



Invasive and Introduced Species Section

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<https://introducedfish.fisheries.org>

President's Vector

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What a great year it has been. We have been discussing how the Introduced Fish Section is perceived by AFS members (is our name recognized by members as it is intended) and proposed potential new names. The name INVASIVE AND INTRODUCED SPECIES SECTION was approved by Section members, AFS management committee and AFS governing board. We believe as both the executive committee and a membership that this name will best reflect us in representing section members interests, will assist in recruiting like minded professionals, and remove limits and/or confusion among section acronyms.

Our Section was first recognized and established as the Exotic Fish Section in 1980 and later changed to the Introduced Fish Section in 1985. The Invasive and Introduced Species Section allows for us to bridge the issues of introducing species for management purposes as well as fully being recognized as a Section to meet the challenges that invasive species (fish, plants, invertebrates and others) brings our profession.

As we prepare for the fall meeting in Reno, I would encourage Section members to participate in 2 ways. First, attend the Section meeting at 4:30 pm Monday evening. The location may be a challenge, but meet us at the Peppermill. We will keep a tight reign on the agenda so we can join the other activities. Second, if you don't attend our Symposia on "What did we do?", at least stop by our section's poster entitled "What's In a Name?!" This does speak to the process we went through as a section, and recognizes that 52% of the members participated.

I would like to thank Nathan Lederman for yeoman's work in supporting the name change and populating the surveys for the membership. Nathan has been lead on this topic, including the poster at the meeting.

See you in Reno, bring your thoughts and ideas for what 2020 may bring to the Invasive and Introduced Species Section.

Kevin Irons
President - Invasive and Introduced Species Section

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Editor's Note

Hello Everyone! Since this is the first newsletter being circulated for some time I thought it would be a good idea to welcome everyone to *Pathways*. To veteran members of Introduced and Invasive Species, *Pathways* will look familiar in both format and content. Recurring columns will include "President's Vector", "Lighter Side", and a new column titled "Range Expansions." There will also be a recurring section devoted solely to recent publications pertaining to invasive species. Not only does this publication column provide meaningful information but it is also an appropriate place to showcase the great work being completed by our hardworking members. That said, please feel free to provide me with citations for publications which you or your group has authored. Please also send any "Lighter Side" pieces so they can be included in the newsletter. Appropriate material for this section may include cartoons, artwork, riddles, and rhyme. Lastly, if there is any other information you would like to have included in *Pathways* please send it my way.

Resurrecting *Pathways* would not have been possible without the help of Duane Chapman. He provided many ideas and old newsletters which were used as a content template. I'd also like to thank Amy Benson for committing to author "Range Expansions" on a regular basis. Given that introduced and invasive species ranges often expand, having this information will be a great benefit to members. Additionally, I'd like to thank the Executive Committee for giving me the opportunity to serve as Editor. I look forward to what the future brings for our Section!

Seth Love
Newsletter Editor - Introduced and Invasive Species Section

Upcoming Events**Business Meeting**

When: September 30th, 2019 (Monday); 4:30 - 5:30 PM Pacific Time

Where: The Peppermill

**For those unable to make the business meeting, a "call-in" option will be available at the following:*

USA Toll-Free: 888-494-4032

Access code: 698 277 9120

Symposium. - "What Did We Do?! The Biologists' Role in the Management and Spread of Invasive Species."

When: October 3rd, 2019 (Thursday); 8:00 AM - 5:00 PM Pacific Time

Where: A7, Reno-Sparks Convention Center

Range Expansions of Introduced Carps and Snakeheads

There are over one hundred species of fish from outside North America believed to be established in the United States. A number of them have become very widespread over the past decade, two groups in particular, Cyprinid carps and snakeheads. Four species of large carps were introduced into the United States as bio-control agents predominantly in the 1970s. Since their arrival, these carps have become established in the Mississippi River Basin and continue to disperse within the basin. Some of the earliest collections of two carp species, Bighead Carp (*Hypophthalmichthys nobilis*) and Silver Carp (*Hypophthalmichthys molitrix*), occurred in the late 1980s in the middle section of the Mississippi River and have since dispersed simultaneously and together share a nearly identical distribution in the Mississippi River and its major tributaries such as the Arkansas, Illinois, Missouri, Ohio, and Tennessee rivers. Based on collections in a combined 20 states in the Mississippi River Basin, their range extends from Louisiana to Minnesota and the Dakotas, and from Kansas and Nebraska eastward to Ohio and West Virginia. A third species, Black Carp (*Mylopharyngodon piceus*), has also become established in the Mississippi River Basin. It escaped the confines of aquaculture and began to disperse in the Mississippi River. In 2003, this species was first collected in the wild from an Illinois lake adjacent to the river and has established populations in the Mississippi River from Louisiana to Missouri and Illinois. Since 2016, new collection locations include the lower Ohio River in Illinois, Kentucky, and Indiana, and the lower Cumberland and lower Tennessee rivers in Kentucky and Tennessee. Lastly, the Grass Carp (*Ctenopharyngodon Idella*) which has been stocked for decades throughout much of the United States for aquatic weed control is also dispersing and showing evidence of reproduction in new locations, specifically the Colorado River at Lake Powell in Utah and Lake Erie in Ohio. In addition to Grass Carp in Lake Erie, there is growing concern with Bighead, Silver, and Black carps dispersal up the Illinois River ever closer to the Great Lakes. Canal connections in the upper reaches of the Illinois River exist between the Mississippi and Great Lakes basins, thereby posing a significant threat to the Great Lakes ecosystem.

Another fish to take notice of in the United States is the Northern Snakehead (*Channa argus*), a temperate species native to eastern China. A population of this large predatory species was first discovered in a Maryland pond in 2002. Two years later a large population was discovered in a Potomac River tributary in Virginia. From there, Northern Snakehead dispersed very quickly into waters of the mid-Atlantic region including Delaware, western Maryland and Chesapeake Bay, the Delaware River in New Jersey and Pennsylvania, and several New York City ponds and one creek north of the city. An eradication of the creek population in 2008 was considered successful. There is also a large Northern Snakehead population in the White River drainage of east-central Arkansas that was discovered in 2008, a separate introduction from those in the mid-Atlantic region. An eradication was attempted in 2009 but was not successful as their distribution range was underestimated. Since then, they have continued to disperse within this region of Arkansas. Likely due to recent flooding beginning in 2017, Northern Snakehead have been found outside of Arkansas in the state of Mississippi in several small lakes adjacent to the Mississippi River. Recent collections in Virginia continue to be made incrementally southward in Chesapeake Bay tributaries. A second species of snakehead, Bullseye Snakehead (*Channa marulius*), is spreading slowly through the canal system of southeast Florida.

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Recent Publications

- Blair, S. G., May, C., Morrison, B., & Fox, M. G. (2019). Seasonal migration and fine-scale movement of invasive round goby (*Neogobius melanostomus*) in a Great Lakes tributary. *Ecology of Freshwater Fish*, 28(2), 200-208.
- Cathcart, C. N., Dunker, K. J., Quinn, T. P., Sepulveda, A. J., von Hippel, F. A., Wizik, A., ... & Westley, P. A. (2019). Trophic plasticity and the invasion of a renowned piscivore: a diet synthesis of northern pike (*Esox lucius*) from the native and introduced ranges in Alaska, USA. *Biological Invasions*, 21(4), 1379-1392.
- Chapman, D. C., Milardi, M., & Mann, F. A. (2019). Ligation and division of ductus deferens does not produce long term sterility in most bighead carp or grass carp. *Management of Biological Invasions*, 10(2), 285-295.
- Cole, E., Keller, R. P., & Garbach, K. (2019). Risk of invasive species spread by recreational boaters remains high despite widespread adoption of conservation behaviors. *Journal of environmental management*, 229, 112-119.
- Coulter, D. P., Wang, P., Coulter, A. A., Van Susteren, G. E., Eichmiller, J. J., Garvey, J. E., & Sorensen, P. W. (2019). Nonlinear relationship between Silver Carp density and their eDNA concentration in a large river. *PloS one*, 14(6), e0218823.
- Crane, K., Cuthbert, R. N., Dick, J. T., Kregting, L., MacIsaac, H. J., & Coughlan, N. E. (2019). Full steam ahead: direct steam exposure to inhibit spread of invasive aquatic macrophytes. *Biological Invasions*, 21(4), 1311-1321.
- Hoxmeier, R. J. H., & Dieterman, D. J. (2019). Natural replacement of invasive brown trout by brook charr in an upper Midwestern United States stream. *Hydrobiologia*, 1-9.
- Jeffrey, J. D., Jeffries, K. M., & Suski, C. D. (2019). Physiological status of silver carp (*Hypophthalmichthys molitrix*) in the Illinois River: An assessment of fish at the leading edge of the invasion front. *Comparative Biochemistry and Physiology Part D: Genomics and Proteomics*, 100614.
- Larson, E. R., Kreps, T. A., Peters, B., Peters, J. A., & Lodge, D. M. (2019). Habitat explains patterns of population decline for an invasive crayfish. *Ecology*, 100(5), e02659.
- Lishawa, S. C., Lawrence, B. A., Albert, D. A., Larkin, D. J., & Tuchman, N. C. (2019). Invasive species removal increases species and phylogenetic diversity of wetland plant communities. *Ecology and Evolution*.
- Odenkirk, J. S. (2019). The First International Snakehead Symposium: News from the Front(s). *Fisheries*, 44(3), 123-128.

Recent Publications

- Patel, M., Jernigan, S., Richardson, R., Ferguson, S., & Buckner, G. (2019). Autonomous Robotics for Identification and Management of Invasive Aquatic Plant Species. *Applied Sciences*, 9(12), 2410.
- Schwoerer, T., Little, J. M., & Adkison, M. D. (2019). Aquatic Invasive Species Change Ecosystem Services from the World's Largest Wild Sockeye Salmon Fisheries in Alaska. *Journal of Ocean and Coastal Economics*, 6(1), 2.
- Sepulveda, A. J., Schabacker, J., Smith, S., Al-Chokhachy, R., Luikart, G., & Amish, S. J. (2019). Improved detection of rare, endangered and invasive trout in using a new large-volume sampling method for eDNA capture. *Environmental DNA*.
- Stephens, K. L., Dantzer-Kyer, M. E., Patten, M. A., & Souza, L. (2019). Differential responses to global change of aquatic and terrestrial invasive species: evidences from a meta-analysis. *Ecosphere*, 10(4).
- Thresher, R. E., Jones, M., & Drake, D. A. R. (2019). Stakeholder attitudes towards the use of recombinant technology to manage the impact of an invasive species: Sea Lamprey in the North American Great Lakes. *Biological invasions*, 21(2), 575-586.
- Tiberti, R., Bogliani, G., Brighenti, S., Iacobuzio, R., Liautaud, K., Rolla, M., ... & Bassano, B. (2019). Recovery of high mountain Alpine lakes after the eradication of introduced brook trout *Salvelinus fontinalis* using non-chemical methods. *Biological Invasions*, 21(3), 875-894.
- Van Riper, C. J., Browning, M. H., Becker, D., Stewart, W., Suski, C. D., Browning, L., & Golebie, E. (2019). Human-Nature Relationships and Normative Beliefs Influence Behaviors that Reduce the Spread of Aquatic Invasive Species. *Environmental management*, 63(1), 69-79.
- Zhang, H., Rutherford, E. S., Mason, D. M., Wittmann, M. E., Lodge, D. M., Zhu, X., ... & Tucker, A. (2019). Modeling potential impacts of three benthic invasive species on the Lake Erie food web. *Biological Invasions*, 21(5), 1697-1719.

Lighter Side

Our Buddy the Largemouth Bass*Joy Fatooh*

Our buddy the big Largemouth Bass
 Has invaded our waters en masse.
 All the dace in the slough,
 And the tui chubs too,
 And the pupfish, had best watch their wrasse.

We see there's a problem with pike.
 We could leave 'em in there if you like.
 But if you prefer trout
 Then without any doubt
 You'll say "Pike huggers, go take a hike."

Lepidium latifolium
 Could fill up your whole swimming holeium.
 The poor fish and the duck
 Are both out of luck
 And I don't know how you'd consoleium.

(We might as well roll out linoleum.)

The alien plant Purple Loosestrife
 Sucks up all the rivers and slough's life.
 Cut it out of the slough?
 Well, a fish knife won't do;
 It won't even work with a moose knife.

A (Possible) Fish Riddle*Seth Love*

Flys without wings
 Less precious than gold
 Often searched for but not desired

Hydrilla Hydrilla Hydrilla,
 Hydrilla Hydrilla Hydrilla.
 Hydrilla Hydrill,
 A Hydrilla Hydrill.
 A Hydrilla Hydrilla Hydrilla!

(Carolyn says, "That genus name is just too fun to say to dilute with anything else!")

The plants that become too pervasive,
 Though "attractive," transform to "invasive."
 When planting your ground,
 Don't have them around!
 (I hope that you found this persuasive.)

The New Zealand mudsnail's operculum
 Blocks its aperture when you encircle 'em.
 They may think they can hide
 By withdrawing inside...
 Um...
 I'd better get back to workulum.

Fisher's Work (A Haiku)*Seth Love*

Water rippling
 Picks are gleaming in the sun
 Fish are filling the boat

Section Objectives

The *Invasive and Introduced Species Section* (hereafter referred to as Section) was organized as a subunit of the American Fisheries Society under bylaws approved on August 26, 1990. In 2019, members voted to change the name from *Introduced Fish Section* to *Invasive and Introduced Species Section* in order to more accurately reflect the Section's interests and focus. The Section has six major objectives:

- 1) To develop and maintain and association of persons interested and involved in the use of introduced and other aquatic organisms,
- 2) To coordinate and develop programs to advance the knowledge and concerns related to introduced species,
- 3) To provide a forum for identifying and bringing attention to bear on the beneficial and potentially harmful impacts of introduced species,
- 4) To encourage communication among scientists, administrators, managers, educators, aqua- culturists, and others interested in introduces species,
- 5) To assist federal, state, and private groups in making informed decisions on introduction of species, and
- 6) To advise private industry in developing procedures for the safe handling of introduced species intended for closed system maintenance and culture.

Call for Newsletter Articles

Pathways is always looking for new information and articles to include in future issues. Articles may include ongoing research, notable governmental policy and program changes, stories of successful or unsuccessful invasive and introduced aquatic species management, or artistic renderings of these organisms (e.g., poetry, pictures, and paintings). Additionally, *Pathways* would like to provide readers a list of recently published journal articles in order to help communicate information amongst Section members. If interested in submitting an article to *Pathways* or providing a citation for a recent publication, please contact Seth Love at: Seth.Love@Illinois.Gov