

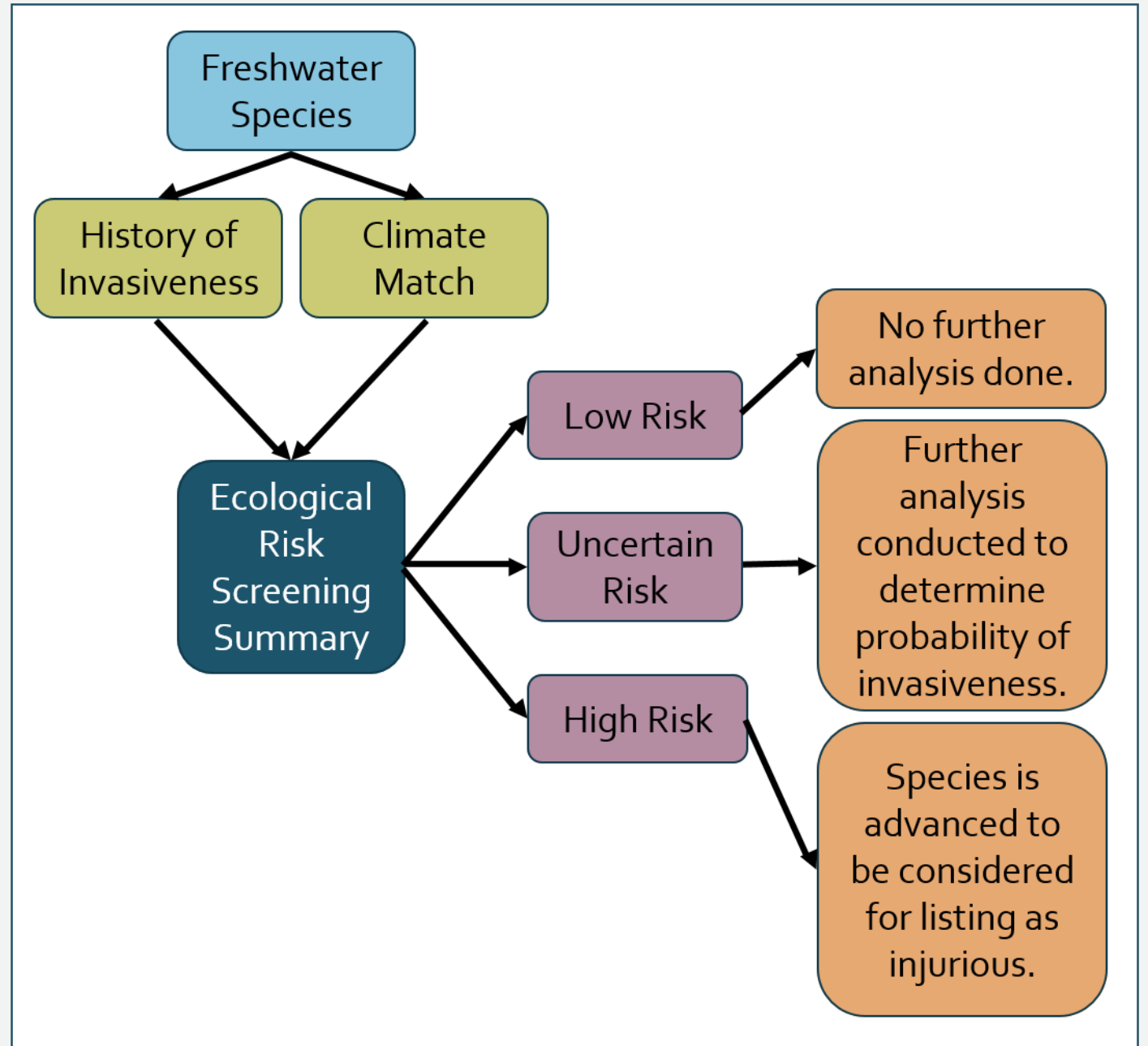
UPDATE ON USFWS RISK ASSESSMENT ACTIVITIES

Kate Wyman-Grothem

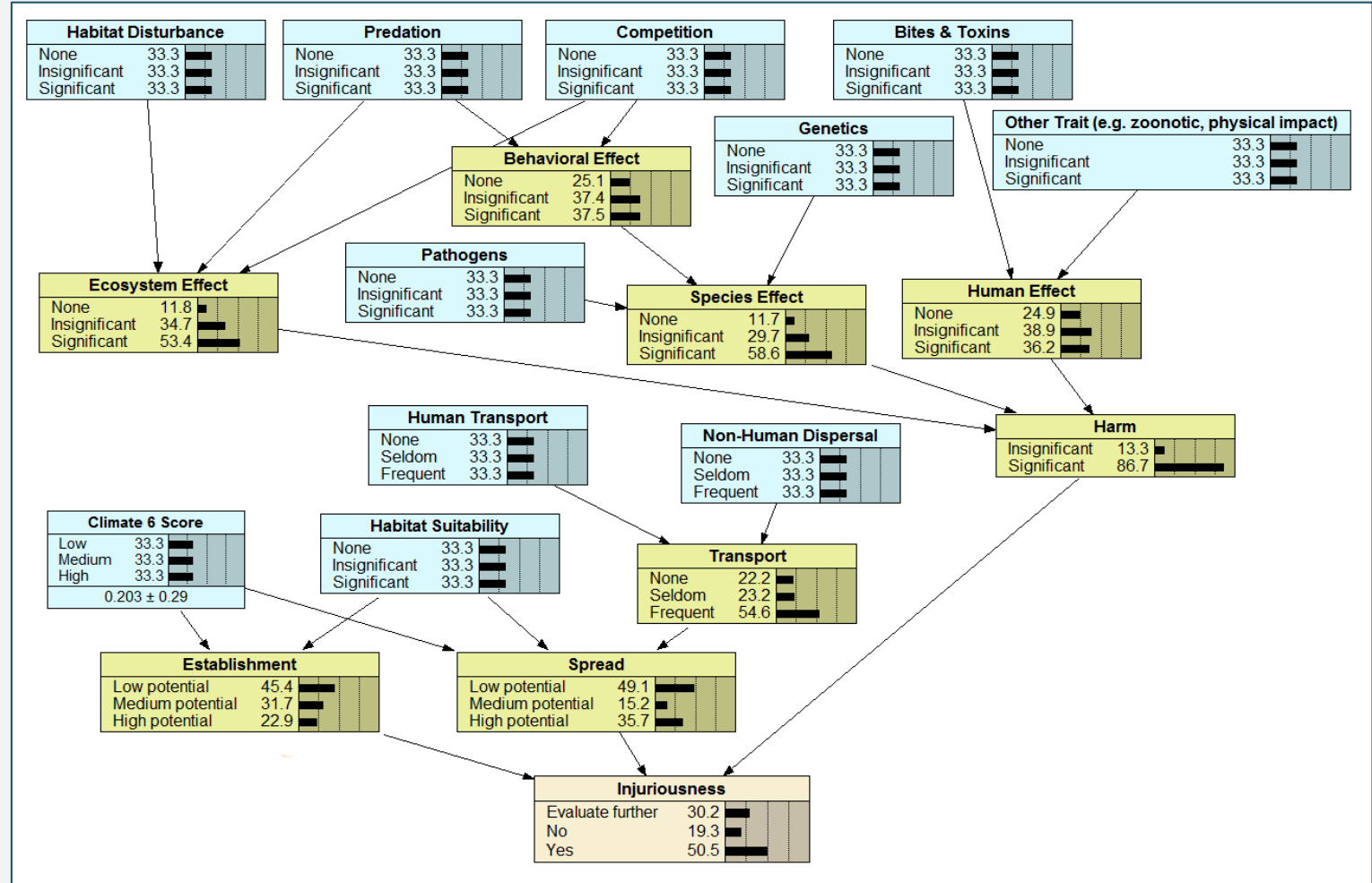
U.S. Fish and Wildlife Service, Midwest Region



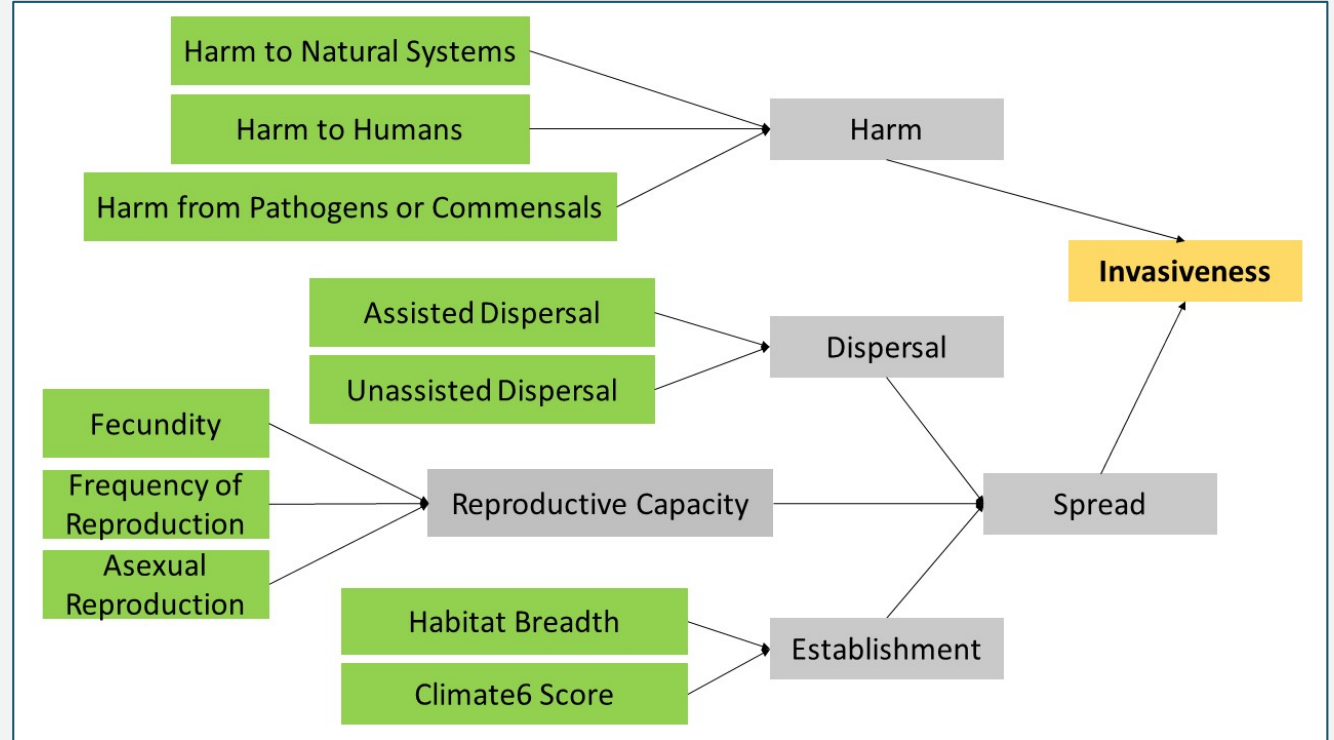
Ecological Risk Screening Summary (ERSS)



Freshwater Fish Injurious Species Risk Assessment Model (FISRAM)



Crayfish Invasiveness Risk Assessment Model (CIRAM)



Components of USFWS Risk Assessment Activities*

	Ecological Risk Screening Summary (ERSS)	Freshwater Fish Injurious Species Risk Assessment Model (FISRAM)	Crayfish Invasiveness Risk Assessment Model (CIRAM) – <i>in development</i>
Type of assessment	Semi-quantitative rapid screen	Bayesian network model	Bayesian network model
Sources of evidence	Published information	Published information and expert opinion	Published information and expert opinion
Taxonomic scope	All	Freshwater fish	Crayfish
Geographic scope	Contiguous United States (supplement available for non-contiguous states and territories)	Flexible	Flexible
Time to complete	approx. 3 days	1-2 months minimum	1-2 months minimum
Number of completed assessments	>1,000	2	0

*excluding participation in species-specific comprehensive risk assessment efforts

*Components of USFWS Risk Assessment Activities**

	Ecological Risk Screening Summary (ERSS)	Freshwater Fish Injurious Species Risk Assessment Model (FISRAM)	Crayfish Invasiveness Risk Assessment Model (CIRAM) – <i>in development</i>
Arrival considered?	No	Yes	Yes
Survival considered?	Yes	Yes	Yes
Establishment considered?	Yes	Yes	Yes
Spread considered?	Yes	Yes	Yes
Ecological impacts considered?	Yes	Yes	Yes
Socioeconomic impacts considered?	Yes	Yes	Yes
Manageability considered?	No	No	No

*excluding participation in species-specific comprehensive risk assessment efforts

*NEWLY AVAILABLE & UPDATED ERSS
OF RELEVANCE TO THE GREAT LAKES*

High Risk Crustaceans



- Killer Shrimp (*Dikerogammarus villosus*)
- Danube Crayfish (*Pontastacus leptodactylus*)
- Fishhook Waterflea (*Cercopagis pengoi*)
- Demon Shrimp (*Dikerogammarus haemobaphes*)
- Amphipod (*Pontogammarus robustoides*)
- Water Flea (*Daphnia lumholtzi*)
- Estuarine Mudcrab (*Rhithropanopeus harrisi*)



High Risk Fish



- Maraena Whitefish (*Coregonus maraena*)
- Threespine Stickleback (*Gasterosteus aculeatus*)
- European Smelt (*Osmerus eperlanus*)
- Eastern Mosquitofish (*Gambusia holbrooki*)
- Northern Snakehead (*Channa argus*)
- Redear Sunfish (*Lepomis microlophus*)
- Topmouth Culter (*Culter alburnus*)
- Inland Silverside (*Menidia beryllina*)
- Barbel (*Barbus barbus*)
- Sailfin Molly (*Poecilia latipinna*)
- Japanese Eel (*Anguilla japonica*)
- Gudgeon (*Gobio gobio*)
- Bighead Carp (*Hypophthalmichthys nobilis*)
- Siberian Sturgeon (*Acipenser baerii*)

High Risk Mollusks

- Red-rim Melania (*Melanoides tuberculata*)
- Channeled Applesnail (*Pomacea canaliculata*)
- Chinese Mystery Snail (*Cipangopaludina chinensis*)
- Dark Falsemussel (*Mytilopsis leucophaeata*)



High Risk Other Vertebrates

- Nutria (*Myocastor coypus*)
- Egyptian Goose (*Alopochen aegyptiaca*)
- American Bullfrog (*Lithobates catesbeianus*)



High Risk Plants



- Giant Reed (*Arundo donax*)
- Hydrilla (*Hydrilla verticillata*)
- Pacific Mosquitofern (*Azolla filiculoides*)
- Parrotfeather (*Myriophyllum aquaticum*)
- Water Lettuce (*Pistia stratiotes*)
- Reed Canarygrass (*Phalaris arundinacea*)
- Eurasian Watermilfoil (*Myriophyllum spicatum*)
- Alligator Weed (*Alternanthera philoxeroides*)
- Flowering Rush (*Butomus umbellatus*)
- Carolina Fanwort (*Cabomba caroliniana*)
- Purple Nutsedge (*Cyperus rotundus*)
- African Elodea (*Lagarosiphon major*)
- Curly Leaved Pondweed (*Potamogeton crispus*)
- Large-flower Primrose-willow (*Ludwigia grandiflora*)
- Brittle Waternymph (*Najas minor*)
- Water Chestnut (*Trapa natans*)

Low Risk Fish

- Cockatoo Cichlid (*Apistogramma cacatuoides*)
- Zebra Loach (*Botia striata*)
- Tricolor Sharkminnow (*Balantiocheilos melanopterus*)
- Redtail Sharkminnow (*Epalzeorhynchos bicolor*)



Updated High Risk ERSS



- Redclaw (*Cherax quadricarinatus*)
- Tench (*Tinca tinca*)
- Grass Carp (*Ctenopharyngodon idella*)
- Nile Perch (*Lates niloticus*)
- Blue Tilapia (*Oreochromis aureus*)
- Mozambique Tilapia (*Oreochromis mossambicus*)
- Nile Tilapia (*Oreochromis niloticus*)
- Jaguar Guapote (*Parachromis managuensis*)
- Guppy (*Poecilia reticulata*)
- Orinoco Sailfin Catfish (*Pterygoplichthys multiradiatus*)
- Amazon Sailfin Catfish (*Pterygoplichthys pardalis*)

Updated Uncertain Risk ERSS

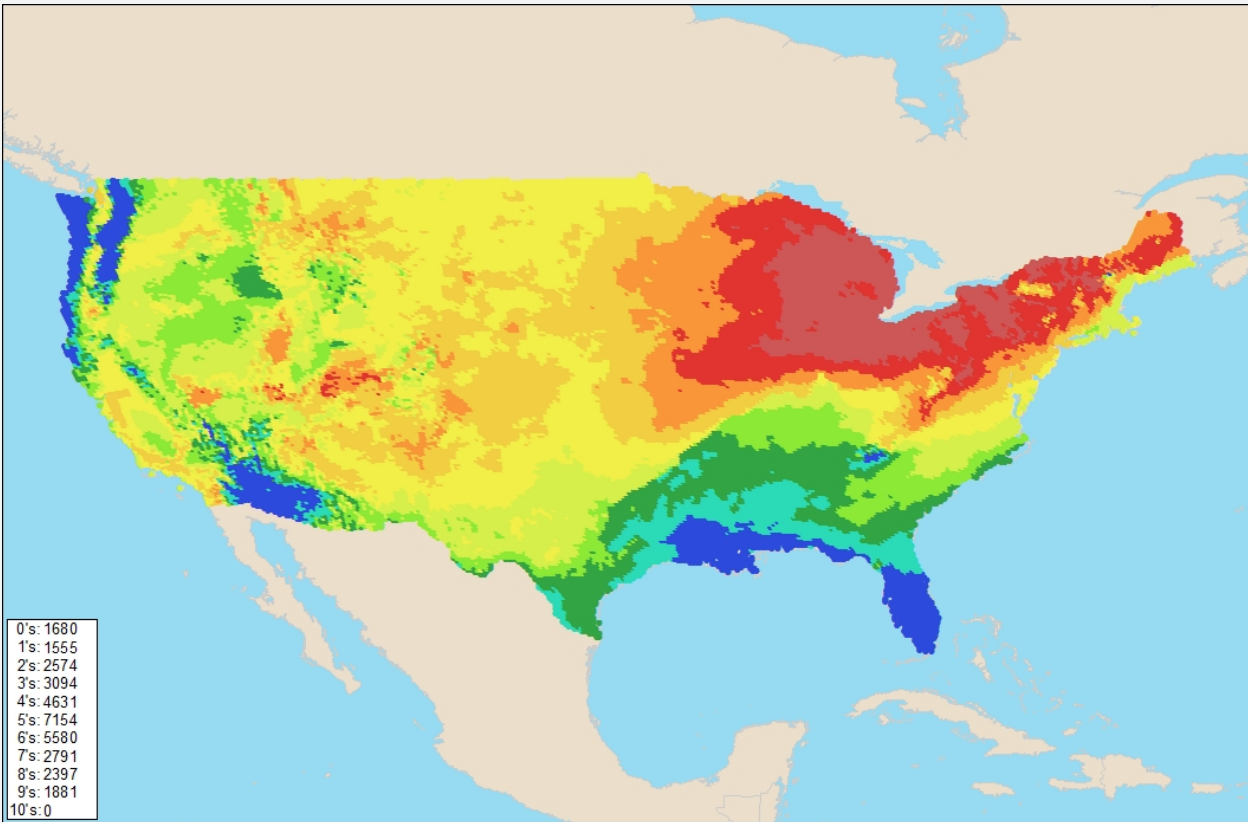
- Marbled Crayfish (*Procambarus virginalis*)
- Mrigal Carp (*Cirrhinus cirrhosus*)
- Black Acara (*Cichlasoma bimaculatum*)
- Crucian Carp (*Carassius carassius*)



Expanded Climate Matching Capabilities

(RAMP 3.1)

- Addition of U.S. commonwealths and territories as target regions
- Ability to conduct a climate matching analysis for a single State or territory
- Improved handling of extremely high and extremely low volumes of species occurrence data
- RAMP SOP now available online



0's:	1680
1's:	1555
2's:	2574
3's:	3094
4's:	4631
5's:	7154
6's:	5580
7's:	2791
8's:	2397
9's:	1881
10's:	0

Species: *Cercopagis pengoi*

Scenario: Current

Climate6: 0.379

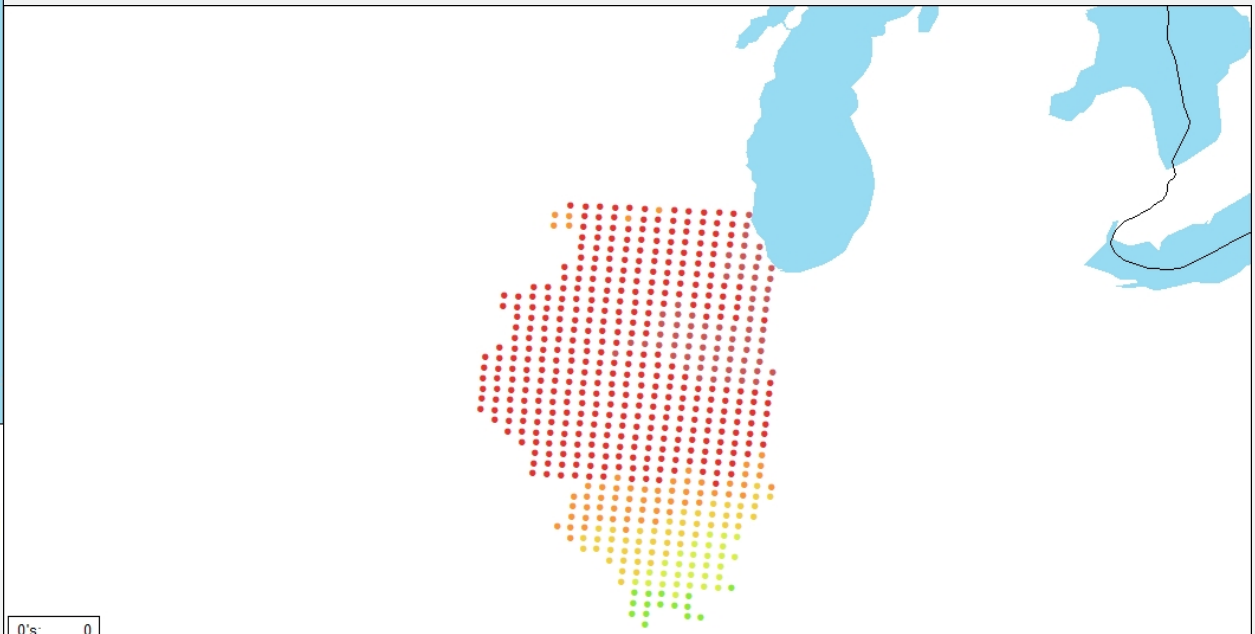
High: AR AZ CA CO CT DC DE IA IL IN KS MA MD ME MI MN MO MT ND NE NH NJ NM NY OH OK PA SD UT VA VT WI WV WY

Medium: ID KY NC NV OR TN TX WA

Low: AL AS FL GA GU LA MP MS PR RI SC VI



RAMP



0's:	0
1's:	0
2's:	0
3's:	15
4's:	30
5's:	0
6's:	48
7's:	61
8's:	381
9's:	73
10's:	0

Species: *Cercopagis pengoi*

Scenario: Current

Climate6: 0.926

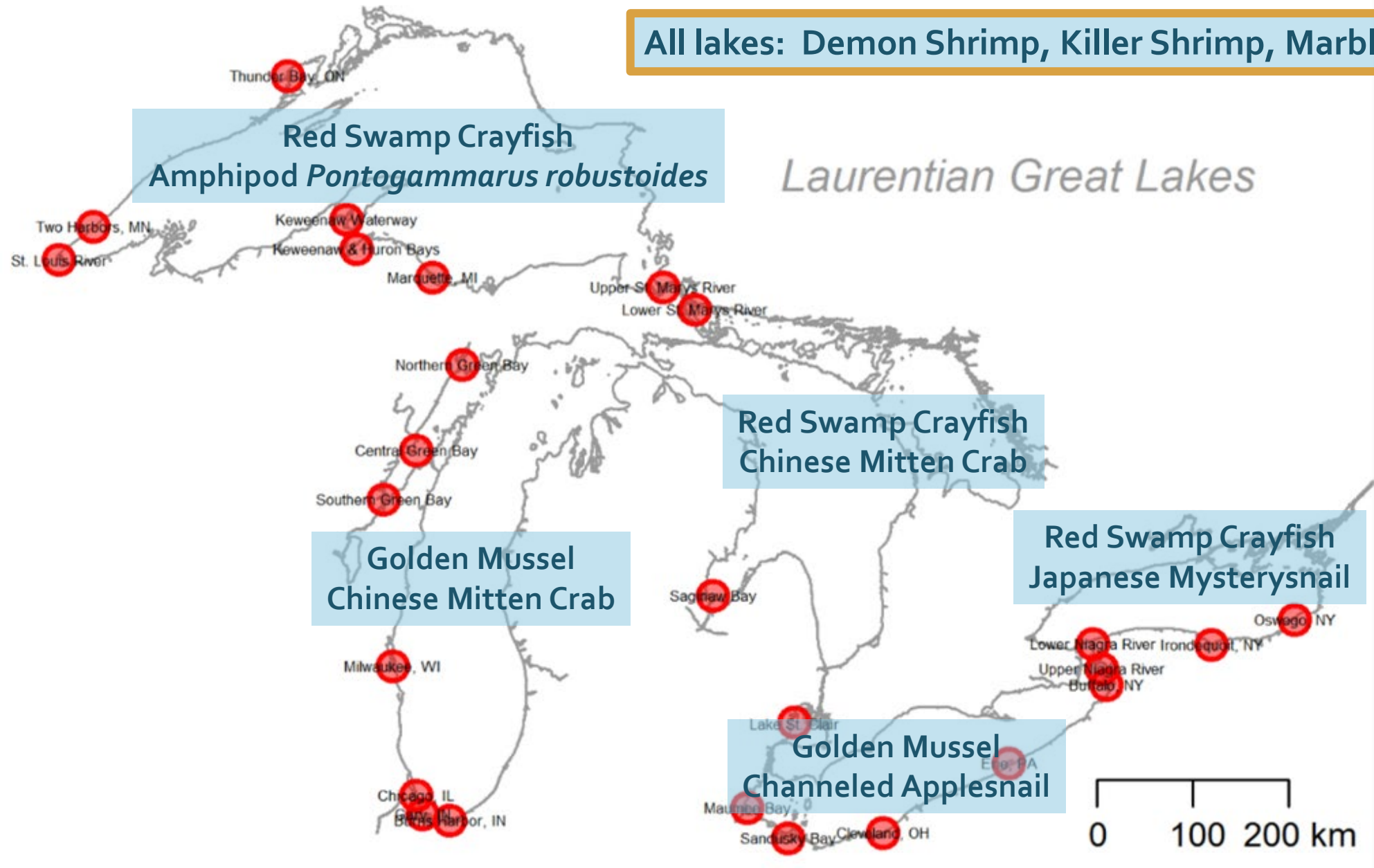


RAMP


Recent Applications of USFWS Risk Assessment in the Great Lakes Region

- ERSS:
 - Supporting USEPA in nonnative zooplankton findings
 - Supporting the State of New York in decision-making following eDNA reports of northern snakehead
 - Identifying targets for invertebrate early detection through the USFWS Early Detection and Monitoring (EDM) program in the U.S. Great Lakes
- FISRAM: Evaluating risk of African longfin eel aquaculture in Michigan

All lakes: Demon Shrimp, Killer Shrimp, Marbled Crayfish



Future Directions

- Continue to update finalized ERSS reports, incorporating the latest research and climate matching results
 - Continue to respond to partner requests to produce ERSS reports that are not currently in our database
 - Implement a standardized horizon scanning protocol to identify future suites of species for risk screening based on priority pathways and climate matching
 - Increase attention to uncertain risk ERSS, prioritizing species for more in-depth assessment
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Resources

- USFWS website:
<https://www.fws.gov/fisheries/ans/prevention.html>
 - All completed ERSS reports, organized by risk category and taxon
 - Standard Operating Procedures for ERSS and RAMP
 - Peer review summaries for ERSS and FISRAM
 - Example use of FISRAM:

Wyman-Grothem, K. E., N. Popoff, M. Hoff, and S. Herbst. 2018. Evaluating risk of African Longfin Eel (*Anguilla mossambica*) aquaculture in Michigan, USA, using a Bayesian belief network of freshwater fish invasion. *Management of Biological Invasions* 9(4):395-403.
 - Email katherine_wyman-grothem@fws.gov to request an ERSS report not on the website or a copy of RAMP for your own use.
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