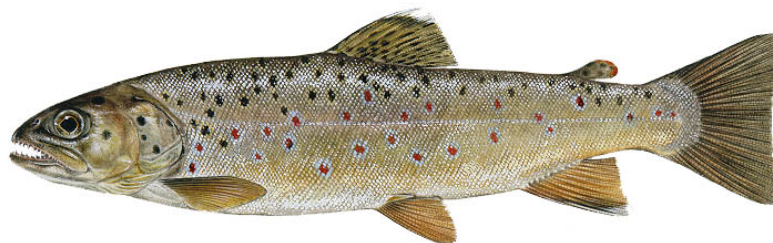


BROWN TROUT MANAGEMENT PLAN



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

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BROWN TROUT LIFE HISTORY

The early history of the brown trout (*Salmo trutta*) dates back to the Eocene Epoch some 70 million years ago. Zoogeographers believe that this trout originated in the Arctic regions and was entirely an ocean dwelling fish. As the glacial sheet advanced, this species was pushed southward and eventually became established in the fjords of the Scandinavian Peninsula. When the glacier receded, some of the Scandinavian populations entered freshwater streams and lakes and gradually established themselves in this new freshwater environment. Other populations still preferred the seas but returned periodically into freshwater streams to spawn. These fish were what we now call sea trout, or sea-run browns. From the Scandinavian Peninsula, brown trout migrated farther inland and southward and later became established throughout most of Europe. Today they exist on every continent except Antarctica.

Brown trout exhibit a greater range of color variation than native salmon or trout. The typical brown trout is yellowish brown with large brown or black spots on its sides, back, and dorsal fin. These spots are usually surrounded by faint halos, and a few red or orange spots on the sides are usually evident. The adipose fin may be spotted with orange or red.

Spawning occurs in the fall usually after brook trout have spawned and typically takes place in streams. Brown trout usually mature at 3 or 4 years of age, somewhat dependent on size. The spawning process is triggered by a combination of decreasing day length, increasing stream flows, and a decrease in water temperatures, usually occurring when water temperatures dip into the 40's(F). Female brown trout create three or four shallow depressions or egg pits in a gravelly substrate. Males defend their chosen territories against the intrusion of rival males prior to the actual spawning act. The female covers the redd with substrate after repeated spawning events. Incubation time varies depending on water temperatures, and at 50 degrees Fahrenheit it's about 50 days until hatching. The young generally spend the first 2 to 3 years in the parent stream, feeding on insects, plankton and other small aquatic organisms. Browns, which return to a lake or pond depend more on fish in addition to other aquatic organisms, such as frogs, to provide sustenance and growth. Those browns remaining in a stream environment continue to feed on aquatic insects and small fish.

Growth is dependent on the available food source. In Maine, age 1 wild browns are approximately 4-6 inches long, and 6-8 inches at age 2. Brown trout can grow to large sizes; the largest on record in Maine was caught in 1997 at Square Pond in Acton and weighed over 23 pounds. Growth to grow to 4 pounds is not uncommon on many lakes and ponds. Brown trout have the ability to survive to an old age, but in Maine lakes browns typically don't survive beyond 6-8 years of age.

Brown trout are generally found in freshwater systems, but can adapt to the marine environment and become sea-run. A few waters in Maine are currently being managed for sea-run brown trout. Brown trout can also hybridize with brook trout to create "tiger trout", but this rarely occurs in the wild.

BROWN TROUT MANAGEMENT HISTORY

The original range of brown trout has been extended by man to nearly every part of the world. Brown trout are native to Europe and western Asia, and were introduced into North America in 1883. The first shipment of brown trout to the Western Hemisphere arrived in New York in February of 1883. Maine, preceded only by New York and Michigan, was the third state in the United States to introduce these trout. A shipment of 10,000 eggs arrived at the Federal Hatchery in Bucksport, Maine in 1885, and the first introduction took place in Branch Lake near Ellsworth shortly thereafter. Browns are now an important part of Maine's freshwater fishery program and are stocked annually into many lakes and ponds. Nearly all waters in Maine are sustained by stocking, but browns have become established and are supported by natural reproduction in a few waters.

By 1900, there were nearly 20 waters scattered throughout central and southern Maine being stocked with browns. Many of the native landlocked salmon fisheries were experiencing a decline during this time and some thought the newly discovered brown trout could be a solution to these declining fisheries.

Many of the early introductions of brown trout in Maine were not successful, and consequently dampened the enthusiasm of some early promoters. The general feeling toward brown trout during the early 1900's can best be summarized from the following excerpt appearing in a 1906 Fish and Game Commissioner's Report: "We continue to raise a few brown trout but are very careful where we plant them. They have not as yet developed in sufficient numbers where planted so as to enable us to give an opinion as to the desirability of propagating them. A few have been taken, however, some weighing fourteen pounds."

Early fish culturists, lacking the technical knowledge and experience in fish management, continued to have problems with early introductions and eventually gave up stocking the species around 1918 or 1920. For the next 10 or 12 years brown trout apparently were not stocked anywhere in Maine. The continuing decline in salmon and trout fisheries, however, prompted another trial with browns around 1932. Fish culturists seemed to be more determined the second time around and apparently felt that higher stocking rates were the answer to making the program a success. Through the 1940's more than 100 waters were stocked with 1.5 to 2 million brown trout annually. Advanced fry (2-4 inches) and small fall fingerlings (4-6 inches) were stocked in most of these waters. Irresponsible stocking programs resulted in introductions of more than 240,000 brown trout into Sebago Lake, which was by that time world famous for its landlocked salmon fishing. Browns never became established in Sebago and salmon still abound in this lake. Other introductions were attempted in the Rangeley Lakes area and Grand Lake Stream, but these introductions also failed in creating an established population.

As the history of fishery management began to unfold and shift from the hatchery to the habitat, fishery scientists began to study the behavior and habits of brown trout in the wild. They discovered that the life history of the brown was very similar to landlocked salmon. Brown trout required clean, cool waters similar to salmon, but were more tolerant of competition from warm water fish. It was also discovered that browns not only utilized the same forage as salmon, but they appeared to be more adaptable by feeding on a variety of organisms that salmon and other trout did not utilize. Browns were also found spawning during the same time period as salmon and appeared to require the same type of stream with similar requirements for gravel and cool flowing water. Brown trout also lived longer than the brook trout and hence had the potential to

attain a larger size. This greater longevity gave brown trout a decisive advantage in many streams where habitat was marginal for brook trout.

With these discoveries, brown trout became the subject of increased controversy and stocking programs were drastically curtailed. Brown trout seemed to be more aggressive and seemed to displace many populations of spawning salmon and brook trout. Some believed the brown trout was too hard to catch and was a poor investment of the sportsman's dollar. Others said they were voracious cannibals and preyed on everything, including young salmon and trout. Much of this controversy resulted from misinformation and a lack of general understanding of the habits and behavior of the brown trout. However, these controversies did not preclude further experimentation with the species. Habitat evaluations revealed that many waters were not capable of supporting native salmon or brook trout, and also that many of these marginal waters were also not suitable for any other coldwater sport fish that were native to the area. The brown seemed to be a likely candidate for these marginal environments. This marked the beginning of the present management program for brown trout in Maine.

Fishery managers utilize brown trout in a variety of management situations. In some cases browns are stocked into waters with excellent water quality and abundant forage bases. In most cases, however, brown trout are utilized in waters where management for other salmonids such as brook trout or salmon has failed. These waters often exhibit depressed dissolved oxygen levels in the hypolimnion and a compressed thermocline. Additionally, many of these waters have an abundant population of competing species. Surprisingly, brown trout provide a high quality coldwater fishery in many of these "marginal waters", where management would otherwise be limited to existing warmwater species, or put-and-take coldwater fisheries. In addition, many waters are managed in conjunction with another salmonid as the principal fishery. Brown trout stocking rates are adjusted downward for these lakes and ponds to allow for multiple principal fishery management, and this reduces the catch rates for the species.

There are currently many lakes and streams in the state supporting brown trout fisheries where, were it not for this species, there would be no coldwater sport fishery today. In streams, large fish are not uncommon and occasionally a trophy or two are found in larger streams with deep pools and undercut banks. The nocturnal feeding habits of these large fish make them very elusive to the average angler who never even suspects their presence. This species also attains a large size in lakes and ponds. In larger bodies of water, they may elude a hook long enough to attain a size of 10 or 15 pounds. In small lakes, however, they rarely have a chance to get larger than 5 or 6 pounds before being caught. A few rivers, principally in southern Maine, also support stocked sea-run brown trout populations, but very little is known about these fish. It is known that they sometimes attain a size greater than 10 pounds.

The popularity of the brown trout as a sport fish has increased in recent years and is now expanding to areas outside their present distribution. Brown trout are a well-accepted part of Maine's fisheries management program. Their attractiveness as a sport fish and their adaptability to a wide range of habitats including lakes and ponds, streams and rivers, and coastal estuaries has made them invaluable in providing a sport fishery in many areas which otherwise would have none. For those anglers who have met the challenges of this unique fish, they find an attraction matched by few other sport fish in Maine.

PAST MANAGEMENT GOALS (1986-2001)

It is important to understand that brown trout are utilized under a variety of management situations, and that their performance under these highly inconsistent circumstances is expected to be quite variable. The measurements included in the following text are included as benchmarks to assist fishery managers in measuring the performance of brown trout, and should not necessarily be used to make comparisons between Regions or to measure the success or failure of a brown trout management program on a particular water or within a Region.

Brown Trout in Lakes

1986 Goal: Increase abundance and fishing opportunities for brown trout in Region A, and maintain current abundance and fishing opportunities in all other Regions.

- A. **Abundance Objective:** Increase distribution of brown trout in Region A to approximately 20,000 acres and maintain principal fisheries in 41,000 acres currently under management in other Regions. Maintain average population levels of legal fish in principal fisheries at about 2.0 fish/acre.
- B. **Harvest Objective:** Maintain the annual rate of exploitation at no greater than 30% of legal-size fish in all Regions.
- C. **Fishing Quality Objective:** Maintain an average statewide harvest rate of about 0.15 fish/angler day and average size of fish in the creel of about 15.0 inches and 1.5 pounds.

Management efforts during the past 15 years have exceeded the goal set in 1986 for brown trout in Region A. About 6,402 new acres of water with brown trout as a principal fishery have been developed in the Region during the 15-year planning period, representing a 44% increase in the total acreage now managed for brown trout. Currently there are approximately 20,911 acres in Region A where brown trout are managed as a principal fishery. The goal to maintain opportunity and abundance in the remaining Regions has been vastly exceeded. The total number of waters managed for brown trout as a principal fishery in the other six regions has increased from 41,122 in 1986 to 76,273 in 2001, representing an 85% increase.

A lack of year-round clerk surveys and population studies precludes our ability to evaluate the objectives related to brown trout population levels and exploitation rates in Maine lakes and ponds. In 1986, the statewide exploitation rate was estimated at 28%. It is unclear whether or not we reached this management objective, or the objective related to the maintenance of brown trout populations at 2.0 per acre. It would not be responsible for us to estimate the current exploitation rate with the available data.

The objective to maintain the catch rate for legal brown trout at 0.15 legal/angler day or higher has not been met according to our clerk surveys conducted during the last survey period (1996-2001). The most recent data indicate a statewide average catch rate of 0.09 legal browns per day in the winter and 0.12 legal browns per day in the summer, but summer data are very limited. However, it appears that the objective to maintain the average weight at 1.5 lbs and the average length at 15 inches has been exceeded. In 1986, the average brown trout harvested in Maine was 14.8 inches and 1.3 pounds. The average length and weight has increased to 15.7 inches and 1.5 lbs respectively (1996-2000).

Brown Trout in Streams

1986 GOAL: Increase abundance and fishing opportunity for brown trout in Regions A and B and maintain abundance and opportunity in all other regions.

- A. **Abundance Objective:** Increase abundance and opportunity for brown trout in Regions A and B by developing fisheries in the Androscoggin and Kennebec Rivers. Maintain all other streams and rivers at current levels of management.

Diversify fishing opportunities by establishing 600 miles of "general management" areas where populations are self-sustaining or augmented only with fry stocking; 10 miles of "special regulated management" where high length limits and low bag limits can establish a quality fishery with average size greater than 10 inches; and 250 miles of "intensive management" where sections of streams are stocked with spring yearlings or fry to produce a quality fishery in terms of numbers, with catch rates greater than 1.0 fish per angler day.

The management goal to increase abundance and fishing opportunity for brown trout in Regions A and B and maintain current abundance and opportunity in all other Regions has not been achieved. In 1986, 41 waters were stocked in Region A with brown trout. In 2000, that number has decreased to 38. Similarly, the number of streams stocked with brown trout in Region B has declined from 13 to 10 during the same time period. On the other hand, the number of streams stocked with brown trout in all other Regions has risen from six waters in 1986 to 17 waters in 2000, which exceeded expectations.

The objective to increase abundance and opportunity for brown trout in Regions A and B by developing fisheries in the Androscoggin and the Kennebec Rivers, while maintaining all other streams and rivers at current levels of management, has been partially achieved. The Kennebec River, from Skowhegan to tidewater has been stocked annually with brown trout for several years and an exceptional brown trout fishery now exists. A stocking program has also been established on a large section of the Kennebec between Bingham and Solon. The upper Androscoggin River from the New Hampshire border downstream to Rumford has also been stocked with brown trout in recent years and is producing an exciting addition to the rainbow trout fishery, which already exists. Browns are also stocked in this river from Rumford downstream to Lewiston. Results from a brown trout stocking program in the lower Androscoggin from Lewiston downstream to tidewater have been disappointing, and after several years of stocking and monitoring, the project was terminated in 1997.

The concept of diversifying fishing opportunity through "general management zones", "special regulation management zones", and "intensive management zones", as outlined in the 1986 brown trout plan, does not seem appropriate at this time for the following reasons:

- 1) Very few self-sustaining brown trout fisheries have been established through stocking programs. Electrofishing studies indicate that natural reproduction of brown trout occurs routinely, but the numbers and survival are not usually sufficient to maintain a fishery without stocking.

- 2) Fry stocking has proven to be of limited value. A current study on the survival of brown trout fry stocked in streams and their contribution to the fishery is underway on two streams in southern Maine. The data suggest that the survival of stocked brown trout fry in brooks and streams is low, and their contribution is unpredictable. A progress report on this project will be forthcoming in 2002.
- 3) Clerk survey data are very limited for Maine's brooks, rivers and streams, thus it is difficult to evaluate fully the success or failure of brown trout fisheries in these waters.
- 4) In most cases brown trout are managed along with another species of salmonid such as brook trout, salmon or rainbow trout; stocking rates, regulations and catch rates typically differ from those waters focusing on a single principal fishery.

Sea-Run Brown Trout

1986 GOAL: Increase abundance and fishing opportunities for sea-run brown trout.

- A. **Abundance Objective:** Continue with experimental programs for the development of viable sea-run fisheries in three coastal rivers now in progress. Specific abundance levels to be determined as information becomes available.
- B. **Harvest Objective:** A minimum of 100 fish per river. Potential sustainable yields to be determined.
- C. **Fishing Quality Objective:** Optimum levels to be determined as fisheries develop.

The 1986 management goal to increase abundance and fishing opportunities for sea-run brown trout has been achieved. Two waters in Region A currently being managed for sea-run brown trout. Additional introductions throughout the Region are being evaluated each year to determine their potential to provide sea-run fisheries. Two additional waters in Region B are also being managed for sea-run brown trout. Although harvest data are not available, the objective to produce a catch of at least 100 fish per river is undoubtedly being achieved at both waters in Region A. It is unclear at this time whether that objective is being met at the other waters.

OPPORTUNITY

Brown Trout in Lakes

In 1986, there were 188 lakes and ponds encompassing more than 187,000 acres where brown trout were known to exist in Maine, and of those, 91 waters supported brown trout as a principal fishery (Table 1). By 2001, the number of waters where brown trout occur had increased to 213 waters, and principal fisheries now exist in 140 of these waters or in approximately 97,184 (55,600) acres of lake and pond habitat. This represents an overall increase of 74% in the amount of habitat being managed for brown trout since the 1986 assessment.

Approximately 88% of the lakes and ponds, and 93% of the acreage, in Maine where brown trout are a principal fishery are found in Regions A, B, and C (Figure 1.). This is very understandable considering that the waters in these regions support more marginal habitat for cold-water fish than waters to the north and west, and more importantly, support a much more diverse and extensive population of competing fish species. Waters in Regions A, B and C provide a greater opportunity for brown trout management.

The waters presently being managed for brown trout are mostly mesotrophic, but they do support water quality suitable for sustaining moderate to high populations of brown trout. These waters range in size from 8 to 8,239 acres with a mean of approximately 600 acres. Most of the waters lack sufficient spawning and nursery habitat to support significant natural reproduction and recruitment into the fishery. Branch Lake in Ellsworth and Reddington Pond in Carrabassett Valley are the only two waters in Maine that have principal fisheries for wild brown trout. Two other ponds, Lower Patten Pond in Surry and Kennebago Lake in Davis Township, consistently produce wild brown trout, although are not considered principal fisheries.

It is apparent that the abundance objective, as stated in 1986, has been greatly exceeded. As mentioned earlier, brown trout are often utilized in waters where management for other species such as brook trout or landlocked salmon has failed. Several waters in southern and central Maine, which were managed for trout or salmon in the early 1980's, are now being managed for brown trout. Long Lake in Naples, the Range Ponds in Poland, Great Pond in Belgrade and Damariscotta Lake in Jefferson are good examples. An unreliable smelt population, marginal water quality and extensive populations of competing species such as perch and bass certainly all contributed to the poor returns of salmon at Long Lake and Great Pond. Browns, which can survive in these less than ideal circumstances, are providing better returns to anglers with some opportunity for large fish. The Range Ponds and Damariscotta Lake have similar problems with forage and competing fish species, although the water quality is much better suited to coldwater fisheries management. Brown trout are now providing higher returns and are growing better than landlocked salmon, which were managed there in the 1980's.

Changes in Maine's fish hatchery product have also enabled biologists to use browns in waters, which in the past produced very few returns. These waters typically supported high numbers of predatory and competing fish species. Fall yearling brown trout, which are generally stocked into Maine lakes and ponds, now range from 12-16 inches depending on the hatchery of origin. In the late 1980's these fish ranged from 10-12 inches (Table 2). Hatchery propagated spring yearling browns have nearly doubled in size during the planning period. Brown trout, when stocked at these larger sizes are much more able to defend against predation and compete for food, and as a result are expected to exhibit higher survival rates.

Traditionally, Maine Lakes have been stocked mostly with fall yearling brown trout; however, spring yearlings have been utilized more often in recent years due to their accelerated growth in Maine hatcheries. In Regions A and B, spring yearlings are used mostly in small lakes and ponds with fewer predators and less competition. Further studies are necessary to predict the effectiveness of this spring yearling program for Maine lakes. The average stocking rate for fall yearling brown trout in Maine Lakes is 1.5 fish per acre, while the statewide average stocking rate for spring yearlings is 2.4 fish per acre (Table 3).

Public access still limits the number of waters managed for brown trout in southern Maine, as in 1986. Adequate public access to all waters would likely result in an increase in the number of waters managed for brown trout.

For the purpose of resource management, the State has been divided into seven Fishery Management Regions. These Regions are aggregations of townships, which were delineated for administrative purposes and are not necessarily based on similarities in human population densities, resource use patterns, or general ecology. The statewide and regional distribution of brown trout lakes is shown in Figure 1, and as indicated, brown trout waters are not evenly distributed throughout the state.

Region A has 43 of the 140 waters containing principal brown trout fisheries. These 43 waters encompass 20,911 surface acres of habitat, which represents 31 percent by number and 22 percent by acreage of the total available in the State. The major changes since the 1986 plan has been the addition of Long Lake (4,867 acres) in Naples, Upper and Middle Range Ponds (366 and 391 acres, respectively) in Poland, and Little Ossipee Lake (564 acres) in Waterboro.

Region B has 57 of the 140 waters available, which represents 41% of the total number present in the state. These lakes contain 56,595 surface acres of lake habitat, representing nearly 58% of the total acreage. Region B has experienced approximately a 91% increase in acreage being actively managed for browns since 1986; three new brown trout waters, Great Pond in Belgrade (8,239 acres), Damariscotta Lake in Jefferson (4,381 acres), and Great Moose Lake in Hartland (3,584 acres) account for much of the new acreage.

Region C has the next highest percentage of brown trout habitat available to anglers. There are 24 waters encompassing 12,981 acres of habitat, representing 17% by number and 13% by acreage of the total amount available in the State. This represents approximately an 89% increase in lake acreage being actively managed for this species since 1986. Molasses Pond in Eastbrook (1,252 acres), Rocky Lake in Whiting (1,126 acres), and Pennamaquan Lake in Pembroke (1,209 acres) account for much of the new acreage.

Region D contains 13 waters encompassing 5,003 acres, which represent 9% by number and 5% by acreage of the total available in the State, very similar to the numbers managed for browns in 1986.

Region E, F and G, which did not have any principal fisheries for brown trout in 1986, now have four waters. Region E now manages one water, Region F has an ongoing introduction at Nicatous Lake (5,165 acres) and Region G is currently managing two waters for brown trout. The presence of other native fish species such as brook trout and landlocked salmon preclude the introduction of brown trout into many waters in these Regions. In addition, the restoration of sea-run Atlantic salmon compromises the opportunities for brown trout management in Regions E and F.

If present levels of management are maintained during the next 15-year planning period, the amount of habitat and present distribution of brown trout is not likely to change. An experimental rainbow trout stocking program, which will begin in 2001, will result in a slight decrease in brown trout stocking over the next several years. If successful, the rainbow program could result in a decrease in brown trout stocking, but most likely would not significantly affect the distribution of brown trout. It is expected, however, that demands on the resource will continue to increase during the next planning period, especially in light of the increasing population trends in Regions A and B.

Brown Trout in Streams

Sixty-five Maine brooks, rivers and streams were stocked from 1996-1999. In recent years, this number has decreased somewhat in Regions A and B, but increased slightly in the other Regions (Table 4).

Brown trout are usually stocked as spring yearlings into medium or large size streams and rivers where brook trout habitat is severely compromised by abundant populations of competing fish species, by marginal water quality conditions, or both. In some of the larger waters where competing species are considered very numerous, fall yearling browns are stocked. Brown trout fry are currently stocked only as unscheduled fish. Brown trout seem to perform best in water temperatures slightly warmer than that preferred by brook trout, but cooler than that preferred by landlocked Atlantic salmon. There are many streams supporting good brook trout fisheries in the cooler headwater areas with good brown trout fisheries in the lower, slightly warmer reaches. Brook trout provide the early fishing action and move into cooler waters during the summer, while browns remain in the lower reaches during the summer months and provide a season-long fishery. For instance, the Pleasant River in Windham and Collyer Brook in Gray are good examples. The main stem of both rivers are managed for stocked brown trout and brook trout, but the headwater streams support excellent populations of wild brook trout.

Nearly all the streams and rivers with principal fisheries for brown trout are maintained entirely by stocking. In Region A, where 2,416 different waters have been sampled, fewer than twenty support wild populations of brown trout. Most of these are stocked annually with browns, and it is assumed that the wild component in most of these waters would disappear if stocking were discontinued. In Region D there are several streams, some of which are in the upper Kennebec River drainage, which support wild populations of brown trout. The Meduxnekeag River, in Region G, is another brown trout fishery supported by wild fish.

There have been very few population studies done on brown trout in Maine streams. A few stream sections have been studied in Region A, back in the late 1970's and early 1980's, and were found to have a standing crop of 18.5 pounds of trout per acre. The estimated abundance was 581 brown trout per acre (all size classes). There were 431 fish per acre in the 0 – 3.9 inch range, 86 per acre in the 4.0 – 5.9 inch range and 61 per acre in the over 6.0 inch range. The standing crops were 1.9 pounds per acre, 4.4 pounds per acre, and 12.2 pounds per acre for these ranges respectively. Because it is realized that there are statewide differences in water quality and other conditions, these figures may not reflect total standing crops on other Maine waters.

In Regions A and B, brown trout stocking in several smaller brooks and streams has been discontinued due to poor returns, and a lack of escapement to older age classes. Brown trout are generally more difficult to catch than brook trout, and put-and-take brook trout stocking programs make more sense on these small waters. Brown trout programs on some of the larger river

systems appear to be providing quality fisheries. Relatively new programs at the Kennebec River below Waterville, and the Androscoggin River above Rumford are producing good returns. A brown trout stocking program on the lower Androscoggin River, below Lewiston, has recently been discontinued due to poor returns of stocked fish.

In Region C, the presence of sea-run Atlantic salmon has precluded intensive stream management for brown trout on many waters. The most viable river fisheries exist in the Union River system and streams surrounding Branch Lake in Ellsworth, as they did during the 1986 plan. Brown trout are stocked only as unscheduled fish into Region C streams.

The most significant change in brown trout riverine management in Region D during the past planning period has been the initiation of stocking programs in the upper Androscoggin River, from the state line downstream to Lewiston, and in the upper Kennebec River between Solon and Bingham. Regional fisheries staff is presently evaluating these new fisheries.

Very few rivers or streams in Regions E, F or G are managed for brown trout. Brown trout introductions into rivers and streams in these Regions have been very limited due to the presence of other native fish species including brook trout, landlocked salmon, or Atlantic sea-run salmon. Many of the streams and rivers in Regions E and F drain directly or indirectly into the Penobscot River, where Atlantic sea-run salmon are being restored. The Meduxnekeag River in Region G supports a fishery for wild brown trout.

Maine's Atlantic salmon stocking program has compromised brown trout management opportunities in Maine waters and will continue to limit any expansion of the brown trout program in some drainages. Additionally, the re-establishment of a rainbow trout stocking program may result in a slight reduction in brown trout stocking. Initially, paired stockings of brown trout and rainbows will be evaluated. If successful, then brown trout allocations may decrease as rainbow trout stocking increases. Assuming no significant loss in habitat, the present distribution of brown trout in streams is unlikely to change significantly during the next planning period under existing management priorities.

Sea-run Brown Trout

The sea-run brown trout program has undergone many changes in the past 15 years. In 1986, the management goal for the sea-run brown trout fisheries called for the development of a viable fishery in three coastal rivers. The management objective called for a rod catch of at least 100 fish in these waters. In 1986, our efforts focused on two waters in Region A, the Royal River in Yarmouth and the Ogunquit River in Ogunquit. In 1989, the stocking program at the Royal River was discontinued due to poor returns of stocked fish. Stocking was continued at the Ogunquit River although angling remained fair at best. Although no official studies were conducted, it is felt that intensive predation by the striped bass, bluefish, and predatory birds were responsible for the poor returns.

In recent years, biologists conducted preliminary assessments of available angler access, water quality and physical habitat of several waters along the southern Maine coast to determine their suitability for sea-run management. This work has resulted in several new waters being stocked on an experimental basis.

Much larger fall yearling brown trout, which now average 12-16 inches, are stocked annually at several southern coastal Maine waters. These larger size brown trout are stocked to overcome predation losses. The Mousam River in Kennebunk and the Ogunquit River in Ogunquit are each

producing very exciting fisheries. Other waters in Region A are currently being stocked to determine their potential to provide sea-run fisheries.

Farther up the Maine coast, this Department has initiated similar programs at the Medomak River in Waldoboro and the St. George River in Thomaston. Stocking larger fall yearling browns in the Kennebec River, below the dam in Waterville is expected to result in some tidewater angling in the Augusta area.

The hatcheries' ability to provide a larger fall yearling brown trout, which can more effectively compete in an estuarine environment, has contributed significantly to the success of this program. It is also apparent that fall fishing opportunities provided by sea-runs are in demand. It is expected that the sea-run program will continue, and additional improvements must be realized to meet future demands.

DEMAND

Brown Trout in Lakes

Data from the most recent Open Water and Ice Fishing Surveys conducted by the University of Maine (1999) suggest that angler use on Maine's brown trout lakes and ponds has risen considerably since the 1986 plan (Table 5). Total annual use on these waters has escalated 218%, up 86% in the winter and 278% in the summer since the last survey was conducted in 1983. All Regions showed a marked increase in summer use, and all Regions showed significant increases in use during the winter with the exception of Region D, which experienced a decline.

A 74% increase in the number of waters managed for brown trout during the planning period helped to disperse this increase in use. As a result, the increase in angler use per acre during the planning period was not as dramatic as the increase in total use (Table 6). Summer use per acre increased 74%, winter use increased only 6%, and total annual angler use per acre has increased 56% since 1986.

One must realize that these use estimates include all angler use on waters with principal brown trout fisheries. Most brown trout waters support bass populations as well as populations of other coldwater or warmwater principal fish species. The enormous increase in bass fishing during the planning period most likely accounts for a large part of the increase, and the summer angler estimates support this theory. During the 2000 flight counts at Mousam Lake in Acton, a popular southern Maine brown trout/bass water, the pilot counted bass anglers and trout anglers separately. Approximately 50% of the total seasonal use was directed at bass. Bass fishing during the winter is not as popular, and as a result the winter surveys probably provide a more reliable estimate of the trend in winter angling for brown trout. It is important to understand that questionnaire data rely on an angler's memory, and that a certain amount of bias is expected, but the quality of the trend information is very valuable.

Statewide annual angler use, as estimated from clerk surveys during the last planning period (1996-2000) is estimated at 4.50 anglers/acre/year, also suggesting a sharp increase since the 1986 Species Plan Update, at which time the statewide angler use was estimated at 3.26 anglers/acre/year (Table 7). However, these surveys showed a 25% drop in winter use during the planning period, while summer use increased. The summer clerk surveys, as well as winter surveys, from Regions other than A and B should be viewed with caution since there were very few surveys between 1981 and 1985. However, there were a relatively high number of clerk surveys conducted in Regions A and B during the most recent survey period, and these estimates of use are probably more reliable than the estimates from the University's survey. In Region A, where there were a reliable number of winter surveys from both planning periods, winter use dropped 10%.

Several successive years of poor ice conditions in southern and central Maine may account for the decline in use during the last planning period. The last four or five winters have been very mild, especially in this part of Maine. The interest in other winter sports such as snowmobiling, skiing and snowshoeing has also risen dramatically during the planning period. This increase may also account for some of the decline in ice fishing use.

Most lakes and ponds in Regions A and B are now open to fishing until Nov 30, a new regulation enacted in 1998 to increase angling opportunity. Though early indications show that use during this extended season is low, a slight increase in demand has occurred and may

possibly increase in the future. In 1998 and again in 2000, use was estimated on 25 Region A brown trout waters during the extended fall season. The total fall use was 0.09 angler days per acre, of which we suspect was largely directed at bass.

Brown Trout in Streams

Data from the University of Maine Open Water Fishing Survey, conducted in 1999, detail the estimates by Regions for angler days spent fishing brown trout rivers and streams (Table 8). The data suggest a substantial increase in angler use in all Regions except Region G, from 1983 to 1994, and corresponding decreases in angler use in all Regions except Region G from 1994 to 1999. The data show a 120% increase in statewide angler use on Maine's brown trout streams from 1983 to 1999. A steady increase since the 1980's was anticipated due to the addition of several large river (i.e. Kennebec and Andoscoggin Rivers) brown trout fisheries during the planning period, but the decline since 1994 is difficult to explain. This decline is also unusual in light of the substantial increases in angling on lakes and ponds during the same period. Dry conditions prevailed in 1999, and may have slightly affected use during the open water season. These are single season estimates, and it is believed that an increase in use on rivers and streams has been the trend during the entire planning period.

On most of the smaller streams managed for browns, angler use is highest in the spring, and then declines through the summer months. In the larger rivers and streams, where adequate flows prevail, summer angling for brown trout is quite prevalent. Some of the new stocking programs on the Kennebec River, Androscoggin River, Little Androscoggin River, and the Meduxnekeag River are providing angling for brown trout all season, and use is quite high.

Many of the larger brown trout rivers are also very popular bass fishing destinations, and the high interest in bass fishing in recent years certainly must contribute to the increase in river use. The addition of several new public access sites on these large rivers during the planning period has also most likely resulted in an increase in use. These sites have been constructed in conjunction with the relicensing of hydropower facilities.

In recent years, with the increased demand for fall fishing opportunities in rivers and streams, additional waters have been opened either year-round or well into the fall to increase fishing opportunity. Waters such as the Little Androscoggin, and the Little Ossipee Rivers in Region A, and the Nezinscot as well as sections of the Kennebec River in Region B, have been opened to either year-round fishing or extended fall fishing. Demand for this type of opportunity is likely to increase, and additional fall fishing opportunities for stocked fisheries will need to be considered.

Sea-Run Brown Trout

Currently, use data are not available for the sea-run brown trout waters in Maine. At two waters, the Mousam River in Kennebunk and the Ogunquit River in Ogunquit, annual use is estimated to be well in excess of 1000 angler trips, although no formal surveys have been conducted. It is obvious that demand is very high for this program, and efforts will be taken to expand the sea-run brown trout fishing opportunities. Any expansion of the program will also serve to reduce the concentrations of anglers that occur now. Contrary to typical brown trout stream fisheries, demand for the sea-run program is highest in the fall, early winter and early spring. Anglers from all over New England are participating in the fishery. Reports of 30 anglers or more on a weekend day are common on the Mousam and Ogunquit Rivers in November, December, and March.

FISHING QUALITY

Brown Trout in Lakes

Recent data from clerk surveys suggest a precipitous decline in the statewide winter catch rates and harvest rates for brown trout taken from Maine lakes (Table 9). From 1996 to 2000, there were 60 winter clerk surveys conducted on Maine lakes and ponds, and the data indicate catch rates far below the 1986 objectives for brown trout in lakes for all Regions with the exception of Region G, where there are only two brown trout waters. The average winter catch rate for all state waters is 0.09 brown trout/angler/day, and the objective as stated in the 1986 plan called for a catch rate of at least .20 brown trout/angler/day. Though there were very few summer creel surveys conducted during either planning period, these data also indicate declining catch rates.

Catch rate data from the Open Water and Ice Fishing Surveys, conducted by the University of Maine, also indicates a decline during the planning period 1986-2000 (Table 10). Statewide winter catch rates declined by 35%, and summer catch rates declined by 56%. The high catch rates in 1999 from Regions D, E, F and G may be a result of the small sample size from those Regions. The most meaningful information is from Regions A and B as well as the statewide data. It must be re-emphasized that a certain amount of bias is expected since this information is based on memory.

Although this information has biologists extremely concerned, some of the decline can be explained by the focus of clerk surveys in southern and central Maine. In Region A, for instance, all five surveys were conducted on lakes experiencing growth and survival problems. In Region B similar waters were targeted for surveys. Angler use, as discussed in the opportunity section has also increased significantly since the 1986 planning period. This increase in effort may also be partly to blame for the decline in catch and harvest rates. Considering that typical brown trout waters are mesotrophic and usually support extensive populations of competitors, and the fact that the largest brown trout programs exist in Regions A and B, where angler use is very high, the catch rate objectives were perhaps set too high and should be lowered for the next planning period.

In 1999, the genetic variability of the brown trout brood stock at New Gloucester hatchery was tested at the University of Montana and the results indicated low genetic variability, due to severe inbreeding. It is possible that this finding may be related to poor survival of stocked brown trout, thus contributing to the anecdotal reports of poor brown trout fishing in southern Maine.

Average length and weight of brown trout taken from Maine lakes and ponds, as measured during clerk creel surveys, increased slightly during the planning period (1986-2000)(Table 11). The average brown trout from Maine lakes is now 15.7 inches long and weighs 1.5 pounds. In 1986 browns averaged 14.8 inches and 1.3 pounds. One reason, which may account for this slight improvement in growth, is the increase in size quality of stocked hatchery fish. As stated earlier, the average size of stocked brown trout has nearly doubled since the mid 1980's. As a result, these stocked brown trout have a head start on growth and this may result in a slight increase in average size of creeled browns.

Improvements in brown trout management may have also resulted in more appropriate management at certain waters. Clerk creel surveys enable the manager to adjust stocking rates

and regulations in order to produce a higher quality fishery. These adjustments in stocking rates or regulations many times result in an increase in the size of creel brown trout.

Brown Trout in Streams

A lack of sport fishing surveys precludes our ability to evaluate the catch rate and size quality parameters in Maine streams effectively. Catch rates and harvest rates for brown trout in Maine streams, from clerk surveys, are detailed in Table 12. As indicated, there are very few full clerk surveys conducted on Maine's brown trout rivers or streams. This table provides data from 21 surveys, which were conducted on only six different waters, and the data may or may not be applicable to all other Maine rivers and streams. Although specific catch rate objectives were not provided in the 1986 brown trout species plan, it appears that present catch rates are low, but in light of the fact that most of these waters are managed for additional salmonids, these catch rates may possibly be satisfactory. The statewide catch rate for brown trout in streams is 0.27 brown trout per angler day.

Sea Run Brown Trout

A lack of sport fishing surveys precludes our ability to evaluate the catch rate and size quality parameters on Maine's sea-run brown trout fisheries. Most of the catch is made up of stocked brown trout, which have been at large for 6 months or less. Although there have not been any clerk surveys conducted during the planning period, it is clearly evident that catch rates are much higher now than they were in the 1980's. Anecdotal reports also suggest that stocking larger fall yearling browns in these sea-run waters has produced significantly more older age larger brown trout. In the 1980's, browns over 18 inches were reported very occasionally. Now, reports of fish over 18 inches are quite common, and reports of fish over 20 inches are not unusual.

APPENDIX

Table 1. Occurrence of Brown Trout in Lakes by Region, Comparing 1985 and 2000

REGION	TOTAL OCCURRENCE		PRINCIPAL FISHERIES		ONGOING INTRODUCTIONS	
	NUMBER OF LAKES	ACRES OF LAKES	NUMBER OF LAKES	ACRES OF LAKES	NUMBER OF LAKES	ACRES OF LAKES
YEAR 1985						
A	63	55,582	33	14,509		
B	76	61,587	36	29,689		
C	24	24,176	10	6,855		
D	21	44,194	12	4,578		
E	1	403	0	0		
F	0	0	0	0		
G	3	1,165	0	0		
STATE	188	187,107	91	55,631		
YEAR 2000						
A	54	56,047	43	20,911	0	0
B	91	73,333	57	56,595	0	0
C	40	21,659	24	12,981	4	3,542
D	21	47,259	13	5,003	0	0
E	1	403	1	403	0	0
F	1	5,165	0	0	1	5,165
G	5	1,450	2	1,291	0	0
STATE	213	205,316	140	97,184	5	8,707

Table 2. Average Size at Stocking (Number Per Pound) for Spring Yearling and Fall Yearling Brown Trout in Maine, 1988 and 2000.

YEAR	NUMBER PER POUND	
	SPRING YEARLINGS	FALL YEARLINGS
1988	6.9	2.2
2000	3.5	1.4*

*Figure does not include 14,000 very large fall yearlings, which perished at the Casco Hatchery prior to stocking.

Table 3. Three Year Stocking History (1997-1999) for Brown Trout in Lakes by Region and Age Group

REGION	AGE	NUMBER OF LAKES STOCKED	ACRES STOCKED	AVERAGE STOCKED PER YEAR		AVERAGE STOCKED PER ACRE	
				NUMBER	POUNDS	NUMBER	POUNDS
A	AD	15	8,156	162	1,001	0.042	0.228
	FY	26	18,214	9,933	8,951	0.871	0.786
	SY	38	13,577	5,107	1,449	2.717	0.663
	ALL	51	22,008	5,067	3,801	1.566	0.639
B	AD	8	8,935	88	648	0.047	0.288
	FY	56	54,411	41,137	26,388	2.038	1.268
	SY	11	24,231	12,383	2,511	1.755	0.386
	ALL	61	59,513	16,093	8,870	1.910	1.123
C	FY	20	12,621	5,725	4,348	0.574	0.432
	SY	14	7,047	2,850	667	2.205	0.520
	ALL	28	15,156	4,288	2,508	1.152	0.463
D	FY	6	1,953	2,705	1,948	2.752	2.095
	SY	10	4,763	5,500	2,168	1.916	0.690
	ALL	11	4,810	4,382	2,080	2.160	1.099
E	FY	1	403	1200	1,000	2.978	2.481
	SY	1	403	1200	305	2.978	0.756
	ALL	1	403	1,200	536	2.978	1.331
F	SY	1	5,165	2,750	483	0.052	0.093
	ALL	1	5,165	2,750	483	0.532	0.093
G	FY	2	1,291	1,733	1,399	1.375	1.092
	ALL	2	1,291	1,733	1,399	1.375	1.092
STATE	AD	23	17,091	250	1,649	0.043	0.242
	FY	111	88,893	60,765	42,739	1.499	1.021
	SY	75	55,186	28,473	7,320	2.352	0.594
	ALL	155	108,346	89,488	51,708	1.656	0.827

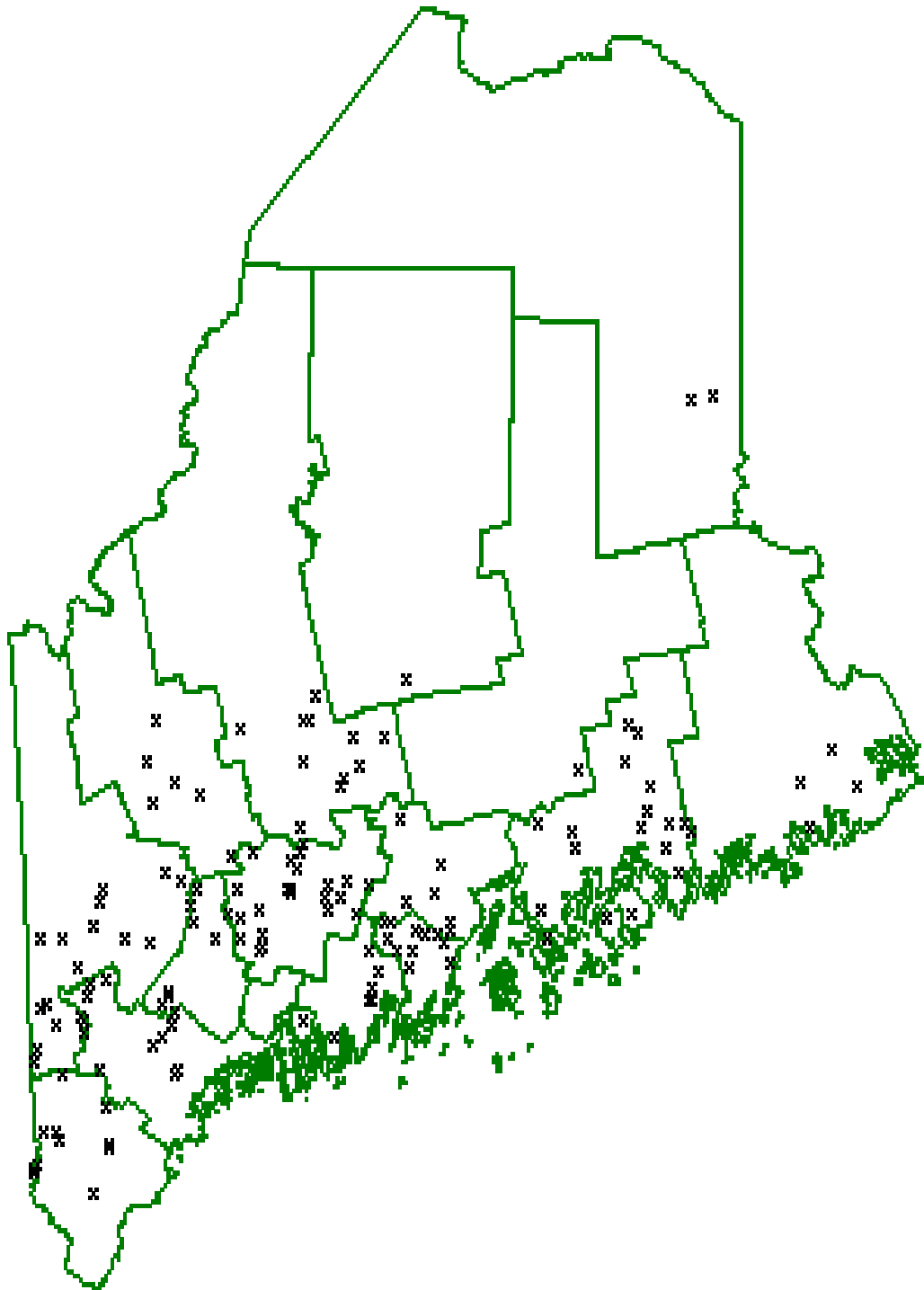


FIGURE 1. The 1999 Distribution of all Principal Fisheries for Brown Trout in the Lakes and Ponds of Maine.

Table 4. Three-Year Brown Trout Stocking History (1998-2000) for Streams by Region and Age Group.

REGION	AGE	NUMBER OF STREAMS STOCKED	AVERAGE STOCKED PER YEAR		AVERAGE STOCKED PER STREAM	
			NUMBER	POUNDS	NUMBER	POUNDS
A	AD	2	97	268	45	173
	FRY	4	53,489	510	21,260	192
	FY	11	5,542	4,420	438	339
	SY	37	68,061	14,322	823	165
	ALL	38	127,189	19,520	22,566	869
B	AD	4	381	818	60	136
	FRY	1	23,000	280	23,000	280
	FY	4	2,900	2,068	550	399
	SY	9	27,517	6,788	1,403	333
	ALL	10	53,798	9,954	25,013	1,148
C	SY	6	4,150	866	667	143
	ALL	6	4,150	866	667	143
D	FY	1	150	107	150	107
	SY	10	24,545	7,275	1,186	330
	ALL	10	24,695	7,382	1,336	437
E	FY	1	1,217	985	1,217	985
	All	1	1,217	985	1,217	985
STATE	AD	6	224	540	53	155
	FRY	5	61,156	604	21,477	203
	FY	17	7,775	6,130	521	403
	SY	62	122,989	28,979	951	214
	ALL	65	192,144	36,253	5,750	244

Note: The stocking rates for brown trout fry and spring yearlings were high during the last 3 years, in part due to the high number of unscheduled fish during the period.

Table 5. Expressed Demand (Angler-Days/Acre) From the 1999 Open Water and Ice Fishing Surveys, Conducted by the University of Maine, and the Percent Change Since the 1983 Survey.

REGION	1999					
	ANNUAL USE PER ACRE	PERCENT CHANGE SINCE 1983	SUMMER USE PER ACRES	PERCENT CHANGE SINCE 1983	WINTER USE PER ACRES	PERCENT CHANGE SINCE 1983
A	16.42	+55	13.80	+67	2.62	+11
B	9.19	+101	7.51	+149	1.68	+07
C	4.49	+04	2.89	-16	1.40	+66
D	6.53	+07	5.84	+37	0.69	-62
E	2.77	*	*		2.77	*
F	*	*	*		*	*
G	6.96	+185	2.28	-06	2.40	*
STATE	9.92	+56	8.11	+74	1.81	+06

Table 6. Expressed Demand (Angler-Days) From the 1999 Open Water and Ice Fishing Surveys, Conducted by the University of Maine, and the Percent Change Since the 1983 Survey.

REGION	1999					
	TOTAL ANNUAL USE	PERCENT CHANGE SINCE 1983	TOTAL SUMMER USE	PERCENT CHANGE SINCE 1983	TOTAL WINTER USE	PERCENT CHANGE SINCE 1983
A	343,289	+175	288,545	+217	54,744	+61
B	520,466	+300	425,529	+406	94,937	+106
C	55,842	+142	37,631	+121	18,211	+203
D	32,660	+56	29,291	+125	3,450	-56
E	1,115	-55	*	*	1,115	+271
F	314	-89	*	*	314	*
G	8,991	+125	5,889	+1372	3,102	*
STATE	962,677	+218	786,804	+278	175,873	+86

Table 7. Average Angler Days Per Acre Expended on Maine Lakes With Brown Trout During the Years 1996-2000, and the Percent Change Since the 1981 to 1985 Planning Period. Data From Clerk Surveys or Aerial Count Surveys

REGION	WINTER			SUMMER		
	NUMBER OF SURVEYS	MEAN ANGLER-DAYS PER ACRE (SE)	PERCENT CHANGE SINCE 1983	NUMBER OF SURVEYS	MEAN ANGLER-DAYS PER ACRES (SE)	PERCENT CHANGE SINCE 1983
A	49	2.10 (0.68)	-10	43	3.84 (0.92)	N/A
B	31	0.62 (0.07)	-31	21	3.42 (0.60)	+212
C	14	0.52 (NA)	N/A	14	0.50 (NA)	N/A
D	2	1.03 (0.32)	+04	0	N/A	N/A
E	0	N/A	N/A	0	N/A	N/A
F	0	N/A	N/A	0	N/A	N/A
G	4	1.90 (0.51)	N/A	0	N/A	N/A
STATE	100	1.38 (0.43)	-25	78	3.12 (0.81)	+237

Table 8. Estimates of Angler Use on Maine Brown Trout Rivers and Streams. Data Derived From the University of Maine Open Water Fishing Survey, Summer 1999

REGION	1983 ANGLER USE	1994 ANGLER USE	1999 ANGLER USE
A	27,980	65,594	45,304
B	5,091	41,036	32,797
C	5,844	No data	3,610
D	6,768	35,157	23,205
E	499	4,992	2,438
F	449	1,592	1,330
G	2,454	423	3,515
STATE	49,084	148,794	112,199

Table 9. Mean Catch Rate (Legals Kept Plus Released/Angler Day) and Harvest Rate (Legals Kept/Angler Day) of Brown Trout Angled From Maine Lakes, Comparing the Periods 1981-1985 and 1996-2000

REGION	WINTER						SUMMER					
	CATCH RATE			HARVEST RATE			CATCH RATE			HARVEST RATE		
	N	MEAN	SE	N	MEAN	SE	N	MEAN	SE	N	MEAN	SE
1996 –2000												
A	5	0.0290	0.0169	5	0.0233	0.0137	1	0.0000		1	0.0000	
B	42	0.0867	0.0100	42	0.0586	0.0062	7	0.1368	0.0318	7	0.0289	0.0089
C	1	0.0635	*	1	0.0476		0			0		
D	2	0.0690	0.0245	2	0.0581	0.0201	0			0		
E	0	*	*	0	*	*	0			0		
F	0	*	*	0	*	*	0			0		
G	10	0.2831	0.0574	10	0.2255	0.0415	0			0		
STATE	60	0.0942	0.0122	60	0.0669	0.0089	8	0.1279	0.0312	8	0.0271	0.0084
1981-1985												
A	38	0.1382	0.0198	38	0.1353	0.0198	0					
B	3	0.1855	0.0749	3	0.1835	0.0745	4	0.1942	0.0529	4	0.1853	0.0570
C	2	0.2121	0.0921	2	0.1919	0.0921	0					
D							0					
E							0					
F							0					
G	2	0.0133	0.0179	2	0.0133	0.0067	0					
STATE	45	0.1499	0.0179	45	0.1466	0.0178	4	0.1942	0.0529	4	0.1853	0.0570

Table 10. Brown Trout Catch Rates From Open Water and Ice Fishing Surveys Conducted by the Department of Resource Economics at the University of Maine. CUE (Legals/ Angler Day)

REGION	WINTER			SUMMER		
	CUE-83	CUE-94	CUE-99	CUE-83	CUE-94	CUE-99
A	0.48	0.22 (0.11)	0.25 (0.10)	0.38	0.17 (0.03)	0.14 (0.03)
B	0.54	0.35 (0.17)	0.42 (0.14)	0.29	0.12 (0.05)	0.12 (0.04)
C	0.22	0.20 (0.11)	0.30 (0.08)	0.16	0.10 (0.06)	0.18 (0.06)
D	0.97	0.40 (0.24)	0.37 (0.18)	0.40	0.16 (0.11)	0.39 (0.07)
E	1.2	0.53 (0.47)	0.69 (0.34)	0.03	0.45 (0.12)	N/A
F	0.00	0.00 (0.00)	0.67 (0.33)	0.16	0.23 (N/A)	N/A
G	0.00	0.56 (0.40)	0.43 (0.28)	0.13	1.13 (0.31)	0.50 (0.03)
STATE	0.54	0.29 (0.15)	0.35 (0.13)	0.32	0.15 (0.05)	0.14 (0.04)

Table 11. Comparison of Mean Length and Weight of Angled Brown Trout Collected From Winter Lake Creel Surveys Conducted 1996-2000 and 1981-1985

REGION	LENGTH (INCHES)			WEIGHT (POUNDS)		
	N	Mean	SE	N	Mean	SE
1996 - 2000						
A	6	16.4	0.47	6	1.69	0.13
B	47	15.5	0.31	47	1.45	0.11
C	0			0		
D	2	13.9	0.26	2	0.84	0.08
E	0			0		
F	0			0		
G	10	16.6	0.88	10	1.66	0.32
STATE	65	15.7	0.41	65	1.49	0.14
1981-1985						
A	45	14.7	0.20	45	1.27	0.09
B	7	15.7	0.56	5	2.05	0.23
C	2	15.1	0.14	2	1.40	0.01
D	0					
E	0					
F	0					
G	0					
STATE	54	14.8	0.24	52	1.35	0.10

Table 12. Mean Catch Rate (Legals Kept and Legals Released/Angler Day) and Harvest Rate (Legals Kept/Angler Day) by Region for Years 1996-2000, Rivers and Streams Only. Means Were Weighted by the Number of Anglers Surveyed, N = the Number of Clerk Surveys.

REGION	CATCH RATE			HARVEST RATE		
	N	Mean	SE	N	Mean	SE
A	8	0.3349	0.1306	8	0.0443	0.016
B	0			0		
C	0			0		
D	5	0.1971	0.1831	5	0.0705	0.091
E	7	0.2433	0.0454	7	0.0667	0.013
F	0			0		
G	1	*		1	*	*
State	21	0.2733	0.0662	21	0.0570	0.021

**BROWN TROUT
GOALS AND OBJECTIVES FOR LAKES
2001 – 2016**

GOAL: Maintain principal brown trout fisheries in approximately 140 lakes statewide.

Abundance Objective: Maintain the present distribution of brown trout in Maine (97,184 acres). Maintain all present populations that support principal fisheries for brown trout at or above current levels of abundance.

Catch Rate Objective: Experienced anglers should expect catch rates of 1.0 brown trout per day or higher. This objective may differ in waters managed for trophy size quality or for multiple salmonid fisheries.

Fish Quality Objective: Experienced brown trout anglers should expect to catch brown trout averaging 15 inches and 1.5 pounds, and can expect to catch an 18-20 inch fish on a good fishing day.

Capability of Habitat: There are additional waters statewide with suitable habitat for brown trout, where management for this species could be expanded. However, all habitats currently under management are considered adequate to meet public demand. All waters managed for brown trout should have the capability to support survival for at least one year at large. Additionally, there should be sufficient forage for brown trout to reach the legal length limit within one year at large.

Feasibility: Any expansion of the current brown trout program in lakes and ponds will need to be carefully scrutinized by the Fishery Division. Likewise any water in which the brown trout management is not providing adequate returns or cannot be modified to provide adequate returns should be removed from the program. Hatcheries are currently at capacity for the production of fall yearling brown trout, and pending the results of DEP wastewater monitoring, these numbers may have to be reduced. Some lakes with light competition from other fish species could possibly be converted to a spring yearling stocking.

Desirability: Brown trout provide an opportunity for coldwater fishery management in waters where management for other coldwater fish species has failed. In addition, browns provide an opportunity to catch large-size salmonids. Angler use on the state's brown trout waters has increased, and evidence suggests that catch rates have declined. Angler use on these waters is expected to continue to increase, and any improvement in the quality of the fishery would be desirable.

Possible Consequences: Larger stocking programs for other salmonid species such as legal-size brook trout and rainbow trout, coupled with more restrictive environmental regulations, may impact the total production of Maine's fish hatcheries. This could necessitate changes in some fall yearling brown trout stocking programs.

Increasing the catch rate objective for brown trout in lakes may necessitate more intensive studies to better understand brown trout exploitation rates and standing crops. These studies would require additional manpower and funding. Increasing the catch rate objective may also require higher stocking rates, which may be a problem at the current hatchery production levels.

Also, a more thorough evaluation of the genetics issues relative to Maine's brown trout program may be necessary, since it appears that these issues may play a role in survival of stocked brown trout. Public access issues may compromise the number of waters managed for brown trout.

BROWN TROUT IN LAKES MANAGEMENT PROBLEMS AND STRATEGIES

FINANCIAL ISSUES:

PROBLEM 1. Staffing is not adequate to address all the problems and issues associated with brown trout management in Maine.

Strategy a. Seek sufficient staff and financial resources to address all the problems and issues associated with brown trout management in Maine.

ACCESS:

PROBLEM 1. Lack of adequate public access in Maine compromises fishing opportunities on lakes and precludes development of fisheries in potential brown trout waters.

Strategy a. Aggressively seek to provide public rights-of-way and appropriate physical access to all public waters.

HABITAT:

PROBLEM 1. Environmental degradation, especially from pollution and siltation, may cause loss of brown trout habitat.

Strategy a. Strictly enforce DEP environmental laws.

Strategy b. Monitor habitat losses, and attempt to restore and/or mitigate.

POPULATION AND MANGEMENT INFORMATION:

PROBLEM 1. There is a deficiency of baseline data on many brown trout waters relative to habitat quality, angling pressure, exploitation levels and fish quality, especially for the open water season.

Strategy a. Continue to survey and re-survey waters being managed for brown trout to collect data on habitat quality and status of populations.

Strategy b. Conduct winter and summer angler surveys to determine utilization and exploitation of existing fisheries.

Strategy c. Determine catch rates and size quality on 10% of the waters where brown trout is a principal fishery.

Strategy d. Request that each Region solicit voluntary records from experienced brown trout anglers, whenever possible.

HATCHERY RELATED:

PROBLEM 1. The genetic variability (heterozygosity) of the brown trout brood stock at New Gloucester was tested and the results indicated very low variability, which may be impacting the performance of stocked fish.

Strategy a. Identify and evaluate the genetic characteristics of the current brood stock, and if necessary, implement a plan to infuse new genetic variability or replace the brown trout brood stock.

PROBLEM 2. Regional stocking allocations have increased and are creating stress on the current hatchery system. Additionally, pending the results of DEP's wastewater monitoring, the total production of fish raised at Maine's hatcheries may be impacted.

Strategy a. Determine the stocking needs for future brown trout programs and secure rearing space if necessary.

Strategy b. Establish allocation quotas by Region if requests for hatchery fish exceed hatchery production capabilities.

**BROWN TROUT
GOALS AND OBJECTIVES FOR INLAND RIVERS AND STREAMS
2001 – 2016**

GOAL: Maintain present fishing opportunities, and improve fishing quality for brown trout in all Regions.

Abundance Objective: Maintain the current distribution of brown trout in all Regions. Maintain all present populations that support principal fisheries for brown trout at or above current levels of abundance.

Catch Rate Objective: Improve the catch rate for experienced brown trout anglers to at least 1.0 legal brown trout per angler day on waters with principal fisheries for brown trout. This objective may differ in waters managed for multiple salmonid fisheries. Catch rates should be higher on select waters from each Region.

Fishing Quality Objective: The average size of brown trout in the creel should be at least 10 inches. Increase the opportunity to catch 12-16 inch brown trout in selected waters in Regions A, B and D.

Capability of Habitat: The capabilities of the habitat to support populations for this level of management has not been determined nor has the average size of stream-caught brown trout in Maine been established, consequently the figures stated in the objectives are preliminary.

Feasibility: There is a paucity of data on appropriate stocking rates for streams and these rates need to be determined. It is assumed that hatchery production is adequate to meet management needs during the next 5 years.

Desirability: This objective would increase fishing opportunity and create diversified stream fisheries of higher quality than are now being realized. Brown trout anglers would welcome this.

Possible Consequences: Nearly all the brown trout stream stocking currently takes place in Region A. Additional manpower will be necessary for Region A Fishery staff to effectively monitor catch rates, survival of stocked fish, interactions with other fish species, and changes in habitat or public access. Special management areas, including stocking sites might cause conflicts with landowners and result in the posting of more land due to high angler use. Because of riparian trespass rights, the State has no way to guarantee its investment in these more intensive programs.

BROWN TROUT IN INLAND RIVERS AND STREAMS MANAGEMENT PROBLEMS AND STRATEGIES

FINANCIAL ISSUES:

PROBLEM 1. Staffing is not adequate to address all the problems and issues associated with brown trout management in Maine.

Strategy a. Seek sufficient staff and financial resources to address all the problems and issues associated with brown trout management in Maine.

HABITAT:

PROBLEM 1. Environmental degradation, especially from pollution and siltation, may cause loss of brown trout habitat.

Strategy a. Strictly enforce DEP environmental laws.

Strategy b. Monitor habitat losses, and attempt to restore and/or mitigate.

POPULATION AND MANAGEMENT INFORMATION:

PROBLEM 1. There is a lack of baseline data on present use, exploitation, standing crops, and related fishery data on existing fisheries.

Strategy a. Obtain baseline data by designing appropriate surveys to collect needed information.

Strategy b. Continue to survey and re-survey waters being managed for brown trout to collect data on habitat quality and status of populations.

Strategy c. Conduct summer angler surveys to determine utilization and exploitation of existing fisheries.

Strategy d. Determine catch rates and size quality on 10% of the waters where brown trout is a principal fishery.

Strategy e. Request that each Region recruit voluntary fishing diary keepers from experienced brown trout anglers.

Strategy f. Prepare stream assessments to use when revising the next Strategic Plan

PROBLEM 2. There is a lack of information to suggest what stocking rates are needed for most effective stream management for quality fisheries.

Strategy a. Set up studies on a representative number of waters to determine the stocking rates needed to provide desirable fisheries and fulfill management objectives.

RESOURCE PROTECTION:

PROBLEM 1. There is a lack of information to suggest the regulations needed for most effective stream management for quality fisheries

Strategy a. Identify the most likely streams or sections of streams where special regulations could be established and implemented.

HATCHERY RELATED:

PROBLEM 1. The genetic variability (heterozygosity) of the brown trout brood stock at New Gloucester was tested and results indicated very low variability, which may be impacting the performance of stocked fish.

Strategy a. Identify and evaluate the genetic characteristics of the current brood stock, and if necessary, implement a plan to infuse genetic variability or replace the brown trout brood stock.

PROBLEM 2. Regional stocking allocations have increased and are creating stress on the current hatchery system. Additionally, pending the results of DEP's wastewater monitoring, the total production of fish raised at Maine's hatcheries may be impacted.

Strategy a. Establish allocation quotas by Region if requests for hatchery fish exceed hatchery production capabilities.

Strategy b. Develop additional hatchery capacity if necessary to be available during the next planning period.

**BROWN TROUT
GOALS AND OBJECTIVES FOR SEA-RUN FISHERIES
2001 – 2016**

GOAL: Increase abundance and fishing opportunities for sea-run brown trout.

Abundance Objective: Continue with experimental programs for the development of viable sea-run fisheries in 5 coastal rivers, which are now in progress, and stock additional waters if possible. Specific abundance levels to be determined as information becomes available.

Catch Rate Objective: Experienced anglers should expect catch rates of at least 1.0 brown trout per day. Potential sustainable yields to be determined.

Fishing Quality Objective: Experienced anglers should expect to catch brown trout averaging 12-16 inches and an 18-20 inch brown on a good fishing day.

Capability of Habitat: Recent experiences with on-going efforts indicate that habitat does exist in Maine to support viable fisheries for sea-run brown trout.

Feasibility: Fisheries in two rivers have proven very successful, whereas programs on other coastal waters have been less successful. Additional rivers are being considered. Fall yearling brown trout appear to be necessary for this program to be successful; therefore the program will depend on the availability of fall yearling brown trout from the hatchery system.

Desirability: Development of sea-run fisheries for scarce salmonid fishing opportunities in southern coastal Maine, especially in the fall, winter and early spring.

Possible Consequences: There are jurisdictional issues, which need to be worked out between this Department and the Maine Department of Marine Resources. This objective may conflict with future plans for the restoration of Atlantic sea-run salmon and certain programs administered by the Department of Marine Resources for anadromous species.

Additional studies are needed to evaluate current stocking rates, survival of stocked fish, age and growth of stocked brown trout, as well as impacts to other resident fish species. Additional funding is necessary to conduct these studies. At present, a fishing license is not required to fish for brown trout in tidal waters.

SEA-RUN BROWN TROUT MANAGEMENT PROBLEMS AND STRATEGIES

FINANCIAL ISSUES:

PROBLEM 1. MDIFW lacks sufficient funding to indefinitely maintain and/or expand this program.

Strategy a. Solicit DMR for funding to maintain and/or expand this program.

SPECIAL PROBLEMS:

PROBLEM 1. MDIFW does not have jurisdiction in tidal waters.

Strategy a. Work with DMR to resolve management conflicts jurisdictional issues (see also, Financial Issues).

RESOURCE PROTECTION:

PROBLEM 1. There is a lack of information to suggest the regulations necessary for most effective management for quality sea-run brown trout fisheries

Strategy a. Formulate and implement a study to determine those regulations most effective in providing desirable sea-run brown trout fisheries.

POPULATION AND MANGEMENT INFORMATION:

PROBLEM 1. There is a lack of information on movements of sea-run brown trout in Maine estuaries.

Strategy a. Contract to obtain data on movements (seasonal) of sea-run browns in coastal estuaries.

PROBLEM 2. There is a lack of information to suggest what stocking rates are needed to effectively manage for quality sea-run fisheries.

Strategy a. Set up studies on a representative number of waters to determine those stocking rates necessary to provide desirable sea-run brown trout fisheries.

HATCHERY RELATED:

PROBLEM 1. The genetic variability (heterozygosity) of the brown trout brood stock at New Gloucester was tested and results indicated very low variability, which may be impacting the performance of stocked fish.

Strategy a. Identify and evaluate the genetic characteristics of the current brood stock, and if necessary, implement a plan to infuse genetic variability or replace the brown trout brood stock.

PROBLEM 2. Regional stocking allocations have increased and are creating stress on the current hatchery system. Additionally, pending the results of DEP's wastewater monitoring, the total production of fish raised at Maine's hatcheries may be impacted.

Strategy a. Establish allocation quotas by Region if requests for hatchery fish exceed hatchery production capabilities.

Strategy b. Develop additional hatchery capacity if necessary to be available during the next planning period.

APPENDIX A

**COLDWATER WORKING GROUP INPUT
BROWN TROUT MEETING SUMMARY
Tuesday, July 11, 2001**

Issues:

- ✓ GENETICS, i.e. lack of genetic variability (heterozygosity) in “brood stock” and its possible effects on survival and growth of hatchery-reared fish. Incomplete knowledge of the genetic characteristics of the current “brood stock” with respect to habitat specificity.
- ✓ POOR RETURNS: indications that returns (catch-rates and size) are declining.
- ✓ The primary thrust of the program should be to provide fishing opportunities for “LARGE” FISH.
- ✓ This species is NOT often the best choice for a put-and-take fishery.
- ✓ DATA are inconclusive and incomplete largely because of lack of manpower and funding.
- ✓ The Department should seek ways to expand the use of VOLUNTEERS to assist in data gathering.
- ✓ Catch-rate criteria should be based on brown trout anglers, i.e. those targeting brown trout, not on all anglers.
- ✓ FORAGE is an important component of a successful brown trout program.
- ✓ INTERACTIONS with other species should be carefully weighed when considering the implementation of a brown trout management program.
- ✓ The brown trout program should be carefully scrutinized and “failures” modified to achieve “success” or abandoned if “success” is not possible.
- ✓ FISHING PRESSURE should be an important element in the development of a stocking program.
- ✓ WILD populations of native species should receive priority before initiating a brown trout program.

Goals and Objectives:

LAKES AND PONDS: Maintain principal fisheries for brown trout in 140 lakes and ponds (97,184 acres) as per present distribution.

A SUCCESSFUL PROGRAM implies:

- ✓ The habitat is capable of supporting at least some survival through one year at large, or longer.
- ✓ The forage base supports growth to, or in excess of, the legal length limit after one year at large.
- ✓ The fishery provides the opportunity to catch fish of a variety of sizes BUT an experienced brown trout angler should have a reasonable expectation of catching one 18” to 20” brown trout on a “good” fishing day, NOT on an average day.

RIVERS AND STREAMS: Maintain a variety of fishing opportunities for brown trout in 65 waters.

PRIORITIZED BROWN TROUT MANAGEMENT OBJECTIVES

DESCRIPTION OF STATEWIDE OBJECTIVES	RANKINGS, COLDWATER GROUP
Experienced anglers should expect catch rates of 1.0 brown trout per day or higher in lakes & ponds.	1
Maintain the present distribution of brown trout in lakes & ponds in Maine (97,184 acres).	2
Maintain all present populations that support principal fisheries for brown trout in lakes & ponds at or above current levels of abundance.	2
Maintain all present populations that support principal fisheries for brown trout in rivers & streams at or above current levels of abundance.	2
Improve the catch rate for experienced brown trout anglers to at least 1.0 legal brown trout per day on rivers & streams with principal fisheries for brown trout.	2
Experienced brown trout anglers should expect to catch brown trout averaging 15 inches and 1.5 pounds, and can expect to catch an 18-20 inch fish on a good fishing day in lakes & ponds.	6
Maintain the current distribution of brown trout rivers and streams in all Regions.	7
Experienced brown trout anglers should expect to catch brown trout averaging 15 inches and 1.5 pounds, and can expect to catch an 18-20 inch fish on a good fishing day in rivers & streams.	7
Continue with experimental programs for the development of viable sea-run fisheries in 5 coastal rivers. Stock additional waters if possible.	9
Determine specific abundance levels and sustainable yields for existing sea-run fisheries.	10
Experienced anglers should expect to catch brown trout averaging 12-16 inches and an 18-20 inch brown on a good fishing day in sea-run fisheries.	11
Experienced brown trout anglers should expect of at least 1.0 brown trout per day in sea-run fisheries.	12

PRIORITIZED BROWN TROUT MANAGEMENT PROBLEMS

DESCRIPTION OF MANAGEMENT PROBLEMS	FINAL RANKINGS
The Fisheries Division lacks sufficient information to determine the most effective brown trout stocking rates for managing sea-run brown trout fisheries in Maine.	12
Environmental degradation, especially from pollution and siltation, may cause the loss of brown trout habitat.	9
There is insufficient information on angler use, catch and harvest for brown trout fisheries in rivers and streams to permit the development and implementation of the most effective management programs.	3
The genetic variability of Maine's brown trout brood stock is very low and may be negatively impacting the performance of hatchery fish in the wild.	1
The Fisheries Division lacks sufficient information to determine the most effective brown trout stocking rates for rivers and streams.	6
The Fisheries Division lacks sufficient staff and financial resources to implement the strategies necessary to achieve the goals and objectives of the brown trout plan.	2
Baseline data on the population dynamics (population numbers, growth rate mortality rates, etc.) of brown trout populations in rivers and streams is not sufficient to permit the development of the most effective brown trout management programs.	8
Maine's present hatchery system may be unable to support projected increases in brown trout production.	10
DIFW lacks jurisdiction in tidal waters.	15
Existing data on the population dynamics (population numbers, growth rate mortality rates, etc.) of brown trout populations in lakes and ponds is not adequate to permit the development of the most effective brown trout management programs.	5
Lack of adequate public access compromises fishing opportunities and precludes development of fisheries in some potential brown trout waters.	4
There is insufficient information on angler use, catch and harvest for brown trout fisheries in rivers and streams to permit the development and implementation of the most effective management programs.	7
Existing information is inadequate to permit the development of effective regulations for the management of quality sea-run brown trout fisheries.	13
There is a lack of information on the movements of sea-run brown trout in Maine estuaries.	14
The Fisheries Division lacks sufficient information to determine the regulations needed for effectively managing quality brown trout fisheries in rivers and streams.	11

CONEPT PLAN FOR THE IMPLEMENTATION OF BROWN TROUT MANAGEMENT OBJECTIVES

PRIORITIZED BROWN 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 ¹	Pt ²	Add ³	EXST	Pt	Add	EXST	Pt	Add	EXST	Pt	Add	EXST	Pt	Add	EXST	Pt	Add	EXST	Pt	Add	EXST	Pt	Add
Experienced anglers should expect catch rates of 1.0 brown trout per day or higher in lakes & ponds.	1																								
Maintain the present distribution of brown trout in lakes & ponds in Maine (97,184 acres).	2																								
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Experienced brown trout anglers should expect of at least 1.0 brown trout per day in sea-run fisheries.	12																								

¹ **Exst (existing) = (Pt – Add)** The number of waters in this category and Region **at this time**. **These waters are currently meeting performance standards for this category.**

² **Pt (potential) = (Exst + Add)** The **total number** of waters proposed for this category and Region **by the year 2016**, i.e. at the end of the current planning period. It is the Region's total potential for this category of management.

³ **Add (additional) = (Pt – Exst)**, i.e. this constitutes **the number of waters that have the potential to function in this management category but are not currently doing so**. The Region would attempt to manage these waters in such a manner as to move them into the Exst management category by the year 2016.