ADVANCING AQUACULTURE IN THE MIDWESTERN REGION*

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ADVANCING AQUACULTURE IN THE MIDWESTERN REGION

North Central Regional Aquaculture Center

$177,158, 2024-2025

NEXT GENERATION AQUACULTURE IN MISSOURI

Missouri Agriculture and Small Business Development Authority

$137,245, 2022-2023

Project Justification

Expanding Midwestern aquaculture requires understanding new markets and developing efficient, cost-effective systems to maximize production and profitability.

Target Audience

Current Midwestern farmers, existing and prospective aquaculture producers, investors, and state legislators informing on the economic impact of expanding the aquaculture industry in Missouri and the North Central Region. Outreach will also focus on educating consumers about the sustainability of U.S. aquaculture versus imported seafood

Project Objectives

- Summarize trends and outlook for U.S. and Midwestern aquaculture.
- Conduct farm site visits providing a needs assessment of existing Midwestern aquaculture producers.
- Conduct survey of aquaculture consumers preferences and willingness to pay for farmed seafood products.
- Craft business models and enterprise budgets for most promising Midwestern aquaculture operations.
- Provide aquaculture educational materials through events, social media websites and other communications.

North Central Regional Aquaculture Industry: Trends and Outlook

Extension
University of Missouri

April 2025

NCRAC North Central Regional Aquaculture Center

MX465

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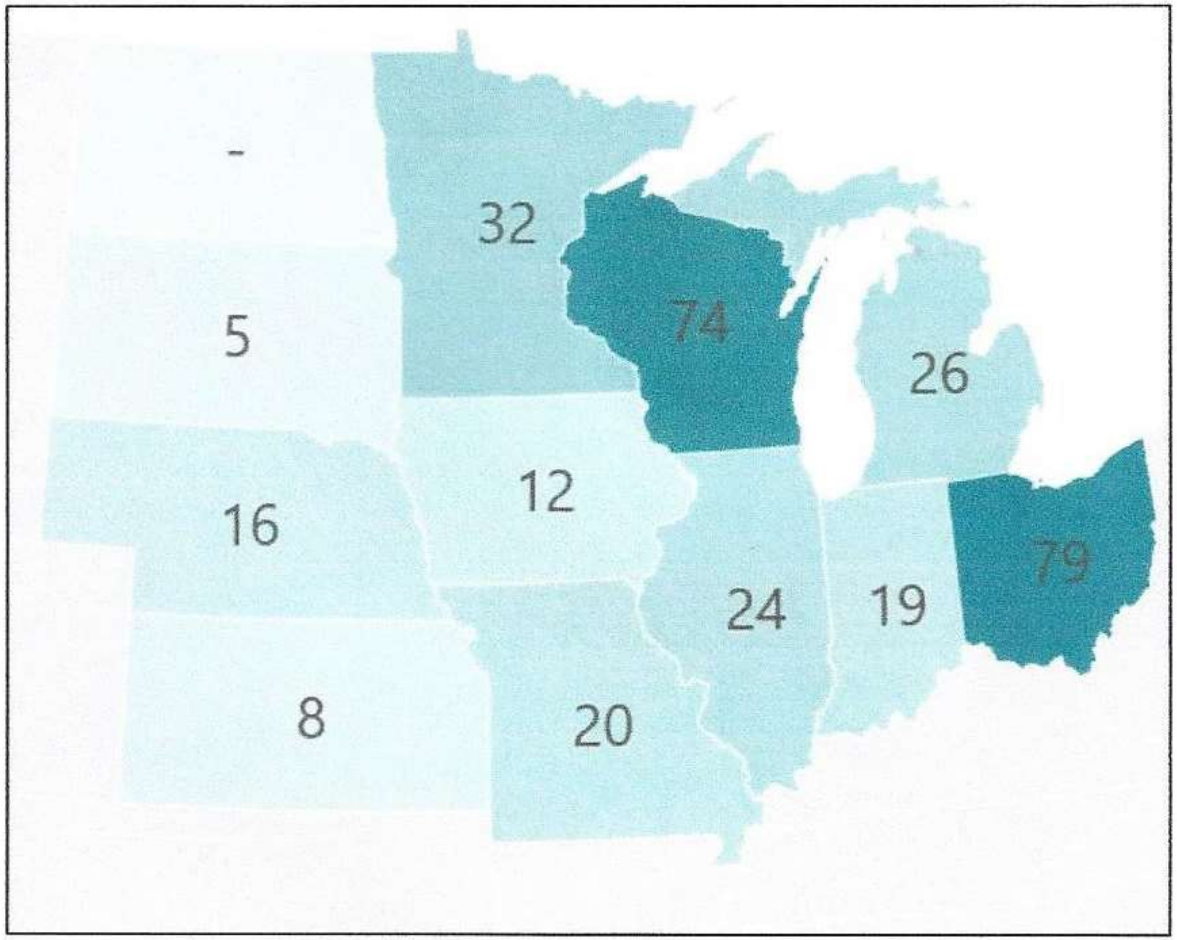
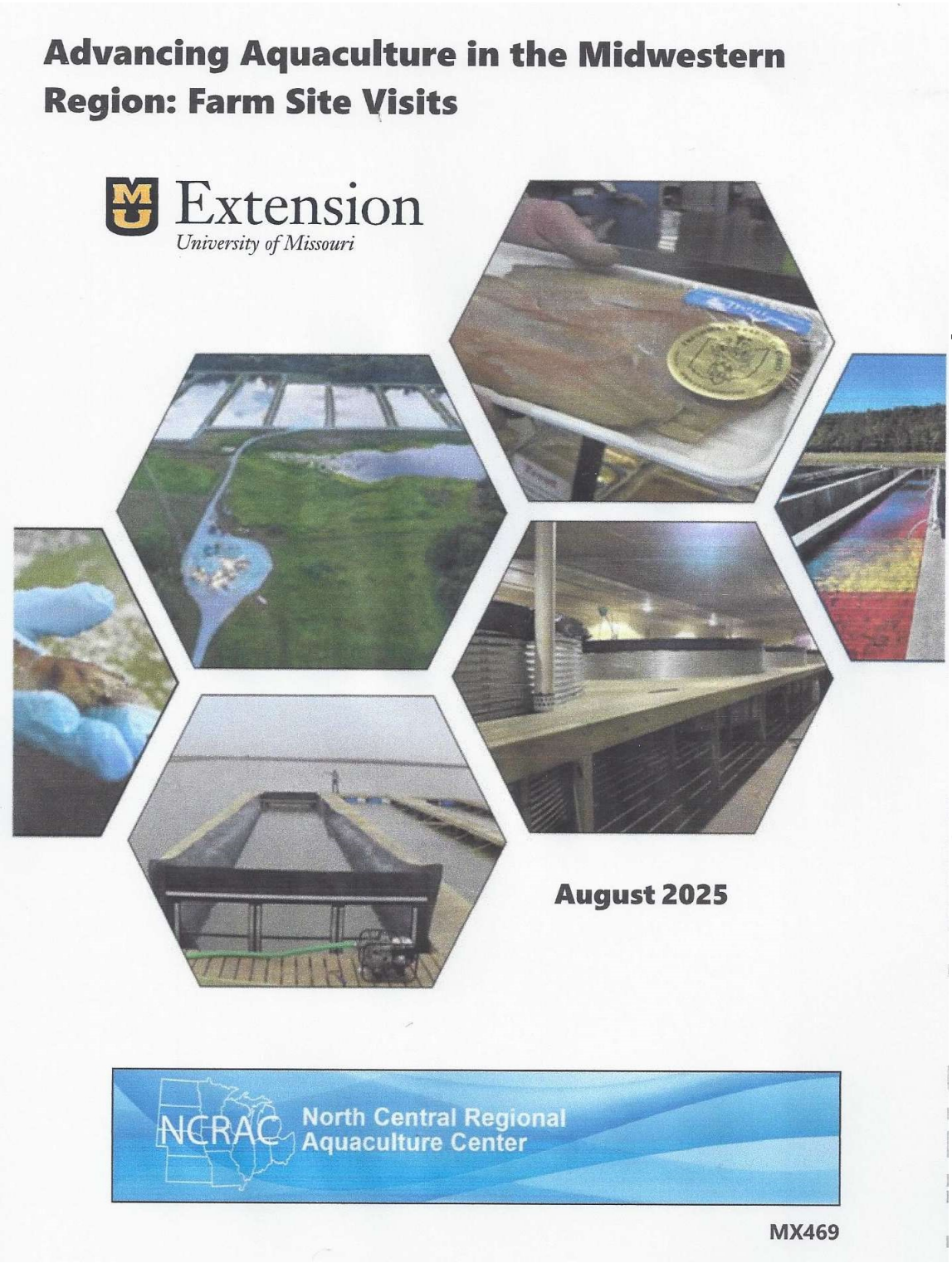
1.2 Aquaculture farms

The Census of Aquaculture counted 315 farms in the NCR that sold aquaculture products in 2023. Exhibit 1.2.1 shows the number of these farms by state. These states represent 9.1% of the 3,453 aquaculture farms across the U.S. Ohio had the greatest number in the region, 79, followed by Wisconsin with 74 and Minnesota with 32.

Exhibit 1.2.1. Aquaculture farms in the North Central Region, 2023.



Source: USDA National Agricultural Statistics Service.[2]



Hanilu Farms (Barramundi), Cutler Indiana

Tippco Fish Inc (Tilapia), Romney Indiana

Freshwater Farms of Ohio (Trout), Urbana Ohio

Harrietta Hills Trout Farm (Trout), Harrietta Michigan

Millcreek Perch Farm (Yellow Perch), Maryville Ohio

Ozark Fisheries (Ornamental Fish), Stoutland Missouri

Gollon Brothers International, Ltd (Bait), Stevens Point Wisconsin

Superior Raceway Systems, Stevens Point Wisconsin

RDM Aquaculture LLC (Shrimp), Fowler Indiana

Rushing Waters Fisheries (Trout), Palmyra Wisconsin

Growers were asked, "What are your greatest successes, challenges or potentials?"

1) "Improvements in software to track pond fish stocks and sales have played an important role in ornamental fish production/sales profitability,"
2) "The main challenge in largemouth bass production is insuring farm profitability,"
3) "Knowledge supporting barramundi fish farming comes more from farm experience as opposed to meetings and fish farm tours,"
4) "A major challenge yellow perch farmers face is obtaining high-quality, cost-effective feed supply,"
5) A major challenge (for marine shrimp production) is ensuring shrimp survival rate and providing a reliable source of shrimp PLs for stocking,"
6) "Successful fish farmers must possess a passion for raising fish because of the long hours and effort required,"
7) "A major challenge for selling tilapia fillets is import price competition and the need to sell to ethnic fish markets in the U.S.,"
8) "A promising aquaculture candidate to replace yellow perch is native sunfish and bluegill,"
9) "A major challenge for trout farmers is addressing/correcting misinformation about fish farming,"
10) "Baitfish industry would benefit from leadership to help influence state and federal regulatory policies."

Understanding Consumer Seafood Preferences for Midwestern Aquaculture Producers

Summer 2025

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Report targets consumers in, Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin. Commonly raised Midwestern species include; rainbow trout, lake trout, walleye, bass, yellow perch, Great Lakes whitefish, grass carp, hybrid striped bass, bluegill, and catfish in warmer southern states.

Marketing Insights for Midwestern Food Fish Producers

- Frozen Fillets: Selling packaged frozen fillets helps manage inventory and extends shelf life.
- Emphasize Quality: Compete on quality, not cost. Track production expenses and target niche markets that value sustainability and freshness.
- Highlight Sustainability: Promote eco-friendly practices and safety and freshness of U.S.-farmed fish.
- Support Consumer Education: Offer samples and preparation demos to encourage consumers to try new species.
- Train Staff & Shoppers: Educate sales teams and consumers on easy preparation methods. Direct-to-consumer sales can double as cooking education opportunities.

U.S. Seafood Consumers' Willingness to Pay for Rainbow Trout, Walleye, Yellow Perch Fillets and Select Product Attributes

Summer 2025

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U.S. Seafood Consumers' Willingness to Pay for Rainbow Trout, Walleye, Yellow Perch Fillets and Select Product Attributes

In 2020, amid the COVID-19 pandemic, a nationwide survey was conducted to assess consumer preferences and estimate willingness to pay for key food fish species produced in the North Central Region. The survey was repeated in 2025, updating prices to adjust for inflation. Despite a global pandemic and subsequent economic changes, consumer preferences were largely unchanged.

Summary

Rainbow trout commands a higher price per lb from consumers outside of Midwest ($32.2) compared to $25.51.

Walleye and yellow perch attract a higher premium price from consumers inside the Midwest.

Survey respondents living outside the Midwest place higher value on fresh rather than frozen fillets.

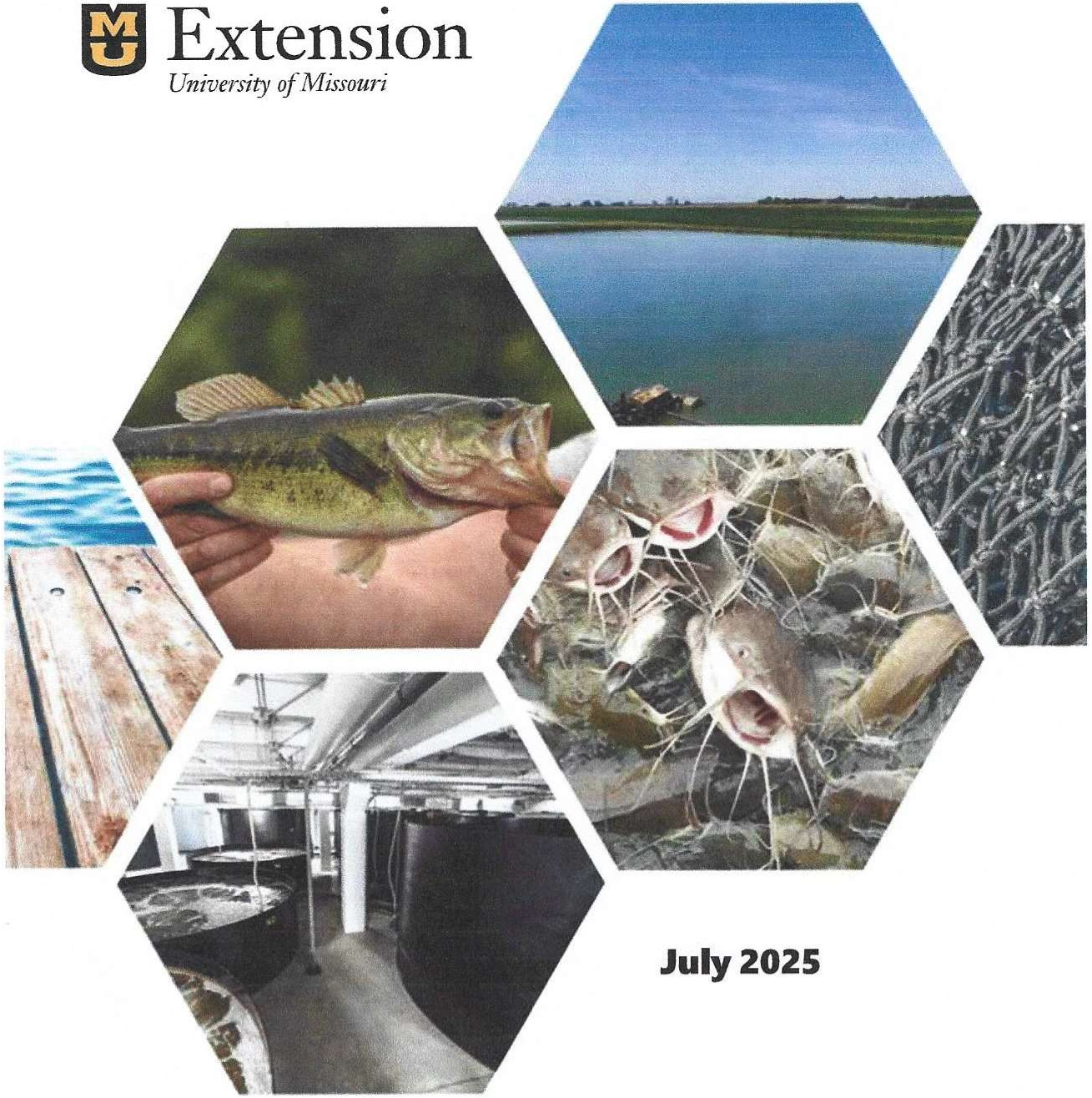
Non-Midwesterners are willing to pay a $3.96 premium for wild caught fish. They also value fish sourced from the North Central Region and are willing to pay an additional $2.43 per pound.

2025 Mean Willingness to Pay Study

Fish Species (Prepared)	National ($/lb.)	Non-Midwest States ($/lb.)	Midwest States ($/lb.)
Rainbow trout	29.73	32.29	25.51
Walleye	25.21	24.77	25.72
Yellow Perch	22.52	21.78	23.45
Attributes(+)			
Fresh Fillets	1.06	1.02	0.82
North Central Region Sourced	2.20	2.43	1.76
Wild-caught	3.50	3.96	2.69

North Central Regional Aquaculture Industry: Business Models

MU Extension
University of Missouri



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NCRAC Pond Culture Business Models Summary

Exhibit 3.1. Comparison of North Central aquaculture models: pond culture.

Pond model	Stocking size	Unit of sale	Capital investment[1] ($)	Cycle[2] (months)	Stocking density[3] (fingerlings/ acre)	Feed[4] (FCR/protein)	Break-even price[5] ($/lb.)	Payback period[6] (years)	Internal rate of return[7] (10 years) (%)
Food – Catfish	(3"–5", 45 grams)	lb. (1.8 lb./fish, whole fish)	423,964	12	3,750	2.2/32%	3.40	3	35.20%
Food – Hybrid striped bass									
Nursery	(2", 3 grams)	fish (6"/100 grams)	423,964	6	13,400	2.4/36%	6.69		
Grow-out	(6", 100 grams)	lb. (2.5 lb./fish, whole fish)	423,964	12	3,200	2.4/32%	5.48		
Integrated (nursery + grow-out)	(2", 3 grams)	lb. (2.5 lb./fish, whole fish)	423,964	18	-	2.4/32%	5.26	2	55.89%
Food – Yellow perch	(4"–5", 14 grams)	lb. (0.33 lb./fish, whole fish)	423,964	12	10,000	1.85/32%	7.91	8	12.04%
Stocking – Blue gill	(1"–3", 2 grams)	fish (4"–5", 45 grams)	399,151	8	15,000	2/40%	16.51	8	12.17%
Stocking – Catfish	(3"–5", 45 grams)	fish (11"/0.5lb.)	399,151	8	15,000	2.5/32%	3.70	4	30.35%
Stocking – Golden shiner (bait/stocking)	Fry	lb. (live fish, 85 fish/lb.)	399,151	18	100,000	2.75/32%	21.14	9	9.56%
Stocking– Grass carp	(3"–5", 25 grams)	fish (8"–11", 226 grams)	399,151	9	3,750	-	10.84	5	19.41%
Stocking – Hybrid striped bass									
Nursery	(2", 3 grams)	fish (6"/100 grams)	399,151	6	13,400	2.4/36%	6.65		
Grow-out	(6", 100 grams)	fish (12"+/0.8 lb.)	399,151	5	4,000	2.4/32%	6.80		
Integrated (nursery + grow-out)	(6", 100 grams)	fish (12"+/0.8 lb.)	399,151	11	-	2.4/32%	5.94	5	21.99%
Stocking – Largemouth bass									
Nursery	(2"–4", 3 grams)	fish (6"/0.22 lb.)	399,151	6	30,000	2.4/36%	12.21		
Grow-out	(6", 100 grams)	fish (12"+/0.8 lb.)	399,151	5	8,000	2.4/32%	8.99		
Integrated (nursery + grow-out)	(6", 100 grams)	fish (12"+/0.8 lb.)	399,151	11	-	2.4/32%	7.46	4	24.32%
Stocking – Yellow perch	(4"–5", 14 grams)	fish (7.5"–8.5", 90 grams)	399,151	6	10,000	1.85/32%	17.40	5	21.60%

NCRAC Pond Culture Recirculating Aquaculture Business Models Summary

Exhibit 3.2. Comparison of North Central aquaculture models: recirculating aquaculture systems (RAS).

RAS model	Stocking size	Unit of sale	Capital investment[1] ($)	Cycle[2] (months)	Carrying capacity[3] (lb./gallon/cycle)	Feed[4] (FCR/protein)	Break-even price[5] ($/lb.)	Payback period[6] (years)	Internal rate of return[7] (10 years) (%)
Salmon (food)	Eggs	lb. (whole fish, 8.8 lb./fish)	451,351	24	0.67	1.15/42%	6.30	*	High loss
Trout (food)	(3", 3 grams)	lb. (whole fish, 3.3 lb./fish)	447,623	10	0.54	1.36/50-42%	5.10	3	34.79%
Trout (stocking)	Eggs	fish (6"–10", 30-135 grams)	451,351	7	0.38	1.30/50-42%	5.45	7	13.35%
Walleye (stocking)	(4"-6",8.5 grams)	fish (6"–10", 30-135 grams)	447,623	5	0.42	1.35/42%	8.22	3	35.04%
Yellow Perch (food)	(2"/5 grams)	lb. (whole fish, 0.5 lb./fish)	447,623	24	0.57	1.9/50-42%	21.10	*	-3.39%
Yellow Perch (stocking)	(2"/5 grams)	fish (3'–5")	447,623	12	0.59	1.9/50-42%	9.11	4	31.08%

Missouri (MASBDA) Pond and RAS Business Models Summary

Exhibit 3.1. Comparison of Missouri Aquaculture Models

Model	Culture System	Annual Production (Pounds)	Primary Market Channel	Capital Investment (Dollars)	Annual Sales (Dollars)	Operating Profit Margin[1] (Percent)
Catfish	Pond	76,500	Recreational stocking	438,050	382,500	36%
Bluegill	Pond	54,600	Recreational stocking	438,050	819,000	18%
Bass	Pond	50,400	Recreational stocking	438,050	315,000	24%
Grass Carp	Pond	25,650	Recreational stocking	438,050	149,625	17%
Catfish	RAS	63,384	Food fish (live)	360,353	273,537	48%
Bass	RAS	40,102	Food fish (live)	360,353	240,611	48%
Shrimp	RAS	15,513	Food fish (live)	360,353	310,262	47%
Tilapia	RAS	142,467	Food fish (live)	360,353	356,168	28%

[1] Operating profit is calculated by sales net of delivery costs minus operating costs minus ownership costs. Operating profit is then divided by net sales to arrive at the operating profit margin.

The projects, "Next Generation Aquaculture in Missouri" (funded by MASBDA) and "Advancing Aquaculture in the Midwestern Region," (funded by NCRAC*) led to eight publications available at MU aquaculture extension website:

https://extension.missouri.edu/programs/aquaculture-extension

Missouri's Aquaculture Industry: Needs Assessment https://extension.missouri.edu/publications/mx461
Missouri's Aquaculture Industry: Trends and Outlook https://extension.missouri.edu/publications/mx462
Missouri's Aquaculture Industry: Business Models https://extension.missouri.edu/publications/mx463
Missouri's Aquaculture Industry: Marketing Study https://extension.missouri.edu/publications/mx464

North Central Region Aquaculture Industry: Trends and Outlook
https://extension.missouri.edu/publications/mx465
North Central Region Aquaculture Business Models
https://extension.missouri.edu/publications/mx466
Understanding Consumer Preferences for Aquaculture Produces in the Midwest:
https://extension.missouri.edu/publications/mx467
US Consumers' Willingness to Pay for Trout, Walleye and Selected Aquaculture Products
https://extension.missouri.edu/publications/mx468

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