

Aquarium Species Scorecard



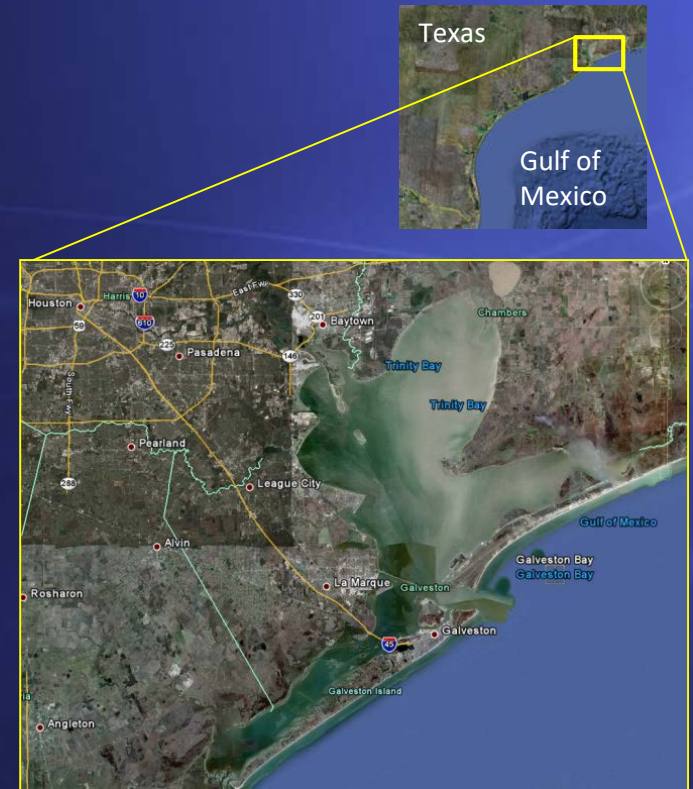
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AQUATIC INVASIVE SPECIES IN THE SOUTH EAST
Raleigh, NC
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Project Background

- Houston-Galveston Metropolitan Region
- White list approach to regulation of some; other species attempted
- Agency was interested in other approaches
- Phase I completed in 2011 – social science of release (Weeks et al.)



Loricariid catfish

Availability Potential

Species Attributes
(maintenance,
breeding, color,
size, finnage)

Local Fish
stores

Informal
Web Sales

Local Breeders

Club Auctions

Large Pet
stores

Big Box
Stores

Imports
(LEMIS)

Release Potential

Species
Attributes
(personality,
size)

Aquarium Owners'
Attributes
(aquarist identity,
personal circumstances,
where buy fish, where
get information, how
they frame release)

Survival and Reproduction Potential

Species
Attributes

Ecosystem
Attributes

Ability to
survive in
released
environment

Reproduction
Capability

Factors Affecting Release Potential

- **Factors increasing release potential**
 - Purchase fish and get information from “big box” stores
 - Not connected into aquarium community
- **Factors decreasing release potential**
 - Using local fish stores for information
 - Being a serious aquarist involved in the social network
- **General**
 - Trade/sell preferred but release is a close second
 - Well-being of fish is the primary value; not convenience
 - Environmental impact of release is a secondary value
 - No worry about legal consequences of release
 - Misapply ecological principles

Survival & Reproduction Potential – Sample species

Common Name	Scientific Name	Invasive/Exotic/Native
Armored catfish	<i>Hypostomus plecostomus/</i> <i>Pterygoplichthys sp.</i>	Invasive in Houston-Galveston Region
Red-bellied pacu	<i>Piaractus brachypomus</i>	Exotic in Houston-Galveston Region
Guppy	<i>Poecilia reticulata</i>	Exotic elsewhere in Texas
Jack Dempsey cichlid	<i>Cichlasoma octofasciatum</i>	Exotic elsewhere in the US
Bronze cory catfish	<i>Corydoras aeneus</i>	Exotic elsewhere in the US
Flavescent peacock	<i>Aulonocara stuartgranti</i>	Invasive potential unknown
Western mosquitofish	<i>Gambusia affinis</i>	Native to Houston-Galveston Region

Phase II Objectives

- Use results from the previous study by Weeks et al. 2011 to develop scorecard questions
- Conduct literature search of traditional risk assessments and invasion potential criteria to review questions and weighting criteria
- Develop a preliminary scoring system for the scorecard & test on selected species

Scorecard Differs from Other Traditional Risk Assessments

- Not assessing impacts
- Species & pathway specific, includes aquarium fishes only
- Incorporates the ecological and **social** drivers of aquarium species invasion



A. Market Availability Potential		N	Y
1	Is the species sold in superstores (e.g., Petco or Wal-Mart)?	0	1
2	Does the species show up consistently on internet sales?	0	1
3	Is the species in the first quarter of the total number of sales in fish auctions?	0	2
4	Is the species in the second quarter of the total number of sales in fish auctions?	0	1.5
5	Is the species in the third quarter of the total number of sales in fish auctions?	0	1
6	Is the species in the first quartile of the total number of imports into major Texas ports (Dallas and Houston, as documented through the LEMIS data)?	0	2
7	Is the species in the second quartile of the total number of imports into major Texas ports (Dallas and Houston, as documented through the LEMIS data)?	0	1.5
8	Is the species in the third quartile of the total number of imports into major Texas ports (Dallas and Houston, as documented through the LEMIS data)?	0	1
9	Is the species in the fourth quartile of the total number of imports into major Texas ports (Dallas and Houston, as documented through the LEMIS data)?	0	0.5
10	Is the species distributed through 4 or more nodes of the aquarium trade (local fish stores, big box pet stores, Wal-mart or other non-pet retail stores, local fish auctions, internet sales, imports, wholesalers or local breeders)?	0	1
Total Score for Availability Potential		0	7

B. Release Potential		N	Y
1	Is the species sold in superstores (e.g., Petco or Wal-Mart)?	0	2
2	Does the species breed easily (without encouragement) in captivity?	0	1
3	Is the species able to grow to 24 centimeters (cm) and over?	0	2
4	Is the species rare?	1	-1
5	Is the species aggressive towards other individuals in the aquarium?	0	1.5
6	Does the species pose risks to humans (e.g. venomous)?	0	1
Total Score for Release Potential		1	6.5

C. Survival and Reproduction Potential

N**Y**

Dispersal Potential

1	Is the species introduced in another country other than the U.S. outside native range?	0	1
2	Is the species successfully established in another country other than the U.S. outside native range?	0	1
3	Is the species introduced elsewhere in the U.S. outside native range?	0	1
4	Is the species successfully established elsewhere in the U.S. outside native range?	0	1
5	Is the species introduced in the assessment area?	0	1
6	Is the species successfully established in the assessment area?	0	1
7	Does the species have invasive congeners (relatives of the same taxonomic genus)?	0	1

Survival Potential

1	Is the species a habitat generalist (known to establish in a broad range of habitat types and conditions)?	0	1
2	Can the species survive in a habitat type that is available in the assessment area?	-1	1
3	Does the species have the capability to tolerate or adapt to water temperatures of the assessment area?	-1	1
4	Does the species have the capability to tolerate salinity conditions of the assessment area?	-1	1
5	Does the species have the capability to tolerate a wide range of dissolved oxygen conditions?	-1	1
6	Does the species use multiple respiration strategies, allowing the species to withstand hypoxic conditions?	-1	1
7	Is water quality degraded in the assessment area?	0	1
8	Is the species tolerant of degraded water quality?	-1	1
9	Is the species tolerant to the range of water flow velocities observed in the assessment area?	0	1
10	Is the maximum adult length of the species between 10 cm and 80 cm?	0	1

C. Survival and Reproduction Potential		N	Y
<u>Reproductive Potential</u>			
1	Does the species have a maximum age of 4 to 10 years in the wild ? (If the age limit in the wild is not known, age limit in aquarium may be used as a proxy)	0	1
2	Does the species spawn multiple times throughout the year?	-1	1
3	Is the species highly fecund (release >1,000 eggs per female)?	-1	1
4	Does it take less than one year for the species to reach reproductive maturity?	-1	1
5	Does the species exhibit specialized parental care?	0	1
6	Does the species require specific conditions (e.g. special habitat features or the presence of other species) to reproduce or complete life cycle?	0	-1
<u>Food web Interactions</u>			
1	Is the species a diet generalist (eats many food types)?	0	1.5
2	Is the species a specialist that eats a food type <u>not</u> available in the assessment area?	0	-1
3	Is the species a specialist that eats a food type available in the assessment area?	0	1
4	Are there are known predators or control agents in the assessment area <u>known to effect population growth in assessment area</u> ?	1	-1
5	Does the species exhibit a specialized defensive strategy or behavior (e.g. thickened scales, venom, spines)?	-1	1
Total Score for Survival and Reproductive Potential		-9	22.5

Applying the Scorecard

- Score for each section rather than overall
- Multiple combinations of “scores” for a species
 - Examples
 - High Availability, High Release, Low Survival → Low Priority
 - High Availability, Low Release, High Survival → High Priority
- Each Score Combination results in a different Outreach/Communication /Management target and message

Applying the Scorecard

<u>Availability</u>	<u>Release</u>	<u>Survival</u>	<u>Number of Outreach Targets</u>	<u>Outreach Target</u>	<u>Communication Topic</u>
H	H	L	0	None	None
H	L	L			
H	M	L			
L	H	L			
L	L	L			
L	M	L			
M	H	L			
M	L	L			
M	M	L			
L	L	H	1	NR Managers	EDRR Alert
L	L	M			
L	H	H	2	Consumers, NR Managers	Options to Release, EDRR Alert
L	H	M			
L	M	H			
L	M	M			
M	L	H	2	Aquarium Trade, NR Managers	Sales Alert/Sp. Info, EDRR Alert
M	L	M			
H	L	H			
H	L	M			
H	H	M	3	Aquarium Trade, Consumers, NR Managers	Sales Alert/Sp. Info, Options to Release, EDRR Alert
H	H	H			
H	M	H			
H	M	M			
M	H	H			
M	H	M			
M	M	H			
M	M	M			

Next Steps

- Refine questions and weighting using input from a September 19th stakeholder meeting
- Test scorecard on 7 selected species
- Phase III
 - Test species of concern suggested by TPWD and aquarium industry stakeholders
 - Refine scorecard application strategy
 - Automate scorecard
 - Train others to use

Thank You



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