



Introduced Fish Section

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American Fisheries Society

President's Message

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It's time for another IFS election and I would urge each of you to spend a little time looking over the ballot on page 7. "Write in" nominees are always encouraged, so help us out and return the ballot. We are a little out of phase with our elections and we may attempt to hold another one before the IFS business meeting in August. Please contact me if you are interested in being a nominee for President-Elect for 2000/2001.

I am very excited to report that Karl Mueller has volunteered to take the reins of the newsletter. My excitement stems from Karl's outstanding ability to do a fine job and from the fact that I won't have to do it any more since starting as editor in 1996. As contributing members, you can make the transition a smooth one by sending Karl articles, editorials or any news from your neighborhood. We would like to have another issue in early August, so please add Karl's address to your files (Karl W. Mueller, 3310 Carrington Way, Bellingham, WA 98226, phone 360-586-2202, e-mail <muellkwm@dfw.wa.gov>).

One of the Section's goals stemming from last year's business meeting was to examine the AFS Position Statement on Introduction of Aquatic Species. It has been 14 years since Chris Kohler and Walter Courtenay, Jr. developed the original statement and it was suggested at the meeting that it might be appropriate to look it over for possible revisions. The position statement can be found on the AFS web site at www.fisheries.org/resource/resource.htm. Any comments you would like to make about it with regard to a possible revision should be sent to me at jcassani@peganet.com.

I am excited to remind you that the IFS will be co-sponsoring a symposium for the annual meeting in St. Louis entitled "Aquatic Invaders: Entry, Impact and Control. The American Institute of Fishery Research Biologists will also co-host. Dora Reader has done the lion's share of work in organizing what will be an all day, 20 speaker, symposium. So please plan to attend.

Hot off the press is an article by

Frank J. Rahel entitled "Homogenization of Fish Faunas Across the United States" which appeared in *Science* 288: 854-856. This topic always generates debate amongst fish managers and the media has focused on it once again. Please note the articles on page 5 referring to it. Any follow-up editorials would be appropriate fodder for our IFS newsletter.



- Bruce L. Tetzlaff, Carbondale, IL.
- Joseph D. Grist, Blacksburg, VA.
- Kenneth M. Cook, Saint Louis, MO.
- Mark Sytsma, Portland, OR.
- Laurence L. Connor, Eustis, FL.
- Michael J. Banach, Gladstone, OR.
- Rick Vetter, Hines, OR.
- Dr. Annie Brasher, Honolulu, HI.
- David R. Longanecker, San Ramon, CA.
- Nicholas J. Utrup, Columbus, OH.
- Kristina VanStone-Hopkins, Quincy, CA.
- Dr. Phillip Moy, Manitowoc, WI.

EXOTIC SPECIES DAY CAMP AND TEACHER RESOURCES

The Great Lakes Sea Grant Network conducted successful teacher-training programs in 1998-99 on exotic aquatic species such as zebra mussels. Both workshops and day camp formats gave teachers an opportunity to learn and accumulate teaching resources

Continued on page 2

Ninety-seven teachers participated in hands-on workshops at five different locations in the Great Lakes region. Attendees tried out activities from two Traveling Trunks (education kits). They participated in a boat tour of lake Erie where exotic species impacts were discussed, inspected piers and other dock structures in Chicago for zebra mussel colonization, viewed several new videos on zebra mussels and other exotic species and much more!

The "Exotic Species Day Camp", which recently won an Outstanding Educational Program Award from the American Distance Education Consortium, helped teachers develop new classroom activities based on their learning experiences from the workshop. Teacher attendees shared their newly acquired knowledge on exotic species with colleagues at conferences and in-service training sessions in their own districts. Participants also utilized the training they gained and applied it to their own classroom curriculum. The collection of 35 new exotic aquatic activities, ESCAPE, should be available in summer 2000.

A new project is in the works, focusing on exotic aquatic education for geography and social studies teachers and students. Teacher workshops will be held in Indiana, Louisiana, New York, and Washington. "Exotic Aquatics on the Move (EATM) will use geographical concepts and teaching tools to make the study of nonindigenous aquatic species interesting and fun. Teachers will incorporate what they've learned from EATM to engage their students in developing community awareness projects. These projects will educate local citizens and help youth become environmental stewards. Information and resources will also become available on a new web site geared to the geography and social studies classrooms.

Contact Project Coordinator, Robin Goettel at (217) 333-9448 or goettel@uiuc.edu for more information on these projects.

Reprinted from Zebra Mussel Newsletter, Nov. 1999

THEY AREN'T ZEBRA MUSSELS. ARE THEY?

Since the arrival of zebra mussels in southern Louisiana, people have been on the look out for invasions into new areas. Yvonne Allen of Louisiana State University's Coastal Fisheries Institute has fielded a number of telephone calls from concerned people who have found new populations in places where none had been found before, or attached to hard substrates in local waters. The question is always, "They aren't zebra mussels, are they?" And recently, Allen's answer has been "No, they are *Mytilopsis*." For example, in early summer, a sailboat bottom was found in the Calcasieu River in Louisiana, covered with these new animals. On the basis of local rumors about the sailboat, the management of a nearby industry

began to look into zebra mussel monitoring. When Allen closely examined mussel samples from the boat, she identified them as *Mytilopsis*. Allen was able to positively identify the mussel and suggest treatments as a result of her studies of zebra mussels that can exist in similar areas.

"*Mytilopsis*, the dark false mussel, is in the same family as *Dreissena* and has similar life history characteristics, such as veliger larvae and firm attachment to hard substrates as adults," Allen said. "But *Mytilopsis* are more tolerant of higher salinities than *Dreissena*, so they are more commonly found in locations receiving some brackish water." Zebra mussels prefer fresh water. There are some subtle features which distinguish *Mytilopsis* from *Dreissena*, but the layperson may have difficulties telling them apart. Consult a mollusk expert at a local university or wildlife department for help.

Mytilopsis infestations can be very heavy and can cause the same problems as those caused by *Dreissena*. *Mytilopsis* attach to hard substrates and can restrict flow at raw water intakes for land-based industry. *Mytilopsis* can also attach to commercial and recreational boats. They have been found attached to raw water intakes and around the keel coolers of excursion boats in the area around Lake Charles and Lake Pontchartrain in Louisiana. *Mytilopsis* have also been found attached to a sailboat which was sailed from Lake Pontchartrain to Pensacola, Florida. There has been some effort to control *Mytilopsis* populations, particularly in areas where they have recently invaded. Control methods for this mussel are similar to those for zebra mussels such as heat or chlorine.

There are several species of *Mytilopsis*, but *M. leucophaeta* and *M. sallei* are the only species that have been found in North America. *M. leucophaeta* is thought to be native to the Gulf Coast and has invaded estuarine systems as far away as the North Sea. *M. sallei* is probably native to the Caribbean and South America and has invaded estuaries throughout the world including Hong Kong and India. Because it can withstand higher salinities than *Dreissena*, and *Mytilopsis* can be transported to new systems by hull fouling as well as by ballast water. For more information, contact Yvonne Allen, Phone (225) 388-6507 or e-mail allenyc@lsu.edu.

Reprinted from Zebra Mussel Newsletter November, 1999

DO ALL EXOTIC SPECIES CAUSE PROBLEMS?

The round goby is an exotic fish from Europe now found in the Great Lakes. However, in an article about Great Lakes fishing in the February 2000 issue of *Lakeland Boating* magazine, DNR fisheries biologist Gary Towns is quoted as saying that perch fishing in Lake St. Clair is excellent, probably the best of any of the Great Lakes. Towns says the perch fishing is going to remain excellent because the perch stomachs are full of small gobies. The gobies are eating the zebra mussels, and

then the perch are eating the gobies. Sounds like a normal biological food chain to me.

Reprinted from The Water Newsletter Vol 7, Feb. 2000 No.2

HARD SUBSTRATE MAY MEAN SAND

Since the invasion of zebra mussels in the Great Lakes in the mid-1980s, researchers have wondered about the extent of zebra mussels' colonization capacity. Previously accepted limitations to hard surfaces such as rocks, clams, and runoff pipes are now being questioned due to the new research by Ohio State University Professor Paul Berkman and his colleagues. It documents that zebra mussels have a far wider invasive capacity than previously suspected. Sonar and video surveys taken at Lake Erie indicate the mussels have been building colonies on large sand and muddy areas of the lake, are as previously thought incapable of supporting the animals.

The new findings, reported in the May 7, 1998 issue of *Nature*, reveal that this may be a rude awakening for the Great Lakes. "In terms of potential zebra mussel habitat, Lake Erie is wide open," said Berkman, senior research associate at the Ohio State University's Byrd Polar Research Institute. "We found that zebra mussels clearly colonize sand and muddy substrates in the lake," adding that the densities of some zebra mussel colonies exceed 20,000 animals per square meter.

The researchers studied 200 square kilometers of the Lake Erie floor, collecting dreissenid mussels and their underlying sediments from 1994-96. With the use of an underwater video camera attached to a submersible remotely operated vehicle, the researchers took pictures of the suspect areas. By 1995 they determined that zebra mussels covered about 2,000 square kilometers of the lake bed's soft sediment. Zebra mussel densities ranged from 1,500 to 32,500 animals per square meter. In order to differentiate between hard and soft underwater surfaces, side scan sonar was used. "Since the side scan signal is strongly reflected by hard substrate and weakly reflected by soft substrate, we could profile the lake bottom to determine where the zebra mussels were located," Berkman said.

Starting out as a microscopic larva, a zebra mussel can attach itself to a single grain of sand or mud. As the animal matures to a juvenile state, it begins to secrete byssal threads, which serve as anchors, attaching the mussel to a stable surface. By sending out these threads and attaching to sand grains, juveniles create a hard substrate which grows into a bed of zebra mussels on the bottom of the lake.

This discovery documents that zebra mussels can persevere in areas once thought to be not compatible. Because Lake Erie's floor is 90 percent soft substrate, it is now fair game for a full zebra mussel invasion. This article is based on Ohio Sea Grant-funded research by

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Hard Substrate

Dr. Berkman, The Ohio State University; David Garton, Ohio Sea Grant; Gregory Kennedy and John Gannon, U.S. Geological Survey; and Scudder Mackey, Jonathan Fuller and Dale Liebenthal, Ohio Dept. of Natural Resources. For more information, contact Jill Jentes by e-mail at Jentes.1@osu.edu.

Reprinted from
Zebra Mussel Newsletter
November, 1999

**BLACKBERRY TO
ZEBRA MUSSEL:
INVADING SPECIES
DISCUSSED APRIL 12, 2000**

Any gardener, fishing enthusiast or bird-watcher can appreciate Oregon State University's biology colloquium this year. If you've ever grubbed blackberries out by the roots, scared opossums out of your garbage, had a fishing spot changed by a new critter or watched starlings chase songbirds away, you've been affected by nonindigenous, invasive species "Biological Invasions! The Quiet Global Change" is a research-sharing event for scientists and the public about those bossy, overbearing newcomers and the economic and ecological havoc they can cause.

Oregon Sea Grant has invited researchers on the international problem to the April 12 gathering at LaSells Stewart Center in Corvallis, Ore. They will discuss such questions as:

- When does a newcomer become invasive?
- Is there a pattern to invasive species?
- Do habitats have characteristics that make them vulnerable to takeover?
- How extensive are the ecological, socioeconomic and health impacts of non-native population explosions?
- When is eradication possible or worth attempting?
- What effect will invasive species have on the course of evolution, biological diversity and ecological stability?

Registration is required for this free, day-long event. Visit <http://seagrant.orst.edu/colloquium> or contact Christi Sheridan at (541) 867-0367 or at Extension Sea Grant, OSU Hatfield Marine Science Center, 2030 SE Marine Science Drive, Newport, OR 97362-5296.

Oregon State University began hosting an annual biology colloquium in 1940 as a forum for public discussion of research topics relevant to the academic mission of the university and the lives of students and fellow citizens. Recent topics include: "Micronutrients, Phytochemicals and Optimal Health," "Ecosystems, Society and Environmental Change," and "Who were the First Americans?"

Submitted by: Ellen Saunders
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FROM THE NET

**CALIFORNIA
PORTS**

On January 1, 2000, California became the first state to require ships to exchange their ballast water at sea to minimize the possibility of transporting invasive species to California ports. This is a result of the California Legislature enacting AB703.

(San Jose Mercury)

**ZEBRA
MUSSELS**

On February 18, 2000, officials of the Michigan State University Extension Sea Grant program announced that 19 additional inland MI lakes had become infested with zebra mussels during the past year. Previously, a total of 100 inland MI lakes were known to have been infested with zebra mussels.

Detroit Free Press

**INVASIVE SPECIES
MANAGEMENT PLAN**

On January 26, 2000, Secretary of the Interior Bruce Babbitt announced the appointment of a 32-member Invasive Species Advisory Committee that will serve as a link between government agencies on the Invasive Species Council and stakeholder groups. The Council is to develop a national Invasive Species Management Plan by August 2000.

Department of the Interior
press release

**MICHIGAN BALLAST
WATER PROPOSAL**

In late January 2000, SB955 was introduced in the MI Senate, proposing to require that any ballast water taken from outside MI waters before entering the Great Lakes be sterilized and to require a MI permit before a ship could discharge any ballast water into MI waters.

Muskegon Chronicle

SAVE LAKE DAVIS PIKE

On February 7, 2000, the Save Lake Davis Task Force and the CA Department of Fish and Game were scheduled to release a 49-page report (<http://www.dfg.ca.gov/northernpike/index.html>) outlining a \$1 million program based on 13 recommendations for controlling, containing, and killing northern pike in Lake Davis. No fish-killing chemicals would be used.

Sacramento BEE

**ECONOMICS
OF INVASIONS**

Economics doesn't come up on this list server often but has recently. So maybe some of you would like to know that there is an economics section to GISP (the Global Invasive Species Program), and that we have a symposium volume in press. You'll find the details at: <http://www-users.york.ac.uk/~sd103/> which will give you a link to the main GISP site too.

Mark Williamson, Department of Biology
University of York, York YO105DDEngland

NON-NATIVE FISH

An article in the May 5, 2000, issue of Science by a University of WY ecologist reports that releases of non-native fish since the late 1800's are responsible for a significant loss of regional distinctiveness and diversity in U.S. rivers and lakes. Few refuges are left where almost purely native fish species exist, and areas that historically had no fish species in common now share many (e.g., AZ and MT now share 33 species in common; 89 pairs of states that formerly had no species in common now share an average of more than 25 species). Some states, such as NV, UT, and AZ, currently have more than 50% of their freshwater fish species introduced rather than native. Introductions for food and sportfishing were major factors contributing to this loss.

[Asbury Park Press,
Assoc. Press]

**VOLUNTARY GUIDELINES
ON
RECREATIONAL
ACTIVITIES**

On April 13, 2000, the Coast Guard published voluntary guidelines on recreational activities (e.g., boating and fishing) to control the spread of zebra mussels and other aquatic nuisance species. Public comment will be accepted through June 12, 2000.

[Personal communication,
Fed. Register]

**GEORGIA'S
SAVANNAH HARBOR**

On December 7, 1999, the Georgia Ports Authority's 50-member environmental stakeholders group met to consider whether making Savannah harbor deeper and more accessible to larger ships would substantially increase any invasive species problem.

Augusta Chronicle

**LAKE DAVIS PIKE:
DEPARTMENTS PLAN
IRRESPONSIBLE**

In mid-March 2000, officials of the American Fisheries Society sent a letter to the Robert Hight, Director of the California Department of Fish and Game, calling the Department's management plan (<http://www.dfg.ca.gov/northernpike/mgpike.htm>) for northern pike in Lake Davis, irresponsible for settling for less than complete eradication.

San Francisco Examiner

**SAN FRANCISCO BAY:
Y2K**

On March 1, 2000, the California Academy of Sciences announced the beginning of "San Francisco Bay: Y2K" -- a 4-year effort to comprehensively survey Bay fauna and identify non-native species.

San Francisco Chronicle

**WORKSHOP DISCUSSED
AQUATIC INVASIVE
SPECIES AND BALLAST WATER**

The U.S. Fish and Wildlife Service, Prince William Sound Regional Citizens' Advisory Council and California Sea Grant co-sponsored a free informational workshop on March 23 and 24, 2000, in Anchorage, Alaska, to report and discuss the results of a three-year investigation of aquatic invasive species in Prince William Sound and Port Valdez.

Scientists focused on the investigation, which included an analysis of species found in oil tanker ballast water, invasive species found in Prince William Sound and the effectiveness of oil tanker ballast water exchange in reducing the risk of introducing invasive species into Alaskan coastal waters.

Scientists also discussed ballast water management programs, and the implications of the programs on the shipping industries, and provided an overview of ballast water treatment technologies presently being developed.

**New Green Crab
Regulations**

You're poking around an Oregon estuary and encounter someone gathering the invasive European green crab, *Carcinus maenas*. Are they breaking the law? Not necessarily. This past December, the Oregon Fish and Wildlife Commission amended state regulations (OAR 635-056-0075) to allow people to collect green crabs recreationally within the scope of harvest rules. Once harvested, green crabs cannot be returned to state waters, and commercial harvest is prohibited. It's interesting to compare this stance with Washington Department of Fish & Wildlife regulations,

which prohibit anyone from possessing or transporting live green crabs without a permit. A key reason behind the difference - the fact that green crabs now appear to inhabit all of Oregon's major estuaries but have not been sighted in Puget Sound.

**Green Crab 2000
Workshop**

The Pacific NW Marine Invasive Species Team and a number of other west coast partners organized a Green Crab 2000 workshop in Seattle on March 23rd from 1-4:30 p.m. This forum occurred immediately after the National Shellfisheries Association annual meeting. Oregon Sea Grant and Washington Sea Grant co-sponsored a green crab workshop in February 1998. Since then, green crab populations have spread northward, new monitoring efforts have started, and a lot of information is being generated on population dynamics, predation, and other topics. In the light of these changes, the green Crab 2000 workshop offered a chance to revisit coordination of west coast monitoring, management, research, and education activities.

**A Control
For Mitten Crabs**

In December, ANS Update reported how Chinese mitten crabs may have added stealth to their list of scary attributes. On the upbeat side, there also may be potential to exploit one of their weaknesses. In 1997, Chinese researchers report an outbreak of "trembling disease" among this species in China. In the primary affected region, the majority of reared mitten crabs died. Infected crabs' livers were loaded with a microspore, but the precise disease mechanism is not known. Trembling disease prevailed from May - October with the largest mortality occurring from July - September. No unusual symptoms are reported (not sure why the term "trembling" is assigned) Chinese scientists have not yet found any effective drugs to control this disease.

**SPECIES PROFILE:
*Myxobolus cerebralis***

Imagine that you're peacefully swimming in your favorite lake when a tiny parasitic creature passes through your skin, eventually settling into cartilage within your head and spinal region. The creature begins to multiply and produce spores, building up pressure that distorts your body and/or damages your equilibrium, causing you to circle round and round. Unfortunately this is not a scene from "Aliens 9" but the real life story of salmonids affected by *Myxobolus cerebralis*, the parasite responsible for whirling disease. Although whirling disease has been getting more attention, particularly after it began to infect fish in Yellowstone Park in 1998, it is not always identified among the ranks of non-native species. However, *M. cerebralis*

is actually native to Europe and was not observed in the United States until a 1956 discovery in Pennsylvania. Whirling disease involves a complex life cycle with two hosts. Small bottom-dwelling aquatic worms (*Tubifex tubifex*) release a free-swimming form of the parasite, which then infects a host fish. Spores are produced, released when the fish dies, and then ultimately ingested by Tubifex worms for another round. The parasite has not been reported to harm humans or other species. Among salmonids, rainbow and cutthroat trout appear to be most susceptible. The parasite's two-stage life cycle creates multiple opportunities for whirling disease to spread to new water bodies. A single fish can contain thousands of spores, and transport/stocking of live infected fish has likely been a significant transport mechanism. Once released, mature *M. cerebralis* spores remain viable in the mud for years. In this form, they can easily be transported unintentionally by boots, fishing gear, boat trailers, etc.) at appropriate strength chlorine appears to be an effective disinfectant control). Some suspect wildlife as a pathway for spread as well. For example, studies have shown the parasites can survive a bird's digestive tract and remain infectious.

If you're interested in learning more about this particular ANS and its impacts, the Whirling disease Foundation maintains a very comprehensive web site at <http://www.whirling-disease.org>.

**Washington ANS Legislation
Moving Ahead**

Ballast Water legislation moving through both houses of the Washington legislature continues to build momentum and appears likely to pass. With mandatory state ballast management programs to the south and north, Oregon would likely be under more scrutiny to deal with this issue. Here are some of the key points of the current draft House (HB2466) and Senate (SB 6293) bills in Olympia.

* Self-propelled vessels over 300 gross tons (with a few exceptions, such as military) can not discharge ballast water into Washington state waters unless the vessel has conducted ballast water exchange at least 50 miles offshore. Until July 1, 2002, vessels are exempt from this provision if the master determines vessel/crew safety will be threatened or that exchange isn't feasible based on vessel design or equipment limitations. After that deadline, vessels unable to exchange ballast water must treat it before discharge is authorized (again, with allowance for compliance delays due to safety considerations). Treatment must meet yet-undeveloped standards set by the Washington Department of Fish & Wildlife (with typical legislative language about "technologically and practically feasible").

* Vessels covered by the discharge restrictions must report ballast water management data to WDFW using existing Coast Guard forms (it should be noted that the

Continued on page 5

Continued from page 4
Species Profile

bills contain several provisions to facilitate coordination with Coast Guard requirements). Vessels must also have their ballast water sampled and analyzed, also based on rules and protocols to be developed by WDFW.

* The bills call for WDFW and the shipping industry to "promote" the creation of a ballast water treatment pilot project. Among other things, the pilot project should develop treatment equipment and methods that do not "increase the cost of ballast water treatment at smaller ports."

* Noncompliance with the ballast management report provisions carries a civil penalty of up to \$500 per violation, increased up to \$5,000 and potential criminal charges if a falsified report is knowingly submitted. Non-compliance with other statutory provisions carry a civil penalty of up to \$5,000 per violation.

Note that the State of Washington v. Intertanko continues to be a footnote that could affect this bill and the existing California law. The Supreme Court has now heard arguments on this case regarding the state's authority to impose oil spill prevention standards on oil tankers. A ruling is expected in the next few months, and some believe it will have implications for state authority to regulate ballast management.

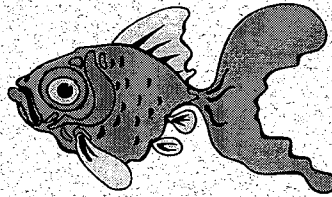
Excerpts taken from
**AQUATIC NON-NATIVE
 SPECIES UPDATE**
 (A monthly report of Oregon Sea
 Grant Extension faculty)

**WATER MANAGEMENT
 MEASURES FOR SHIPS
 OPERATING IN
 WA STATE WATERS**

On March 24, 2000, WA Governor Gary Locke signed Substitute HB2466 into state law, specifying ballast water management measures for ships operating in WA state waters.

In late March 2000, more than 200 biologists and managers from the Upper Mississippi River Conservation Committee met in Cape Girardeau, MO, to discuss management issues, including damage of invasive species upon native organisms. Concerns include the delay in construction of an electronic barrier to slow the spread of round goby from the Great Lakes into the Mississippi River basin and the increasing use of Asian black carp to control snail infestations in catfish growing ponds in MS. The April 1, 2000 issue of Environmental Science and Technology contains an article report that zebra mussels are consuming so much dissolved oxygen from the Hudson River that much of the ecosystem is approaching a danger point at which other aquatic life will flee or die.

UIMRCC press release
 New York Times



**DID YOU KNOW?
 PANEL: GOLD FISH
 GREAT AS PETS,
 BUT NOT AS BAIT**

STATE COLLEGE, Pa. — It may look cute in the aquarium, but the ubiquitous goldfish poses a serious threat when it escapes into the wild.

Biologists say goldfish—which can grow to 14 inches outside of confining aquariums—multiply rapidly and can crowd out other native species.

In order to prevent that from happening in Pennsylvania's waterways, the state Fish and Boat Commission voted Saturday to ban the use of goldfish as bait.

"It's not to say they're a bad fish or anything," said Mike Kaufmann, Philadelphia area fisheries manager for the commission. "They have their place."

Pennsylvania fisheries officials say they come across goldfish all the time. Some escape from anglers, while others are former pets released into streams.

While the goldfish has not caused a big problem in Pennsylvania, the species has wreaked havoc elsewhere. In Nevada, it was blamed for the initial demise of the Pahrump poolfish, now an endangered species. It has been fingered for the decline of the Sacramento sucker. In New Mexico last summer, officials hauled five tons of goldfish out of a lake near Albuquerque—and barely dented the population. The goldfish crowded the trout; anglers stayed away and a lakeside restaurant had to close.

In the 1970's, pollution killed many species in the Monogahela River in Pennsylvania—but biologists could always count on sighting goldfish.

Researchers think goldfish, native to Eastern Asia, were brought by settlers in the early 1700's. Now goldfish are found in the wild in every state except Alaska.

Saturday's fish commission vote closed a loophole in current law. Using goldfish as bait had been illegal until 1980, when the laws were recodified and the fish inadvertently were left off the books.

The Associated press

**U.S. FISH
 DIVERSITY SINKING**

May 5, 2000 — A different kind of "species invasion" is spreading across the United States, homogenizing fish from Nevada to Pennsylvania to California, according to a new study.

In response to a burgeoning sport-fishing industry, the U.S. government has stocked the nation's streams with popular farm-raised sport fish like rainbow trout and smallmouth bass, says Frank J. Rahel of the University of Wyoming, author of the study published in the journal Science.

Rahel says these fish have often eliminated native species by forcing them out of their habitats and taking over food supplies.

After combining data from population studies and state fisheries, Rahel found that more than half of all the fish found in Nevada, Arizona and Utah are non-native species. And in the rest of the West, a quarter to half of all the fish he found are not native.

It's not hard to see why state governments stock streams with farmed species: government and industry sources estimate that freshwater sport-fishers spend \$26 billion a year on everything from bait to helicopter travel to secret fishing holes.

Rahel notes that fish management started with a "Johnny Appleseed" idea — seeking out lakes and streams to seed with "better" fish. But now, slowly, the tide is changing. States are stocking sport fish in lower numbers, partly because of environmental concerns, and partly because previously introduced fish are reproducing and keeping the waters naturally stocked.

And, unlike many other species invasions, many hesitate to condemn the introduction of the sport fish.

"It's a gray issue," says Charles Brown of the Introduced Fish Section of the American Fisheries Society. "It's not always that these introductions are completely positive or negative. The sports angler may be very satisfied while the conservationist may think it's terrible."

But no one disagrees that the legacy of these programs is an overall fish population that looks the same from state to state. The question now is what, if anything, to do about it.

"Once the bell is rung it's hard to recapture the sound," Brown says. "And that's the case with many of these species. We just have to deal with them the best we can."

Rahel adds that fish are introduced in other ways. For example, goldfish are the second-most introduced fish nationwide. They're "released" from aquariums.

*By Aries Keck,
 Discovery.com News*



ASIAN GREEN MUSSEL THRIVING IN TAMPA BAY: POTENTIAL IMPACTS, SOLUTIONS OF INVASIVE EXOTIC SPECIES DISCUSSED AT WORKSHOP

Facts on the Asian Green Mussel

Scientific Name: *Perna viridis*
Range: Coastal areas of the Indian and Pacific Oceans
Size: Up to 4 inches
Uses: A popular food, the green mussel is harvested in the wild and grown in aquaculture facilities in its native area

Hitchhiking History:

The green mussel was first seen in the Caribbean at Trinidad in 1990, where it apparently had been transported as larvae in the seawater ballast of large ships. That is probably the same mechanism that brought the green mussel to Tampa Bay, where it was discovered earlier this year by divers performing maintenance work at the TECO power plant in South Hillsborough County.

The discovery in Tampa Bay of an exotic mussel native to Asia provided a timely focus for scientists and shippers who gathered recently in Tampa for a two-day workshop on aquatic invasive species and the shipping industry.

The workshop explored ways to prevent unwanted plants and animals from entering the bay in ballast water taken on by a ship in one port and then discharged in another. Bay managers suspect that is how the Asian green mussel, *Perna viridis*, "hitchhiked" to Tampa Bay -- where it was found last summer clogging intake pipes at Tampa Electric Company's Big Bend power plant. Since then, the mussel has been found by the thousands on three of the four bridges spanning the bay. Researchers conducting the surveys report that many of the mussels are three inches long and encrusted with barnacles, indicating they have been here for some time.

"When we first started planning the invasive species workshop, we didn't think we had any invasive species associated with ballast water in the bay," said Holly Greening, Senior Scientist for the Tampa Bay Estuary Program. "Finding out about the green mussel certainly lent a sense of urgency to the workshop."

The workshop was organized by the Tampa Bay Estuary Program in partnership with a host of public and private organizations.

The goal was to bring the scientific and shipping communities together to share their knowledge and concerns. Topics included an assessment of the potential threats posed to Tampa Bay and similar coastal waters by invasive species; methods to prevent or eliminate exotic species in invasions; and the implications of new policies governing ballast water exchange.

Shipping activities are the primary route of introduction for aquatic invasive species in coastal waters. A new policy being implemented by the U.S. Coast Guard calls for shippers to report the origin of their ballast water and what they expect to do with it. The policy also requests that shippers voluntarily discharge their ballast in the salty open ocean, where few hitchhiking plants or animals are likely to survive.

Engineering technologies discussed at the workshop that may eventually be helpful in "sanitizing" ballast water include special filtering systems using UV light, biocides, and shoreside treatment stations.

Once exotic species gain a toehold, they may out compete more beneficial native species, introduce diseases to native stocks, clog water intake pipes, and blanket dock and bridge pilings. The zebra mussel, an interloper from southeastern Europe that is now found in 20 Midwest and Northeast states, has caused billions of dollars in damage to pipes and water control structures.

Speakers at the Tampa workshop included representatives of the Chamber of Shipping of America, the U.S. Environmental Protection Agency, the U.S. Geological Survey, and the American Association of Port Authorities, along with scientists from a

variety of universities and research institutions.

A highlight of the workshop was a talk by Dr. Henry Lee, a research scientist with the EPA in San Francisco -- which currently holds the title of the nation's "most highly invaded estuary." Dr. Lee reported that there are presently 212 identified non-indigenous species in the San Francisco Bay-Delta, and that exotic species are now being introduced at the rate of *one every 14 weeks*.

Florida's warm, moist climate makes it an ideal candidate for a variety of exotic, potentially harmful species to flourish. In fact, Dr. Bob Doren of the U.S. Fish and Wildlife service told participants that Florida is second only to Hawaii in total number of exotic plants and animals.

Increased global trade heightens the potential for species to cross regions and even continents. Chamber of Shipping representative Kathy Metcalf said her industry recognizes the extent and seriousness of the problem, and supports measures to restrict the transport of species in ballast water as long as the measures are fair and equitable.

Roundtable discussions at lunch allowed workshop participants to discuss specific issues, such as viable alternatives to ballast water; how to more accurately detect and assess the presence of exotic species; and whether a non-regulatory approach to ballast water management would be effective. A somewhat surprising response from all participants was that a regulatory mechanism was needed to drive both public and private participation in ballast water management and treatment strategies.

The input provided by workshop participants will help the Estuary Program refine its monitoring program to more rapidly detect potentially harmful aquatic invasives, and develop policies to minimize the risks posed by such species.

The workshop was co-sponsored by the Tampa Bay Estuary Program, Tampa Port Authority, Gulf of Mexico Program, Louisiana and Florida sea grant programs, U.S. Environmental Protection Agency, U.S. Geological Survey, The Florida Aquarium, National Marine Fisheries Service, Florida Marine Research Institute, Gee and Jensen, and URS Greiner Woodward Clyde.

For a summary of the workshop, log on to TBEP's web site at www.tbep.org, or call (727) 893-2765.

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Monthly Arrivals of Foreign Ships "In Ballast" at the Port of Tampa

"In Ballast" refers to vessels that are traveling with no cargo and therefore (more or less) with full ballast tanks

Month	Arrival	In Ballast
January	156	41
February	123	40
March	138	35
April	118	34
May	136	35
June	110	30
July	110	29
August	106	25
September	112	28
October	113	29
November	128	37
December	126	33
Total	1,476	396

Source: 1995 "National Biological Invasions Shipping Study," Carlton, et al.

BALLOT

President-Elect Candidates (vote for one)

Secretary/Treasurer Candidates (vote for one)

 Charles L. Brown

 Jacqueline F. Savino

 Write-in _____

 Write-in _____

Please return your ballot by June 15, 2000 to:

John R. Cassani

Lee County Hyacinth Control District

P.O. Box 60005

Ft. Myers, FL 33906

Please use this original form when returning ballot

Charles L. Brown

Charles L. Brown received his B.S. in 1972 from St. Norbert College and M.S. in 1974 from the University of Arkansas. Currently, he is an ecologist at the Washington DC headquarters of the U.S. Department of Agriculture's, Animal and Plant Health Inspection Service (APHIS), which is the main federal agency involved in prevention and control of agricultural pests and diseases. While with APHIS, Charlie has been involved with assessing the environmental risks associated with field testing of genetically modified organisms, and he has actively pursued issues involving aquaculture and aquatic nuisance species. Prior to joining APHIS, he spent 13 years with the U.S. Fish and Wildlife Service conducting fish habitat research at the Great Lakes Science Center in Ann Arbor, Michigan. Charlie has been the Introduced Fish Section's Secretary/Treasurer since 1997.

According to Charlie, now is an exciting time for the Introduced Fish Section. While invasive species in general — and aquatic nuisance species in particular — have caught the attention of the general public, there is a continued demand to transfer species for sportfishing, aquaculture, and pest control purposes. The Introduced Fish Section has historically served as a scientific forum to discuss both the benefits and drawbacks to aquatic species transfers. As president, Charlie's main goal would be to assure that the Introduced Fish Section continues the tradition of providing authoritative and reasoned scientific information on the effects of introduced species.

Jacqueline F. Savino

Jacqueline F. Savino is the Branch Chief for Ecosystem Dynamics at the Great Lakes Science Center of the U.S. Geological Survey in Ann Arbor, MI. Formerly from upstate New York, Jaci obtained a B.S. in the Biological Sciences at Cornell University. She completed a Master's and PhD. at The Ohio State University in behavioral ecology of fishes. Her recent research has included studies on the effects of nonindigenous ruffe and round gobies on the native Great Lakes fish community. She is also testing control mechanisms to limit movement of invasive species into new watersheds. Jaci has been an active member of the American Fisheries Society since joining in 1980. She has served on the Publications Overview Committee, two Program Committees for Parent Society Meetings, associate editor for Transactions of the American Fisheries Society, and President of the Michigan Chapter.

Jaci agrees that the perturbations caused by introduced fish on the aquatic community can be severe and difficult to reverse. The Introduced Fish Section can provide AFS with information and expertise to address this high profile topic. As Secretary/Treasurer, Jaci would like to increase the membership of those interested in introduced fish problems. In addition, the Section can explore means to enhance its responsiveness to these issues. Ideally, the Introduced Fish Section should be a leader in defining emerging issues and facilitating their resolution.

PUBLICATIONS

Aquatic Habitat Assessment: Common Methods

Mark B. Bain and Nathalie J. Stevenson, eds.
224 pages, 8 1/2 x 11, softcover, ISBN 1-888569-18-2

This new manual represents the synthesis of a comprehensive survey of the most widely used methods for inland aquatic habitat assessment in North America. *Common Methods* seeks to reduce the variability in approaches to habitat assessment, while still providing flexibility for selecting practices that vary in effort, cost, precision, and detail.

Sixteen method chapters detail step-by-step procedures for assessing and describing regional setting * basin attributes * waterbody identification * stream reaches * macrohabitat * substrate * cover and refuge * bank condition * riparian vegetation * barriers * stream discharge and volume * water velocity * temperature * lake morphometry * optical and chemical properties.

Browse on-line at <http://www.fisheries.org/publications/bookpdf/aquaticintro.htm>

List price: \$33; AFS members, \$20. Stock number 540.28

To order, contact AFS publications at 412/741-5700 or afsorders@abdintl.com or order through the AFS Online Bookstore at <http://www.fisheries.org/pubs.html>

Innovations in Fish Passage Technology

edited by Mufeed Odeh
228 pages, 8 1/2 x 11, hardcover, ISBN 1-888569-17-4

This comprehensive volume examines state-of-the-art technology for assisting migratory fishes in overcoming natural and engineered obstructions. Chapters include studies about:

- *Efficiencies of existing downstream bypass engineering in the United States, Europe, and Australia
- *The use of single-beam, split-beam, and tracking radar-type hydroacoustics in monitoring fish movement through bypass structures
- *Differences in the bypass needs of nonsalmonid and salmonid species
- *Efficiencies of diversion screen and surface collection technologies

This book is an outstanding example of a fruitful collaboration between engineers and biologists as a mandatory basis for sound fish passage solutions.

- *Professor Stefan Schmutz, University of Agricultural Sciences, Vienna, Austria*

List Price \$55; AFS members, \$42. To order, contact AFS publications at 412/741-5700 or afsorders@abdintl.com / stock number 540.24. For more information, visit <http://www.fisheries.org/publication/AFSBooks/webinal/x540.24.htm>

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