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The State of Ohio, Auditor of State

Ohio Department of Natural Resources Interim Report: Fish Hatchery Operations

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Dave Yost · Auditor of State

January 15, 2015

James Zehringer, Director
Ohio Department of Natural Resources
2045 Morse Road
Columbus, Ohio 43229

Dear Director Zehringer: Jim:

It is my pleasure to present to you this interim report of operations at the Ohio Department of Natural Resources. This service to ODNR and to the taxpayers of the state of Ohio is being provided pursuant to Ohio Revised Code § 117.46 and is outlined in the letters of engagement signed September 4, 2013 and April 2, 2014.

The Ohio Performance Team (OPT) of the Auditor of State's office is managing the project and is conducting their work in accordance with *Government Auditing Standards.* This interim report is issued pursuant to the engagement agreement, which provides that the Auditor of State's office may issue reports from time to time during the course of the engagement.

The objective of this engagement is to review and analyze selected areas of ODNR operations in relation to surrounding states, industry standards, and recommended or leading practices. Where supported, the performance audit will identify recommendations for improvement.

The enclosed interim report is limited to Fish Hatcheries, including operations, processes, and data-driven management practices, with an eye to maximizing efficiency, cost effectiveness, and customer responsiveness. This report is subject to modification as appropriate upon issuance of the final report. This report reviews preliminary findings as of January 15, 2015.

Sincerely,

Dave Yost
Auditor of State

Danny A. Cecil
Director, Ohio Performance Team

88 East Broad Street, Fifth Floor, Columbus, Ohio 43215-3506
Phone: 614-466-4514 or 800-282-0370 Fax: 614-466-4490
www.ohioauditor.gov

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Fish Hatchery Operations

Section Overview

This section focuses on the Ohio Department of Natural Resources' (ODNR or the Department) fish hatchery operations. Information was collected to determine species-specific production costs across the six state-owned fish hatcheries that are operated by ODNR's Division of Wildlife (Wildlife or the Division). Analysis was performed to assess hatchery-to-hatchery cost effectiveness as well as cost effectiveness relative to market prices from privately owned and operated fish hatcheries. Analysis determined that ODNR's fish hatchery operation is generally price competitive with the private market, especially when producing at high volumes. In addition, the analysis found that key operational data and information has not been uniformly collected or analyzed. As a result, Wildlife is unable to easily engage in a more detailed level of comparison that would help to inform operational decision making and identify opportunities for greater efficiency and effectiveness.

Recommendation Overview

Recommendation 8.1: ODNR should ensure that necessary data and information is being gathered, reported, and analyzed to ensure that the fish hatchery operation is efficient and effective and produces fish at a cost commensurate to, or lower than, external suppliers. In doing so, the Department should track detailed cost inputs and allocate them back to production lines in order to capture the true, full cost of the hatchery operations and each species produced. The full cost should then be taken into account when determining the best course of action to cost effectively meet production needs. Finally, hatchery-specific production capabilities and relative efficiencies should be taken into account when assessing the ongoing strategic nature and cost of hatchery operations.

Financial Implication 8.1: By analyzing and implementing identified opportunities for increased efficiency and effectiveness, such as has been done with largemouth bass production, ODNR can ensure that resources are reallocated toward mission-critical functions. Eliminating the internal production of largemouth bass and instead, sourcing this species from external suppliers will result in a net annual efficiency gain of **$54,994**.

R8.1 Fish Hatchery Operations

Background

Wildlife is tasked with managing Ohio's public fisheries which, according to the Division, encompass "124,000 acres of inland water, 7,000 miles of streams, 2¼ million acres of Lake Erie, and Ohio's portion of 481 miles of the Ohio River." Though fish hatchery operations are the focus of this report section, managing Ohio's public fisheries also encompasses other activities such as improving spawning habitat, developing fishing regulations, and monitoring species populations. The *Fisheries Tactical Plan* (Wildlife, 2010) notes that the collective mission of the six fish hatcheries is to, "provide fisheries and human resources to help the [Division] carry out its mission to conserve and improve fish and wildlife resources and their habitats for sustainable use by all."

ODNR's fish hatchery operation produces and stocks over 30 million sportfish of varying species and sizes each year.[1] In FY 2013-14, Wildlife staffed hatchery facilities with 33 employees; 25 were full-time, year-round while the remaining 8 were part-time, seasonal. Though specific day-to-day activities vary by hatchery location and season, fish hatchery personnel are primarily responsible for fish rearing, hatchery maintenance and upkeep, and transport of fish to stocking sites. Secondary responsibilities include: facilitating hatchery tours, facilitating stocking events, and conducting educational activities. Inclusive of labor and other operating expenditures, the hatchery operation functions on an annual budget of $2.0 to $2.5 million. A majority of the revenue used to support the hatchery operation comes from Ohio fishing license proceeds and federal sportfish restoration funds.[2]

[1] Total fish produced and stocked annually by Wildlife includes 10 to 15 million fry-sized walleye and saugeye. Though these fry represent substantial numbers, they were excluded from the analysis contained in this report due to the immaterial resource inputs used in their direct rearing. Specifically, for the time-period that these fry are in hatcheries they subsist wholly on nutrients that are present in the egg sack or that naturally occur in the water.
[2] Federal Aid in Sport Fish Restoration Act of 1950; commonly called the Dingell-Johnson Act.

Table 8-1 shows the six state hatcheries along with high-level information regarding location, age, and infrastructure. This type of information provides insight into the statewide footprint of hatchery operations as well as the site-specific footprint and duration of facility operation.

Table 8-1: ODNR Hatcheries Overview

Hatchery	County	Est. [1]	Acres (Land)	Acres (Water)	Water Source
Kincaid State Fish Hatchery	Pike	1935	214	24	Natural Spring
London State Fish Hatchery	Madison	1896	83	8	Natural Spring / Wells
Hebron State Fish Hatchery	Licking	1982	235	60	Buckeye Lake / Wells
St. Marys State Fish Hatchery	Auglaize	1936	155	43	Grand Lake St. Marys / Well
Castalia State Fish Hatchery [2]	Erie	1997	90	N/A	Blue Hole Aquifer, Cold Creek
Senecaville State Fish Hatchery	Guernsey	1987	121	37	Seneca Lake

Source: Wildlife
[1] Dates indicate establishment as a State of Ohio fish hatchery.
[2] Castalia State Fish Hatchery does not have ponds and therefore has no calculated water acreage.

As shown in **Table 8-1**, ODNR's hatcheries are a long-established operation with locations across the State. For example, London State Fish Hatchery (London) and Kincaid State Fish Hatchery (Kincaid) both commenced operation as State hatcheries under two previous iterations of the Division – the Ohio Fish Commission and the Division of Conservation, respectively.[3] St. Marys State Fish Hatchery (St. Marys) was dedicated as a state entity in 1936 after being founded by the Western Ohio Fish & Game Association in 1913. Having both been built in 1938 as part of the Works Progress Administration initiative, Senecaville State Fish Hatchery (Senecaville) and Hebron State Fish Hatchery (Hebron) were acquired from the United States Fish and Wildlife Service in the 1980s. Finally, Castalia State Fish Hatchery (Castalia) was built in 1937 and purchased from private interests in 1997.

Water sources for each hatchery are also shown in **Table 8-1**. Water sources are integral to hatchery operations and often dictate how cost effectively a species may be produced. Certain species can only be cost effectively produced at certain water temperatures and dissolved oxygen content ranges. For example, rainbow trout require cold, clean, high-oxygen content water, so the bulk of production is centered to take advantage of these natural conditions.

[3] According to Wildlife, "The [Division] is a direct descendant of the Ohio Fish Commission, which was created by the General Assembly in 1873 to deal with declining fish populations in Ohio's inland lakes and streams. In 1949 the Division was joined with other state conservation agencies under the mantle of the newly created Department of Natural Resources. By that time, the original Fish Commission's duties had expanded to include law enforcement, fish and wildlife management, propagation, research, stream improvement, and pollution investigation."

Table 8-2 shows the species produced at each hatchery and average production volume from FY 2011-12 to FY 2012-14. This overview illustrates the diversification and volume of production between hatcheries as well as the link to species specialization based on water source.

Table 8-2: Species Production Overview Average FY 2011-12 to FY 2013-14

Cold Water Species							
	Kincaid	**London**	**Hebron**	**St. Marys**	**Castalia**	**Senecaville**	**Total**
Steelhead	N/A	N/A	N/A	N/A	432,333	N/A	**432,333**
Rainbow Trout[1]	25,000	31,684	N/A	N/A	80,667	N/A	**105,667**
Brown Trout	N/A	34,982	N/A	N/A	N/A	N/A	**34,982**
Cool Water Species							
	Kincaid	**London**	**Hebron**	**St. Marys**	**Castalia**	**Senecaville**	**Total**
Muskellunge	14,000	8,884	N/A	N/A	N/A	N/A	**22,884**
Walleye	N/A	N/A	0.9M	1.4M	N/A	4.1M	**6.4M**
Saugeye	N/A	N/A	2.3M	3.0M	N/A	1.4M	**6.7M**
Yellow Perch	N/A	N/A	N/A	1.3M	N/A	N/A	**1.3M**
Warm Water Species							
	Kincaid	**London**	**Hebron**	**St. Marys**	**Castalia**	**Senecaville**	**Total**
Largemouth Bass	N/A	N/A	N/A	3,736	N/A	N/A	**3,736**
Hybrid Striped Bass	N/A	N/A	N/A	N/A	N/A	967,785	**967,785**
Bluegill	N/A	N/A	98,164	N/A	N/A	N/A	**98,164**
Blue Catfish[2]	N/A	N/A	11,242	N/A	N/A	N/A	**11,242**
Channel Catfish	N/A	N/A	54,429	53,394	N/A	57,320	**165,143**

Source: Wildlife

[1] Rainbow trout are initially raised at London and then transferred to Kincaid for feed-out to catchable size. Therefore, the total for rainbow trout represents only the total finished and stocked fish from Castalia and Kincaid.

[2] Blue catfish are in a trial phase of stocking and are being studied by Division biologists. There is a high likelihood of a significant increase in production numbers if trial results are favorable.

As shown in **Table 8-2**, species production and volumes vary by hatchery.[4] However, the overall composition of species produced has remained fairly constant over the last decade and is normally made up of these species common to recreational sportfishing in the Midwest/Great Lakes region. A hatchery's total production volume is partly a function of available water resources, but is also a function of available capacity, target production size, and resources (e.g., personnel and financial). In general, species produced at higher volumes are stocked at smaller sizes than those being produced at lower volumes.

[4] As shown in **Table 8-1** and **Table 8-2**, hatcheries with surface water sources such as Hebron, Senecaville, and St. Marys are sufficient for the rearing of warm water species, while the cooler water of springs and aquifer sources at Castalia, Kincaid, and London are well suited to the rearing of cold and cool water species.

Production Sizes

Within the industry, production sizes are commonly signified by life stages. The Division states that their common production sizes include:

- "**Fry** – Newly hatched fish that have just completed absorbing their nutrient-rich egg sac, and are typically a few days or more old and less than a half-inch. When stocked, fry are ready to start feeding on plankton or other small organisms.
- **Fingerlings** – Depending upon the species, these fish are typically three to six weeks old and about 1.5 [to] 2 inches. When stocked, fingerlings are ready to feed on insects, or, in the case of fish-eating fishes such as walleye or saugeye, small fish such as newly hatched gizzard shad.
- **Advanced Fingerlings** – Muskellunge are the only advanced fingerlings presently stocked by [Wildlife]. At the time of stocking, they are over 4 months old and 8 [to] 12 inches, and ready to feed on fish such as gizzard shad.
- **Yearlings** – These are fish in their second growing season that have been raised in the hatchery to larger sizes to improve their survival when stocked. Channel catfish are often stocked as yearlings at 8 [to] 12 inches when they are large enough to avoid predation by bass and ready to feed on a variety of items.
- **Catchables** – These are larger fish raised for "put-and-take" fishing opportunities, typically rainbow trout, channel catfish, or hybrid sunfish. Sizes may vary, but they are older fish that have been kept in the hatchery more than one year and will be ready for anglers to harvest as soon as they are stocked."

Production and Stocking Strategies

Desired species-specific production size, volume, and timing are driven largely by fisheries management goals and objectives.[5] Common objectives that feed into sportfish production strategies include: population establishment, restoration, enhancement, and/or diversification. Aside from specific sportfishing goals, Wildlife may also produce and stock endangered or threatened species in order to support or reestablish populations. Common production and stocking strategies employed by the Division include:

- **Put-Grow-Take –** This stocking strategy accounts for approximately 97.0 percent of total annual production. Fish are raised and stocked at a length of less than catchable size with the intent that growth up to catchable size will occur in the wild. This practice is employed to help create or maintain a species or fishery where habitat or other factors may be limiting natural reproduction to a point insufficient to support sportfishing. Species typically included in this strategy are walleye, saugeye, yellow perch, hybrid striped bass, steelhead, brown trout, and muskellunge.
- **Put-and-Take –** This stocking strategy accounts for 1.0 to 1.5 percent of total annual production. This strategy is targeted toward Wildlife's programmatic objective centered on "recruitment and retention" of anglers. As such, the Division raises and stocks fish at a

[5] Fish stocking occurs intermittently between early spring and mid-fall of each year.

size which anglers, typically youth, will catch and keep. These "release" events[6] are open to the public and often include partnerships with local governments or sporting groups as well as special event activities. Most often these fish will be caught immediately or within a few weeks of stocking. Species typically included in this strategy are rainbow trout, channel catfish, bluegill, and hybrid sunfish.

- **Restart –** This stocking strategy accounts for another 1.0 to 1.5 percent of total annual production. In this strategy, target production size is equivalent to put-grow-take, but the goal is to create or restore a naturally reproducing population. This strategy is typically employed when a new impoundment has been created or when an existing impoundment had been drained for repair or renovation. Species typically included in this strategy are largemouth bass, bluegill, and channel catfish.
- **Restoration –** This stocking strategy is the least common, accounting for less than 1.0 percent of total annual production. The strategy involves re-establishing or attempting to bolster a population which has been deemed "threatened" or "endangered". Historically, this strategy has included species such as shiners and darters, paddlefish, and brook trout.

Impact on Production Cost Profile

Species diversity, number, and size are outputs of a production and stocking strategy that is developed by Wildlife fisheries biologists with input from sportfishing and environmental stakeholders. As noted, production is affected by capacity and water supply at each hatchery. However, production is also limited by available resources and each strategy mix (i.e., species, size, and production number) presents a different cost profile. In general:

- **Species –** Some species are more cost intensive than others to produce. For example, muskellunge, as a carnivorous species require live feed (e.g., carp fry and fathead minnows) throughout their duration in the hatchery system. Muskellunge present a much more expensive cost profile relative to species that are primarily or completely reliant on pelleted foods.[7]
- **Size –** Larger target production size correlates to more resource intensive, and therefore higher cost, production. As noted, however, certain production sizes and stocking strategies are required to effectively meet program goals and biological needs. For example, determination of production size takes into account survivability ratios, which tend to increase as production size increases. While smaller fish can be produced at lower cost they must also be produced in greater number to have the same effect as a smaller number of larger fish.[8]
- **Number –** Due to economies of scale, producing larger numbers of fish is typically more cost effective, especially on a per unit basis, than producing in lesser amounts. For

[6] Specific to rainbow trout, Wildlife scheduled 63 releases across the State from March through May 2014.

[7] According to Wildlife, the cost of muskellunge is offset through the internal production of feeder fish. However, there have been instances where internal production of feeder fish has not been able to meet demand. To meet this resource demand, the Division is forced to source feeder fish from private suppliers. Often this is done with Division resources, but there have been times when muskellunge sportfishing stakeholders have partnered to raise funds to offset this cost.

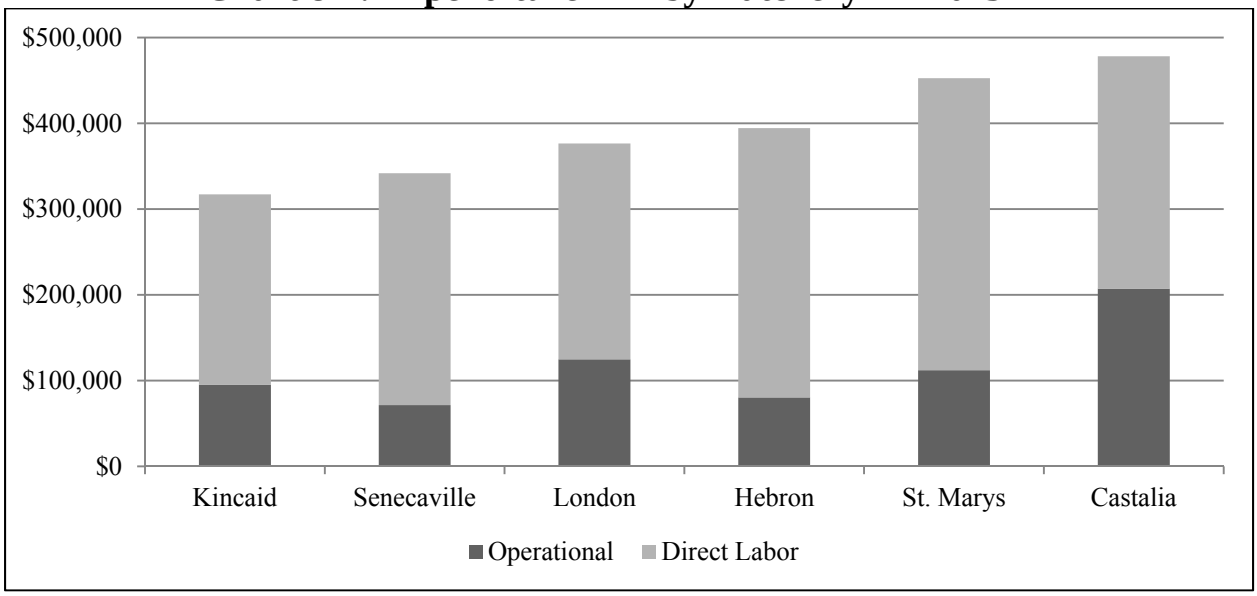
[8] According to the Wildlife publication *Muskellunge Fishing in Ohio*, the initial muskellunge stocking was focused on fry and fingerlings, but "In 1982 the Division redirected its efforts to the production of 8- to 10-inch fish, because ongoing research was demonstrating that they survived better than 3- to 6- inch fish."

example, each species requires a fixed cost or resource baseline (e.g., rainbow trout require a cold water run while largemouth bass require a warm water pond). Once the baseline fixed cost is committed, production can be scaled to gain efficiencies. Up to a certain point, each incremental increase in the number of fish produced represents only a marginal increase in variable cost (e.g., feed), but increases the efficiency of the original fixed cost (e.g., building and maintenance cost to operate the hatchery).

Market prices are reflective of all three aspects of the cost profile. For example, market prices of rainbow trout ranged from $1.29 for each 2-4 inch fingerling to $3.99 for each 8-10 inch juvenile at one private hatchery in Ohio. Furthermore, bulk purchases at another privately operated hatchery in Ohio are rewarded with a 3.0 percent reduction in unit price when increasing rainbow trout purchase volume from between 50 and 100 pounds ($8.50 per pound) to between 101 and 250 pounds ($8.25 per pound).

Chart 8-1 shows expenses for each hatchery organized by direct labor and operational expenditures for FY 2013-14. This overview provides baseline information on total operating expenses and illustrates the cost structure of each hatchery.

Chart 8-1: Expenditure Mix by Hatchery FY 2013-14



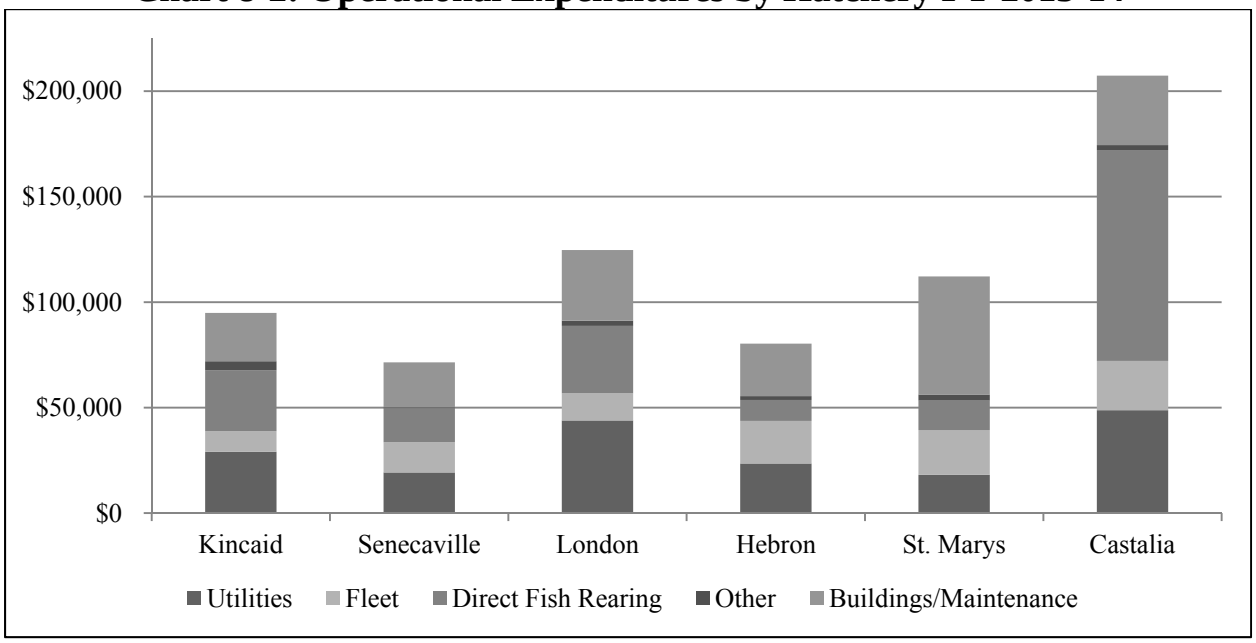
Source: Wildlife

As shown in **Chart 8-1**, total hatchery expenditures vary from a low of $317,219 at Kincaid to a high of $478,141 at Castalia for FY 2013-14. Total expenditures can be divided into two, principal components including direct labor expenses and operational expenses. Direct labor encompasses the cost of employee payroll and benefits, whereas operational expenses include all other costs to run the hatchery, excluding capital investments. Direct labor expense consistently represents the largest proportion of total expenditures for the hatchery operation; 70.7 percent of total costs in FY 2013-14. Direct labor expense is a relatively fixed cost and varies from a low of $222,292 at Kincaid to a high of $340,573 at St. Marys; a difference of $118,281 or 53.2

percent.[9] However, operational expense varies from a low of $71,435 at Senecaville to a high of $207,328 at Castalia; a difference of $135,893 or 190.2 percent. Operational expense is largely a reflection of the production strategy employed at each hatchery and, as such, warrants further analysis.

Chart 8-2 shows a breakdown of operational expenditures by hatchery for FY 2013-14. This provides additional context to **Chart 8-1**, but also illustrates the aforementioned relative cost intensity of the various production strategies.

Chart 8-2: Operational Expenditures by Hatchery FY 2013-14



Source: Wildlife
Note: Other expenditures include employee apparel, training, and travel only.

As shown in **Chart 8-2** the amount and distribution of operational expenditures varies between hatcheries. Among operational expenses, buildings/maintenance, personnel, and fleet remain fairly uniform from year-to-year and are generally reflective of a fixed operating cost. In contrast, direct fish rearing and utilities are variable in nature and closely correlate to each hatchery's production strategy. The muskellunge, steelhead, rainbow trout, and brown trout collectively raised at Castalia, London, and Kincaid are all relatively feed-intensive varieties of fish. Production at these three hatcheries couples relative feed intensity with species-specific production sizes focused on advanced fingerlings, yearlings, and/or catchables. The result is that the direct fish rearing cost center, largely made up of feed cost, represents the main source of operational cost variation across hatcheries. For example, when including all costs, total operational expenditures range from a low of $71,435 at Senecaville to a high of $207,328 at Castalia; a difference of $135,893 or 190.2 percent. When excluding direct fish rearing cost, total operational expenditures range from a low of $55,341 at Senecaville to a high of $107,352 at Castalia; a difference of $52,011 or 94.0 percent. When specifically examining direct fish rearing

[9] For FY 2013-14 full-time equivalent (FTE) staffing, based on 2,080 hours per FTE, by hatchery is as follows: Kincaid 3.5, Senecaville 4.3, London 4.4, Hebron 5.4, St. Marys 5.4, and Castalia 4.7.

costs, Castalia is 213.9 percent higher than the next most cost intensive hatchery (London); 396.3 percent higher than the average of all other hatcheries; and 650.3 percent higher than the average of all other non-trout hatcheries. Castalia, London, and Kincaid are also relatively energy intensive with average utility costs that are 99.7 percent higher than the average utility costs at Senecaville, Hebron, and St. Marys. Utility cost differences are largely driven by the need to pump and aerate large quantities of water for trout production and the use of propane to heat water for muskellunge forage fish production.

Methodology

This section of the performance audit seeks to enumerate hatchery-to-hatchery and system-wide species-specific production costs, assess internal comparability, and compare Wildlife's hatchery operation cost effectiveness to the private market. Production data and information was provided by the Division and supplemented by the testimonial evidence of Central Office personnel as well as hatchery-specific management staff. Data and analysis focused on hatchery expenses and production for FY 2011-12 through FY 2013-14.[10]

Total expenditures were readily available from Division financial information. However, categorical and sub-categorical expenditures were not readily comparable due to the presence of hatchery-to-hatchery coding and naming convention differences. These differences were able to be fully reconciled through additional detailed information from Central Office as well as hatchery-specific management staff. Where possible and appropriate, categorical and sub-categorical expenditures were immediately allocated at a species-specific level. However, certain categories of expense (e.g., direct labor, fleet, and buildings/maintenance) lacked detailed records which would easily facilitate species-specific cost allocation. To address the lack of readily available detail, site visits and surveys of hatchery-specific management staff were conducted.

Once total expenditures were allocated by hatchery and species, production cost per unit could be calculated. Production cost per unit was then compared internally where multiple hatcheries were engaging in similar production (e.g., rainbow trout and channel catfish). Further, production cost per unit was compared to CY 2014 market prices, by size and species where applicable.[11] Market prices were obtained through research conducted on private-sector hatcheries across Ohio.

[10] Fish are typically counted at release, as such, certain species final production numbers were not yet available for FY 2013-14 given that some fish are due to be released during FY 2014-15. In these cases expenditures are average FY 2011-12 through FY 2013-14 while production numbers are average FY 2011-12 and FY 2012-13.

[11] Not all species produced by Wildlife have a market rate (e.g., walleye, saugeye, and brown trout). As such, analysis focuses on hatchery-to-hatchery cost efficiency.

Analysis

Table 8-3 shows Wildlife's per-species average production cost for FY 2011-12 to FY 2013-14 compared to CY 2014 market prices, controlling for species and production size. In addition, where multiple hatcheries produce the same species, each hatchery's production cost and size is broken out for comparison. This analysis is instructive to not only assessing market cost efficiency, but also hatchery-to-hatchery cost efficiency.

Table 8-3: Production Cost Comparison Average FY 2011-12 to FY 2013-14

Species	Hatchery	Avg. Size (Inches)	Cost per Fish	Market Price	Difference	Percent Difference
Cold Water Species						
Steelhead [1]	**Castalia**	**6 to 8**	**$0.59**	**$3.49**	**($2.90)**	**(83.1%)**
Rainbow Trout [2]	Castalia	10 to 12	$2.68	$4.36	($1.68)	(38.5%)
	London	3 to 6	$4.07	$2.29	$1.78	77.7%
	Kincaid	10 to 12	$5.34	$4.36	$0.98	22.5%
	Wildlife Avg.	**10 to 12**	**$4.27**	**$4.36**	**($0.09)**	**(2.1%)**
Brown Trout	**London**	**6 to 8**	**$3.51**	**N/A**	**N/A**	**N/A**
Cool Water Species						
Muskellunge	London	10 to 12	$21.17	$45.00	($23.83)	(53.0%)
	Kincaid	10 to 12	$18.09	$45.00	($26.91)	(59.8%)
	Wildlife Avg.	**10 to 12**	**$19.29**	**$45.00**	**($25.71)**	**(57.1%)**
Walleye	Hebron	1 to 2	$0.07	N/A	N/A	N/A
	Senecaville	1 to 2	$0.02	N/A	N/A	N/A
	St. Marys	1 to 2	$0.05	N/A	N/A	N/A
	Wildlife Avg.	**1 to 2**	**$0.03**	**N/A**	**N/A**	**N/A**
Saugeye	Hebron	1 to 2	$0.03	N/A	N/A	N/A
	Senecaville	1 to 2	$0.05	N/A	N/A	N/A
	St. Marys	1 to 2	$0.03	N/A	N/A	N/A
	Wildlife Avg.	**1 to 2**	**$0.03**	**N/A**	**N/A**	**N/A**
Yellow Perch	**St. Marys**	**2**	**$0.06**	**$0.89**	**($0.83)**	**(93.3%)**
Warm Water Species						
Largemouth Bass	**St. Marys**	**3 to 5**	**$16.25**	**$1.53**	**$14.72**	**962.1%**
Hybrid Striped Bass	**Senecaville**	**1 to 2**	**$0.06**	**N/A**	**N/A**	**N/A**
Bluegill	**Hebron**	**2 to 3**	**$0.66**	**$0.70**	**($0.04)**	**(5.7%)**
Blue Catfish [3]	**Hebron**	**12**	**$5.83**	**N/A**	**N/A**	**N/A**
Channel Catfish	Hebron	12	$1.41	$2.80	($1.39)	(49.6%)
	Senecaville	12	$2.28	$2.80	($0.52)	(18.6%)
	St. Marys	12	$1.71	$2.80	($1.09)	(38.9%)
	Wildlife Avg.	**12**	**$1.81**	**$2.80**	**($0.99)**	**(35.4%)**

Source: Wildlife and private-sector hatcheries

[1] Steelhead are similar to rainbow trout and the inputs and requirements for commercial production of each are largely the same. Though a true market price does not exist for steelhead, the proxy rainbow trout market price does provide informative context for gauging the efficiency of the Division's steelhead production.

[2] Rainbow trout average cost takes into account the aggregate "cohort" cost of rainbow trout that are initially raised at London, but then finished out to catchable size at Kincaid; $9.41 per fish.

[3] Blue catfish are in a trial phase of stocking and are being studied by Division biologists. There is a high likelihood of a significant increase in production numbers if trial results are favorable.

As shown in **Table 8-3**, Wildlife's hatchery operation is, on average, cost competitive versus market prices. There are, however, production lines which approach or exceed market prices. In instances where a species is produced at multiple hatcheries, the total average expenditure per fish for that species is a weighted average of the entire operation. Both aspects, be it an individual hatchery's production cost per fish, or the total species cost, warrant further evaluation when assessing opportunities for greater efficiency and effectiveness.

Species Produced for Less than Market Prices

- **Rainbow Trout** – A production cost of $4.27 per fish compared to the identified market price of $4.36 per fish yielded a difference of $0.09 or 2.0 percent. However, the Division's hatchery-to-hatchery costs vary significantly due to production sizes and economies of scale. For example, Castalia produces rainbow trout at the lowest internal cost; $2.68 per fish, $1.59 or 37.2 percent lower than the Division average. Castalia's relative efficiency is attributable to high-volume specialization in trout species (i.e., rainbow and steelhead) at a hatchery with a natural water supply that is conducive to efficient production of these species. In contrast, the remainder of the Division's rainbow trout production is a combined effort between London and Kincaid. This arrangement involves a cohort of rainbow trout beginning their life at London and remaining there until they are three to six inches in length. At this time, they are transferred to Kincaid for feed-out to catchable size. Due to current production being structured in this manner, London's average expenditure per fish of $4.07 and Kincaid's of $5.34 result in a total $9.41 average expenditure per fish. This aggregated production cost per fish is higher than the Division average by $5.14 or 120.3 percent. The relative cost inefficiencies of London and Kincaid are attributable to low production volumes and hatchery facilities that are amenable, but not optimized for cold water species production. Though the Division could more cost effectively source all rainbow trout from Castalia, there may be capacity constraints and biological considerations (e.g., production diversification to guard against the spread of disease among a single population) that should be taken into account when making this determination.

- **Bluegill** – A production cost of $0.66 per fish compared to the identified market price of $0.70 per fish yielded a difference of $0.04 or 5.7 percent. Raised only at Hebron, the production volume varied from 130,781 in FY 2011-12 to 65,546 in FY 2012-13. Because of this variation, the cost per fish went from $0.40 in FY 2011-12 to $1.05 in FY 2012-13. This demonstrates the price-sensitivity to shifts in production volume as a result of changing production needs. Given current expenditure levels, remaining competitive with market prices requires a minimum annual production volume of between 90,000 and 100,000 fish. Baseline competitive pricing information such as this will allow the Division to more efficiently and effectively plan and execute on meeting production demands in a constrained resources environment.

- **Channel Catfish** – A production cost of $1.81 per fish compared to the identified market price of $2.80 per fish yielded a difference of $0.99 or 35.3 percent. The warm water and extensive pond capacity available at Hebron, Senecaville, and St. Marys enables the

Division to produce channel catfish in a cost effective manner. Hebron produces channel catfish at the lowest internal cost; $1.41 per fish, $0.40 or 22.0 percent lower than the Division average. Likewise, St. Marys produces at a reduced cost; $1.71 per fish, $0.10 or 5.5 percent lower than the Division average. Senecaville has the highest cost of the three facilities, producing channel catfish at a cost of $2.28 per fish, $0.47 or 25.9 percent above the Division average. Among all species produced at multiple hatcheries, channel catfish production volume has the least variation from hatchery to hatchery; no more than 6.9 percent. This means that any variations in production price among the hatcheries is almost solely due to expenditures, not differences in volume produced. Relative efficiency should be taken into account when planning and executing on production demands.[12]

- **Yellow Perch** – A production cost of $0.06 per fish compared to the identified market price of $0.89 yielded a difference of $0.83 or 93.3 percent. Like the bluegill, yellow perch are only produced at one facility (i.e., St. Marys) and their production volume has fluctuated drastically within the three year window of this analysis. St. Marys produced 371,381 yellow perch fingerlings in FY 2011-12 and 2,158,455 in FY 2013-14. Due largely to the fact that the resource inputs required to raise yellow perch to this size are minimal, vast numbers of these fish can be raised relatively cheaply. Even as the production numbers were at their lowest in FY 2011-12 St. Marys was still able to produce this species for $0.24 per fish, $0.65 or 73.0 percent below the identified market price.

Species Produced for More than Market Prices

- **Largemouth Bass** – A production cost of $16.25 per fish compared to the identified market price of $1.53 yielded a difference of $14.72 or 962.0 percent. During the three years taken into account, largemouth bass were produced only to meet restart production strategy needs and were only produced at St. Marys. As previously noted, restart typically involves relatively small numbers of larger fish. Both of these factors contribute significantly to the high per-fish cost. The Division should use this information to inform future planning decisions in regard to the most cost-efficient production and sourcing methods employed to meet biological needs.

During the course of the audit, Division management decided to discontinue the internal production of largemouth bass as a cost-saving measure. Furthermore, the existing largemouth bass brood stock which had been kept at St. Marys were diverted to population restart needs. As such, future sourcing of largemouth bass will be from external producers. Based on a three-year average production volume and a cost difference of $14.72 per fish, the net efficiency gain from sourcing largemouth bass from external suppliers rather than through internal production is $54,994.

[12] Wildlife noted that the channel catfish brood stock at Senecaville are likely the cause of the production cost imbalance. These larger, more mature fish consume more feed than the 12 inch fish that are raised for stocking.

Species with No True Market Price [13]

- **Muskellunge** – A production cost of $19.29 per fish compared to the identified market price of $45.00 yielded a difference of $25.71 or 57.1 percent. However, only one market price was able to be identified for muskellunge which indicates that this species has a highly specialized demand. As such, market prices are likely not a true measure of production cost, but rather the cost of what amounts to a low volume, luxury item. Internal cost comparisons identify Kincaid as producing muskellunge most cost effectively at $18.09 per fish while London produces them at $21.17 per fish. The difference in price stems mainly from economies of scale created by Kincaid producing a greater volume.[14]

- **Brown Trout** – Wildlife's brown trout production cost is $3.51 per fish. This cold water species is only suitable to being stocked in four Ohio rivers and is only produced at London. Research into various private hatcheries revealed that none produced brown trout in Ohio.

- **Blue Catfish** – Wildlife's blue catfish production cost is $5.83 per fish. As noted in **Table 8-3**, the production of this species of catfish is still relatively new to the Division's hatchery system. Only produced at Hebron, this species is currently in a trial phase of stocking and requires further study to determine its viability as a sportfish in Ohio before production may increase. At such time, further economic evaluation of the Division's ability to cost-effectively produce this species would also be necessary.

- **Steelhead** – Wildlife's steelhead production cost is $0.59 per fish. Produced solely at the Castalia hatchery, the steelhead is essentially a rainbow trout which migrates between riverine systems and larger bodies of water, such as the Great Lakes or their native oceans. These fish, both steelhead and rainbow trout, cannot tolerate water temperatures much above 70 degrees Fahrenheit, thus they are stocked within tributaries of Lake Erie, where they will head to deeper, cooler waters of the lake once temperatures warm. They will remain there for a few years and then return to the rivers to spawn. As they are not native to this part of the United States, the spawning grounds which exist are not optimal for a completely self-sustaining fishery. Thus, the rationale behind stocking them has been to establish and sustain a sportfishery within the tributaries of Lake Erie to generate economic activity. Though no market price currently exists for steelhead, their commercial production requirements parallel those of rainbow trout. Therefore, in analyzing the operational efficiency of production, the rainbow trout market price is useful as a proxy. The Division produces steelhead that are six to eight inches in length for $0.59 per fish compared to the identified market price for similarly sized rainbow trout of $3.49; a difference of $2.90 or 83.0 percent.

[13] Certain species produced by Wildlife have little or no private sector market and are most appropriate when compared internally between similar producing hatcheries.

[14] Hatchery management staff at London noted a history of substantial muskellunge losses to bird predation. Given the significant cost associated with each such fish lost to predation, there may be strategic opportunities to employ netting systems to mitigate these losses and improve overall production efficiency and effectiveness.

- **Hybrid Striped Bass** – Wildlife's hybrid striped bass production cost is $0.06 per fish. Currently produced only at Senecaville, this species is raised to one to two inches in length for stocking. There are private entities which produce / distribute hybrid striped bass commercially in Ohio, but none do so at a size comparable to that produced by the Division.

- **Walleye** – Wildlife's walleye production cost is $0.03 per fish. Production of walleye takes place at Hebron, Senecaville, and St. Marys where the available infrastructure and water sources provide the volume and characteristic make-up of water amenable to raising walleye in large quantities. There are private entities which produce / distribute walleye commercially in Ohio, but none do so at a size comparable to that produced by the Division.

- **Saugeye** – Wildlife's saugeye production cost is $0.03 per fish. Production of saugeye takes place at Hebron, Senecaville, and St. Marys where the available infrastructure and water sources provide the volume and characteristic make-up of water amenable to raising saugeye in large quantities.

Production Cost Detail and Ongoing Measurement

Though production cost comparisons were completed, there are data points which would help to further refine species-specific production cost if Wildlife were able to gather and analyze additional detailed information. Furthermore, expenditures data was not always recorded consistently from hatchery to hatchery, or from year to year. As such, Wildlife is unable to target specific efficiency opportunities through further production cost analysis without incurring a labor-intensive reconciliation. Specific opportunities for improved data collection and management include labor allocation, transportation cost, and hatchery-to-hatchery expenditures continuity. Each opportunity is discussed in further detail below.

- **Labor Allocation** – The Division lacks data to document and confirm an exact number of annual labor hours spent on specific tasks for which hatchery personnel are responsible. In lieu of this, each hatchery superintendent provided estimates for: maintenance, mowing, and upkeep; species-specific direct labor; and all other tasks. These percentage estimates were instructive to the allocation of direct labor costs shown in **Chart 8-1** and ultimately reflected in **Table 8-3**. Direct labor accounted for an average 71.3 percent of total hatchery expenditures in FY 2013-14. Developing a systematic approach to obtaining the most accurate accounting of direct labor consumed by each task is crucial to ongoing measurement of the cost-effectiveness of operations.

- **Transportation Cost** – Each hatchery has assigned vehicles; some of which are used to transport fish while others are used for general hatchery operations. The Division retains total fuel and maintenance cost data for its hatchery fleet, but does not systematically track vehicle use as it relates to meeting operational needs. For example, the Division stocks a variety of species at many and varied sites around the state. To consistently and accurately account for the actual transportation cost associated with each species, greater detail is required. Specifically, the number of stocking trips, miles traveled per trip, fuel

usage, and volume of fish stocked should all be tracked by species. Fleet expenditures accounted for an average 22.3 percent of total hatchery operational expenditures in FY 2013-14. Developing a systemic approach to obtaining the most accurate measure of fleet expense would not only augment the determination of per-species cost effectiveness, but would also shed light on the full logistical cost of stocking strategies.

- **Expenditure Continuity** – In developing detailed cost profiles for each hatchery, it was identified that multiple expenditures of the same nature were categorized under different account codes. For example, certain feed expenditures were coded under, both, the "Agr, Groundskeeping Supplies" and "Livestock, Poultry & Fish Supp" account ID's. For this performance audit, these differences were fully reconciled through additional detailed information from Central Office personnel as well as hatchery-specific management staff. The Division would benefit from increased continuity of accounting for expenditures. Doing so would reduce the amount of administrative time and effort expended in future production analyses.

During the course of the audit, the Division began to take steps toward collecting transportation data in greater detail. For example, the Division now maintains monthly vehicle logs that include daily fuel use, mileage, and service transactions. However, the addition of species-specific trip use would improve the value of the data that is now being collected and would facilitate accurate cost allocation on a per-species basis.

Measuring the Full Cost of Government Service (GFOA, 2002), notes that, "the full cost of a service encompasses all direct and indirect costs related to that service. Direct costs include the salaries, wages, and benefits of employees while they are exclusively working on the delivery of the service as well as the materials and supplies, and other associated operating costs such as utilities and rent, training and travel. Likewise they include costs that may not be fully funded in the current period such as compensated absences, interest expense, depreciation or a use allowance, and pensions. Indirect costs include shared administrative expenses within the work unit and in one or more support functions outside the work unit (e.g., legal, finance, human resources, facilities, maintenance, [and] technology)." Further, GFOA notes that, "cost data can be extremely useful in identifying situations where a government should explore alternative service delivery options." This reinforces several points of analysis which suggest that the Division use species-specific production cost in conjunction with their other planning metrics to determine a production mix, or sourcing strategy, that provides for the most efficient and effective means of service delivery. GFOA goes on to note that, "measuring the cost of government services is useful for a variety of purposes, including performance measurement and benchmarking; setting user fees and charges; privatization; competition initiatives or 'managed competition'; and activity-based costing and activity-based management." The ability to undertake these performance-based management approaches is a result of measuring the full cost of government service.

A Systematic Approach to Managing Performance (GFOA, 2011), provides a conceptual framework for the creation of performance-based strategies, processes, and organizational culture. Many of these elements are already being employed by Wildlife as the Division carries out its mission. However, GFOA furthers this idea by noting that, "performance management

emphasizes the importance of continuous learning, improvement, and accountability for results." Consistent with observations contained in this performance audit, Wildlife should not only gather, but also report and analyze data to ensure internal and external efficiency and effectiveness.

Similar observations were made, and recommendations issued, by the Pennsylvania General Assembly's Legislative Budget and Finance Committee (LBFC) as part of two recent performance audits of the Pennsylvania Fish and Boat Commission (PFBC). *Performance Audit of the Pennsylvania Fish and Boat Commission* (LBFC, 2010) highlights a need for the PFBC to, "complete its review of the fish hatchery program to identify possible operational efficiencies that could result in cost savings." Similar to the practices recommended by the GFOA, the PFBC was tasked with creating, "a broad-based working group assigned primary responsibility to identify strategies for promoting cost savings (including hatchery consolidation strategies) in the operation of the state fish hatcheries with the least adverse effects on services to the angling public." Similarly, in the 2013 review of the original 2010 performance audit, the PFBC was instructed to, "conduct a review of its new organizational structure at the end of FY 2013-14 to determine whether the goals identified have been achieved or whether additional changes are needed, particularly as these changes would affect needed revenues." Analogous to the recommendations offered to the Division, these reviews of the PFBC and their resultant findings and recommendations focus on the continued efforts of the respective organizations to further their scope and depth of internal review, keeping in mind the efficiency with which goals and objectives are achieved.

Conclusion

ODNR's fish hatchery operation is competitive with market prices, especially when producing at high volumes. However, key operational data and information has not been uniformly collected or analyzed. As a result, Wildlife is unable to easily engage in a more detailed level of comparison that would help to inform ongoing operational decision making as well as to identify opportunities for greater efficiency and effectiveness.

Recommendation 8.1: ODNR should ensure that necessary data and information is being gathered, reported, and analyzed to ensure that the fish hatchery operation is efficient and effective and produces at a cost commensurate to or lower than external suppliers. In doing so, the Department should track detailed cost inputs and allocate them back to production lines in order to capture the true, full cost of the hatchery operations and each species produced. The full cost should then be taken into account when determining the best course of action to cost effectively meet production needs. Finally, hatchery-specific production capabilities and relative efficiencies should be taken into account when assessing the ongoing strategic nature and cost of hatchery operations.

Financial Implication 8.1: By analyzing and implementing identified opportunities for increased efficiency and effectiveness, such as has been done with largemouth bass production, ODNR can ensure that resources are reallocated toward mission-critical functions. Eliminating the internal production of largemouth bass and instead, sourcing this species from external suppliers will result in a net annual efficiency gain of **$54,994**.