

Walleye Initiative Private Fish Farm Capacity Study, 2014

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**Survey Research Center Report 2014/12
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Table of Contents

Executive Summary	3
Survey Methods	5
Profile of Respondents	6
Current Operations	8
Future Operations	19
Written Comments	29
Conclusions	30
Appendix A – Non-response Bias Test	31
Appendix B – “Other” Written Responses and Open-Ended Comments	32
Appendix C – Quantitative Summary of Responses by Question	36

Executive Summary

The purpose of this study was to learn more about the current operations and future plans among Wisconsin aquaculture business owners. The survey was requested by the Wisconsin Legislature and sponsored by the UW-Extension Aquaculture Outreach Program, which chose to work with the Survey Research Center (SRC) at the University of Wisconsin-River Falls to gather this information.

In March 2014, the SRC mailed surveys to 253 DATCP registered fish farms. The mailing list included all 110 Type 2 and 3 fish farms, which are allowed to sell live fish. In addition the list included 143 Type 1 fish farms that have a business name and therefore were considered by the Wisconsin Walleye Capacity Study Committee likely to be conducting a commercial operation (See Page 7 for Fish Farm Registration Definitions). The surveys were followed at roughly 14-day intervals with reminder postcards and a second mailing of the survey to non-respondents. The SRC received 138 useable responses, which represents a response rate of 55 percent. Overall, the results are expected to be accurate to within plus/minus 6.6%. Due to the smaller number of respondents who produced and sold fish in 2013 or who have expansion plans, the recalculated confidence interval (“margin of error”) for the survey questions about current production and expansion plans is plus/minus 9.9% (See “Survey Methods below for a full explanation of this adjustment).

Only one-third of fish farm registration holders produced and sold fish in 2013. About six in ten sold fish either for stocking or for food. Relatively few respondents sold fish for bait.

Respondents were more likely to produce and sell cool water species than cold water species. The most common cold water species both for stock and for food were trout. Among cool water species, yellow perch was the most common for stock, and bluegills were the most common for food.

Fathead minnows were the most common baitfish species.

Among respondents who raise advanced fingerlings for stock, the most common species were yellow perch, bluegills, and largemouth bass. Typically, respondents who produced advanced fingerlings said their total annual production was less than 10,000.

A large majority of those who produced and sold fish in 2013 reported having a pond. Total pond acreage tended to be less than 3 acres. Over half of producers/sellers have raceways; total volume tended to be either 100 to 499 gallons per minute or less than 50 gallons per minute. About a third of producers/sellers use aquaponics. Relatively few producers/sellers use recirculated aquaculture systems.

Approximately half of all respondents maintain brood stock, have the ability to keep specific strains of brood stock in the future, and have unused capacity for growing fish for stocking.

A third of all respondents said they plan to expand their operations in the next three years. Among those who plan to expand, two-thirds plan to increase their total pond acreage, half plan to increase aquaponics production, a third plan to increase recirculated aquaculture systems capacity, and 20% plan to increase their raceway water flow.

Respondents were more likely to plan expansion of cool water species than cold water species. Bluegills, yellow perch, and walleyes were the most favored cool water species both for stock and for food.

Respondents are more likely to plan to expand production of fathead minnows than other bait species.

Regulations and permit issues were the most important challenge facing respondents with plans to expand, followed by access to capital and finding markets. The availability of quality labor and land acquisition were less important challenges to expansion.

About one in four respondents who produced or sold fish in 2013 said working with the DNR to fulfill their stocking needs is important or very important to their operation and half of active sellers said UW-Extension assistance is important or very important.

Survey Purpose

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Survey Methods

In March 2014, the SRC mailed surveys to 253 DATCP registered fish farms. The mailing list included all 110 Type 2 and 3 fish farms, which are allowed to sell live fish. In addition the list included 143 Type 1 fish farms that have a business name and therefore were considered by the Wisconsin Walleye Capacity Study Committee likely to be conducting a commercial operation (See Page 7 for Fish Farm Registration Definitions). The surveys were followed at roughly 14-day intervals with reminder postcards and a second mailing of the survey to non-respondents. The SRC received 138 useable responses, which represents a response rate of 55 percent. The confidence interval (“margin of error”) for these data is plus/minus 6.6%.

Two groups of follow-up questions were designed only for permit holders who produced and sold fish in 2013 (Q2 to Q9) and for permit holders who plan to expand in the next three years (Q11 to Q18). The number of permit holders who produced/sold fish in 2013 and who are planning to expand was substantially less than the total number of respondents, which reduced the sample size for the follow-up questions. Forty-six of the 138 respondents (34%) produced and sold fish in 2013. The number of respondents who plan to expand was also 46 (34%), but the composition of the 46 with expansion plans was not identical to the 46 respondents who produced and sold fish in 2013.

Based on the 34% of survey respondents who were producers/sellers in 2013, the SRC infers that there are 86 fish farm permit holders who were producers/sellers in 2013 (34% of the total population of 253 permit holders). The recalculated “margin of error” for the survey data from 46 respondents in Q2 to Q9 based on an estimated total population of 86 active producers/sellers is plus/minus 9.9%. Similarly, the inferred population of permit holders planning to expand is 86, and the recalculated “margin of error” for the 46 responses to Q11 to Q18 is plus/minus 9.9%.

Any survey has to be concerned with “non-response bias.” Non-response bias refers to a situation in which people who do not return a questionnaire have opinions that are systematically different from the opinions of those who return their surveys. Based upon a standard statistical analysis that is described in **Appendix A**, the Survey Research Center concludes that non-response bias is not a significant concern for this survey.

In addition to numeric data, respondents provided additional written answers and comments. **Appendix B** contains the written responses.

Appendix C contains a copy of the survey questionnaire with a complete quantitative summary of responses by question.

Profile of Respondents

The survey asked respondents to indicate the type of fish farm permit(s) they hold and the number of years they have been in business. In addition, the survey asked three demographic questions: gender, age range, and educational attainment. The SRC utilized the 2012 estimates from the US Census Bureau American Community Survey (ACS) to compare the gender, age, and educational attainment of respondents to the overall profile of Wisconsin adults. Table 1 shows the results.

Most respondents hold a single type of fish farm permit. Type 1 permits and Type 2 permits are by far the most common among survey respondents. See the definition of the three types of permits at the end of this section.

Respondents tend to be long-time owners of fish farm operations. A third of respondents have been in business at least 25 years, with an additional 10% who have been business between 20 years and 24 years. One in five respondents have started their business within the past five years.

Respondents are overwhelmingly men (92%). Seventy-three percent are age 55 or older.

With respect to educational attainment, the profile of respondents is similar to the adult population of Wisconsin.

Table 1. Profile of Respondents							
Fish Farm Permit Type	Count	Type 1 only	Type 2 only	Type 3 only	Type 1 and 2	Type 2 and 3	Type 1 and 3
Sample	126	48%	40%	2%	2%	7%	1%
Years in business	Count	Less than 5 yrs.	5 to 9 yrs.	10 to 14 yrs.	15 to 19 yrs.	20 to 24 yrs.	25 or more yrs.
Sample	133	20%	17%	12%	11%	10%	32%
Gender (Age 18+)	Count	Male	Female				
Sample	129	92%	8%				
State ACS 2012	4,409,648	49%	51%				
Age 18+	Count	18 – 24	25 – 34	35 – 44	45 – 54	55 – 64	65+
Sample	134	0%	2%	6%	19%	42%	31%
State ACS 2012	4,409,648	13%	17%	16%	19%	17%	19%
Highest Level of Education (Age 25+)	Count	Less than High Sch.	High Sch. Diploma	Some College/ Tech	Tech/ College Grad.	Bachelor Degree	Graduate/ Profess. Degree
Sample	127	2%	28%	22%	11%	20%	17%
State ACS 2012	3,854,170	9%	32%	21%	10%	18%	9%

The SRC performed statistical tests to see if there were significant differences in the responses of the survey questions based on the variables in Table 1. In statistics, a result is called **statistically significant** if it is unlikely to have occurred by chance. Statistical significance is expressed as a probability that the difference is *not* true. A commonly used probability standard is .05 (5%). Statistical significance at the .05 level indicates a 5 in 100 probability that the observed

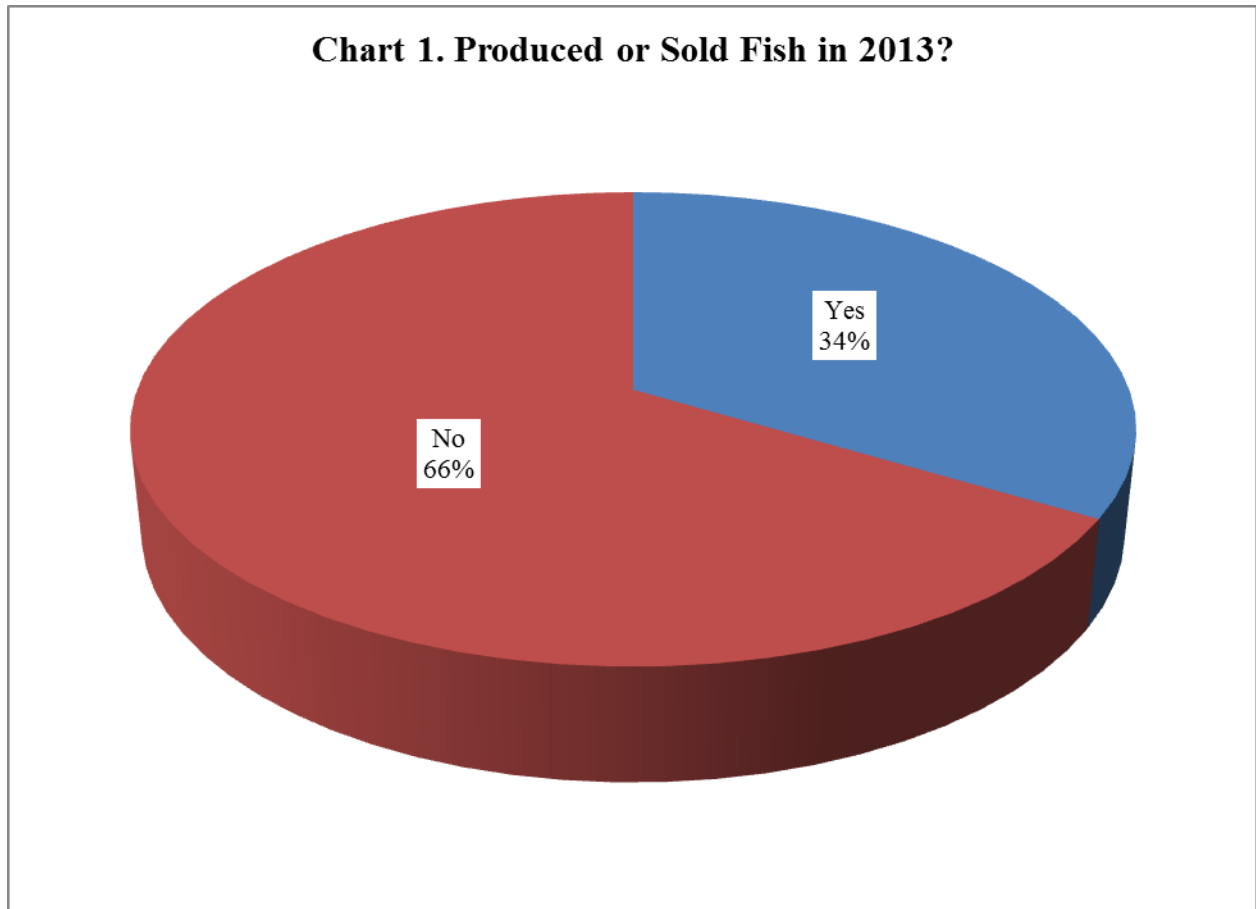
difference across demographic groups for a given variable is not real. It does *not* mean the difference is necessarily large, important, or significant in the common meaning of the word.

The report will identify those instances where there were differences in the response pattern within a particular group that would have affected the interpretation of the results.

Fish Farm Registration Definitions: A Type 1 fish farm can accept live fish, allow public fishing at the farm, ship live fish or fish eggs from the fish farm to a food processing plant, retail food establishment, or restaurant, for processing or direct sale to consumers with some restrictions, ship live fish or fish eggs to a specific location (such as farmers markets) for direct sale to consumers as food provided that certain requirements are met. A Type 2 fish farm can do all of what a Type 1 can and can also sell or distribute live fish or fish eggs from that fish farm. A Wisconsin Type 3 fish farm can receive any fish or fish eggs from a wild source. There are DATCP requirements that need to be met for a farm to be considered a Type 3 farm, and there are additional health requirements to be met when live fish leave a Type 3 farm (see ATCP 10.61 (3)).

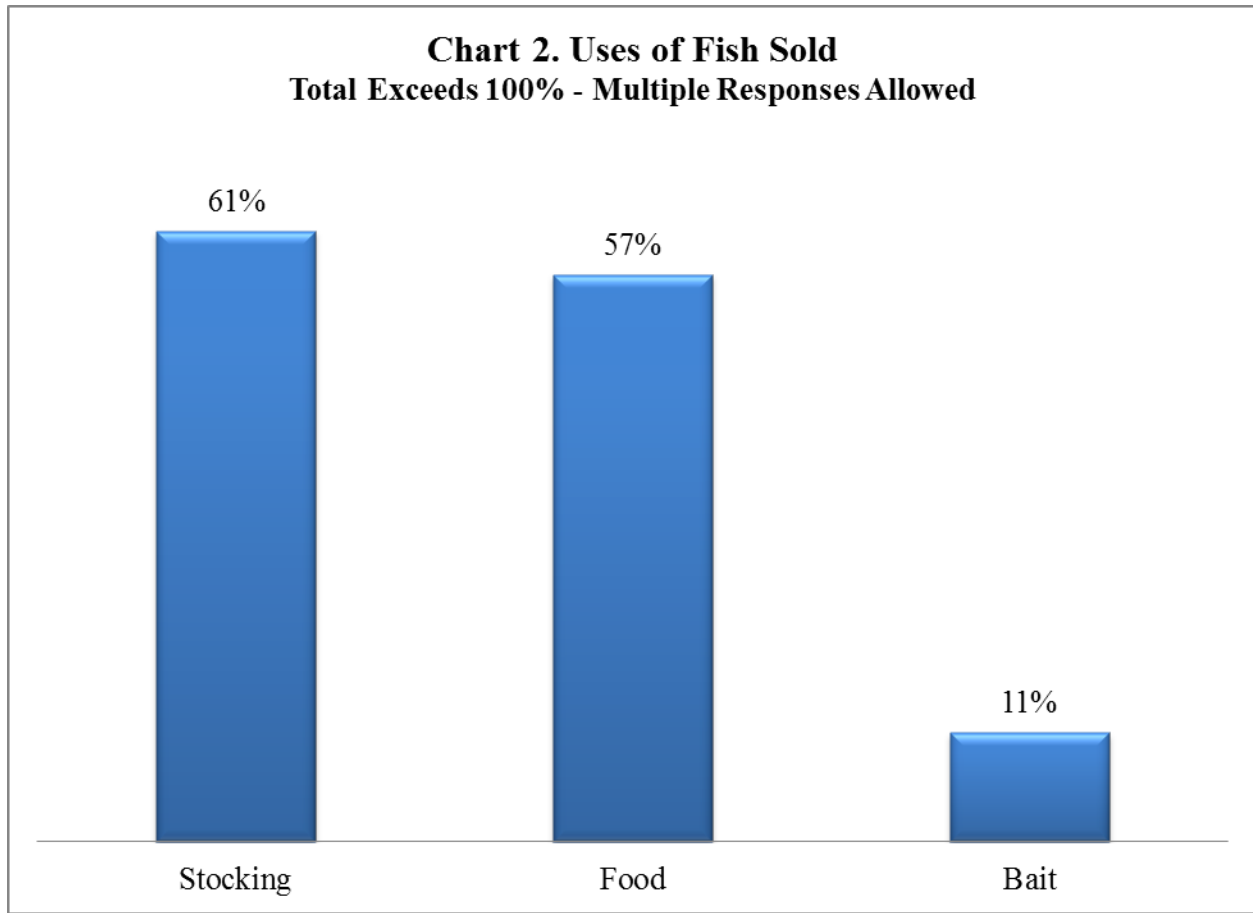
Current Operations

The initial question asked respondents if they produced or sold any fish from their operation in 2013. As shown in Chart 1, only a third of respondents produced or sold fish during 2013.



Demographic comparisons. Respondents with a Type 2 permit were more likely to have produced or sold fish in 2013.

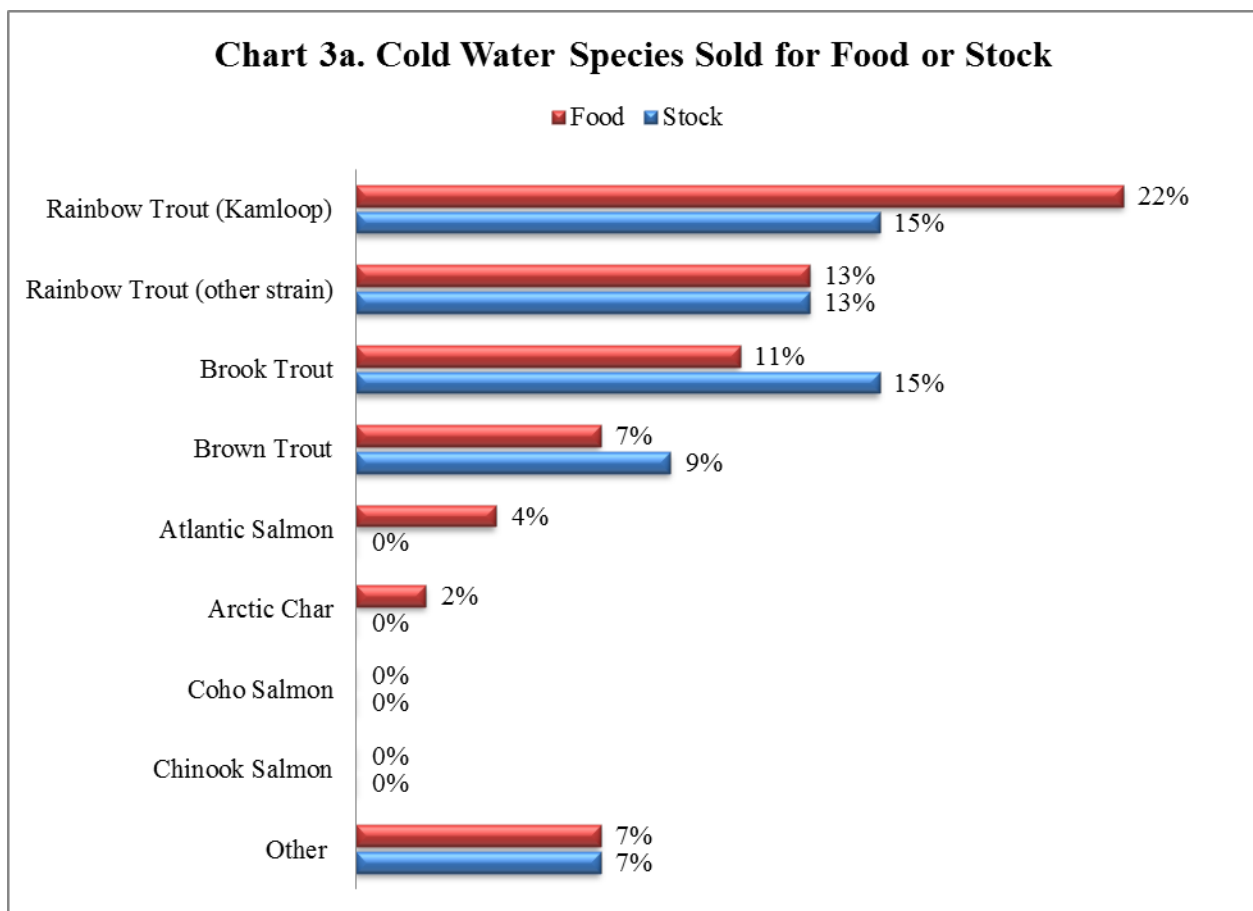
Respondents who said “yes, they did produce or sell fish in 2013” were asked a series of follow-up questions about their current operation. As shown in Chart 2, six in ten respondents who produced or sold fish in 2013 said their fish were used for stocking, and a similar percentage said their fish were used for food. Only about one in ten respondents indicated they sold fish for bait.



Demographic comparisons. Respondents with a Type 2 permit and respondents with 20 or more years in business were more likely to have sold fish for stocking.

Respondents were shown a list of fish species and asked to indicate whether they sold each species for food (top bar in each pair) or stock (bottom bar in each pair). Chart 3a shows the results for cold water fish species. Respondents who sold fish in 2013 were more likely to sell the trout species (Kamloop rainbow, other rainbow, brook, and brown) for either food or stock than salmon or char species. Among those who sold fish for food, Kamloop rainbow trout had the largest percentage (22%), followed by other rainbow trout strains, brook trout and brown trout.

As was the case with food sales, trout species were favored over salmon or char for stocking. The percentage of respondents who sold Kamloop rainbow trout, other rainbow strains, and brook trout was about the same (13%-15%).



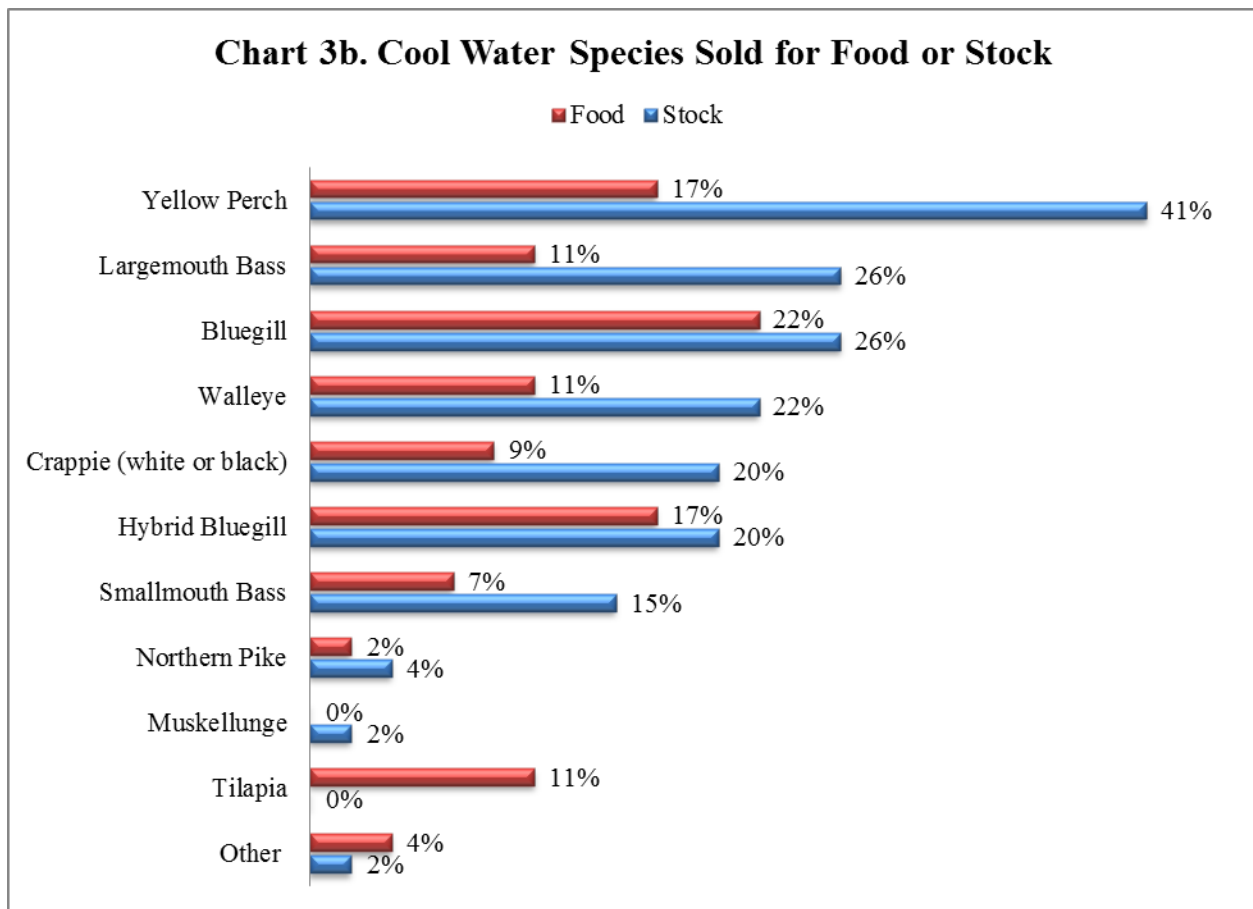
Demographic comparisons. Women respondents were more likely to produce Kamloop rainbow trout for food and Atlantic salmon for food.

Results for the sale of cool water species are shown in Chart 3b and indicate that respondents who sold fish in 2013 were more likely to sell cool water species for stock than the cold water species in Chart 3a. In addition, sales of cool water species were more likely to be for stock than for food.

Among stock sales, four in ten respondents said they sold yellow perch in 2013. About one in four sold largemouth bass and bluegills, followed closely by sales of walleye, crappie, and hybrid bluegills.

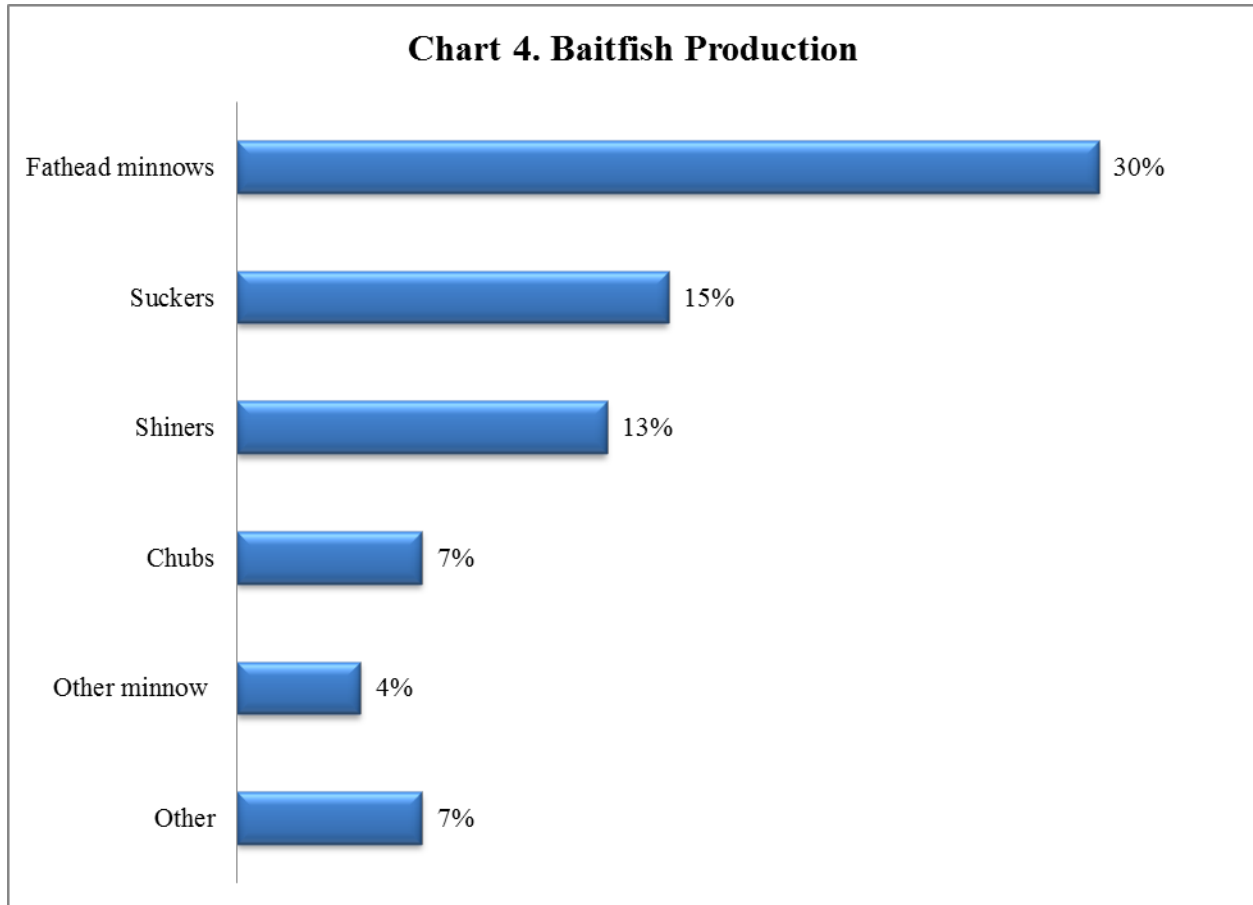
With respect to food sales, bluegills (22%), yellow perch (17%) and hybrid bluegills (17%) were the most frequent, followed by largemouth bass, walleye, and tilapia.

Relatively few respondents reported sales of northern pike or muskellunge.



Demographic comparisons. Women respondents, compared to their male counterparts, were more likely to produce hybrid bluegills for stock and tilapia for food.

As shown in Chart 4, among respondents who sold fish in 2013, 30% sold fathead minnows for baitfish. Suckers (15%) and shiners (13%) were in a statistical tie for second place. Chubs were produced by relatively few active respondents who sold fish in 2013 (7%).



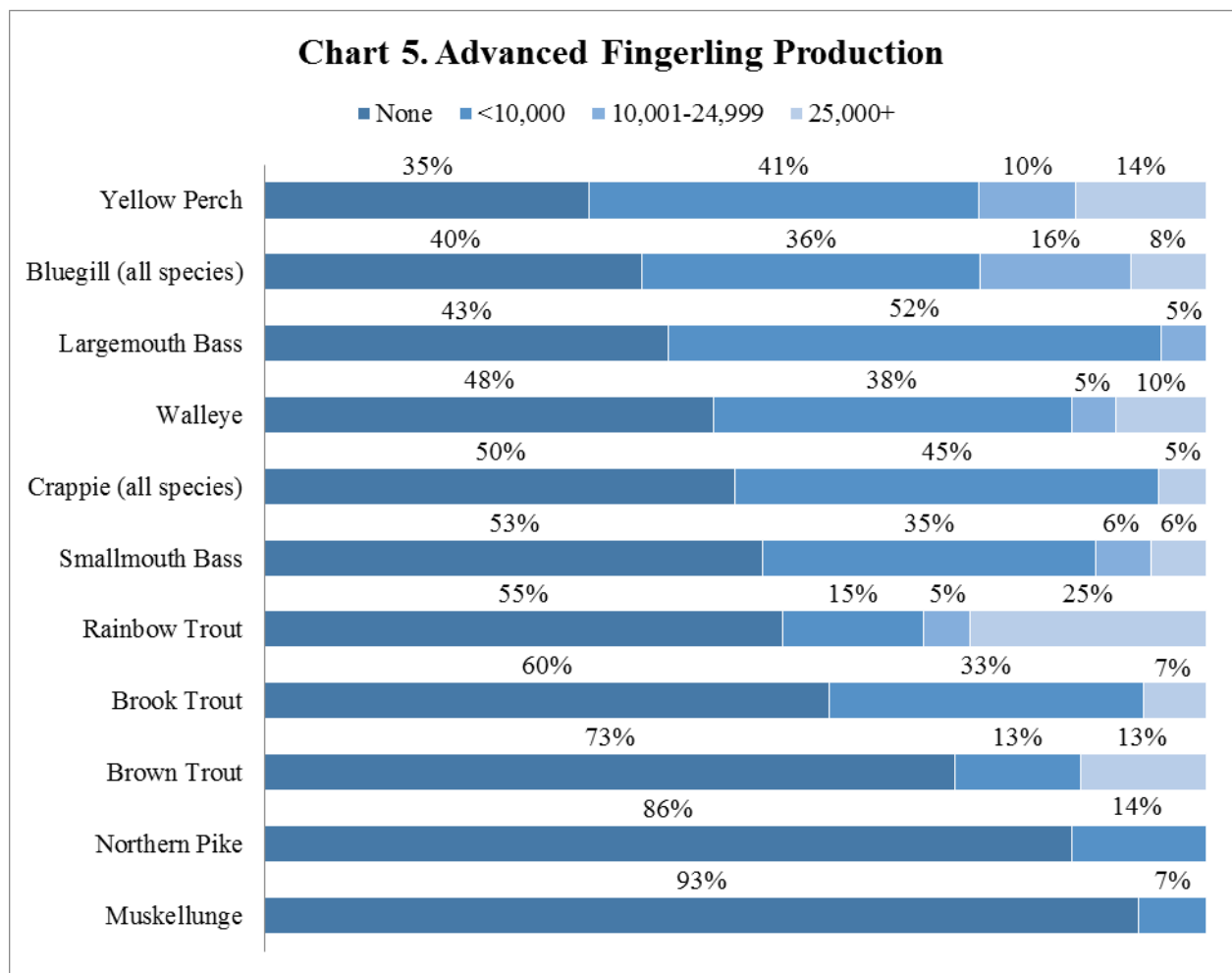
Demographic comparisons. Respondents with a Type 1 permit were less likely to produce fathead minnows. Operators with at least 20 years of experience were more likely to produce suckers.

Active producers or sellers were next asked about the number of advanced fingerlings they produced by species. Answer choices were none, less than 10,000, 10,001 to 24,999, 25,000 to 49,999, 50,000 to 99,999, and 100,000 plus. Chart 5 shows the results. For the purposes of graphic presentation and the relatively small number of producers in each, the SRC grouped the four largest production categories into a single category showing the combined percentage of 25,000 plus. Additional detail is shown in Appendix C.

About half of active producers or sellers in 2013 said they did not raise any advanced fingerlings for the following species: largemouth bass, walleye, crappie, smallmouth bass, and rainbow trout. More than half of active producers said they did not raise advanced fingerlings for the following: brook trout, brown trout, northern pike, and muskellunge.

Among respondents who raise advanced fingerlings for stock, the most common species were yellow perch (64%), bluegills (60%), and largemouth bass (57%).

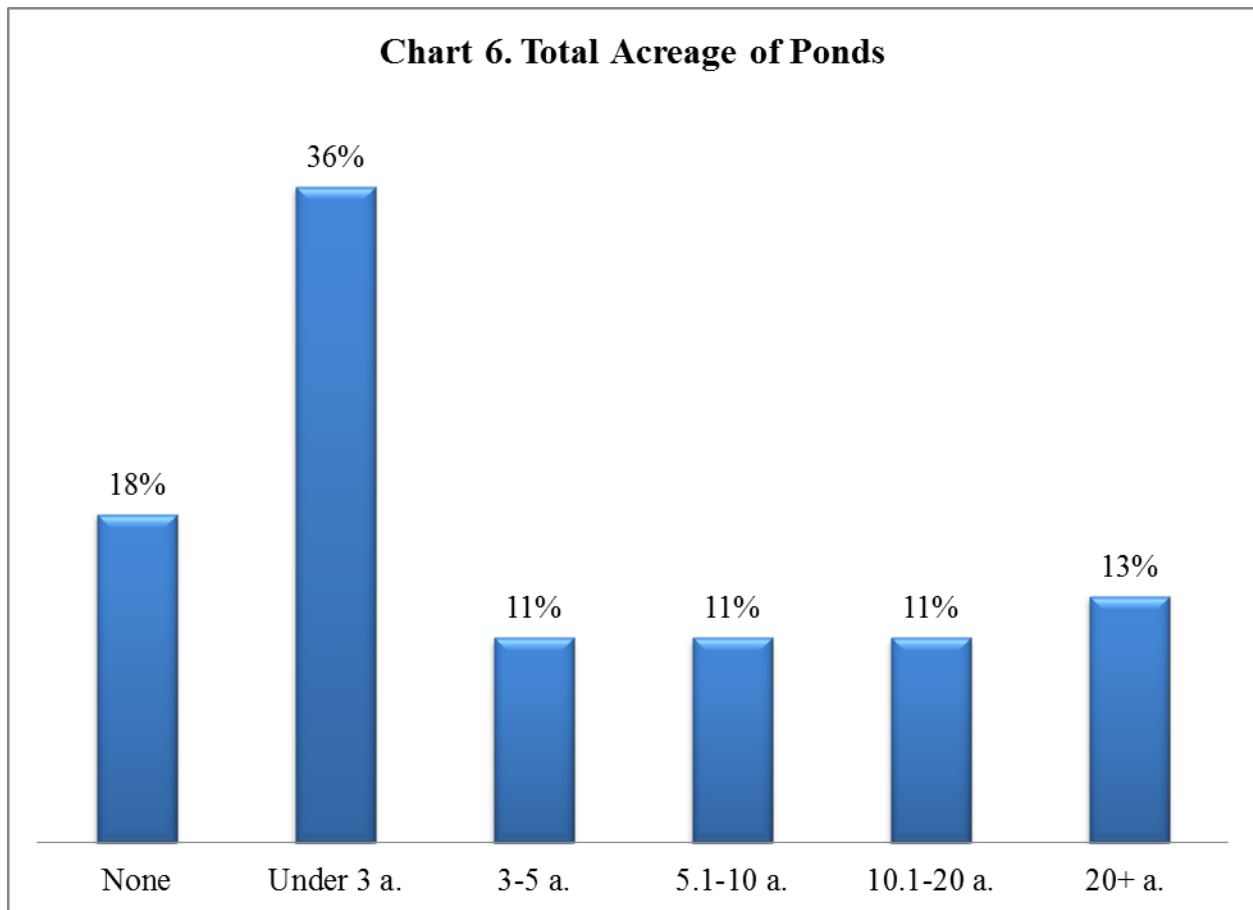
Most respondents who sold advanced fingerlings said their total production was less than 10,000 fingerlings.



Demographic comparisons. Female respondents were more likely to produce larger numbers of smallmouth bass and largemouth bass fingerlings. Respondents who have been in business for at least 20 years were more likely to produce brook trout fingerlings.

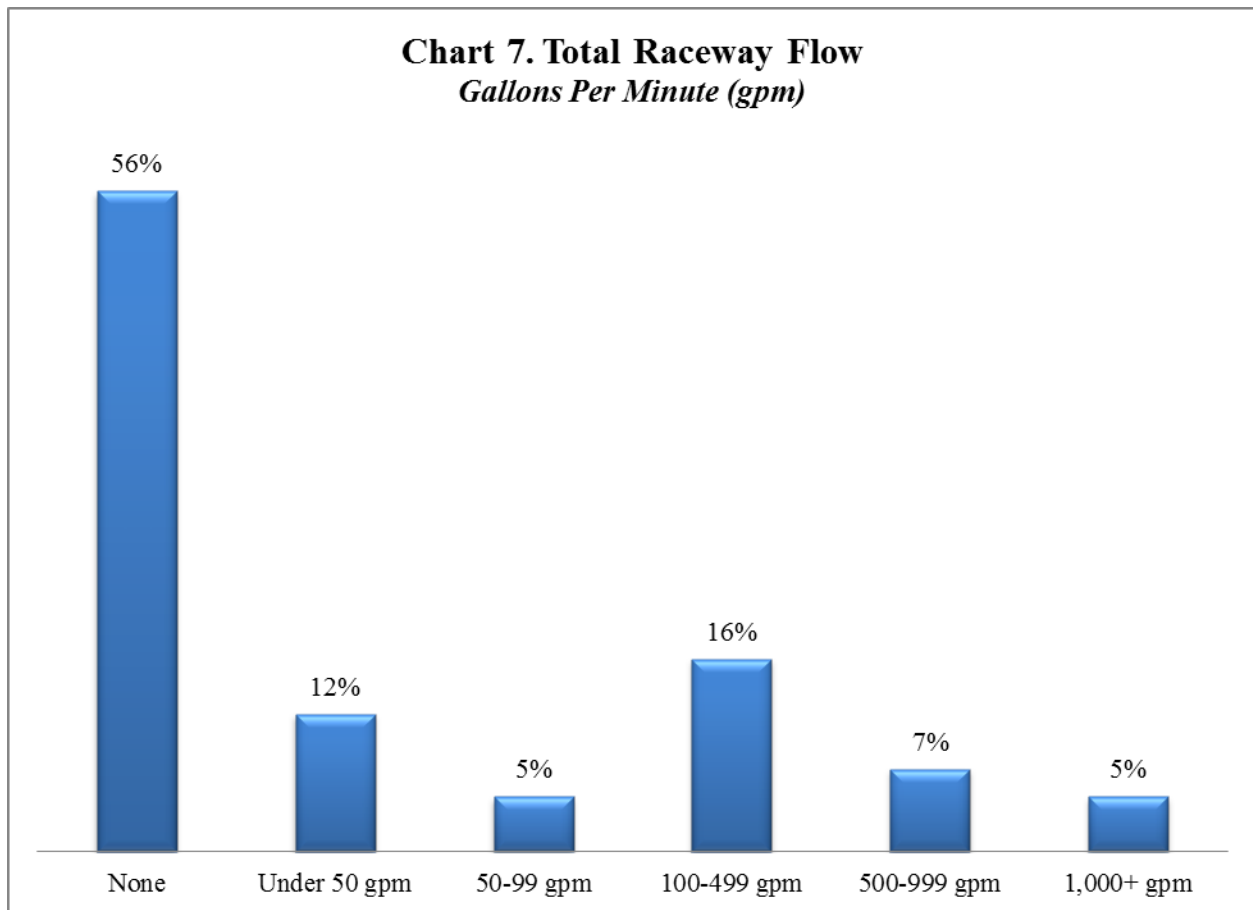
Active sellers were next asked a group of four questions: total number of pond acres, raceway total water flow volume, recirculated aquaculture system total water volume, and total weight of aquaponics production. The results are shown in Chart 6, Chart 7, Chart 8 and Chart 9.

As shown in Chart 6, 82% of respondents reported having a pond. Total pond acreage tended to be less than 3 acres (36%). The remaining total acreages were evenly distributed among the larger totals.



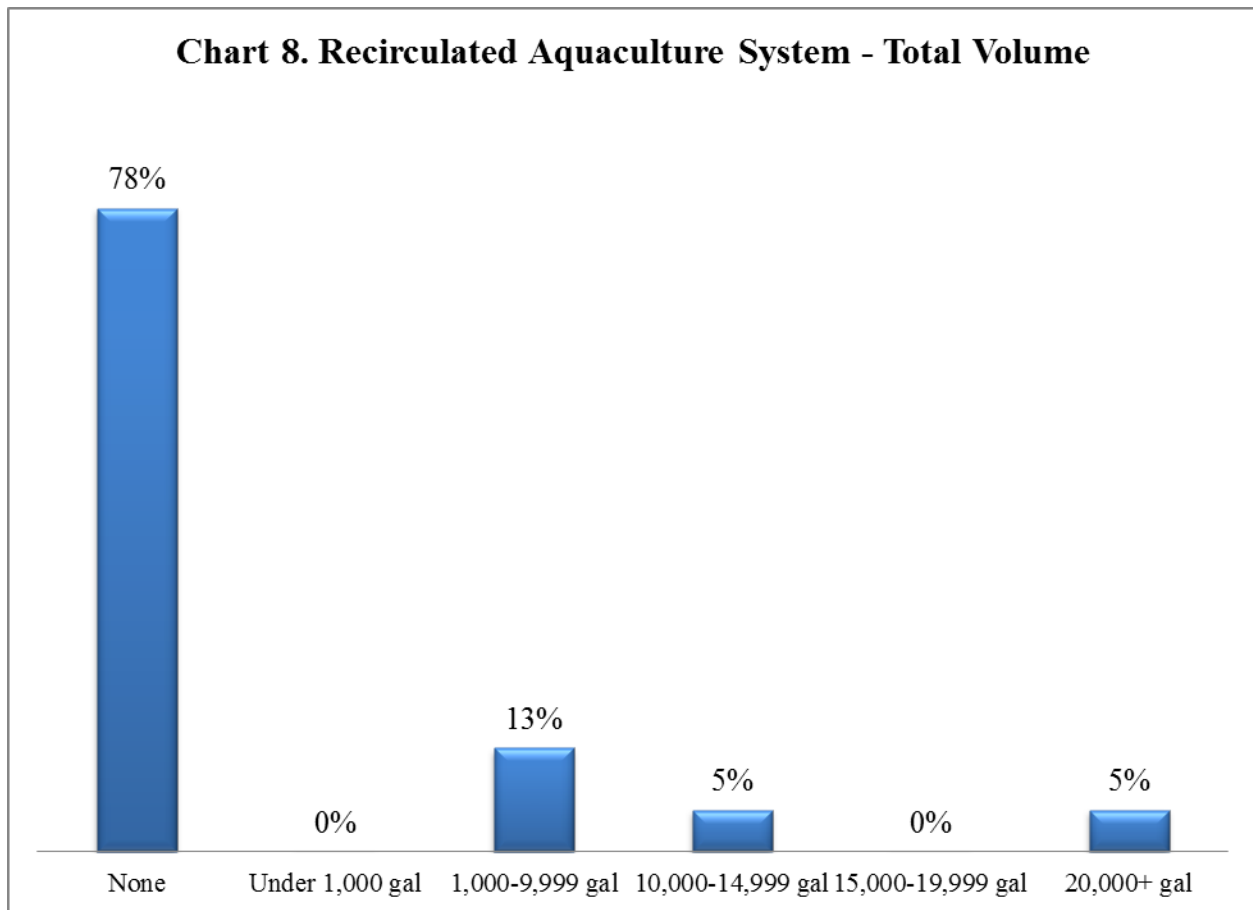
Demographic comparisons. There were no noteworthy differences among the demographic groups.

Chart 7 indicates that over half of active sellers in 2013 reported they do not have raceways. Among the 44% who have raceways, the most common total volume tended to be 100 to 499 gallons per minute (16%) or less than 50 gallons per minute (12%).



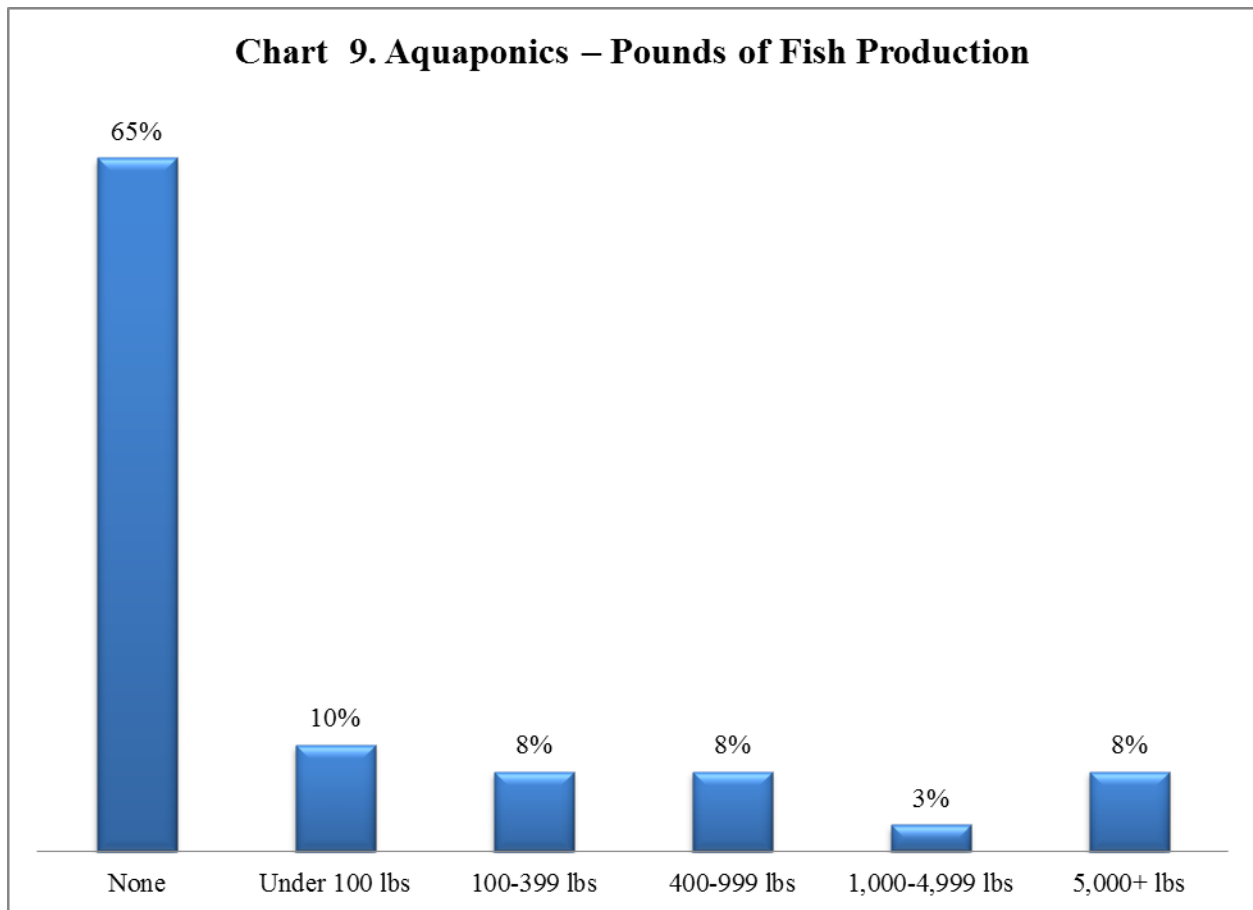
Demographic comparisons. Respondents who have been in business at least 20 years were more likely to have raceways.

The use of recirculated aquaculture systems (RAS) technology was relatively uncommon among respondents who were active sellers in 2013. Only 22% of respondents said they use RAS. Among those who use RAS, the most frequent total volume was 1,000 to 9,999 gallons.



Demographic comparisons. Operators who have been in business less than five years are more likely to use recirculated aquaculture system technology.

Chart 9 shows the distribution of total production weight from aquaponics operations. Only 35% of respondents reported using aquaponics. Production by weight tended to be relatively small, with 10% producing under 100 pounds, and 16% producing between 100 and 1,000 pounds.

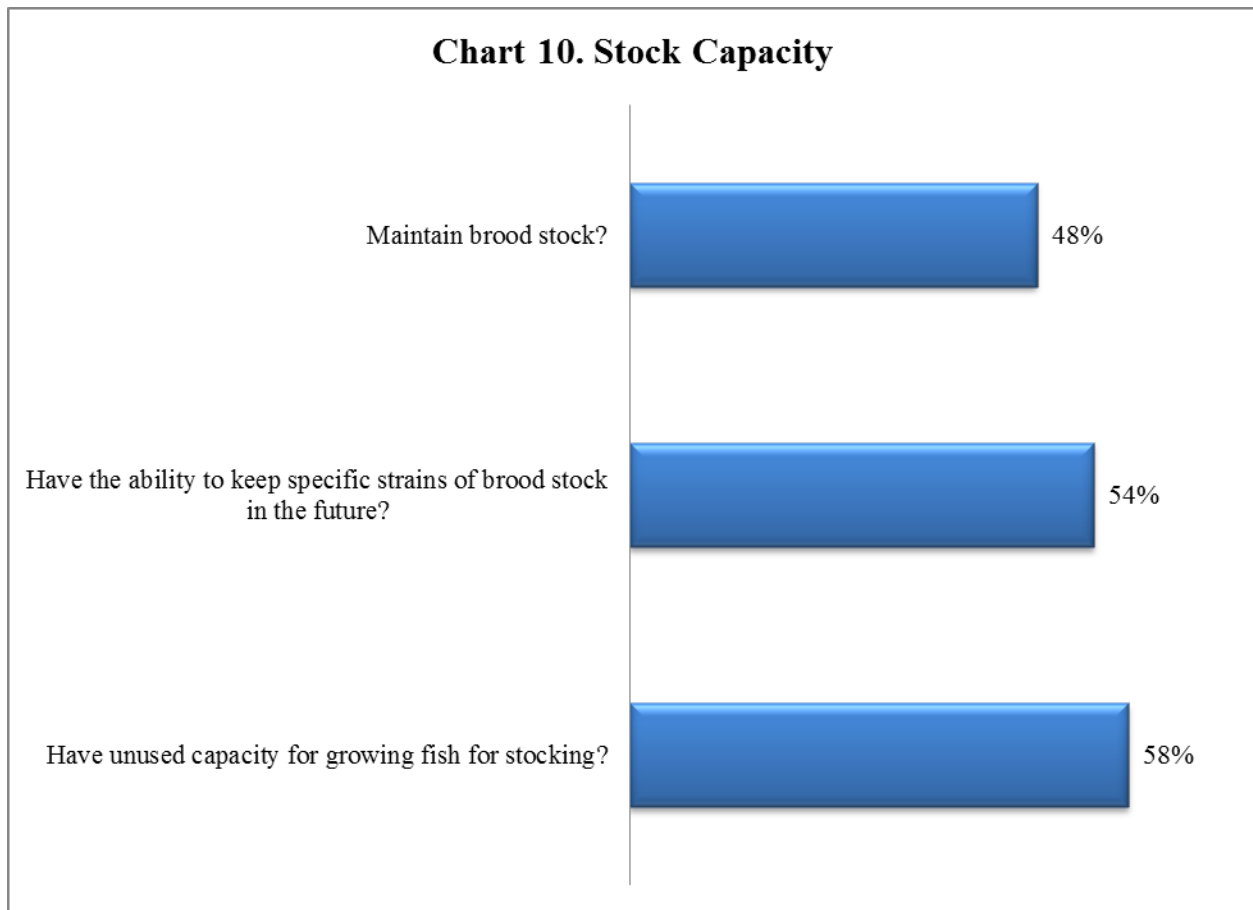


Demographic comparisons. Operators who have been in business less than five years are more likely to have aquaponics production capacity.

All respondents, regardless of sales activity in 2013, were asked if they maintain brood stock, have unused capacity for growing fish for stocking, and if they have the ability to keep specific strains of brood stock in the future.

As shown in Chart 10, about half of respondents maintain brood stock, and half have the ability to keep specific strains of brood stock in the future.

Slightly over half of respondents said they have unused capacity for growing fish for stocking.



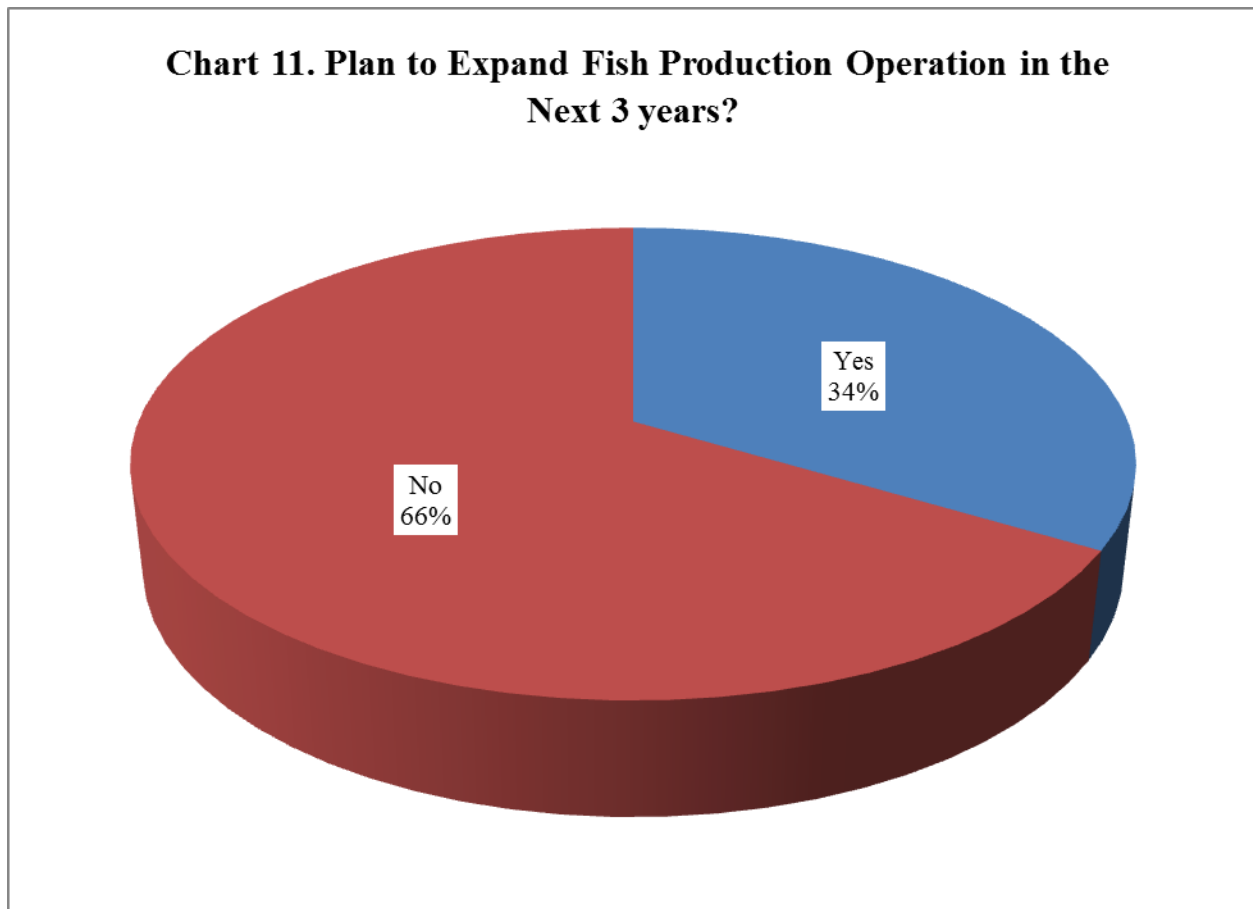
Demographic comparisons. Respondents with a Type 2 permit were more likely to maintain brood stock and a larger percentage of respondents under age 45 have the ability to keep specific strains of brood stock in the future. A higher percentage of respondents who have completed a post-secondary educational program have unused capacity for growing fish for stocking.

Future Operations

The second section of the survey asked respondent about future operations.

The initial question asked if the respondent has plans to expand his or her fish production operation in the next 3 years. As shown in Chart 11, only a third of respondents plan to expand.

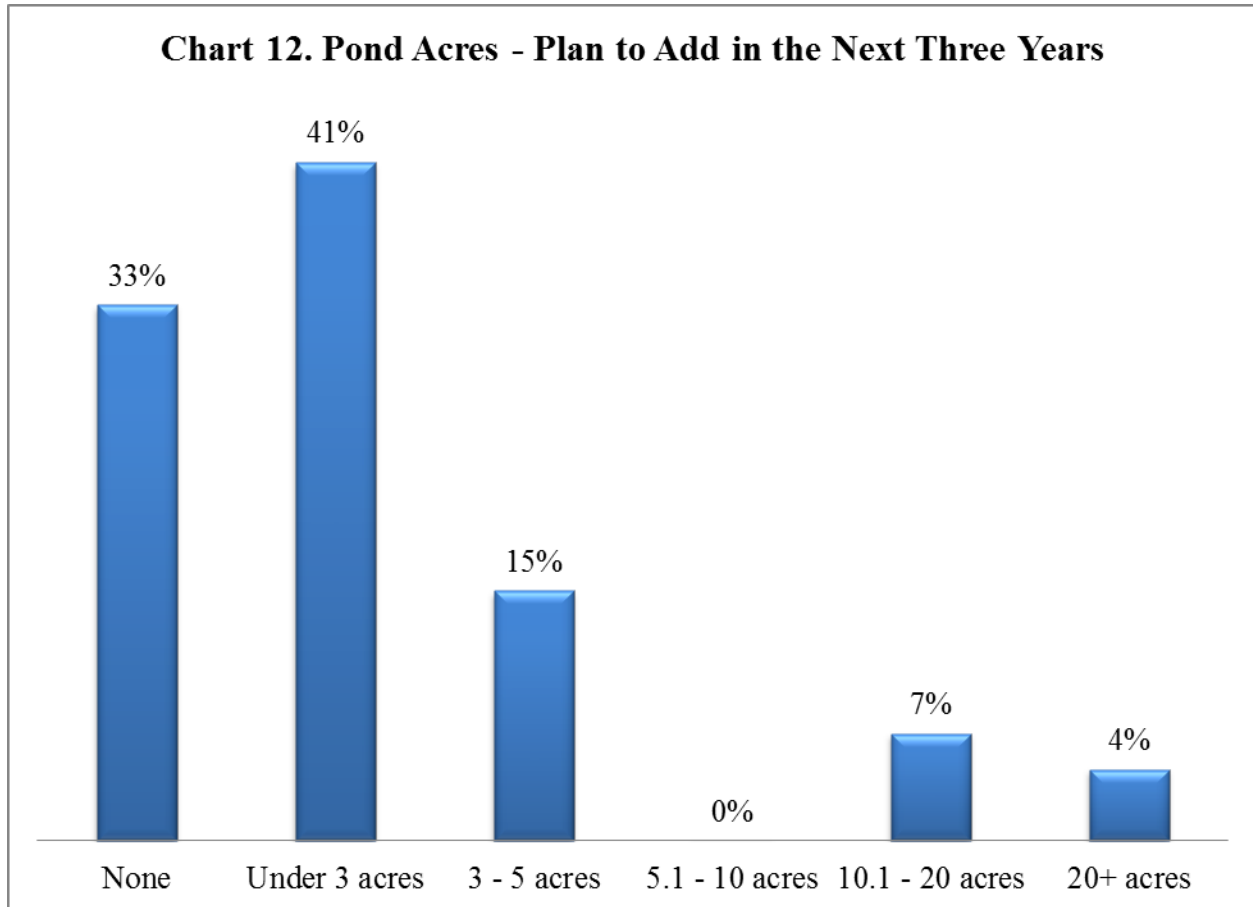
A cross-tabulation revealed that respondents who produced and sold fish in 2013 were substantially more likely to have plans to expand (57%) than those who were not producers/sellers last year (22%).



Demographic comparisons. Respondents with a Type 2 permit were more likely to have expansion plans. Operators who have been in business less than five years are more likely be planning an expansion.

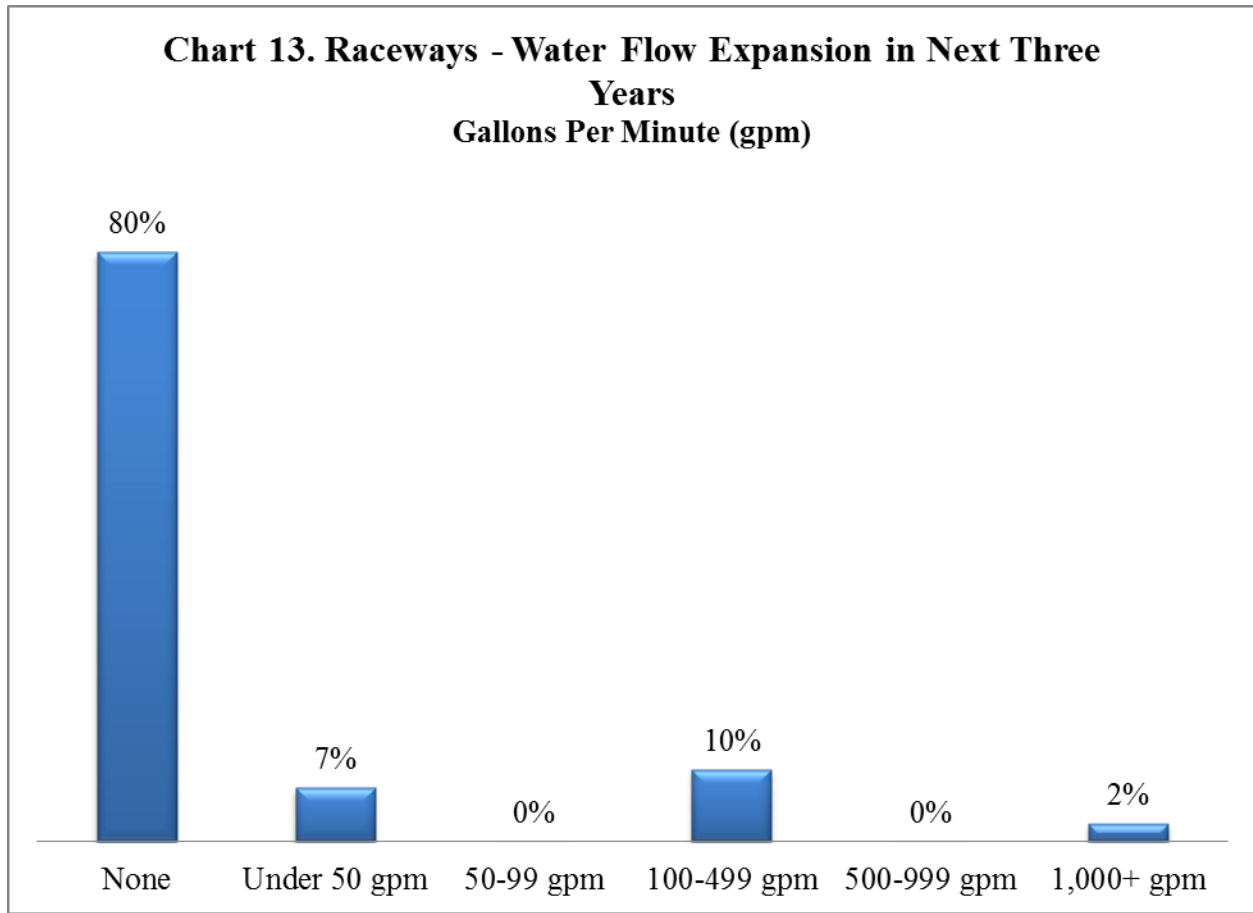
Respondents with expansion plans were then asked if their plans included additional pond acreage, raceway flow, recirculated aquaculture system flow, or aquaponics production. All but three of the respondents planning expanded production reported that their plans include one of these four types of expansion. The remaining three respondents who indicated expanded production plans presumably will do so via other means such as tapping unused existing capacity.

As shown in Chart 12, about two-thirds of respondents who plan to expand their operations are planning additional acres of ponds. The largest proportion of respondents with expansion plans said their pond expansion would add less than three acres (41%), followed by three to five acres (15%).



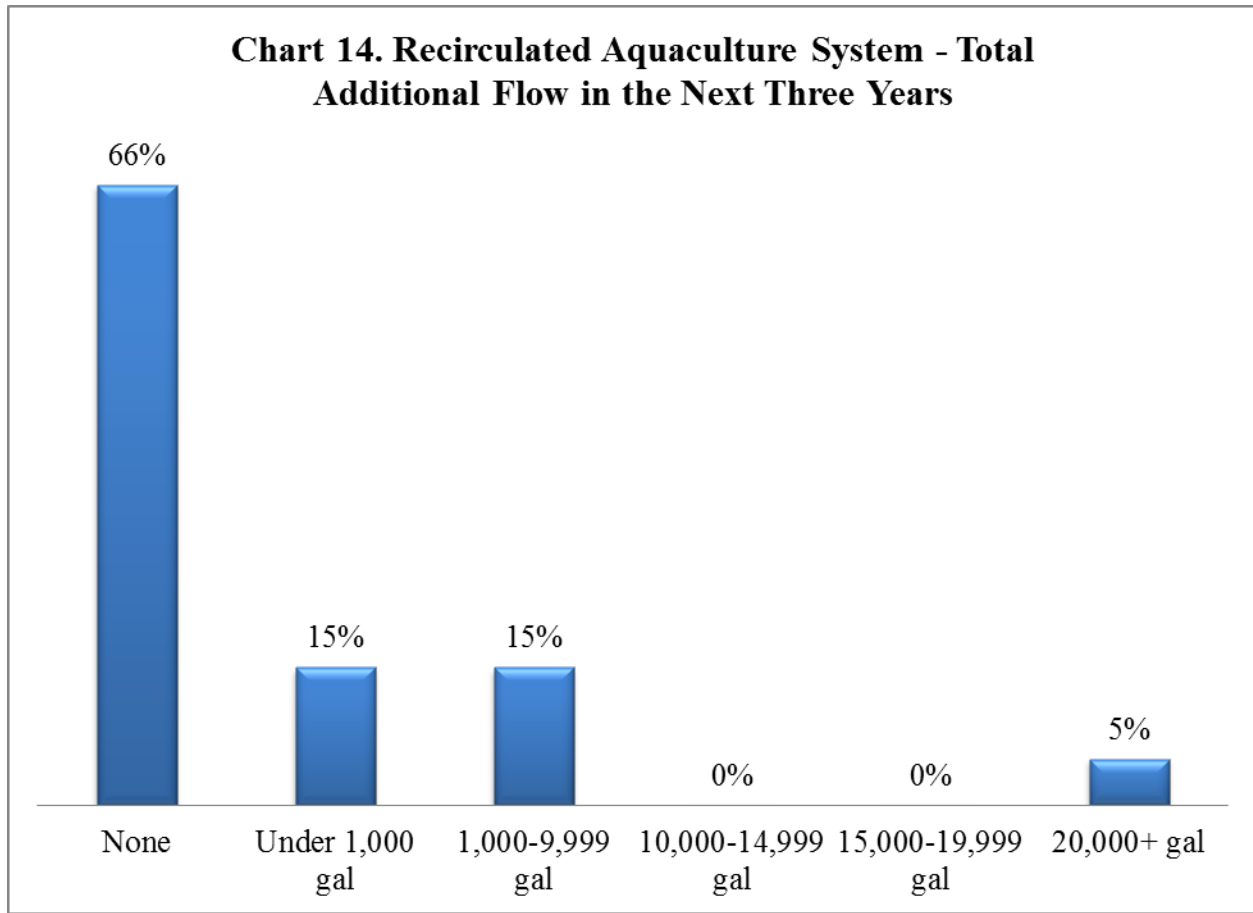
Demographic comparisons. Type 2 permit holders and respondents under age 45 were more likely to plan additional pond acreage.

Relatively few respondents with expansion plans indicated that their plans included additional raceway capacity. Chart 13 shows that only 20% of respondents with expansion plans indicated that they will add more raceway capacity. Among those who plan raceway expansion, the largest portion said they will add 100 to 499 gallons per minute, followed by those who said they will add less than 50 gallons per minute.



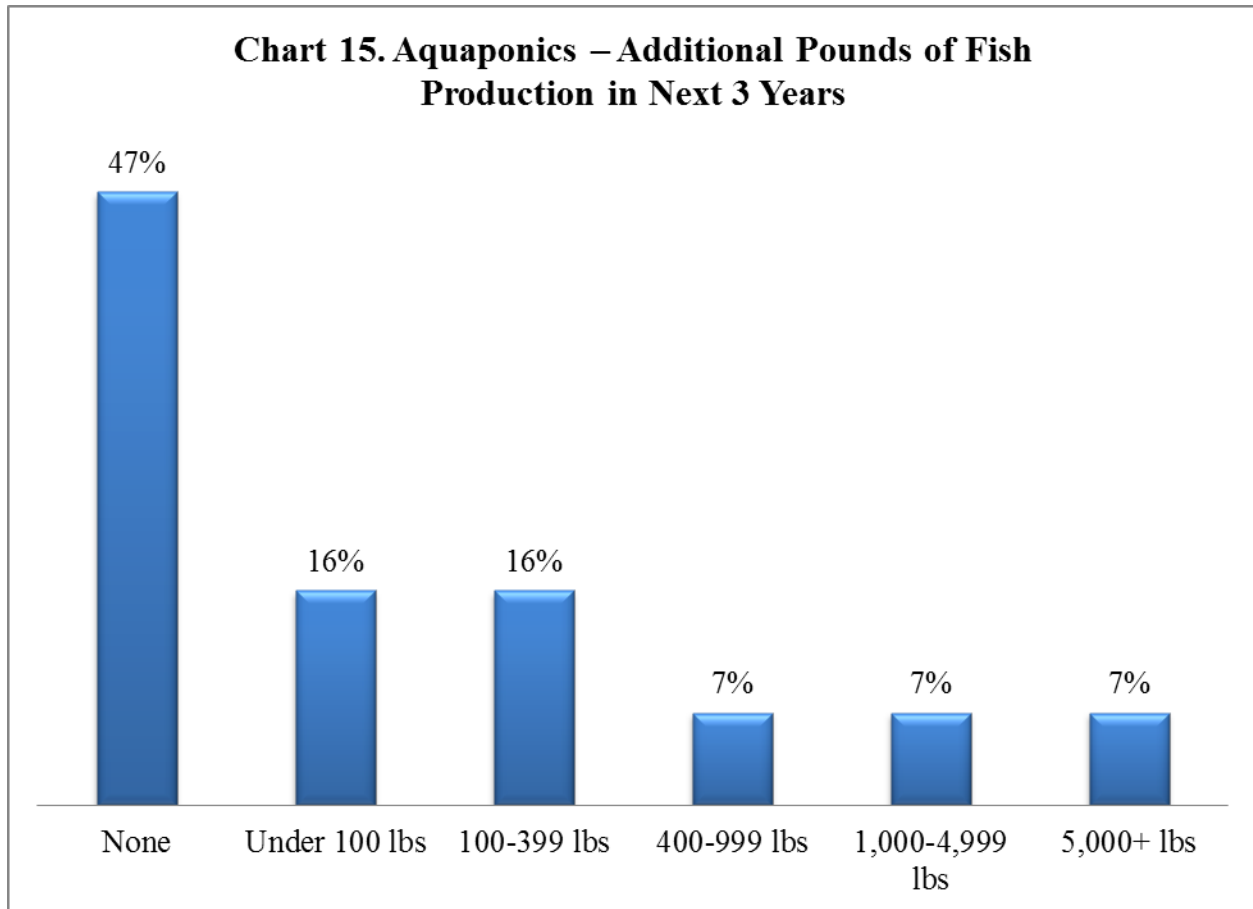
Demographic comparisons. Respondents under age 45 were more likely to plan raceway water flow expansion.

One in three respondents with expansion plans said they plan to increase recirculated aquaculture system technology (RAS). As shown in Chart 14, 15% of respondents with expansion plans using RAS said their capacity will increase by less than 1,000 gallons, and 15% said their RAS expansion will total 1,000 to 9,999 gallons.



Demographic comparisons. Women respondents were more likely to be planning additional recirculated aquaculture system flow.

With respect to aquaponics expansion, about half of respondents with expansion plans said they plan increased production. Most expansion plans are for less than 400 pounds: 16% plan to add 100 to 399 pounds, and an equal percentage said they plan to add less than 100 pounds of aquaponics production in the next three years.

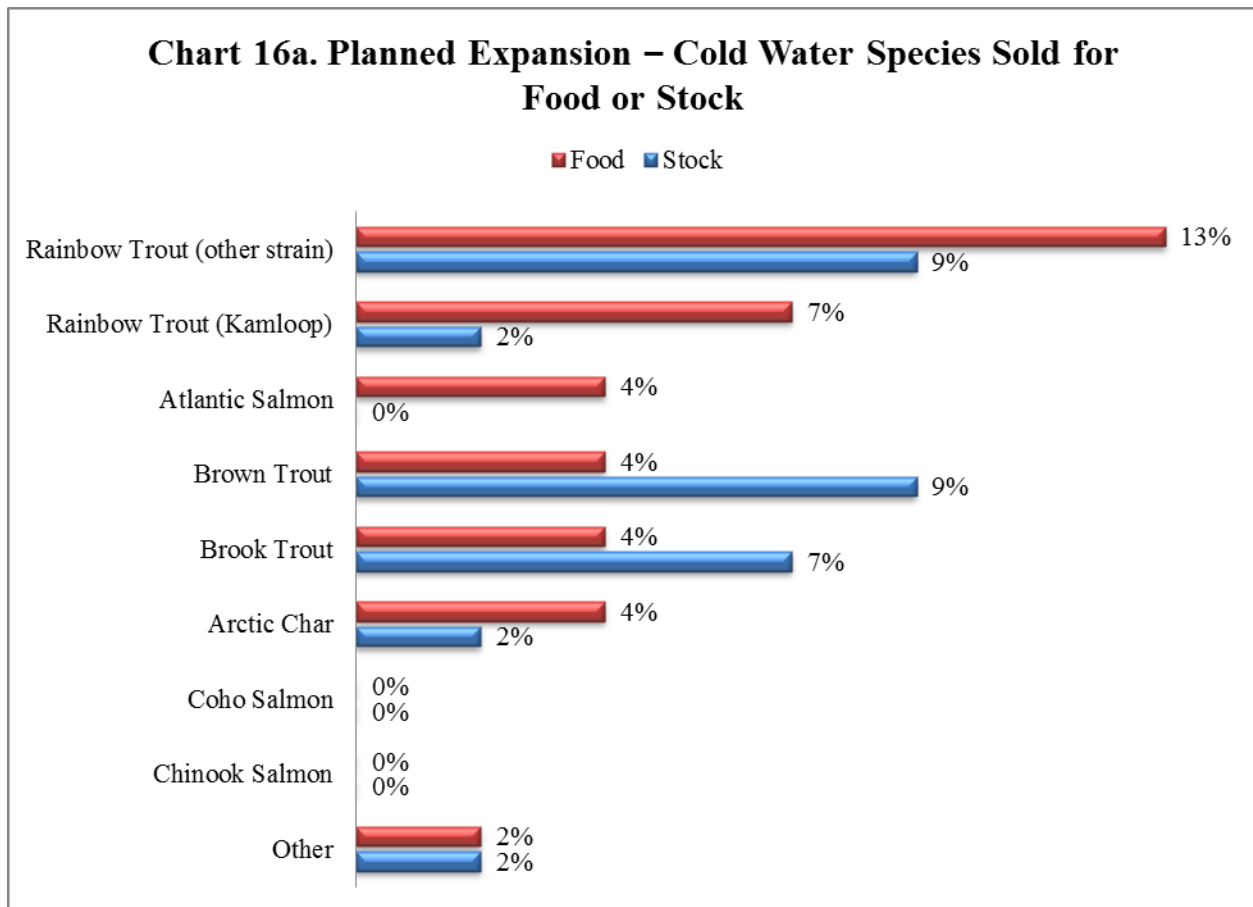


Demographic comparisons. Respondents under age 45 and operators who have been in business less than five years were more likely to plan aquaponic expansions.

Respondents were asked to indicate which species are included in their expansion plans for food or stock. The listed species were the same as in an earlier question (see Chart 3a and Chart 3b) and were grouped by cold water species and cool water species. The results are shown in Chart 16a and Chart 16b. With respect to cold water species food production, relatively few respondents with expansion plans said they have plans for increased fish production for food (top bar in each pair); 13% of respondents with expansion plans said they plan to expand production of rainbow trout, and 7% indicated planned expansion for Kamloop rainbow trout. Four percent indicated planned increases in production of arctic char, Atlantic salmon, brown trout and brook trout for food. Four percent indicated planned increases in production of arctic char, Atlantic salmon, brown trout and brook trout for food.

Relatively few respondents said they planned to expand stock production (bottom bar in each pair). Nine percent said they have expansion plans for rainbow trout and brown trout stock, and 7% indicated planned expansion for brook trout stock.

None of the respondents indicated they have expansion plans for coho salmon or chinook salmon for food.

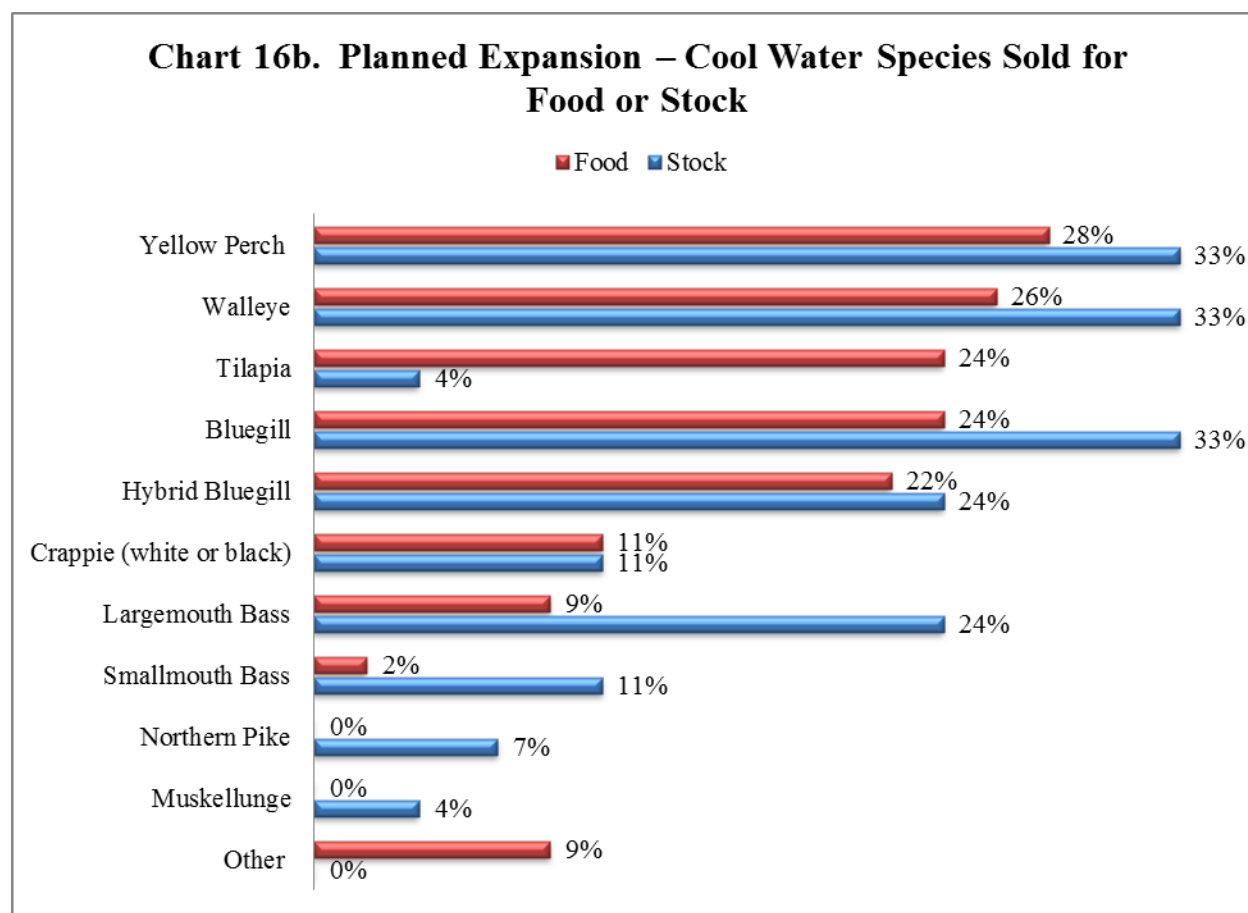


Demographic comparisons. Respondents under age 45 were more likely to plan increased production of Kamloop rainbow trout for food. A larger proportion of women said they plan to add arctic char production for food and rainbow trout (other strain) for stock.

As shown in Chart 16b, yellow perch, walleye, tilapia, bluegills, and hybrid bluegills were the most frequently mentioned species for food production expansion among cool water species (22% to 28%). With respect to expansion for stocking purposes, the most frequent species were yellow perch, walleye, and bluegills (33% each). Although one in four respondents plan to expand tilapia food production, relatively few (4%) plan to expand tilapia stock production. About a quarter of respondents said they plan to expand production of hybrid bluegills and largemouth bass.

A larger percentage of respondents said they are more likely to expand their production of these cool water species compared to the cold water species in Chart 16a.

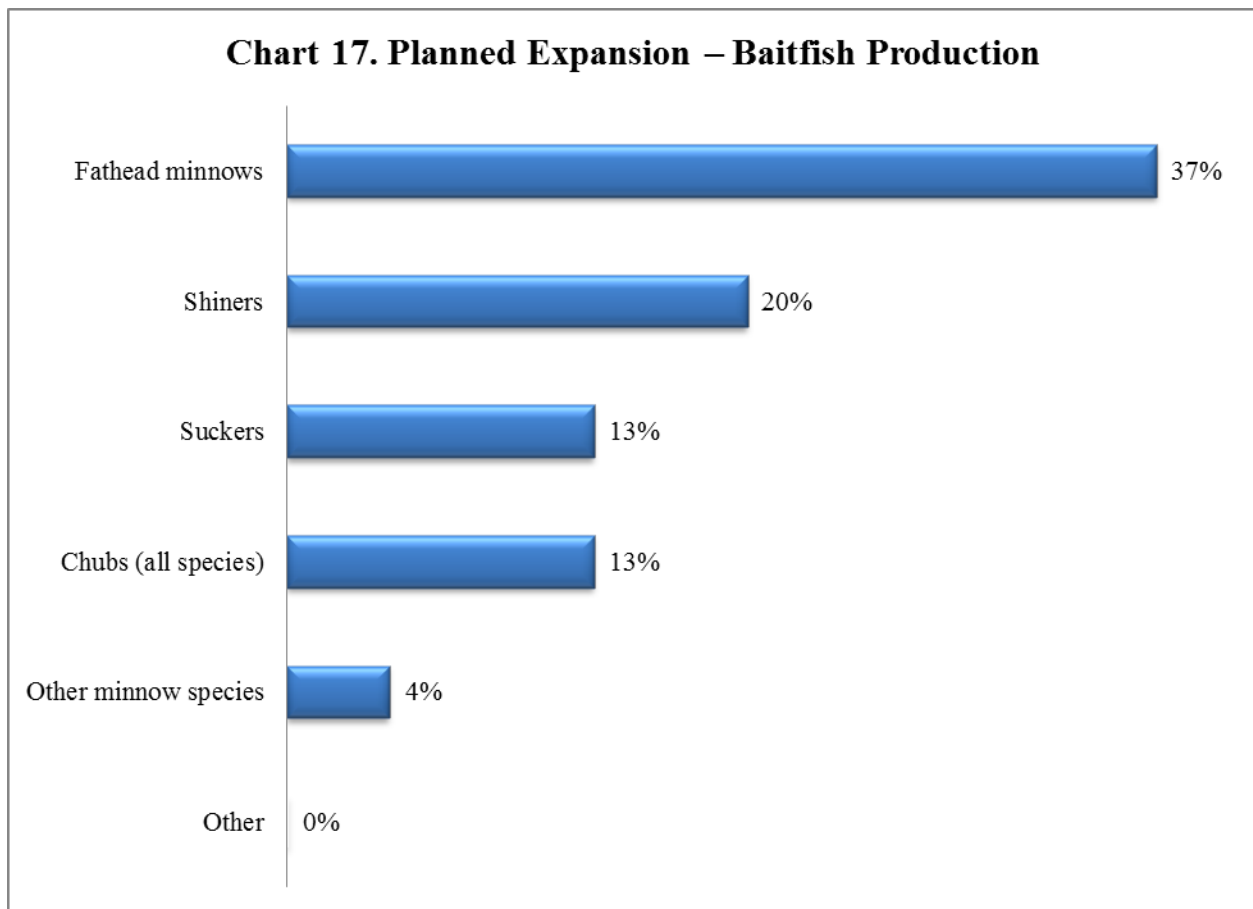
Overall, the most frequent species included in expansion plans generally align with the species currently being produced, which suggests that fish farm operators are not planning to expand into production of new species.



Demographic comparisons. Respondents under age 45 were more likely to plan increased production of the following: tilapia for food, crappies for stock, crappies for food, walleyes for stock, and walleyes for food. A larger proportion of operators who have been in business less than five years are planning expansion of yellow perch for food, tilapia for food, and walleye for food. Respondents who have completed a post-secondary educational program are more likely to be planning to expand production of tilapia for food and walleye for food.

As shown in Chart 17, the most frequent baitfish species included in expansion plans is the fathead minnow, which was cited by 37% of respondents. Shiners (20%), suckers (13%), and chubs (13%) were less frequently included in expansion plans.

The most frequent baitfish species included in expansion plans generally align with the species they are currently producing (see Chart 4).



Demographic comparisons. Respondents under age 45 and operators who have been in business less than five years were more likely to plan expanding their chub production.

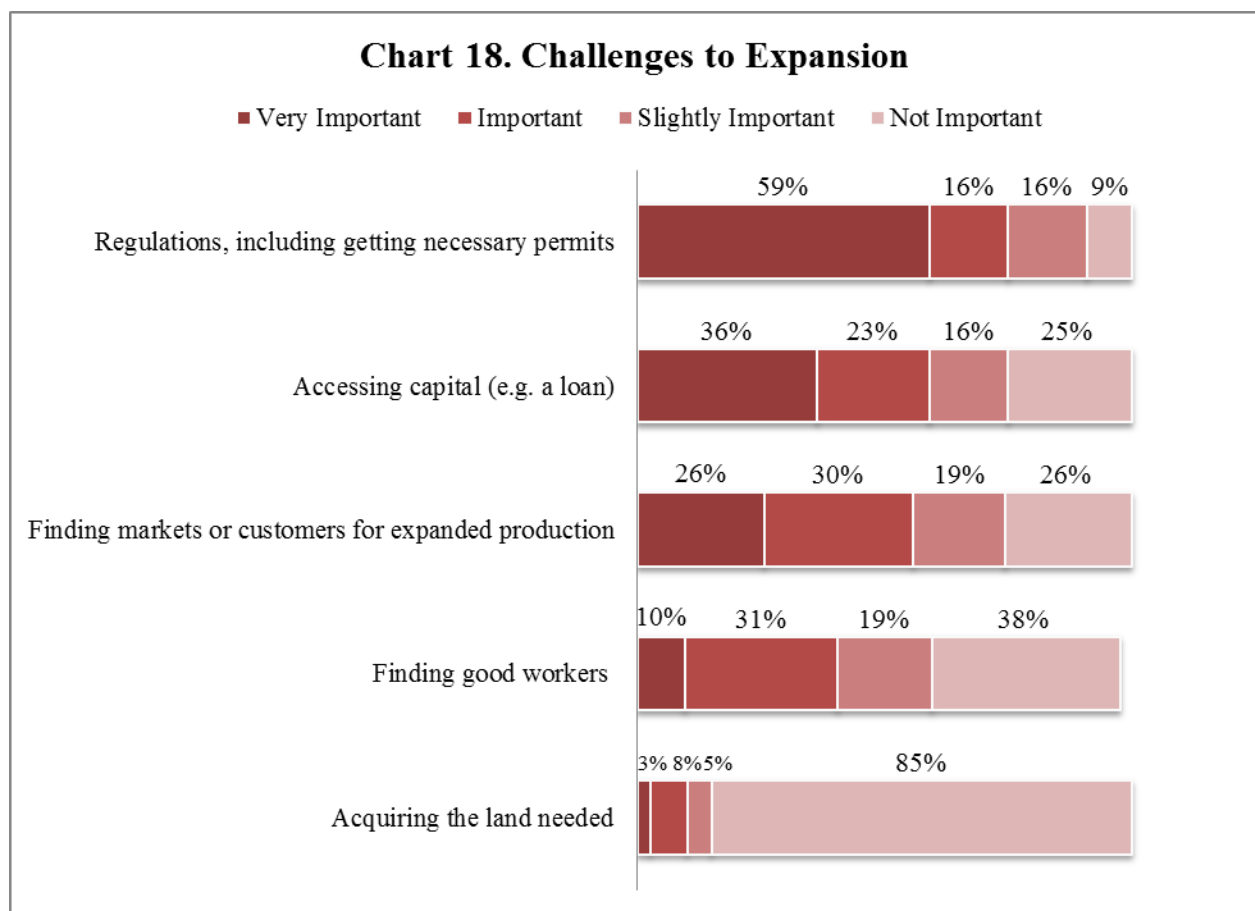
Respondents were asked to indicate the challenges they face as they expand their operations. Five challenges were listed, and respondents were asked to rate the importance of each on a scale ranging from very important to not important. The results are shown in Chart 18.

The largest challenge for expansion cited by respondents was related to regulations and permitting issues. Six in ten respondents rated this as very important and an additional 16% said it is an important challenge.

Access to capital for expansion was the second ranked challenge, with 36% rating it as a very important challenge and another 23% said it is an important challenge.

Over half of respondents said that finding markets or customers for expanded production is a very important (26%) challenge or important (30%) challenge.

Workforce issues are not as large a challenge, with only 10% of respondents having said that finding good workers is a very important challenge and 31% saying it is an important challenge. Arranging available space for expansion is not an issue for a large majority of respondents (85%).

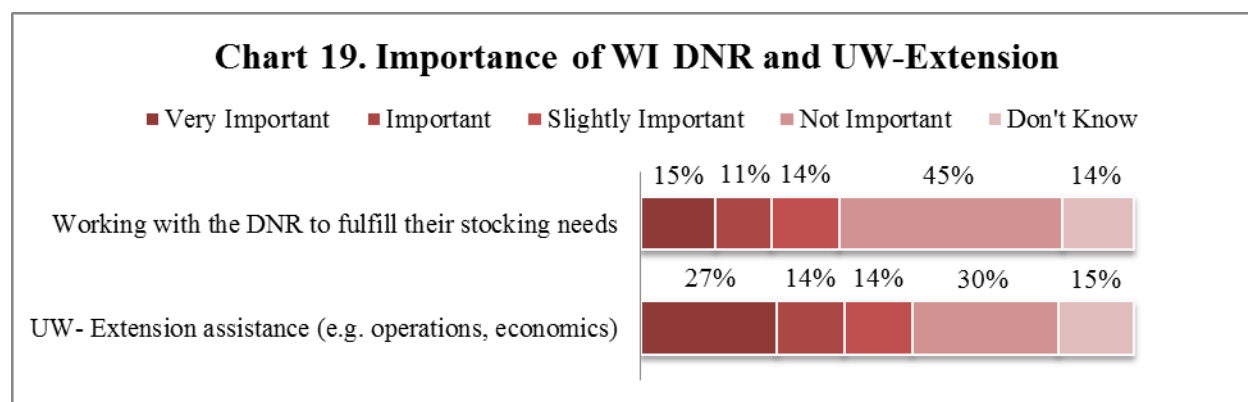


Demographic comparisons. Respondents under age 45 were more likely to say that land acquisition is a challenge for their expansion plans.

Respondents were asked to rate the importance of UW-Extension assistance and the stocking needs of the Wisconsin DNR with respect to their expansion plans. Answer choices were on a scale of very important to not important and included an option for “don’t know.”

As shown in Chart 19, about one in four respondents said that working with the DNR was very important (15%) or important (11%) to their expansion plans.

About four in ten said UW-Extension assistance was very important (27%) or important (14%) to their expansion plans.



Demographic comparisons. Respondents under age 45 were more likely to give higher importance ratings to UW-Extension assistance.

The SRC compared the responses to these two questions between respondents who sold product in 2013 and respondents who were not sellers. As shown in Table 2, sellers gave higher importance ratings to working with the DNR on their stocking needs, with 26% of sellers saying it is very important compared to 9% of non-sellers. A higher percentage of sellers also said UW-Extension assistance is very important (41%) compared to non-sellers (20%). These differences between sellers and non-sellers are statistically significant.

Table 2. Importance DNR and UW-Extension: Sellers vs. Non-sellers - 2013						
		Very Important	Important	Slightly Important	Not Important	Don't Know
Working with DNR Stocking Needs	Seller	26%	13%	13%	41%	7%
	Non- Seller	9%	11%	13%	48%	19%
UW-Extension Assistance	Seller	41%	13%	13%	24%	9%
	Non- Seller	20%	14%	13%	33%	19%

Written Comments

The survey contained an open-ended question in which respondents could add comments and concerns. A total of 54 responses were entered into the text block provided on the survey. The SRC analyzed the contents and created 8 topical categories plus a “miscellaneous” category.

The results are summarized in Table 3. The most frequent comments were that the respondent’s fish farm was for use by family and friends rather than a commercial operation (20%).

Not surprisingly, the most common substantive comments expressed concerns and objections to current regulations and permit issues (19%). The following quotes exemplify the comments about regulations and permits.

“DNR contracts are too complicated and unworkable. Regulations are ridiculous, not cost effective and are destroying fish and wild fur farming. Land used for these activities will be forced to convert to other uses if they are not already.”

“One of our biggest challenges has been to keep up to date on the continuing regulations so we are in compliance. Regulations of neighboring states, mainly Illinois, have greatly impacted our fish sales and thus our rearing capacity to find additional sources to sell our trout.”

Comments about the economics of aquaculture comprised 15% of the comments. The following are examples of these concerns:

“It takes too long to pay off a loan. I need a grant to expand production. If I had a few more ponds I would have more volume, which would create more funds for future expansion.”

“My biggest obstacle to expanding has been the high cost of excavating ponds and the low rate of profit per fish.”

Table 3. Written Comments by Topic		
Topic	Count	%
Personal/Family/Friends use only	11	20%
Regulations	10	19%
Economics and money	8	15%
Not active/not in use	6	14%
Business growth	4	7%
DNR	4	7%
Information/Assistance	4	7%
Disease	2	4%
Miscellaneous	5	9%
Total	54	100%

Conclusions

Key findings of this survey include the following:

- About a third of fish farm permit holders produced and sold fish in 2013.
- Over half of respondents have unused capacity for fish stocking.
- Over half of respondents who produced and sold fish in 2013 plan to expand in the next three years. The most common type of expansion is additional pond acreage.
- Expansions are more likely for cool water species than cold water species.
- Regulations and permitting issues are the biggest challenge to expansion plans.

Appendix A – Non-response Bias Test

Any survey has to be concerned with “non-response bias.” Non-response bias refers to a situation in which people who do not return a questionnaire have opinions that are systematically different from the opinions of those who return their surveys. For example, suppose most non-respondents said they do not maintain brood stock, whereas most of those who responded said they do maintain brood stock. In this case, non-response bias would exist, and the raw results would overestimate the percentage of operators who maintain brood stock.

The standard way to test for non-response bias is to compare the responses of those who respond to the first mailing to those who respond to the second mailing. Those who respond to the second mailing are, in effect, a sample of non-respondents (to the first mailing), and we assume that they are representative of that group. In this survey, there were 106 responses to the first mailing and 32 to the second mailing. There are 124 variables in the questionnaire, and the SRC found only 4 variables with statistically significant differences.

Respondents to the first mailing were more likely to:

- Plan to expand their fish production in the next 3 years (Q11)
- Add slightly more pond acres in their expansion plans (Q12)
- Plan expansion of walleye for stock (Q16)

Respondents to the second mailing were more likely to:

- Currently produce brook trout for stock (Q3)

The SRC concludes that there is little evidence that non-response bias is a concern for this sample.

Table A1 – Statistically Significant Differences Between Responses of First and Second Mailings			
Variable	Statistical Significance	Mean First mailing	Mean Second Mailing
Q3. Brook trout stock production	.029	.028	.125
Q11. Plan to expand	.017	1.61	1.84
Q12. Pond expansion	.024	1.97	1.20
Q16. Walleye stock expansion	.012	.17	.00

Appendix B –“Other” Written Responses and Open-Ended Comments

Q3. “Other” cold water species for stock (3 responses)

- Tiger perch (2x)
- Bullheads

Q3. “Other” cold water species for food (3 responses)

- Perch
- Perch and bluegills
- Tilapia

Q3. “Other” cool water species produced for stock (1 response)

- Bullheads

Q3. “Other” cool water species produced for food (2 responses)

- Channel catfish
- River prawns

Q4. “Other” bait fish produced (3 responses)

- Bullheads
- Golden
- Mud minnows

Q16. “Other” cold water species for stock – planned expansion (1 response)

- Catfish

Q16. “Other” cold water species for food – planned expansion (1 response)

- Catfish

Q18. “Other” challenges to expansion

- Getting the population to eat more fish.
- The biggest challenge by far is the cost of electricity.

Q23. Additional comments or concerns

Personal/Family and Friend Use Only (11 responses)

- As you have seen in my survey responses, I fish farm for my personal use and family and friends only.
- Hobby fish pond only.
- I already just have a "6in. fishing pond" for personal enjoyment with friends and relatives. Not for commercial sale.
- I have a type 1 license in order to buy game fish and minnows. I do not sell any fish. I maintain my pond for the enjoyment of family and friends. For this reason I did not originally complete the survey because I felt that it did not apply to my situation.
- Just have a pond on location and have an aquaponic system used for our own purpose.
- My operation is a self-sustaining bullhead pond for bait only use.
- My pond is for family recreation only!
- My two ponds are for personal (family) use only, and retain sufficient numbers of fish to supply our needs. We purchase fathead minnows periodically and introduced smallmouth bass last fall (October 2013) to see how they fair in our newest pond constructed in 2013.
- Our ponds are used for recreational fishing (catch and release) only and are initially stocked with fish and left to populate on their own.

- Stocked pond for family and friends.
- This is primarily a hobby for me. I want to get neighbors on board to help raise fish in their ponds for pleasure. I want to help raise fish to support local lakes that are receiving higher fishing pressure due to technology and number of fisherman.

Regulations (10 responses)

- DNR contracts are too complicated and unworkable. Regulations are ridiculous, not cost effective and are destroying fish and wild fur farming. Land used for these activities will be forced to convert to other uses if they are not already.
- Fish farming should be water/wetland dependent and should only need to comply with federal wetland rules. Discharge from fish farm should only need to comply with federal rules. DNR has too many policies that prohibit the growth of aquaculture. All of aquaculture should move to department of Ag (ex: pond building, discharge, etc.).
- I have been in the live bait business for 17 years and I am finding it harder to do business with the state of Wisconsin more so then ever. First of all I currently hold a class A bait dealer's license that costs \$50 per year through the WDNR. 12%-17% of all my sales are minnows to one gas station. The Department of Agriculture wants \$125 for a type 2 fish farm license. I find this to be way out of line for the cost of the type 2 license considering I already pay \$50 for my bait license through the WDNR. I don't feed the minnows, and I don't raise them. They have already been inspected when I get them and all I have to do is transport them to one gas station. If you really want to talk about hurting small business owners this is definitely the way to do it.
- Need to change regulations/laws so that land adjacent to wetland can be utilized for ponds and pond production. Current laws are ridiculous and by preventing production ponds are not necessarily protecting wetlands!
- One of our biggest challenges has been to keep up to date on the continuing regulations so we are in compliance. Regulations of neighboring states, mainly Illinois, have greatly impacted our fish sales and thus our rearing capacity to find additional sources to sell our trout.
- Reduce FDA regulations on smoking process.
- Survey fails to take into account increased production potential based on better use of existing resources. Importance of regulatory control over operations is a direct disincentive to expand. In addition, new DTCP regulations for processors are absolutely preventing expansion of small processing operations. Survey is slanted toward stocking and not addressing food fish concerns.
- The big problem with raising fish is the DNR rules for wetlands. Once you put a pond in, it develops wetlands and then the DNR takes over and won't allow developing the ponds or change and denies of ponds. There are people who have been trying to put ponds in for years and have been denied.
- The expenses associated with getting fish certified are too high.
- The fight between the Ag Department and the DNR. Lack of communication between all parties. Permit systems are ridiculous. No help for fish farmers from any government sources other than the constant harassment. This is also a waste of money for taxpayers.

Money and Economy (8 responses)

- Aquaculture is very dependent on economy of service. Small expectations cannot make profit. There is an almost impossible hurdle to acquire convention capital from banks. This industry must get government low interest loans to grow. For RAS the task is very capital intensive but in the end this method is profitable and should be urban farming's future.
- Due to VHS requiring tests and requirements from other states it is hard to make any money when it costs so much just to sell or stock fish.
- I only do fee fishing at this time for food because the health certificate requirements don't make it cost effective to sell fish for stocking on a small scale.

- I put "not important" in my finding markets question because I live in an area where it is nearly impossible for restaurants to get affordable fish. Right now I have far more customers than I can supply currently.
- If the WDNR would control the otters from eating my trout, it doesn't pay to stock trout. I am renewing my license each year to remove the silt from the ponds. The contractor gave an estimate of \$10,000.
- It takes too long to pay off a loan. I need a grant to expand production. If I had a few more ponds I would have more volume, which would create more funds for future expansion.
- My biggest obstacle to expanding has been the high cost of excavating ponds and the low rate of profit per fish.
- We made 11 acres of ponds to raise fish (Perch primarily) and sold the first large amount of farmed perch in the state-about 800 lbs to Seaway Foods. Through the years, there were no profits. Fish food is expensive. We raised 25,000 fingerlings in and out of the ponds a few years ago and after a call to the Aquaculture Association, we were told nobody wanted them and 2 other raisers were stuck with fish like us. Marketing in this business is a sloppy free for all-Extremely Disappointing.

Not Active/Not Applicable (6 responses)

- During 2013 the pond was used by a registered fish farm to store, feed, and sell for own profit and business where he lost his property. I received no money or other gain from this use. This stopped in November, 2013.
- Farm is not in operation at this time.
- I am not currently selling any fish or bait. Very little of the survey applies currently.
- I no longer raise fish since otters killed my fish and broad stock 3 winters ago. Minimum \$5,000 loss. Too expensive to fence it all in.
- This fish farm is rented out to Ma Ma Fish Hatchery, Phillips, Wisconsin.
- Your survey is looking for fish farms for stocking the lakes in Wisconsin. It has nothing to do with me!

Business Expansion/Growth (4 responses)

- I live on Beecher Lake in Beecher, WI. It's approximately an 88 acre lake ranging from 17' to 55' deep. I have 160' frontage and about 11-14 acres of land. I currently have a 26' by 48' greenhouse operation raising Bluegill and vegetables. I have at least 5 acres of land that could be converted into ponds and or greenhouses to raise any species that is needed. I would be more than willing to do my part.
- In regard to question 19a it would be nice to sell fish to the DNR to fulfill their stocking needs. In all of our years in business we have never had the opportunity to sell the DNR any fish. Our farm is in Northern WI and as far as I know, all the fish purchased by the DNR are south and east.
- #5 increasing production to 40-50 thousand.
- Looking to expand into aquaponics and RAS aquaculture.

DNR (4 responses)

- DNR is not much help at all.
- Don't really use electronic services-DNR stocking not done now but may in the future.
- Honesty from Wisconsin DNR.
- The DNR is not being pro-active in changing possession limits so this would be my way to be pro-active. I would like to work with the DNR in stocking at little or no cost.

Information and Assistance (4 responses)

- But I still need continued information on how to keep it going/growing healthy fish.
- Don't know if you could help me or not? More information would be nice.
- Interested about possibilities with DNR and UW-Extension assistance.

- Ron I would like to work with the university on any program that they might have. I sold most of the farm but still have the trout ponds.

Disease (2 responses)

- It would be beneficial if the Wisconsin Lab could do the test for whirling disease again. It is very expensive to send the fish to a lab out of state.
- Moa in China wanted backyard iron smelting. It didn't work. 1000 small producers will NOT provide quality stocking sized fish at reliable quantities. Sorry, but it will not. Just think of all the entrance points for disease we have now created.

Miscellaneous (5 Responses)

- Canned foods.
- Help market or inform population to get outdoors, eat fish.
- I could easily fill our pages on comments and concerns. Most I would not put in writing. If you want real comments/concerns call [Withheld].
- We are a small fee fishing operation that sells rainbow and brook trout only. We have no capacity to produce any type of fish.
- We need replacements for [Withheld].

Appendix C – Quantitative Summary of Responses by Question

Wisconsin Walleye Initiative Capacity Study

Current Operations

1. In 2013 did you produce and sell any fish raised on this farm (not including fish you purchased and resold or wild capture bait)?

Yes	No
34%	66%

If “No” is selected, go to question 10

2. For which of the following uses were these fish sold? (• mark all that apply)

a. Stocking	b. Food	c. Bait
61%	57%	11%

3. Which of the following fish species are currently raised for stocking or food? (•mark all that apply)

Cold Water Species:

	Stock	Food		Stock	Food		Stock	Food
Arctic Char	0%	2%	Rainbow Trout (Kamloop)	15%	22%	Chinook Salmon	0%	0%
Brook Trout	15%	11%	Rainbow Trout (other strain)	13%	13%	Coho Salmon	0%	0%
Brown Trout	9%	7%	Atlantic Salmon	0%	4%	Other See Appendix B	7%	7%

Cool Water Species:

	Stock	Food		Stock	Food		Stock	Food
Bluegill	26%	22%	Crappie (white or black)	20%	9%	Northern Pike	4%	2%
Hybrid Bluegill	20%	17%	Largemouth Bass	26%	11%	Walleye	22%	11%
Yellow Perch	41%	17%	Smallmouth Bass	15%	7%	Other See Appendix B	2%	4%
Tilapia	0%	11%	Muskellunge	2%	0%			

4. Which of the following baitfish are currently raised?

Chubs (all species)	7%	Shiners	13%	Other minnow species	4%
Fathead minnows	30%	Suckers	15%	Other (specify) See Appendix B	7%

5. For each species below, please indicate the number of advanced fingerlings for stocking (fall or spring) you normally produce on your current operation.

	None	<10,000	10,001-24,999	25,000-49,999	50,000-99,999	100,000+
Largemouth Bass	43%	52%	5%	0%	0%	0%
Smallmouth Bass	53%	35%	6%	0%	6%	0%
Walleye	48%	38%	5%	0%	5%	5%
Muskellunge	93%	7%	0%	0%	0%	0%
Northern Pike	86%	14%	0%	0%	0%	0%
Bluegill (all species)	40%	36%	16%	4%	0%	4%
Crappie (all species)	50%	45%	0%	5%	0%	0%
Yellow Perch	35%	41%	10%	0%	3%	10%
Brook Trout	60%	33%	0%	0%	7%	0%
Brown Trout	73%	13%	0%	13%	0%	0%
Rainbow Trout	55%	15%	5%	5%	15%	5%

Describe the culture system(s) you currently use in your operation

6. Total acre of ponds typically used in your operation

None	Under 3 acres	3 – 5 acres	5.1 – 10 acres	10.1 – 20 acres	20+ acres
18%	36%	11%	11%	11%	13%

7. Raceways – total water flow

None	Under 50 gpm	50-99 gpm	100-499 gpm	500-999 gpm	1,000+ gpm
56%	12%	5%	16%	7%	5%

8. Recirculated Aquaculture System (RAS) - total water volume

None	Under 1,000 gal	1,000-9,999 gal	10,000-14,999 gal	15,000-19,999 gal	20,000+ gal
78%	0%	13%	5%	0%	5%

9. Aquaponics – lbs of fish production (annualized gross weight)

None	Under 100 lbs	100-399 lbs	400-999 lbs	1,000-4,999 lbs	5,000+ lbs
65%	10%	8%	8%	3%	8%

10. Does your current operation:

	Yes	No
a. Maintain broodstock?	48%	52%
b. Have unused capacity for growing fish for stocking?	58%	42%
c. Have the ability to keep specific strains of brood stock in the future?	54%	46%

Future Operations

11. Do you plan to expand your fish production operation in the next 3 years?

Yes	No
34%	66%

If "No" is selected, go to question 19

12. Total acre of ponds you plan to add to your operation in the next three years

None	Under 3 acres	3 – 5 acres	5.1 – 10 acres	10.1 – 20 acres	20+ acres
33%	41%	15%	0%	7%	4%

13. Raceways – total additional water flow you plan to add to your operation in the next three years

None	Under 50 gpm	50-99 gpm	100-499 gpm	500-999 gpm	1,000+ gpm
80%	7%	0%	10%	0%	2%

14. Recirculated Aquaculture System (RAS) - total additional water flow you plan to add to your operation in the next three year

None	Under 1,000 gal	1,000-9,999 gal	10,000-14,999 gal	15,000-19,999 gal	20,000+ gal
66%	15%	15%	0%	0%	5%

15. Aquaponics – additional lbs of fish production you plan to add in next 3 years (annualized gross weight)

None	Under 100 lbs	100-399 lbs	400-999 lbs	1,000-4,999 lbs	5,000+ lbs
47%	16%	16%	7%	7%	7%

16. Which of the following fish species do you plan to expand your production for stocking or food in the next 3 years? (•mark all that apply)

Cold Water Species:

	Stock	Food		Stock	Food		Stock	Food
Arctic Char	2%	4%	Rainbow Trout (Kamloop)	2%	7%	Chinook Salmon	0%	0%
Brook Trout	7%	4%	Rainbow Trout (other strain)	9%	13%	Coho Salmon	0%	0%
Brown Trout	9%	4%	Atlantic Salmon	0%	4%	Other (specify) <u>See Appendix B</u>	2%	2%

Cool Water Species:

	Stock	Food		Stock	Food		Stock	Food
Bluegill	33%	24%	Crappie (white or black)	11%	11%	Northern Pike	7%	0%
Hybrid Bluegill	24%	22%	Largemouth Bass	24%	9%	Walleye	33%	26%
Yellow Perch	33%	28%	Smallmouth Bass	11%	2%	Other (specify) <u>See Appendix B</u>	0%	9%
Tilapia	4%	24%	Muskellunge	4%	0%			

17. Which of the following baitfish do you plan to expand your production in the next 3 years (•mark all that apply)?

Chubs (all species)	13%	Shiners	20%	Other minnow species	4%
Fathead minnows	37%	Suckers	13%	Other (specify) <u>See Appendix B</u>	0%

18. Please indicate how big a challenge the following are for your planned expansion:

	Very Important	Important	Slightly Important	Not Important	Don't Know
Acquiring the land needed	3%	8%	5%	85%	0%
Accessing capital (e.g. a loan)	36%	23%	16%	25%	0%
Finding markets or customers for expanded production	26%	30%	19%	26%	0%
Regulations, including getting necessary permits	59%	16%	16%	9%	0%
Finding good workers	10%	31%	19%	38%	2%
Other : <u>See Appendix B</u>	100%	0%	0%	0%	0%

19. Please indicate how important the following are to your operation:

	Very Important	Important	Slightly Important	Not Important	Don't Know
a. Working with the DNR to fulfill their stocking needs	15%	11%	14%	45%	14%
b. UW- Extension assistance (e.g. operations, economics)	27%	14%	14%	30%	15%

20. Mark which type DATCP fish farm registration you have (•mark all that apply)

Type 1	Type 2	Type 3
50%	48%	11%

21. Please use the space below to enter additional comments or concerns:

See Appendix B

Demographics (for statistical purposes only)

22. Gender:	Male	Female				
	92%	8%				
23. Age:	18-24	25-34	35-44	45-54	55-64	65 and older
	0%	2%	6%	19%	42%	31%
24. Years in business	Less than 5 yrs.	5 to 9 yrs.	10 to 14 yrs.	15 to 19 yrs.	20 to 24 yrs.	25 or more yrs.
	20%	17%	12%	11%	10%	32%
25. Education	Less than high school	High school diploma	Some college/tech	Tech college graduate	Bachelor's degree	Graduate or professional degree
	2%	28%	22%	11%	20%	17%

Please return your survey in the enclosed postage-paid envelope by **March 20, 2014** to:
 Survey Research Center, University of Wisconsin – River Falls
 124 Regional Development Institute
 410 S. Third Street, River Falls, WI 54022-5001