

Aquatic Species Invasiveness Risk Screening

Jeffrey E. Hill, Professor and Extension Specialist (jeffhill@ufl.edu)

GSARP ANSTF, Orlando, FL; 4/23/25

Co-authors: Natalie Claunch, Myles Domohowski, Allison Durland Donahou, Meghan Eaton, Katie Everett, Colin Goodman, Steve Johnson, Lauren Lapham, Tim Lyons, Mackenzie Montgomery, Cayla Morningstar, Erin Ray, Christina Romagosa, Elizabeth Walsh, Emily Wooley, and Quenton Tuckett





"...risk assessment should be considered the cornerstone of a successful aquatic invasive species program." (Mandrak and Cudmore 2015)



What information do you need to make management decisions?



Risk Assessment Options

- Literature review/biological synopses
 - Risk screens (e.g. AS-ISK)
 - Taxon- and region-specific screens
 - Secondary screens
 - Comprehensive assessments
 - Risk management
-
- In-house, outside experts, stakeholders, combo



Species Bioprofile

- Aka, species/biological synopsis, species profile
- Review of information on a species
- CLIMATCH – climate matching
- Contains factual information and expert opinion
- Information dense
 - More information than needed for risk screen
 - Support comprehensive assessment



Bioprofile

Major sections:

1. Classification
2. Distribution
3. Biology
4. Control
5. Potential Florida distribution
6. Potential impacts
7. Commerce and trade
8. Containment in captivity
9. References

Bioprofile of Luna Lionfish *Pterois lunulata* (Temminck and Schlegel 1843)

1. CLASSIFICATION

a. Taxonomy, common names, and references

Class: Actinopterygii

Order: Scorpaeniformes

Suborder: Scorpanoidei

Family: Scorpaenidae

Subfamily: Pteroinae

Genus: *Pterois*

Pterois lunulata (Temminck and Schlegel 1843)

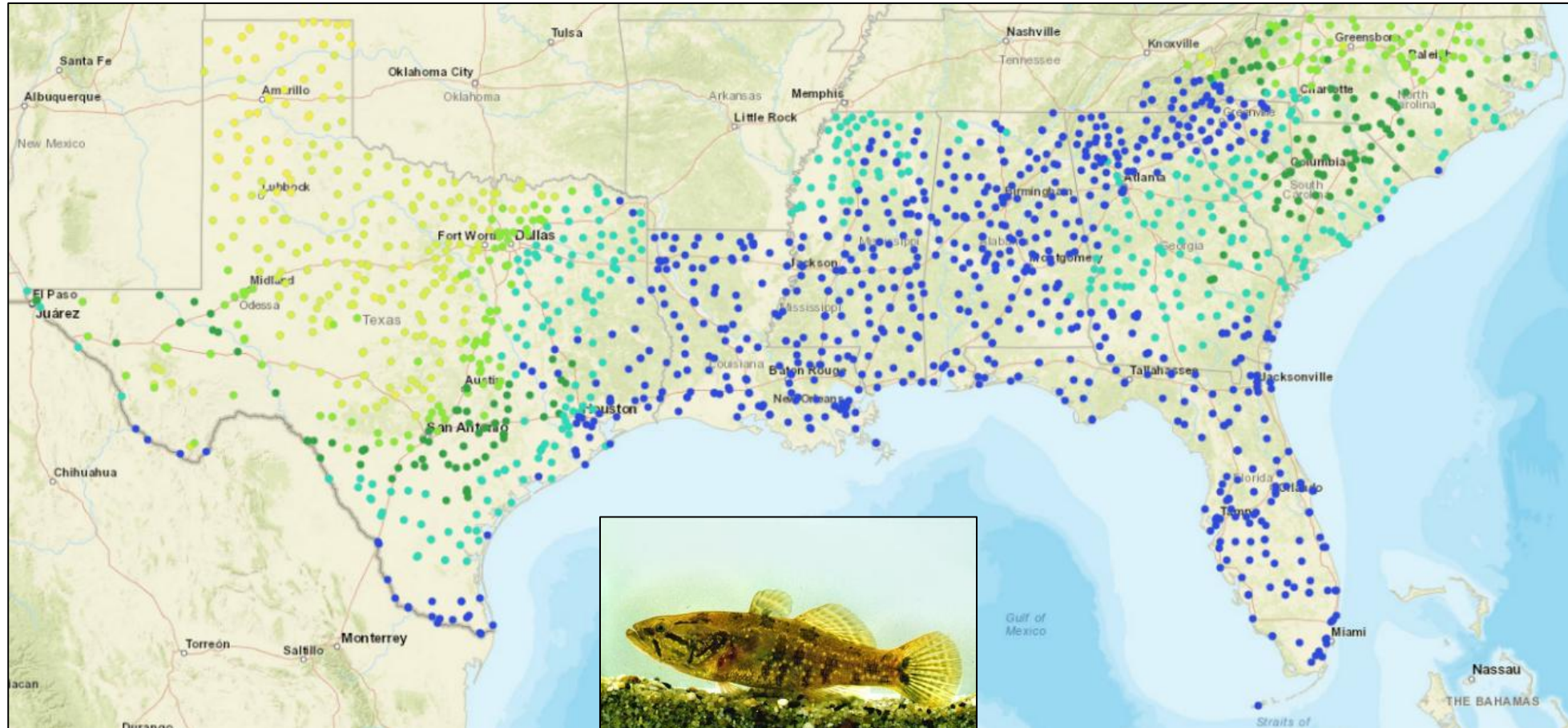
The Luna Lionfish does not have any taxonomic synonyms. It is frequently referred to by other common names, including the Japanese Lionfish and the Dragon's Beard Fish, and is often mistaken for Russell's Lionfish *Pterois russelii* in the aquarium trade due to similarities in appearance (Michael 2001). Evidence suggests these currently recognized species may be conspecifics (Wilcox 2014).



Figure 20: Luna Lionfish at 9 meters off Izu Peninsula, Japan. Photo: <http://fishesofaustralia.net.au/home/species/3649>.

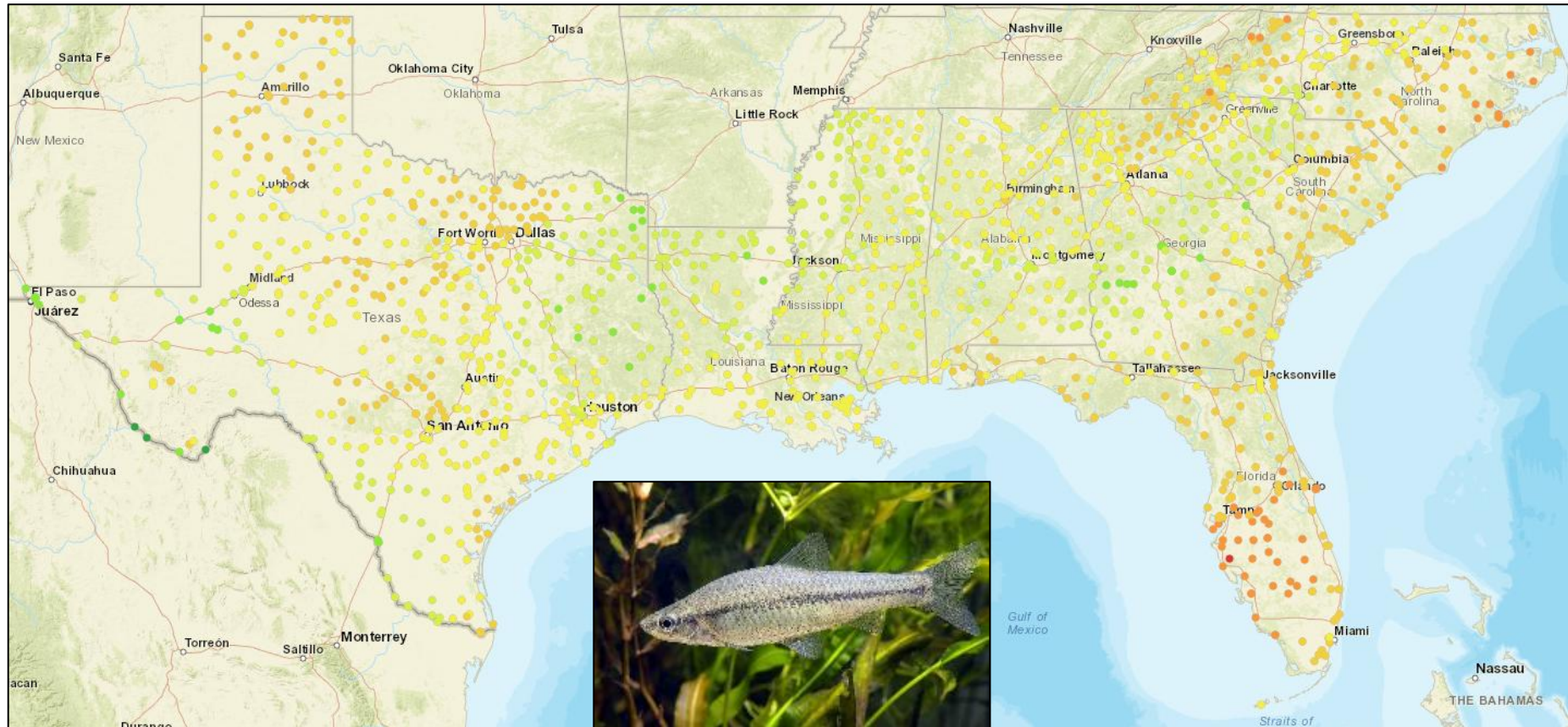
Amur Sleeper – Low Match

Climate 6 score = 0



Stone Moroko – High Match

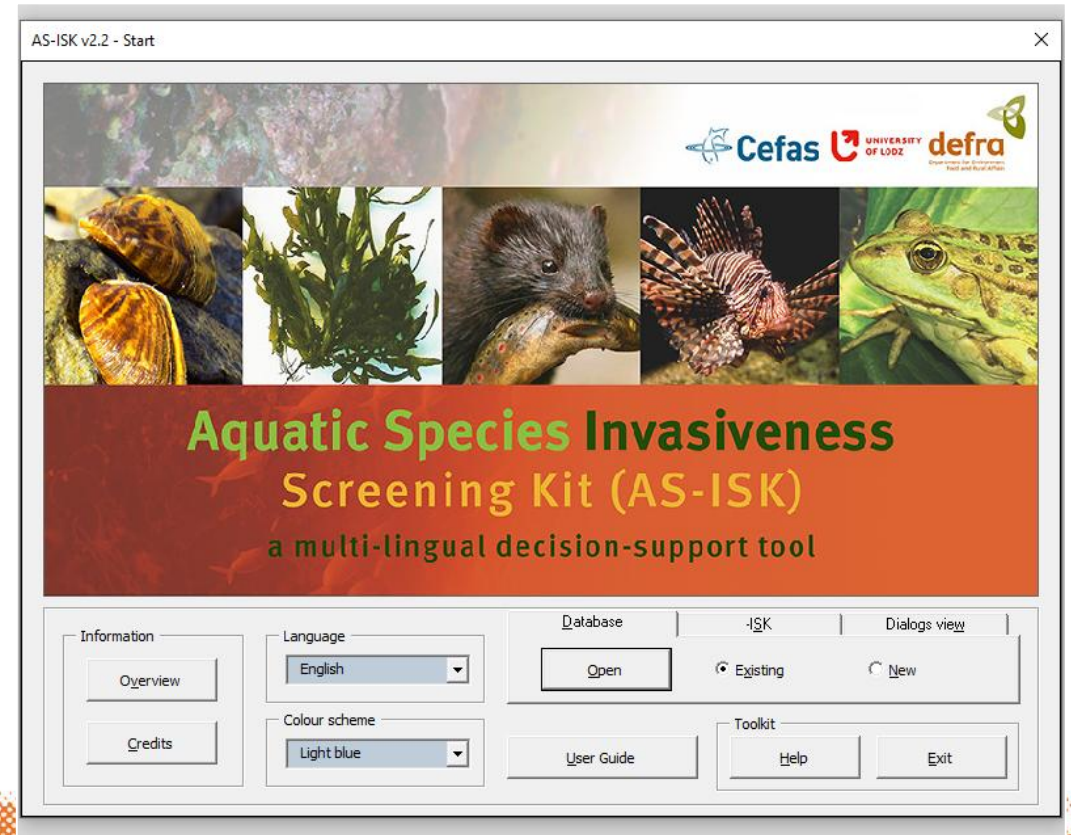
Climate 6 score = 0.31



Aquatic Species Invasiveness Screening Kit (AS-ISK)

<https://siren.fort.usgs.gov/static-page/invasiveness-screening-kit-decision-support-tools-for-the-identification-and-management-of-invasive-non-native-species>

- Any aquatic species
 - Animal or plant
 - Freshwater, brackish, or marine
- Basic Risk Assessment (BRA)
 - 49 questions
 - Medium-High threshold
- Climate Change Assessment (CCA)
 - 6 questions
- BRA+CCA
 - Same threshold as BRA



Risk Screens answer key questions

1. Is the nonnative species likely to be a hazard (i.e., cause harm)?
2. Is the species likely to become invasive (i.e., the preliminary risk estimate is low, medium/uncertain, or high)?
3. Are there any critical data gaps?
4. Is there a need for additional assessment (i.e., the preliminary risk estimate is uncertain or high risk)?



Management of Biological Invasions (2025) Volume 16, Issue 1: 45–72

Special Issue: Advances in the study of the management of biological invasions in inland waters
and the legacy of Gordon Howard Copp (1956–2023)
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Risk Assessment

Review of invasiveness screening kit use in the United States of America

Jeffrey E. Hill¹, Scott Hardin², Allison Durland Donahou³, Timothy J. Lyons⁴ and Quenton M. Tuckett¹

¹University of Florida, Institute of Food and Agricultural Sciences, School of Forest, Fisheries, and Geomatics Sciences, Program in Fisheries and Aquatic Sciences, Tropical Aquaculture Laboratory, Ruskin, Florida, USA

²Florida Fish and Wildlife Conservation Commission (retired), Tallahassee, Florida, USA

³Florida Southern College, Department of Biology, Lakeland, Florida, USA

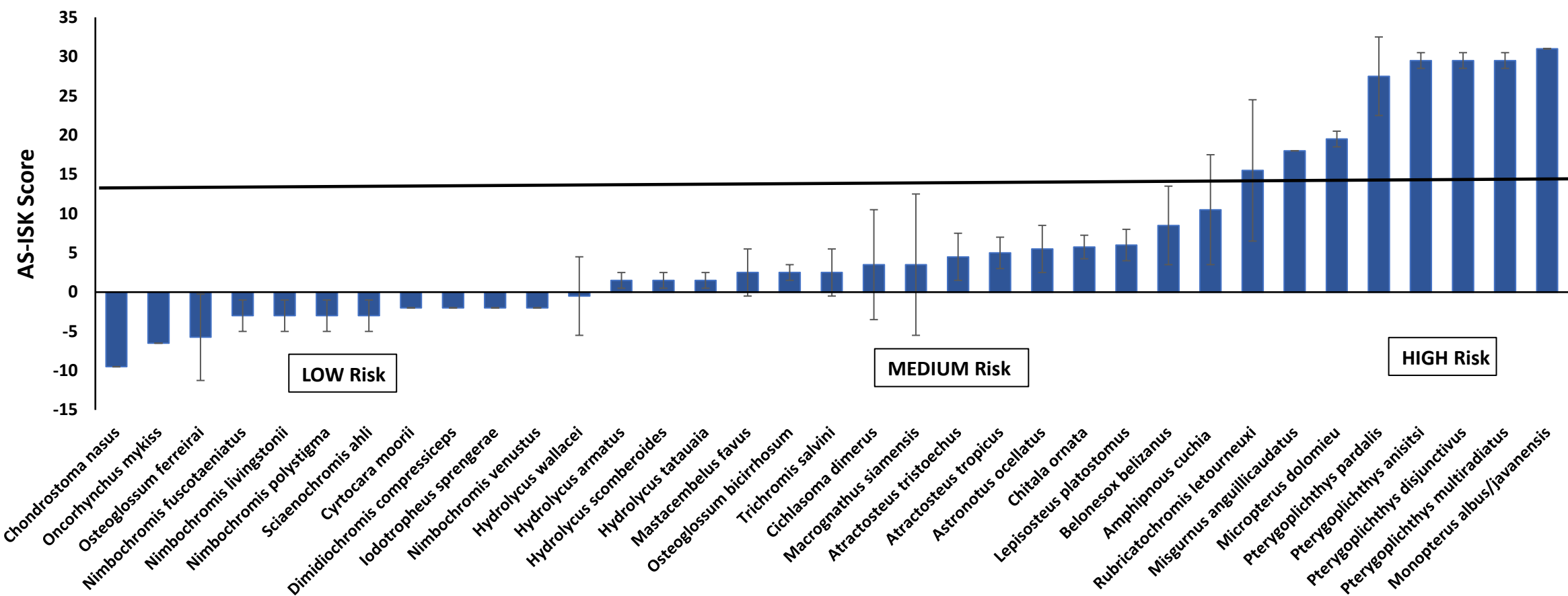
⁴New Mexico BioPark Society, Albuquerque New Mexico, USA

Corresponding author: Jeffrey E. Hill (jeffhill@ufl.edu)

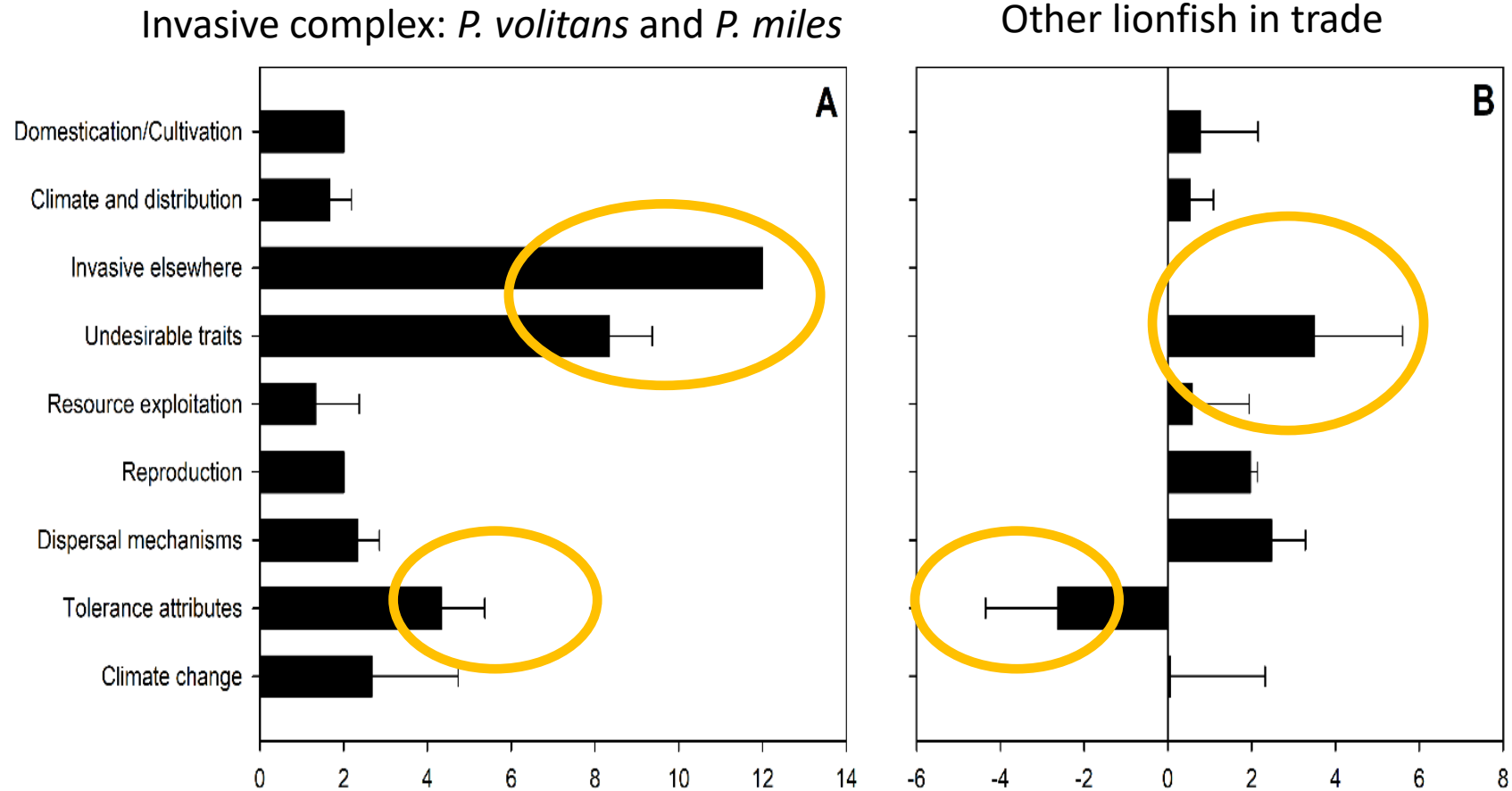
- 337 species × risk assessment area combinations
- 102 marine invertebrates
- 6 tunicates
- 168 freshwater fishes
- 1 brackish fish
- 58 marine fishes
- 1 amphibian
- 1 bird

- Published applications of the Fish Invasiveness Screening Kit (FISK v2) and AS-ISK
- See also O'Shaughnessy et al. 2023. *Aquat Inv* 18:415-453

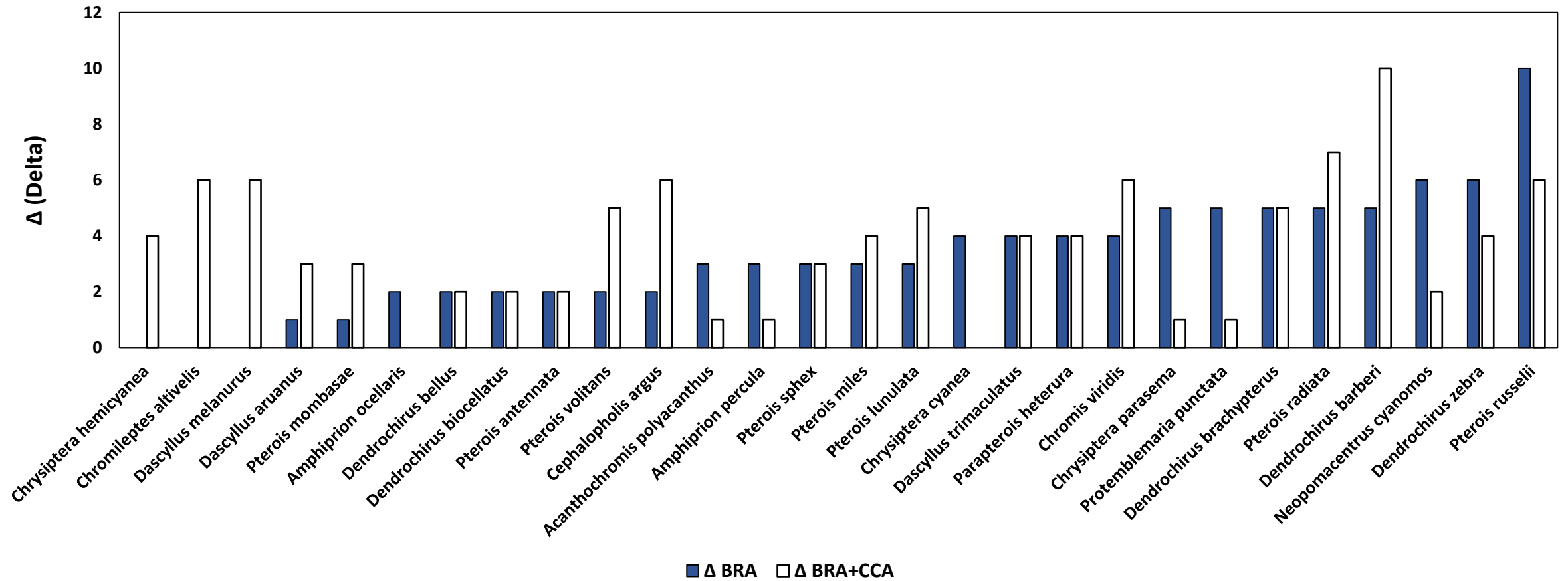
Freshwater Fish (34) – BRA scores and Δ



Risk Screen: Lionfish (14) Score Partition



Marine Fish (28) – Δ for BRA and BRA+CCA



Invertebrates

• Marine (15)

Australian Box Jellyfish
Barnes' Box Jellyfish
Common Kingslayer
Crown of Thorns Starfish
Short-spined Crown of Thorns Starfish
Greater Blue-ringed Octopus
Blue-lined Octopus
Lesser Blue-ringed Octopus
Pulsing Soft Coral
Orange Keyhole Sponge
Flower Urchin
Striped Pyjama Squid
Geography Cone Snail
Indo-Pacific Swimming Crab
Green Mussel



• Freshwater (15)

Creole Painted Crayfish
Virile Crayfish
Giant Ramshorn Snail
Fawn Melania
Quilted Melania
Marbled Crayfish (Marmokrebs)
Red Swamp Crayfish
Common Yabby
Asian Clam
Golden Mussel
Channeled Apple Snail
Island Apple Snail
Chinese Mystery Snail
Japanese Mystery Snail
Red-rim Melania



Amphibians and Aquatic Reptiles

- Amphibians

Rio Cauca Caecilian
Oriental Fire-Bellied Newt
Mesoamerican Cane Toad
Cane Toad
African Clawed Frog
Tropical Clawed Frog
Marsh Frog
African Bullfrog

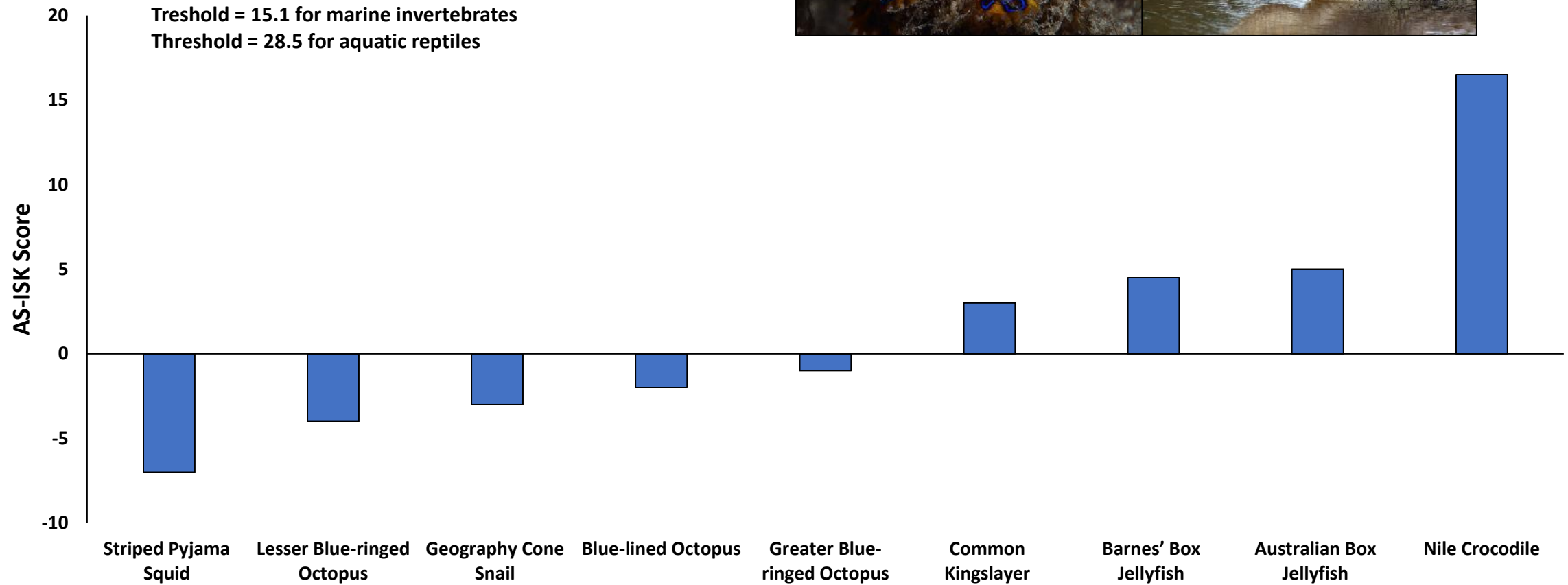


- Reptiles

Brown Basilisk
Spectacled Caiman
Nile Crocodile
Mangrove Monitor
Asian Water Monitor



Invasive vs. Dangerous





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Management Implications

- Tool development
- Flexible components
- Horizon scanning
- Prioritization
- Intraspecific variation
- Regulatory questions



Questions?



Jeff Hill contact information:

**UF/IFAS Tropical Aquaculture Laboratory
1408 24th Street SE, Ruskin, Florida 33570**

jeffhill@ufl.edu

813-671-5230 x118

<https://tal.ifas.ufl.edu/>