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Economic Contribution of Hatchery-Reared Walleye Stocked in South Dakota, USA

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Abstract

Walleye (*Sander vitreus*) are a popular sportfish species in South Dakota, USA, with most of the walleye fisheries in the state maintained by hatchery production and stocking. This study determined the economic contribution of the hatchery rearing of walleyes for maintaining recreational fisheries in South Dakota. For the past three fiscal years, South Dakota spent approximately $670,358 yearly in hatchery operational costs to produce walleye. The 197,503 licensed anglers who specifically target walleyes had estimated expenditures of $547,432,210 on walleye fishing in Fiscal Year 2025 (1 July 2024 through 30 June 2025) with $410,574,232 of that spending occurring in the 75% of the walleye fisheries maintained by hatchery propagation. In combination with an estimated indirect and induced effect of $303,003,783, the total economic contribution of walleye rearing and stocking to the South Dakota economy was an estimated $714,694,161. Thus, the economic contribution per budgetary dollar spent on the hatchery rearing and stocking of walleyes was estimated to be $1066 in 2025. Funding for walleye hatcheries is a user-pay system, coming from the sale of fishing licenses and an excise tax on fishing equipment. This study indicates that walleye hatchery rearing is an important component of the economy of South Dakota.

Keywords

Economic Contribution, Walleye, Fish Hatchery, Fish Stocking

1. Introduction

Walleye (*Sander vitreus*) are a popular sportfish species with a native range extending from northern Canada to the southern United States (Johnston et al., 2012). Recreational walleye fisheries are extremely important and have a considerable economic contribution (Kerr, 2011; Schmalz et al., 2011). Because wall-

eye fisheries are subject to overharvest (Shaw et al., 2018) with many populations historically decreased (Hansen et al., 2015), walleye fisheries are routinely maintained using hatchery propagation and restocking (Raabe et al., 2020). Hatchery rearing of walleye typically occurs by artificially spawning wild broodstock (Gonsorowski et al., 2024). Fertilized eggs are then incubated in hatcheries with the resulting newly hatched fry either directly stocked into recreational fishing waters or retained at the hatchery for further rearing to larger juvenile sizes (Czesny et al., 2005; Zebro et al., 2025). An estimated 1 billion fry and fingerlings are stocked annually in the United States alone (Fenton et al., 1996; Summerfelt, 1996).

Recreational fishing in South Dakota, USA has a major economic contribution, with direct recreational spending estimated at $530,743,523 USD in 2022 (Southwick Associates, 2022). To meet the demand for recreational fishing, the South Dakota Department of Game, Fish and Parks (SDGFP) owns and operates three fish hatcheries with a 2023 budget of over $3,000,000 USD (SDGFP, 2024). Walleye are the most sought-after fish species for recreational angling in South Dakota (Gigliotti, 2014; U.S. Department of the Interior et al., 2018) and 75% of the walleye fisheries in South Dakota lakes and reservoirs are maintained by hatchery stocking. However, the effect of hatchery production on the economics of walleye fishing in South Dakota is unknown. Understanding the economic contributions of public hatchery operations is extremely important, given the stewardship obligations of government agencies, such as the South Dakota Game, Fish and Parks (SDGFP, 2015). Thus, the objective of this study was to determine the economic contribution of walleye rearing and stocking on the economy of South Dakota.

2. Methods

2.1. Direct Effects of Operational Expenditures

Two hatcheries, Blue Dog State Fish Hatchery and Cleghorn Springs State Fish Hatchery, are primarily responsible for walleye production in South Dakota. Each of these hatcheries produces other fish in addition to walleyes, however. At Blue Dog Hatchery, the primary walleye producer for the state, 80% of the total expenditures are spent on walleye production, whereas only 5% of the annual expenditures are spent on walleye production at the Cleghorn Springs Hatchery. To determine overall hatchery expenditures on walleye production, the mean annual inflation-adjusted operating expenses (U.S. Bureau of Labor Statistics, 2025) for each hatchery for 2023, 2024, and 2025 were calculated, resulting in values of $774,343 for Blue Dog and $1,017,664 for Cleghorn Springs (**Table 1**). These mean expenses were multiplied by the portion attributable to walleye production for each hatchery (80% and 5%) to determine walleye production costs of $619,474 at Blue Dog and $50,884 for Cleghorn Springs (**Table 2**). These two values were added together to determine the total operational expenditures of walleye rearing at state fish hatcheries in South Dakota of $670,358.

Table 1. Actual and inflation-adjusted fiscal year operating expenses for Blue Dog State Fish Hatchery and Cleghorn Springs State Fish Hatchery, South Dakota, USA.

Fiscal Year	Expenses			
	Actual		Real (Inflation-Adjusted)	
	Blue Dog	Cleghorn	Blue Dog	Cleghorn
2025	$1,011,375.00	$916,787.00	$1,011,375.00	$916,787.00
2024	633,284.00	1,235,924.00	651,775.89	1,272,012.98
2023	625,360.00	818,985.00	659,879.87	864,192.97
Mean	$756,673.00	$990,565.33	$774,343.59	$1,017,664.32

Table 2. Operational expenses attributable to walleye production at Blue Dog State Fish Hatchery and Cleghorn Springs State Fish Hatchery, South Dakota, USA.

Hatchery	Yearly Expenses	Attributed to Walleye	Walleye Expenditures
Blue Dog	$774,343,59	80%	$619,474.87
Cleghorn	$1,017,664.32	5%	$50,883.22
Total	$1,792,007.91		$670,358.09

2.2. Direct Effects of Recreational Expenditures

A total of 228,327 anglers purchased fishing licenses in 2024 in South Dakota (SDGFP, 2025). This included 135,864 resident and 92,463 non-resident anglers but did not include anglers under the age of 18 who are not required to purchase a fishing license. The number of licensed anglers specifically engaged in walleye fishing was 86.5%, as determined from angler survey data (Potter et al., 2016; SDGFP, 2019a). This percentage was multiplied by the total number of anglers to estimate a total of 197,503 anglers specifically targeting walleye in 2024 in South Dakota. This included an estimated 117,522 resident and 79,980 non-resident anglers.

Recreational spending on fishing trips in South Dakota was $530,743,523 in 2022 (Southwick Associates, 2022). Adjusted for inflation to current Consumer Price Index standards (U.S. Bureau of Labor Statistics, 2025), real 2025 spending was an estimated $632,869,722. This value was multiplied by the proportion of anglers targeting walleye, giving an estimated $547,432,210 in recreational spending attributable to walleye fishing (**Table 3**). This number was further multiplied by 75%, which is the percentage of walleye fisheries in South Dakota dependent on stocking. This produced the value of direct recreational expenditures attributable to walleye stocking of $410,574,232.

2.3. Indirect and Induced Effects

Indirect effects are the economic ripple impacts of individuals or organizations purchasing materials and services from other organizations, which in turn lead to

additional rounds of spending with other businesses or organizations (Windfeld & Lhermie, 2022). Induced effects are the economic ripple impacts of employee spending on goods and services, thereby inducing further economic activity (Malik & Palmeiri, 2008). Both indirect and induced effects are secondary effects resulting from direct impacts. To calculate the indirect and induced effects, the initial spending from both direct sources was multiplied by the appropriate spending multipliers from the Regional Input-Output Modeling System (RIMS-II) (U.S. Bureau of Economic Analysis, 2025). Indirect and induced effects were aggregated because they are both considered in RIMS-II.

Table 3. Total angler expenditures in South Dakota in 2021, adjusted for inflation to 2025. Real expenditures for walleye angling are based on 86.5% of licensed anglers targeting walleye while fishing. Walleye expenditures attributable to stocking are based on 75% of walleye fisheries sustained by stocking of hatchery-reared fish.

	Expenses			
Licensed Angler Type	2021	Real 2025 (Inflation Adjusted)	Real 2025 Walleye	Attributable to Stocking
Resident	$315,814,328	$376,583,636	$325,744,845	$244,308,634
Non-Resident	214,929,195	253,286,086	221,687,464	166,265,598
Total	$530,743,523	$632,869,722	$547,432,309	$410,574,232

To compute the indirect and induced effects of hatchery operations, the RIMS-II multiplier for other animal production in South Dakota of 0.67 was used (Decision Innovation Solutions, 2016). Multiplying 0.67 by the total operational expenditures of walleye rearing ($670,358) produced an indirect and induced effect of hatchery operations of $445,788 (**Table 4**).

Table 4. Total indirect and induced economic effects of walleye stocking in South Dakota. Operational expenditures are direct expenses of hatchery rearing and stocking. Recreational expenses are those from walleye anglers.

Expenditure Type	Attributable to Walleye	RIMS-II Multiplier	Indirect and Induced
Operational	$630,358	0.665	$445,788
Recreational	410,574,232	0.738	303,003,783
Total	$411,244,590		$303,449,571

On the recreational level, the appropriate multiplier was more complex. Because there is no single RIMS-II multiplier for recreational angling, a multiplier from the American Sportfishing Association was used (American Sportfishing Association, 2007). The 0.738 multiplier was calculated by taking a weighted average of the average expenditures per trip (e.g., fuel, lodging, food, fishing tackle, bait, etc.) by wildlife-related forest visitors paired with the appropriate industry multipliers for South Dakota (Stynes, 2005). Multiplying the direct recreational expend-

itures attributable to walleye stocking by 0.738 indicated that the indirect and induced effect of recreational expenditures were $303,003,783.

2.4. Economic Contribution

Total economic contributions were found by aggregating the direct, indirect, and induced effects of both operational expenditures and recreational expenditures attributable to walleye stocking.

3. Results

The total economic contribution of walleye rearing and stocking to the South Dakota economy was an estimated $714,694,161 (Table 5). Thus, the economic contribution per budgetary dollar spent on the hatchery rearing and stocking of walleyes was estimated to be $1066.

Table 5. Total economic contributions of the stocking of hatchery-reared walleye in South Dakota. Operational expenditures are direct expenses of hatchery rearing and stocking. Recreational expenses are those from walleye anglers.

	Source		
	Operations	Recreation	Total
Direct	$670,358	$410,574,232	$411,244,590
Indirect/Induced	445,788	303,003,783	303,449,571
Total	$1,116,146	$713,578,015	$714,694,161

4. Discussion

This is the first study to determine the economic contribution of walleye hatchery production and the stocking of walleye to sustain recreational fisheries. Specific to South Dakota, the calculation of $1066 in economic contribution per budgetary dollar spent on walleye production is considerably larger than that reported previously for hatcheries producing trout and salmon in South Dakota and elsewhere. Martling et al. (2020) stated an economic contribution of $216.47 (inflation adjusted) for every hatchery budget dollar spent on trout and salmon production at Cleghorn Springs State Fish Hatchery. Barnes and Palmer (2019) reported a similar economic contribution at McNenny State Fish Hatchery in South Dakota. Other hatcheries in the United States producing trout and salmon have reported economic contributions (inflation adjusted) of less than $200 per budgetary dollar spent (U.S. Fish and Wildlife Service, 2001, 2006; Loomis & Ng, 2012).

The large difference in economic contribution between hatchery rearing and stocking of walleye versus trout and salmon in South Dakota can be largely explained by the relative popularity of these fish species by South Dakota anglers. Walleye are the state fish of South Dakota and have a long history of being the most sought-after sport fish in South Dakota (Fielder, 1994; Gigliotti, 1999, 2007,

2014; U.S. Department of the Interior et al., 2018). While over 86% of South Dakota anglers engage in walleye fishing, only 26% engage in trout fishing (U.S. Fish and Wildlife Service, 2015; Potter et al., 2016; SDGFP, 2019a). Walleye anglers also spend more than trout anglers. The expenditures by anglers targeting highly preferred fish species, like walleyes in South Dakota, are greater than those for less preferred species (Long & Melstrom, 2016). In addition, walleye fisheries in South Dakota are typically in large lakes and reservoirs, compared to trout fisheries which are typically in streams and ponds (Longmire, 2015; Greiner et al., 2016; Scarnecchia et al., 2023). Long and Melstrom (2016) noted that anglers who fished in rivers and ponds spent less money than those who fished in larger water bodies. Lastly, Erickson, Leis and Simpson (2019) reported that walleye anglers in Wisconsin spent more than black bass and salmon anglers.

The 86.5% of the licensed anglers in South Dakota targeting walleye noted in this study was nearly identical to the 85% of licensed anglers who self-reported to prefer walleye fishing in 2021 (Wolter, 2022). The number of anglers indicating a preference to catch walleye appears to have slightly risen from historical levels, at 82.2% in 2017, 78.3% in 2018, and 81.1% in 2019 (Longmire, 2018; HWA Wildlife Consulting Inc., 2020). The percentage of anglers preferring to catch trout has ranged from 19% to 22% over the same time period (Longmire, 2018; HWA Wildlife Consulting Inc., 2020; Wolter, 2022).

The large economic contribution of state government fish hatcheries producing and stocking walleye occurs without any funding from South Dakota state general tax revenues (SDGFP, 2019b; Barnes & Palmer, 2019; Martling et al., 2020). This is a user-pay model, whereby anglers pay for hatchery operations and stocking by purchasing fishing licenses along with an excise tax on fishing equipment (Organ et al., 2012; Scarnecchia et al., 2021). Even though licensed anglers are funding hatchery operations, the non-angling general public is receiving considerable financial benefits. Directly and indirectly, public fish hatcheries funded solely by licensed anglers are an important component of the economy of South Dakota (Tourism Economics, 2017).

The economic contribution indicated in this study is likely a conservative estimate for several reasons. First, only yearly operating expenditures were included; construction expenditures were excluded. No large infrastructure improvements or repair projects were conducted at either Blue Dog or Cleghorn Springs Hatcheries during the three years of this study. However, such projects are a part of hatchery operations and have substantial positive economic contribution with direct costs running into the tens of millions of dollars (Trushenski et al., 2018; New York State Department of Environmental Conservation, 2025). Secondly, there is considerable research and innovation involving walleye production at both hatcheries, including those increasing pond production (Ward et al., 2012; Ward, 2018; Ward et al., 2021; Ward, 2022) and novel Recirculating Aquaculture System rearing (Kastl et al., 2023; Kastl et al., 2024). The results of this experimentation and innovation have economic contributions that are hard to quantify (Griliches,

1979; Williams & Rank, 1998; Bessette, 2003). These long-term economic contributions benefit the South Dakota economy and also extend well beyond the state (Evenson, 2001; Salter & Martin, 2001; Blanco et al., 2016).

This study is limited by the year of economic inputs used. Adult walleye populations can fluctuate from year-to-year (Nate et al., 2011). There can also be fluctuations in the number of licensed anglers (Hunt et al., 2017), particularly in South Dakota (Haiar, 2025). Thus, the economic impact resulting from the rearing and stocking of walleye may vary from the years used in this study. In addition, the economic inputs used in the study are somewhat variable. However, this estimate would likely become more accurate with additional and more precise data, which should be pursued in additional studies.

The economic information described in this study can be used to make decisions regarding the potential allocation of funding for hatchery operations and improvements (Watson et al., 2007). With over $1000 of economic contribution per hatchery budgetary dollar spent, investing in hatchery production would appear to greatly benefit the overall economy of South Dakota. Based on this high return on investment, funding prioritization should be given to hatchery maintenance and improvements. This recommendation is further strengthened by declining recruitment of naturally-produced walleyes (Hansen et al., 2017; Embke et al., 2019; Honsey et al., 2019) and an overall decline in walleye populations in the midwestern United States (Sass, 2025), making increased hatchery stocking even more important to maintain recreational fisheries (Schall et al., 2025).

In conclusion, with walleye being the most popular sportfish species in South Dakota, and with most walleye fisheries sustained by the stocking of hatchery-reared fish, the economic contribution per budgetary dollar spent on the hatchery rearing of $1066 reported in this study is not surprising. The total economic contribution of an estimated $714,694,161 to the South Dakota economy from walleye rearing and stocking is a substantial return on the yearly hatchery walleye rearing expenditures of approximately $700,000. This study, the first to document the economics of walleye hatchery rearing, provides considerable justification for investments in hatchery infrastructure benefitting walleye production.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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