KPMG Peat Marwick

FINAL REPORT

FISH HATCHERY COST COMPARISON STUDY

Minnesota Department of Natural Resources

KPMG PEAT MARWICK

October 11, 1990

Consultant's Report prepared for the Dept of Natural Resources

Pursuant to 1989 Laws, ch 335, Art 1 sec 21, subd 7, para #12

DNR COST COMPARISON STUDY

Executive Summary

Background

KPMG Peat Marwick and its subcontractor FishPro, Inc., conducted a study to compare the costs of fish production by state and private fish hatcheries for recreational angling in Minnesota.

Methodology

Fourteen "products" were identified — various species of fish at specified stages of growth. The study team determined the Department of Natural Resources' costs to produce these fish in fiscal year 1989 based on Statewide Accounting System data. Direct costs and administrative overhead were included in the final cost figures; a contribution toward the costs of land acquisition, capital improvements and depreciation was estimated and included as well.

To obtain information on the prices DNR would pay to buy fish from the private sector, twenty-five private fish growers were invited to submit sample bids. Thirteen responded, providing the prices they would charge for the fourteen specified products if they entered into an agreement with the DNR in 1991 or 1992.

Ten growers submitted bids on walleye fingerlings, four on muskellunge fingerlings and one or two for each trout and salmon product.

Selected Findings

Based on the DNR cost analysis and the private bids, we determined that the DNR's costs are lower than private prices for these products:

- Walleye fingerlings;
- Brook Trout fingerlings;
- Lake Trout fingerlings and yearlings;
- Kamloop Rainbow Trout fingerlings and yearlings; and
- Chinook Salmon smolt.

The private growers' prices are lower than the DNR costs for these products:

- Pure and Tiger Muskellunge fingerlings;
- Brook Trout yearlings;
- Brown Trout fingerlings; and
- Rainbow Trout yearlings.

There appears to be relative parity for these products:

- Brown Trout yearlings; and
- Rainbow Trout fingerlings.

The findings suggest there may be some opportunities for private purchase arrangements in the future, but the following cost factors should be considered:

- Volume and Fixed Cost Relationships

  Certain costs currently incurred by the DNR hatchery production process are fixed. Items such as administrative salaries and certain types of overhead do not vary with changes in volume. As volume of production increases, some costs remain constant and unit cost decreases. Conversely, as volume decreases cost per unit of production increases. If the DNR is producing below full capacity, increased private grower purchases may increase unit costs for the DNR.

- Transportation and Other Costs

  Decisions to enter into private purchase agreements may be influenced by other cost considerations such as the following:

  - Transportation

    There may be instances where savings in transportation costs result in a better value from private growers.

  - Alternative Sources

    It may be a wise investment to purchase from private growers to assure an alternative source to meet special needs for new strains or programs.

Selected Recommendations

Recommendation 1: For both coldwater and warmwater species, the DNR should maintain control over two critical stages of the fish production process: egg-taking and final stocking into lakes and streams. Should increased privatization take place, the DNR should ensure that adequate eggs are available for sale to the private sector so that contracts may be fulfilled and state biological requirements satisfied.

This recommendation implies that the state should continue to operate its current facilities. Should DNR management requirements for certain species exceed the state's current capacity, however, we recommend that the state perform a make-or-buy analysis before contracting with private growers or constructing new production facilities.

Recommendation 2: The DNR should consider contracting with private growers for products where private prices appear lower than public costs. Muskellunge is the recommended species to start with, because greater competition appears likely for muskellunge than for the three trout products. In addition, the state has some experience in purchasing muskellunge from private growers.

Recommendation 3: The DNR should perform make–or–buy analyses for those products where there is relative parity between public costs and private prices. As management requirements change, the state should consider entering into contracts before investing public monies in new facilities.

Due to limited competition among private growers for the fish in this category, one potential drawback of increased privatization is the potential for one trout grower to become a monopoly supplier. The state should maintain its current trout and salmon programs and utilize private growers to supplement the state's production; this will reduce the risk of excessive reliance on one or two private suppliers.

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I. BACKGROUND

Annually, millions of resident and non-resident anglers utilize Minnesota's lakes and streams for the recreation of fishing. According to the Department of Natural Resources (DNR) planning office, fishing is the most popular activity of visitors to the state, representing about 37% of all outdoor recreation hours. For residents it is tied for second place, with 12% of all outdoor recreation hours.

It is the responsibility of the DNR Section of Fisheries to manage and protect the millions of acres of lakes and streams on which this activity depends. For many years, this management effort has included the production of fish for stocking into public waters. This stocking is done with regard to both the angling public's wishes and the natural limitations of the waters.

Recently, Minnesota legislators have been under pressure to allow private fish growers to supplement the operations of state-run fish hatcheries. Owners of privately run hatcheries have insisted that they can produce fish at a lower cost than the state.

In response to this, legislators mandated a study in 1989 to compare the public and private costs of raising fish for recreational angling in Minnesota. The legislation states:

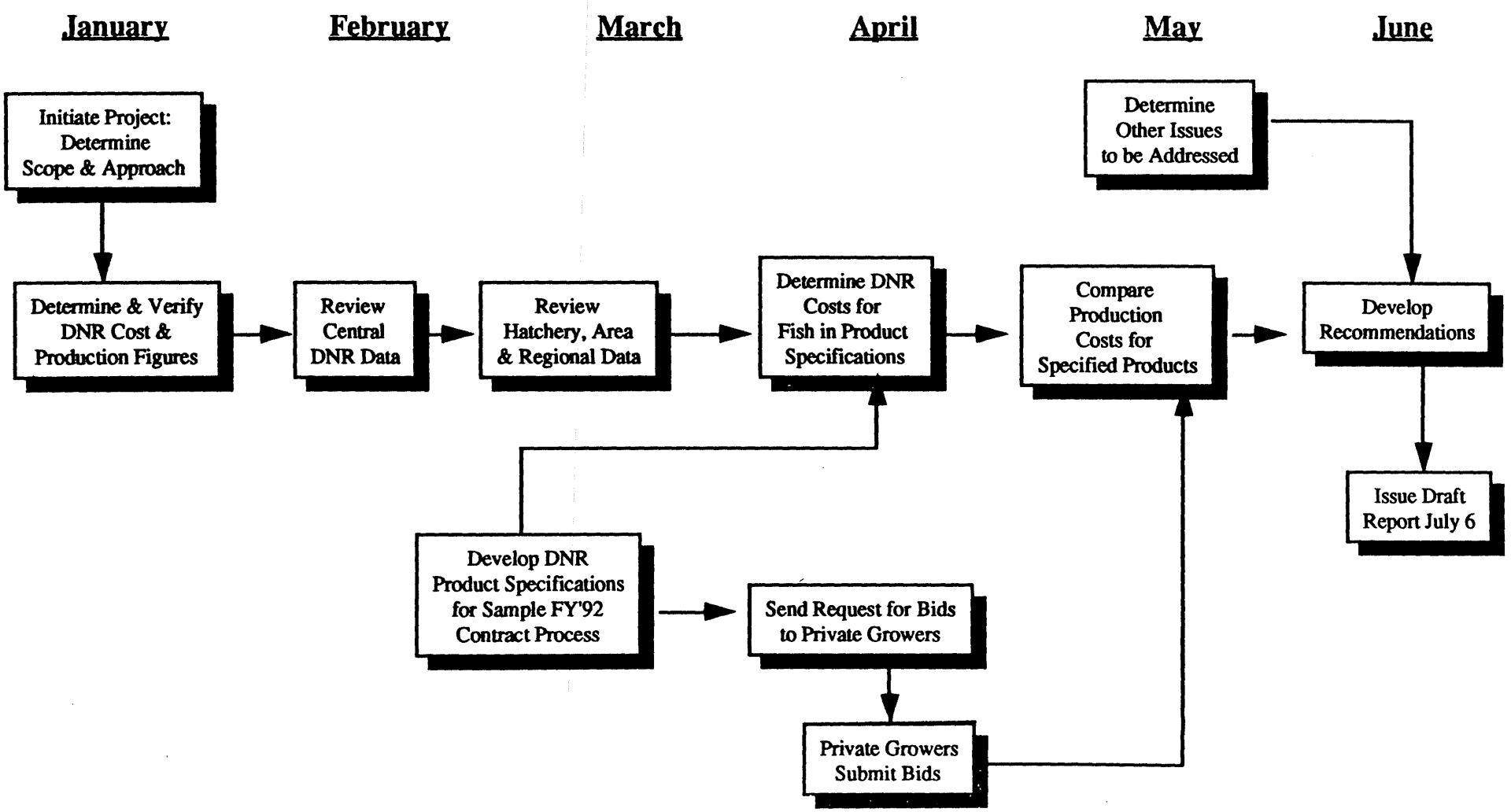
> "The commissioner shall contract with a private consultant outside state service to conduct a study of the cost-effectiveness of this program and the potential for continuation beyond the biennium. The study shall also include an analysis of the costs associated with the operation of a state fish hatchery to include at least building maintenance, personnel, supplies, and expenses as compared to the costs of private hatchery operations. The study shall be submitted to the legislature on or before January 1, 1991, analyzing the results of the project and making specific recommendations for future actions relative to public and private ventures. A work plan must be submitted and reviewed by the legislative commission on Minnesota resources for the project. Should the appropriation from either year be insufficient, the appropriation from the other year shall be made available." (H.F. 372, Section 21, Subd. 7)

With assistance from DNR employees and private growers throughout Minnesota, KPMG Peat Marwick and its subcontractor FishPro, Inc., conducted the study between January and July, 1990. This draft report sets forth our methodology, findings and recommendations.

Figure 1

FISH HATCHERY COST STUDY

Methodology



II. METHODOLOGY

Working with individuals in both the private and public sectors, the study team determined important elements of the scope of the project. Figure 1 illustrates the tasks and timing of the study.

A. Specification of Products

The study focused on the most important species of fish, as indicated by popularity among anglers and volume of current stocking by the DNR. Among species which live in cool and warm water (hereafter described as "warmwater species"), walleye, pure muskellunge and a hybrid ("tiger") muskellunge were selected.

Coldwater fish included several species of trout: brook, brown, lake, rainbow and a strain of rainbow known as kamloop, as well as chinook salmon. As Appendix I illustrates, the species in the study represented approximately 68% (by weight) of the warmwater and 96% of the coldwater fish stocked in Minnesota in 1988.

There are important differences in the rearing methods for coldwater and warmwater species, which have an impact on the study's findings and recommendations. We discuss this in Section II.B.

The team developed detailed specifications for these fourteen products, including size requirements, strain designations, delivery dates and delivery locations. These were the specifications which the private growers used in determining sample contract prices, and these were the specifications to which the DNR's fish were held as well. That is, if a DNR hatchery produced rainbow trout fingerlings smaller than those required by the sample contracts, that hatchery was not included in the determination of DNR's rainbow trout costs. (See Appendix IV for two examples of the sample contracts.)

This lengthy process was necessary to ensure that public and private products would be comparable. In addition, it helped to convince each group that the other was interested in "playing fair."

B. Cost Determination: Public

1. Selection of Facilities

The project team selected representative fish production facilities for inclusion in the study. Of the 21 warmwater fish production areas, this study investigated the costs of nine (see Figure 2). These nine areas produced 40% of the walleye fingerlings and 45% of the muskie fingerlings stocked in lakes statewide in 1988.

Of the six state-run coldwater hatcheries, three were included in the study, as Figure 3 shows. The fish produced at the other three hatcheries in fiscal year 1989 did not meet the size or species requirements of the sample contracts. For nine of the study's eleven coldwater "products", over 90% of the fish stocked were produced by the three hatcheries included in the study.

Figure 2

WARMWATER

Facilities Included

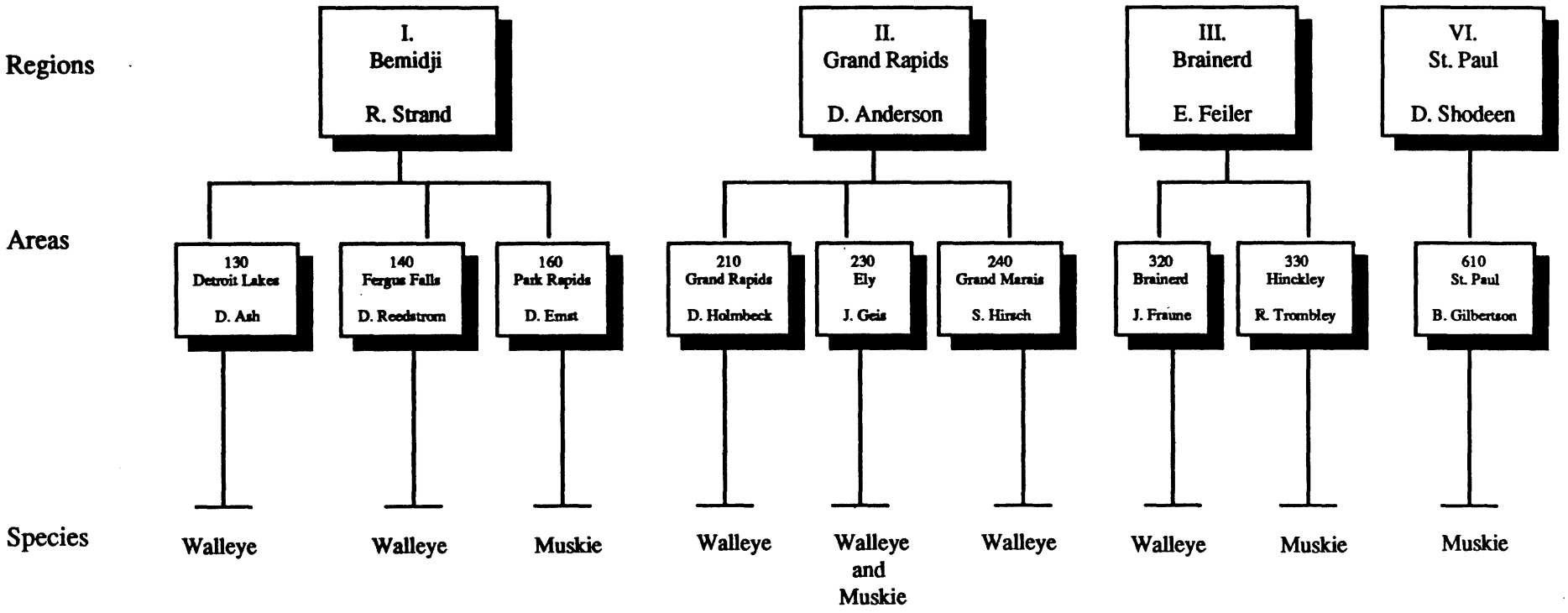


Figure 3

COLDWATER

Facilities Included

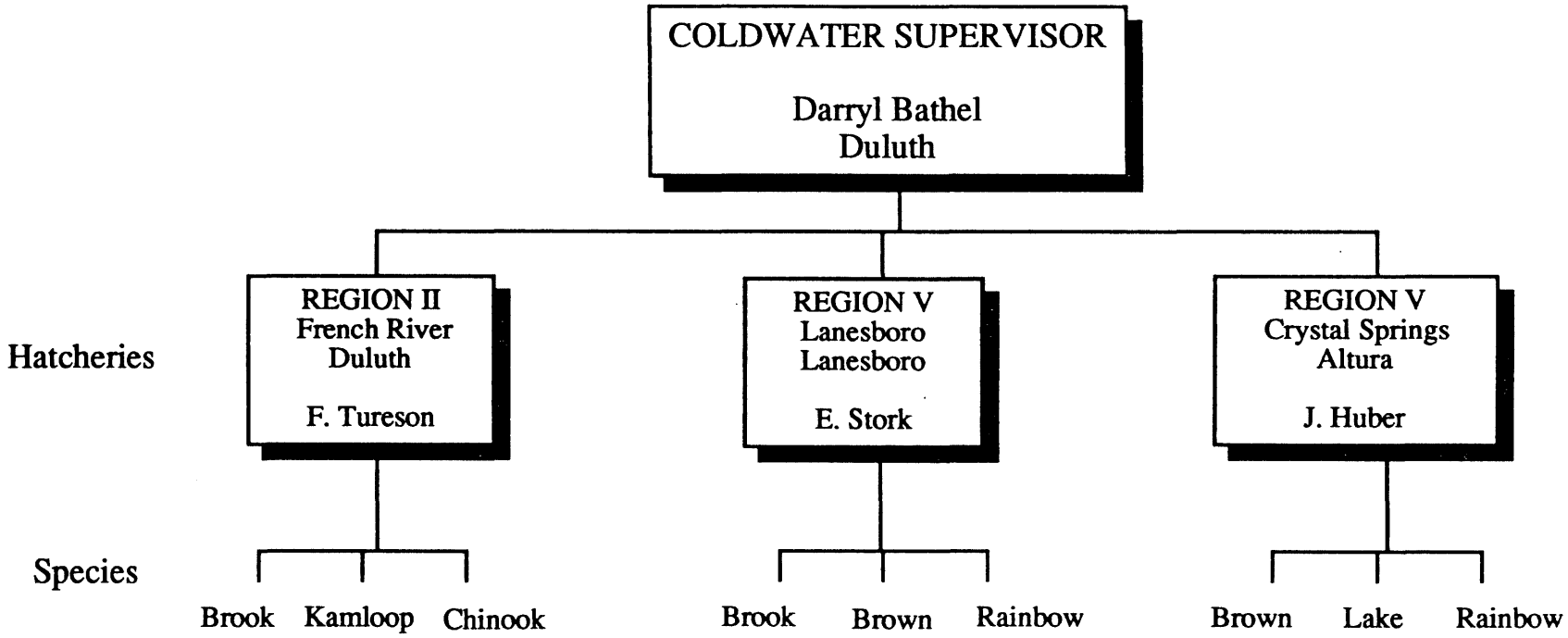
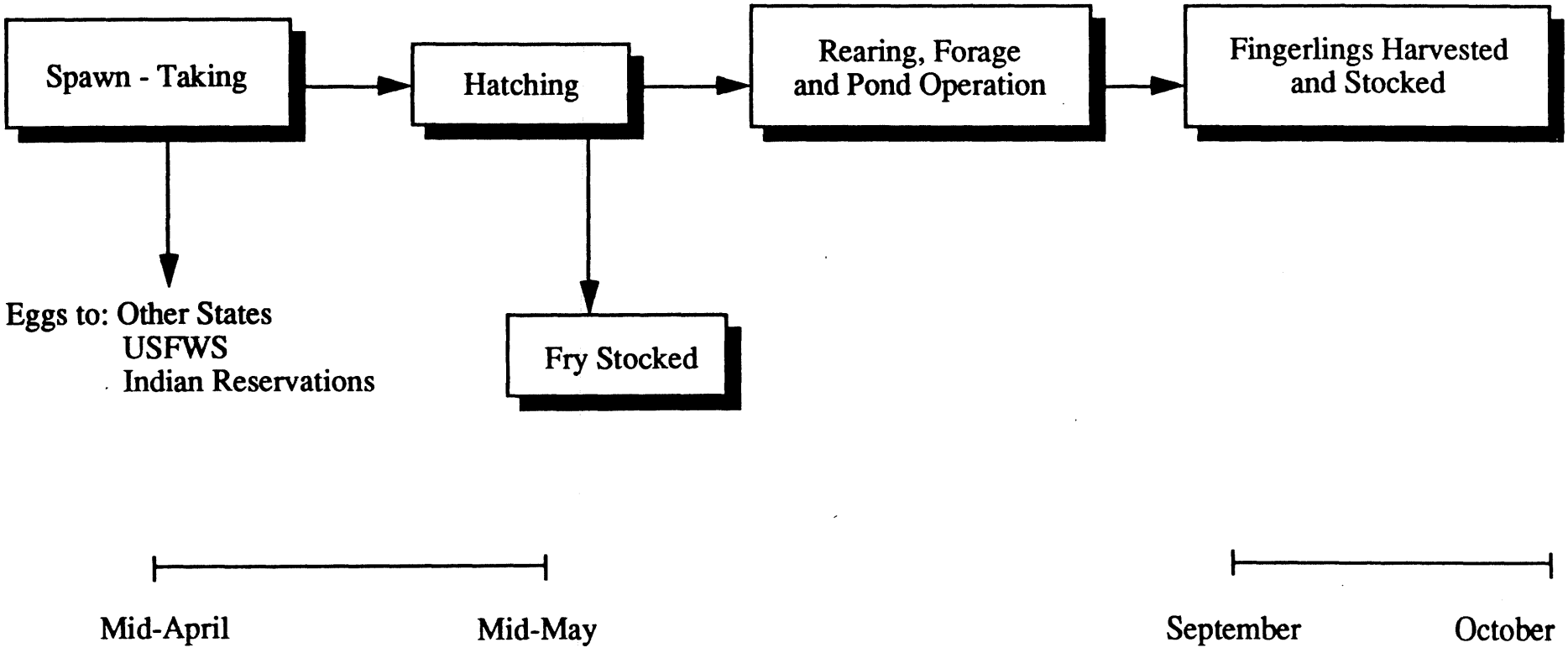


Figure 4

WARMWATER PRODUCTION CYCLE

Seasonal



2. Cost Determination

The aim of the public cost analysis was to determine an accurate cost per fish, in accordance with the sample contracts. This section describes the method used to find the numerator of that fraction: the cost.

Figures 4 and 5 illustrate the basic stages in the rearing process for warmwater and coldwater fish, respectively. This study took these stages into consideration.

In determining both public and private costs, the study team made certain assumptions regarding the role of the DNR in providing fish for recreational angling. Central among these assumptions were two:

1. The DNR would retain control over the taking of eggs from all species of fish. This would include broodstock maintenance; and

2. The DNR would continue to control the actual stocking of the fish into Minnesota lakes and streams, in accordance with management plans.

These assumptions acknowledge the responsibility and mandate of the DNR to manage and protect public resources. They also acknowledge the practicality of granting one agency the sole ability to determine and control the types, amounts and location of eggs to be taken and fish to be stocked.

These critical assumptions were agreed upon by both private and public professionals involved in fish-rearing. The state's egg-taking costs were included in DNR costs for all 14 products because the private growers were asked to incorporate the cost of eggs in their sample bids. The costs of fish stocking, however, including transportation of fish from hatchery to final stocking location were not included in either the public costs or the private bids.

For the three warmwater products, only a portion of the FY'89 egg-taking and hatching costs were applied to the final fish products. As Figure 4 illustrates, walleye and muskie are treated in two ways: (1) Stocked directly into lakes as fry, or (2) Maintained in rearing ponds until they reach the fingerling stage. The fraction of fry retained for rearing in FY'89 ranged from less than 1% to over 60% at state rearing stations; these fractions were applied to the facilities' egg-taking and hatching costs in order to burden the fry and fingerlings accurately. (Fry leaving the hatchery before the rearing stage were also assigned a portion of overhead costs.)

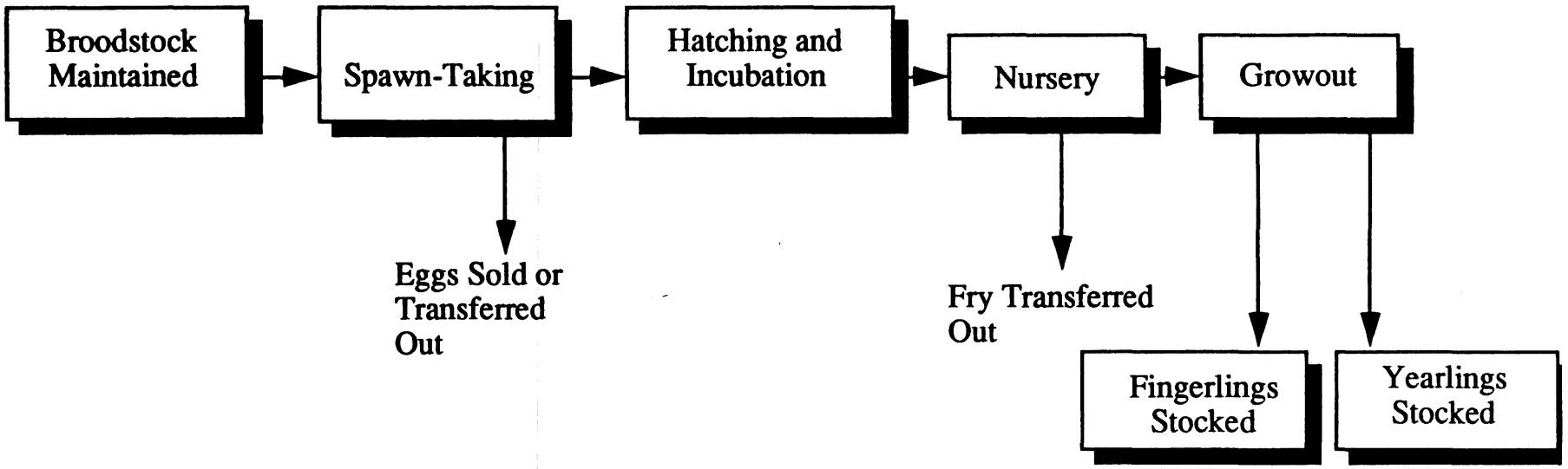
Fiscal year 1989 (July 1, 1988 to June 30, 1989) cost data for the selected hatcheries were collected via the Statewide Accounting System (SWA) and the Division of Fish and Wildlife cost accounting system. These figures were the most readily verifiable (e.g., traceable to timesheets), though DNR employees stated that any corrections that came into the system after September 1989 would not be included. It is believed that any adjustment not included would be immaterial to the final outcome given the margin of error included in the final cost figures.

In order to facilitate fair comparison with the private sample bids, which were made for fiscal year 1991 or 1992, the state's costs were inflated by 5%.

Figure 5

COLDWATER PRODUCTION CYCLE

Year-Round



Direct costs and administrative overhead were included in the final cost figures. Administrative costs by definition support multiple programs and activities. It was necessary to make allocations of joint costs. Allocations were based on interviews with DNR personnel, nonfiscal information and the professional judgements of the study team. Every attempt was made to obtain fair and reasonable allocations. To allow for differences in opinion and the subjective element in cost allocations, a 5% margin of variance was built in to the cost model.

Other elements of cost determination, such as land, capital equipment and buildings (the depreciation factor), were more problematic. The State of Minnesota does not account for capital investments in the same way that a private business accounts for such items. In addition, capital investments (land acquisition and buildings) are sometimes made for public policy reasons not directly related to production needs. There was no practical way to separate and develop actual cost information related to capital expenditures.

Due to this lack of information on facilities cost, it was necessary for the study team to assume an additional cost factor. The cost model includes an additional 15% as a contribution to facilities cost which is consistent with a normal and reasonable rate that might be included in a traditional business setting. This contribution to facilities cost has two elements: 1) cost of capital (interest rate on debt or a rate of return on investment) and 2) facilities replacement charge (the depreciation factor). Ten percent was subjectively determined to be a fair cost factor to provide a rate of return on capital or investment, and five percent was included to cover amortization of the cost of facilities. Together these two elements represent the study team's estimation of the fish rearing program's contribution to facilities cost.

A summary of the cost build-up is as follows:

Direct costs	XX
Administrative allocation	XX
Total before facilities, variance and inflation	XX
Facilities cost:	
Return on investment 10%	XX
Amortization of original cost 5%	XX
Variance for allocations 5%	XX
Inflation factor 5%	XX
Total costs	XX

The reason for this treatment of facilities' costs is one seen commonly in studies of this type: the study concerns the best way to raise the next fish needed for stocking. For this purpose, capital expenditures are sunk costs; focus is properly placed on direct costs, particularly direct variable costs. Were the state to consider building a new hatchery, however, the actual capital expenses would be most relevant and would have to be included in any analysis or cost comparison. This point and others appear in Artifically Propagated Fish for Wildlife for National Fishery Programs; A Report to Congress. (Washington, DC: U.S. Fish and Wildlife Service, January, 1986.)

Labor expenses accounted for the majority of the public direct costs. Whenever possible, personnel costs were related directly to fish species and stages of growth. Additional costs related directly to production were included, such as the services of the DNR operations manager, pathologist and engineers.

Central administrative costs were allocated to all facilities on the basis of their administrative costs for FY'89. All costs were assigned to production–related or non–production–related categories before assignment to particular species and sizes of fish.

When costs were not coded by species and size, as was true for the coldwater species, the proportion (by weight) that each species represented at a given hatchery was applied to the costs. For example, if rainbow trout constituted 50% of a hatchery's production, then 50% of its "coldwater rearing" costs would be applied to rainbow trout. Then the relative weights of fingerlings and yearlings produced would be used to determine the final products' shares of that cost.

3. Production Numbers

This section describes the method used to find the denominator of the cost per fish fraction: the number of fish produced. Once that unit cost was determined, the result was multiplied by the lot size stated in the sample contract for each sample.

For the purposes of this analysis, a fish "produced" was defined as a fish "harvested" at a warmwater facility or "released by transfer" at a coldwater hatchery. As stated above, the costs of transferring and stocking were not included in either the public costs or the private bids.

All fish meeting the product specifications were counted, including a very few raised in rearing ponds managed cooperatively by the state and private lake associations and game clubs. (This latter inclusion had little effect, if any, on the findings of the study.)

Appendix II sets forth the results of this analysis. For each species, we state a cost per fish and a cost per lot.

4. Other States' Public Costs

In order to check the reasonableness of the final DNR cost figures, the study team obtained information from several other states involved in fish–rearing (see Appendix III). Generally, Minnesota's costs are within the range of these figures and are often somewhat below the average of these states.

Minnesota's costs are from 10% – 90% higher than the average for pure and tiger muskie, brown trout fingerlings, brook trout yearlings and rainbow trout yearlings and from 4% – 80% lower for the other products. Walleye costs in Minnesota are about 36% below the average.

The DNR cost analysis indicated strongly that there are economies of scale in fish–rearing. The study team feels it quite likely that these lower costs are due to higher volume of fish produced particularly the walleye, Minnesota's state fish.

C. Cost Determination: Private

To obtain information on the prices DNR would pay to buy fish from the private sector, twenty–five private fish growers were invited to submit sample contracts.

The rationale for this process was based on three considerations, as follows.

1. The selling prices established by private fish producers are the most relevant figures to be considered for comparative purposes. This selling price represents the cost to the DNR of purchasing any fish from the private sector, whether to supplement or replace state production, and thus it is the proper figure to compare to the DNR's actual fish production costs.

2. The sample contract process is forward-looking; it provides the information the private growers need to determine their ability to produce the specified fish for delivery on the specified dates. It does not look back at price lists for products that might not have met the DNR's requirements. The process allows private growers to factor in any necessary changes in facilities or technologies, which are then reflected in the prices.

3. Finally, the bid process allows the study team to present an average of several prices from different growers. Use of this average and the range of all bids is helpful in the cost comparison: it decreases reliance on any one grower's sample price. It also provides a gauge of the relative interest in the various products, which is a measure of the potential competitive environment in which increased privatization might occur.

Thirteen growers responded to the sample request for bids, a 52% response rate. The growers stated the prices they would charge for the fourteen specified products if they entered into an agreement with the DNR in 1991 or 1992. Because the sample contracts are nonbinding, they should be viewed as providing only a general indication of the prices that might be offered to the state.

Ten growers submitted bids on walleye fingerlings, four on muskellunge fingerlings and either one or two for each trout and salmon product. This response reflects both the popularity of the two warmwater species as well as the greater technological requirements of coldwater fish production.

Appendix IV summarizes information from the sample contracts submitted by private growers. For comparative purposes, information on current walleye and muskellunge prices offered by several Minnesota private growers is also presented. These prices are for products that may not meet the DNR's specifications, however; the study team has therefore drawn no conclusions based on these figures.

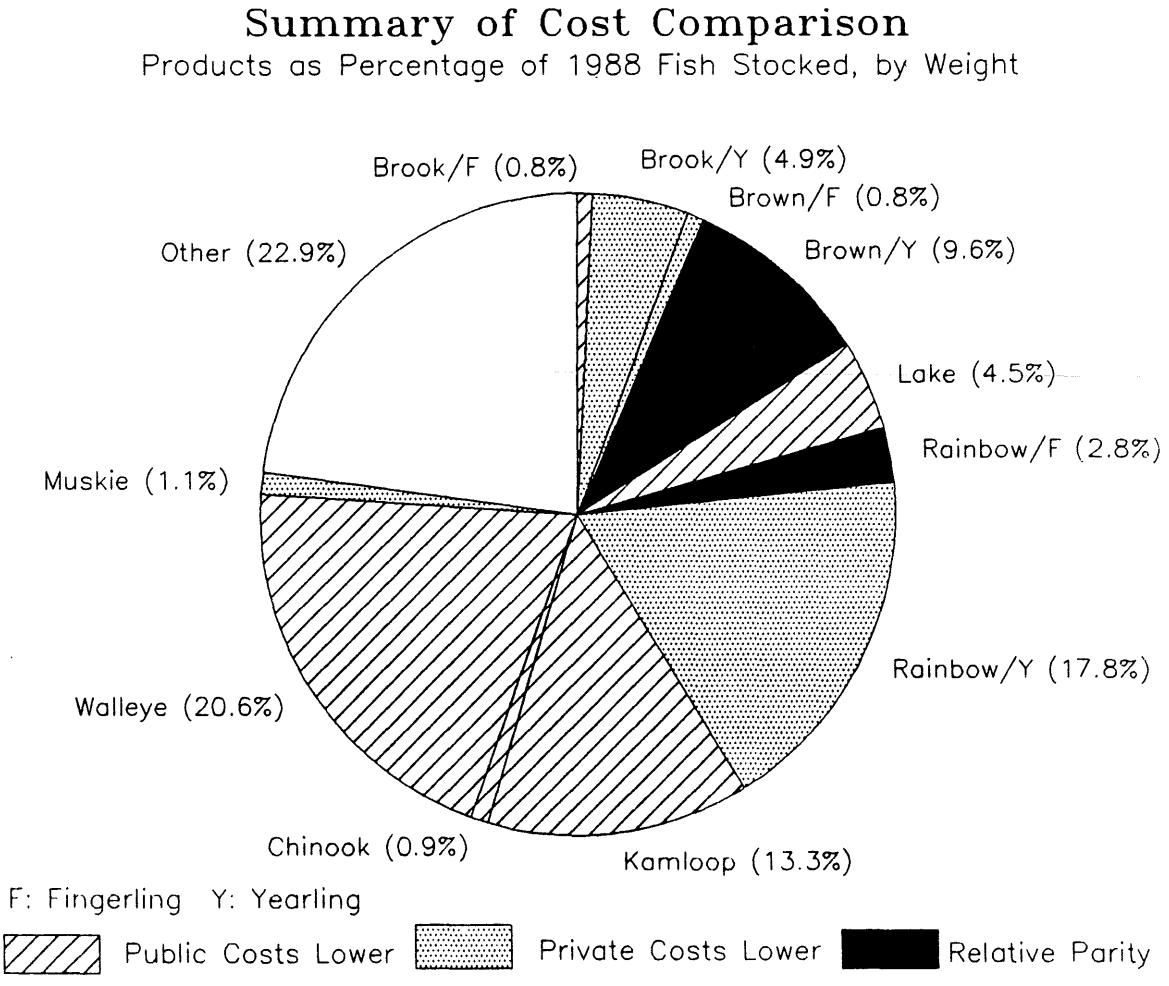
The study team discussed the issue of the state sales tax with DNR employees and private growers. The DNR currently pays a 6% tax on fish products it obtains from private suppliers and would do so upon entering into contracts such as those utilized in this study. DNR Fisheries managers necessarily consider the tax a cost when making budgetary decisions and for this reason felt that the private growers' sample contract prices should be increased by six percent.

The private growers felt that the tax does not represent a true additional cost to the taxpayer and thus should not be added to their sample contract prices.

Figure 6A

COST COMPARISON: SUMMARY

Public Costs Lower	Private Costs Lower	Relative Parity	Not Included in Study
Walleye	Muskellunge	Brown Trout Yearling	All Other Species
Brook Trout Fingerling	Brook Trout Yearling	Rainbow Trout Fingerling	
Lake Trout	Brown Trout Fingerling		
Kamloop Rainbow Trout	Rainbow Trout Yearling		
Chinook Salmon			
40.1% of 1988 fish stocked (by weight)	24.6%	12.4%	22.9%



This report presents the private growers' prices with the 6% tax added, while acknowledging the growers' concern. The study team has determined that the study's findings would not change significantly if the tax were excluded.

Appendix V sets forth the comments of six growers regarding the bid process and the contracts themselves. Particular concern was expressed over a high bonding requirement — potentially prohibitive to many growers. DNR management expressed a willingness to require a more reasonable level of bonding should it enter into binding contracts in the future. Other comments address fingerling size specifications, delivery dates and lot sizes (particularly for muskie).

III. FINDINGS

A. Cost/Price Comparison

The main findings of the cost comparison are summarized in Figure 6A.

The products for which the DNR's costs are lower than private prices represented 40.1% by weight of the fish stocked in Minnesota in 1988. Those products for which the private growers' prices are lower than the DNR costs represented 24.6%, and those for which there is relative parity represented 12.4%.

Figures 6B and 6C present the averages and ranges of the public costs and private prices as determined by the methods described in Section II.

The findings suggest there may be some opportunities for private purchase arrangements in the future, but the following cost factors should be considered:

- Volume and Fixed Cost Relationships

  Certain costs currently incurred by the DNR hatchery production process are fixed. Items such as administrative salaries and certain types of overhead do not vary with changes in volume. As volume of production increases, some costs remain constant and unit cost decreases. Conversely, as volume decreases cost per unit of production increases. If the DNR is producing below full capacity, increased private grower purchases may increase unit costs for the DNR.

- Transportation and Other Costs

  Decisions to enter into private purchase agreements may be influenced by other cost considerations such as the following:

  - Transportation

    There may be instances where savings in transportation costs result in a better value from private growers.

  - Alternative Sources

    It may be a wise investment to purchase from private growers to assure an alternative source to meet specials needs for new strains or programs.

B. Demand for Products

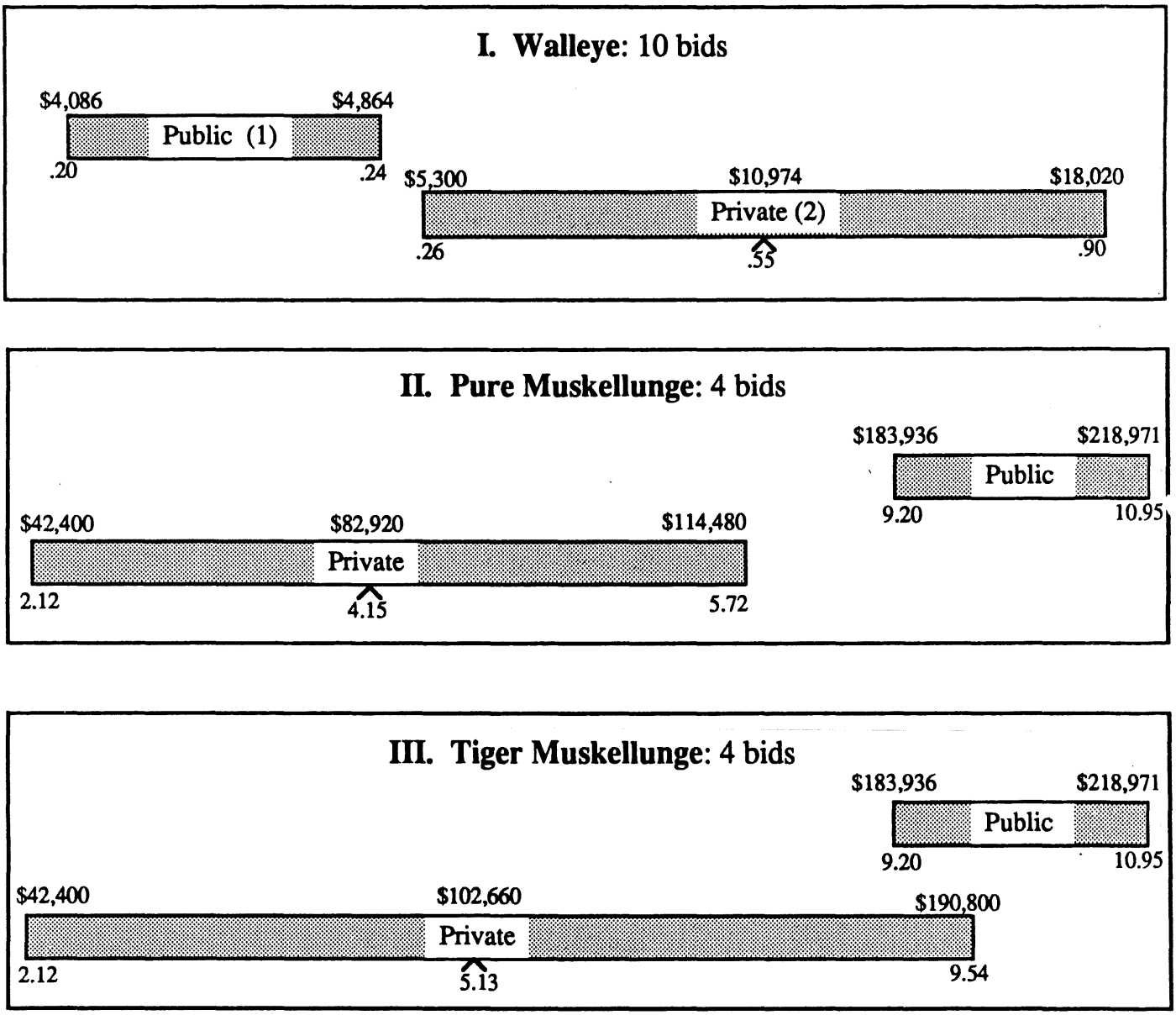
In conducting the cost comparison study, the study team found great concern and disagreement between DNR employees and private growers regarding public demand for certain species of fish, particularly walleye. DNR employees stated that stocking has reached its highest biologically sustainable levels.

Figure 6B

COST COMPARISON

Warmwater Fish Species

Costs above the bar are per lot of fish (10,000 - 100,000 fish per lot, depending on species and size).
Costs below the bar are per fish.



(1) This range represents a point estimate, derived from analysis of DNR data, plus a margin to allow for facilities contribution, allocation variance and inflation. See Appendix II for detailed cost data.

(2) Private growers submitted sample prices for each species. States sales tax of 6% has been added to the bid prices. High and low prices appear here with the weighted average of all bids. See Appendix IV for additional information.

Figure 6C

COST COMPARISON

Coldwater Fish Species

Costs above the bar are per lot of fish (10,000 - 100,000 fish per lot, depending on species and size).
Costs below the bar are per fish.

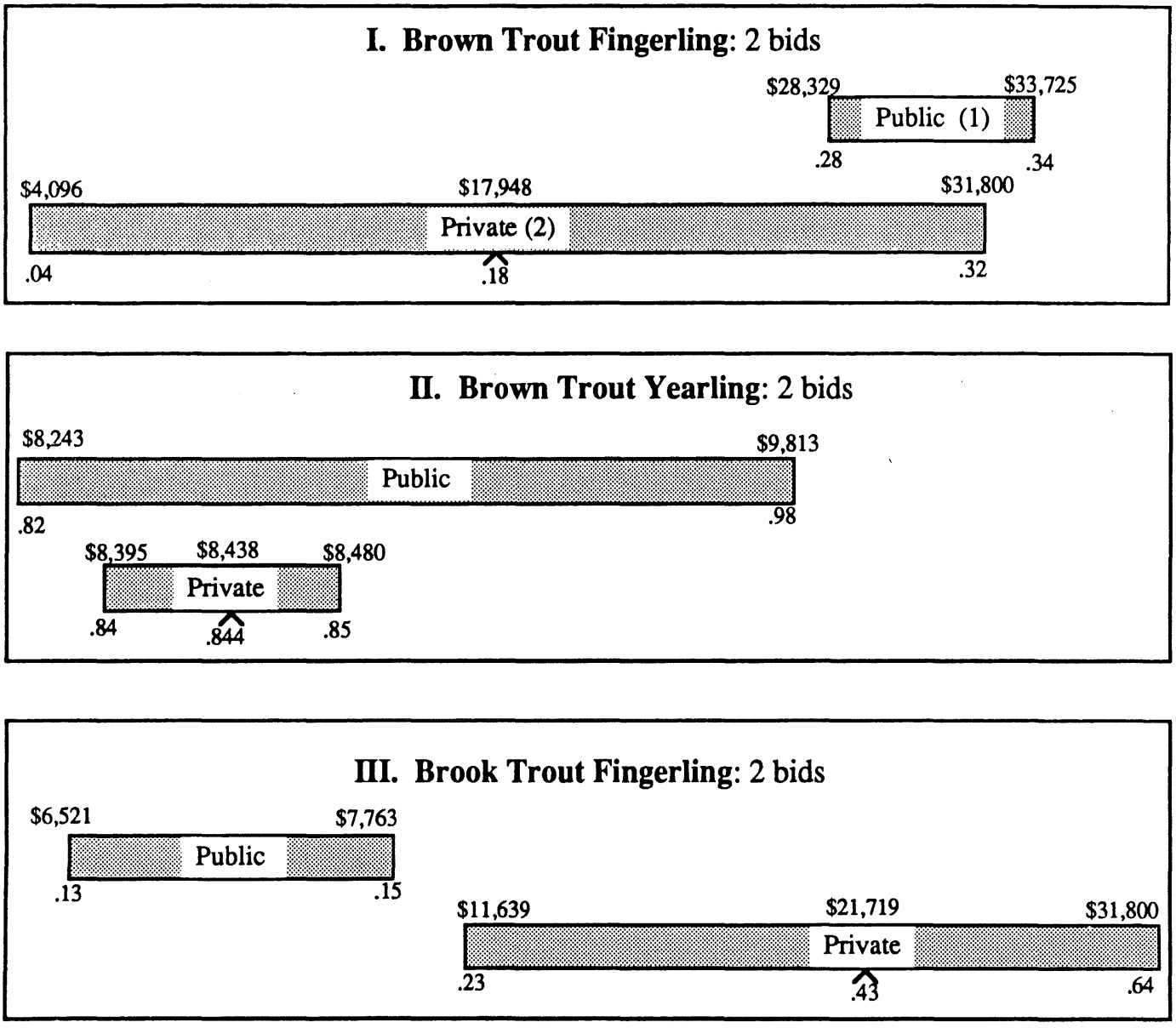


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Figure 6C

COST COMPARISON

Coldwater Fish Species

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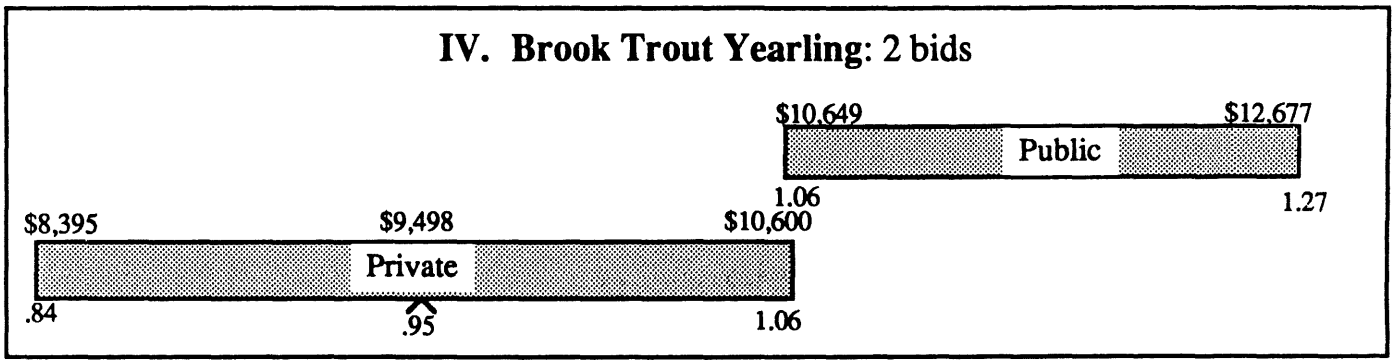

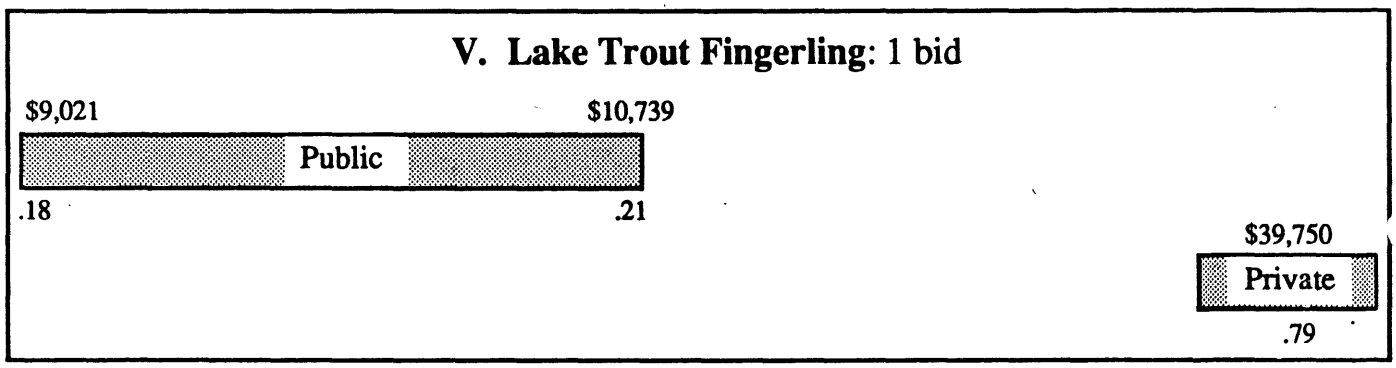

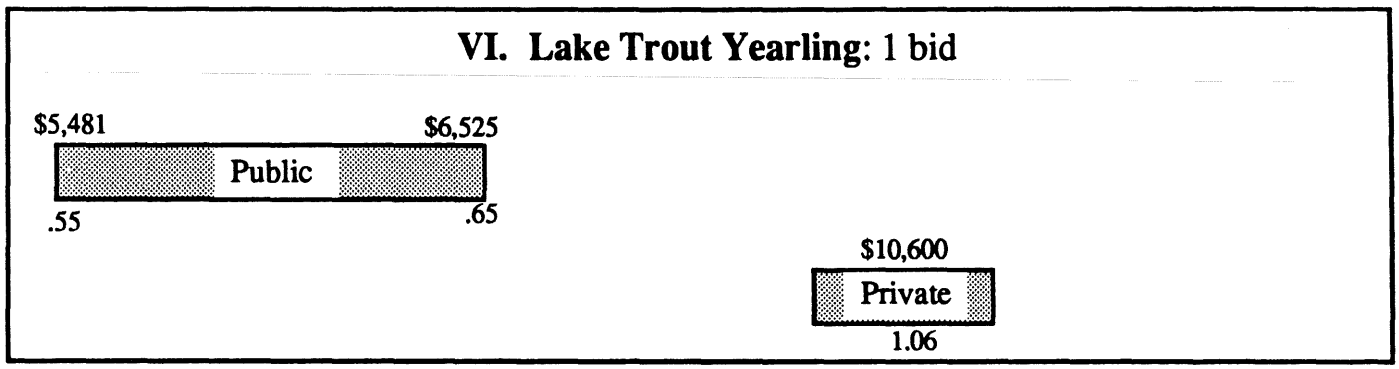

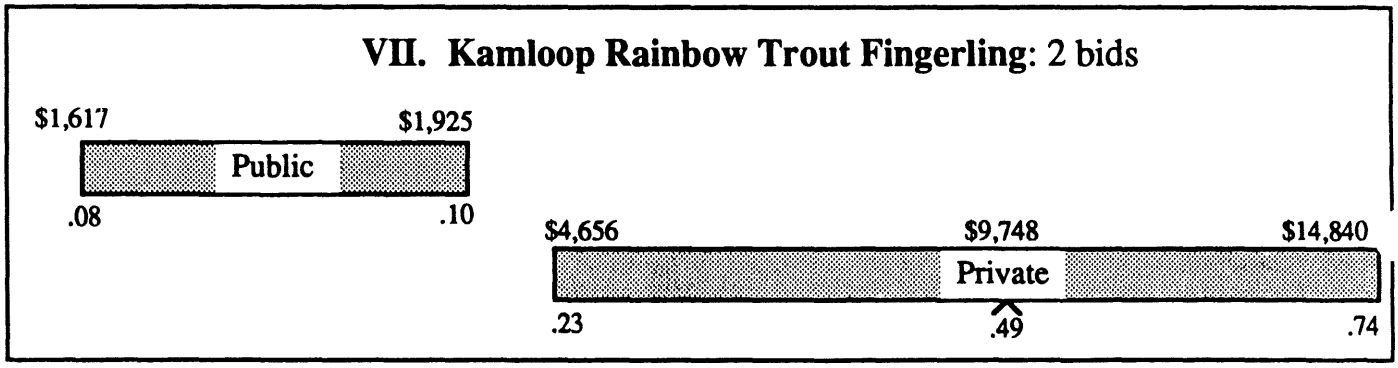

Figure 6C

COST COMPARISON

Coldwater Fish Species

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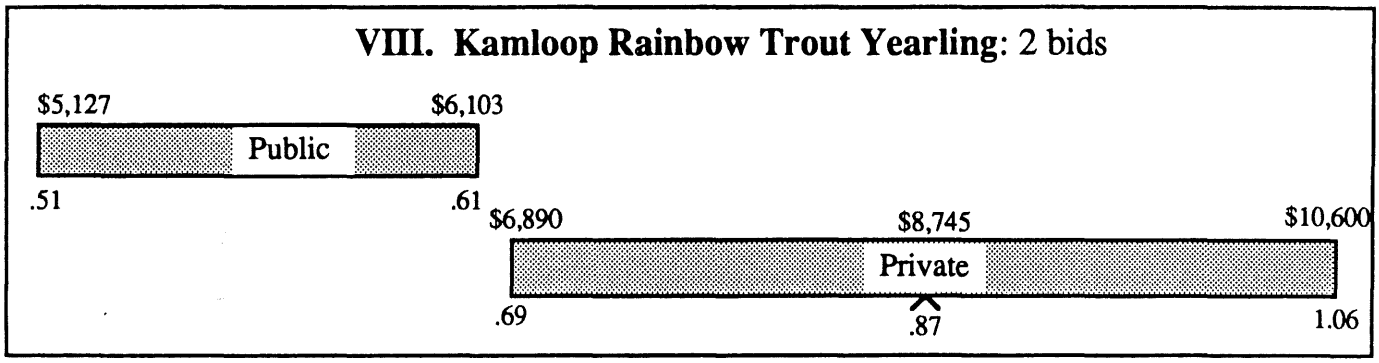
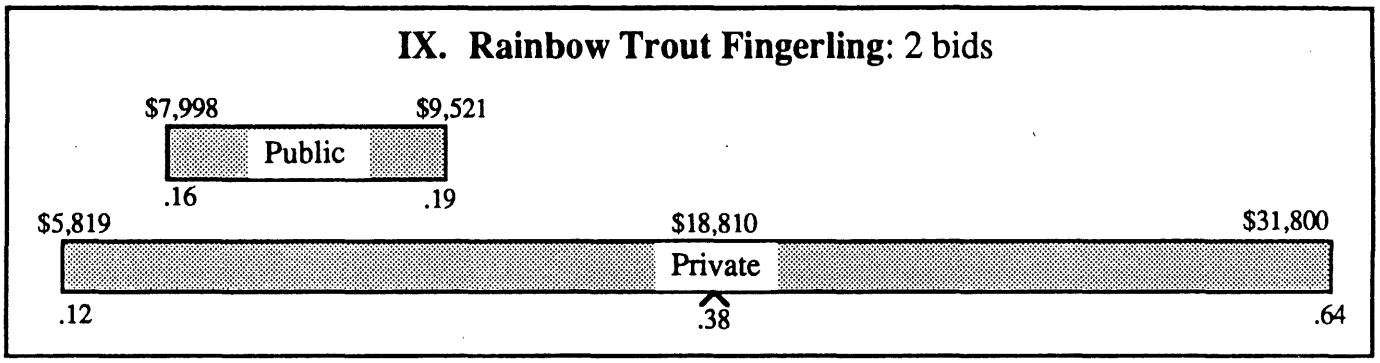
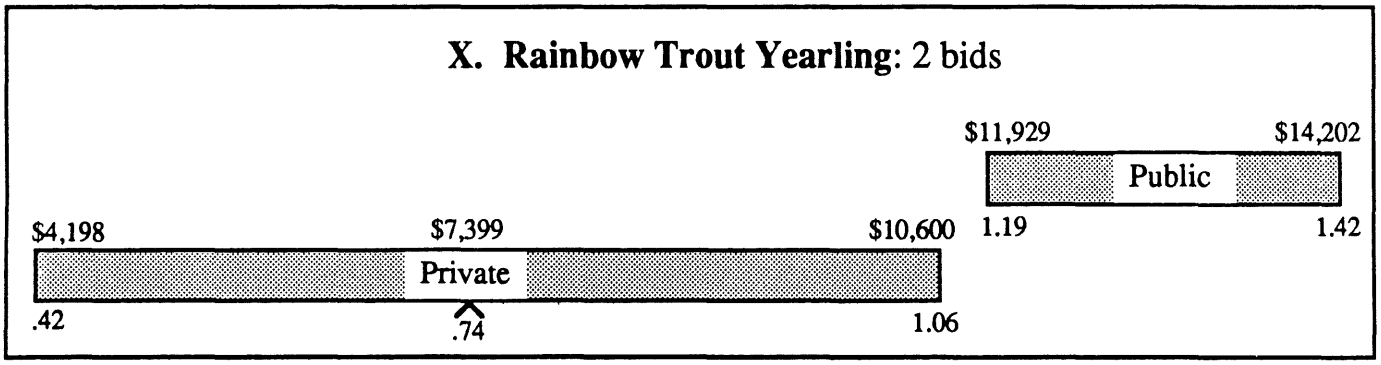






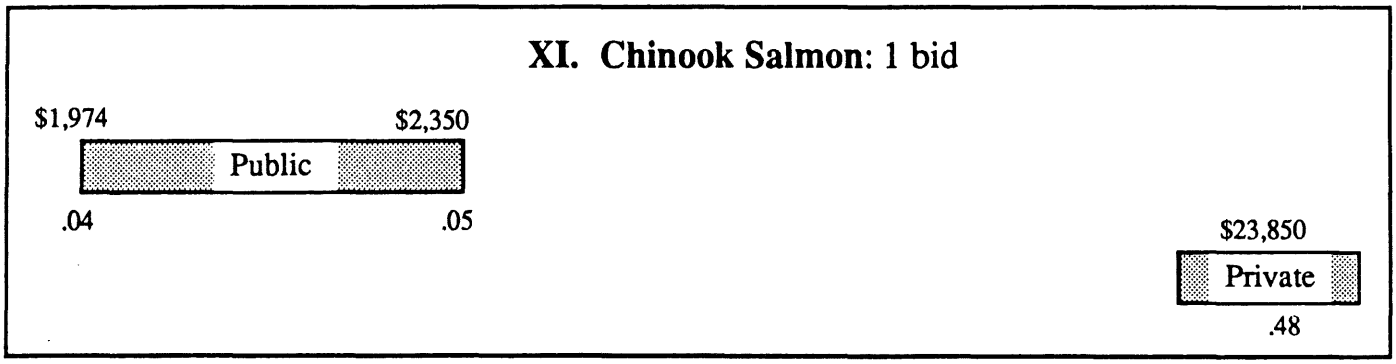


Table 1. Summary of Telephone Survey of North-Central States' Contracting History with the Private Aquaculture Industry

State	Previous Contracts	No. of Contracts per Year	Species/Age Contract for	Size of contracts Number of Fish Costs	Program Success	Comments
Illinois	Yes	As needed	Coho and chinook salmon smolts. 4" catfish fingerlings. Forage fish contracted on an ongoing basis.	200,000 - 300,000 Pacific salmon five years ago. Several hundred thousand catfish. Thousand of pounds of forage fish per year to feed hatchery smallmouth and largemouth bass.	Moderate (some incidence of disease in some fish)	• Illinois has now built a hatchery to produce enough Pacific salmon for their needs. • Illinois is still buying forage fish, catfish and other game fish on a regular contract basis.
Indiana	Yes	As needed	Adult grass carp. Northern Pike up to 8". Catfish fingerlings	Variable size contracts. Few carp for research needs. Many catfish and pike for supplementation.	High	• Indiana would like to contract for year-round production from private growers. • Growers cannot yet produce year-round supplies.
Iowa	No					• Iowa feels that private growers cannot produce quantity and quality of fish needed using current technology (i.e., farm ponds)
Michigan	No					• Michigan requires genetically select strains of fish that private growers cannot produce at competitive prices because of high overhead.
Missouri	Yes	As needed	Adult channel catfish, bullheads and carp. Hybrid adult catfish and fingerlings.	Adult fish are for urban lake stocking programs, which are ongoing. Catfish fingerlings are used for lake stocking.	High	• Missouri is planning to continue all purchasing programs in the future.
North Dakota	Yes	As needed	Walleye fingerlings	Costs - walleye $1.46/lb of fish of any size, labor included. Trout $0.32 to $0.33 lb of fish of any size, labor not included.	High	• North Dakota is in the process of studying feasibility of private growers supplementing state needs. • State would definitely consider buying from private growers if fish are needed.
Ohio	No					• No feasibility study conducted. • Ohio can produce fish for own needs
South Dakota	Yes	As needed	Walleye fingerlings	State produces eggs. Private farmers produce fingerlings. State gets percentage of fingerlings produced.	High	• South Dakota is very interested in continuing contracts but private growers have not offered their products for sale.
Wisconsin	Yes	As needed	Rainbow trout yearlings. Walleye fingerlings.	Many rainbow trout only in mid 1970's. State provides walleye fry to private growers for growout to fingerling. State gets guaranteed percentage back.	Low(trout) High(wall.)	• Wisconsin is in the process of studying feasibility of private growers supplementing state needs • State Aquaculture Advisory Council is highly recommending program.

An important aspect of the demand for products issue is the role of the DNR management planning process. Hatchery production levels are determined by the collective resource management plans determined by DNR units other than hatcheries. Hatcheries management responds to the requests furnished to them. Current production levels are below maximum hatcheries capacity. If future changes in demand for volume or species require different production facilities, a make–or–buy analysis should be prepared.

C. Other States' Experience with Contracting

The study team surveyed staff members of other states' departments of natural resources to gather information on their experiences in contracting with private fish growers. The result of this survey appear in Table 1 with supporting detail in Appendix VI.

Several states have adequate resources and facilities to meet management plan requirements, while others utilize contracts to supplement the states' fish production. It seems likely that the experience of some of these states, particularly Wisconsin, South Dakota and North Dakota, could prove helpful to Minnesota policy–makers. It appears that in other states, private growers are utilized to supplement, not to replace, state production.

The supervisor of Wisconsin's hatcheries believes that a successful contract program with private growers requires these conditions:

- The state is able to provide specific strains of fish to the private growers;
- The private growers can provide fish of necessary sizes at specified times of the year so that private production is integrated into the public stocking program;
- The private growers can provide high–quality, healthy fish; and
- The private growers can guarantee steady, long–term production.

Wisconsin currently has a relatively successful contracting program for walleye fingerling production.

IV. OTHER ISSUES

A. Facilities/Technology

A representative of Fish Pro, Inc. toured three public and four private fish rearing facilities to gather information on the difference in rearing technologies. During each site visit, operators and managers discussed facility operations and conditions, production capacity, program goals and overall success. More specific issues, such as nursery pond availability, water quality, disease and costs, were also addressed as they arose during the facility tours. A concerted effort was made to examine a representative group of both public and private facilities within this limited survey.

Both facility types use similar hatching and rearing methods. Most hatcheries are able to control water temperatures and treat incoming water (e.g.; iron, filters, UV disinfection). Jar incubation is used for walleye, muskie and muskie crosses and forage fish (suckers, etc.). Heath trays are used to incubate and hatch salmonids (coldwater species). The subsequent fry are moved to various sizes of raceways where they are started on feed and reared.

Private farmers seem to prefer to use raceway-type rearing units for salmonids, but if water or space is a limiting factor, they will use circular ponds. Private walleye hatcheries produce advanced fry and fingerlings before stocking them into large growout ponds, usually 5-100 acres in size. The private warmwater hatcheries surveyed employ intensive pond-management practices to produce walleye, muskie and other species. These practices include winter pond aeration, water reuse, algae and week control, forage fish stocking, pond fertilization and frequent pond sampling to monitor growth and survival rates.

The public warmwater facilities surveyed focus on producing advanced fry for stocking into "wild" nursery ponds. After hatching, muskie fry are fed for a short period of time, then fry are released into nursery ponds for natural rearing. These ponds are not typically managed or monitored regularly. After the necessary growing period, the state returns to harvest the natural ponds for whatever fingerling production was achieved.

Some public warmwater facilities have intensively managed ponds, but these were few in comparison to the private sector. The state finds it more cost-effective to rely on natural conditions in the growout ponds.

Public and private hatcheries use similar fish diets. Muskie are first fed on plankton and brine shrimp or sometimes moist or semi-moist commercial feeds. Private producers stock sucker and fathead minnow fry to fish in growout ponds. The state finds it more cost-effective not to stock forage fish in the growout ponds, except for muskie. Salmonids are first fed a commercial moist or semi-moist starter, then a commercial pellet feed for growout. Feeding by hand is the preferred method in both sectors, with occasional supplemental use of timed automatic or demand feeders. Rearing criteria related to product quality, such as densities, flows and oxygen content, are similar to each facility type.

Table 2A

PUBLIC FACILITIES: WARMWATER

Area/Location	Year Established	Number of Personnel in Production* Year Round Ft	Year Round Pt	Seasonal Ft	Seasonal Pt	1989 Top Species/Volume #1	Volume**	#2	Volume	1988/89 Diseases
Park Rapids	1924		4		6	Walleye	7,087,000	Muskie	212,000	Internal parasite infection in muskies, Fungal infection in walleye & muskies
Brainerd	1928	8		3		Walleye	46,498,200	White Sucker	16 qts.	Light fungus on eggs annually, successfully treated
Ely	1900 (Present hatchery 1971)			4	9	Walleye	103,871,000			None
Grand Rapids	1925		6	8		Walleye	572 qts. of eggs			Fungus on eggs
Detroit Lakes	1918	6		2	3	Walleye	21,460 lbs.			None
Hinckley	1975			7		Walleye	7,110 lbs.	Muskie	830 lbs.	None
Dead River	1972	4		10		Walleye	42,686,000			None

* Full-time DNR personnel have duties in addition to their fish production duties.
** In number of fish unless otherwise noted

Table 2B

PUBLIC FACILITIES: COLDWATER

Area/Location	Year Established	Number of Personnel in Production Year Round Ft	Year Round Pt	Seasonal Ft	Seasonal Pt	1989 Top Species/Volume #1	Volume*	#2	Volume	1988/89 Diseases
Lanesboro	1925	6		1	1	Rainbow	81,942 lbs	Brown	26,200 lbs	Bacterial Kidney Disease
Spire Valley	1968	1	2			Brook	12,000 lbs	Lake	7,500 lbs	None
Crystal Springs	1938	3	2			Lake	810,000	Splake	224,000	None
St. Paul	1890	1	3			At. Salmon	8,247 lbs			None
French River	1976	3	4			Kamloop	62,294 lbs	Chinook	5,642 lbs	Fin rot, Bacterial gill disease, Parasites: Epistylus, Gyrodactylus, Trichodina Ichthyopthirius
Peterson	1988	1	3			At. Salmon	65,000	Lake	58,000	None
	AVERAGE	3.3	4	5.8	3.8					

* In number of fish unless otherwise noted

Minimal chemical therapeutants are used in either public or private facilities. Formalin is used extensively to eliminate fungal growth on eggs. Most public facilities have small on-site labs where they can perform preliminary pathological examinations on fish and some water quality testing. They also utilize the services of the state fisheries pathologist. Through the sample contract process, private growers interested in producing fish for the state have agreed to obtain a fish health inspection by an AFS-certified fish health inspector or the state fisheries pathologist in order to meet disease control requirements.

B. Fish Health and Quality

From a technical standpoint, both the public and private sectors are capable of producing healthy and high-quality product for stocking into Minnesota waters.

Information reported on recent disease outbreaks appears in Tables 2A, 2B and 3.

C. Personnel Qualifications

Fourteen public and thirteen private facilities reported educational background and experience of hatchery personnel (see Tables 4A., 4B., and 5 for detail). This included 57 public employees and 32 private employees.

Seventy-six percent of the state employees polled had some kind of secondary training. Twenty-four percent had a B.S. or an M.S. specifically in Fisheries. The average length of experience in aquaculture was 9.2 years, with twelve percent at twenty or more years. Forty-one percent of the personnel polled had professional affiliations, mostly with the American Fisheries Society.

Forty-five percent of the personnel at private facilities had some relevant post-secondary training. Only seven percent of that was specific to fisheries. The average length of experience in aquaculture was 8.1 years, with six percent at twenty years or more. Twenty-four percent of the personnel polled at private facilities were members of the American Fisheries Society, and another 42% had other professional affiliations. Some of these included Minnesota Fish Farmers Association and Native American Wildlife Society.

The study team found no evidence of deficiencies in the training or skills of public or private personnel.

D. Other Hatchery Functions

DNR hatchery personnel are involved in functions other than fish production, including hatchery tours and exhibits at state and local fairs. The costs and benefits of these activities are not included in DNR production costs because an assumption underlying much of the study was that the state would maintain its current facilities in order to provide some stability to the fish production program and to guarantee the acceptability of the eggs available to private growers. It is believed that educational activities would be continued as part of the DNR's responsibility to citizens.

Table 3

PRIVATE FACILITIES

Area/Location	Year Established	Number of Personnel In Production: Year Round Ft	Year Round Pt	Seasonal Ft	Seasonal Pt	1989 Top Species/Volume: #1	Volume*	#2	Volume	1988/89 Diseases
A	1972	1		3		Fathead	20,000 lbs.	Wh. Sucker	8,000 lbs.	None
B	1987	1	1	1		Muskies	8,500 lbs.	Tiger Muskie	2,500 lbs.	None
C	1988					Walleye		Muskie		None
D	1987	1		3	5	Walleye	366,600			None
E	1985	3			2	Walleye	100,000	Crappie	15,000	None
F	1988	4		2	1	Walleye	260,000	Perch	85,000	None
G	1984	5		6		Whitefish	160,000	Wh. Sucker	220 qts.	Gas bubble disease & bacterial gill disease
H	1985			1		Walleye	60,000	Bl. Crappie	500	None
I	1979	2	2			Rainbow				Air bubble disease
J	1986		1			Walleye	20,000			None
K	1984	2	1	1	3	Walleye	700,000	N. Pike	60,000	
L	1985	1			2	Walleye				
M	1958	1	3			Rainbow	14,000 lbs.	Brook	4,000 lbs.	
	AVERAGE	2.1	1.6	2.4	2.6					

*In number of fish unless otherwise noted.

Table 4A

PUBLIC PERSONNEL: WARMWATER

Area/Location	Title	Years Aquaculture Experience	Years with MN DNR	Relevant Post-Secondary Education	Professional Affiliations	Relevant Experience
Park Rapids	Asst Area Mgr.	19	20			
	Area Mgr.	7	25	B.S. Biology	AFS	
	Gen. Labor - Seasonal	10	10			
	Gen. Labor - Seasonal	8	8			Resort Operator
	Gen. Labor - Seasonal	2	2			Worked as laborer in trout hatchery in Iowa
	Gen. Labor - Seasonal	6	7			Bait dealer - wholesale
Brainerd	Asst Area Supervisor	10	11	B.S. Fisheries Mgt.	AFS	10 yrs experience in walleye pond operations & 2 yrs as hatchery supervisor
	NR Technician	17	17	Nat'l Res. Technology, vocational degree		15 yrs. hatchery experience at Brainerd
	NR Technician	36	36			Lanesboro trout hatchery, Brainerd walleye hatchery
Ely	NR Specialist	14	14	Nat'l Res. Technology, voc. degree	AFS	MN DNR Waterville Area Fisheries
	Asst Supervisor	6	10	B.S. Fisheries Mgt.	AFS	U of M lab technician rearing test organisms for aquatic toxity testing
	NR Specialist	5	10	B.S. Aquatic Biology	AFS	
Grand Rapids	Specialist	5	10	B.S. Aquatic Biology	AFS	
Hinckley	NR Technician	2.5	5	B.A. Environmental Biology	AFS	
	NR Specialist	1	1.5	B.A. Zoology/M.A. Biology		University research assistant; DNR wildlife - Game lake surveys
	Area Supervisor	28	29			
	NR Specialist	27	27			
Detroit Lakes	Area Supervisor	22	25	B.A. Fish and Wildlife		
	Area Assistant	11	11	B.A. Biology		
	NR Technician	9	9	B.A. Biology		
Grand Marais	Work Crew Leader	3	11	B.S. Fisheries	AFS	DNR walleye pond management 10 yrs.
	NR Specialist	0.5	0.5	B.S. Biology, pursuing M.S. in Natural Resources (fisheries)	AFS	

Table 4A continued

PUBLIC PERSONNEL: WARMWATER

Area/Location	Title	Years Aquaculture Experience	Years with MN DNR	Relevant Post-Secondary Education	Professional Affiliations	Relevant Experience
St. Paul	Asst Supervisor	2	12	B.S. Aquatic Biology; USFWS coldwater course		
	Area Supervisor	15	15	B.A. Biology, 1 yr Masters Fish Mgmt	AFS	Fisheries Specialist and Technician
	NR Specialist			B.A. Biology	AFS	Fisheries Technician
	NR Technician	0.5	0.5	B.S. Fisheries	AFS	2 yrs. NSP working on larval fish study
	NR Specialist	21	8	M.S. Fisheries	AFS	U of MN - Fisheries Dept.: aquaculture operation Aquaculture experiments on feeding, disease control
	NR Technician	2	18	B.S. Fish Mgmt		U of MN student worker, fisheries bio lab
	Intern	0	0.5	A.A.S. Nat'l Resource Mgmt - currently pursuing		
Fergus Falls	Asst Area Manager	4	4	M.S. Fisheries Biology	AFS	
	NR Specialist	2	6	B.S. Biology (Fish emphasis)	AFS	
	NR Technician	18	18	Nat'l Res Science 2 yr degree	MN Fish & Wildlife Employees Assn	
	Area Supervisor	36	36		MN Fish & Wildlife Employees Assn	
	NR Technician	35	35		MN Fish & Wildlife Employees Assn	

Table 4B

PUBLIC PERSONNEL: COLDWATER

Area/Location	Title	Years Aquaculture Experience	Years with MN DNR	Relevant Post-Secondary Education	Professional Affiliations	Relevant Experience
Lanesboro	Asst. Supervisor	12.5	14	Nat'l Res. Technology, vocational degree Fish & Wildlife Mgt.		Natural Resources Specialist Intermediate
	NR Technician	0	2	Nat'l Res. Technology, vocational degree B.S. Aquatic Biology		
	NR Specialist	5.5	8.5	B.S. Fisheries	AFS	Wisconsin DNR - 3 yrs. stream/lake surveys MN DNR Lake City - Creel survey work
	Hatchery Supervisor	15	10	M.S. Fisheries Mgmt.	AFS	Hagen Western Fisheries Consultant - Hatchery Manager
Spire Valley	NR Specialist	1	3			Technician, Crystal Springs
	NR Technician	0	0.5			Wisconsin DNR 9 yrs. - Field Tech Fisheries
	Hatchery Supervisor	15	15	B.S. Fish Mgmt., 2 yrs Grad Statistics		Supervisor, St. Paul Hatchery 13 yrs.
Crystal Springs	NR Specialist	2	4	B.S. near completion in Fisheries Mgmt.		DNR Pathologist asst., hatchery fish health inspections
	NR Technician	0.5	2	B.A. Biology	AFS, MN Fish & Wildlife Employees Association	
	NR Technician	3	15	B.F.A., USFWS courses in Fish Health and Coldwater fish culture	AFSCME, Council 6	
	Hatchery Supervisor	19	19	2 yr degree, Fisheries, Forestry and Conservation; USFWS course on Fish health and coldwater culture		
French River	Repair Worker		32			Fish rescue, lake survey, population research walleye trout stripping, pond work, mapping, carpentering; plumbing, electrical & mechanical
	Secretary	5	15	Secretarial degree		Light hatchery duties, public relations & clerical
	NR Technician	2	6	B.A. Biology		Fisheries creel census worker 2 yrs. with intensive hatchery culture
	NR Technician	6	8	B.A. General Biology		U of M Duluth - leech rearing project; DNR fisheries - lake survey , creel census
	NR Technician	2.5	2.5	M.S. - Wildlife & Fisheries Sciences, B.S. Zoology (Fisheries Option)	AFS	USDWS: Bio Technician, 1.5 yrs. S. Dakota State University, 3 yrs.;N. Dakota game and Fish Dept, 4 summers,; teaching assistant-invertebrate zoology lab
	Asst Mgr.	13	17	M.S. Fisheries, B.S. Fisheries		

Table 4B continued

PUBLIC PERSONNEL: COLDWATER

Area/Location	Title	Years Aquaculture Experience	Years with MN DNR	Relevant Post-Secondary Education	Professional Affiliations	Relevant Experience
French River	Coldwater Supervisor	18	16	B.S. Fisheries Mgmt.	AFS	Ontario Ministry of Nat'l Resources - lake survey, tagging operation; Peace Corps - Mariculture projects in Palau
Peterson	Hatchery Supervisor	11	2	B.S. Biology; supplemental courses in fisheries mgmt., fish culture, broodstock & genetics	AFS	USFWS; S. Dakota Game Fish & Parks - McNenny State Fish Hatchery 5 yrs.
	NR Specialist	1.5	2.5	B.S. Aquatic Biology		2 yr lab asst. U of Wis., aquatic toxicity testing
	NR Technician	0.5	3	B.A. Biology, A.A.S. NR Technology		DNR - laborer: muskie pawning, walley production/distribution; Pop. assessments/ surveys
St. Paul	NR Supervisor	5.5	9	B.S. Fisheries; USFWS courses on Fish Health & Coldwater culture		DNR - NR Technician and assistant hatchery Supervisor
	NR Technician	0.5	6	B.S. Fisheries		USFWS, Marquette MI
	NR Specialist	2	13	NR Technician vocational degree some college coursework		NUS Corp. Pittsburgh, PA power plant site study
	AVERAGE	9.2	11.9			

Table 5

PRIVATE PERSONNEL

Area/ Location	Title	Years Aquaculture Experience	Years with Current Hatchery	Relevant Post-Secondary Education	Professional Affiliations	Relevant Experience
1	Co-Owner	28	28			
	Co-Owner	32	32			
2	Owner	5	5		MFFA	
3	Manager	5	2	B.S. Ed., Major in Biology	AFS, MFFA	3 yrs with MN Power environmental engineer, aide, research technician; research at ND State hatchery
4	Owner/Operator	8	4	Nat'l Resource Technology	MFFA	White Earth Indian Reservation-Fisheries Mgr.
5	Owner	16	8	M.S. Aquatic Biology	AFS, Wisconsin Trout Farm Assoc., MN Trout Farmers Assoc., MN Aquaculture Comm., USTF	FWS, MN DNR, Alaskan College, private business
6	Owner/Manager	7	5	Nat'l Resource Technology	MFFA Society of Nat'l Res. Techs.	MN DNR Fisheries: Lake & Stream surveys, seining of walleyes; White Earth RBC hatchery: walleye spawn taking
7	Fisheries Director	11	3.5	M.S. Animal Ecology	AFS, MFFA, MN Aquaculture Comm.	Private Hatchery 3 yrs as manager, Biologist at a State hatchery in SD; MN DNR 6 mos. laborer at St. Paul hatchery
	Hatchery Manager	6	6	2 yrs. Vocational B.S. in Aquatic Biology	AFS, Native Am. Fish & Wildlife Society	
	Technician	4	4		Inland Commercial Fisherman's Assoc.	
	Technician	5.5	5.5		Native Am. Fish Society, MFFA	
	Technician	6.5	6.5	A.A.S. degree Nat'l Resources	AFS, Native Am. Fish Society, MN Darkhouse & Angling Assoc., MFFA	U.S. FWS: Fish & Wildlife Management; U.S. Forest Service - Wildlife Management
	Fisheries Aide	4	4	Nat'l Resouces Technology	Native Am. Fish Society	
8	Manager	8	3	M.S. Fisheries	AFS	South Dakota DNR
	Foreman	6	3			Two other private fisheries
	Owner	8	3			

Table 5 continued

PRIVATE PERSONNEL

Area/ Location	Title	Years Aquaculture Experience	Years with Current Hatchery	Relevant Post-Secondary Education	Professional Affiliations	Relevant Experience
9	President	6	5	B.A. theoretical math and statistics	MFFA	Fish grower 6 yrs./Primary hatchery operator 5 yrs.
	Vice President	6	5		MFFA Board of Directors	Hatchery pond operations 5 yrs./Business owner and operator 5 yrs.
	Operations Assistant	2	2		MFFA	
10	Dir/Pres./CEO, Walleye Culture	7	3		VP MFFA, MN Aquaculture Advisory Comm., LCMR Advisory Comm., GMC Grant Review Board and ND State U. Masters Degree Review Board	Operation Walleye, Inc., Director; Chair Ed. & Research. V.P. R&D for Magnetronics, Inc.
	Dir/Treas., Walleye Culture	7	3		MFFA	Operation Walleye, Inc. Pond Master and Director
	Dir/Sec., Walleye Culture	3	3	Electronics Controls	MFFA	
	Walleye Culture Specialist	10	1	M.S. Animal Husbandry	12 relevant affiliations	10 yrs. with Fla. Aquaculture Extension
11	Manager	8	3	M.S. Fisheries	AFS	South Dakota DNR
	Foreman	6	3			Two other private fisheries
	Owner	8	3			
12	Worker	4	4		Muskies, Inc., MN Bait Dealers Assoc.	
	Owner/Operator	4	4		Muskies Inc., MN Bait Dealers Assoc.	Resource management of Wetlands, Pond construction
	Worker	4	4			
13	Worker	3	3			Grew up on Fish Farm
	Worker	3	3			Grew up on Fish Farm
	Owner/Manager	18	18		AFS, V.P. MN Bait Dealers Assoc., Secretary/Treas. MN Fish Farmers Assoc.	Self-employed crop & livestock farmer
	AVERAGE	8.1	5.9			

V. RECOMMENDATIONS

Generally, the study team recommends that the DNR explore ways in which the private sector might be utilized to advance the goals of the DNR in meeting resource management requirements. We recommend that private growers be utilized to supplement, not to replace, DNR production. Specific recommendations include:

Recommendation 1: The DNR should maintain control over two critical stages of the fish production process: egg–taking and final stocking into lakes and streams. Should increased privatization take place, the DNR should ensure that adequate eggs are available for sale to the private sector so that contracts may be fulfilled.

This recommendation implies that the state should continue to operate its current facilities. Should DNR management requirements for certain species exceed the state's current capacity, however, we recommend that the state perform a make–or–buy analysis before contracting with private growers or constructing new production facilities.

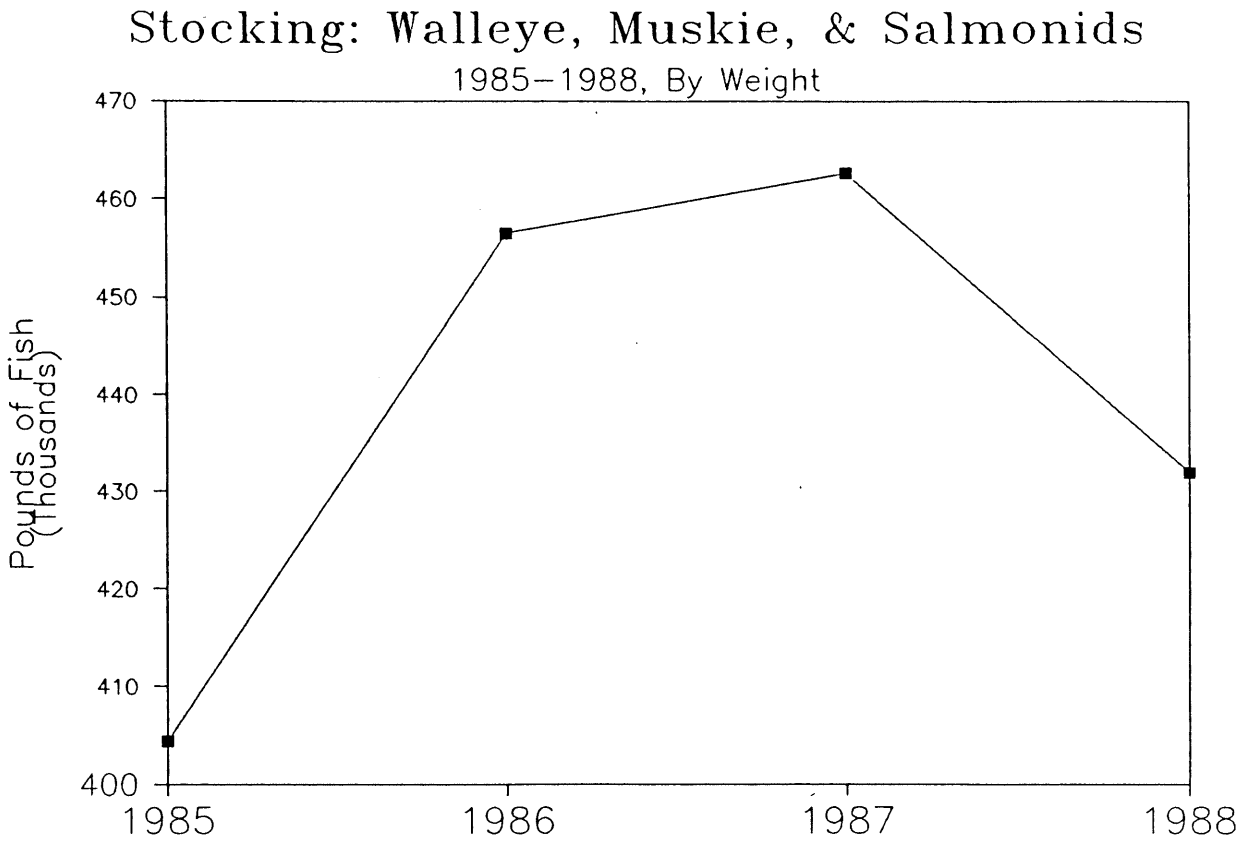
Recommendation 2: The DNR should consider contracting with private growers for products where private prices appear lower than public costs. Muskellunge is the recommended species to start with, because of the potentially large number of private producers. In addition, the state has some experience in purchasing muskie from private growers.

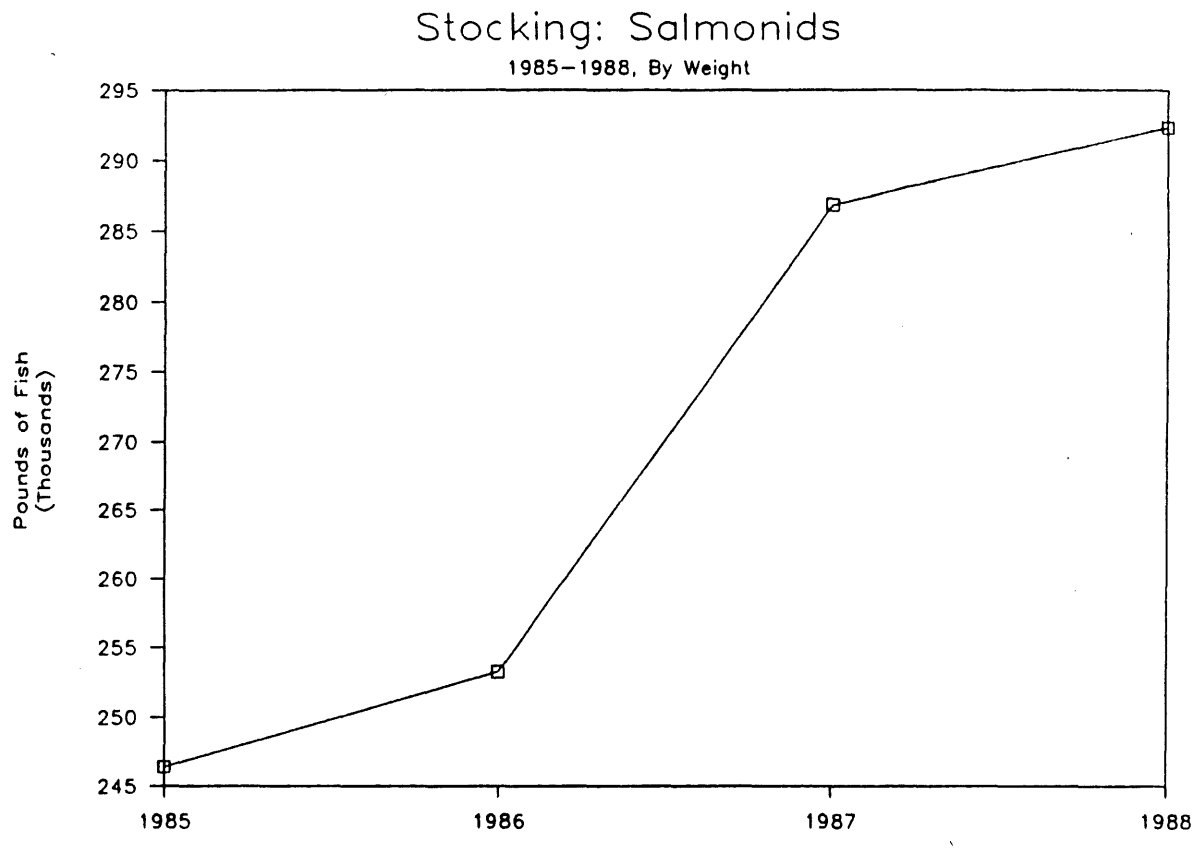
Recommendation 3: The DNR should perform make–or–buy analyses for those products where there is relative parity between public costs and private prices. As management requirements change, the state should consider entering into contracts before investing public monies in new facilities.

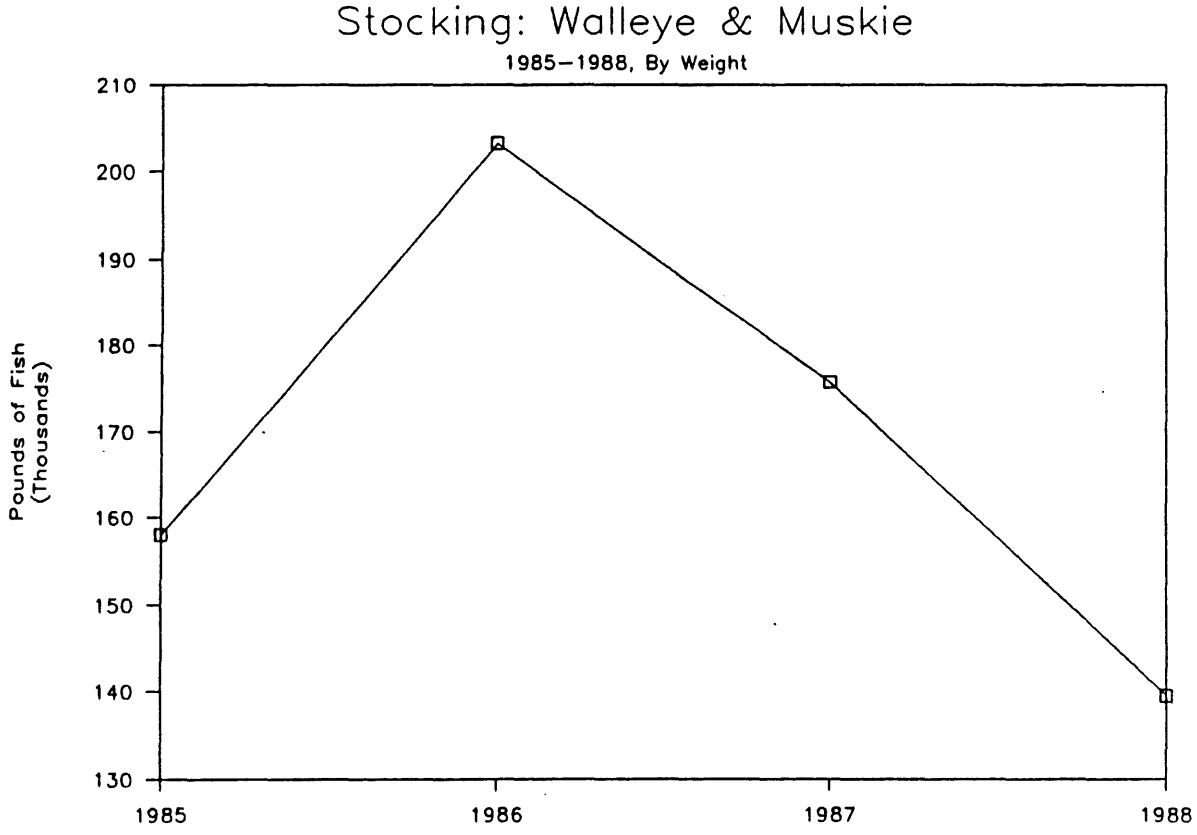
Recommendation 4: The DNR and the private sector should explore opportunities for cooperation and collaboration among Minnesota fish–rearing professionals in both the public and private sectors.

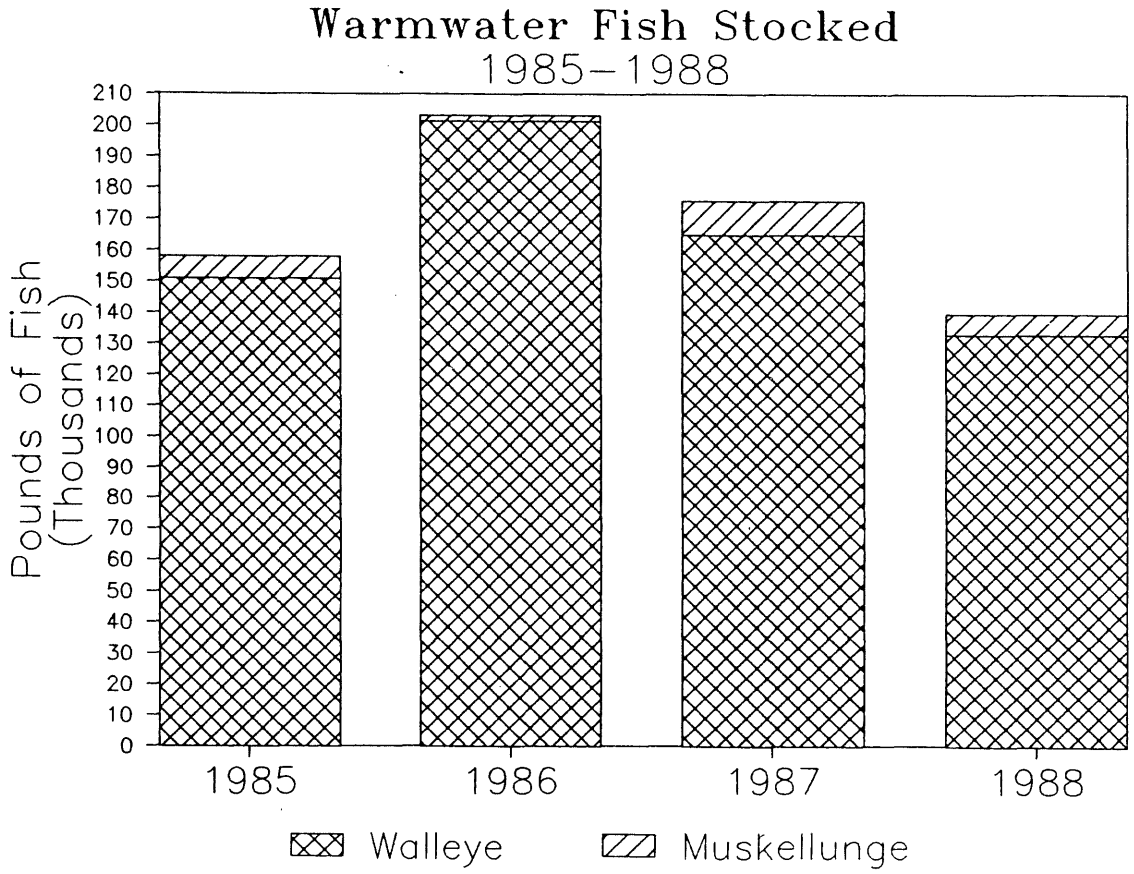
Appendix I.

Stocking Levels and Trends


Stocking: Walleye, Muskie, & Salmonids
1985–1988, By Weight
Pounds of Fish (Thousands)
470
460
450
440
430
420
410
400
1985
1986
1987
1988

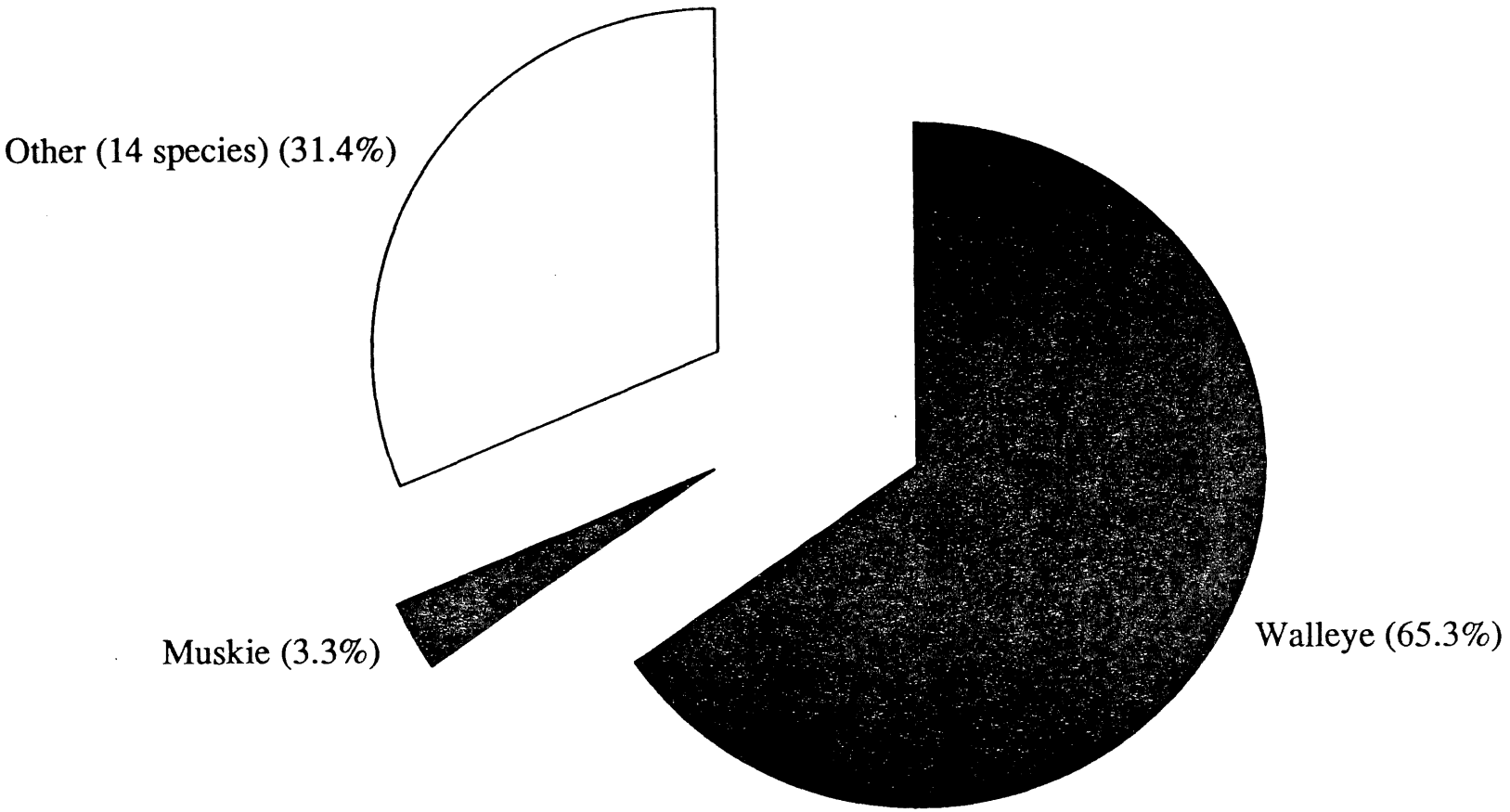

Stocking: Salmonids
1985–1988, By Weight
Pounds of Fish (Thousands)
295
290
285
280
275
270
265
260
255
250
245
1985
1986
1987
1988

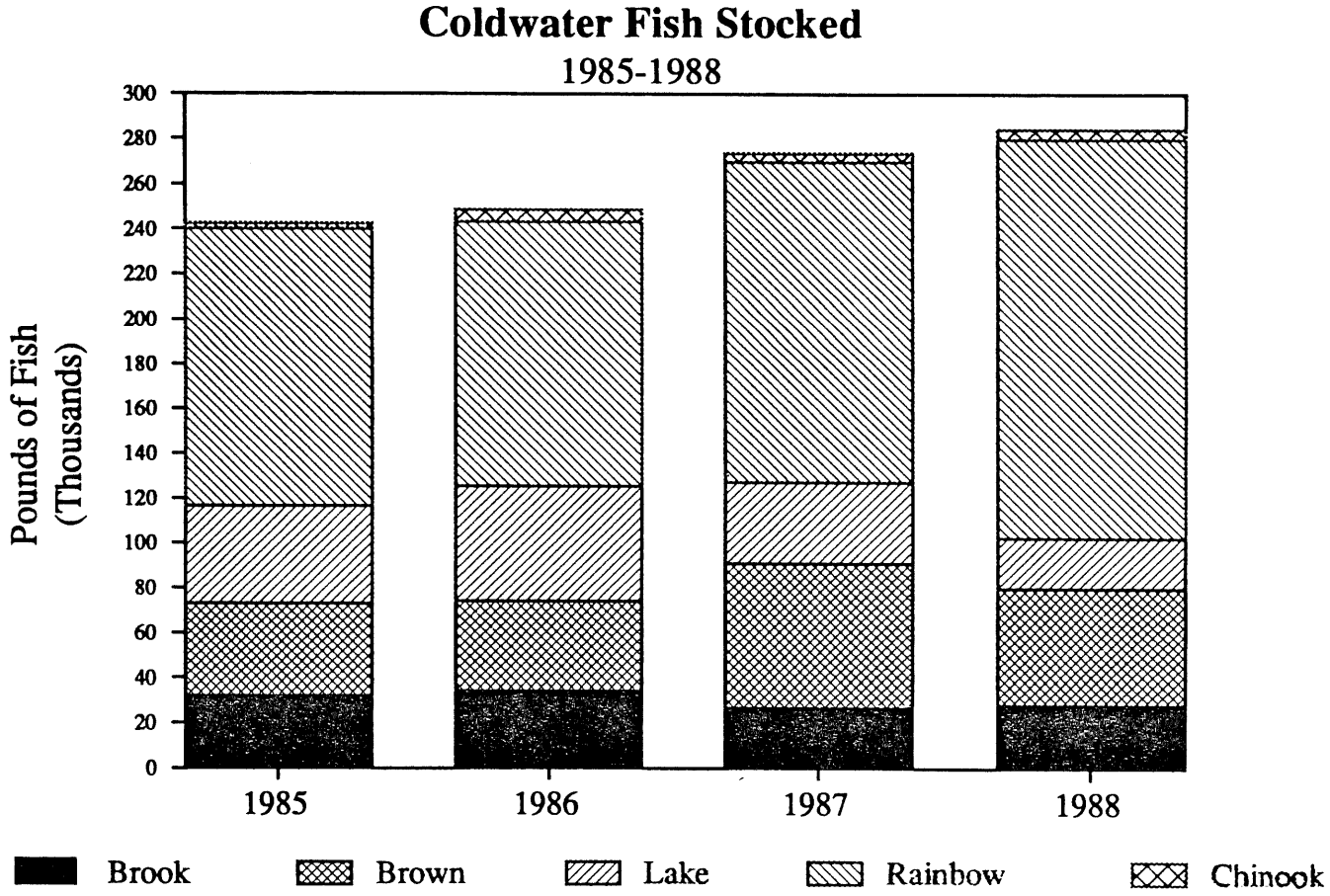

Stocking: Walleye & Muskie
1985–1988, By Weight
Pounds of Fish (Thousands)
210
200
190
180
170
160
150
140
130
1985
1986
1987
1988


Warmwater Fish Stocked
1985–1988
Pounds of Fish
(Thousands)
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
1985
1986
1987
1988
Walleye
Muskellunge

Warmwater Fish Stocked

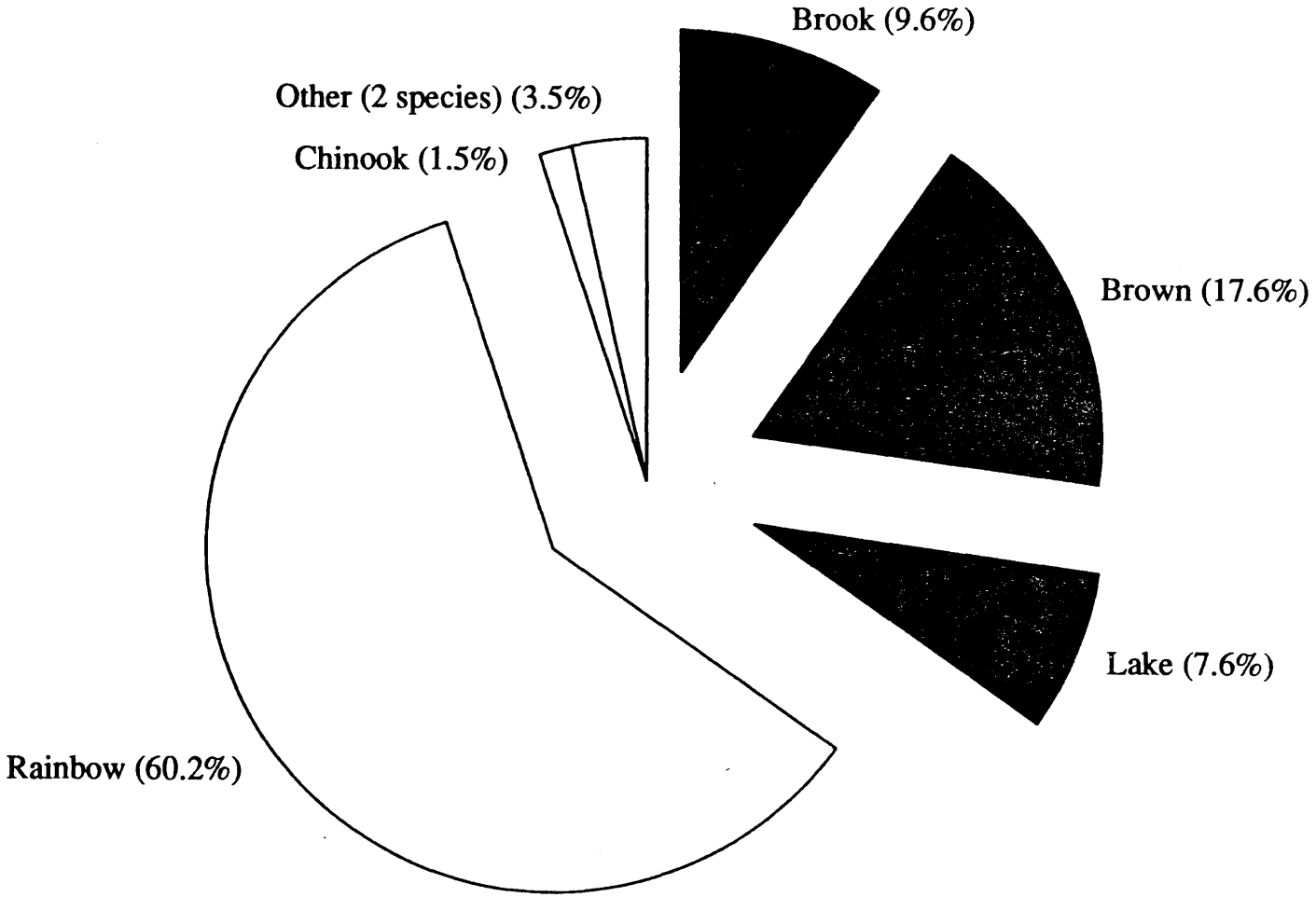
1988, By Weight




Coldwater Fish Stocked
1985-1988
Pounds of Fish
(Thousands)
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
1985
1986
1987
1988
Brook
Brown
Lake
Rainbow
Chinook

Coldwater Fish Stocked

1988, By Weight



Appendix II.

Public Cost Determination: Detail

Appendix II

WALLEYE FINGERLINGS

	TOTAL
SPAWN-TAKING	
Labor	55,466.93
Transportation	3,535.27
Materials & Supplies	3,365.96
Other Direct	623.02
Region Overhead	30,971.63
Central Overhead	4,522.36
	98,485.17
% Applied to FY89 harvest	
SUBTOTAL	20,887.54
HATCHING	
Labor	70,648.30
Transportation	2,363.59
Materials & Supplies	9,465.19
Other Direct	4,840.54
Region Overhead	45,029.36
Central Overhead	5,292.81
	137,639.79
% Applied to FY89 harvest	
SUBTOTAL	24,086.96
REARING	
Labor	104,109.69
Transportation	6,405.94
Materials & Supplies	3,485.86
Other Direct	2,848.94
Region Overhead	60,966.53
Central Overhead	15,182.35
SUBTOTAL	192,999.31
TOTAL	237,973.81
FINGERLING HARVEST	1,223,176
SUBTOTAL COST PER LOT OF 20,000	3,891.08
INFLATION FACTOR (5%)	194.55
COST PER LOT, NO FACILITIES CONTRIBUTION OR VARIANCE ALLOWANCE	4,085.63
COST PER FISH, NO FACILITIES CONTRIBUTION OR VARIANCE ALLOWANCE	0.204

TOTAL	237,973.81
FINGERLING HARVEST	1,223,176
SUBTOTAL COST PER LOT OF 20,000	3,891.08
INFLATION FACTOR (5%)	194.55
FACILITIES CONTRIBUTION (15%)	583.66
VARIANCE ALLOWANCE (5%)	194.55
COST PER LOT, ALL-INCLUSIVE	4,863.85
COST PER FISH, ALL-INCLUSIVE	0.243

COST RANGE PER LOT:	4,085.63	TO	4,863.85
COST RANGE PER FISH:	0.204	TO	0.243

MUSKELLUNGE FINGERLINGS, PURE AND TIGER

	TOTAL
SPAWN-TAKING	
Labor	10,614.06
Transportation	632.57
Materials & Supplies	130.37
Other	0.00
SUBTOTAL	11,377.00
HATCHING	
Labor	3,750.01
Transportation	56.04
Materials & Supplies	36.13
Other	39.71
SUBTOTAL	3,881.89
REARING	
Labor	50,000.12
Transportation	2,295.44
Materials & Supplies	1,648.96
Other	4,228.73
SUBTOTAL	58,173.25
OVERHEAD	
Region: Spawning	8,909.51
Region: Hatching	2,672.51
Region: Rearing	42,375.78
Central: Spawning	1,209.90
Central: Hatching	252.12
Central: Rearing	5,789.11
SUBTOTAL	61,208.93
TOTAL	134,641.07
FINGERLING HARVEST	15,372
SUBTOTAL COST PER LOT OF 20,000	175,177.04
INFLATION FACTOR (5%)	8,758.85
COST PER LOT, NO FACILITIES CONTRIBUTION OR VARIANCE ALLOWANCE	183,935.89
COST PER FISH, NO FACILITIES CONTRIBUTION OR VARIANCE ALLOWANCE	9.197

TOTAL	134,641.07
FINGERLING HARVEST	15,372
SUBTOTAL COST PER LOT OF 20,000	175,177.04
INFLATION FACTOR (5%)	8,758.85
FACILITIES CONTRIBUTION (15%)	26,276.56
VARIANCE ALLOWANCE (5%)	8,758.85
COST PER LOT, ALL-INCLUSIVE	218,971.30
COST PER FISH, ALL-INCLUSIVE	10.949

COST RANGE PER LOT:	183,935.89	TO	218,971.30
COST RANGE PER FISH:	9.197	TO	10.949

BROOK TROUT FINGERLINGS

	TOTAL
SPAWN-TAKING	
Labor	3,454.68
Transportation	312.12
Materials & Supplies	11.49
Other Direct	40.56
Region Overhead	4,213.53
Central Overhead	1,208.58
	9,240.96
% Applied to FY89 fgls	
SUBTOTAL	0.00
HATCHING/INCUBATION	
Labor	11,323.36
Transportation	94.68
Materials & Supplies	127.70
Other Direct	153.66
Region Overhead	12,908.55
Central Overhead	3,702.59
	28,310.54
% Applied to FY89 fgls	
SUBTOTAL	489.77
NURSERY REARING	
Labor	31,345.81
Transportation	0.00
Materials & Supplies	6,717.86
Other Direct	26,459.64
Region Overhead	71,191.87
Central Overhead	20,420.12
	156,135.30
% Applied to FY89 fgls	
SUBTOTAL	2,701.14
GROWOUT REARING	
Labor	18,345.86
Transportation	50.40
Materials & Supplies	238.78
Other Direct	43,868.34
Region Overhead	68,963.18
Central Overhead	19,780.86
	151,247.42
% Applied to FY89 fgls	
SUBTOTAL	8,469.86
TOTAL	11,660.77
FINGERLING HARVEST	93,882
SUBTOTAL COST PER LOT OF 50,000	6,210.33
INFLATION FACTOR (5%)	310.52
COST PER LOT, NO FACILITIES CONTRIBUTION OR VARIANCE ALLOWANCE	6,520.85
COST PER FISH, NO FACILITIES CONTRIBUTION OR VARIANCE ALLOWANCE	0.130

TOTAL	11,660.77
FINGERLING HARVEST	93,882
SUBTOTAL COST PER LOT OF 50,000	6,210.33
INFLATION FACTOR (5%)	310.52
FACILITIES CONTRIBUTION (15%)	931.55
VARIANCE ALLOWANCE (5%)	310.52
COST PER LOT, ALL-INCLUSIVE	7,762.92
COST PER FISH, ALL-INCLUSIVE	0.155

COST RANGE PER LOT:	6,520.85	TO	7,762.92
COST RANGE PER FISH:	0.130	TO	0.155

BROOK TROUT YEARLINGS

	TOTAL
SPAWN-TAKING	
Labor	4,438.65
Transportation	0.00
Materials & Supplies	0.00
Other Direct	0.00
Region Overhead	6,904.36
Central Overhead	2,066.14
	13,409.15
% Applied to FY89 yrlgs	
SUBTOTAL	0.00
HATCHING/INCUBATION	
Labor	10,756.15
Transportation	0.00
Materials & Supplies	870.14
Other Direct	0.00
Region Overhead	18,084.79
Central Overhead	5,411.90
	35,122.98
% Applied to FY89 yrlgs	
SUBTOTAL	1,819.37
NURSERY REARING	
Labor	20,881.26
Transportation	0.00
Materials & Supplies	100.00
Other Direct	0.00
Region Overhead	32,636.53
Central Overhead	9,766.52
	63,384.31
% Applied to FY89 yrlgs	
SUBTOTAL	3,283.31
GROWOUT REARING	
Labor	37,250.60
Transportation	133.94
Materials & Supplies	814.43
Other Direct	9,595.98
Region Overhead	74,345.44
Central Overhead	22,247.96
	144,388.35
% Applied to FY89 yrlgs	
SUBTOTAL	7,479.32
TOTAL	12,581.99
YEARLING HARVEST	12,406
SUBTOTAL COST PER LOT OF 10,000	10,141.86
INFLATION FACTOR (5%)	507.09
COST PER LOT, NO FACILITIES CONTRIBUTION OR VARIANCE ALLOWANCE	10,648.96
COST PER FISH, NO FACILITIES CONTRIBUTION OR VARIANCE ALLOWANCE	1.065

TOTAL	12,581.99
YEARLING HARVEST	12,406
SUBTOTAL COST PER LOT OF 10,000	10,141.86
INFLATION FACTOR (5%)	507.09
FACILITIES CONTRIBUTION (15%)	1,521.28
VARIANCE ALLOWANCE (5%)	507.09
COST PER LOT, ALL-INCLUSIVE	12,677.33
COST PER FISH, ALL-INCLUSIVE	1.268

COST RANGE PER LOT:	10,648.96	TO	12,677.33
COST RANGE PER FISH:	1.065	TO	1.268

BROWN TROUT FINGERLINGS

	TOTAL
SPAWN-TAKING	
Labor	4,438.65
Transportation	0.00
Materials & Supplies	0.00
Other Direct	0.00
Region Overhead	6,904.36
Central Overhead	2,066.14
	13,409.15
% Applied to FY89 fgls	
SUBTOTAL	1,112.96
BROODSTOCK	
Labor	6,387.85
Transportation	24.72
Materials & Supplies	0.00
Other Direct	0.00
Region Overhead	9,974.81
Central Overhead	2,984.97
	19,372.35
% Applied to FY89 fgls	
SUBTOTAL	1,232.08
HATCHING/INCUBATION	
Labor	10,756.15
Transportation	0.00
Materials & Supplies	870.14
Other Direct	0.00
Region Overhead	18,084.79
Central Overhead	5,411.90
	35,122.98
% Applied to FY89 fgls	
SUBTOTAL	20,308.11
NURSERY REARING	
Labor	20,881.26
Transportation	0.00
Materials & Supplies	100.00
Other Direct	0.00
Region Overhead	32,636.53
Central Overhead	9,766.52
	63,384.31
% Applied to FY89 fgls	
SUBTOTAL	36,648.81
GROWOUT REARING	
Labor	37,250.60
Transportation	133.94
Materials & Supplies	814.43
Other Direct	9,595.98
Region Overhead	74,345.44
Central Overhead	22,247.96
	144,388.35
% Applied to FY89 fgls	
SUBTOTAL	83,485.34
TOTAL	142,787.30
FINGERLING HARVEST	529,239
SUBTOTAL COST PER LOT OF 100,000	26,979.74
INFLATION FACTOR (5%)	1,348.99
COST PER LOT, NO FACILITIES CONTRIBUTION OR VARIANCE ALLOWANCE	28,328.73
COST PER FISH, NO FACILITIES CONTRIBUTION OR VARIANCE ALLOWANCE	0.28

TOTAL	142,787.30
FINGERLING HARVEST	529,239
SUBTOTAL COST PER LOT OF 100,000	26,979.74
INFLATION FACTOR (5%)	1,348.99
FACILITIES CONTRIBUTION (15%)	4,046.96
VARIANCE ALLOWANCE (5%)	1,348.99
COST PER LOT, ALL-INCLUSIVE	33,724.67
COST PER FISH, ALL-INCLUSIVE	0.337
COST RANGE PER LOT:	28,328.73 TO 33,724.67
COST RANGE PER FISH:	0.283 TO 0.337

BROWN TROUT YEARLINGS

	TOTAL
SPAWN-TAKING	
Labor	9,925.49
Transportation	6.30
Materials & Supplies	942.69
Other Direct	0.00
Region Overhead	20,926.51
Central Overhead	9,033.76
	40,834.75
% Applied to FY89 yrlgs	
SUBTOTAL	5,859.80
BROODSTOCK	
Labor	6,387.85
Transportation	24.72
Materials & Supplies	0.00
Other Direct	0.00
Region Overhead	9,974.81
Central Overhead	2,984.97
	31,340.52
% Applied to FY89 yrlgs	
SUBTOTAL	6,516.86
HATCHING/INCUBATION	
Labor	19,310.41
Transportation	0.00
Materials & Supplies	1,917.55
Other Direct	600.09
Region Overhead	40,312.01
Central Overhead	16,456.52
	78,596.58
% Applied to FY89 yrlgs	
SUBTOTAL	11,772.17
NURSERY REARING	
Labor	30,833.90
Transportation	0.00
Materials & Supplies	383.18
Other Direct	0.00
Region Overhead	54,937.96
Central Overhead	20,848.12
	107,003.16
% Applied to FY89 yrlgs	
SUBTOTAL	17,248.93
GROWOUT REARING	
Labor	73,049.97
Transportation	316.15
Materials & Supplies	5,076.34
Other Direct	10,856.82
Region Overhead	164,857.92
Central Overhead	67,223.69
	321,380.89
% Applied to FY89 yrlgs	
SUBTOTAL	48,196.87
TOTAL	89,594.63
YEARLING HARVEST	114,124
SUBTOTAL COST PER LOT OF 10,000	7,850.64
INFLATION FACTOR (5%)	392.53
COST PER LOT, NO FACILITIES CONTRIBUTION OR VARIANCE ALLOWANCE	8,243.17
COST PER FISH, NO FACILITIES CONTRIBUTION OR VARIANCE ALLOWANCE	0.824

TOTAL	89,594.63
YEARLING HARVEST	114,124
SUBTOTAL COST PER LOT OF 10,000	7,850.64
INFLATION FACTOR (5%)	392.53
FACILITIES CONTRIBUTION (15%)	1,177.60
VARIANCE ALLOWANCE (5%)	392.53
COST PER LOT, ALL-INCLUSIVE	9,813.30
COST PER FISH, ALL-INCLUSIVE	0.981
COST RANGE PER LOT:	8,243.17 TO 9,813.30
COST RANGE PER FISH:	0.824 TO 0.981

LAKE TROUT FINGERLINGS

	TOTAL
SPAWN-TAKING	
Labor	5,486.84
Transportation	6.30
Materials & Supplies	942.69
Other Direct	0.00
Region Overhead	14,022.15
Central Overhead	6,967.62
	27,425.60
% Applied to FY89 fgls	
SUBTOTAL	41.14
BROODSTOCK	
Labor	2,390.86
Transportation	0.00
Materials & Supplies	417.65
Other Direct	0.00
Region Overhead	6,119.08
Central Overhead	3,040.58
	11,968.17
% Applied to FY89 fgls	
SUBTOTAL	23.94
HATCHING/INCUBATION	
Labor	8,554.26
Transportation	0.00
Materials & Supplies	1,047.41
Other Direct	600.09
Region Overhead	22,227.22
Central Overhead	11,044.73
	43,473.71
% Applied to FY89 fgls	
SUBTOTAL	52.17
NURSERY REARING	
Labor	9,952.64
Transportation	0.00
Materials & Supplies	283.18
Other Direct	0.00
Region Overhead	22,301.43
Central Overhead	11,081.60
	43,618.85
% Applied to FY89 fgls	
SUBTOTAL	52.34
GROWOUT REARING	
Labor	35,799.37
Transportation	182.21
Materials & Supplies	4,261.91
Other Direct	1,260.84
Region Overhead	90,512.48
Central Overhead	44,975.73
	176,992.54
% Applied to FY89 fgls	
SUBTOTAL	212.39
TOTAL	381.98
FINGERLING HARVEST	2,223
SUBTOTAL COST PER LOT OF 50,000	8,591.47
INFLATION FACTOR (5%)	429.57
COST PER LOT, NO FACILITIES CONTRIBUTION OR VARIANCE ALLOWANCE	9,021.05
COST PER FISH, NO FACILITIES CONTRIBUTION OR VARIANCE ALLOWANCE	0.180

TOTAL	381.98
FINGERLING HARVEST	2,223
SUBTOTAL COST PER LOT OF 50,000	8,591.47
INFLATION FACTOR (5%)	429.57
FACILITIES CONTRIBUTION (15%)	1,288.72
VARIANCE ALLOWANCE (5%)	429.57
COST PER LOT, ALL-INCLUSIVE	10,739.34
COST PER FISH, ALL-INCLUSIVE	0.215
COST RANGE PER LOT:	9,021.05 TO 10,739.34
COST RANGE PER FISH:	0.180 TO 0.215

LAKE TROUT YEARLINGS

	TOTAL
SPAWN-TAKING	
Labor	5,486.84
Transportation	6.30
Materials & Supplies	942.69
Other Direct	0.00
Region Overhead	14,022.15
Central Overhead	6,967.62
	27,425.60
% Applied to FY89 yrlgs	
SUBTOTAL	19,930.18
BROODSTOCK	
Labor	2,390.86
Transportation	0.00
Materials & Supplies	417.65
Other Direct	0.00
Region Overhead	6,119.08
Central Overhead	3,040.58
	11,968.17
% Applied to FY89 yrlgs	
SUBTOTAL	11,944.23
HATCHING/INCUBATION	
Labor	8,554.26
Transportation	0.00
Materials & Supplies	1,047.41
Other Direct	600.09
Region Overhead	22,227.22
Central Overhead	11,044.73
	43,473.71
% Applied to FY89 yrlgs	
SUBTOTAL	26,549.39
NURSERY REARING	
Labor	9,952.64
Transportation	0.00
Materials & Supplies	283.18
Other Direct	0.00
Region Overhead	22,301.43
Central Overhead	11,081.60
	43,618.85
% Applied to FY89 yrlgs	
SUBTOTAL	26,638.03
GROWOUT REARING	
Labor	35,799.37
Transportation	182.21
Materials & Supplies	4,261.91
Other Direct	1,260.84
Region Overhead	90,512.48
Central Overhead	44,975.73
	176,992.54
% Applied to FY89 yrlgs	
SUBTOTAL	108,089.34
TOTAL	193,151.19
YEARLING HARVEST	370,029
SUBTOTAL COST PER LOT OF 10,000	5,219.89
INFLATION FACTOR (5%)	260.99
COST PER LOT, NO FACILITIES CONTRIBUTION OR VARIANCE ALLOWANCE	5,480.89
COST PER FISH, NO FACILITIES CONTRIBUTION OR VARIANCE ALLOWANCE	0.548

TOTAL	193,151.19
YEARLING HARVEST	370,029
SUBTOTAL COST PER LOT OF 10,000	5,219.89
INFLATION FACTOR (5%)	260.99
FACILITIES CONTRIBUTION (15%)	782.98
VARIANCE ALLOWANCE (5%)	260.99
COST PER LOT, ALL-INCLUSIVE	6,524.87
COST PER FISH, ALL-INCLUSIVE	0.652
COST RANGE PER LOT:	5,480.89 TO 6,524.87
COST RANGE PER FISH:	0.548 TO 0.652

KAMLOOP FINGERLINGS

	TOTAL
SPAWN-TAKING	
Labor	3,454.68
Transportation	312.12
Materials & Supplies	11.49
Other Direct	40.56
Region Overhead	4,213.53
Central Overhead	1,208.58
	9,240.96
% Applied to FY89 fgls	
SUBTOTAL	23.10
HATCHING/INCUBATION	
Labor	11,323.36
Transportation	94.68
Materials & Supplies	127.70
Other Direct	153.66
Region Overhead	12,908.55
Central Overhead	3,702.59
	28,310.54
% Applied to FY89 fgls	
SUBTOTAL	45.30
NURSERY REARING	
Labor	31,345.81
Transportation	0.00
Materials & Supplies	6,717.86
Other Direct	26,459.64
Region Overhead	71,191.87
Central Overhead	20,420.12
	156,135.30
% Applied to FY89 fgls	
SUBTOTAL	249.82
GROWOUT REARING	
Labor	18,345.86
Transportation	50.40
Materials & Supplies	238.78
Other Direct	43,868.34
Region Overhead	68,963.18
Central Overhead	19,780.86
	151,247.42
% Applied to FY89 fgls	
SUBTOTAL	756.24
TOTAL	1,074.45
FINGERLING HARVEST	13,952
SUBTOTAL COST PER LOT OF 20,000	1,540.21
INFLATION FACTOR (5%)	77.01
COST PER LOT, NO FACILITIES CONTRIBUTION OR VARIANCE ALLOWANCE	1,617.22
COST PER FISH, NO FACILITIES CONTRIBUTION OR VARIANCE ALLOWANCE	0.081

TOTAL	1,074.45
FINGERLING HARVEST	13,952
SUBTOTAL COST PER LOT OF 20,000	1,540.21
INFLATION FACTOR (5%)	77.01
FACILITIES CONTRIBUTION (15%)	231.03
VARIANCE ALLOWANCE (5%)	77.01
COST PER LOT, ALL-INCLUSIVE	1,925.27
COST PER FISH, ALL-INCLUSIVE	0.096

COST RANGE PER LOT:	1,617.22	TO	1,925.27
COST RANGE PER FISH:	0.081	TO	0.096

KAMLOOP YEARLINGS

	TOTAL
SPAWN-TAKING	
Labor	3,454.68
Transportation	312.12
Materials & Supplies	11.49
Other Direct	40.56
Region Overhead	4,213.53
Central Overhead	1,208.58
	9,240.96
% Applied to FY89 yrlgs	
SUBTOTAL	3,830.38
HATCHING/INCUBATION	
Labor	11,323.36
Transportation	94.68
Materials & Supplies	127.70
Other Direct	153.66
Region Overhead	12,908.55
Central Overhead	3,702.59
	28,310.54
% Applied to FY89 yrlgs	
SUBTOTAL	7,516.45
NURSERY REARING	
Labor	31,345.81
Transportation	0.00
Materials & Supplies	6,717.86
Other Direct	26,459.64
Region Overhead	71,191.87
Central Overhead	20,420.12
	156,135.30
% Applied to FY89 yrlgs	
SUBTOTAL	41,453.92
GROWOUT REARING	
Labor	18,345.86
Transportation	50.40
Materials & Supplies	238.78
Other Direct	43,868.34
Region Overhead	68,963.18
Central Overhead	19,780.86
	151,247.42
% Applied to FY89 yrlgs	
SUBTOTAL	40,156.19
TOTAL	92,956.94
YEARLING HARVEST	190,381
SUBTOTAL COST PER LOT OF 10,000	4,882.679
INFLATION FACTOR (5%)	244.13
COST PER LOT, NO FACILITIES CONTRIBUTION OR VARIANCE ALLOWANCE	5,126.81
COST PER FISH, NO FACILITIES CONTRIBUTION OR VARIANCE ALLOWANCE	0.513

TOTAL	92,956.94
YEARLING HARVEST	190,381
SUBTOTAL COST PER LOT OF 10,000	4,882.68
INFLATION FACTOR (5%)	244.13
FACILITIES CONTRIBUTION (15%)	732.40
VARIANCE ALLOWANCE (5%)	244.13
COST PER LOT, ALL-INCLUSIVE	6,103.35
COST PER FISH, ALL-INCLUSIVE	0.610

COST RANGE PER LOT:	5,126.81	TO	6,103.35
COST RANGE PER FISH:	0.513	TO	0.610

RAINBOW TROUT FINGERLINGS

	TOTAL
SPAWN-TAKING	
Labor	4,438.65
Transportation	0.00
Materials & Supplies	0.00
Other Direct	0.00
Region Overhead	6,904.36
Central Overhead	2,066.14
	13,409.15
% Applied to FY89 fgls	
SUBTOTAL	978.87
BROODSTOCK	
Labor	6,387.85
Transportation	24.72
Materials & Supplies	0.00
Other Direct	0.00
Region Overhead	9,974.81
Central Overhead	2,984.97
	19,372.35
% Applied to FY89 yrlgs	
SUBTOTAL	1,987.60
HATCHING/INCUBATION	
Labor	10,756.15
Transportation	0.00
Materials & Supplies	870.14
Other Direct	0.00
Region Overhead	18,084.79
Central Overhead	5,411.90
	35,122.98
% Applied to FY89 fgls	
SUBTOTAL	4,306.08
NURSERY REARING	
Labor	20,881.26
Transportation	0.00
Materials & Supplies	100.00
Other Direct	0.00
Region Overhead	32,636.53
Central Overhead	9,766.52
	63,384.31
% Applied to FY89 fgls	
SUBTOTAL	7,770.92
GROWOUT REARING	
Labor	37,250.60
Transportation	133.94
Materials & Supplies	814.43
Other Direct	9,595.98
Region Overhead	74,345.44
Central Overhead	22,247.96
	144,388.35
% Applied to FY89 fgls	
SUBTOTAL	17,702.01
TOTAL	32,745.48
FINGERLING HARVEST	214,945
SUBTOTAL COST PER LOT OF 50,000	7,617.18
INFLATION FACTOR (5%)	380.86
COST PER LOT, NO FACILITIES CONTRIBUTION OR VARIANCE ALLOWANCE	7,998.03
COST PER FISH, NO FACILITIES CONTRIBUTION OR VARIANCE ALLOWANCE	0.160

TOTAL	32,745.48		
FINGERLING HARVEST	214,945		
SUBTOTAL COST PER LOT OF 50,000	7,617.18		
INFLATION FACTOR (5%)	380.86		
FACILITIES CONTRIBUTION (15%)	1,142.58		
VARIANCE ALLOWANCE (5%)	380.86		
COST PER LOT, ALL-INCLUSIVE	9,521.47		
COST PER FISH, ALL-INCLUSIVE	0.190		
COST RANGE PER LOT:	7,998.03	TO	9,521.47
COST RANGE PER FISH:	0.160	TO	0.190

RAINBOW TROUT YEARLINGS

	TOTAL
SPAWN-TAKING	
Labor	9,925.49
Transportation	6.30
Materials & Supplies	942.69
Other Direct	0.00
Region Overhead	20,926.51
Central Overhead	9,033.76
	40,834.75
% Applied to FY89 yrlgs	
SUBTOTAL	4,720.02
BROODSTOCK	
Labor	8,778.71
Transportation	24.72
Materials & Supplies	417.65
Other Direct	0.00
Region Overhead	16,093.99
Central Overhead	6,025.55
	31,340.62
% Applied to FY89 yrlgs	
SUBTOTAL	9,635.81
HATCHING/INCUBATION	
Labor	19,310.41
Transportation	0.00
Materials & Supplies	1,917.55
Other Direct	600.09
Region Overhead	40,312.01
Central Overhead	16,456.63
	78,596.69
% Applied to FY89 yrlgs	
SUBTOTAL	29,885.37
NURSERY REARING	
Labor	30,833.90
Transportation	0.00
Materials & Supplies	383.18
Other Direct	0.00
Region Overhead	54,937.96
Central Overhead	20,848.12
	107,003.16
% Applied to FY89 yrlgs	
SUBTOTAL	46,756.19
GROWOUT REARING	
Labor	73,049.97
Transportation	316.15
Materials & Supplies	5,076.34
Other Direct	10,856.82
Region Overhead	164,857.92
Central Overhead	67,223.69
	321,380.89
% Applied to FY89 yrlgs	
SUBTOTAL	122,501.48
TOTAL	213,498.87
YEARLING HARVEST	187,917
SUBTOTAL COST PER LOT OF 10,000	11,361.34
INFLATION FACTOR (5%)	568.07
COST PER LOT, NO FACILITIES CONTRIBUTION OR VARIANCE ALLOWANCE	11,929.41
COST PER FISH, NO FACILITIES CONTRIBUTION OR VARIANCE ALLOWANCE	1.193

TOTAL	213,498.87		
YEARLING HARVEST	187,917		
SUBTOTAL COST PER LOT OF 10,000	11,361.34		
INFLATION FACTOR (5%)	568.07		
FACILITIES CONTRIBUTION (15%)	1,704.20		
VARIANCE ALLOWANCE (5%)	568.07		
COST PER LOT, ALL-INCLUSIVE	14,201.67		
COST PER FISH, ALL-INCLUSIVE	1.420		
COST RANGE PER LOT:	11,929.41	TO	14,201.67
COST RANGE PER FISH:	1.193	TO	1.420

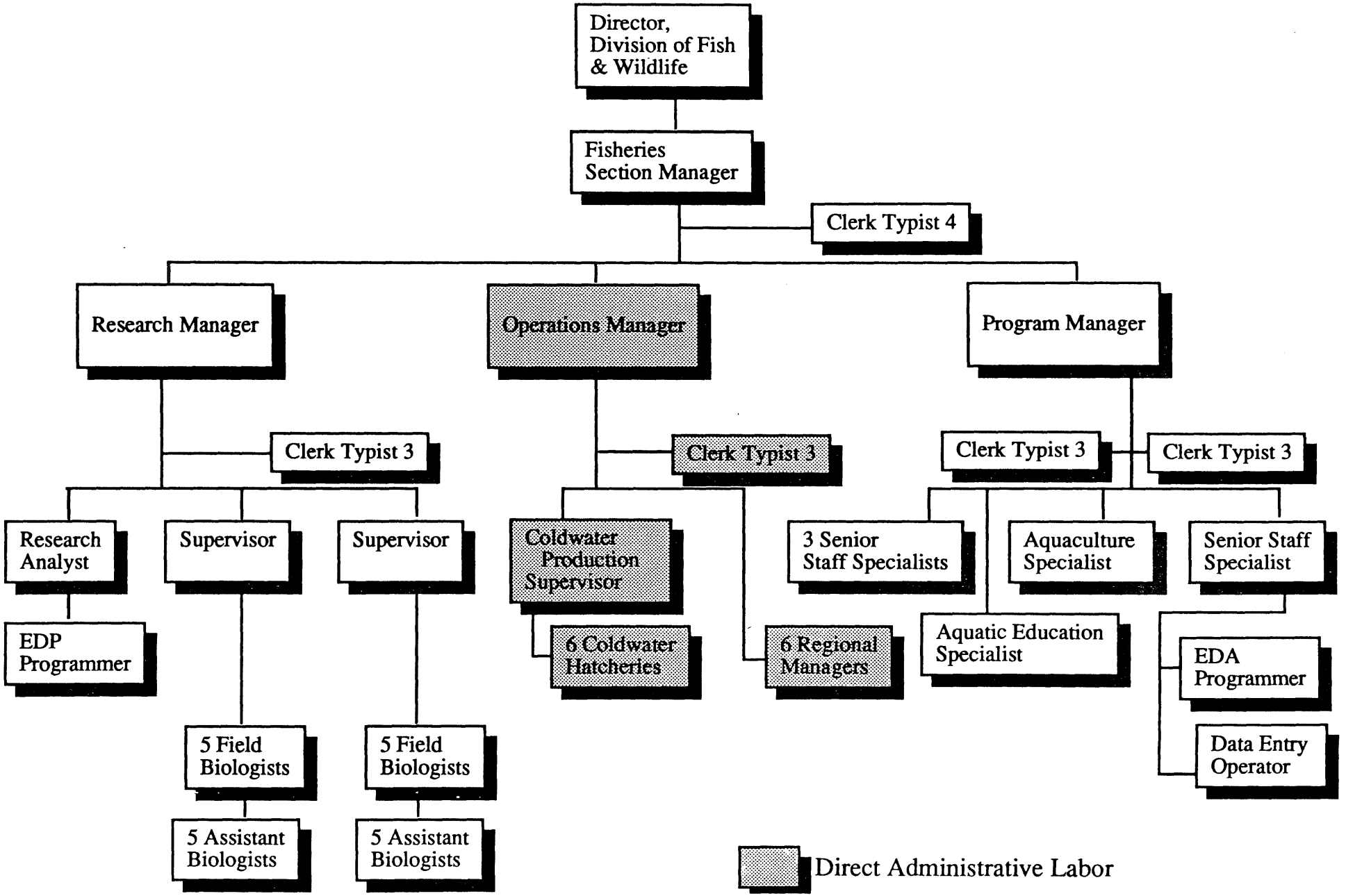
CHINOOK SALMON SMOLT

	TOTAL
SPAWN-TAKING	
Labor	3,454.68
Transportation	312.12
Materials & Supplies	11.49
Other Direct	40.56
Region Overhead	4,213.53
Central Overhead	1,208.58
	9,240.96
% Applied to FY89 smolt	
SUBTOTAL	2,434.99
HATCHING/INCUBATION	
Labor	11,323.36
Transportation	94.68
Materials & Supplies	127.70
Other Direct	153.66
Region Overhead	12,908.55
Central Overhead	3,702.59
	28,310.54
% Applied to FY89 smolt	
SUBTOTAL	719.09
NURSERY REARING	
Labor	31,345.81
Transportation	0.00
Materials & Supplies	6,717.86
Other Direct	26,459.64
Region Overhead	71,191.87
Central Overhead	20,420.12
	156,135.30
% Applied to FY89 smolt	
SUBTOTAL	3,965.84
GROWOUT REARING	
Labor	18,345.86
Transportation	50.40
Materials & Supplies	238.78
Other Direct	43,868.34
Region Overhead	68,963.18
Central Overhead	19,780.86
	151,247.42
% Applied to FY89 smolt	
SUBTOTAL	12,402.29
TOTAL	19,522.21
SMOLT HARVEST	519,241
SUBTOTAL COST PER LOT 50,000	1,879.88
INFLATION FACTOR (5%)	93.99
COST PER LOT, NO FACILITIES CONTRIBUTION OR VARIANCE ALLOWANCE	1,973.873
COST PER FISH, NO FACILITIES CONTRIBUTION OR VARIANCE ALLOWANCE	0.039

TOTAL	19,522.21
SMOLT HARVEST	519,241
SUBTOTAL COST PER LOT OF 50,000	1,879.88
INFLATION FACTOR (5%)	93.99
FACILITIES CONTRIBUTION (15%)	281.98
VARIANCE ALLOWANCE (5%)	93.99
COST PER LOT, ALL-INCLUSIVE	2,349.85
COST PER FISH, ALL-INCLUSIVE	0.047

COST RANGE PER LOT:	1,973.87	TO	2,349.85
COST RANGE PER FISH:	0.039	TO	0.047

Minnesota Department Of Natural Resources



Appendix III.

Comparative Cost Information: Other States

COMPARATIVE COST INFORMATION: OTHER STATES

PER-FISH PRODUCTION COSTS

These costs are for fish meeting the size specifications in the sample contracts.

Minnesota figures include only direct costs and administrative allocations. Estimated facilities contribution, variance allowance and inflation factor are not included.

Figures are from 1986-1989, the most recent available from the states.

	California	Illinois	Indiana	Iowa	Michigan	Missouri	New Jersey	South Dakota	Texas	AVERAGE	MINNESOTA	Ratio: MN/AVG
Walleye		0.350		0.378				0.178		0.302	0.194	64%
Muskie: Pure		2.850			0.882			10.108		4.613	8.759	190%
Muskie: Tiger		1.000	3.840		0.698			22.030		6.892	8.759	127%
Brook Trout/F										N/A	0.124	N/A
Brook Trout/Y							0.880			0.880	1.014	115%
Brown Trout/F		0.500			0.212			0.024		0.245	0.269	110%
Brown Trout/Y		1.000				0.830	0.880	0.553		0.816	0.785	96%
Lake Trout/F										N/A	0.171	N/A
Lake Trout/Y		1.000								1.000	0.522	52%
Kamloop Rainbow/F		0.500						0.067		0.284	0.077	27%
Kamloop Rainbow/Y		1.000	1.830			0.830	0.880	0.641	0.970	1.025	0.489	48%
Rainbow Trout/F		0.500						0.067		0.284	0.152	54%
Rainbow Trout/Y		1.000	1.830			0.830	0.880	0.641	0.970	1.025	1.136	111%
Chinook Salmon/F	0.115	0.470	0.080		0.065			0.213		0.189	0.037	20%

Appendix III

Appendix IV.

Private Price Determination: Detail

Sample Contract
for Walleye Fingerling Purchase

State of Minnesota Department of Natural Resources
(hereinafter called Purchaser), and

_____

(hereinafter called Supplier):

1. **Product** - Purchaser desires to obtain walleye fingerlings of the Mississippi or Leech Lake strains only. These fish must be in healthy condition for stocking into various public waters of Minnesota. The size, quality, condition, handling and delivery of these fish are specified within this contract.

2. **Term** - The term of this contract shall be for one year commencing the **1st** day of **November, 1991** and terminate the **1st** day of **November, 1992.** Three one-year renewal options of this contract are provided for, subject to the agreement of both Purchaser and Supplier.

3. **Quantity** - Units of 20,000 fish of walleye fingerlings (at 4 inches minimum). This contract is for up to _____ units.

4. **Price -** The price shall be $ per unit - F.O.B. Supplier's site if in-state according to the following table.

# of Units	$ per Unit

5. **Terms of Payment -** The Purchaser will pay the Supplier the total price of this contract upon the successful delivery of walleye fingerlings under the terms of this contract.

6. **Bonding** - Bonding with a licensed bonding firm in the State of Minnesota, shall be the responsibility of the Supplier. Such bonding shall be 100% of the total amount of this contract to insure that the Purchaser may meet program requirements under emergency conditions.

7. **Source of Fish -** The Purchaser will not accept any fish obtained directly or indirectly from Lake Erie. Lake Erie stocks do not meet the disease control policies and objectives of the State of Minnesota. The source and stock of fish to be supplied

must be approved by the Purchaser. Walleye eggs may be obtained from the Purchaser for this contract at fair market value (currently $10/thousand). Walleye fry may be obtained from the Purchaser at $18.80/thousand (0-50,000); $15.10/thousand (50,000-100,000); $13.50/thousand (100,000 +). These eggs or fry and resultant fish stocks will be kept separate from any other fish stocks which may be maintained on the Supplier's premises.

8. **Conditions of Handling -** Fish will be reared in a manner proven beneficial to the growth and health of walleye. Supplier will present a Fish Production Plan that describes rearing methods to be employed during this contract. This plan will include a general description of the Supplier's facility, proposed stocking density and timing, harvest methods and inventory procedures. It is expected that Fish Production Plans will vary by facility and as such considerable leeway is to be expected. Generally established fish culture methods will be allowed. However, cribbing of the fish for more than 24 hours following harvesting and prior to delivery is not allowed.

9. **Fish Health Certification -** The Supplier agrees to obtain a fish health inspection of the fish prior to product delivery by the State Fisheries Pathologist. Fish health and overall physical appearance must meet Purchaser standards. Fish will not be accepted if they display severely eroded fins or abrasions that may result in reduced survival or fungal infections after delivery. Fish displaying fungal infections will not be accepted. The following diseases will be screened: *Saprolegnia, Neascus sp.* (Black spot), bacterial gill disease, *Chondrococeus columnaris* and Lymphosystis. In addition, the Purchaser has the option of collecting a sample of fish prior to delivery for electrophorectic stock determination at Purchaser's cost.

10. **Inventory -** An accurate inventory of fish shall be conducted at the time of delivery. This inventory shall be made in the presence of a Purchaser's representative and will include total numbers, weights and visual inspection for fish health.

11. **Delivery and Delivery Schedule -** Delivery shall be F.O.B. to the Supplier's specified site. Delivery must be accomplished between September 1 and October 31. Deliveries will not be accepted outside of this time period. A three (3) day advance delivery notice is required. Fish must reach the minimum contract size within 30 days of contract date or this contract will be subject to default.

12. **Liability for Fish Loss -** Upon acceptable delivery of the fish as specified herein, Supplier shall not be liable for any losses of fish, however the Supplier will provide bonding to cover any shortage of fish under the minimum required by this contract.

13. **Access -** Purchaser has the right to enter Supplier's facility for the purpose of inspecting the fish being produced for the Purchaser under this contract. Purchaser agrees to make such inspections at reasonable times and to notify the Supplier not less than 24 hours prior to such inspections.

14. **Subletting or Assignment -** This contract shall not be assignable to any other parties or facilities.

15. **Modifications to Contract** - Terms of this contract may be modified by additional sections signed by both parties.

16. **Indemnification** - The Supplier hereby agrees to defend Purchaser, it's officers and employees, from and against any and all claims and legal actions and hold Purchaser harmless from and against any and all liability or damages in any way arising from Supplier, or Supplier's employee, actions under the terms herein.

17. **Venue** - This contract shall be construed according to the laws of the State of Minnesota and venue for any action brought regarding this contract shall be in Ramsey County, Minnesota.

Supplier

_____
Signature

_____
Name

_____
Title

Purchaser

_____
Signature

_____
Name

_____
Title

Approved as to form and execution:

_____
Special Assistant
Attorney General
Date: _____

Department of Administration

_____

_____
Date

Department of Finance

_____

_____
Date

Sample Contract
for Brown Trout Yearling Purchase

State of Minnesota Department of Natural Resources
(hereinafter called Purchaser), and

_____

(hereinafter called Supplier):

1. **Product** - Purchaser desires to obtain Brown trout yearlings in healthy condition for stocking into various public waters of Minnesota. The size, quality, condition, handling and delivery of these fish are specified within this contract. For terms of this contract, Brown trout may include the following strains: Plymouth Rock.

2. **Term** - The term of this contract shall be for one year commencing the **30th** day of **June, 1991** and terminate the **1st** day of **July, 1992**. Three one-year renewal options of this contract are provided for, subject to the agreement of both Purchaser and Supplier.

3. **Quantity** - Units of 10,000 Brown trout yearlings (5 fish/lb. minimum). This contract is for up to _____ units.

4. **Price** - The price shall be $ per unit - F.O.B. Supplier's site if in-state according to the following table:

# of Units	$ per Unit

5. **Terms of Payment** - The Purchaser will pay the Supplier the total price of this contract upon the successful delivery of Brown trout yearlings (5 fish/lb. minimum) under the terms of this contract.

6. **Bonding** - Bonding with a licensed bonding firm in the State of Minnesota, shall be the responsibility of the Supplier. Such bonding shall be 100% of the total amount of this contract to insure that the supplier may meet program requirements under emergency conditions.

7. **Source of Eggs** - The Purchaser can provide healthy eyed eggs or fry to the Supplier at fair market value (currently $9/thousand eggs or $13/thousand fry), or the Supplier can procure his own if they meet contract standards. These eggs or fry and resultant fish stocks will be kept separate from any other fish stocks which may be maintained on the Supplier's premises.

8. **Egg Certification** - All eggs or fry will be certified as per the State of Minnesota Fish disease control policies and terms of this contract.

9. **Conditions of Rearing** - Eggs and fish will be incubated and reared separately from other fish lots or stocks at the Supplier's facility in a manner proven beneficial to the growth and health of trout and which is approved by the Purchaser. Supplier will present a monthly fish production record to the Purchaser following the Minnesota Department of Natural Resources Fish Production Record (Government Form 92) as shown in Attachment A.

10. **Quality** - The Purchaser will provide a condition index (length and weight) and other physiological characteristics to establish a quality control evaluation which will be mutually agreed upon by both parties and attached as part of this contract.

11. **Certification** - The Supplier agrees to obtain fish health certification on the fish prior to delivery by an AFS Certified Fish Health Inspector or the State Fisheries Pathologist for the following diseases: IHN, VHS, IPN, *Ceratomyxa shasta, Renibacterium salmoninarum, Aeromonas salmonicida, Yersinia ruckerii, Ceratomyxa shasta* and *Muxosoma cerebralis.* Supplier agrees to provide Purchaser with certification covering emergency diseases and diseases for any fish on site prior to introducing eggs and/or fry to the Supplier's facility other than those covered by this contract. Purchaser shall have the right to reject any fish tested positive for such diseases or exhibiting active disease infections at the time of delivery. In addition, the Purchaser has the option of collecting a sample of fish prior to delivery for electrophoretic stock determination at Purchaser's cost.

12. **Disease Treatments** - Treatment for any disease encountered during the rearing of fish under this contract shall utilize therapeutants approved by the Federal Drug Administration. The Purchaser shall be notified when such treatments take place.

13. **Inventory** - An accurate inventory of fish shall be maintained at all times within the duration of this contract. This inventory shall be provided in writing as a monthly progress report, which will include the accurate completion of Attachment A. A final inventory will be conducted at time of delivery to determine the number, weight and health of the fish produced under this contract. This inventory must be made in the presence of a Purchaser's representative for mutual agreement.

14. **Delivery and Delivery Schedule** - Delivery shall be F.O.B. Supplier's hatchery if in-state, and Lanesboro area if out-of-state. Yearling deliveries will be accepted between April and June. A delivery schedule will be attached to this contract which specifies the number and pounds of fish which can be delivered on a daily basis to the Purchaser within the given time period. A minimum of three (3) days notice is required prior to all deliveries. Fish must reach the minimum contract size within 30 days of the contract date or this contract will be subject to default. Should fish not be of sufficient size or not physiologically completed with the smoltification process, the Purchaser has the right to amend the delivery schedule to meet planting obligations.

15. **Liability for Fish Loss** - Upon acceptable delivery of the fish as specified herein, Supplier shall not be liable for any losses of fish, however the Supplier will provide bonding to cover any shortage of fish under the minimum required by this contract.

16. **Access** - Purchaser has the right to enter Supplier's facility for the purpose of inspecting the fish being reared for the Purchaser under this contract. Purchaser agrees to make such inspections at reasonable times and to notify the Supplier not less than 24 hours prior to such inspections.

17. **Subletting or Assignment** - This contract shall not be assignable to any other parties or facilities.

18. **Modifications to Contract** - Terms of this contract may be modified by additional sections signed by both parties.

19. **Indemnification** - The Supplier hereby agrees to defend Purchaser, its officers and employees, from and against any and all claims and legal actions and hold Purchaser harmless from and against any and all liability or damages in any way arising from Supplier, or Supplier's employee, actions under the terms herein.

20. **Venue** - This contract shall be construed according to the laws of the State of Minnesota and venue for any action brought regarding this contract shall be in Ramsey County, Minnesota.

Supplier

_____
Signature

_____
Name

_____
Title

Purchaser

_____
Signature

_____
Name

_____
Title

Approved as to form and execution:

_____
Special Assistant
Attorney General
Date: _____

Department of Administration

_____

_____
Date

Department of Finance

_____

_____
Date

SAMPLE CONTRACT PRICES: WARMWATER

PRIVATE SUPPLIER	A	B	C	D	E	F	G	H	I	J	K	L	M	Average	Number of Sample Bids
Walleye Fingerling															10
Lot Size 20,000															
$ per unit - 1	7,000		7,000	8,800	15,000	8,000	17,000	9,000		18,000	9,000	10,000		10,880	10
$ per unit - 2	6,000			12,000							8,600			8,867	3
$ per unit - 3	5,000			15,600							8,000			9,533	3
$ per unit - 4				12,000										12,000	1
														10,353	
Pure Muskie Fingerling															
Lot Size 20,000															
$ per unit - 1	40,000	108,000	72,000			108,000								82,000	4
Tiger Muskie Fingerling															
Lot Size 20,000															
$ per unit - 1	40,000	95,400	72,000			180,000								96,850	4

Note: State sales tax of 6% was added to sample contract prices for comparison to public costs. The highest, lowest and average bids for each product appear in figure 6B and include this sales tax.

Minnesota Private Growers
Comparative Prices: 1989-90

Warmwater Species

Species	Size	Price (1)	Sample Contract Lot Size		Single Lot Price	Average of Sample Bids	
Walleye	5-6"(2)	.85/inch	20,000		$17,000		
	4-6"	.75/inch			$15,000		
	4"	.10/inch			$8,000		
	4"	.13/inch			$10,400		
	4-5"	.10/inch			$8,000		
				Average	$11,680	$10,353	
Muskellunge	9"	.95/inch	20,000		$171,000		
	9"	1.00/inch			$180,000		
	10"	.65/inch			$130,000		
				Average	$160,333	$82,000	Pure
						$96,850	Tiger

(1) Some wholesale, some retail
(2) No price given for 4" fish

Note: These prices do not take into account DNR's product or delivery specifications, stated in the sample contracts.

Source: Private grower price lists and DNR contracts.

SAMPLE CONTRACT PRICES: COLDWATER

PRIVATE SUPPLIER	A	B	C	D	E	F	G	H	I	J	K	L	M	Average	Sample Bids
Brown Trout Fingerling															
Lot Size 100,000															
$ per unit - 1									3,864				30,000	16,932	2
Brown Trout Yearling															
Lot Size 10,000															
$ per unit - 1									7,920				8,000	7,960	2
Brook Trout Fingerling															
Lot Size 50,000															
$ per unit - 1									10,980				30,000	20,490	2
Brook Trout Yearling															
Lot Size 10,000															
$ per unit - 1									7,920				10,000	8,960	2
Lake Trout Fingerling															
Lot Size 50,000															
$ per unit - 1													37,500	37,500	1
Lake Trout Yearling															
Lot Size 10,000															
$ per unit - 1													10,000	10,000	1
Kamloops Trout Fingerling															
Lot Size 20,000															
$ per unit - 1									4,392				14,000	9,196	2
Kamloops Trout Yearling															
Lot Size 10,000									6,500				10,000	8,250	2
$ per unit - 1															
Rainbow Trout Fingerling															
Lot Size 50,000															
$ per unit - 1									5,490				30,000	17,745	2
Rainbow Trout Yearling															
Lot Size 10,000															
$ per unit - 1									3,960				10,000	6,980	2
Chinook Salmon Smolt															
Lot Size 50,000															
$ per unit - 1													22,500	22,500	1

Note: State sales tax of 6% was added to sample contract prices for comparison to public costs. The highest, lowest and average bids for each product appear in figure 6C and include this sales tax.

Appendix V.

Private Growers' Comments on Sample Contracts

PRIVATE GROWERS' COMMENTS

Grower 1

"I should like to offer a few comments regarding the private sector versus state supplied fish for stocking analysts that you are currently working through. There are a few things that may be incurred in procuring fish for stocking purposes from the private sector that should be highlighted in your report so that they are properly understood by folks receiving the report.

1) Performance bonding.

   a) Costs of performance bonding may run between 2 and 4 per cent of contract value.

   b) A more subtle cost is that bonding companies may require the company to maintain a cash position of up to 50% of the value of the contract. Escrowing vendors venture capital to meet a cash position requirement like this can incur a secondary hidden cost.

   c) The State does not guarantee performance in their own rearing and stocking levels why require performance bonding from a fish supplier.

   d) Bonding companies may include as part of their costing criteria "how long the company has been supply product at the levels being requested." Most of our fish raisers may not have a great deal of background in filling large orders at state requested quantities, therefore, this may tend to inflate bonding costs somewhat.

2) Contract requirements I have heard about include a "minimum" statement can result in receipt of less desirable product. By that I mean, if a contact has a walleye fingerling minimum size statement of 4 inches, a vendor may sort down to that level to get rid of some "culls" he may have on hand. The same thing could be true for other species. Prices I have seen from the private sector have involved a price/length differential. DNR contracts should include protective language.

3) It is my understanding that the sample contracts developed cited delivery in September or October. September can be quite hot resulting in undue stress and high shipping induced losses. Procurement procedures should be developed to recognize and prevent high shipping losses at the state's expense.

4) Consideration should be given to whether the fish purchased would be F.O.B. the fish pond or delivered to a target lake or DNR facility. Since delivery of the fish to a target lake is the ultimate objective contract language should be developed to provide for delivery of a healthy, viable product to the target lake.

5) Since the state would be buying fish for stocking they would be subjected to a 6% surcharge due to sales tax. This is unacceptable."

Grower 2

"Sample contract item number 2, the term; the term should be extended to November 10 to be concurrent with item number 11. Please read number 11.

Sample contract item number 3, quantity; because of accepted stocking and production problems, muskies are normally sold in lots of 500 to 1000 fish. They are stocked in smaller quantities than other fish resulting in smaller total requirements. It's my understanding the State of Minnesota traditionally stocks about 25,000 muskies. Therefore, purchasing muskies in lots of 20,000 fish does not fit past or present policy. However, I believe they can be produced in large number to fulfill large stocking requirements. Also, muskies are normally, if not always, sold by the inch delivered, using a maximum and minimum parameter resulting an average length to base payment on. An 8 inch to 10 inch requirement would result in a 9 inch average fish. However, a 9 inch minimum would result in anti-selection against the contract because the producer would likely be selling only smaller or cull fish to the state of Minnesota. Properly raised muskies under normal conditions in October should range in size from 9 inches to 12 inches. Nine inch fish under the proposed contract would be the bottom one-third of the corp.

Sample contract item number 6, bonding; all fish furnishing contracts I have seen in the last 5 years have been "best effort" contracts with no bonding required. The grower wants to sell fish! But, what if: the state has a poor egg take - No fish for contract; the state has hatching problems - No fish for contract; the grower has water, temperature or disease problems - No fish for contract; the sucker egg and hatching operations fail - No fish for contract; the minnow suppliers are short on forage minnows - No fish for contract. In other words, only about 25% of the operation is directly in control of the contract holder. The muskie fry supplier, the sucker supplier, and the minnow supplier cannot guarantee delivery one year in advance. Bonding is available, but the requirements may get prohibitive in most cases. In the case of this proposed contract, no producer in the state of Minnesota would qualify. My insurance agent had two companies that would consider a performance bond on a fish contract with the same two underwriting requirements, financial strengths and production history. Financial strength meant having 30-50% of the value of the contract liquid to get a bond. That stringent of a cash reserve requirement would virtually eliminate everyone. Production history, simply means you must have successfully produced as many muskies as the contract requires prior to the contract date. To the best of my knowledge, no one in the state of Minnesota has successfully produced 20,000 9 inch muskies in one growing season.

Sample contract item number 11, delivery and delivery schedule; delivery should not begin before the 15th of September and should be extended to November 30th. Normally the weather is too warm in early September to properly handle large quantities of fish. The first week of September is at least partly used up by State Fair activities. Because muskies are raised in a particularly low density situation it naturally takes more time and effort on the part of the producer to harvest and deliver large quantities without damaging the fish.

Sample contract item number 12, liability for fish lost; since the states real interest is to get as many inches of healthy fish in Minnesota lakes as reasonably priced as possible, penalizing the producer financially for a shortage of fish accomplishes nothing. If the producer fails to produce enough fish, the state should only pay for what it received and of to the next supplier. Since the state has access, (proposed contract item #13), it can reject frivolous bids after facility inspections and production history from the producer. A cash penalty against the producer does not put fish in Minnesota lakes. The money does the state no good and only makes it more difficult for the producer to be in business.

Proposed contract item number 16, indemnifications; the producer should hold the supplier harmless from any and all liability arising or resulting from the misuse of the product whether real or construed. Some people are against stocking muskies in Minnesota waters. The producer is not willing to accept or share the state's liability from any claims.

In final analysis, it's my opinion that if I was proposing this contract to the State of Minnesota or anyone else they could not live with the contract. The so-called good or fair contract should be one that you would be able to live on either side of."

Grower 3
May 10, 1990

"The contract is largely very well thought out. For the benefit of the State it might be beneficial to add a quality index based on the % of species practical maximum. This could be written in the form of Purchaser's Standards.

Presently, the issue of bonding might not be able to be addressed. MN approved bonding companies might not even exist. You might not get very many growers to respond because of that issue."

Grower 3
June 4, 1990

"In discussing the subject of sample contracts with our MFFA members, there are a number of concerns on the part of the members. If this exercise is to inform our legislature, great care must be taken to compare apples to apples.

The first issue is that of bonding and the effect of its cost on the bid. DNR fish hatcheries do not deal with bonds so to include this in the cost comparison must be done with rare wisdom.

Farm Bureau Insurance will supply the required bond at a cost from $15 to $25 per $1000 to qualified contractors. The clincher is that with the short history of game fish fingerling rearing in MN, there might only be one or two who qualify for the bond. The way around that is to make bonded fish more valuable than the unbonded fish. This way, any given contractor could bond his performance up to a certain level at a premium price and still bid fish number above that bonded number at a reduced price. In addition, new contractors could bid and deliver unbonded fish until they become bonded.

In general, the design of these sample contract documents is very good.

Experience and outside input could aid in the progressive evolution of the document and the process. For starters, this would go as is but, as a result of the sample contract process, I'm sure that you now have ample input to fashion an improved document.

We of MFFA stand ready to help at any time we are called upon and invite you to do so."

Grower 4

"Some comments on bid sheets:

- Basically, these look good, but for species like pure muskellunge, units of 20,000 are way too large. Current value is about $7.00 per fingerling.

- It would be difficult under #11, delivery, to give 3–day notice before delivery and meet #8. Conditions of handling clause, states fish can only be cribbed for 24 hrs. after harvest. Some provision for holding in tanks should be made.

- The walleye fingerling contract specifies Mississippi or Leech lake strains. There is currently no egg source for Leech Lake strain walleye at this time.

- The contracts seem to be generally acceptable and several producers could meet the terms of the contract as written."

Grower 5

"Walleye fingerlings should be divided into different size classes, otherwise why raise 6" walleye if you get paid the same for 4". But sizes determined should be reasonable for one summer's growth in Minnesota rearing ponds."

Grower 6

"1) Mississippi or Leech Lake strains? I'm not aware that these were the only walleye strains the DNR used in their walleye program. I also would like to find out if the DNR has dropped their idea that there are several different strains according to watersheds throughout the state?

6) If you can only fill part of the contract does that then void the whole contract or would they accept the amount of fish you have and collect from your bond on the remaining portion of it. Availability of bonding may be difficult.

8) Cribbing of fish for more than 24 hours is a common practice among private growers, as a rule I hold all fish for three days prior to shipment, this allows the ones that were injured during netting to be removed and leaves you with a better all around product.

9) I already have my fingerlings inspected on a yearly basis and have no problems with the disease inspection. However, if the private sector is strapped with these requirements then the DNR should also comply. I would prefer that they be inspected by someone from outside the DNR or by a person representing the private sector.

11) I would like to see the period of deliveries to include April and May also. There are many times that we hold fish over in a pond for spring harvest. I don't understand the last sentence in this section. In section three, it states the fish must be a minimum of four inches and this section states that deliveries are acceptable from September 1 thru October 31, this should mean that if the fish are four inches within this time period that they will be accepted."

Appendix VI.

Other States' Contracting Activity

Support Information to the Telephone Survey of the North-Central States

Source	Comments
Rod Horner Head of State Aquaculture Program, Illinois Dept. of Conservation (309)968-7531	Illinois contracts with private growers to supplement the state's annual production. A Minnesota firm was contracted to produce 200,000 to 300,000 coho and chinook smolts for introduction to Lake Michigan. Illinois now has a hatchery that can produce enough Pacific salmon for state needs so they have not contracted with private farmers over the last 4 or 5 years. The state has bought a substantial amount of 4 inch catfish fingerlings over the years to supplement shortcomings in their production. The state has ongoing contracts with private growers to produce minnows for smallmouth and largemouth bass forage. The state has had reasonable success with the quality of fish produced by private growers. Illinois has not studied the feasibility of private farms producing all fish for state needs because the state hatcheries are considered multipurpose facilities, involved in not only fish production but also in research and education.
Gary Armstrong Administrator Indiana Dept. of Nat'l Resources	The state buys fish on an as-needed basis to supplement state production. Fish are usually bought from the lowest bidder. Recently the state purchased pike, carp and catfish. Mr. Armstrong feels it would very difficult to find a private fish farm that could guarantee year-round production of specific lifestages of fish, but the state would consider contracting if one could be found.
Terry Jennings Iowa Dept. of Nat'l Resources (515)647-2406	Iowa has never looked into buying fish from private farmers. Mr. Jennings feels that you cannot get a dependable supply from private growers.
Harry Westers Administrator Michigan Dept. of Nat'l Resources (517)373-1220	Contracts have never been considered with private farmers. Mr. Westers feels that the state could never achieve the level of control over the private growers needed to produce the genetic strains of fish required by state stocking programs.
Charles Supps Pathologist at Blind Pond Hatchery, Sweet Springs, Missouri (816)335-4531	Missouri has, on occasion, bought fish from private farmers to supplement state production. The state has an ongoing contract with private growers to produce fish for their Urban Fisheries Program and Missouri Angler Program. The state supplements production by purchasing fingerling catfish from private farms. In an ongoing contract with private growers, the state buys adult channel catfish, bullheads and carp for their Urban Lake Stocking Program. Also the state buys hybrid channel catfish from private farms to put into urban ponds for their Missouri Angler program, an organization which teaches kids how to fish. There has been some concern in the past with the health of some fish bought by the state; in addition, supply has been short in certain years.

Support Information to the Telephone Survey of the North-Central States

Terry Steinwand
North Dakota Game & Fish Dept.

North Dakota contracted with Golden Pond in Minnesota to produce walleye fingerlings in 1987 and 1989. They are now doing a feasibility study to find out about how private farms would perform. Due to the drought conditions they are experiencing difficulty in obtaining broodstock. Mr. Steinwand said that he would definitely consider buying fish from private growers if there was a need.

Kathy McDaniel
Hatchery Manager
Ohio Dept. of Nat'l Resources
Fisheries Division
(614)265-6346

She has been with the state for ten years and has never heard of such a program.

Dennis Unkenholz
Division Staff Specialist, South Dakota
Dept. of Game, Fish and Parks
(605)773-3381

South Dakota had a contract with a private farm in Minnesota to grow walleye fingerlings. SD gave the private company walleye fry of specific strains, the fish were grown to fingerlings then the state received a percentage of the production. The program was successful and SD was pleased with the condition of the fish. State officials would seriously consider contracting with a private grower to produce fish for state needs, but no private growers have offered to do so. A feasibility study by SD says the state will need to expand production.

David Ives
Supervisor of Hatcheries
Wisconsin Dept. of Nat'l Resources
(608)267-7865

Wisconsin is now in the process of conducting an analysis of what it costs the state to produce fish. Current cost estimates are not available. In the mid-1970's, due to pressure from the aquaculture lobby, the Wisconsin legislature forced the state to buy fish from private growers. The state purchased trout yearlings. State personnel felt that they never received the quality or quantity of fish they expected. In addition, there were cost bidding problems. The private growers at that time controlled all phases of their production from spawn to harvest. Brown trout are the species most stocked by the state. Most private growers raise rainbow trout.

A cost analysis in the late 1970's showed that the state could produce fish more cheaply than private growers. This cost analysis involved feed, labor and facility maintenance and upkeep. All of the state hatcheries were paid for so there were no development costs.

Mr. Ives stated that a contract program with private growers could be successful if:

- The state was able to provide specific strains of fish to the private growers
- The state could get fish of necessary size at specific times of the year to integrate into its stock program
- The state could get high quality, healthy fish
- The private growers could guarantee steady and long-term production. "The state is going to be around for a long time, can we depend upon the private farmer to be there also?"

Mr. Ives believes it would take a couple of years working with the private growers before they would be able to provide a good and dependable product. Wisconsin does have contracts with private growers for walleye fingerling production. The state produces the eggs or fry and the private growers produce fish to the desired size. The program has been relatively successful.