
FLORIDA AQUACULTURE INDUSTRY OVERVIEW

Florida Department of Agriculture and Consumer Services
Division of Aquaculture

AQUACULTURE IS AGRICULTURE

The **Florida Aquaculture Policy Act** ([Chapter 597, Florida Statutes](#)) established that aquaculture is agriculture, and consolidated state regulatory responsibilities under the Florida Department of Agriculture and Consumer Services (FDACS). Florida's aquaculture industry produces the greatest variety of aquatic species of any state in the nation. Moreover, aquaculture is Florida's most diverse agribusiness. The state's subtropical climate, extensive marine and freshwater resources, cargo shipping infrastructure and extensive coastline have made the state's aquaculture industry uniquely diverse. There are approximately **1,000 certified aquaculture farms in Florida**, located in every region of the state (Figure 1), which produce an estimated **1,500 varieties** of fish, aquatic plants, mollusks, crustaceans, turtles, amphibians and alligators for ornamental, food and bait markets as well as for sporting, conservation and educational purposes.

MAJOR AQUACULTURE COMMODITIES

Below is a production summary report for major aquaculture commodity groups in Florida. The industry data are as reported by the United States Department of Agriculture (USDA) National Agricultural Statistics Service (NASS), including the Florida Field Office/Florida Agricultural Statistics Service. The USDA *Census of Agriculture* has been conducted every 4-5 years since 1920 (most recently conducted in 2007, 2012 and 2017), and the *Census of Aquaculture* was conducted in 2005, 2013 and 2018. Additional data from 1989-2012 were collected via surveys by the USDA NASS Florida Field Office in cooperation with the FDACS Division of Aquaculture. All reported sales are farm gate values in real dollars not adjusted for inflation. The data provided in this summary are the most up-to-date and accurate statistics available on Florida's aquaculture industry.

Farm gate sales of Florida aquaculture products (in real dollars) as reported by the USDA totaled approximately **\$75 million** in 2005, **\$68.8 million** in 2012 and **\$71.6 million** in

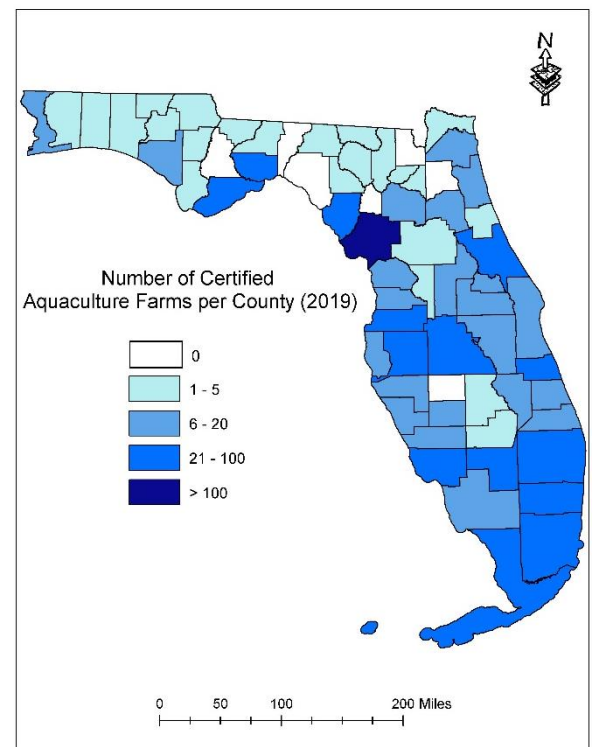


Figure 1. Density of certified aquaculture farms by county (Source: FDACS internal data, 2019).



2018 (USDA 2006, 2013, 2019; Figure 2).¹ Based on sales data, Florida ranked 9th in the nation for total overall aquaculture value in 2018 (Table 1), down slightly from 6th place in 2013 and 7th place in 2005.

State	Sales Value (US \$1,000)	# Farms Reporting	Rank
Mississippi	215,709	174	1
Washington	207,685	121	2
Louisiana	135,712	522	3
Virginia	112,640	191	4
California	106,021	91	5
Alabama	95,199	115	6
Hawaii	78,429	49	7
Maine	72,340	65	8
Florida	71,649	325	9
Arkansas	67,661	70	10

Table 1. Top ten 2018 total aquaculture farm gate sales values (in thousands of dollars) as reported in the USDA *Census of Aquaculture* (sales data withheld for confidentiality from DE, MT, OK and SD; Source: USDA 2019).

ALLIGATORS

Alligators are the primary aquatic reptile aquaculture product in Florida. Beginning in St. Augustine at the turn of the 20th century, alligator aquaculture for hides, meat and tourism began to increase in popularity and profitability and continues to be a robust industry today. In 2005, 12 out of 14 operations reported sales of alligator or alligator products totaling **\$4.07 million**. Hides and meat accounted for **\$3.6 million** (90%) of sales in 2005. In 2012, sales from live animals at 7 farms totaled **\$1.4 million** and sales from eggs, hides and meats at 5 farms totaled **\$6.6 million**. In 2018, there were 14 total reported operations with sales: 5 operations for hides, 11 for meat and 6 for whole animals. Only meat sales were reported (for farmer confidentiality) in 2018, totaling **\$397,000** from 11 operations (Table 2).

AQUATIC PLANTS

Aquatic plants include those grown for water gardens, aquariums, food markets (such as watercress) and wetland restoration. In 2005, 20 operations reported sales of aquatic plants totaling **\$17.6 million** (USDA 2006), **\$8.4 million** of which (48%) was for ornamental markets from 17 operations. In 2012, sales (excluding those for food markets) totaled **\$5.3 million** from 19 operations. Sales from aquatic plants in Florida peaked in 2001 at **\$21.3 million** (Table 2), and the industry has been in decline since. Business owners attribute the significant reduction in sales to an overall decline in aquaria hobbyists in the U.S. over the past two decades. In 2018, sales of algae (sea vegetables and

¹ Reported from 359 operations with sales in 2005, 404 operations in 2012 and 325 operations in 2018. Based on the total number of operations certified with FDACS in those years, the **average survey response rate was 36%**.



microalgae) from 5 operations totaled **\$76,000**; other aquatic plants were not included in the 2018 *Census of Aquaculture*.

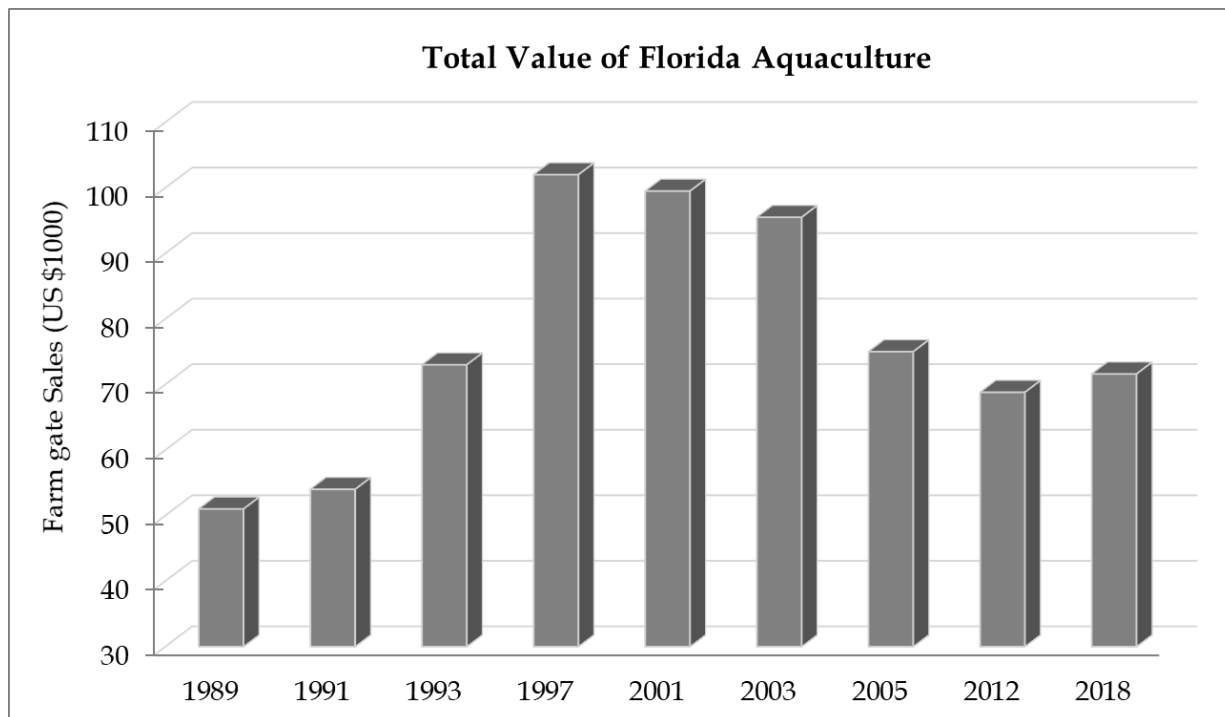


Figure 2. Total farm gate sales value (in thousands of dollars) for all Florida aquaculture commodities, 1989-2018. Based on FDACS internal data, the average survey response rate from operations with sales in 2003 through 2018 was only 39% (Source: Florida Agricultural Statistics Service 1990-2004; USDA 2006, 2013, 2019).

ORNAMENTALS

The ornamental industry includes marine and freshwater fish, marine and freshwater invertebrates, snails, coral and live rock. Florida consistently ranks first in the nation for ornamental fish production – approximately 45% of the total U.S. ornamental economy – and is the largest sector of Florida’s aquaculture industry (Figures 3-4). The total sales from all ornamental commodities, including freshwater and marine fish, coral, live rock, aquarium plants and other marine and freshwater invertebrates was **\$35 million** in 2012 (USDA 2013).

Ornamental fish sales in 2005 totaled **\$33.2 million** from 133 operations and **\$27.3 million** in 2012 from 101 operations (Table 2). Live rock sales from 6 operations totaled **\$341,000** in 2005 and **\$373,000** from 12 operations in 2012. Live rock was produced at 17 operations in 2018, although sales data were withheld for farmer confidentiality. In 2018, total ornamental fish sales totaled **\$28.7 million** from 109 operations, a 5% increase over 2012 and by far the highest value of any state in the nation (Table 3). More specifically, Florida ranked first in the nation for sales of koi, saltwater ornamental fish and freshwater ornamental fish in 2018 (Table 3).



	Sales Value (US \$1,000)					
	1997	2001	2003	2005	2012	2018
Total	102,000	99,500	95,500	75,000	68,800	71,600
Alligators	3,189	3,253	2,452	4,070	7,995	397
Aquatic Plants	13,200	21,320	20,433	17,560	5,327	76
Ornamental Fish	57,200	42,424	47,229	33,232	27,269	28,721
Live Rock	n/a	577	661	341	373	In "Other"
Clams and Oysters*	13,078	18,264	12,970	10,694	11,889	15,547
Other Aquaculture**	13,767	3,078	3,875	7,156	12,920	9,752
Response Rate	--	--	47%	37%	41%	31%

Table 2. Farm gate sales (in thousands of dollars) annual total and for select Florida aquaculture commodities, 1997-2018. Based on FDACS internal data, the average survey response rate from operations with sales in 2003, 2005, 2012 and 2018 was 39% (Source: Florida Agricultural Statistics Service 1998-2004; USDA 2006, 2013, 2019).

Notes: Aquatic plants for food markets (watercress) were not reported in 2012; Survey response rate was calculated from the number of total operations with sales reported by FASS/USDA and the number of total operations certified with FDACS (internal data available starting in 2002); Alligator sales in 2018 are meat values only.

* Value in 2001 includes clams only; oysters in 2001 were counted as "other aquatics." Clam sales in 2001, 2003 and 2005 were reported to include clam seed.

** Value includes catfish, tilapia and minor commodities reported as "other" or "miscellaneous aquaculture." Due to inconsistency in reporting, this value does not include data on other fish, whether used for sport, stocking, conservation, education or food.

FOOD FISH

Food fish species produced in Florida include tilapia, catfish, sturgeon, striped bass, cobia, pompano and red drum. Sales were reported from 49 farms in 2005, including catfish, tilapia, sturgeon and bass, for a total of **\$3.6 million**. Of these, 26 farms reported sales for catfish (**\$1.4 million**), 18 for sales of tilapia (**\$477,000**) and 19 for sales of bass, carp and sturgeon (**\$1.7 million**)(USDA 2006).

In 2012, food fish sales were reported from 95 farms for a total of **\$4.6 million**. Catfish sales were reported from 17 farms for a total of **\$390,000** (a 73% decrease from 2005), 47 farms reported sales of tilapia for a total of **\$1.2 million** (a 157% increase from 2005) and 31 farms reported sales of **\$2.98 million** for other species including bass, sturgeon, carp, cobia, pompano and red drum. Additionally, 13 farms reported shrimp sales of **\$7.5 million** in 2012 (USDA 2013).

In 2018, food fish sales were reported from 46 farms for a total of **\$3.96 million** (a 14% decrease from 2012). Overall, Florida ranked 12th in the nation for total food fish sales in 2018 (USDA 2019). Catfish sales reported from 18 operations (**\$302,000**) accounted for 8% of total food fish sales and tilapia sales from 17 operations (**\$1.5 million**)



accounted for 39% of total food fish sales. From 2012 to 2018, catfish sales decreased by 23% and tilapia sales increased by 26%. Striped bass from 5 operations added an additional **\$714,000** in sales (18% of total food fish sales). Shrimp were produced at 11 farms, but sales data were not reported for farmer confidentiality.

Commodity	State	Sales Value (US \$1,000)	# Farms Reporting	Rank
Ornamental Fish (total)	Florida	28,721	109	1
	Pennsylvania	808	8	2
	Texas	636	15	3
	Maryland	232	3	4
	New Jersey	202	5	5
Koi	Florida	793	30	1
	Missouri	346	4	2
	Ohio	70	10	3
	Connecticut	59	6	4
	Arkansas	47	4	5
Saltwater ornamental fish	Florida	6,780	15	1
	Hawaii	166	5	2
Freshwater ornamental fish (see table note)	Florida	19,299	61 egg layers/ 24 live bearers	1
	Texas	63	3	2
	Hawaii	30	5	3

Table 3. Top five 2018 farm gate sales values (in thousands of dollars) for total and select ornamental fish commodities as reported in the USDA *Census of Aquaculture* (Source: USDA 2019).

Note: Hawaii data are only for live bearers, Texas data are only for egg layers, Florida data are total for both egg layers and live bearers.

SHELLFISH

Hard clams dominate shellfish aquaculture in Florida, and most of the hard clam production occurs in Levy County (Figure 1). Other shellfish produced in the state include oysters and sunray venus clams. In 2005, sales of clam, clam seed and oysters from 153 operations totaled **\$10.7 million** (down from \$13 million in 2003), with 142 operations reporting hard clam sales of **\$9.8 million** (92% of total sales). In 2012, sales reported by 139 operations totaled **\$11.9 million**, with hard clams bringing in **\$11.65 million** (98% of total sales). In 2018, clams and oysters from 111 operations brought in **\$15.5 million** in sales, a 31% increase from 2012. Clam sales were reported from 95 operations, totaling **\$14.3 million** (92% of sales). Florida ranked third in the nation for total clam sales and sixth for sales of oysters in 2018 (USDA 2019).

Hurricanes in 2004 and 2005 negatively impacted Florida's coastal zone, where clams are cultured, and in addition to large production losses in 2004, 55 clam farmers reported going out of business between 2003 and 2005. Nevertheless, Florida's shellfish industry has seen strong growth. The number of water column and



submerged land leases for clam and oyster aquaculture has increased by 360% since 2003. At the end of 2019, there were 719 commercial leases in use (among 336 producers), with 406 (56%) producing hard clams, 112 (16%) producing oysters and 201 (28%) producing both hard clams and oysters (FDACS internal data, 2019).

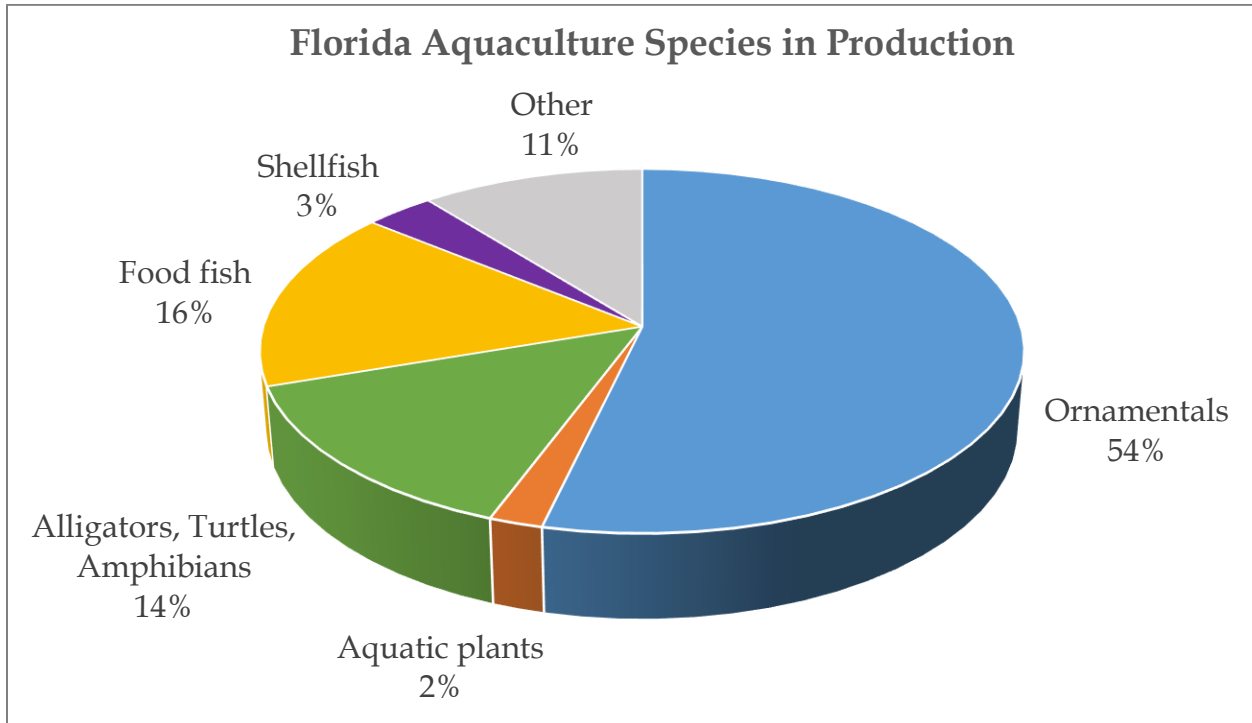


Figure 3. Aquaculture species in production among major sectors in Florida, based on producers certified with the FDACS Division of Aquaculture. The “other” category includes baitfish, sport and stocking fish species, microalgae and other zooplankton species used for feeding purposes (Source: FDACS internal data, 2019).

OTHER COMMODITIES

Other aquaculture commodities include turtles, frogs, baitfish (including fathead minnows, shiners and novel marine species such as pinfish, killifish and croakers) and recreational game fish used for stocking (including largemouth bass, bluegill, catfish and crappie). Florida's baitfish industry increased from two farms in 2005 to 12 farms in 2012, reporting **\$41,000** in sales in 2012. Sportfish sales were reported from ten farms for a total of **\$97,000** in 2012, a sharp decline from **\$191,000** reported in 2005. Turtles and turtle products were reported from 28 operations with **\$1.2 million** in sales in 2012. In 2018, 45 operations had **\$7.9 million** in total sales from minor and miscellaneous commodities. Sportfish and baitfish were produced at three and five farms, respectively, but sales data were not reported for farmer confidentiality. Turtles were produced at 14 farms in 2018 for a total of **\$875,000** in sales.



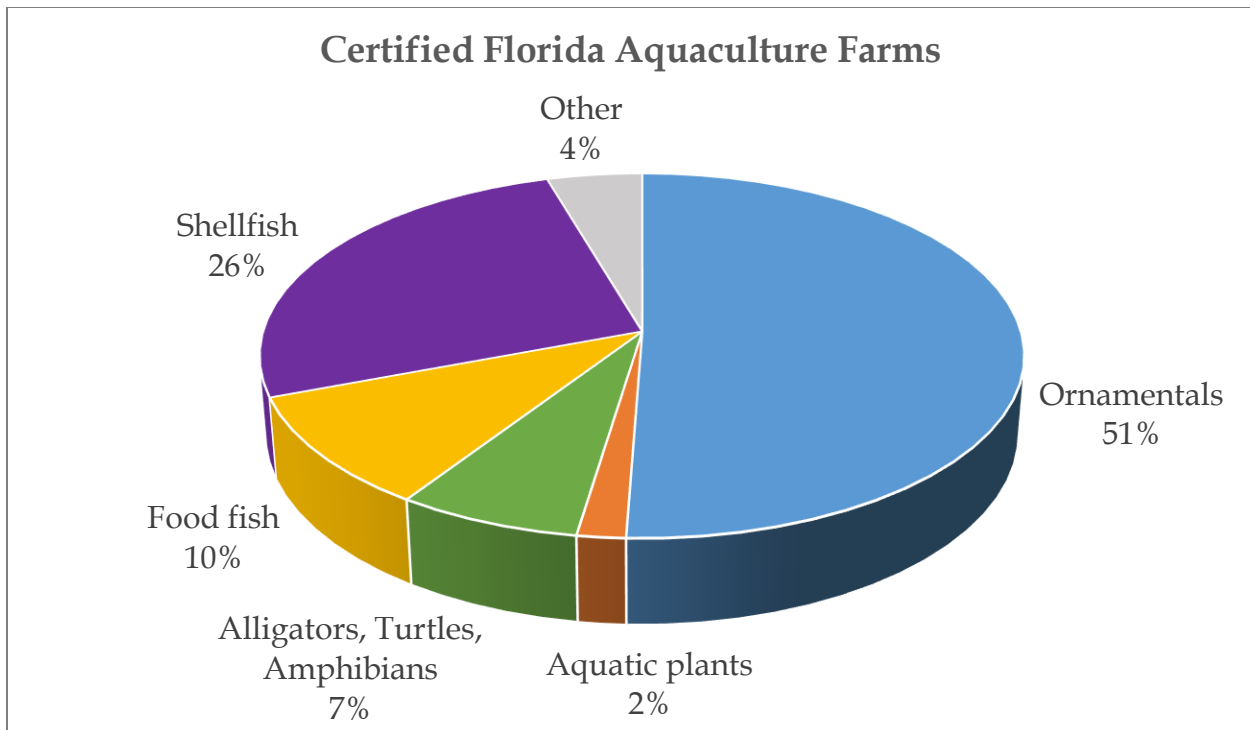


Figure 4. Make up of Florida aquaculture farms by major sector, based on producers certified with the FDACS Division of Aquaculture. Data include sovereignty submerged land leases for clams and oysters (in the shellfish category) and live rock (in the ornamental category). The “other” category includes baitfish, sport and stocking fish species, microalgae and other zooplankton species used for feeding purposes (Source: FDACS internal data, 2019).

LABOR & METHODS OF PRODUCTION

Florida aquaculture commodities are produced in a wide variety of ways. Table 4 and Figure 5 below show the number of farms that used a particular production method and the number of production units for each method in 2005, 2013 and 2018 (the years of data available from the USDA *Census of Aquaculture*).

In 2005, 2,292 acres of freshwater were used for production on 196 farms and 718 acres of saltwater² were used on 163 farms; 52% of operations were less than 3 acres in size. In 2013, 238 operations used 2,003 acres of freshwater and 169 operations used 1,078 acres of saltwater; 61% of operations were less than 3 acres in size. In 2018, 172 operations used 2,541 acres of freshwater and 178 operations used 869 acres of saltwater.

In 2005, 359 farm operators reported a total of 1,055 workers at an average of 31 hours per week. Of these, 158 operations (44%) had 262 unpaid workers (typically partners or family members) and 195 (54%) reported paid workers for a total of **\$12.4 million** in payroll. Of the paid workers, 95 farms reported 478 employed for 150 days or more, and

² Saltwater is defined as water sourced from the sea or ocean, including brackish water, and freshwater converted to saltwater by adding chemicals.



143 farms had 315 employed for less than 150 days. In 2012, 402 operations reported 765 unpaid workers, 158 operations reported 864 full-time workers and 134 operations reported 322 part-time workers. Labor data were not available for 2018.

Production Method	2005	2013	2018
Ponds	10,437	6,614	6,523
Raceways (Tanks)	1,037	4,784	3,915
Recirculating systems (Tanks)	6,781	10,570	11,734
Flow-through (Tanks)	29,302	11,929	12,098
Aquaponics (Tanks)	No data	184	126
Cages or pens	95	25,297	28,229
On-bottom molluscs (Acres)	528	550	580

Table 4. Number of units for each aquaculture production method as reported in the USDA *Census of Aquaculture* (Source: USDA 2006, 2014, 2019).

Note: 2005 and 2013 data exclude operations that solely produced and distributed aquaculture products for conservation, recreation, enhancement or restoration purposes.

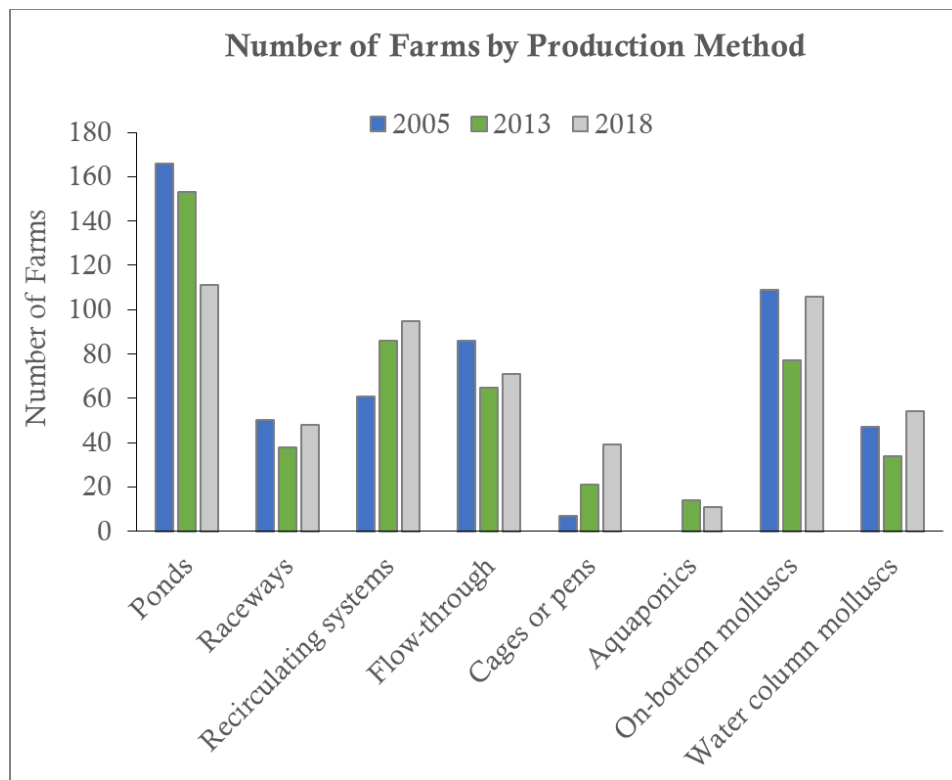


Figure 5. Number of farms in Florida for each aquaculture production method as reported in the USDA *Census of Aquaculture* (Source: USDA 2006, 2014, 2019). 2005 and 2013 data exclude operations that solely produced and distributed products for conservation, recreation, enhancement or restoration purposes.



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