



WISCONSIN DEPARTMENT OF NATURAL RESOURCES

BUREAU OF FISH AND WILDLIFE MANAGEMENT

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A Review of Needs and Alternatives  
for Trout Hatchery Expansion

John Klingbiel  
Supervisor of Fish Production







## A Review of Needs and Alternatives for Trout Hatchery Expansion

### INTRODUCTION

The Fish Management Section is striving to provide a modern efficient hatchery system which will assure an ample stock of coldwater species to provide adequate fishing in the state's waters. This effort discusses the present system and presents alternative methods of reaching these goals.

The proper management of Wisconsin's waters promotes quality recreation and makes available large quantities of desirable fish for food. These benefits are reflected in the social and economic condition of the state. In order to properly manage the waters of Wisconsin, approximately 700,000 pounds of salmonids should be stocked annually. About 2/3 of the present production is utilized in the inland waters and 1/3 in the Great Lakes. Although a slight production increase in a few species is needed for inland stocking, most of the additional stocking is needed for waters of the Great Lakes.

In the late 1960's and early 1970's, the potential of these waters became evident. Each year from 1969 through 1971 fishing pressure on Lake Michigan doubled and continues to increase markedly. By 1973 there were 670,000 angler days spent on Lake Michigan and 87,000 days spent on Lake Superior. The harvest of salmonids in 1973 was 1,665,000 pounds from Lake Michigan and 196,000 pounds from Lake Superior. In the 1940's before the drastic changes in fish populations occurred, 2,500,000 pounds were produced annually from Lake Michigan and 550,000 pounds from Lake Superior. To once again reach these levels, annual stocking must be increased by approximately 200,000 pounds. At the present time 7.5 pounds of salmonids are harvested from Lake Michigan for each pound stocked and four pounds are removed from Lake Superior for each pound stocked.

Current production facilities consist of 12 stations which vary from 5,000 to 150,000 pounds annual production (Table 1). Most of these were constructed in the 1920's and 1930's. Only Wild Rose and St. Croix Falls have had major improvements within the last 20 years. At the present time major reconstruction is underway at the Bayfield Hatchery. About 50,000 pounds of additional production is expected from this facility when it is placed in operation. Although production can be increased at some existing stations by construction of additional rearing facilities, available water supplies limit the potential for expansion unless considerable recirculation and water reconditioning is used. Hydrological studies are underway at some of these stations to assess the feasibility of these improvement measures. New sites have also been considered.

### SPECIAL CONSIDERATIONS

In considering the salmonid production program, there are three important factors to face in addition to increased production. These are production and distribution costs, disease control and pollution control. Production and distribution costs depend largely upon respective manpower requirements and hauling distances. Figure 1 shows there is economy in large production stations. At the high producing stations, the number of pounds produced by each worker is considerably more than for workers at the low production stations. Figure 2 shows the extensive hauling pattern involved in the present system. It now costs \$.18/ lb. to haul the fish to the

planting site. The location of large production units closer to Lake Michigan would drastically reduce this cost.

Increasing disease problems, especially in hatchery brood stock, necessitate the development of disease-free brood stocks and rearing facilities where fingerling can be kept disease free. In order to accomplish this end, it will be necessary to develop new rearing units located directly at spring water sources and these facilities must be designed so that they can be effectively sterilized.

The third consideration, pollution control, has become especially important because of new legislation. In accordance with this legislation, pollution control facilities will have to be installed by July 1, 1977 at almost all stations. To date two stations, Wild Rose and Lakewood, have some pollution control facilities and they are also included in the new Bayfield construction. It is estimated that capital costs will be about \$190,000 statewide and operational costs will be \$33,000 annually. Final Environmental Protection Agency standards have not yet been established; however, close liaison is being carried out with that agency.

#### DEVELOPMENT LOCATIONS

The following locations can be developed to increase production and provide for development and maintenance of brood stocks:

##### Point Beach Nuclear Power Plant

Wisconsin Electric Power Company has expressed the desire to enter into a cooperative rearing program at this site, utilizing heated discharge water. Although heated discharges are being utilized for catfish and marine sea food production in some areas, its utilization for salmonid rearing is new to this country. Plans are being prepared for a rearing facility with the capability of producing at least 100,000 pounds of salmonids annually. This facility would have relatively high water temperatures and therefore very excellent growth rates can be expected. Although no bona fide cost estimate on construction is available, it is expected that it will be in the neighborhood of \$200,000. It is expected that the power company will construct the facility and by some type of lease agreement allow the Department to operate it for production of salmonids for stocking Lake Michigan. The location on the shore of Lake Michigan would considerably reduce the cost of fish distribution. However, water would have to be pumped to the rearing facility. Assuming the Department would pay the electric charges, production and distribution costs are expected to be about \$1.085 per pound. This includes the operation and maintenance of pollution control facilities but excludes any rental fee.

##### Hancock

Extensive hydrologic studies in cooperation with the U. S. Geological Survey have taken place on the Greenwood Goose Refuge near Hancock to test the feasibility of using recirculated groundwater in salmonid culture. Field studies have been completed and fish have been reared there experimentally for about one year. Large quantities of groundwater are available and two large wells have been developed which will yield 1,500 and 750 gallons per minute, respectively. The soil is porous enough so that the hatchery discharge can be impounded in a relatively small area and infiltrate back into the groundwater system. Three hundred gallons per minute of continuous discharge was easily impounded in a 40,000 square foot area.

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When water was discharged directly around the well, a recirculation system formed which used only 17 percent fresh water. When holding as much as 40 pounds of trout per gallon of fresh water used, neither phosphorus or nitrogen levels increased significantly in the groundwater. With this mode of operation, average groundwater temperatures were increased two degrees. By discharging at the well in summer and away from the well in winter, a five-degree temperature rise can be obtained. Significantly increased growth rates can be obtained in this manner.

The concepts of temperature regulation and recirculation within the groundwater system are new and extensive testing shows them to be practical. Unique advantages of this site are the high quality spring water supply with temperatures near optimum for trout growth and the fact that no surface waters are involved which eliminates the potential of detrimental effects upon lakes or streams. The site is located less than 100 miles from Lake Michigan; therefore, stocking costs would be reduced from present levels.

It is estimated that the site could be developed sufficiently for about \$410,000 to rear 50,000 pounds of salmonids annually. Production and distribution costs would be about \$1.058 per pound. It would cost about \$715,000 to develop the area sufficiently to produce 100,000 pounds annually. Production and distribution costs then would be reduced to about \$.956 per pound.

#### Kettle Moraine Springs Hatchery

This is a private hatchery in southwestern Sheboygan County which is offered for sale at an asking price of \$345,000. Appraisals just being completed indicate a lower value. The water supply is 1,000 gallons a minute of spring water, but studies indicate that this could be increased to at least 1,500 gallons per minute. With existing facilities it is expected that about 40,000 pounds of salmonids could be produced annually. Estimated production and distribution costs are about \$.979 per pounds. Necessary improvements on existing facilities require an expenditure of about \$30,000, including pollution control facilities.

This station could be developed as a major salmon production station. This would involve further development of the water supply and the construction of a new hatchery building. It is estimated that these improvements would cost \$35,000 and \$120,000, respectively. This system would then be independent of other hatcheries and could produce sufficient eggs and fingerlings for its own production, as well as furnish fingerling for other rearing facilities. It too has the advantage of being near Lake Michigan, the ultimate destiny of large numbers of stocked fish.

#### St. Croix Falls

This station has insufficient rearing facilities to fully utilize the available water supply. Additional water could also be obtained here by extending the pick-up line. The gravity system would continue to be in operation, however. Because of the distance from the major stocking sites, namely the Great Lakes, this station could best be used to carry brood stock and furnish fingerling for rearing stations. Present rearing facilities must be altered to be suitable for brood stock if they are to be kept free of disease. It is estimated that the development will cost \$69,000. One additional man will be needed at this station if brood stock are held here.

With this development of the St. Croix facility, brook trout brood stock would no longer be held at Osceola nor rainbow trout at Westfield, and the number of brown trout brood stock at Wild Rose could be substantially reduced. Westfield Hatchery could then be closed and manpower utilized at more efficient stations. In addition, Osceola and Wild Rose production could be increased somewhat because of the additional space available. This increase, along with a slight production increase at St. Croix Falls, could probably total 14,000 pounds.

Although additional study is necessary on the groundwater supply, it is estimated that 500 gallons per minute of additional water could be obtained for \$35,000 and sufficient additional rearing space provided for 10,000 pounds production for \$50,000. Production and distribution costs for these fish would be about 60 cents per pound which would reduce the costs of the entire production by \$.12. Pollution control facilities must be provided for in addition to these proposals.

#### Langlade

Plans have been developed to build four new rearing ponds and pollution control facilities here. Two existing ponds and some raceways which are in poor condition will be eliminated. The cost of this development is estimated at \$51,750. Production could be increased by 10,000 pounds. Costs of the additional production and distribution would be about \$.51 per pound. This would reduce the cost of the entire production by \$.21 per pound.

#### Nevin

Hydrological studies are now being carried out at this station. About 250 gallons per minute of spring water can be obtained a considerable distance from the present facilities. The cost of development is still unknown, however.

The Mt. Hope Pond located 60 miles west of Nevin in Grant County, is operated from this station. Because of environmental considerations, this pond should be eliminated. It is believed that 8,000 pounds of the 15,000 pounds being produce at Mt. Hope could be produced at Nevin with proper development of the water system.

#### Crystal Springs

Hydrological studies being carried out at this station indicate that large quantities of additional groundwater are available. Water supplies would have to be pumped, however. If development is undertaken at this station, none of the present facilities nor water supply system could be used because of its poor condition. Much of the area is low and swampy and therefore development of rearing facilities may prove somewhat more expensive than at other sites.

#### Osceola

Additional groundwater for hatchery expansion is available at this location but it would probably have to be pumped. The location on the extreme west side of the state away from the Great Lakes gives it a lower priority than other sites for significant expansion of rearing facilities; however, it may be practical to significantly expand its fingerling production capabilities.

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### CONTINUED OPERATION

In order to continue operation of the present facilities at the existing level, about \$190,000 must be spent for pollution control facilities by July 1, 1977. The operation of these facilities plus increases in food costs, will raise production costs about \$.17 per pound, or \$85,000 statewide. Average production costs now vary greatly according to species, but average \$1.17 per pound. In the future, these will increase to about \$1.34 per pound, excluding stocking.

### FUTURE DEVELOPMENT

Any future expansion must consider the development of disease-free brood stocks and fingerling production facilities. Proximity to the major stocking sites, particularly the Great Lakes, is another important consideration in order to keep distribution costs as low as possible. Because of the economics inherent in large production facilities, it is important that the small inefficient stations be abandoned for production purposes. This includes Pinnacle Rock Pond in Monroe County, Hayward, and Westfield Hatcheries. Mt. Hope Pond in Grant County should also be abandoned because of environmental considerations. Although 1972-73 production at Westfield was 17,000 pounds, it is normally much less and production costs there are relatively high. Less than 400 gallons of water per minute is available; although additional water could easily be obtained at this station, it would drastically affect a considerable number of private wells because of its location in the Village of Westfield.

The following alternatives are given in terms of priority for the development program (Table 1). It must be noted that changes can be expected in these recommendations as additional information is gathered on the hydrology of the sites and costs of development. Because the Bayfield Hatchery construction is now underway, its completion is assumed and it will not be included in any of the alternatives.

#### Development Alternative 1

This alternative is the best, particularly from the standpoint of transportation (Figure 3).

St. Croix Hatchery should be developed for holding brood stocks. This would cost \$69,000 and allow for a production increase of about 14,000 pounds.

Langlade Hatchery should be developed at a cost of \$26,750 to produce 10,000 additional pounds production. Production costs of the additional fish would be very low.

Nevin Hatchery should be developed to produce an additional 8,000 pounds to partially compensate for the abandonment of the Mt. Hope Pond. Although costs for this development are not now available, it is assumed they will be about \$50,000.

Kettle Moraine Springs Hatchery should be purchased. The water supply should be developed and a new hatchery building constructed to furnish fingerling production for this as well as other stations. Development costs are estimated at \$135,000 and 40,000 pounds of fish could be produced annually.

Facilities at Point Beach Nuclear Power Plant should be operated for production of 100,000 pounds if a suitable agreement can be reached with the Wisconsin Electric Power Company.

This development alternative will allow for abandonment of Hayward, Westfield, Pinnacle Rock Pond, and Mt. Hope Pond. It would also alleviate the brood stock problem. The total cost of development will be about \$330,750. The purchase price of Kettle Moraine Springs Hatchery and the development of the Point Beach site are excluded from this cost.

#### Development Alternative 2

If Kettle Moraine Springs cannot be purchased, it is recommended that the Hancock site be developed to produce 50,000 pounds annually. Development costs for this are estimated at \$410,000.

All of the development recommended for Alternative 1 should be included except that for Nevin Hatchery.

It would also be necessary to construct additional incubation and fingerling rearing facilities. This could probably be accomplished at a cost of about \$250,000. Sites which should be considered are Osceola, St. Croix, Crystal Springs, Hancock, and Langlade. The exact site cannot be recommended until further hydrologic studies are completed.

#### Development Alternative 3

If an agreement cannot be reached with Wisconsin Electric Power Company on the Point Beach facility, it is recommended that the Hancock site be developed to produce 100,000 pounds annually. It is estimated that this could be accomplished for \$715,000. Developments at Langlade, St. Croix Falls, Nevin, and Kettle Moraine Springs would also have to be completed in order to reach the desired goals. A total for these development costs is \$1,045,750.

#### Development Alternative 4

If neither the Point Beach site nor Kettle Moraine Springs Hatchery can be placed in operation, it would be desirable to establish a major station at Hancock which would produce at least 100,000 pounds. Development of St. Croix Falls for brood stock should be carried out, as well as the limited development at Langlade. In order to obtain the additional production needed however, additional information will have to be obtained on the hydrology of present stations and estimated development costs.

#### CONCLUSIONS

The developments proposed here would provide for the production needed to properly manage the state's trout waters, including the Great Lakes. It would have the flexibility to change species produced with the current needs. For the sake of economy, use of the smaller stations would be discontinued and larger stations

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developed. Most of the present stations would be left basically the same but pollution control would be provided.

Costs of production and distribution would be minimized because of the increased efficiency of large production units and their location near Lake Michigan.

Provisions must be made in future budgets for both development and operation. The pending mini-budget includes provisions to pay for increased costs of present production. Funds for additional pollution control facilities and expansion programs may be available from Anadromous Fish and ORAP programs.

After facilities are established to produce the goal of 700,000 pounds, about \$250,000 of additional funds will be needed annually for operational purposes.

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Table 1. Production levels and development costs of various alternatives.

	1972 Lb. Prod.	Pollution Control Capital Costs	1st Development Alternative		2nd Development Alternative		3rd Development Alternative	
			Lb. Prod.	Devel. Costs	Lb. Prod.	Devel. Costs	Lb. Prod.	Devel. Costs
Bayfield	14,000	\$	75,000	\$	75,000	\$	75,000	\$
Brule	63,000	25,000	63,000		63,000		63,000	
Hayward	6,000							
Crystal Springs	16,000	25,000	17,000		17,000	(225,000) <sup>3</sup>	17,000	
Lakewood	18,000		21,000		21,000		21,000	
Langlade	23,000	25,000	33,000	26,750	33,000	(225,000) <sup>3</sup> 26,750	33,000	26,750
Thunder River	30,000	25,000	30,000		30,000		30,000	
Osceola	60,000	20,000	68,000		68,000	(225,000) <sup>3</sup>	68,000	
St. Croix	44,000	30,000	50,000	69,000	50,000	(+225,000) <sup>3</sup> 69,000	50,000	69,000
Pinnacle Rock	1,000							
Wild Rose	138,000	15,000	137,000		137,000		137,000	
Westfield	17,000							
Nevin	73,000	25,000	66,000	50,000	56,000		66,000	50,000
Kettle Moraine, Springs <sup>1</sup>			40,000	185,000 <sup>1</sup>			40,000	185,000
Point Beach			100,000	<sup>2</sup>	100,000	<sup>2</sup>		
Hancock					50,000	(+225,000) <sup>3</sup> 410,000		715,000
<b>Total</b>	<b>503,000</b>	<b>\$190,000</b>	<b>700,000</b>	<b>\$330,750</b>	<b>700,000</b>	<b>\$730,750</b>	<b>700,000</b>	<b>\$1,045,750</b>

<sup>1</sup>/ Excludes cost of purchase

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Kevin	73,000	25,000	66,000	50,000	56,000		66,000	50,000
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Figure 1

Relationship of Station Production & Production per Man Year











