Production Capacities of the Wisconsin Department of Natural Resources' Fish Propagation Facilities

by

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for

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Contents

Report Summary

In 1997, the Wisconsin Legislative Audit Bureau published a report on the Wisconsin Department of Natural Resources' (WDNR) fish propagation and stocking programs entitled *An Evaluation - Fish Stocking - Department of Natural Resources - Report 97-9*. The report recommended that the WDNR summarize the production capacity of each of its hatcheries, rearing stations, ponds, and any other production facilities and, based on long-range propagation and stocking goals, identify the extent of unused capacity.

This report focuses on the Legislative Audit Bureau's recommendation by defining the aspects of production capacity, briefly presenting the science and methods that are applied in determining production capacity, and summarizing the species-specific production capacity of the Department's propagation program on both an individual facility and statewide basis.

PRODUCTION CAPACITIES

For the purposes of this report, production capacity is defined as the number and pounds of fish of a given species, age, and size (length and weight) that a WDNR facility can produce for transfer to other facilities and/or for stocking. Production capacities are summarized at the following levels:

- Optimum Sustained Production (the optimum number and pounds of high quality fish that can be produced on a consistent basis), and

- Maximum Sustained Production (the maximum number and pounds of reasonably healthy fish that can be produced on a consistent basis).

These definitions deserve consideration because, unlike many commercial hatcheries where fish produced directly for consumption or for stocking as catchable fish in private ponds for immediate harvest, almost all of the fish that the Department of Natural Resources stocks have to be able to survive for a period of time, sometime years, to fulfill the management goals that prompted the stocking.

INDICES OF PRODUCTION

Production capacities have been estimated from the calculations of several indices. The Density Index expresses the carrying capacity of intensive, coldwater rearing units in pounds of fish per cubic foot of water, while the Flow Index is expressed by the pounds of fish per gallon per minute of water inflow. These two theoretical indices, along with the known average production and professional judgement have been used to estimate the optimum and sustained production capacity in the state's coldwater facilities (Table 1).

In extensive, warm or coolwater fish rearing ponds, the carrying capacity is usually expressed in pounds of production per acre. Average production figures and professional judgement have been used to estimate the production capacity in the state's warm/coolwater facilities (Table 2).

DATA PRESENTATION

The information presented is a summary of data generated by hatchery supervisors that oversee the WDNRs' fish hatchery facilities. Statewide production capacity estimates are presented by the number and pounds of a particular species' life stage (for example, eggs, fry, and fingerling) either transferred out of the hatchery or stocked into the wild. Tables 1 and 2 are composite, generalized tables.

In evaluating these statewide production capacity tables, it is important to understand that although the transferred fish are moved out of one hatchery and either to another facility, rearing pond, or into the wild, they can represent a significant component of an individual facility's production capacity. Additionally, one has to remember that this information represents a combination of fish species and ages that is being reared in each of the facilities in the system to meet current management needs. As those needs change, the production scenarios, within limits, will also change.

Information for each DNR fish propagation facility is presented alphabetically in Appendix 1. These summaries include information on the

facility history, fish production (optimum and maximum sustained), physical plant, budget, operational complexity, staffing, and production limitations of the facility.

PRODUCTION LIMITATIONS

Production capacity at any WDNR fish propagation facility can and will be as limited by the operations funding and staffing available, as the amount of rearing space available in the facility. Therefore, production levels presented can only be achieved if adequate funding is provided for facility maintenance or renovation, increased operating expenses coincide with increased production, and adequate staffing by trained personnel exists to ensure that the fish produced meet the management needs.

TABLE 1. Total statewide production capacity estimates at WDNRs' coldwater hatchery facilities generated by using established indices and professional experience. Optimum Sustained Production is the optimum number of high quality fish that can be produced on a consistent basis. Maximum Sustained Production is the number of reasonably healthy fish that can be produced on a consistent basis. Flow Index is limited by the amount of dissolved oxygen in the water. Density Index is limited by the spatial relationship of one fish to another. Transfers represent fish species that are transferred to other hatchery facilities or rearing ponds.

		Optimum Sustained Production			Maximum Sustained Production	
		Flow Index	Density Index	Professional Judgement	Discharge Water Quatlity	Professional Judgement
Transfers	Eggs	8,710,000	3,810,000	9,500,000		10,775,000
	Fry	5,374,460	2,591,080	4,790,000		5,590,000
	Spring Fgl	2,003,720	1,735,525	1,897,550		2,095,122
	Fall Fgl	36,400	409,200	190,000		240,000
Stocking	Spring Fgl	1,355,570	2,069,620	1,859,015		2,524,390
	Fall Fgl	1,384,685	2,581,810	1,635,935		1,901,766
	Yearling	2,443,650	8,047,985	3,190,127		3,742,169
	Adult	10,200	8,200	10,200		11,000
Total Production	Fry	5,374,460	2,591,080	4,790,000		5,590,000
	Spring Fgl	3,359,290	3,805,145	3,756,565		4,619,512
	Fall Fgl	1,421,085	2,991,010	1,825,935		2,141,766
	Yearling	2,443,650	8,047,985	3,190,127		3,742,169
	Adult	10,200	8,200	10,200		11,000

TABLE 2. Total statewide production capacity estimates at WDNRs' warm/coolwater hatchery facilities generated by using average production and professional experience. Transfers represent fish species that are transferred to other hatchery facilities or rearing ponds.

		Optimum Sustained Production		Maximum Sustained Production	
		Average Production	Professional Judgement	Discharge Water Quatlity	Professional Judgement
Transfers	Eggs	168,107,800			211,334,000
	Small Fgl	311,887			441,520
Trans/Stock	Fry	56,613,898			87,370,000
Stocked	Small Fgl	4,796,470			7,385,575
	Large Fgl	144,495			257,440
	X-Large Fgl	72,775			72,345
	Yearling	200			10,250
Total Production	All Stages	154,640,325			209,823,130

I. INTRODUCTION

In 1997, the Wisconsin Legislative Audit Bureau published a report on the Wisconsin Department of Natural Resources' (WDNR) fish propagation and stocking programs entitled *An Evaluation - Fish Stocking - Department of Natural Resources - Report 97-9*. The report recommended that the WDNR summarize the production capacity of each of its hatcheries, rearing stations, ponds, and any other production facilities and, based on long-range propagation and stocking goals, eventually identify the extent of unused capacity.

This report focuses on the Legislative Audit Bureau's recommendation by defining the aspects of production capacity, briefly presenting the science and methods that are applied in determining production capacity, and summarizing the species-specific production capacity of the Department's propagation program on both an individual facility and statewide basis. The information compiled to make this report will be used by the WDNRs' Bureau of Fisheries Management and Habitat Protection to develop a comprehensive long-range propagation and stocking plan.

II. THE SCIENCE OF PROPAGATION

There are a variety of scientific principles that are applied in determining production capacities. The following glossary section has been included to assist in the understanding of the methods used to arrive at the the final production capacity estimates.

Carrying capacity. - Carrying capacity is the animal load a system can support. This, in turn, directly results in the production capacity, which is the amount (usually numbers and pounds) of animals that a system can produce for the final usage (sales, stocking, transfer to other facilities, etc.). In a fish hatchery, the carrying capacity depends on:

Water Flow. - The amount of water available to the rearing unit(s), usually expressed in gallons per minute (gpm).

Volume. - The amount of rearing space available in the rearing unit(s), usually expressed in cubic feet (tanks and raceways) or acre feet (ponds).

Exchange rate. - The amount of time required for one complete change of water in a rearing unit.

Water temperature. - Usually expressed in degrees Fahrenheit (°F).

Oxygen supply. - The amount of dissolved oxygen available in the rearing water, usually expressed in parts per million (ppm).

Rearing density. - The number or pounds of fish being reared in a given volume of rearing space.

Metabolic products. - Carbon dioxide, urea, ammonia and feces given off by fish.

pH. - The measurement of acidity or alkalinity of the water supply.

HOW SCIENTIFIC PRINCIPLES AFFECT FISH PRODUCTION

Insufficient water flow and exchange rate in rearing units may cause low oxygen supply, especially in higher rearing densities, such as are used for trout and salmon. As fish consume oxygen, they also excrete metabolic products into the water. If the fish are to survive and grow, ammonia and other metabolic products must be diluted and removed by a sufficient water flow. Because metabolic products increase with fish growth and rearing density, the water flow must be increased as fish grow.

The amount of water flow and the exchange rate are particularly important in high rearing density fish culture, such as is generally used to rear trout and salmon. This high density rearing is also referred to as intensive rearing. In most warm/coolwater fish propagation, especially in outdoor ponds, the fish are held at a much lower rearing density so the water flow and exchange rate needed is much lower. This low density rearing is also referred to as extensive rearing. In addition, the larger surface area of ponds and exposure to wind create a more effective interface for the water to absorb oxygen directly from the air.

The pH of the water supply is important in determining the safe level of ammonia, a metabolic product of fish. For example, an increase of pH from 8.0 to 9.0 increases the amount of unionized ammonia approximately

tenfold. When unionized ammonia levels exceed 0.0125 parts per million, trout can exhibit reduced growth rates, and damage to gill, kidney and liver tissues.

The oxygen supply must be sufficient to maintain normal growth. Oxygen consumption varies with water temperature and with fish species, size, and activity. When swimming speed and water temperature increase, oxygen consumption increases. Low oxygen supply in rearing units may be caused by insufficient water flow, overloading with fish, high water temperature which lowers the solubility of oxygen in water, or low oxygen supply in the source water. At hatcheries with chronic low oxygen supply and comparatively high water temperatures, production must be held down to levels that safely utilize the available oxygen supply, or supplemental aeration will be required.

A depleted oxygen supply can occur at night in ponds that contain large amounts of aquatic vegetation or phytoplankton. Here again, aeration may be necessary to increase the oxygen supply.

Catastrophic fish losses because of overloaded rearing facilities (exceeding the carrying capacity) are an ever-present danger in fish hatcheries. Many successful managers have operated a fish hatchery as an art, making judgements by intuition and experience. However, there are several quantitative approaches for estimating carrying capacities in fish hatcheries.

III. INDICES FOR THE PRODUCTION OF COLDWATER FISH SPECIES

The carrying capacity of an intensive coldwater rearing unit is usually stated as pounds of fish per cubic foot of water (Density Index) or the pounds of fish per gallon per minute water inflow (Flow Index). In extensive warm/coolwater fish rearing in ponds, the carrying capacity is usually expressed in pounds of production per acre. Although all of these criteria are commonly used to express carrying capacity, they are often used without regard for each other, which can be misleading.

The term Flow Index refers to the relationship of fish weight and size to water supply and the term Density Index refers to the relationship of fish weight and size to water volume. There are clear distinctions as to the effects of these two expressions. Both indices can vary by the species and size of fish being reared. They are most often applied in determining rearing capacity in intensive, coldwater rearing scenarios such as trout and salmon hatcheries.

FLOW INDEX

The Flow Index deals specifically with the amount of dissolved oxygen available in a given water flow for life support and growth. A formula has been developed that identifies the safe carrying capacity for various sizes of trout based on fish length and weight and the given flow volume.

Because the Flow Index is based on the amount of dissolved oxygen available, one has to consider the primary factors that determine the maximum amount (saturation) of dissolved oxygen that water can hold under normal conditions, water temperature, and elevation (altitude).

The colder the water temperature, until frozen, the more dissolved oxygen it will hold at saturation. The effect of water temperature on the Flow Index can directly impact carrying capacity at a hatchery where the water temperature varies seasonally, as is common with an open (other than a well) water supply. A decrease in water temperature would increase the Flow Index, because the metabolic rate of the fish normally would drop, causing them to use less oxygen, and the oxygen concentration at saturation would increase with the drop in water temperature. The reverse would be true with a rise in water temperature.

In addition, the higher the elevation of a hatchery, the less dissolved oxygen the water can hold at a given temperature. This is because the lower atmospheric pressure at higher altitude allows dissolved oxygen to escape from the water more readily.

Tables have been developed that provide these kinds of information to the hatchery manager. Although such tables are useful for planning and estimating preliminary carrying capacity in a trout or salmon hatchery, they should be considered only as a guide and specific Flow

Indices ultimately should be developed at each individual hatchery.

Flow Index calculations are important at most WDNR trout and salmon hatcheries where water is reused through a series of raceways or ponds and the dissolved oxygen concentration may decrease as the water flows through the series. As a result, if aeration does not restore the oxygen supply to the original concentration between uses, the carrying capacity or Flow Index will decrease after each "use" in a raceway series, somewhat proportional to the decrease in the dissolved oxygen concentration. The carrying capacity of succeeding raceways in the series can be calculated by determining the percent decrease in dissolved oxygen concentration in the water flow, but only down to the minimum acceptable oxygen concentration for the fish species.

Generally, the Flow Index method of determining carrying capacity is limited to intensive rearing of fish in situations where oxygen availability is regulated by the inflowing water, such as most trout and salmon hatcheries.

In extensive rearing systems involving large ponds, oxygen availability depends to a greater extent on oxygen replacement through the surface area of the water. Water inflow in such situations is not as significant in determining carrying capacity as pond surface area and total volume. However, rearing ponds with heavy loading of fish or high levels of nighttime oxygen use by plants have been known to undergo dissolved oxygen depletion to the point where supplemental aeration is required.

DENSITY INDEX

The Density Index indicates the spatial relationship of one fish to another. What affect does loading density, as pounds or numbers of fish per cubic foot of rearing space, have on carrying capacity? Even though water flows may be adequate to provide oxygen and flush wastes (Flow Index), too much crowding (Density Index) may cause the fish to have behavioral and physical problems. This is especially true with "wild" fish, that is, fish that originated from feral parents.

Purely economic considerations dictate that the Density Index be maintained as high as is practical. However, a reduction in loading density of fish has been reported to result in better quality fish, even though there was no apparent environmental stress in their original crowded situation.

Most carrying capacity tables are based on the maximum fish loading density possible without excessive dissolved oxygen depletion, and ignore the pathogen load of the water supply. It is known that in steelhead rearing ponds, parasites apparently cannot be controlled by formalin treatments if the loading exceeds seven to eight pounds of fish per gallon of water per minute at 60-70 F^{o}. Carrying capacities tables are available that are based on rearing densities that include disease and optimum health considerations for chinook and coho salmon.

Experience has shown that loading density can be safely increased as fish increase in length. This information provides the principle that as fish length increases, fish loading can be increased proportionally. A Density Index can be established that uses fish length in determining the pounds of fish to be held per cubic foot of rearing space. A rule of thumb that has been used to avoid undue crowding of domestic trout is to hold them at densities in pounds per cubic foot no greater than half their length in inches (i.e., 2-inch fish at one pound per cubic foot, 4-inch fish at two pounds per cubic foot, etc.). This results in a Density Index equal to 0.5.

Through extensive experience with propagating wild trout (brook, brown, rainbow, and lake trout), the Department has found that a Density Index of 0.25 results in a better quality fish with fewer health problems. Other agencies that rear landlocked or Atlantic salmon have found that they also require lower rearing densities. These reduced loading densities are not the result of oxygen depletion or water quality, but simply seem to be related to the amount of crowding that these fish will tolerate.

This concept of space requirement assumes that the Density Index remains constant as the fish increase in length. In reality, experience has shown that larger fish may be able to tolerate higher densities in proportion to their length. This method has proved to be a practical hatchery management tool, nonetheless, and

can be used with any species of fish for which a Density Index has been determined. Like the Flow Index, the Density Index tends to be most applicable in intensive rearing situations.

Much of the preceding material was taken from the publication, *Fish Hatchery Management,* by R. Piper and others published by the U.S. Fish and Wildlife Service in 1986.

SUMMARY OF COLDWATER INDICES

Flow Index or Density Index calculations of rearing unit loadings should be based on the final weights and lengths anticipated when the fish are to be harvested or when the loadings are reduced by thinning. In this way, maximum rearing unit (density) and water flow requirements will be delineated and frequent adjusting of water flows or fish transfers can be avoided.

In applying either of these techniques of calculating carrying capacity for any fish propagation facility, one has to be careful to use the method that is most limiting i.e., using the Density Index to calculate the trout loading for a large tank with a very limited water supply would probably lead to severe overloading. Therefore, the most prudent approach would be to work through both sets of calculations, and apply the one that provided the most conservative results.

Additionally, in rearing fish, one is working with living organisms that will provide a variety of tolerances for their living conditions. The combination of environmental parameters will vary greatly between facilities, and even between apparently identical rearing units at the same facility. These factors make it almost impossible to create a formula or model that will accurately reflect the situation at every hatchery. Formulas are no substitute for a long sequence of carefully documented rearing cycles to determines what works and what doesn't at a given facility. That is to say, there's no substitute for experience and good records.

On the other hand, when a hatchery manager is faced with an unknown such as a new bank of raceways, or a substantially changed rearing water volume, the Flow and Density indices give the manager the means to calculate a prudent starting point.

IV. WARM/COOLWATER FISH REARING DENSITIES

Acceptable rearing densities for warm and coolwater fish propagation are related to the type of rearing employed (intensive or extensive) and the species being raised. The appropriate density is influenced by such factors as desired growth rate, carrying capacity of the rearing facility, and environmental conditions.

Most warm and coolwater fish, other than catfish, are cultured extensively. In that type of culture, production capacity is usually determined by the pounds or number of fish produced per acre.

The number of fish needed for the end product is normally used to calculate the number of fry or small fingerling that are stocked into the rearing pond to be grown to the size needed. This ratio is usually based on experience as to the average survival of the smaller fish to the harvest size (i.e. a 50% survival would mean that one would need to stock twice as many fry in the rearing pond as the number that one hoped to harvest), and the pond's production capacity (i.e. if that pond has a maximum production capacity of 50,000 fingerlings of the size needed, one would probably stock no more than 100,000 fry to rear).

The production capacities and stocking rates used for extensive rearing ponds vary widely, depending on a number of factors. These include construction method, pond configuration, pond size, water supply, location (especially latitude, as it affects the growing season length) and management techniques (i.e., ponds on hatchery grounds can be monitored more closely for important parameters such as dissolved oxygen concentration, fertility, and food supply).

The following paragraphs cover the major species groups of commonly- cultured warmwater and coolwater fishes in Wisconsin. Stocking and production rates for related species can be estimated from these examples.

Muskellunge. - In Wisconsin, muskellunge are reared in two different scenarios, in extensively managed earthen (dirt) or synthetically lined ponds on hatchery grounds, or in outlying ponds without day-to-day management.

In on-hatchery extensive ponds, the dirt ponds are stocked at a rate of 18,000-20,000 fry per acre or 6,000 small fingerling (3.5 inch) per acre (at Wild Rose) resulting in about 5,000 large fingerling per acre. Stocking rates for the new lined pond systems at Oehmcke and Thompson are still in development with Oehmcke trying 15,000, 30,000 and 60,000 fry per acre, and Thompson stocking at 15,000-30,000 fry per acre. Production results so far indicate that lined ponds, producing about 3,500-4,000 large fingerling per acre, may not be as productive for muskellunge as dirt ponds.

The outlying ponds in the West Central Region are normally stocked with 2-inch fingerling at a rate of about 3,500 per acre resulting in an average harvest of 1,450 large fingerling per acre.

The production of "yearling" muskellunge has occurred to provide larger fish for stocking the following Spring (about 14-inch, 0.7 pounds each) or the following Fall (18-inch, 1.3 pounds apiece) for research or rehabilitation purposes. This is done on a very limited scale, so extensive stocking density data is not available. The range is from 445 large fingerling per acre producing 315 Fall yearlings per acre in an outlying pond in the Northeast Region, to 1,430 and 2,230 large fingerling per acre producing 1,400 and 2,100 Spring yearlings per acre in dirt ponds at Spooner (Thompson).

Hybrid muskellunge (tiger). - The only significant production of this northern pike x muskellunge hybrid has occurred at Wild Rose where fish were reared in "intensive" ponds on artificial diet. The small (0.05 acre) ponds are stocked with 3-inch fingerling at a density of 200,000 per acre to produce about 150,000 large fingerling per acre.

Northern pike. - A combination of intensive and extensive culture is applied to this species in Wisconsin. In the intensive scenario, these fish are raised at Wild Rose in exactly the same manner as the hybrid muskellunge previously described, with almost identical results.

The extensive rearing occurs in dirt and lined ponds on hatchery grounds. Fry are usually stocked in earthen ponds at densities of 3,000 to 12,000 per acre depending on the size of the fingerling to be produced (lower density for larger fish) with production ranging from 800 to 7,500 per acre, depending on the size at harvest.

As with muskellunge, the hatcheries with lined ponds are on a "learning curve" regarding northern pike production. Fry stocking densities of 12,000-34,000 per acre are being used, with the best results to date resulting in 5,300 fingerling per acre.

Walleye. - Walleye are also reared in two different scenarios, in extensively managed earthen or synthetically lined ponds on hatchery grounds, or in outlying ponds without day-to-day management.

In on-hatchery extensive ponds, the dirt ponds are stocked at 50,000-75,000 fry per acre resulting in about 10,000-30,000 fingerling per acre. Stocking rates for the new lined pond systems at Oehmcke and Thompson are much higher at 70,000-130,000 fry per acre. Results so far indicate that lined ponds are much more productive for walleye than earthen ponds, producing 60,000-113,000 fingerling per acre.

The outlying ponds in the Northern, South Central, and West Central Regions are stocked with 33,000-80,000 (averaging 49,000) fry per acre and result in production of about 16,000 fingerling per acre.

Extra-large or "extended-growth" (5-inch, 25 per pound) walleye fingerling are produced in limited numbers at Oehmcke and Thompson as required for special management or research stocking needs. These fish are produced by stocking 10,000 1.5-2 inch fingerling in a pond and feeding them with forage minnows until they are harvested in the fall at an average of 9,000 per acre.

Largemouth/Smallmouth bass. - Stocking rearing ponds for bass production takes two forms in Wisconsin. The majority of the bass produced for stocking result from adult bass broodstock being placed in the rearing ponds and being allowed to spawn and care for the young bass naturally. Minnows are provided to reduce predation by the adults on their offspring. The number of broodstock used ranges from 6 to 50 pairs per acre and results in production ranging from 5,000-22,000 fingerling per acre.

The other approach is that used by Kettle Moraine Springs where they stock 6,000-10,000 small (1.5-2 inch) fingerling per acre and feed them minnows to produce extra-large or "extended-growth" fingerling (4.5 inch, 25 per pound).

V. METHODS USED TO DEFINE AND GATHER INFORMATION ON PRODUCTION CAPACITIES

To prepare this report, a number of preliminary steps had to be taken. First, production capacity had to be defined. For the purpose of this report, production capacity is defined as the number and pounds of fish of a given species, age, and size (length and weight) that a WDNR facility can produce for transfer to other facilities and/or for stocking.

Second, the Department had to gather the appropriate information from its fish propagation staff. Each facility was asked to determine their capacity for:

- OPTIMUM SUSTAINED PRODUCTION - The optimum number and pounds of high quality fish that can be produced on a consistent basis, and

- MAXIMUM SUSTAINED PRODUCTION - The maximum number and pounds of reasonably healthy fish that can be produced on a consistent basis

given their current facilities and water supply, and assuming adequate funding and staff would be available.

Facilities were provided with background information, identical instructions, and guidance that allowed for the creation of consistent, uniform evaluations of each propagation facility.

VI. RESULTS

The Department's fish propagation facilities have generated production capacities for both coldwater and warmwater/coolwater species groups. These individual summaries have been combined into statewide and individual facility production capacity tables (Tables 3, 4, 5, and 6). Production capacities are listed by the method used to calculate them (e.g., the Flow Index, the Density Index, and Professional Judgement for coldwater species, and Average Production and Professional Judgement for warm/coolwater species).

In analyzing these statewide production capacity tables, one has to remember that this information represents the combination of fish species and ages that is being reared in each of the facilities in the system to meet current management needs. As those needs change, the production scenarios, within limits, will also change.

For example, if the number of feral (wild) trout desired for inland stocking continues to increase, the amount of space available for rearing domestic trout will decrease at twice that rate. This is due to the fact that the feral trout require about twice as much rearing space (have to be raised at about half the density) as domestic trout. In the same vein, if the demand for musky stocking goes up, the space available for rearing walleye goes down, and so on.

Information for each WDNR fish propagation facility is presented alphabetically in Appendix 1. These summaries include information on the facility history, fish production, physical plant, budget, operational complexity, staffing, and production limitations of the facility. It should be noted that most of the past fish production summaries for the warm/coolwater facilities have a more current basis (1987-96) than do those for the coldwater facilities (1984-90). That is because the computer programs to compile those data have recently been completed for the warm/coolwater program, but are still in development for the coldwater program.

Because the Department's warm/coolwater fish propagation program is still facility limited, an estimate of species-specific production in numbers and pounds per acre is provided for each warm/coolwater facility, where feasible. This provides a means to calculate production potential if, for example, "all the ponds at Thompson are put into walleye production".

TABLE 3. Production capacity estimates (numbers and pounds) of all coldwater fish species propagated at WDNRs' hatchery facilities using established indices and professional experience. Optimum Sustained Production is the optimum number and pounds of high quality fish that can be produced on a consistent basis. Maximum Sustained Production is the number and pounds of reasonably healthy fish that can be produced on a consistent basis. The Flow Index is limited by the amount of dissolved oxygen in the water. Density Index is limited by the spatial relationship of one fish to another. Total production is the combination of fish transferred out of a facility and/or stocked.

				Optimum Sustained Production			Maximum Sustained Production	
Fish Species	Transfers[1] / Stocked.	Life Stage		Flow Index	Density Index	Professional Judgement	Water Quality Discharge	Professional Judgement
DOMESTIC TROUT	Transfers		No.	4,674,240	4,028,505	4,089,450		6,075,000
			lbs.	30,671	29,299	22,625		25,903
	Stocked	Spring Fgl		207,455	366,090	179,200		198,640
			lbs.	4,147	7,321	3,584		3,972
		Fall Fgl		1,118,265	2,114,110	1,079,385		1,250,266
			lbs.	11,647	211,411	107,938		125,026
		Yearling		1,224,960	4,387,635	1,230,342		1,432,569
			lbs.	244,992	877,527	247,067		287,413
		Adult		10,200	8,200	10,200		11,000
			lbs.	20,135	16,135	20,135		22,285
	Total Production		No.	7,235,120	10,904,540	6,588,577		7,541,597
			lbs.	411,592	1,141,693	401,349		464,599
WILD TROUT	Transfers		No.	600,000	143,100	543,100		760,000
			lbs.	162	954	1,062		1,228
	Stocked	Spring Fgl		125,030	144,375	223,400		280,750
			lbs.	833	963	1,490		1,871
		Fall Fgl		185,400	227,700	266,550		331,500
			lbs.	2,472	3,036	3,554		4,420
		Yearling		435,770	738,465	461,235		537,600
			lbs.	36,314	63,849	38,436		44,799
	Total Production		No.	1,353,200	1,260,640	1,501,285		1,916,850
			lbs.	41,509	70,530	46,270		54,046
STEELHEAD (rainbow)	Transfers		No.	------	------	------		------
	Stocked	Fall Fgl			100,000	100,000		120,000
			lbs.		400	400		480
		Yearling		373,900	764,000	530,000		620,000
			lbs.	24,923	50,933	35,333		41,333
	Total Production		No.	373,900	864,000	630,000		740,000
			lbs.	24,923	51,333	35,733		41,813
LAKE TROUT	Transfers		No.		40,000	20,000		20,000
			lbs.		667	333		333
	Stocked	Fall Fgl			40,000	90,000		70,000
			lbs.		667	500		1,167
		Yearling			105,000	90,000		120,000
			lbs.		7,000	6,000		8,000
	Total Production		No.		185,000	200,000		740,000
			lbs.		8,334	6,833		41,813

(continued)

TABLE 3. Production capacity of all coldwater fish species (continued)

Fish Species	Transfers[1]/ Stocked.	Life Stage	Optimum Sustained Production: Flow Index	Optimum Sustained Production: Density Index	Optimum Sustained Production: Professional Judgement	Maximum Sustained Production: Water Quality Discharge	Maximum Sustained Production: Professional Judgement
SPLAKE	Stocked	Yearling		170,500	164,00		180,000
		lbs.		17,050	16,400		18,000
	Total Production	No.		170,500	164,00		180,000
		lbs.		17,050	16,400		18,000
COHO SALMON	Transfers	No.	140,340	524,200	325,000		396,000
		lbs.	2,914	20,092	10,132		12,853
	Stocked	Fall Fgl	81,020	100,000	100,000		130,000
		lbs.	4,051	5,000	5,000		6,500
		Yearling	409,020	1,882,385	714,550		852,000
		lbs.	22,242	103,288	43,470		51,800
	Total Production	No.	630,380	2,506,585	1,139,550		1,378,000
		lbs.	29,207	128,380	58,602		71,153
CHINOOK SALMON	Transfers	No.	2,000,000		1,900,000		2,100,000
		lbs.	3,686		4,107		4,274
	Stocked	Spring Fgl	1,023,085	1,599,155	1,456,415		2,045,000
		lbs.	12,036	18,343	17,193		24,058
	Total Production	No.	3,023,085	1,559,155	3,356,415		4,145,000
		lbs.	15,722	18,343	21,300		28,332
TOTAL COLD WATER	Transfers	No.	7,414,580	4,735,805	6,877,550		7,925,122
		lbs.	37,433	51,012	38,259		44,591
	Stocked	Spring Fgl	1,355,570	2,069,620	1,859,015		2,524,390
		lbs.	17,016	26,627	22,267		29,901
		Fall Fgl	1,384,685	2,581,810	1,635,935		1,901,766
		lbs.	118,170	220,514	117,392		137,593
		Yearling	2,443,650	8,047,985	3,190,127		3,742,169
		lbs.	328,471	1,119,647	386,706		451,345
		Adult	10,200	8,200	10,200		11,000
		lbs.	20,135	16,135	20,135		22,285
	Total Production	No.	12,385,165	16,390,640	13,099,827		15,591,447
		lbs.	520,241	1,423,195	580,781		681,325

VII. DISCUSSION

Clarifying the terms Optimum Sustained Production (The optimum number and pounds of high quality fish that can be produced on a consistent basis) and Maximum Sustained Production (The maximum number and pounds of reasonably healthy fish that can be produced on a consistent basis) is important in understanding the true meaning of the information presented in this report. These definitions specifically address the fact that, unlike many commercial hatcheries where fish produced directly for human food or for stocking as catchable fish in private ponds for immediate harvest, almost all of the fish that the Department stocks have to be able to survive in the wild for a period of time, sometime years, to fulfill the management goals that prompted the stocking.

TABLE 4. Production capacity estimates (numbers and pounds) of all warmwater/coolwater fish species propagated at Wisconsin Department of Natural Resources' hatchery facilities using average production figures and professional judgement. Optimum Sustained Production is the optimum number and pounds of high quality fish that can be produced on a consistent basis. Maximum Sustained Production is the number and pounds of reasonably healthy fish that can be produced on a consistent basis. Total production capacity is the combination of fish transferred out of a facility and/or stocked.

			Optimum Sustained Production		Maximum Sustained Production	
Fish Species	Transfers/ Stocked	Life Stage	Average Production	Professional Judgement	Discharge Water Quality	Professional Judgement
MUSKELLUNGE (and Hybrids)	Transfers	Eggs	1,347,500			2,664,000
		Small fgl.	74,037			136,520
		lbs.	162			175
	Trans/Stock	Fry	2,297,038			4,205,700
		lbs.	106			195
	Stocked	Small Fgl	10,085			28,075
		lbs.	101			181
		Large Fgl	101,595			136,740
		lbs.	20,319			27,344
		Yearling	200			10,250
		lbs.	133			6,834
	Total Production	No.	2,482,955			4,517,285
		lbs.	20,821			34,729
NORTHERN PIKE	Transfers	Eggs	14,498,000			34,845,000
		Small Fgl	10,400			35,000
		lbs.	29			100
	Trans/Stock	Fry	9,155,860			26,529,300
		lbs.	409			1,184
	Stocked	Small Fgl	42,020			60,000
		lbs.	600			856
		Large Fgl	27,900			70,700
		lbs.	2,790			7,070
	Total Production	No.	9,236,180			26,695,000
			3,828			9,210
LAKE STURGEON	Transfers	Eggs	350,000			500,000
	Trans/Stock	Fry	300,000			400,000
		lbs.	19			25
	Stocked	Small Fgl	5,000			10,000
		lbs.	43			87
		Large Fgl.	15,000			50,000
		lbs.	375			1,250
	Total Production	No.	320,000			460,000
		lbs.	437			1,362

These definitions also provide a narrower interpretation than that of the legislative audit report which stated "Nevertheless, reasonable estimates of capacity may be based on the largest number of fish stocked in a single year." This statement ignores several factors that impact Department production of fish for stocking in any given year:

- The "demand" for fish to be stocked. The audit report ignored the fact that the number of fish requested for stocking

TABLE 4. Production capacity estimates of all warmwater/coolwater fish species (continued).

Fish Species	Transfers/ Stocked	Life Stage	Optimum Sustained Production: Average Production	Optimum Sustained Production: Professional Judgement	Maximum Sustained Production: Discharge Water Quality	Maximum Sustained Production: Professional Judgement
WALLEYE	Transfers	Eggs	41,850,000			51,250,000
		Small fgl.	210,450			240,000
		lbs.	247			282
	Trans/Stock	Fry	44,861,000			56,235,000
		lbs.	701			879
	Stocked	Small Fgl	4,007,000			6,227,500
		lbs.	4,713			7,326
		X-Large Fgl	63,700			55,5000
		lbs.	2,548			2,220
	Total Production	No.	49,142,160			62,758,000
		lbs.	8,209			10,707
LARGEMOUTH SMALLMOUTH BASS	Transfers	Small Fgl	17,000			30,000
		lbs.	26			46
	Trans/Stock		-------			-------
	Stocked	Small Fgl	732,355			1,060,000
		lbs.	1,127			1,630
		X-Large Fgl	9,075			16,845
		lbs.	363			674
	Total Production	No.	758,430			1,106,845
			1,516			2,350
SUCKERS MINNOWS	Transfers	Eggs	110,062,300			122,075,000
	Production	Sucker fry	91,143,000			112,150,000
		lbs.	2,279			2,804
		Minnows	1,557,600			2,136,000
		lbs.	6,490			8,900
	Total Production	No.	92,700,600			114,286,000
		lbs.	8,769			11,704
TOTAL WARM/ COOL WATER	Transfers	Eggs	168,107,800			211,334,000
		Small Fgl	311,887			441,520
		lbs.	464			603
	Trans/Stock	Fry	56,613,898			87,370,000
		lbs.	1,235			2,283
	Stocked	Small Fgl	4,796,470			7,385,575
		lbs.	6,584			10,080
		Large Fgl	144,495			257,440
		lbs.	23,484			35,664
		X-large Fgl	72,775			72,345
		lbs.	2,911			2,894
		Yearling	200			10,250
		lbs.	133			6,834
	Total Production	No.	154,640,325			209,823,130
		lbs.	43,579			70,061

TABLE 5. Coldwater production capacity estimates at each WDNR hatchery facilitiy generated by using established indices and professional experience. Optimum Sustained Production is the optimum number of high quality fish that can be produced on a consistent basis. Maximum Sustained Production is the number of reasonably healthy fish that can be produced on a consistent basis. Flow Index is limited by the amount of dissolved oxygen in the water. Density Index is limited by the spatial relationship of one fish to another.

		Optimum Sustained Production			Maximum Sustained Production	
Facility	Species Group	Flow Index	Density Index	Professional Judgement	Discharge Water Quatlity	Professional Judgement
Bayfield	Cold		1,642,695	1,452,285		1,895,000
Brule	Cold	764,835	1,735,025	578,410		672,500
Besadny	Cold	61,785		62,305		125,000
Kettle Moraine	Cold	373,900	684,000	450,000		520,000
Lake Mills	Cold	251,845	445,000	445,000	445,000	513,000
Lakewood	Cold	140,000	675,100	145,000		293,000
Langlade	Cold	226,800		245,000		256,000
Nevin (total)	Cold	754,445	4,180,595	803,000		849,250
Osceola	Cold	1,037,520	1,052,655	1,045,087		1,173,497
St. Croix Falls	Cold	3,252,520	3,238,025	2,629,080		2,930,000
Thunder River	Cold	584,800	2,291,370	544,000		636,700
Westfield	Cold	280,085	1,505,955	620,000		730,000
Wild Rose	Cold	4,829,000		4,442,000		5,362,500

TABLE 6. Warm/Coolwater production capacity estimates at each WDNR hatchery facilitiy generated by using average production and professional experience. Optimum Sustained Production is the optimum number of high quality fish that can be produced on a consistent basis. Maximum Sustained Production is the number of reasonably healthy fish that can be produced on a consistent basis.

		Optimum Sustained Production		Maximum Sustained Production	
Facility	Species Group	Average Production	Professional Judgement	Discharge Water Quatlity	Professional Judgement
Kettle Moraine	Warm		5,028,000		9,042,500
Lake Mills	Warm	6,550,000	6,555,000		11,057,700
Oehmcke (total)	Warm	19,764,765			27,931,315
South Central	Warm		568,700		937,500
Southeastern	Warm		82,500		82,500
Thompson	Warm	94,805,170			119,540,500
West Central	Warm		1,362,340		2,044,865
Wild Rose	Warm	24,448,200			36,286,250

varies from year to year, sometimes significantly. There is no attempt in that report to correlate stocking requests to the number of fish produced, other than for 1997.

- The production of warm/coolwater fish in outdoor ponds at hatcheries and rearing stations (both the Department's and others) tends to be heavily influenced in any given year by the prevailing weather conditions. Therefore, the long-term average production is a much more accurate means of determining the production capacity of those types of facilities. Ironically, in those years where production is exceptionally good in the Department's rearing ponds, it also tends to be very good in "nature's hatchery", reducing the biological need for supplemental stocking in those waters that have some natural reproduction of the species being stocked.

- Different species, strains, and sizes of fish can have different requirements for the rearing space required. "Wild" trout require about twice as much rearing space per fish produced as do "domestic" trout, so rearing them

effectively reduces the production capacity of the space utilized by half. On the other hand, the Department's fisheries biologists have exhibited an increasing interest in stocking "wild" trout because of potentially greater survivorship, and the Department's fish propagation program's function is to meet those types of needs. Private hatcheries whose driving force is profit margin tend to choose species that will maximize the production capacity of their available space, or charge a premium for those species that have to be reared at lower densities.

- Like any production facility, fish propagation facilities require raw materials, adequate operational funding, and adequate trained staff. If the latter two basic resources are not available because budget cuts, hiring freezes, etc., it is difficult to operate the facilities at full capacity. No comparison of fish production to available funding/staff was made in the audit report, except for 1995-96.

The auditors believed that the recommendation to identify production capacity was important because of the contention that the Department has developed and improved fish propagation rearing capacity without regard to actual need.

Contrary to the audit report's conclusions, the Department has targeted levels of increases in fish production needed to meet management requirements to determine the needs for hatchery development and renovation. For example, when the push came to increase walleye stocking in response to public pressure resulting from the exercising of treaty fishing rights by Wisconsin Native Americans, an evaluation of the stocking level required to provide an acceptable walleye adult population in all waters being stocked was conducted. The resulting answer required annual stocking of 2 million additional fingerlings.

Even before that point, the Department's hatchery system had a documented history of not being able to produce adequate numbers of fish to meet all stocking requests, especially in the warm/coolwater species. Part of this was because the stocking focus had changed from large numbers of fry (just-hatched fish which only require enough building space and water supply for egg incubation), to smaller numbers of fingerling (with higher survival levels in the wild) which require rearing ponds and feeding. The rest of it was due to changes in policy that broadened the number of waters in the state where certain species were "allowed" to be stocked.

Because major facility development in Wisconsin, including hatcheries, has traditionally been funded with "general purpose revenues" (tax dollars), any significant improvements to the hatchery system have always been in direct competition with other building programs such as the University system, state office buildings, prisons, etc. As a result, in recent years, it has required a specific political interest to obtain funding for major hatchery development or renovation. Examples include the renovation of the Bayfield Hatchery in 1974-75 based on Federal funding solicited by the local U.S. Senator; the 1979 purchase and subsequent development of the Kettle Moraine Springs Hatchery based on demands by the Lake Michigan sport fishing community; and the recent renovation of Lake Mills, Woodruff (Oehmcke), and Spooner (Thompson) hatcheries and the Winding Creek Rearing Station based on public concerns about walleye stocking in the area of Wisconsin open to tribal harvest.

While most of these major developments have had an immediately identified need to fulfill, others have required substantial changes in management policy to fully utilize the potential production. In the case of the walleye program, the production capacity was available 1-2 years before the revised policy was in place.

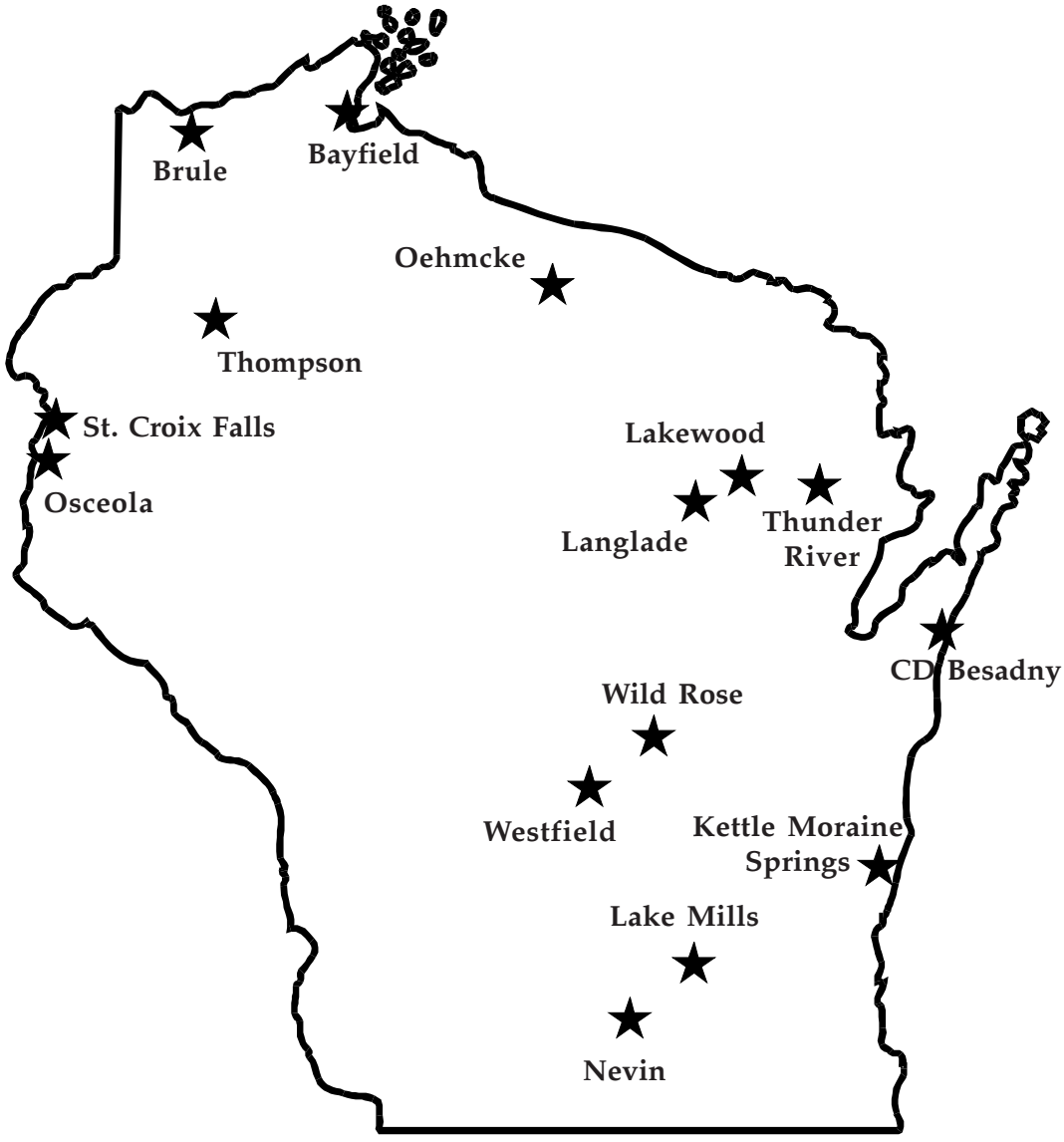
Another factor that influenced utilization of production capacity during the audited period was the decision in the 1995-97 biennium to reduce inland trout stocking by 25% and save $150,000 per year. This was due to tight budgets in that biennium, and resulted in 354,900 trout being cut from stocking quotas in 1995-96, 379,850 in 1996-97 and 208,550 in 1997-98. These reductions obviously resulted in unused production capacity at most of the Department's coldwater facilities, however the audit report contends that budget cuts were not a causative factor.

As mentioned previously, production capacity at any Department fish propagation facility can and will be as limited by the operations funding and staffing available, up to a point, as the amount of space there is to rear fish in. Therefore, the production levels listed in this report are only achievable if adequate funding is provided for:

- facility maintenance (or renovation as necessary),
- the increased operating expenses that naturally come with increased production, and
- adequate staffing by trained personnel to ensure that the fish produced meet management needs.

APPENDIX

Summaries of the WDNRs' Hatchery and Rearing Facilities



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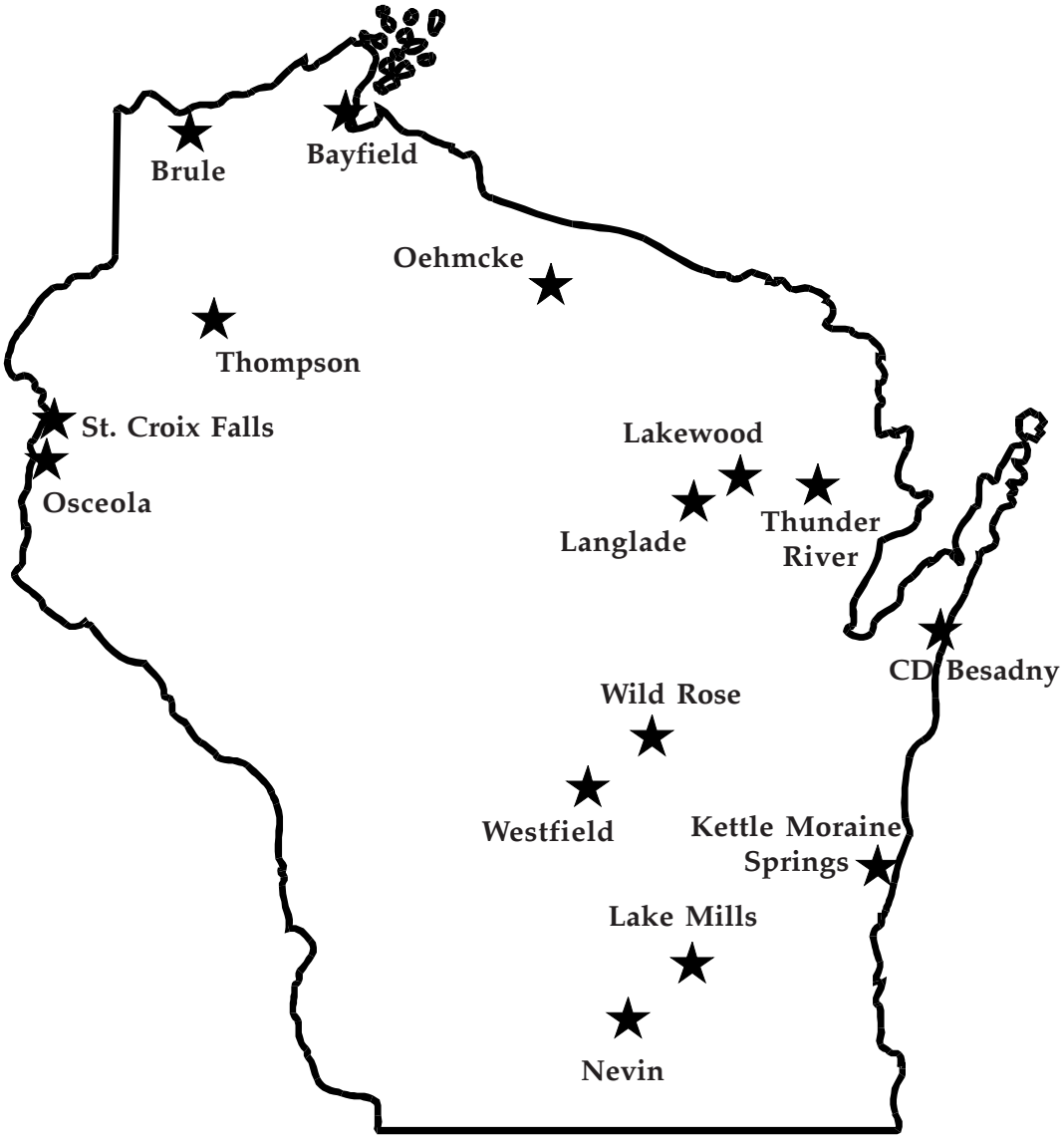

BAYFIELD HATCHERY

PO Box 589, 141 S. Third St.
Bayfield, WI 54814
(715) 779-4022

Bayfield Hatchery is located on Hwy. 13 between Bayfield and Washburn, in Bayfield County. This station was established in 1895, as the third Wisconsin state fish hatchery, but was completely rebuilt in 1974-5. The resulting new building with 34 modern rearing tanks and an exhibit area makes Bayfield our most modern coldwater hatchery. Bayfield is unique in that all of the rearing facilities are currently located indoors, in four buildings. This prevents losses due to predators and weather.

The primary water supply system has recently been upgraded with a 6,000 gpm gravity-flow pipe from Lake Superior, which is then pumped into the main hatchery building for distribution to all of the rearing units on the grounds. Additional water is supplied by two 400 foot deep wells at more than 1,000 gpm, the previous primary water supply. One well is held in reserve when the other is pumped. There is also a 200 gpm well that supplies additional water to the old hatchery building.

FISH PRODUCTION

This hatchery is our principal lake trout production facility, with nearly all going to Lake Superior. The facility also raises other trout and salmon, including splake, wild brook trout, wild brown trout, steelhead (wild rainbow trout) and both chinook and coho salmon, in recent years. Approximately 65% of all production goes to the Great Lakes, 5% to inland waters, and 30% to other production facilities for further rearing. This facility has spawned wild broodstock (lake trout, steelhead, salmon) as part of the production program, but currently obtains the majority of the eggs incubated from other sources. A captive feral brown trout broodstock is being developed here.

From 1984 through 1990, yearly fish production for direct stocking from this facility averaged as follows:

	Number	Pounds
Fingerlings	328,306	12,901
Yearlings	223,907	21,161
Adults	3,101	5,583
Totals	583,224	39,645

Due to the new water supply, the Optimum Sustained Production Capacity is 1,452,285 fish weighing a total of 54,780 pounds. The Maximum Sustained Production Capacity is 1,895,000 fish weighing a total of 66,850 pounds.

FACILITIES

The Bayfield Hatchery has 10 buildings, including 2 residences, with an overall replacement value of $5,429,735.

Prior to the development of the new water supply line, maintenance of the two wells providing the primary water supply were the recurring major maintenance expenditures at this facility.

Six-Year Facilities Plan
Addition to Residence (Beyond 2003) $30,000

BAYFIELD HATCHERY EXPENDITURES - FY 1995-96

Permanent Salaries	$123,822
Fringe	52,005
Limited Term Employees	0
Fringe	0
Supplies and Services	126,248
Capital and Equipment	245
Total Expenditures	$302,320

SUPERVISORY COMPLEXITY

The supervisor at this facility is also responsible for direct supervision of the Brule Hatchery, with overall administrative responsibility for seven permanent employees. Supervising a facility with a pumped water supply requires round-the-clock responsibilities for maintenance of equipment and associated alarm systems. A sewage treatment plant is part of the physical plant and requires daily monitoring and operation by a certified operator, adding to supervisory responsibilities. Overall, this facility exacts a demanding workload, requiring that the supervisor have expertise in water quality, public relations, land management and development, facilities and equipment maintenance, scientific methodology,, salmonid broodstock management, coldwater fish culture techniques, state and federal regulatory procedures and requirements, personnel management and fish distribution technology. Two hatchery staff live on the hatchery grounds.

STAFFING

The current staffing allocation to Bayfield is

5.75 permanent FTE. The last workload analysis identified a need for 6.4 FTE, however that evaluation was made prior to the assignment of supervision of the Brule Hatchery to the Bayfield Hatchery Supervisor. In addition, Bayfield's production capacity has increased (130% in numbers, 35% in pounds) as a result of the new primary water supply system. A request has been made to add one permanent FTE to the existing staff to handle the additional workload. The work force also includes 1-2 limited term employees during peak production periods.

PRODUCTION LIMITATIONS

Because of the high volume water supply now available (6,000+ gallons per minute), the Flow Index is not applicable at Bayfield. The factor currently restricting production at this facility is rearing space.

BRULE HATCHERY

13847 E. Hatchery Rd.
Brule, WI 54820
(715) 372-4820

The Brule Hatchery is located south of the village of Brule, off Hwy. 27, in Douglas County. This facility was established in 1927 as a fish rearing station, but egg incubation and hatching have been done here in the past several years, as the need arose. Several new rearing ponds were constructed in 1968, making Brule our largest coldwater rearing station. The rearing facilities are outdoors, and are a combination of concrete raceways and riprapped ponds. Almost all of the water from the Little Brule River, about 2,400 gpm, is currently utilized and there is little opportunity for expansion.The facility lies in the watershed of the Bois Brule (River), an outstanding resource water, which affects both future expansion and current operations.

FISH PRODUCTION

Brule rears domestic brook trout, and wild and domestic brown and rainbow trout. From 1984 through 1990, fish production for direct stocking from this facility averaged as follows:

	Number	Pounds
Fingerlings	96,787	10,122
Yearlings	205,279	32,733
Adults	893	1,404
Totals	302,959	44,259

Optimum Sustained Production Capacity: 578,410 fish weighing a total of 70,090 pounds. Maximum Sustained Production Capacity: 672,500 fish weighing a total of 80,360 pounds.

FACILITIES

The Brule Hatchery has 6 buildings, including 2 residences, with an overall replacement value of $215,851. In the future, replacement of the main hatchery building will be necessary.

Six-Year Facilities Plan

Repair Hatchery/Garage (1999-2001) $15,000; Hatchery Building Feasability (2003 and beyond) $80,000; and new hatchery and office building (2003 and beyond) $400,000

BRULE HATCHERY EXPENDITURES - FY 1995-96

Permanent Salaries	$44,130
Fringe	$18,535
Limited Term Employees	$3,635
Fringe	$436
Supplies and Services	$38,359
Capital and Equipment	0
Total Expenditures	$105,096

SUPERVISORY COMPLEXITY

This facility is directly supervised by the Bayfield Hatchery Supervisor, with a Hatchery Foreman overseeing the day-to-day operations. Because of the nature of the effluent-receiving stream, the Foreman at this facility must be well versed in environmental regulations and water quality management in addition to public relations, facilities and equipment maintenance, coldwater fish culture techniques, personnel management and fish distribution technology. Because of the remote location, a technician lives on the site.

STAFFING

The current staffing at Brule is two permanent FTE, with supervision provided by the Bayfield Hatchery Supervisor. The last workload analysis identified a need for 3.6 FTE, however that was before supervisory

responsibilities were transferred to Bayfield. This facility also has one limited term employee during peak production periods.

PRODUCTION LIMITATIONS
The amount and quality of the water supply are the primary factors limiting production at this facility. Because of the long-term rearing record, professional judgement is the most reasonable means of determining capacity.

C.D. BESADNY ANADRAMOUS FISH FACILITY

N 3884 Ransom Moore Lane
Kewaunee, WI 54216
(414) 388-2105

The C.D. Besadny Anadromous Fish Facility is an integral part of the Lake Michigan fish propagation program which includes egg taking and fish rearing facilities in Sturgeon Bay (Door County), Kewaunee (Kewaunee County), Manitowoc (Manitowoc County), and on the Root River in Racine.

The Besadny Facility is located in Kewaunee County on the Kewaunee River, with initial development starting in the late 1980's. A major addition was recently completed at this site, including a new building, and an additional holding pond, for a total of five holding ponds. This is one of the two primary sources for Lake Michigan coho salmon and steelhead eggs, and a backup source for chinook salmon and lake-run brown trout eggs. This facility collects fish for spawning and management surveys during Spring, Summer and Fall runs. The water supply for the Besadny Facility comes from two wells and water diverted from the Kewaunee River.

Besides its important propagation and assessment functions, the facility was developed as a public showcase for fisheries and other important department functions in the Kewaunee River watershed. With a fish ladder and viewing window, the Besadny Facility is a local attraction to thousands of visitors during the fish spawning runs.

FISH PRODUCTION
One of Wisconsin's original salmon release facilities, a pond in the DNR's Kewaunee River Recreation Area, has been renovated to raise trout or salmon. In addition, there is a pond in Manitowoc County, in the Manitowoc Zoo, that is used each Spring to hold salmon for rearing and imprinting prior to release to the Lake Michigan system. Management of all of these facilities is the responsibility of the Besadny Station Technician. This facility has only been in operation for a few years, so long-term production records aren't available. For 1994-96, the following annual average stocking occurred:

	Number	Pounds
Chinook fingerlings	190,765	2,500
Coho fingerlings	24,735	1,230
Coho yearlings	35,995	4,115
Totals	251,495	7,845

Optimum Sustained Production Capacity: 119,935 fish weighing a total of 2,910 pounds. Maximum Sustained Production Capacity: 280,000 fish weighing a total of 6,310 pounds.

FACILITIES
This facility consists of a dam on the Kewaunee River (which doubles as a lamprey barrier), a fish ladder, five holding ponds, two outlying rearing ponds, the main operations building, and a residence and garage. No estimate of current replacement value is available.

Six-Year Facilities Plan
No projects pending.

C.D. BESADNY ANADROMOUS FISH FACILITY EXPENDITURES
The budget for the operation of these facilities is mixed with other Lake Michigan fisheries operations, so separate expenditures cannot be readily derived.

STAFFING
The current permanent staffing is 1 FTE. This position oversees the LTE's and cooperators who work on the rearing ponds, maintains the facilities, and assists in the spawning and survey operations at Besadny. This facility did not exist during the last workload analysis.

PRODUCTION LIMITATIONS
The Density Index has no application at these facilities since they are fairly large rearing ponds with limited water supply.

KETTLE MORAINE SPRINGS HATCHERY

N1929 Trout Spring Road
Adell, WI 53001
(920) 528-8825

Kettle Moraine Springs Hatchery is located adjacent to the Kettle Moraine State Forest near the village of Batavia in Sheboygan County. This station was a private hatchery that became a state facility in 1979, when it was purchased through special legislation to "provide a hatchery within 40 miles of Lake Michigan in southern Wisconsin capable of producing greater than 40,000 pounds of trout and salmon for Lake Michigan". Since then, water supplies have been renovated, new raceways constructed, a new hatchery building and residence constructed and a new cold storage facility provided.

The water supply consists two pumped high capacity wells equipped with ferric iron removal filters, with aeration to strip hydrogen sulfide, and six high capacity gravity flow ground water collection wells.

The hatchery has three hatching buildings with 49 rearing tanks and a boiler for heating rearing water. In addition, there are 44 raceways and 5 holding tanks, outside. The latter are used for holding feral brood stock as part of the steelhead program. The hatchery also has two 1/3 acre coolwater rearing ponds and an additional 2-acre coolwater fish rearing pond that are used to raise walleye or bass as needed for local stocking. The facility has an intensive sanitary system for fish waste water handling and on-site disposal of sludge for agricultural fertilizer on lands managed for sharecropping purposes.

This the only DNR hatchery in metropolitan southeastern Wisconsin.

FISH PRODUCTION

Kettle Moraine Springs Hatchery specializes in rearing specific strains of rainbow trout (steelhead) from captured feral Lake Michigan broodstock. This involves producing fish in 5 distinct lots (species/age) annually, maintaining 2 to 3 wild broodstock lots and also spawning wild steelhead captured in the Kewaunee River and Root River spawning facilities. This hatchery currently spawns and initially incubates all of the coho salmon eggs for Lake Michigan stocking. This the primary steelhead hatchery for Lake Michigan.

From 1984 through 1990, salmonid production at this facility averaged as follows:

Coldwater

	Number	Pounds
Fingerlings	282,944	16,048
Yearlings	338,772	26,673
Totals	621,716	42,721

The coldwater Optimum Sustained Production Capacity is 450,000 fish weighing a total of 30,000 pounds. The coldwater Maximum Sustained Production Capacity is 520,000 fish weighing a total of 34,670 pounds.

The eggs for walleye strains unique to southeastern Wisconsin have been incubated here, with both fry and fingerling being stocked as a result. Some largemouth bass have also been produced. The annual production record for coolwater species from 1987-96 averages as follows:

Coolwater

	Number	Pounds
Fry	1,100,000	17
Fingerlings	8,228	342
Totals	1,108,228	359

The warm/coolwater Optimum Sustained Production Capacity is 5,028,000 fish weighing a total of 420 pounds. The warm/coolwater Maximum Sustained Production Capacity is 9,042,500 fish weighing a total of 675 pounds.

The rearing ponds at Kettle Moraine Springs are suited to rearing a variety of warm/coolwater species, so the amount of acreage used for any one species depends on production needs for that rearing cycle. The following **per acre** production capacities could be used to calculate different species mixes:

	Optimum		Maximum	
Walleye	No.	Lbs.	No.	Lbs.
Small Fgl	10,000	12	15,000	18
X-Large Fgl	2,500	100	3,250	130

	Optimum		Maximum	
Lgmouth bass	No.	Lbs.	No.	Lbs.
X-Large Fgl.	6,000	240	10,000	400

FACILITIES

Kettle Moraine Springs Hatchery has 13 buildings, including a residence, with an overall replacement value of $864,567. Recent developments have focused on improving facilities for holding steelhead broodstock.

Six-Year Facilities Plan

Aquatic Displays (Beyond 2003) $15,000

KETTLE MORAINE SPRINGS HATCHERY EXPENDITURES - FY1995-96

Operating costs for this facility are covered through the Great Lakes Trout and Salmon Stamp revenue, and special projects funding.

Permanent Salaries	$114,215
Fringe	$47,970
Limited Term Employees	$20,303
Fringe	$2,436
Supplies and Services	$125,693
Capital and Equipment	$0
Total Expenditures	$310,607

SUPERVISORY COMPLEXITY

Because of the threat of disease posed by handling feral broodstocks, the Hatchery Supervisor must have expertise in disease prevention procedures. In addition, they must have expertise in water quality, public relations, land management and development, facilities and equipment maintenance, scientific methodology, salmonid broodstock management, cold and coolwater fish culture techniques, state and federal regulatory procedures and requirements, personnel management and fish distribution technology. Since the facility has a complex water supply system, the supervisor has enhanced responsibility for water supply security. The supervisor is responsible for coordinating operations of the Kenosha smolt release pond, cooperating closely with the cooperators operating the pond. The supervisor also provides logistical support for feral broodstock spawning for steelhead and coho salmon at the C.D. Besadny Anadromous Fish Facility and the Root River Steelhead Facility. The supervisor is often in contact with media personnel and organized angling groups as well as those who independently visit these facilities. Since broodstock and the water supply require immediate attention in emergencies, the Hatchery Supervisor must live on the site.

STAFFING

This facility is currently staffed with four permanent FTE with one vacancy. The most recent workload analysis identified a need for 8.4 FTE, however the Hatchery Supervisor believes that current staffing is adequate, with sufficient LTE funding, for the current level of operation and development.

This facility employees 2-4 limited term personnel 12 months of the year. In addition, the manager uses summer interns and other training programs to provide additional personnel as needed.

PRODUCTION LIMITATIONS

The amount and quality of the water supply are the primary factors limiting coldwater production at this facility. Because of the long-term rearing record, professional judgement is the most reasonable means of determining capacity.

LAKE MILLS HATCHERY

302 S. Main
Lake Mills, WI 53551
(920) 648-8012

Lake Mills Hatchery is located in the city of Lake Mills in Jefferson County. The 73.6 acres land for this hatchery were purchased by the Federal government for $16,350 in 1931 and the original rearing ponds were built by the Work Projects Administration (WPA) in 1931 and 1932. Initially, warm and coolwater species were hatched and reared there, using a gravity-flow water supply from Rock Lake to fill the ponds. Ponds were added over the years, bring the total number to 24 at 30 acres, and in the mid 1960's, two high-capacity wells and six concrete raceways were constructed for rearing coldwater species. Until 1983, the hatchery was operated by the U.S. Fish and Wildlife Service (USFWS). The DNR operated the hatchery from April, 1983 to November, 1988, under a memorandum of agreement with USFWS, at which time the DNR "purchased" the facility from the Federal government. Since 1983, the University of Wisconsin - Madison has maintained an aquacultural research facility at Lake Mills, under a cooperative use agreement with the DNR.

After DNR acquired the facility, a renovation plan was developed to improve the rearing ponds, water supply system, and buildings. Enough funding was provided to renovate the water supply system to the rearing ponds, and to improve about $^1/_4$ of the rearing pond acreage (10 ponds), in the first "phase", which was completed in 1992.

The current water supply are a filtered gravity-flow water supply line from Rock Lake with two separate intakes, which supplies water to all of the ponds and the hatching building, and the two high-capacity wells which supply water to the raceways and the hatching building.

The rearing units include six inside tanks, six raceways, and 31 ponds totalling 31 acres.

FISH PRODUCTION

Lake Mills has recently produced coho salmon, largemouth and smallmouth bass, walleye, and Northern pike. From 1984 through 1990, coho salmon production at this facility averaged as follows:

Coldwater	Number	Pounds
Fingerlings	211,524	11,159
Yearlings	247,770	12,482
Totals	459,294	23,641

The Optimum Sustained Production Capacity is 445,000 coho salmon weighing a total of 18,130 pounds. The Maximum Sustained Production Capacity is 513,000 coho salmon weighing a total of 21,000 pounds.

This facility once held broodstock for largemouth and smallmouth bass, and hybrid panfish production. More recently, production has focused on hatching and rearing northern pike and walleye from eggs spawned from local wild populations.

The following annual production record is presented for the pre-renovation period (1988-90) and the post-renovation period (1992-97). The biggest changes occured in the production of northern pike and walleye:

	Pre-Ren.		Post-Ren.	
Coolwater	No.	Lbs.	No.	Lbs.
Fry	990,000	25	4,034,789	92
Fngl.	251,087	591	280,996	618
Totals	1,241,087	616	4,315,785	710

The coolwater Optimum Sustained Production Capacity is 6,550,000 fish weighing a total of 621 pounds. The coolwater Maximum Sustained Production Capacity is 11,057,700 fish weighing a total of 1,130 pounds.

The rearing ponds at Lake Mills are suited to rearing a variety of coolwater species, so the amount of acreage used for any one species depends on production needs for that rearing cycle. The following **per acre** production capacities could be used to calculate different species mixes:

	Opt. Prod.		Max. Prod.	
Northern Pike	No.	Lbs.	No.	Lbs.
Small Fgl	4,000	60	7,500	110
Large Fgl	700	70	800	80

	Opt. Prod.		Max. Prod.	
Walleye	No.	Lbs.	No.	Lbs.
Small Fgl	14,080	17	30,800	36

FACILITIES

The initial renovation project did not complete the renovation and upgrade of this facility. A "phase II" project was been prepared for the 1995-97 biennium that would provide the following:

-Renovation of the remaining 20 rearing ponds

-Upgrading the well water supply system

-Renovation of the coldwater rearing facilities

Remaining as a final future phase would be construction of a new hatching and rearing building.

Six-Year Facilities Plan

Security Fencing (currently funded) $216,000; Rearing House Siding (1997-99) $4,500; Replace Shop Siding (1997-99) $5,000; Engineering For Phase II (1999-2001) $135,000; Road Renovation (2001-2003) $200,000; New Hatchery Building (beyond 2003) $3,591,700; Phase II Ponds (beyond 2003) $1,700,000; Heated Shop/Cold Storage (beyond 2003 $141,000

Lake Mills Hatchery has 8 buildings on inventory, including a residence, with an overall replacement value of $564,627. This does not include an aeration blower building constructed as part of the recent facilities renovation.

LAKE MILLS EXPENDITURES - FY 1995-96

Permanent Salaries	$95,378
Fringe	40,059
Limited Term Employees	11,622
Fringe	1,395
Supplies and Services	68,046
Capital and Equipment	0
Total Expenditures	$216,500

SUPERVISORY COMPLEXITY

The Hatchery Supervisor works closely with the University of Wisconsin Aquaculture Program personnel which have their main wet lab facilities here. This involves coordinating facility and rearing space use, manpower use and administration of a cooperative use agreement. The recent renovations have made this facility one of the more complex coolwater hatcheries in the state. Water processing systems are an integral part of this facility. The supervisor must have expertise in water quality, public relations, land management and development, facilities and equipment maintenance, scientific methodology, centrachid broodstock management, coldwater and coolwater fish culture techniques, state and federal regulatory procedures and requirements, personnel management and fish distribution technology. The production program at this facility requires that an employee live on the station to assure security of the fish stocks and water supply.

STAFFING

This facility is currently staffed with four permanent FTE. The most recent workload analysis identified a need for 4.8 FTE.

PRODUCTION LIMITATIONS

The amount and quality of the water supply are the primary factors limiting coldwater production at this facility. Because of the long-term rearing record, professional judgement is the most reasonable means of determining capacity.

LAKEWOOD REARING STATION

14865 Hatchery Lane
Lakewood, WI
54138-9610
(715) 276-6066

Lakewood Rearing Station is located in Oconto County. This station was built in 1923 under the WPA program. Lakewood has 26 tanks, 7 raceways and 6 ponds in which fish are reared. The water supply is a series of open spring ponds which produce about 1,500 gallons per minute.

FISH PRODUCTION

Domestic brook and rainbow trout are commonly raised here. Lakewood produces fish from 2 distinct lots (species/age) annually. From 1984 through 1990, fish production at this facility averaged as follows:

Coldwater	Number	Pounds
Fingerlings	80,194	7,617
Yearlings	117,846	18,994
Totals	198,040	26,611

The Optimum Sustained Production Capacity is 145,000 fish weighing a total of 24,000 pounds. The Maximum Sustained Production Capacity is 293,000 fish weighing a total of 48,500 pounds.

FACILITIES

Lakewood Rearing Station has 5 buildings, including a residence, with an overall replacement value of $300,196.

Six-Year Facilities Plan
Renovate Rearing Facilities (Beyond 2003) $47,400; Repair John Lake Road (Future) $57,600

LAKEWOOD REARING STATION EXPENDITURES - FY 1995-96

Permanent Salaries	$44,836
Fringe	18,831
Limited Term Employees	4,829
Fringe	579
Supplies and Services	24,805
Capital and Equipment	0
Total Expenditures	$93,880

SUPERVISORY COMPLEXITY

This facility is directly supervised by the Langlade Hatchery Supervisor, with the local Rearing Station Foreman overseeing the day-to-day operations. Since direct supervision is not available at the site and the water supply is open and vulnerable to climatic conditions affecting water quality, the foreman must be knowledgeable of water quality requirements. In addition, the foreman must be versed in public relations, land management and development, facilities and equipment maintenance, scientific methodology, coldwater fish culture techniques, personnel management and fish distribution technology. Because of the remote location, the foreman must live on the site.

STAFFING

The current staffing at Lakewood is two permanent FTE, with supervision provided by the Langlade Hatchery Supervisor. The last workload analysis identified a need for 1.8 FTE.

PRODUCTION LIMITATIONS

The amount and quality of the water supply are the primary factors limiting coldwater production at this facility. Because of the long-term rearing record, professional judgement is the most reasonable means of determining capacity.

LANGLADE HATCHERY

W1269 Fish Hatchery Road
White Lake, WI 54491
(715) 882-8757

Langlade Hatchery is located in Langlade County. This facility was built in 1939 under the WPA program. One half of the raceways were replaced in the 1983-85 biennium, and an additional pond was developed for rearing yearling trout. There are currently six ponds used for rearing. There are also six raceways at this facility that are currently unusable.

The water supply for this facility is a diversion of about 2,000 gpm from Dalton Creek. This stream is prone to flash floods, and although a flood bypass channel has been constructed, the hatchery has periodically been flooded.

FISH PRODUCTION

Brown trout are the principal fish reared here, however, in the past, the station has reared brook and rainbow trout, as well. Langlade produces fish from 1 to 2 distinct lots (species/age) annually. From 1984 through 1990, fish production at this facility averaged as follows:

Coldwater	Number	Pounds
Fingerlings	94,058	13,721
Yearlings	144,341	27,919
Adults	564	2,064
Totals	238,963	43,704

The Optimum Sustained Production Capacity is 245,000 fish weighing a total of 40,500 pounds. The Maximum Sustained Production Capacity is 256,000 fish weighing a total of 41,200 pounds.

FACILITIES

Langlade Hatchery has 5 buildings, including a residence, with an overall replacement value of $291,547.

Six-Year Facilities Plan
No projects pending

LANGLADE REARING STATION EXPENDITURES - FY1995-96

Permanent Salaries	$23,122
Fringe	9,711
Limited Term Employees	7,738
Fringe	929
Supplies and Services	24,217
Capital and Equipment	0
Total Expenditures	$65,717

SUPERVISOR COMPLEXITY

The Hatchery Supervisor serves a dual role, as both overall supervisor of the local coldwater propagation work unit (Lakewood and Thunder River Rearing Stations, and Langlade Hatchery) and as day-to-day supervisor of Langlade. Because of the nature of the facilities in the work unit, the supervisor must be well versed in environmental regulations and have expertise in water quality management in addition to public relations, land management and development, facilities and equipment maintenance, scientific methodology, coldwater fish culture techniques, personnel management and fish distribution technology. Langlade Hatchery has an open water supply, subject to dramatic changes in water temperature and quality with changes in flow, requiring that staff reside on the site for constant monitoring.

STAFFING

The current staffing at Langlade is two permanent FTE. The last workload analysis identified a need for 1.7 FTE. In addition, this facility has one limited term employee during peak rearing periods.

PRODUCTION LIMITATIONS

The amount and quality of the water supply are the primary factors limiting coldwater production at this facility. Because of the long-term rearing record, professional judgement is the most reasonable means of determining capacity.

NEVIN HATCHERY

3911 Fish Hatchery Rd
Fitchburg, WI 53711
(608) 275-3246

Nevin Hatchery is located in the city of Fitchburg, Dane County. Nevin was built in 1875, and is the state's oldest conservation property. Two outlying rearing stations, **Token Creek**, in Dane County, and **Lima Pond**, in Jefferson County, are also operated from this facility. Token Creek was developed in 1960, and Lima Pond was converted from a rough fish holding pond in 1976.

The water supply at Nevin currently consists of several artesian wells and covered springs, providing a total flow of about 1,100 gpm. Two high capacity wells were drilled in 1992, but are not currently in use. The water supply at Token Creek is about 780 gpm, and at Lima Pond is about 1,400 gpm, both from flowing springs.

Many different rearing unit configurations have been developed and redeveloped over the past 120 years at Nevin. Currently, the outside rearing units consist of one concrete pond, two sets of linear raceways and a divided earthen pond. The "inside" rearing units consist of 36 concrete tanks in the main hatchery building, and a large circular tank in the "spiral building" (the remnants of an experimental spiral raceway). There is another earthen pond on the Nevin grounds, but its currently used for coolwater production by the Operations Crew and is not considered part of the hatchery rearing facilities. The facilities at Lima and Token Creek are drainable earthen ponds.

FISH PRODUCTION

Domestic rainbow, brook, and brown trout are the major species hatched and raised at Nevin. Recently, the propagation of feral brook and brown trout has been initiated, with a feral brown trout broodstock being developed. Lima Pond is used primarily to raise domestic brown trout, while Token Creek usually produces rainbows. Nevin Hatchery produces fish in 7 to 8 distinct lots (species/age) annually, and is responsible for rearing operations at Token Creek and Lima Ponds.

From 1987 through 1991, fish production for stocking and transfers out from these facilities averaged as follows:

Nevin	Number	Pounds
Fingerlings	343,012	24,211
Yearlings	131,553	33,297
Totals	474,565	57,508

The Optimum Sustained Production Capacity is 578,000 fish weighing a total of 51,085 pounds. The Maximum Sustained Production Capacity is 599,250 fish weighing a total of 51,335 pounds.

It should be noted that as the number of feral trout being reared increases, the production capacity will decrease due to the lower Density Index (0.25) that these fish require.

Lima Pond		
Yearlings	100,000	20,000

The Optimum Sustained Production Capacity is 100,000 fish weighing a total of 20,000 pounds. The Maximum Sustained Production Capacity is 110,000 fish weighing a total of 22,000 pounds.

Token Creek		
Yearlings	125,000	25,000

The Optimum Sustained Production Capacity is 125,000 fish weighing a total of 25,000 pounds. The Maximum Sustained Production Capacity is 140,000 fish weighing a total of 28,000 pounds.

In recent years, production at Nevin has declined due to deteriorating facilities, and Lima Pond and Token Creek Rearing Stations have not been operated due to inadequate staffing.

NEVIN HATCHERY EXPENDITURES - FY 1995-96

Permanent Salaries	$56,956
Fringe	23,922
Limited Term Employees	9,546
Fringe	1,146
Supplies and Services	44,504
Capital and Equipment	0
Total Expenditures	$136,074

FACILITIES

A major renovation of outside rearing units was proposed for Nevin and approved for development at an estimated cost of $1.6 million. Unfortunately, no funding was provided and DNR was directed to use segregated fund supported borrowing. Monies to do that are not available, so a new renovation project has been initiated to try to restore the previous rearing capacity (115,000 pounds/year) in a more cost effective manner than the previous design.

Six-Year Facilities Plan
Engineering/Redesign (1997-99) $100,000; Spray-on Insul. #131 (1997-99) $28,000; Insulate #0118 (1997-99) $12,000; Replace Spiral Raceway (1999-2001) $300,000; Sealcoat Pavement (1999-2001) $35,000; Rearing Facility 2nd Level (1999-2001) $21,000; Raceway Renovation (beyond 2003) $1,642,900; Office Remodeling (beyond 2003) $52,500

Nevin Hatchery has 5 buildings with a replacement value of $310,598. This does not include other buildings on the grounds used by other functions or district administration.

SUPERVISORY COMPLEXITY

The supervisor at this facility is also responsible for supervision of cooperatively operated outlying trout rearing ponds, with overall administrative responsibility for four permanent employees. In addition, the supervisor has a responsibility of supervising prison inmates used on the facility at times. Overall, this facility exacts a demanding workload, requiring that the supervisor have expertise in water quality, public relations, land management and development, facilities and equipment maintenance, scientific methodology, salmonid broodstock management, coldwater fish culture techniques, state and federal regulatory procedures and requirements, personnel management and fish distribution technology. The supervisor has responsibility for all permits and reports associated with these facilities.

STAFFING

The current staffing at Nevin is 3.76 permanent FTE. The last workload analysis identified a need for 5.5 FTE.

During the DNR reorganization, one Fish Propagation FTE was recommended for transfer to Nevin, but that position was reallocated to a Fisheries Management Technician at Dodgeville. The facility has operated with 1.76 permanent FTE for the past year, since the retirement of the Hatchery Supervisor. Lack of adequate staff has prevented operation of Lima Pond and Token Creek Rearing Stations in the past several years.

The facility also employs as many as three limited term employees (LTE's are employed to feed the fish at Lima Pond and Token Creek, when operating), and 1-2 prisoners from the Oak Hill Correctional Facility, at any one time.

PRODUCTION LIMITATIONS

The amount and quality of the water supply are the primary factors limiting coldwater production at this facility. Because of the long-term rearing record, professional judgement is the most reasonable means of determining capacity.

ART OEHMCKE (WOODRUFF) HATCHERY

8770 Hwy J
Woodruff, WI 54568
(715) 356-9215

The Art Oehmcke Hatchery is located in Oneida County. This station was established as the Woodruff Hatchery in 1900. In 1946, pond rearing was started in earnest and in 1964, construction began on a 1,200 jar hatchery building. This hatchery underwent a major renovation in 1994-95, consisting of upgrading the rearing water supply system, new and renovated rearing ponds, and new wastewater treatment facilities. The hatchery has 21 ponds totalling approximately 21 acres.

The hatchery water supply consists of 1,500 gallons per minute from nearby Madeline Lake, by way of two intake lines. Water for temperature control in the main hatchery building can also be pumped from Clear Lake, about 2 miles away.

Personnel from the hatchery currently operate the **Presque Isle Rearing Station**, a 23 acre walleye rearing pond, and oversee operation of several cooperative rearing ponds.

FISH PRODUCTION

The hatchery has raised walleye, northern pike, muskellunge, hybrid muskellunge, smallmouth bass and white suckers. The primary species are walleye, northern pike, muskellunge, and white suckers. Oehmcke usually rears fish from 4 distinct lots (species/age) all from feral broodstocks.

The following annual average fish production is presented for the pre-hatchery renovation period (1988-93) and the post-renovation period (1994-97), with the biggest change occurring in the increased production of walleye fingerling:

	Pre-Ren.		Post-Ren.	
Oehmcke	No.	Lbs.	No.	Lbs.
Fry	29,986,165	511	19,479,834	385
Fngl	54,051	6,527	316,866	4,359
Totals	30,040,216	7,037	19,796,700	4,744

The Optimum Sustained Production Capacity is 19,274,765 fish weighing a total of 5,020 pounds.

The Maximum Sustained Production Capacity is 27,231,315 fish weighing a total of 4,430 pounds.

The rearing ponds at Oehmcke are suited to rearing a variety of coolwater species, so the amount of acreage used for any one species depends on production needs for that rearing cycle. The following **per acre** production capacities could be used to calculate different species mixes:

	Opt. Prod.		Max. Prod.	
Muskellunge	No.	Lbs.	No	Lbs.
Small Fgl	2,775	30	3,525	35
Large Fgl	1,470	295	2,045	410

	Opt. Prod.		Max. Prod.	
Walleye	No.	Lbs.	No	Lbs.
Small Fgl	92,625	110	112,500	130
XLarge Fgl	9,000	360	10,000	400

For 1988-97, the annual walleye production at Presque Isle has averaged:

Presque Isle	Number	Pounds
Fingerling	469,077	891

The Optimum Sustained Production Capacity is 490,000 fish weighing a total of 576 pounds. The Maximum Sustained Production Capacity is 700,000 fish weighing a total of 824 pounds.

FACILITIES

Major renovation occurred at this facility during 1993-94, totalling $3.25 million. This included development of new water supply and treatment systems, seven new rearing ponds, renovation of existing rearing ponds, and a new wastewater treatment system. This was intended to increase capacity for walleye and muskellunge production. Because the project was inadequately funded to accomplish all of the proposed renovation development, some additional work remains on the unlined rearing ponds.

Six-Year Facilities Plan

Resurface Roads/Lots (1997-99) $75,000; Storm Sewer Replacement (1997-99) $28,300; Windows for Shop (1997-99) $4,500; Insulate Shop Ceiling (1997-99) $2,000; Install Vinyl Siding (2001-2003) $52,000; Insulate Hatchery Building (2001-2003) $5,000; Remodel Storage Building (beyond 2003) $12,000

The Oehmcke Hatchery has 15 buildings with a replacement value of $1,228,288.

OEHMCKE HATCHERY EXPENDITURES - FY 1995-96

Permanent Salaries	$165,155
Fringe	69,365
Limited Term Employees	28,486
Fringe	3,418
Supplies and Services	113,130
Capital and Equipment	48,823
Total Expenditures	$428,377

SUPERVISORY COMPLEXITY

From mid-April through the end of May, the Hatchery Supervisor is responsible for a complex system of obtaining eggs from feral brood stocks in area lakes. This requires that personnel work in shifts round-the-clock, 7 days a week, spawning fish and incubating eggs. The supervisor must provide real-time supervision to both intensive and extensive hatchery operations and numerous off-station crews. Operating a large coolwater hatchery as well as extensive rearing ponds both off-station and on-station exacts a demanding workload, requiring that the supervisor have expertise in water quality, public relations, land management and development, facilities and equipment maintenance, scientific methodology, coolwater fish culture techniques, state and federal regulatory procedures and requirements, personnel management, and fish distribution technology.

STAFFING

The current staffing at Oehmcke is 8.25 permanent FTE including 0.5 and 0.75 seasonal positions. There is a 0.5 vacancy. The last workload analysis identified a minimal staffing requirement for 7.2 FTE, however that was done prior to the hatchery renovation which has changed the production program. In addition, at least 6 LTEs are used during peak rearing periods at the Oehmcke Hatchery.

PRODUCTION LIMITATIONS

As a relatively new facility, the crew is still in the "learning curve" phase of developing a consistent production program at Oehmcke Hatchery.

OSCEOLA HATCHERY

2517 90th Ave.
Osceola, WI 54020-4204
(715) 294-2525

The Osceola Hatchery is located north of Osceola on Highway 35, in Polk County. Trout were reared at this site in private hatcheries since the late 1800's. This station became a state facility in 1925, and the current facility was constructed by the WPA in the 1930's. There are over a mile of outdoor raceways, 52 indoor metal tanks and 6 incubation tanks used to rear fish.

The water supply is 1,850 gallons per minute from springs and artesian wells.

FISH PRODUCTION

Domestic rainbow trout are the only species raised currently, and this is our domestic rainbow broodstock station. This facility annually produces 125,000 sac fry and 250-400,000 eyed eggs for transfer to other DNR hatcheries and rearing stations. Osceola Hatchery produces 1 distinct lot of fish each year and is responsible for maintaining 4 distinct lots of domesticated brood stock.

From 1984 through 1990, fish production for direct stocking from this facility averaged as follows:

Coldwater	Number	Pounds
Fingerlings	29,143	1,453
Yearlings	118,110	27,504
Adults	2,812	7,076
Totals	150,065	36,033

Transfers of Spring fingerlings to other DNR hatcheries and rearing stations add 130,000 fingerlings (4,000 pounds) to this total.

The Optimum Sustained Production Capacity is 1,045,085 fish weighing a total of 43,215 pounds, including transfers. The Maximum Sustained Production Capacity is 1,173,500 fish weighing a total of 46,990 pounds, including transfers.

FACILITIES

The Osceola Hatchery has 7 buildings, including a residence, with a replacement value of $314,013. Some expenditures in the future will be necessary to maintain buildings and water supplies to meet standards.

Six-Year Facilities Plan

Lower Dam Removal (1997-99) $118,000; Troutmere Dam Removal (1997-99) $92,000; Garage Doors (1997-99) $14,500; Drill New Well (1999-2001) $6,000; New Ditch/Tile Area (beyond 2003) $2,500

OSCEOLA HATCHERY EXPENDITURES - FY 1995-96

Permanent Salaries	$95,468
Fringe	40,097
Limited Term Employees	568
Fringe	68
Supplies and Services	28,978
Capital and Equipment	0
Total Expenditures	$163,906

SUPERVISORY COMPLEXITY

Since Osceola is the DNR's broodstock facility for domesticated rainbow trout in Wisconsin, it must maintain a Class "A" disease-free status. Facility maintenance, fish health protection and security are critical supervisory responsibilities here. In addition, the Hatchery Supervisor must have expertise in water quality, public relations, land management and development, facilities and equipment maintenance, scientific methodology, salmonid broodstock management, coldwater fish culture techniques, state and federal regulatory procedures and requirements, personnel management and fish distribution technology. This facility has a high visitation rate, providing the principal DNR contact point in the area. The supervisor also works with the Private Industry Council, providing a work site for several individuals each year, adding to supervisory responsibility and complexity. Since this is a remote hatchery, with broodstock that require special attention and security, the supervisor is expected to live on the site.

STAFFING

The current staffing at Osceola is four FTE. There is currently one vacancy. The last workload analysis identified a need for 4.7 FTE. The hatchery also employs 1 six-month limited term employee during peak work periods.

PRODUCTION LIMITATIONS

The amount and quality of the water supply are the primary factors limiting coldwater production at this facility. Because of the long-term rearing record, professional judgement is the most reasonable means of determining capacity.

SOUTH CENTRAL REGION OPERATIONS

3991 Fish Hatchery Road
Fitchburg, WI 53711
(608) 275-3244

Several off-site rearing ponds are operated by the South Central Region Operations personnel from Fitchburg. They are:

I-90 Pond - This is a shallow 4 acre pond on the DNR's Pine Island Wildlife Area, near Portage in Columbia County, that was created by excavation for fill dirt during the construction of Interstate 90-94. Over the past 10 years, walleye and largemouth bass have been raised here.

Lake Katrine - This is a 38 acre natural landlocked lake west of Madison in Dane County. This lake is surrounded by property owned by a youth camp, who give the DNR permission to operate it as a rearing pond. This pond is solely used to rear walleye. Production has been highly variable over the years, with occasional total failures due to contamination by herbicides from nearby farm land.

Nevin Pond - This is a 4 acre dug pond on the Nevin Hatchery grounds that is operated by South Central Region operations staff to rear Northern pike or muskellunge.

Operations personnel are also responsible for obtaining walleye and Northern pike spawn from area lakes for incubation and rearing at Lake Mills Hatchery, collecting adult bass for broodstock as required, and stocking fish in South Central Region waters.

FISH PRODUCTION

The South Central Region rearing ponds receive walleye fry from Lake Mills Hatchery, northern pike fingerlings from Lake Mills or Wild Rose Hatcheries, and muskellunge fingerlings from Thompson Hatchery as required for production. South Central Region Operations obtain wild largemouth bass broodstock as needed to produce this species.

From 1987 through 1996, fish production at these facilities averaged as follows:

I-90	Number	Pounds
Fingerling	52,530	238

The Optimum Sustained Production Capacity for walleye is 72,500 fish weighing a total of 85 pounds.

The Maximum Sustained Production Capacity for walleye is 90,000 fish weighing a total of 106 pounds.

The Optimum Sustained Production Capacity for largemouth bass is 50,000 fish weighing a total of 77 pounds. The Maximum Sustained Production Capacity for largemouth bass is 90,000 fish weighing a total of 138 pounds.

Katrine	Number	Pounds
Fingerling	380,102	1,876

The Optimum Sustained Production Capacity for walleye is 440,000 fish weighing a total of 518 pounds. The Maximum Sustained Production Capacity for walleye is 750,000 fish weighing a total of 882 pounds.

Nevin	Number	Pounds
Fingerling	7,372	310

The Optimum Sustained Production Capacity for muskellunge is 2,000 fish weighing a total of 400 pounds. The Maximum Sustained Production Capacity for muskellunge is 2,500 fish weighing a total of 500 pounds.

The Optimum Sustained Production Capacity for Northern pike is 4,200 fish weighing a total of 420 pounds. The Maximum Sustained Production Capacity for Northern pike is 5,000 fish weighing a total of 500 pounds.

FACILITIES

Other than the rearing stations and associated lands and buildings, there are no other facilities directly associated with this propagation program.

Six-Year Facilities Plan
No projects pending.

SOUTH CENTRAL REGION OPERATIONS PROPAGATION EXPENDITURES - FY 1995-96

Permanent Salaries	$32,122
Fringe	10,791
Limited Term Employees	3,314
Fringe	398
Supplies and Services	23,765
Capital and Equipment	0
Total Expenditures	$73,091

SUPERVISORY COMPLEXITY
The Regional Field Operations Supervisor must have expertise in water quality, public relations, land management and development, facilities and equipment maintenance, scientific methodology, coolwater fish culture techniques, state and federal regulatory procedures and requirements, personnel management and fish distribution technology.

STAFFING
The South Central Region Operations propagation program does not have any staff permanently assigned to it. All of the staff that work on it have other primary operations assignments. The last workload analysis did not include Operations Crew propagation activities.

ST. CROIX FALLS HATCHERY

Box 397, 230 River St.
St. Croix Falls, WI
54024
(715) 483-3535

St. Croix Falls Hatchery is located in the city of St. Croix Falls in Polk County. This station was established in 1919. In 1960, a new hatchery building and a service building were provided and in 1976, sixteen new outdoor raceways were constructed. Since then, several additional projects have been funded to improve existing buildings. The hatchery now has 248 egg incubating trays, 49 indoor rearing tanks and 24 outdoor raceways.

The water supply is about 2,000 gpm from a "french drain" ground water collection system on a hillside overlooking the hatchery.

FISH PRODUCTION
This is our principle broodstock station for brook trout, and one of two broodstock stations for domestic brown trout. Hatchery personnel take 1 million brook trout eggs and 2.2 million brown trout eggs annually, to supply statewide needs. St. Croix Falls Hatchery produces fish in 2 distinct lots (species/age) annually for stocking and is responsible for maintaining 4 lots of domesticated brown trout and 3 lots of domesticated brook trout brood stock.

From 1984 through 1990, fish production for direct stocking from this facility averaged as follows:

Coldwater	Number	Pounds
Fingerlings	54,158	12,295
Yearlings	100,784	23,783
Adults	4,588	7,054
Totals	159,530	43,132

This facility transfers about 290,000 Spring fingerlings weighing 5,800 ponds to other DNR hatcheries and rearing stations, and to cooperative rearing facilities. It also maintains 1,800 brook trout and 3,400 brown trout broodstock.

The Optimum Sustained Production Capacity is 2,629,080 fish weighing a total of 64,190 pounds, including transfers. The Maximum Sustained Production Capacity is 2,930,000 fish weighing a total of 69,895 pounds, including transfers.

FACILITIES
St. Croix Falls Hatchery has 6 buildings, including a residence, with a replacement value of $766,833.

Expenditures for water supply maintenance may be substantial in the future. The water supply has been contaminated several times in the past by gasoline spills from gas stations on the top of the hill, resulting in corrective action by the gas station owners. However, there is concern that water supply contamination may occur again in the future as development continues in the groundwater recharge area.

Six-Year Facilities Plan
Office Windows/Insulation (2001-2003) $23,000; Building Repair Feasibility (2001-2003) $6,000

ST. CROIX FALLS HATCHERY EXPENDITURES - FY 1995-96

Permanent Salaries	$90,915
Fringe	38,185
Limited Term Employees	0
Fringe	0
Supplies and Services	37,106
Capital and Equipment	0
Total Expenditures	$166,206

SUPERVISORY COMPLEXITY

This facility is currently classified Class "A" (disease-free), requiring that the supervisor have expertise in disease prevention procedures. In addition, the supervisor must have expertise in water quality, public relations, land management and development, facilities and equipment maintenance, scientific methodology, salmonid broodstock management, coldwater fish culture techniques, state and federal regulatory procedures and requirements, personnel management and fish distribution technology. Since the facility has a complex water supply system, prone to contamination from external sources, the supervisor has enhanced responsibility for water supply security. Since broodstock and the water supply require immediate attention in emergencies, the supervisor must live on the site.

STAFFING

St.Croix Falls is currently staffed with four permanent FTE. The last workload analysis identified a need for 5.8 FTE, however a significant amount of time was spent on DNR license sales and permits. That responsibility has ended.

PRODUCTION LIMITATIONS

The amount and quality of the water supply are the primary factors limiting coldwater production at this facility. Because of the long-term rearing record, professional judgement is the most reasonable means of determining capacity.

GOV. TOMMY THOMPSON (SPOONER) HATCHERY

951 W. Maple St.
Spooner, WI 54801
(715) 635-4149

Gov. Thompson Hatchery is located on Hwy. 27 in the city of Spooner, in Washburn County. This station was established as the Spooner Hatchery in 1914 as a northern pike hatchery. Major expansion in 1994-95 has resulted in one of the largest coolwater fish propagation facilities in the world. This is an 1,200 jar hatchery where northern pike, walleye, muskellunge and sucker eggs are incubated and hatched. The hatchery operates 48 rearing ponds onsite as well as leasing 5-10 outlying walleye rearing ponds.

The main water supply is the Yellow River Flowage, which supplies 1,800 gallons per minute. Additional water is available from the Spooner municipal well system.

FISH PRODUCTION

Annually, personnel at this hatchery spawn wild fish in area lakes to obtain about 1 million muskellunge eggs, 40 million walleye eggs, 4.3 million northern pike eggs and about 120 million sucker eggs (for forage). Muskellunge, walleye and northern pike are reared on-site, while addition walleye are reared in the outlying ponds.

The following annual average fish production is presented for the pre-renovation period (1988-93), and the post-renovation period (1996-97). The biggest change was an increase in walleye fingerling production:

	Pre-Ren.		Post-Ren.	
Thompson	No.	Lbs.	No.	Lbs.
Fry	43,695,120	836	18,457,250	418
Fingerling	205,877	26,091	1,555,387	17,833
Yearling	2,144	1,279	0	0
Totals	43,902,069	27,566	20,012,637	18,251

The Optimum Sustained Production Capacity is 94,805,170 fish weighing a total of 15,700 pounds, including forage production. The Maximum Sustained Production Capacity is 119,540,500 fish weighing a total of 30,630 pounds, including forage production. The rearing ponds at Thompson are suited to rearing a variety of coolwater species, so the amount of acreage used for any one species depends on production needs for that rearing cycle. The following **per acre** production capacities could be used to calculate different species mixes:

Muskellunge	Opt. Prod. No.	Opt. Prod. Lbs	Max. Prod. No.	Max. Prod. Lbs.
Small Fgl	6,500	65	7,500	75
Large Fgl	4,300	860	5,000	1,000
Yearling	2,100	1,400	2,500	1,670

Northern pike	Opt. Prod. No.	Opt. Prod. Lbs	Max. Prod. No.	Max. Prod. Lbs.
Small Fgl	5,150	75	8,000	115
Large Fgl	2,000	200	5,000	500

Walleye	Opt. Prod. No.	Opt. Prod. Lbs	Max. Prod. No.	Max. Prod. Lbs.
Small Fgl	60,100	70	76,000	90
XLarge Fgl	10,000	400	12,000	480

With the increased capacity for walleye production at Thompson, the number of outlying ponds utilized was reduced to cut operating expenses:

Outlying Ponds	Pre-Ren. No.	Pre-Ren. Lbs	Post-Ren. No.	Post-Ren. Lbs.
Fingerling	1,664,09	8,343	544,145	2,338

The Optimum Sustained Production Capacity and the Maximum Sustained Production Capacity for these ponds depends on the number being operated.

The Optimum Sustained Production Capacity is an average of 15,750 fish weighing a total of 19 pounds per acre. The Maximum Sustained Production Capacity is an average of 20,000 fish weighing a total of 24 pounds per acre.

FACILITIES

A major renovation project costing in excess of $10.5 million was completed in the Spring of 1996. This total replacement of the hatchery building and rearing pond complex, renovation of the water supply system, and development of a wastewater treatment system expanded the facility's capability to produce both muskellunge and walleye. The Thompson Hatchery complex has four buildings with a replacement value of $1,041,612.

Six-Year Facilities Plan
No projects pending.

GOV. TOMMY THOMPSON HATCHERY EXPENDITURES - FY1995-96

Permanent Salaries	$203,787
Fringe	85,591
Limited Term Employees	40,357
Fringe	4,843
Supplies and Services	105,865
Capital and Equipment	0
Total Expenditures	$440,443

SUPERVISORY COMPLEXITY

Operating perhaps the largest muskellunge and walleye hatchery in the world exacts a demanding workload, requiring that the supervisor have expertise in water quality, public relations, land management and development, facilities and equipment maintenance, scientific methodology, coolwater fish culture techniques, state and federal regulatory procedures and requirements, personnel management and fish distribution technology. The production program at this facility consists of a demanding 2-month round-the-clock work schedule during spawning, hatching and fry distribution. This is followed with 5 months activity to accomplish a major coolwater production and stocking schedule. During the remainder of the year, when fish are not being produced on the station, the supervisor is responsible for maintenance, reporting, planning and personnel management.

STAFFING

The current staffing at Thompson is 9.5 permanent FTE (includes one 0.76 and one 0.5 FTE seasonal positions). There is currently one FTE vacancy. The last workload analysis identified a minimal staffing requirement of 7.1 FTE, however that was done before the hatchery renovation which has substantially changed the production program. The work force also includes up to 17 limited term employees during peak production periods.

PRODUCTION LIMITATIONS

As a relatively new facility, the hatchery crew is still in a "learning curve" phase of developing a dependable program.

THUNDER RIVER REARING STATION

Rt. 1
Crivitz, WI 54114
(715) 757-3541

Thunder River Rearing Station is located in Marinette County. This station was built in 1935 by CCC and WPA crews. In 1957, two earthen ponds were constructed, and in 1967 a new residence was constructed. Minor pond renovations have been made over the years. Most of the raceways at this facility are within buildings.

The water supply is diversion from the South Fork Thunder River, at a minimum of 1,800 gpm. Water temperatures and flow volumes vary drastically due to the large watershed upstream.

FISH PRODUCTION

Brook, brown and rainbow trout have all been reared here, however, due to low water temperatures during the Winter, this facility was operated seasonally, producing Fall fingerlings, from 1982 until 1993 when coho salmon started to be held over-winter. Disease has been a recurring problem here due to wild fish in the water supply. The facility is best suited for raising brown trout and coho salmon. Thunder River produces fish from 2 distinct lots (species/age) annually.

From 1984 through 1990, fish production at this facility averaged as follows:

Coldwater	Number	Pounds
Fingerlings	206,112	29,333
Yearlings	80,000	8,000
Totals	286,112	37,333

The Optimum Sustained Production Capacity is 544,000 fish weighing a total of 41,900 pounds. The Maximum Sustained Production Capacity is 636,700 fish weighing a total of 48,670 pounds.

THUNDER RIVER REARING STATION EXPENDITURES - FY 1995-96

Permanent Salaries	$44,447
Fringe	18,668
Limited Term Employees	7,140
Fringe	857
Supplies and Services	34,944
Capital and Equipment	1,511
Total Expenditures	$107,566

FACILITIES

Thunder River Rearing Station has 8 buildings, including a residence, with an overall replacement value of $420,560.

Six-Year Facilities Plan
Raceway Repair (beyond 2003) $23,100

SUPERVISORY COMPLEXITY

This facility is directly supervised by the Langlade Hatchery Supervisor, with the local Rearing Station Foreman overseeing the day-to-day operations. Since direct supervision is not available at the site and the water supply is open and vulnerable to climatic conditions affecting water quality, the foreman must be knowledgeable of water quality requirements. In addition, because of the remoteness of the site, the foreman must be versed in public relations, land management and development, facilities and equipment maintenance, scientific methodology, cold water fish culture techniques, personnel management and fish distribution technology. Because of the remote location, the foreman must live on the site.

STAFFING

Thunder River is currently staffed with 1.5 permanent FTE (one 0.5 FTE seasonal) with supervision provided by the Langlade Hatchery Supervisor. The seasonal employee has been extended to 11 months since 1993 to provide adequate staffing for coho salmon production. The last workload analysis identified a minimum staffing need of 1.4 FTE, however that was done prior to the addition of coho salmon production to the workload.

PRODUCTION LIMITATIONS

The amount and quality of the water supply are the primary factors limiting coldwater production at this facility. Because of the long-term rearing record, professional judgement is the most reasonable means of determining capacity.

WEST CENTRAL REGION OPERATIONS

910 Hwy 54 E.
Black River Falls, WI
54615
(715) 284-1447

Off-site rearing ponds are operated by the West Central Region Operations personnel from Black River Falls. The major ponds in this complex have been identified as Rearing Stations. They are:

Albion Rearing Station - This is six ponds totaling about five acres located near Black River Falls in Jackson County. Over the past 10 years, muskellunge, northern pike and largemouth bass have been raised here, however the primary production has been in musky and bass. One of the ponds is used to "overwinter" the largemouth bass broodstock used in the Region's bass propagation.

Northfield Rearing Station - This is a 33 acre impoundment lying just east of I-94 near the village of Northfield in Jackson County. This impoundment was built during the Wisconsin Conservation Department's "small lake creation" program during the early 1970's. In recent years, an aeration system was installed on the dam to prevent thermal stratification using a blower in a building on shore with the air passing through hoses connected to a submerged "air lift". There is another four acre impoundment upstream of Northfield (**Holen School Pond**) that is operated as part of this rearing station. These ponds have been used to produce muskellunge (Holen School Pond), walleye and largemouth bass (Northfield) in the past 10 years, however the primary production has been in musky and bass.

Trump Coulee Rearing Station - This is a 14 acre impoundment, also created under the "small lake creation" program, located near Taylor in Jackson County. This facility also has an aeration system installed on the dam to prevent thermal stratification by using a blower in a building on shore with the air passing through hoses connected to a submerged "air lift". Over the past 10 years, muskellunge and largemouth bass have been raised here, however the primary production has been in musky.

Starting in 1997, as a result of reorganization, West Central Region Operations also took over operations of the **Winding Creek Rearing Station** near Colby in western Marathon County, was previously operated by personnel from the Oehmcke (Woodruff) Hatchery. This 63 acre impoundment was also created under the "small lake creation" program during the early 1970's, and is used exclusively for walleye production. A development project to increase the production capacity of this facility was completed in 1993. This included installation of an aeration system using large blowers in a building on shore with the air passing through buried pipes to hoses connecting to floating "air lifts", and construction of a flood bypass channel to pass flash floods around the rearing pond.

In addition, the Region has operated various other ponds on State, Federal or private lands over the years, producing muskellunge, walleye and largemouth bass, with the primary production being walleye. Use of these ponds ended in 1992. Regional Operations staff still use a sewage treatment facility at Whitehall in Trempealeau County as a source of forage minnows for musky production.

Operations personnel are also responsible for coordinating a large number of cooperative rearing ponds in the Region, which add high quality trout to the stocking program.

FISH PRODUCTION

The coolwater ponds receive fry and fingerlings from the Northern Region hatcheries (Oehmcke and Thompson) each year for production of walleyes and muskellunge. West Central Region Operations maintains wild largemouth bass broodstock to produce this species to meet most of the state needs. Several of the rearing ponds in the West Central are suited to rearing a variety of coolwater species, so the amount of acreage used for any one species depends on production needs for that rearing cycle. The following **per acre** production capacities could be used to calculate different species mixes:

From 1987 through 1996, fish production at these facilities averaged as follows:

Albion	Number	Pounds
Fingerling	18,018	1,321

The Optimum Sustained Production Capacity is 9,100 muskellunge weighing a total of

1,820 pounds. The Maximum Sustained Production Capacity is 12,020 muskellunge weighing a total of 2,405 pounds.

When largemouth bass are raised at Albion, the average production was 5,070 fingerling weighing 70 pounds, per acre.

Northfield	Number	Pounds
Fry	71,575	2
Fingerling	729,311	2,855
Totals	800,886	2,857

The Optimum Sustained Production Capacity at Northfield is 705,430 largemouth bass weighing a total of 1,320 pounds. The Maximum Sustained Production Capacity at Northfield is 1,011,845 largemouth bass weighing a total of 2,010 pounds.

When walleye were raised at Northfield, the average production was 19,235 fingerling weighing 40 pounds, per acre.

The Optimum Sustained Production Capacity at Holen School pond is 5,160 muskellunge weighing a total of 1,030 pounds. The Maximum Sustained Production Capacity at Holen School pond is 5,750 muskellunge weighing a total of 1,150 pounds.

Trump Coulee	Number	Pounds
Fingerling	138,690	2,441

The Optimum Sustained Production Capacity is 12,650 muskellunge weighing a total of 2,530 pounds. The Maximum Sustained Production Capacity is 15,250 muskellunge weighing a total of 3,050 pounds.

When largemouth bass were raised at Trump Coulee, the average production was 30,910 fingerling weighing 165 pounds, per acre.

The annual average walleye production at Winding Creek improved significantly following development:

	Pre-Dev.		Post-Dev.	
Winding Creek	No.	Lbs.	No.	Lbs.
Fingerling	430,066	2,960	631,815	3,384

The Optimum Sustained Production Capacity is 630,000 walleye weighing a total of 740 pounds. The Maximum Sustained Production Capacity is 1,000,000 walleye weighing a total of 1,175 pounds.

FACILITIES

Other than the rearing stations and associated lands and buildings, there are no other facilities directly associated with this propagation program.

Six-Year Facilities Plan

Winding Creek - Rock for Roads (1999-2001) $5,000

WEST CENTRAL REGION OPERATIONS PROPAGATION EXPENDITURES - FY 1995-96

Permanent Salaries	$32,836
Fringe	13,791
Limited Term Employees	21,739
Fringe	2,609
Supplies and Services	61,686
Capital and Equipment	0
Total Expenditures	$132,662

SUPERVISORY COMPLEXITY

The Regional Fisheries Operations Supervisor is responsible for maintenance of a large reservoir of largemouth bass broodstock (approximately 200-500 fish) on a year-round basis. Fish are transferred as needed from holding ponds to rearing facilities where they spawn to produce young for our production. This broodstock must continually be monitored for health, growth and age, and portions of the population are periodically replaced to maintain the vigor of the stock. In addition, there is responsibility for extensive minnow production and cooperative trout rearing programs. The supervisor must have expertise in water quality, public relations, land management and development, facilities and equipment maintenance, scientific methodology, cold and coolwater fish culture techniques, state and federal regulatory procedures and requirements, personnel management and fish distribution technology.

STAFFING

The fish propagation program is currently staffed with 3.5 permanent FTE, (one 0.5 FTE seasonal) plus a permanent assignment of

other operations personnel's time for the coldwater cooperatives. The last workload analysis did not include Operations Crew propagation activities, however the Regional Operations Supervisor believes current staffing is adequate.

WESTFIELD HATCHERY

Box 44, 220 W
Pioneer Park Rd
Westfield, WI 53964
(608) 296-2343

Westfield Hatchery is located in the village of Westfield in Marquette County. This station was built in 1927 by WPA crews. Recent improvements include replacement of the raceways in 1992, and a new 10-inch artesian well in 1991. The hatchery now has 27 indoor rearing tanks and 10 outdoor raceways.

The water supply for Westfield is two artesian wells with an average combined flow of 300 gpm.

Hatchery staff also supervise cooperative rearing operations at a complex of outdoor tanks and ponds owned by Green Lake County near Green Lake.

FISH PRODUCTION

Over the years, Westfield has produced a variety of salmonids including brown and lake trout, splake (brook x lake trout hybrid), and coho and chinook salmon. Currently the hatches and rears chinook salmon for Great Lakes stocking. In addition, coho salmon are reared here for Lake Michigan stocking. Westfield Hatchery produces fish in 2 distinct lots (species/age) annually.

From 1984 through 1990, fish production at this facility averaged as follows:

Westfield	Number	Pounds
Fingerlings	950,229	11,394
Yearlings	66,376	4,308
Totals	1,016,605	15,702

The Optimum Sustained Production Capacity is 1,100,000 fish weighing a total of 19,080 pounds. The Maximum Sustained Production Capacity is 1,250,000 fish weighing a total of 23,735 pounds.

The operation of the Green Lake Cooperative Rearing Station is supervised by Westfield personnel. This facility produces brown, lake and rainbow trout for Green Lake, Green Lake County.

Cooperative	Number	Pounds
Fingerlings	30,011	4,305
Yearlings	51,155	11,049
Totals	81,166	15,354

FACILITIES

Westfield Hatchery has 6 buildings, including a residence, with an overall replacement value of $227,091.

Six-Year Facilities Plan
Reside Garage (2001-2003) $2,700

WESTFIELD HATCHERY EXPENDITURES - FY1995-96

Permanent Salaries	$44,972
Fringe	18,888
Limited Term Employees	1,750
Fringe	210
Supplies and Services	26,356
Capital and Equipment	0
Total Expenditures	$92,176

SUPERVISORY COMPLEXITY

This facility is directly supervised by the Wild Rose Hatchery Supervisor, with the local Hatchery Foreman overseeing the day-to-day operations. The foreman must be versed in public relations, land management and development, facilities and equipment maintenance, coldwater fish culture techniques, personnel management and fish distribution technology. A staff person lives on the site.

STAFFING

Westfield is currently staffed with two permanent FTE, with supervision provided by the Wild Rose Hatchery Supervisor. The last workload analysis identified a staffing requirement of 2.5 FTE. There is an LTE at the Green Lake Cooperative that is employed by Green County.

PRODUCTION LIMITATIONS

The amount and quality of the water supply are the primary factors limiting coldwater production at this facility. Because of the long-term rearing record, professional judgement is the most reasonable means of determining capacity.

WILD ROSE HATCHERY

N5871 State Hwy 22
Wild Rose, WI 54984
(920) 622-3527

Wild Rose Hatchery, the state's largest coldwater hatchery, is located just north of the village of Wild Rose, on Highway 22, in Waushara County. This facility was built at the site of a private hatchery in 1905. Since then, an office/service building was added in 1956, a new coldwater hatchery building was built in 1965, a warm/coolwater rearing building in 1974, and a salvaged storage building was erected in 1995. The hatchery has 72 ponds and raceways, most of which were constructed in the 1930's under the W.P.A. program.

The water supply is a combination of artesian wells, pumped wells and flowing springs providing an average flow of 2,000 gpm. The water supply is reused up to 27 times prior to final discharge. A study of the groundwater supply is being completed by the U.S. Geological Survey, with preliminary findings indicating a large volume of water is available through pumping.

Because this is a major warm and cold water production facility, buildings and equipment are in nearly continual use, producing varying numbers of cold and coolwater species, depending upon needs for stocking. Much of the equipment used here was especially fabricated for this facility and requires annual maintenance between rearing seasons. An outlying rearing pond on DNR property, the White River Pond, is used to produce Fall yearling muskellunge for the Lake Michigan restoration project.

FISH PRODUCTION

Wild Rose maintains a domestic brown trout broodstock, and hatches and rears domestic and wild brown trout and chinook salmon for the Great Lakes program and inland programs. It is the primary Lake Michigan hatchery, producing 56% of the brown trout stocked (36% of all trout), and 67% of the chinook salmon (52% of all salmon).

From 1984 through 1990, salmonid production directly for stocking at this facility averaged as follows:

Coldwater	Number	Pounds
Fingerlings	1,439,605	37,970
Yearlings	389,054	81,307
Adults	3,747	2,175
Totals	1,832,406	121,452

In recent years, annual production has included 190,000 brown trout fingerlings transferred to other rearing stations.

The coldwater Optimum Sustained Production Capacity is 4,442,000 fish weighing a total of 86,355 pounds, including transfers. The coldwater Maximum Sustained Production Capacity is 5,362,500 fish weighing a total of 104,050 pounds, including transfers.

Pioneering work on lake sturgeon culture was performed here, and the hatchery supplies sturgeon eggs and fry for a number of rehabilitation and research projects throughout Wisconsin, nationally, and internationally, with the program funded by donations from "Sturgeon For Tomorrow".

Wild Rose is also the leader in development of using artificial diets for rearing northern pike and hybrid muskellunge in Wisconsin, and is the key hatchery in the restoration of the Great Lakes strain of muskellunge to upper Lake Michigan. They incubate sucker eggs to produce forage for their and other hatcheries musky programs.

Average annual production of coolwater species from 1988-97 was:

Coolwater	Number	Pounds
Fry	14,231,262	535
Fingerling	91,472	5,391
Totals	14,322,734	5,926

The coolwater Optimum Sustained Production Capacity is 24,448,200 fish weighing a

total of 4,235 pounds, including forage production. The coolwater Maximum Sustained Production Capacity is 36,286,250 fish weighing a total of 10,560 pounds, including forage production.

There are two types of coolwater ponds at this facility, intensive and extensive. The intensive ponds are designed and used to produce Northern pike or hybrid muskellunge on artificial diets. The extensive ponds have been used to produce a variety of species including Northern pike, walleye, and muskellunge, the current use. The following are the **per acre** production capacities:

	Opt. Prod.		Max.Prod.	
Muskellunge	No.	Lbs.	No.	Lbs.
Large Fgl	3,000	600	6,000	1,200

Wild Rose Hatchery produces fish from 8 to 10 distinct lots (species/age groups) annually, maintains 4 domesticated brown trout broodstock lots, and spawns trout and salmon from the Strawberry Creek, Kewaunee (Besadny) and Root River harvest weirs.

FACILITIES

Wild Rose Hatchery has 22 buildings, including 1 residence, with an overall replacement value of $1,209,071.

Starting in 1998, a feasibility study and preliminary design for a complete renovation of the water supply system and rearing facilities will be initiated. This is necessary to bring the water supply system into compliance with existing codes, and to replace deteriorating and obsolete rearing units, in order to maintain, and enhance if possible, the rearing capability.

Six-Year Facilities Plan
Hatchery design (1997-99) $600,000; Hatchery Renovation (1999-2001) $6,500,000; Storage Facility (beyond 2003) $25,000

WILD ROSE HATCHERY EXPENDITURES - FY 1995-96

Permanent Salaries	$174,956
Fringe	73,481
Limited Term Employees	41,299
Fringe	4,956
Supplies and Services	126,165
Capital and Equipment	0
Total Expenditures	$420,858

SUPERVISORY COMPLEXITY

Rearing both cold and coolwater species at Wild Rose is accomplished by manipulating water temperatures from the upper coldwater rearing units through the lower coolwater ponds. The facility has over 50 artesian wells which provide rearing water. Usually 6-8 species of fish are reared at any one time on this facility, further adding to the complexity of operations. To maximize hatchery space and personnel time, brown trout are spawned over an extensive period through a process which manipulates photoperiod (day length) on the broodstock. Due to the popularity of this facility as a site for tourists and as a major source for the Lake Michigan stocking program, the Hatchery Supervisor is often in contact with media personnel and organized angling groups as well as those who independently visit these facilities. In view of the threat of disease posed by handling feral brood stocks, the supervisor must have expertise in disease prevention procedures. In addition, the supervisor must have expertise in water quality, public relations, land management and development, facilities and equipment maintenance, scientific methodology, salmonid broodstock management, cold and coolwater fish culture techniques, state and federal regulatory procedures and requirements, personnel management and fish distribution technology. Since the facility has a complex water supply system, the supervisor has enhanced responsibility for water supply security. Since broodstock and the water supply require immediate attention in emergencies, the supervisor must live on the site.

STAFFING

Wild Rose is currently staffed with 8.75 permanent FTE. There is one vacancy. The last workload analysis identified a staffing requirement for 9.1 FTE.

PRODUCTION LIMITATIONS

The amount and quality of the water supply are the primary factors limiting coldwater production at this facility. Because of the long-term rearing record, professional judgement is the most reasonable means of determining capacity.