventoried waters, and therefore contributes significantly to the very high proportion of lake trout water there. The lowest percentages of lake principal fishery area occur in south central, eastern and western Maine (Regions B, C, and D).

Table 3. Occurrence of Principal Fisheries for Lake Trout by Fisheries Management Region and by Lake Management Type

REGION	COLDWATER		COMBINATION COLDWATER & WARMWATER		TOTAL	
	NUMBER OF LAKES	ACRES OF LAKES	NUMBER OF LAKES	ACRES OF LAKES	NUMBER OF LAKES	ACRES OF LAKES
A	0	0	6	40,725	6	40,725
B	0	0	7	11,089	7	11,089
C	7	5,015	6	24,198	13	29,213
D	14	16,210	2	1,314	16	17,524
E	23	104,705	5	12,211	28	116,916
F	12	38,225	2	27,260	14	65,485
G	27	39,450	0	0	27	39,450
STATE	**83**	**203,605**	**28**	**116,797**	**111**	**320,402**

West central Maine (Region E) has by far the highest ratio of lake trout acreage per square mile of land area in the region, again due to the influence of Moosehead Lake. South central, eastern, western and northern Maine (Regions B, C, D and G) have the lowest proportions of lake trout acreage in relation to land area, all with fewer than 10 acres of water per square mile of land area in the Region. However, as a result of increases in leisure time, and increases in income, Maine anglers have overcome most of the limitations in use opportunity posed by the unequal distribution of the resource as it relates to the population centers of the state. Fishermen readily can and do travel to wherever lake trout are found in the greatest abundance, and whenever it is reported that they are biting.

Natural reproduction maintains populations in 81 (73%) of the 111 lakes with principal fisheries for lake trout (Table 5). More than half of the populations are self-sustaining in all but southern and south central Maine (Regions A and B). Hatchery fish are used to sustain principal fisheries in 30 waters, but only in south central Maine (Region B) does stocking support lake trout fisheries in more than one half of the total acreage. Southern, eastern, and west central Maine waters (Regions A, C, and E) are least dependent on hatchery fish to support their principal fisheries.

Table 4. Distribution of Maine Lakes, Which Provide Principal Fisheries for Lake Trout

MANAGEMENT REGION	PRINCIPAL FISHERY ACRES AS A PERCENT OF ALL INVENTORIED ACRES	PRINCIPAL FISHERY ACRES PER SQUARE MILE OF LAND AREA
A	45	12.7
B	11	2.8
C	21	7.3
D	16	4.1
E	52	26.6
F	35	13.0
G	42	5.6
STATE	**34**	**10.1**

During the 1990's, the number of spring yearlings stocked in Maine annually decreased by about 25%. This reduction in stocking can be attributed to several factors. In some waters fewer spring yearlings have been requested in order to improve the growth of newly stocked fish with the forage that is available. In the past, some waters with very limited natural reproduction were stocked to maintain satisfactory lake trout fisheries. With the improvements in populations noted as a result of the 18-inch length limit, concern over competition between young wild fish and the much larger, newly stocked lake trout have also prompted significant reductions. In several cases stockings have ceased to determine if natural reproduction can sustain fisheries in waters that had been stocked for many years. Some of the reductions can also be attributed to shifts in management away from lake trout to other species, such as the splake, which has produced better returns to anglers. Finally, there has also been a shift to less-frequent-than-annual stockings due to concerns over growth, available forage, and/or competition with other species being managed in the same body of water. It is anticipated that no more than 30,000 spring yearling lake trout will be required each year during the next 5-year planning period.

Table 5. Number and Acres of Maine Lakes, by Fisheries Management Region, With Principal Fisheries for Lake Trout that are Sustained by Natural Reproduction or by Stocking

REGION	ALL LAKES WITH PRINCIPAL FISHERIES		LAKES WITH POPULATIONS SUSTAINED BY NATURAL REPRODUCTION		STOCKED LAKES	
	NUMBERS	ACRES	NUMBER	ACRES	NUMBER	ACRES
A	6	40,725	3	34,965	3	5,760
B	7	11,089	3	3,625	4	7,464
C	13	29,213	11	26,006	2	3,207
D	16	17,524	14	9,724	2	7,800
E	28	116,916	24	108,166	4	8,750
F	14	65,485	11	34,060	3	31,425
G	27	39,450	15	22,098	12	17,352
STATE	**111**	**320,402**	**81**	**238,644**	**30**	**81,758**

All Maine lake trout waters are open to fishing during the open water fishing season. Many waters; however, are closed to ice fishing, either as a conservation measure or because of a lack of active public demand for winter fishing opportunity. On a statewide basis, 40 (36%) of the 111

waters with principal fisheries for lake trout are closed to ice fishing, yet only 10% of the total acreage is closed (Table 6). Thus many of the waters closed to ice fishing are smaller lakes and ponds, where populations are more vulnerable to over exploitation. Winter fishing opportunities are most limited in western and northern Maine (Regions D and G); areas where tradition has resulted in more restrictions on ice fishing. Throughout the remainder of the state 90% or more of the total lake acreage in each Region is open to ice fishing.

Since 1978, when the ice fishing season was extended by one month to include the month of January, there has been a running debate over the impact of providing this additional ice fishing opportunity. It is likely that this debate will continue. Opening waters presently closed to ice fishing is another topic of ongoing debate. It is unlikely that during the next planning period there will be any increase in the number of waters that are open.

The diversity of lake trout habitats and lake trout populations within and among Regions requires management strategies that differ, sometimes significantly, from water to water. However, the present management of Maine's principal fisheries for lake trout provides for three categories of fishing opportunities. The opportunity each fishery can provide is determined by the characteristics of the aquatic habitat, the characteristics of the lake trout population, the amount and types of forage available for growth, and whether other coldwater game fish species are being managed concurrently in the same body of water.

Table 6. Ice Fishing Opportunities for Lake Trout Principal Fisheries in Maine

	LAKES OPEN TO WINTER OPPORTUNITY				LAKES CLOSED TO WINTER OPPORTUNITY			
REGION	NUMBER	PERCENT	ACRES	PERCENT	NUMBER	PERCENT	ACRES	PERCENT
A	5	83%	38,465	94%	1	17%	2,260	6%
B	7	100%	11,089	100%	0		0	
C	12	92%	29,104	>99%	1	8%	109	<1%
D	8	50%	7,010	40%	8	50%	1,756	60%
E	12	43%	105,946	91%	16	57%	13,887	9%
F	13	93%	64,845	99%	1	7%	640	1%
G	14	52%	31,766	81%	13	48%	10,467	19%
STATE	**71**	**64%**	**288,225**	**90%**	**40**	**36%**	**32,177**	**10%**

General management waters include 69% of all principal fisheries for lake trout, and 55% of the acreage statewide (Table 7). These are Maine's "typical lake trout waters, where populations are generally in balance with available forage and other species present. All are managed with an 18-inch minimum length limit, and a daily bag limit of either 1 or 2 fish. As a general observation, on the average more than one-half of all lake trout caught from these waters are longer than 18 inches.

Many general management waters provide high quality fisheries for lake trout in terms of average size caught. A few (7%) waters, representing 3% of the total area of all principal fisheries, have been identified and actively managed for size quality with special regulations that are designed to consistently produce larger-than-average size lake trout (Table 7). The regulations applied usually involve increasing the legal length limit with the intent of delaying harvest.

In the past, statewide lake trout management objectives have called for increasing the number of waters that provide size quality opportunity. However, few waters and even fewer wild lake trout populations in Maine lend themselves to this type of management using traditional regulations. In most Maine waters productivity is very low, consequently lake trout growth is slow

and wild lake trout that are “saved” to grow to larger sizes require so many years to attain legal size that there is significant risk of “stockpiling” sublegal-size fish and therefore compromising management objectives. Waters most suited for size quality opportunity management are those with hatchery-supported fisheries where suitable forage is not a limiting factor, and where recruitment into the population can be totally controlled through stocking.

The 18-inch minimum length limit implemented statewide in 1982 has been very effective in allowing spawning escapement to increase lake trout abundance in waters with self-sustaining populations, and in establishing self-sustaining populations in waters previously stocked. But due to their growth and maturity characteristics, lake trout normally require 4 to 6 years to attain legal length. Consequently, with the 18-inch length limit large numbers of fish have been “stockpiled” under legal size. In some waters more than one-half of the catch is comprised of fish less than 18 inches. In order to reduce the impact of these fish on the forage base, and maintain the growth and condition of lake trout and other coldwater species managed concurrently in the same body of water, increased harvests have been encouraged with minimum length limits of 12, 14, or 16 inches. In some cases daily bag limits have also been increased to 3 or 5 fish, but usually with only 1 fish over 18 inches allowed in order not to over harvest mature adults. These harvest opportunity waters represent 23% of the number and 42% of the total area with principal fisheries for lake trout (Table 7). Lake trout populations in 21 (81%) of the 26

Table 7. Maine Lakes with Principal Fisheries for Lake Trout by Region, Season, and Fishing Opportunity Category

REGION	SEASON	GENERAL OPPORTUNITY		SIZE QUALITY OPPORTUNITY		HARVEST OPPORTUNITY	
		NUMBER	ACRES	NUMBER	ACRES	NUMBER	ACRES
A	Winter	1	900	0	-	4	37,565
	Summer	1	900	0	-	5	39,825
B	Winter	4	7,464	2	2,432	1	1,193
	Summer	4	7,464	2	2,432	1	1,193
C	Winter	8	26,668	3	2,229	1	187
	Summer	8	26,668	4	2,338	1	187
D	Winter	2	3,387	0	-	6	3,623
	Summer	6	12,820	0	-	10	4,704
E	Winter	9	26,887	2	4,169	1	74,890
	Summer	24	36,477	2	4,169	2	76,270
F	Winter	11	54,049	0	-	2	10,796
	Summer	11	54,049	0	-	3	11,436
G	Winter	14	31,766	0	-	0	
	Summer	23	39,039	0	-	4	411
STATE	**Winter**	**48**	**150,923**	**7**	**8,830**	**15**	**128,254**
	Summer	**77**	**177,437**	**8**	**8,939**	**26**	**134,029**

harvest opportunity waters rely on smelts as the principal forage, and that 16 (62%) of these harvest opportunity waters are also managed for landlocked salmon.

Sebago Lake is the noteworthy exception in this category. There, the introduction of lake trout in the 1970’s was so successful that, although lake trout remain in good condition, the large population has compromised both the abundance and growth of the indigenous and more popular landlocked salmon. Therefore, the management objective at Sebago is to reduce the lake trout population significantly utilizing a 5 fish bag limit and a 16-inch length limit.

DEMAND

An expression of the demand for a fishery resource is the number of days anglers spend in the pursuit of that resource. Although anglers are routinely counted in the Fishery Division's ongoing winter and summer sport fishery surveys, the use estimates derived from these surveys are on an individual water basis. Only a small number of the lake trout principal fisheries in any Fishery Management Region can be surveyed in any year, and most surveys have been conducted for a single season. Therefore, estimating the total use on all of the lake trout fisheries in each Region, whether by season or by fishing opportunity type, is not possible using the information collected in ongoing field surveys.

However, the Department sponsors periodic surveys of both ice and open water anglers to obtain estimates of anglers' effort, catch, harvest, and opinions on management issues, and the information obtained in these surveys is summarized both on a statewide and a regional basis. The most recent surveys, in 1994 and 1999, were conducted using comparable methods. Therefore their estimates of effort, catch, and harvests can be compared. Statewide use estimates based on responses to the Department's 1994 and 1999 Ice Fishing and Open Water Fishing Surveys indicate that in 1999 fishermen in Maine spent 1,196,405 days fishing for lake trout, a decrease of 5% from the 1994 estimates of 1,256,392 angler days (Table 8).

Statewide, ice fishing accounted for 248,164 angler days, 21% of the annual total. Open water fishing accounted for 948,240 angler days, or 79% of the annual total. Ice fishing effort as a proportion of total annual use ranged from 23% to 31% among Management Regions, the notable exception being in southern Maine (Region A), where ice fishing represented only 9% of total use. An open winter with poor ice conditions, especially on a large body of water like Sebago Lake representing 75% of Region A's total winter lake trout fishing opportunity, would undoubtedly contribute to this anomaly.

In 1999, winter use statewide decreased by 27%. Summer use in 1999 was slightly (3%) higher than estimated in 1994. Changes in use from 1994 to 1999 varied considerably among Regions. Decreases were noted in all Regions except in south central Maine (Region B), where the winter and the summer increases cannot be explained. Summer use increased in south central and east central Maine (Regions B and F), remained virtually unchanged in southern, eastern, and west central Maine (Regions A, C, and E), and decreased in western and northern Maine (Regions D and G).

In the 1990's, sport fishery surveys indicate that winter use dropped substantially from peaks observed statewide in the mid to late 1980's. Changes in winter recreational habits, such as the increase in snowmobiling that occurred in the 1990's, likely accounted for this drop.

Summer use, at least on the waters supporting lake trout fisheries, appears to have remained more consistent over time. Although weather, the economy, and especially gasoline prices will undoubtedly continue to influence angler use, during the next 5 years no significant changes are anticipated in the number or acreage of lake trout waters, and therefore during the same period no significant changes are anticipated in the demand for lake trout.

Ice fishing, expressed as days of use per acre of water open to ice fishing, also varied greatly among Regions (Table 7). It was lowest in west central, east central and northern Maine (Regions E, F and G), and moderate (only slightly above the statewide average of 0.86 angler-

days per acre) in southern and eastern Maine (Regions A and C). On a per-acre basis, winter use was highest in south central and western Maine (Regions B and D).

Open water fishing, expressed as days of use per acre of water open to fishing in the summer, followed a pattern similar to the winter. In all regions summer use rates were higher than those observed in the winter. It was lowest in the three northern regions (Regions E, F, and G), moderate in eastern and western Maine (Regions C and D), and highest in southern and south central Maine (Regions A and B).

Table 8. Angler Effort on Maine Lakes With Fisheries for Lake Trout, Comparing the Ice and Open Water Fishing Survey Estimates for the Years 1994 and 1999

REGION	SEASON	TOTAL ANGLER DAYS		(%+/-)	DAYS/ACRE
		1994	1999		1999
A	Winter	87,738	36,474	-58	0.95
	Summer	348,653	351,583	+1	8.63
	Annual	436,391	388,057	-11	
B	Winter	23,673	43,009	+82	3.88
	Summer	65,973	93,725	+42	8.45
	Annual	89,646	136,734	+53	
C	Winter	49,742	33,191	-33	1.14
	Summer	85,401	85,672	0	2.93
	Annual	135,103	118,863	-12	
D	Winter	27,527	17,627	-36	2.51
	Summer	72,208	55,983	-22	3.19
	Annual	99,375	73,610	-26	
E	Winter	83,251	66,573	-20	0.63
	Summer	222,728	220,918	-1	1.89
	Annual	305,979	287,491	-6	
F	Winter	38,776	35,050	-10	0.54
	Summer	72,975	94,966	+30	1.45
	Annual	111,751	130,016	+16	
G	Winter	28,459	17,032	-40	0.54
	Summer	65,082	49,630	-24	1.26
	Annual	93,541	66,662	-29	
STATE	Winter	**339,159**	**248,165**	**-27**	**0.86**
	Summer	**917,233**	**948,240**	**+3**	**2.96**
	Annual	**1,256,392**	**1,196,405**	**-5**	**3.73**

FISHING QUALITY

Catch rates (legal-size lake trout both caught and kept per day of fishing) were estimated for each Region in the 1994 and 1999 Fishing Surveys (Table 9). Most of the differences reported between 1994 and 1999 lie within the range of sampling error that can be expected. From these surveys it is very apparent that success varied widely among Regions and between seasons, as well as between the 2 years. This is to be expected given differences in habitats, lake trout populations, and especially in the use that occurs within and among the Regions.

In the 1999 survey, ice fishing catch rates were higher than those for open water fishing in all areas but southern and eastern Maine (Regions A and C). In 1999, the best winter catch rates of legal-size lake trout per day were reported from waters in western, west central, and northern Maine (Regions D, E, and G). The slowest ice fishing for lake trout was reported in south central Maine (Region B).

In 1999, the best summer catch rates were reported from waters in southern, eastern, and west central Maine (Regions A, C, and E). As in the winter, the slowest open water fishing was also reported from south central Maine (Region B) waters.

Table 9. Angler Catch and Harvest Rates on Maine Lakes With Fisheries for Lake Trout, Comparing the Ice and Open Water Fishing Survey Estimates for the Years 1994 and 1999

REGION	SEASON	LEGAL LKT CAUGHT/DAY		(%+/-)	LEGAL LKT KEPT/DAY	
		1994	1999		1994	1999
A	Winter	0.36	0.37	+3	0.19	0.11
	Summer	0.25	0.39	+56	0.12	0.17
B	Winter	0.17	0.15	-12	0.06	0.06
	Summer	0.06	0.08	+33	0.01	0.03
C	Winter	.40	0.34	-15	0.11	0.08
	Summer	0.30	0.38	+27	0.09	0.08
D	Winter	0.55	0.64	+16	0.19	0.15
	Summer	0.38	0.27	-29	0.09	0.11
E	Winter	1.10	0.73	-34	0.27	0.20
	Summer	0.50	0.43	-14	0.10	0.08
F	Winter	0.21	0.28	+33	0.08	0.10
	Summer	0.26	0.19	-27	0.06	0.07
G	Winter	0.37	.69	+86	0.12	0.15
	Summer	0.28	0.26	-7	0.08	0.07

In both survey years, fewer than half of the legal-size lake trout caught were reported kept, indicating that catch and release fishing is not unique to salmon and brook trout. From 1994 to 1999, decreases in the percentage of lake trout kept in the winter were reported from all regions except south central Maine (Region B). Thus a higher percentage of lake trout were kept in the Region where the lowest catch rates of legal fish were reported. Surprisingly, from 1994 to 1999 a decrease in the percentage of lake trout kept in the summer was reported only from eastern Maine (Region C). Increases were reported in south central, western, and east central Maine (Regions B, D, and F), with essentially no change in the other three Regions. Overall; however, results from the statewide surveys indicate that less than one third of the legal catch is harvested.

The variation in lake trout populations in waters within each Region, and among Regions around the State, results in fishing opportunities that can be considered in three categories. Each category requires different fishing regulations to achieve management objectives. Summarizing and analyzing fishery survey catch statistics from waters in each of these categories is the most effective way to assess the present status of Maine's lake trout fisheries, and provide the basis for future comparisons. Minimum standards can be established for catch rates and fish sizes expected from the fisheries included in each category. In the future, as lake trout fisheries are monitored on a routine schedule, or in response to angler concerns, those found not meeting the minimum standards for waters in that category should be studied further to determine why minimum standards are not being met. The results of these studies should provide the information required to prescribe management changes to overcome factors that might be limiting the fishery from achieving the standards established for that category.

Information from lake trout sport fishery surveys conducted from 1996 to 2000 in each of the seven Fishery Management Regions were used to assess the status of Maine's lake trout fisheries over the past 5 years. The results of 117 winter surveys and 112 summer surveys have been summarized by Region according to the three fishing opportunity categories provided by Maine's lake trout waters. The best measure of fishing success is the number of legal-size fish caught, and not just those that are kept. Therefore, fishing quality is described as the average catch of all legal-size lake trout per angler per day in these fisheries. Likewise, lake trout condition (relative robustness) varies greatly in the waters within a Region, as well as among Regions. Such variation is quite natural, and reflects the productivity of each water, the type and abundance of forage available, and the abundance of lake trout and other species that depend on the forage available. Growth in length is more consistent among waters, therefore fish quality is described as the average length calculated for lake trout that were harvested.

General opportunity management category waters comprise 48 (68%) of the 71 principal fisheries for lake trout open to ice fishing, and 77 (69%) of the 111 that are open during the summer. Information from 77 winter surveys and 86 summer surveys was used to determine Regional average catch rates (Table 10). The highest average catch rates were in waters in west central and northern Maine (Regions E and G), Regions that also account for the greatest number of lake trout fisheries. Catch rates were somewhat consistent between seasons in Regions C, D, E, and G. The information from the other three Regions combined represented only 6% of all winter and 2% of all summer surveys statewide, and therefore are not adequate to assess either the winter or the summer lake trout catch rates there. In terms of fish quality, throughout Maine general opportunity waters have provided fish that average between 20 and 24 inches.

Table 10. Average Fishing Quality in Maine Lake Trout Waters Managed for General Opportunity, 1996-2000, by Region and by Season

REGION	SEASON	WATERS OPEN	NUMBER OF SURVEYS*	CATCH RATE ALL LEGAL LKT/DAY	AVERAGE LENGTH (INCHES) OF LEGAL LKT KEPT
A	Winter	1	1	0.03	23.2
	Summer	1	0	-	-
B	Winter	4	3	0.01	23.9
	Summer	4	0	-	-
C	Winter	8	9	0.26	22.8
	Summer	8	10	0.22	21.2
D	Winter	2	4	0.31	20.0
	Summer	6	13	0.30	21.1
E	Winter	9	22	0.55	20.9
	Summer	24	53	0.34	22.3
F	Winter	11	1	0.00	-
	Summer	11	2	0.25	-
G	Winter	14	37	0.50	21.7
	Summer	23	8	0.56	20.7
ALL	**Winter**	**48**	**77**		
	Summer	**77**	**86**		

* total number of surveys conducted 1996-2000, not the number of waters surveyed

Size-quality opportunity management category waters comprise only 7 (10%) of the 71 principal fisheries for lake trout open to ice fishing, and 8 (7%) of the 111 that are open in the summer. Information from 12 winter surveys and 4 summer surveys was used to determine average catch rates in the three Regions with waters managed in this category (Table 11). The catch rates for lake trout in all cases were very low, in three out of four cases requiring 10 days or more to catch a legal size fish! Managing lake trout waters for specifically for size quality is perhaps the ultimate management challenge. First, anglers who traditionally fish the body of water must be willing to accept the very limited opportunity to keep a fish. But perhaps even more important, the waters considered for such management must be productive, with enough suitable forage for lake trout to attain and maintain the desired sizes. In most cases, recruitment to these populations must be low, ideally controlled by stocking rates, to provide for optimum growth. In unproductive waters, where natural reproduction is significant, increasing minimum length limits will usually only encourage the stockpiling of fish, and increase the demand on the forage base. Therefore, although in the next 5 years some waters may be identified as suitable candidates for this type of management, some of the existing waters in this category will, of necessity, be moved into categories that allow more harvest opportunity.

Table 11. Average Fishing Quality in Maine Lake Trout Waters Managed for Size Quality Opportunity, 1996-2000, by Region and by Season

REGION	SEASON	WATERS OPEN	NUMBER OF SURVEYS*	CATCH RATE ALL LEGAL LKT/DAY	AVERAGE LENGTH (INCHES) OF LEGAL LKT KEPT
A	No waters with special management for this type of opportunity				
B	Winter	2	2	0.05	23.4
	Summer	2	0	-	-
C	Winter	3	3	0.17	-
	Summer	4	0	-	-
D	No waters with special management for this type of opportunity				
E	Winter	2	7	0.08	26.4
	Summer	2	4	0.05	27.5
F	No waters with special management for this type of opportunity				
G	No waters with special management for this type of opportunity				
ALL	**Winter**	**7**	**12**		
	Summer	**8**	**4**		

* Total number of surveys conducted 1996-2000, not the number of waters surveyed

Harvest opportunity management category waters comprise the remaining 15 (21%) of the 71 principal fisheries for lake trout open to ice fishing, and 26 (23%) of the 111 that are open in the summer. Information from 28 winter surveys and 22 summer surveys was used to determine Regional average catch rates (Table 12). Adequate information on waters in this management category is available from only three of the seven regions. In most of these waters, where lake trout are abundant enough to warrant harvesting some of the smaller individuals to maintain a balance between predators and their prey, catch rates of legal-size lake trout were no higher than on general management waters with the 18-inch minimum length limit. In the next 5 years it is anticipated that some waters will be added to this category, especially where lake trout increase in abundance to the level that additional harvesting is desirable to maintain a balance between these predators and the forage available to them.

Table 12. Average Fishing Quality in Maine Lake Trout Waters Managed for Harvest Opportunity, 1996-2000, by Region and by Season

REGION	SEASON	WATERS OPEN	NUMBER OF SURVEYS*	CATCH RATE ALL LEGAL LKT/DAY	AVERAGE LENGTH (INCHES) OF LEGAL LKT KEPT
A	Winter	4	3	0.19	21.4
	Summer	5	3	0.13	18.7
B	Winter	1	1	0.04	24.3
	Summer	1	0	-	-
C	Winter	1	0	-	-
	Summer	1	0	-	-
D	Winter	6	14	0.31	17.7
	Summer	10	7	0.29	18.4
E	Winter	1	9	0.57	17.1
	Summer	2	12	0.41	17.8
F	Winter	2	1	0.05	19.6
	Summer	3	0	-	-
G	Winter	0		-	-
	Summer	4	0		
ALL	Winter	11	28		
	Summer	26	22		

* Total number of surveys conducted 1996-2000, not the number of waters surveyed

GOALS AND OBJECTIVES

2001-2016

LAKE TROUT

GOALS:

I. Maintain the present fishing opportunities for lake trout in Maine.

II. Maintain or enhance, wherever possible, habitat quality in the waters that support principal fisheries for lake trout.

III. Protect Maine's remaining native lake trout populations.

IV. Maintain or enhance, wherever possible, lake trout fishing quality.

V. Provide a diversity of lake trout fishing quality opportunities.

VI. Maintain an acceptable balance between lake trout and other coldwater game fish species.

OBJECTIVES:

A. Maintain principal fisheries for lake trout in 111 Maine lakes (320,402 acres) with the existing distribution.

B. Maintain the quality of lake trout habitat.

1. Maintain late summer dissolved oxygen levels of at least 5 parts per million in the hypolimnion in waters with principal fisheries for lake trout.

2. Maintain over-winter water levels that protect lake trout natural reproduction in all impoundments that support self-sustaining principal fisheries for lake trout.

C. Maintaining the integrity of the remaining 32 native lake trout populations (40,856 acres) shall be a high management priority.

D. Provide for the following fishing quality:

1. Maintain an average catch-rate of 4 to 5 lake trout per day (all sizes) for anglers specifically targeting lake trout in waters that provide principal fisheries.

2. Maintain an average size of fish kept (harvested) in the 2 to 5 pound range for anglers specifically targeting lake trout.

E. Manage Maine's lake trout fisheries for 4 types of fishing quality opportunity:

1. For **harvest opportunity** as necessary where lake trout are abundant and where forage availability limits their growth and condition, or where forage availability is not adequate to meet management objectives for both lake trout and another species (especially salmon) in the same body of water. Lake trout harvested will average 19 inches or less, and 2.25 pounds or less.

2. For **average size quality** in 75 waters (155,121 acres) statewide. Lake trout harvested will average 21 inches, and 3.0 pounds.

3. For **above average size quality** in 13 waters (27,424 acres) statewide where habitat, forage base, and lake trout population characteristics permit. Lake trout harvested will average 23 inches, and 4.25 pounds, with a reasonable expectation of catching a few fish over 5 pounds.

4. For the **highest size quality** in 7 waters (48,326 acres) statewide where habitat, the forage base, and lake trout population characteristics permit. Lake trout harvested will average 25 inches, and 5.5 pounds, with a reasonable expectation of catching a few fish over 8 pounds.

Capability of Habitat: Existing lake trout habitat will not limit these management objectives. The availability of suitable and adequate forage is essential to meeting Objectives E. 2-4.

Feasibility: Self-sustaining lake trout populations, and populations stocked with spring yearlings reared in Maine hatcheries will maintain all existing principal fisheries. Further restrictions on use-opportunity or harvest may be required in order to maintain lake trout harvests within acceptable levels in some of the most heavily used of the existing principal fisheries. Appropriate regulation changes can be made on a case-by-case basis. Special regulations may be necessary to manage for above-average quality lake trout fisheries, or to encourage harvests in waters where lake trout abundance jeopardizes the forage base.

Desirability: Fulfillment of these objectives will maintain the distribution and abundance of lake trout, will maintain habitat and protect native lake trout populations, will maintain existing fisheries, and will satisfy the present and anticipated demand for a diversity of lake trout fishing experiences and opportunities.

Possible Consequences: Conflicts with the management of other species must be avoided in attempting to manage lake trout populations for higher-than-average size quality. Changes to more restrictive fishing regulations on popular, heavily-used waters often meet resistance from anglers not willing to accept that changes may be necessary. Management designed to encourage lake trout harvest may meet with public disfavor, as well.

LAKE TROUT
MANAGEMENT PROBLEMS AND STRATEGIES

PROBLEM 1. There is insufficient information regarding angler use, catch, and harvest of lake trout from summer and winter fishing on Maine's principal fisheries. Present data summaries utilize all anglers rather than those specifically targeting lake trout, and therefore underestimate the real quality of lake trout fishing in Maine.

Strategy 1. Establish an extensive network of ice and open water anglers who will maintain Records of their fishing and provide information on their catch and harvest.

Strategy 2. Conduct clerk surveys, summer and winter, on representative lake trout waters statewide to determine angler use, catch, and harvest.

Strategy 3. Analyze all data collected to insure that management objectives are being met. In computing catch rates, attempt to consider only anglers specifically targeting lake trout.

PROBLEM 2. There is often controversy regarding winter vs. summer harvests of lake trout.

Strategy 4. Determine seasonal harvest levels that are biologically and sociologically acceptable.

Strategy 5. Attempt to maintain the desired balance between winter and summer harvests through appropriate fishing regulations.

PROBLEM 3. Maine anglers and professional fishery workers in other states and provinces are inadequately informed about the progress and results of lake trout management in Maine.

Strategy 6. Develop and implement an information program to inform the public about lake trout management in Maine.

Strategy 7. Report management findings at appropriate scientific meetings, in progress reports, and in scientific journals.

PROBLEM 4. The growth and longevity characteristics of lake trout sometimes result in population abundance that taxes the forage base, especially in waters managed for other coldwater game fish such as the landlocked salmon. This adversely affects the condition of the lake trout, the growth and condition of the other coldwater game fish species, and ultimately fishing quality.

Strategy 8. Determine the most appropriate regulations for each body of water given its productivity and the abundance of forage, the growth and maturity of lake trout and other coldwater species present, and angler exploitation in relation to the ability of lake trout populations in those waters to sustain observed levels of harvest.

PROBLEM 5. Lake trout habitat will be degraded or destroyed if lakeshore and water uses are not managed properly, and if existing environmental regulations are not enforced.

Strategy 9. Continue to monitor habitat suitability in existing lake trout waters.

Strategy 10. Continue to support enforcement of all rules and laws that are designed to protect aquatic habitat.

Strategy 11. Continue active involvement in the protection of aquatic habitat from degradation as a result of unwise land and water use practices through coordination with other state and federal agencies.

PROBLEM 6. The reduction of spawning habitat and/or destruction of eggs by excessive and untimely fall and winter lake drawdowns can seriously limit the success of natural reproduction.

Strategy 12. Continue to seek and maintain water level draw down agreements with the appropriate private interests that control the water rights on lakes managed for self-sustaining lake trout populations.

PROBLEM 7. No single stocking rate is appropriate for all of Maine's stocked lake trout waters.

Strategy 13. Continually evaluate stocking results to determine stocking rates that will maintain the desired population abundance and growth rates, and that will provide the best returns to anglers at the size they desire.

PROBLEM 8. Public access to many waters is a concern, and more access restrictions are anticipated on other waters in the future.

Strategy 14. Secure and maintain legal public access to all Maine lake trout waters.

PROBLEM 9. The structure and abundance of Maine's lake trout populations have not been sufficiently evaluated to adequately determine the status of the resource, optimum exploitation rates, and optimum potential yields.

Strategy 15. Stay informed of lake trout research and management in other states and provinces through fishery literature, scientific meetings, and contacts with lake trout managers and researchers in other States and Provinces.

Strategy 16. Estimate lake trout abundance and evaluate population structures on typical waters throughout the State.

Strategy 17. Determine optimum exploitation rates and yields that will maintain the diversity of lake trout fisheries for the opportunities anglers desire.

Strategy 18. Determine and implement the most appropriate and effective fishing regulations necessary to maintain desired population levels and fishing quality.

PROBLEM 10. There are often conflicts between the management of lake trout and other coldwater sport fish in the same lake.

Strategy 19. Study the interactions among all coldwater species in lake trout waters, including their use of a dependence upon the species available as prey.

Strategy 20. Attempt to maintain an acceptable balance in managing both lake trout and other coldwater species.

PROBLEM 11. There is little information regarding hooking mortalities among sub legal-sized lake trout caught and released.

Strategy 21. Determine hooking mortalities, summer and winter.

PROBLEM 12. The Fisheries Division lacks sufficient staff and financial resources to implement the strategies necessary to achieve all of the objectives of the Management Plan.

Strategy 22. Seek sufficient additional staff and financial resources to achieve the objectives of the Management Plan.

APPENDIX A

COLDWATER WORKING GROUP INPUT
LAKE TROUT MEETING SUMMARY
April 28 2001

Issues:

- ✓ *More data is needed, particularly creel survey data. A suggestion was made to seek more assistance from guides.*
- ✓ *"Large Fish" lakes should be designated but some concern was voiced to the effect that such designation, whether direct or indirect, could draw angler attention, thus obviating the desired outcome.*
- ✓ *Interaction with other species – the DIFW should be alert to the need to avoid possible negative interaction with other coldwater species. It was suggested that such impacts should always be avoided, if at all possible.*
- ✓ *Public input*
- ✓ *Publicize/educate anglers, re the attributes of the lake trout sport fishery.*
- ✓ *Catch-rates: concern was expressed that utilizing all anglers to compute catch-rates results in an under-estimate of the sport's potential. Suggestion was made to employ only those anglers who were genuinely targeting lake trout.*
- ✓ *Hooking mortalities can cause significant problems in lake trout fisheries and may compromise the effectiveness of restrictive regulations.*

Goals:

Maintain the present amount and distribution of principal fisheries for lake trout in Maine.
Protect native lake trout populations.
Maintain/enhance lake trout fishing quality.

Objectives:

A. *Maintain lake trout principal fisheries in 111 lakes (320,402 acres) in the existing distribution (see attached map).*
B. *Maintain/enhance lake trout habitat quality, i.e. late summer dissolved oxygen levels of at least 5 ppm in the hypolimnion.*
C. *Maintenance of native lake trout populations in 30 waters shall be high priority management.*
D. *Provide for the following fishing quality:*
    1. *Statewide catch-rate of 4-5 fish (all sizes)/day for anglers **targeting** lake trout.*
    2. *Average size of fish harvested (kept) for anglers **targeting** lake trout:*
        a. *General Management Waters: 21 inches (18 to 24 inches); 2 to 4 lbs.*
        b. *Size Quality Management Waters: average length = 23 inches plus a few fish > 5 lbs.*
        c. *High Quality Management Waters: average length = 25 inches with a few fish > 8 lbs.*

PRIORITIZED LAKE TROUT MANAGEMENT OBJECTIVES

DESCRIPTION OF STATEWIDE OBJECTIVES	RANKINGS (Coldwater Group)
Maintain principal fisheries for lake trout in 111 Maine lakes with the existing distribution around the State	**5**
Maintain late summer dissolved oxygen levels of at least 5 parts per million in the hypolimnion in waters with principal fisheries for lake trout.	**5**
Maintain over-winter water levels that protect lake trout natural reproduction in all impoundments that support self-sustaining principal fisheries for lake trout	**2**
Maintain the integrity of the remaining 32 native lake trout populations and protecting their habitat shall be a high management priority.	**1**
In **harvest opportunity waters (the number will vary)** lake trout harvested will average 19 inches or less, and 2.25 pounds or less	**8**
In **average size quality waters (N = 75)** lake trout harvested will average 21 inches, and 3.0 pounds.	**5**
In **above average size quality waters (N = 13)** lake trout harvested will average 23 inches, and 4.25 pounds, with an expectation of catching a few fish over 5 pounds.	**4**
In **highest size quality waters (N = 7)** lake trout harvested will average 25 inches, and 5.5 pounds, with an expectation of catching a few fish over 8 pounds.	**3**

PRIORITIZED LAKE TROUT MANAGEMENT PROBLEMS

DESCRIPTION OF MANAGEMENT PROBLEMS	COLDWATER GROUP	FISHERIES STAFF	FINAL RANK
There are often conflicts between the management of lake trout and other coldwater sport fish in the same lake	**5**	**1**	**6**
The reduction of spawning habitat and/or the destruction of eggs by excessive & untimely fall & winter lake draw downs can seriously limit the success of natural reproduction	**2**	**8**	**2**
There is insufficient information on angler use, catch and harvest from lake trout principal fisheries, particularly for the open water season.	**7**	**7**	**7**
Over abundant lake trout populations can tax the forage base, especially in waters managed for other coldwater game fish such as landlocked salmon thus adversely affecting the condition of lake trout as well as that of the other coldwater game fish. Ultimately, fishing quality can be negatively impacted.	**1**	**4**	**1**
The Fisheries Division lacks sufficient staff and financial resources to implement the strategies necessary to achieve the plan's objectives.	**4**	**1**	**4**
The abundance and population characteristics of Maine's lake trout principal fisheries have not been sufficiently evaluated to adequately determine the status of the resource, optimum exploitation rates and optimum potential yields.	**5**	**3**	**5**
There is often controversy regarding winter versus summer harvests of lake trout	**10**	**6**	**10**
Maine anglers and professional fishery workers in other states & provinces are inadequately informed about the progress & results of lake trout management in Maine.	**9**	**5**	**9**
Lake shore habitat will be degraded or destroyed if lake shore & water uses are not managed properly and existing environmental regulations are not enforced.	**2**	**10**	**3**
Public access to many waters is a concern and more access restrictions are anticipated on other waters in the future.	**8**	**8**	**8**

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

PRIORITIZED LAKE TROUT MANAGEMENT OBJECTIVES, (COLDWATER WORK GROUP)		Region A Contribution			Region B Contribution			Region C Contribution			Region D Contribution			Region E Contribution			Region F Contribution			Region G Contribution			Statewide Totals		
DESCRIPTION OF STATEWIDE MANAGEMENT OBJECTIVES	**Rank**	**Exst**	**Prop**	**Dfct**	**Exst**	**Prop**	**Dfct**	**Exst**	**Prop**	**Dfct**	**Exst**	**Prop**	**Dfct**	**Exst**	**Prop**	**Dfct**	**Exst**	**Prop**	**Dfct**	**Exst**	**Prop**	**Dfct**	**Exst**	**Prop**	**Dfct**
Maintain the integrity of the state's remaining native lake trout populations and protecting their habitat shall be a high management priority.	**1**	0	0	0	0	0	0	3	3	0	1	1	0	10	10	0	7	7	0	11	11	0	32	32	
In highest size quality waters lake trout harvested will average 25 inches, and 5.5 pounds, with an expectation of catching a few fish over 8 pounds.	**2**	1	1	0	1	1	0	0	0	0	1	1	0	1	1	0	0	0	0	3	3	0	7	7	0
In above average size quality waters lake trout harvested will average 23 inches, and 4.25 pounds, with an expectation of catching a few fish over 5 pounds.	**3**	1	1	0	0	0	0	2	2	0	5	5	0	1	1	0	0	0	0	4	4	0	13	13	
Maintain the number of waters supporting principal fisheries for lake trout within the existing distribution of the species within the State.	**4**	6	6	0	7	7	0	13	13	0	16	16	0	28	28	0	14	14	0	27	27	0	111	111	
In average size quality waters lake trout harvested will average 21 inches, and 3.0 pounds.	**5**	3	**4**	**1**	6	6	0	8	**9**	**1**	**8**	**9**	**1**	23	**24**	**1**	12	**13**	**1**	15	**16**	**1**	75	**81**	**6**
In harvest opportunity waters (the number will vary) lake trout harvested will average 19 inches or less, and 2.25 pounds or less.	**6**	1	**0**	**0**	0	0	0	2	**1**		2	**1**	0	3	**2**		2	**1**		5	**4**		15	**9?**	

Exst = Existing total;
Prop = Proposed total;
Dfct = Deficit, i.e. (Proposed – Existing).

Numbers in **boldface** indicate waters wherein management changes may be implemented.