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AQUATIC INVASIVE SPECIES NEWS
IN A NUTSHELL

Joan Cabreza, Editor

This newsletter focuses primarily on Western U.S. and aquatic issues, but it also contains terrestrial, national, and international news of interest. Contents do not necessarily reflect views of the PSMFC. We welcome questions, comments, and news items; to submit these, or to subscribe/unsubscribe, contact the Nutshell editor at <joancabreza@msn.com>. For past Nutshell issues 1-29, go to [http://www.aquaticnuisance.org/newsletters].

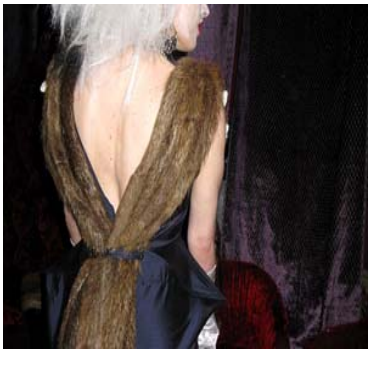
Quotes to Ponder

"There's a new shift in the politics of food, not quite a movement yet, more of an eco-culinary frisson. But it may have staying power; the signs and portents are there. Vegans, freegans, locavores - meet the invasivores" - *James Gorman, in 'Diet for an Invaded Planet: invasive species', December 31*).

"Eat for the environment. Eat locally. Eat wild meat. Eat for habitat. Eat invasive." - Rachel Kesel, a San Francisco blogger. *[Ed. Comment: Think I'll pass on the tunicates and rock snot algae though…]*

This Quarter's Weird News

Fashion Furs. Some ecologists and fashion enthusiasts are trying to rekindle a market for fur made from nutria, large invasive South American rodents. At a Righteous Fur show in Brooklyn last month, models wore everything from fur bikinis to fur legwarmers. Unusual fashion shows in New Orleans and Brooklyn have



show-cased nutria fur made into everything from g-strings to full-length coats. At a recent show in Brooklyn, even the cello player, who accompanies the models as they strut down the runway, wore a nutria bikini. The plunging back of the model's dress (above) is trimmed with nutria tails. And some American designers, including Oscar de la Renta, are now including nutria in their collections. *(From an Elizabeth Shogren article, in NPR, December 29, 'Is 'Eco-conscious fur' an oxymoron?')*

[Ed. Comment: The following is not really an invasive species article per se, because in China mitten crabs are native, but let's hope this unusual practice does not expand to other species or other countries; it is certainly an interesting potential pathway. And I'm still trying to imagine how you eat a live crab on the subway…]

Live Crab Vending Machines. Bored with standard vending machine snacks, commuters in China have been offered an unconventional alternative to crisps and fizzy drinks - live crabs. Automated vending machines distributing the crabs have been installed at several underground stations in Nanjing by a local company. The Dazha hairy crab (AKA Chinese mitten crab, *Eriocheir sinensis)*, a popular delicacy in Nanjing, are sold in three sizes - small, medium or large - and range in price from £1.50 to £5.00. They are packed into custom-

fitted plastic boxes and chilled to 5C, leaving them sedated but still very much alive. Customers are offered three free crabs if they happen to receive a dead one. They are selling hundreds each day, and the company plans to expand further; it is now considering trying out the machines in Japan. *(Excerpted from 'Live crab vending machines', Daily Mail Reporter, November 3.) (Thanks to Stephen Phillips)*

Successes & Lights at the End of the Tunnel

Utah Hatchery Overcomes Whirling Disease. The Springville fish hatchery, Utah's oldest, reopened in December after a major remodeling. It had closed after whirling disease *(Myxobolus cerebralis*) was discovered there in 2005. The new facility features an ultraviolet light system to kill the spores that spread whirling disease and covered raceways to prevent birds from introducing contamination. Drums skim off debris, and the fish live in oxygenated water. The point of the $4 million investment is to raise catchable trout, and some other species, to be introduced into urban fisheries along the Wasatch Front. The facility is expected to produce about 120,000 pounds of rainbow trout, or about 500,000 fish, annually. Visitor facilities also were improved, and people can inspect the operation themselves by appointment, beginning in spring. *(From the Thumb, Salt Lake Tribune, December 31)*

New Bait Eradicates Maui Ant Infestation. The Hawaii State Department of Agriculture announced that it has eradicated a rapidly spreading infestation of stinging fire ants (*Wasmannia auropunctata)* on Maui, by using a special experimental ant bait developed at the University of Hawaii at Manoa. The Department credits rapid response and development of innovative pest control for its success. Before the new bait, ground treatments were the only method of controlling the one-sixteenth inch, pale orange ants. Dubbed the 'little fire ants', these South American ants are among the world's worst invasive species. Agriculture officials say the fire ants move quickly, can cause painful stings and large red welts on people, and could blind pets. They were found in October, 2009, infesting half an acre of a Waihee farm. The new bait was used to treat trees and vegetation where the stinging ants nest and develop large colonies. The area was treated monthly, and by last February the

ants were no longer detected at the site or any other area on Maui. Maui residents who suspect they have little fire ants are urged to call the state's toll-free Pest Hotline at 643-PEST (7378). ***(****Excerpted from a Leila Fujimori article 'New bait curtails ant infestation on Maui', Honolulu Star Advertiser, October 22)*

Help for Florida's Battle Against Exotics. This year's cold is claiming more victims. Last winter's frigid temperatures wiped out entire colonies of iguanas in South Florida, and reduced the populations of other exotic reptile species (see Nutshell # 28). The second cold winter in a row has increased the pressure on non-native species. While Florida natives may not appreciate cold weather, there are some benefits: Iguanas have now vanished from many neighborhoods, and more dead Burmese pythons have turned up in the Everglades. A recent search for African rock pythons, which had established in western Miami-Dade County, failed to turn up any. Few experts expect the succession of cold winters to completely eradicate these exotic-pet trade refugees, now so firmly established in the wild. But the iguana, among the most visible of these species, with a length of up to five feet and a fondness for urban neighborhoods, has disappeared from some areas. *(Excerpted from 'Twilight of the Iguana?' by David Fleshler, in the Sun Sentinel, December 27, 2010.)*

Grapevine Moth Victory. California agricultural officials appear to be on top of the European grapevine moth (*Lobesia botrana*), an invasive species that was threatening the state's wine industry. Feeding moth larvae contaminate grape bunches with webbing and fungal infections like bunch rot. The moths were first detected in Napa County in September, 2009, after one grower lost his entire 9-acre vineyard. Searches subsequently confirmed the moths in nine other counties, including Sonoma and Monterey. Growers fought back with sticky traps, quarantines and insecticides. Early in the year, each trap caught hundreds of moths; now only a handful of moths are caught. California says $8 million has been spent so far on treatment and fruit removal. To see a short video clip of the moth impacts and eradication progress, go to [http://www.cdfa.ca.gov/phpps/egvm/index.html] *(Excerpted from various sources.)*

New Control for Alfalfa Snout Beetle: Nematodes. More than 13 percent (500,000 acres) of the New York's agricultural land has been infested by alfalfa snout beetle (ASB), *(Otiorhynchus ligustici).* These flightless insects, which can destroy entire fields in one year, now infest 9 NY counties and southeastern Ontario, Canada.

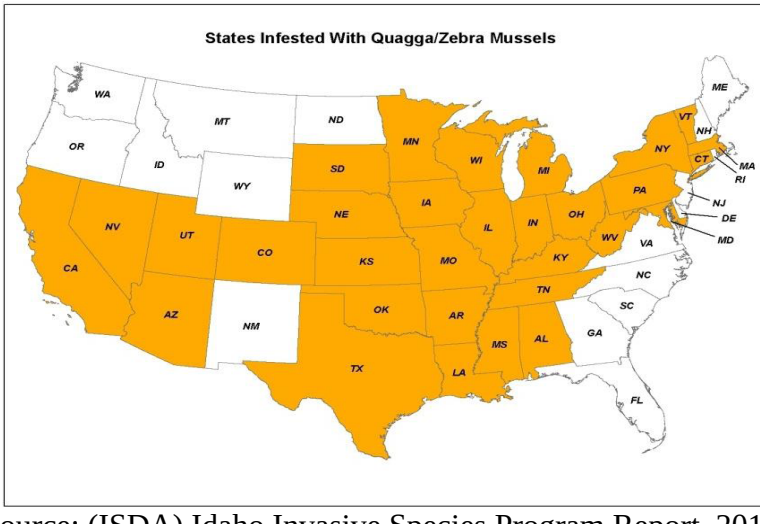
The adult beetle is wingless and has a tough gray shell. It migrates by walking, often appearing as large dark moving masses along rural roadsides, but it also spreads by traveling on trucks and farm equipment. All the beetles in the population are females, and a single individual can start a new infestation. It has a number of hosts, including alfalfa, clover, Queen Anne's lace and curly dock. ASB is most obvious from mid-September to November 1, in areas where plants are yellowed and missing leaves. The hungry large white grubs with brownish heads are more easily seen in the fall. Larvae hibernate below the surface for 16 months and emerge as adults the following spring-summer.

Cornell research has shown that treating fields with native nematodes that feed on the ASB larvae can drastically diminish ASB populations. "The nematodes naturally recycle within the alfalfa snout beetle host, persist in the soil, and effectively self-disperse, creating the opportunity for sweeping and perpetual control across treated fields," says Antonio Testa, a Cornell research support specialist. Farmers could inoculate a 15-25 acre field at a cost of about $75, and inoculate their fields only once to achieve long-term control. "This

eliminates the cost of annual applications of the more costly commercially produced nematodes that persist in the field for less than a single growing season," Testa says. Meanwhile, Cornell plant breeder Don Viands has also developed ASB-resistant alfalfa varieties, and seed companies participating with the northern New York research project now have alfalfa with some ASB-resistance in commercial seed production for potential use. Cornell researchers have produced a 30-page manual, *Rearing and Applying Nematodes to Control Alfalfa Snout Beetle*, which is available online at [http://www.nnyagdev.org] (look under Field Crops for the Alfalfa section.) For additional information, contact Testa at <at28@cornell.edu>. *(Excerpted from 'Inexpensive, on-farm method controls invasive beetle', by Kara Dunn, in The Cutting Edge, November 29, 2010.)*

Western Zebra/Quagga Mussel Invasion (Updates)

We generally focus this section of *Nutshell* on Western activity, but seeing the national picture helps put the mussel problem in perspective. Sometimes a "picture is worth a thousand words". (Infested area in yellow [*Editor's Note: North Dakota should also be colored]*)!



Source: (ISDA) Idaho Invasive Species Program Report, 2010

Zebra Mussels in Montana?? Have zebra or quagga mussels reached Flathead Lake, a 200-square-mile lake in Montana? Montana Fish, Wildlife and Parks (FWP) announced that four of 17 plankton samples collected this summer contained microscopic larvae that had characteristics constant with zebra or quagga mussels. The samples were delivered to FWP in late September, and the samples were processed by the FWP lab and were sent to three out-of-state laboratories for testing. Two independent Midwestern labs reported back that the larvae in the samples have "characteristics consistent with zebra and quagga mussels, but they were smaller than you would expect". In contrast, results from an Oregon lab found no signs of mussel contamination. Samples were also submitted to two independent labs for DNA testing. The results came back negative, but with the caveat that uncertainty was high because of quality of the samples and preservation. In December USGS divers visually searched for mussels at multiple sites, including where the samples had been collected, and found no evidence of mussel colonization. Although the results are suspicious enough for people to be concerned, they are not enough to trigger the CRB rapid response plan. FWP intends to continue heightened surveillance in Flathead Lake in the 2011 field season. A FWP press release can be found at http://fwp.mt.gov/news/newsReleases/fishing/nr_0488.html. For more information, contact the Montana Aquatic Invasive Species Coordinator, Eileen Ryce, at <eryce@mt.gov>.

New Report: Hauler Outreach Survey. A recently completed report on the commercial watercraft/equipment transport industry, *A Survey of Commercial Watercraft Haulers in the United States*, (Zook and Phillips, November 2010), is now available. The survey was based on previous commercial hauler

outreach work done in 2003, and an on-line survey completed June 15, 2010. Some findings from the survey included:

- Nearly half the haulers surveyed reported transporting over 50 watercraft per year.
- The average hauler transported within 2.8 regions (20+ states) per year
- 1 in 5 haulers reported operating in zebra/quagga mussel-infested waters
- 87% were very or somewhat aware of the quagga/zebra mussel issue
- 48% were very aware of state, federal and local regulations in states where they haul
- 53% require all watercraft to be power washed or steam cleaned
- 40% require all water to be drained from the watercraft
- 10% require some prescribed drying time
- 63% said they would favor development of industry standards
- 41% said they would support a "green hauler" program, and
- 26% were willing to participate in a collaborative effort to set standards.

Agency partners hope to begin implementing the recommendations from this report as funding becomes available. To download the report, go to [http://www.aquaticnuisance.org/wit/reports].

New Seaplane and Boat Decontamination Videos (Update). Seaplanes can be a significant vector in spreading aquatic invasive species. A new education and training video for seaplane pilots and water resource managers has been produced in conjunction with the national Seaplane Pilots Association (SPA), and is now available in DVD format. The final version of the new seaplane video is now available on YouTube and DVD. See it at: [http://www.youtube.com/watch?v=luDZptFsQDk]. This video was filmed in Washington State, and takes the viewer through a step-by-step process for inspecting and cleaning seaplanes to avoid spreading ANS when moving between waterbodies. It is also available on DVD. The DVD version also includes a 27 minute introduction which is a slight modification of Part 1 of the original DMM video to include some discussion and pictures of seaplanes and aquatic vegetation.

In addition, a new education and training video to replace the very successful and vastly popular (over 6,000 copies distributed) *Don't Move a Mussel* video, is also underway. The new video will include additional and updated material on the impact of mussels, and new sequences on watercraft interception protocols and standards, including large commercially hauled watercraft and seaplanes. PSMFC has now selected a contractor, and filming should begin in late February, with a projected release date of June 1, 2011. Both videos will be available upon request in DVD format and on-line, at no cost. To order copies of either DVD, contact Stephen Phillips at <stephen_phillips@psmfc.org> or Bill Zook, at <bjzook2@msn.com>.)

Updating the Recommended Protocols and Standards. The *Uniform Minimum Protocols and Standards for Watercraft Interception Programs in the Western United States* (UMPS) is currently being updated. Funded by money allocated to implement the Quagga-Zebra Mussel Action Plan (QZAP), the updated document will include new information generated by recently completed research on the efficacy of the standards, and two additional years of field application by watercraft interception programs throughout the west. The update is expected to be available by May 1, 2011. See the current protocols at [http://www.aquaticnuisance.org/wordpress/wp-content/uploads/2010/01/Recommended-Protocols-and-Standards-for-Watercraft-Interception-Programs-for-Dreissenid-Mussels-in-the-Western-United-States-September-8.pdf]. For more information, contact Bill Zook at <bjzook2@msn.com>.

More WIT Training Offered. More courses in Advanced Watercraft Inspection and Decontamination Training (WIT) for quagga/zebra mussels will be offered on February 15-16, March 22-23 and May 3-4 at Lake Mead. These two-day, intensive, hands-on training courses are provided free of charge, but attendees are responsible for their own travel expenses. Class size is restricted to 10-12 people, and registration is on a first-

come first-served basis. The course is designed for individuals who are currently or soon to become active in setting-up or implementing WIT programs for their respective agencies, organizations or businesses. The course focuses on actual inspections of various watercraft types and the use of several decontamination systems. The course is certified by 100th Meridian Initiative member agencies, and successful graduates will also be qualified as incident responders and Level One Trainers. If you are interested in attending or sending someone to this class, contact Bill Zook as soon as possible, at <Bjzook2@msn.com>.

2010 Utah Waterbody Status Updates. In late May, 2010, Sand Hollow Reservoir, UT, was classified as "infested" due to the find of a single, live adult (20 mm) quagga mussel on the underwater side of a boat dock, (which was removed and euthanized). Despite intense searches, which included substrate samplers, shoreline inspections, scuba dives and plankton tow assessment via microscopy and PCR, no further evidence of adults or veligers was found in 2010. Likewise, plankton tows of Quail Creek Reservoir (connected through a pipe to Sand Hollow), Red Fleet Reservoir and Electric Lake were all assessed monthly in 2010 for the presence of *Dreissena,* using microscopy and PCR; all were negative for adults and veligers.

In 2008, Red Fleet Reservoir and Electric Lake both showed evidence of dreissena veligers, but despite monthly plankton and PCR assessments, no other evidence was found in 2009 or 2010. If this situation continues through 2011, UDWR will begin to assess a re-classification of these waterbodies from "detected" to "inconclusive." Then, if samples continue to be negative in 2012 & 2013, these waterbodies will likely be reclassified as "negative." Huntington North Reservoir, Joe's Valley Reservoir, Midview Reservoir (Ute Tribe) and Pelican Lake were all classified as "inconclusive" in 2008, but no further *Dreissena* evidence was found in 2009 or 2010. If this situation continues into mid 2011, UDWR will begin to assess a re-classification from "inconclusive" to "negative." Such a process has already occurred for Lake Powell, which was classified as "inconclusive" in 2007, due to conflicting microscopy and PCR results. Lake Powell showed no further evidence of *Dreissena* via plankton tow microscopy in 2008, 2009 or 2010, and was re-classified as "negative" in mid summer 2010. Results for individual waters from 2007 thru 2010 are available at [http://wildlife.utah.gov/mussels/waters.php]. For more information on status of Utah waterbodies, contact Larry Dalton, at <larrydalton@utah.gov>.

Idaho Mussel Cost Estimate. The Idaho Invasive Species Program has produced a report to their legislature *(Idaho Invasive Species Program Summary, 2010*), which is a good summary of the state's efforts at zebra/quagga mussel exclusion. Mussels have not yet reached Idaho, but for those who wonder if the exclusion effort is worth it, a table in the report estimates annual costs to the state, should mussels become established there. Costs are in 1997 dollars and are considered conservative, but the bottom line exceeds $94 million!

The breakdown:

Facility	Number	Estimated Cost Per Unit	Estimated State-Wide Cost
Hydro Power	26	$1,817,000.00	$47,242,000.00
Other Dams	86	$1,730.00	$148,700.00
Drinking Water	100	$42,870.00	$4,287,000.00
Golf Courses	114	$150.00	$17,100.00
Boat Facilities	380	$750.00	$285,000.00
Hatcheries/Aquaculture	194	$5,860.00	$1,136,800.00

Boat Maintenance	90,000	$265.00	$23,850,000.00
Angler Days (4% reduction)	2,917,927	$150.00	$17,507,500.00
Irrigation POD	56,175		
TOTAL ESTIMATE			**$94,474,000.00**

The report is not yet online, but for more information on how to obtain a copy, contact Amy Ferriter <amy.ferriter@agri.idaho.gov>. *(Thanks to Amy Ferriter)*

New Publication: Underwater Search Protocols. The *Procedures for Conducting Underwater Searches for Invasive Mussels (Dreissena sp.)*, by Noah Adams, is now available from the USGS. The manual discusses the mussels themselves, dive and search practices, sample collection, decontamination of equipment, and other relevant topics. Thanks to additional funding from the USFWS, an associated dive training program is also being planned for 2011. As many as three upcoming dive training events will be held throughout the region. Download the report at: [http://pubs.usgs.gov/of/2010/1308/pdf/ofr20101308.pdf]

Quagga/Zebra Mussel Rapid Response Exercise #4. Twenty four state, federal and tribal participants attended the fourth zebra mussel response exercise held in Spokane, WA, on September 21-22. The mock eradication exercise responded to a hypothetical find of dreissenid adults (no veligers) at Two Rivers Marina in Lake Roosevelt. On the morning of September 21, participants reviewed the "Columbia River Basin Interagency Invasive Species Response Plan: Zebra Mussels and Other *Dreissenid* Species" and the Incident Command System Planning Process. Participants then divided into two groups, the Incident Management Team (IMT), and the MAC (multi-agency coordination) group and Support Staff. The IMT's objective was to develop the Incident Action Plan for the first Operational Period of response to the infestation, while the Coordination and Support Staff focused on the treatment options. The exercise concluded on day 2 with the presentation to the MAC group, a hot-wash, and closeout. See the after- action report at [http://www.100thmeridian.org/Columbia_RBT.asp]

The attendees also discussed Clean Water Act and Endangered Species Act (ESA) permitting for mussel eradications. USFWS intends to use the ESA emergency consultation provision if the response plan is activated, but NOAA staff have indicated that conducting an emergency consultation is less appropriate given the existing opportunity to conduct an "early consultation" process that proactively engages response agencies and develops best management practices prior to an actual detection of the mussels in the Columbia River Basin. Therefore, it is very important that the region's natural resource agencies develop advance documentation on treatment alternatives that would be the base for environmental compliance documents in any permitting process. The next response exercise is tentatively scheduled for Fall 2011, and may involve a cross-border scenario with British Columbia.

Columbia River Basin Rapid Response Plan Revisions. The Response Plan signatory agencies are in the process of reviewing draft proposed changes to three documents: a set of proposed amendments (edits to ESA verbiage in Appendix E, and a new provision addressing how to stand-down an incident), an amendment approval form (intended to relieve repeated signatures at the top executive level), and an amendment log. A draft Cooperator Form was also discussed, and will be distributed in the near future as a secondary mechanism for additional agencies to endorse the Plan.

Foul-Release Coatings Experiment (Update). The Bonneville Power Administration (BPA) has provided funding to Portland State University (PSU) to conduct an experiment to evaluate the effective service life of three foul-release coatings. After immersing coated panels in the Columbia River for 36 months, the panels will be compared to coatings currently used by the US Army Corps of Engineers (USACE) to protect immersed

concrete and steel. The effective service life will be determined by evaluating resistance of the coatings to quagga mussel attachment and to damage caused by field deployment. Current efforts are focused on identifying a suitable deployment location for the coated panels. The location must provide adequate water flow and exposure to field conditions typical of Columbia River hydropower facilities, allow for biannual access for panel inspections, and limit the impact to existing operations, maintenance, and fish passage. Current efforts also involve permitting and evaluating different panel and support frame configurations for new study locations. Future near-term activities will include gaining access to USACE facilities, preparing panel and support frame field deployment, and the initial panel evaluations. Contact Steve Wells (PSU) <sww@pdx.edu> for more information.

Pacific Northwest 2010 Boat Inspection Results. In 2010, Idaho inspected more than 44,000 boats and intercepted eight with dreissenid mussels. ID also collected 570 water samples for dreissenid mussels (in addition to substrate samplers). All inspection stations are now closed for the season. Washington intercepted six mussel-infested boats in 2010, most commercially hauled boats. When the ID inspection stations are closed, WA finds more infested boats, because they were not stopped in ID. Boats are not required to stop in Oregon, but the 2010 OR inspection program estimated a 32% compliance rate for boaters stopping at inspection sites. Five decontaminations were conducted, and no mussels were found. Montana has three separate programs with the ability to inspect boats, and conducted 3,000 boat inspections in 2010, with no mussels found. More than 600 sites were also monitored for mussels in 2010. *(From various state reports, October Columbia River Basin Team 100th Meridian Initiative meeting).*

PSU Quagga Survival Study (Update). The quagga survival study underway at Lake Mead, using Columbia Basin Water, is showing progress. Researcher Brian Adair is using a commercial shellfish diet to feed test mussels, and results show that calcium content is a good predictor of survival; higher calcium levels in the water result in better survival. Willamette River water will be tested next. For more information, contact Mark Sytsma, at <sytsmam@pdx.edu>.

Tahoe Inspection Program Continues to Ward Off Invasive Mussels. Watercraft inspection data and scientific reports continue to indicate that Lake Tahoe's waters remain clear of invasive Quagga and Zebra mussels. In 2010, Tahoe Resource Conservation District (Tahoe RCD) watercraft inspectors performed 8,000 inspections during the boating season, and there were an additional 19,000 launches comprised of watercraft with intact Tahoe-issued inspection seals. 2010 saw a dramatic increase in watercraft decontaminations, which doubled from approximately 600 in 2009 to 1,208 last year. Improved decontamination capacity at off-highway inspection locations allowed inspectors to be more thorough in treating high-risk watercraft. Additional improvements to inspection protocol allowed inspectors to increase prevention efforts by intercepting watercraft arriving from waters known to be infested with invasive mussels. In total, 11 watercraft with invasive species of concern were intercepted and decontaminated. To see the full press release, go to: [http://www.tahoercd.org/uploads/press/2010%20Watercraft%20Inspection%20Data%20Release%2012-14-10.pdf]

SoCal Metropolitan Water District Wins Award. In December, the Association of California Water Agencies (ACWA) presented the Water Replenishment District of Southern California, Padre Dam Municipal Water District and the Metropolitan Water District of Southern California, with the 2010 Theodore Roosevelt Environmental Award. The winner in Category Three (projects over $1 million) was the Metropolitan Water District of Southern California for its Quagga Mussel Control Program. In response to the discovery of quagga mussels in its system, the district developed a pilot program, testing natural lake processes to control mussel colonization. The result is an environmentally sensitive approach that reduces oxygen levels in the lower portion of the lake without threatening water quality or fish or stimulating algae growth. Today, a tool-box approach is used to control the pest's spread. To see the full press release, go to: [http://www.acwa.com/news/awards/water-agencies-recognized-environmental-excellence]

Texas Efforts to Treat Zebra Mussels Have Mixed Success. Two attempts last September and October to chemically treat Sister Grove Creek, Texas, for zebra mussels and to hopefully keep the mussels out of Lake Lavon, had mixed success, said Brian Van Zee, regional director of the Texas Parks and Wildlife Department's Inland Fisheries Division. But, he added, that may be no success at all. Without complete success, Van Zee said, the mussels could still invade the lake and spread to the Trinity River Basin and beyond. To stop the mussels' spread, crews poured potassium chloride into the creek at a specific location in calculated amounts. The chemical inhibits the mussels' ability to breathe. It has been used successfully to treat still bodies of water, but this was the first attempt to use it in a flowing system. The first evaluations of the treatment were positive, but as crews examined more locations, they discovered mussels that survived the treatment. "When you're dealing with a flowing system like that, it's really difficult to say you're getting an equal and even distribution of the chemical you're using throughout the entire stream," Van Zee said. "There's so many facets to a flowing water system like that, it's just very difficult to achieve." The mussels were discovered in Lake Texoma in April 2009. And while Lake Texoma doesn't connect to Sister Grove Creek, which begins east of Van Alstyne and flows into Lake Lavon, a water pipeline used by the North Texas Municipal Water District connects Texoma and the creek. The situation may also get some help from summer weather. The heat and lower water levels have caused the population of mussels in Texoma to drop and may have the same effect in the creek. "Maybe we knocked them back hard enough and far enough to where there's not enough of a population in there for them to effectively reproduce and continue spreading," Van Zee said. "We don't know. Time's going to tell." *(Excerpted from 'Efforts to Treat Zebra Mussels Have Mixed Success', by Jonathan Cannon of the Herald Democrat, January 13, 2011.)*

NDOW Finalizes Fish Stocking Plans For Next Two Years. The Nevada Department of Wildlife (NDOW) recently held its annual fish stocking coordination meeting to finalize stocking numbers for calendar years 2011 and 2012. NDOW operates 3 hatcheries and 1 rearing station. However, since the discovery of quagga mussels in 2007, as well as the unprecedented drought conditions on the Colorado River, NDOW's Lake Mead Hatchery has been closed. NDOW plans to bring the Lake Mead Hatchery back into production in the future remain in effect. Planning and design for a new system to provide cooler water from the deeper waters of Lake Mead, and a filtration system to remove quagga mussels could be completed by 2012 if funding is approved. Pending future funding availability, pipeline construction could begin shortly thereafter. For the full NDOW press release, go to [http://www.ndow.org/about/news/pr/2011/jan/fish_stocking.shtm**]**

New Report - Zebra Mussel Predation in Lake Champlain. A report "*Will fish become Significant Predators of Zebra Mussels in Lake Champlain"* by Mary Watzin et al., (University of VT) examines predation on zebra mussels. When divers from the Lake Champlain Maritime Museum first examined a historic "railroad drawboat" in Bulwagga Bay, near Port Henry, New York in 1999, they noticed large numbers of crushed zebra mussel shells on its deck. Using a remotely operated underwater vehicle and video camera system during the summer of 2000, they witnessed predation by sheepshead and yellow perch on zebra mussels on the wreck. They then began a two-year study to determine which fish species consistently ate zebra mussels, and how widespread predation on zebra mussels might be in Lake Champlain. They also quantified what percent of the major fish predators' diet is comprised of zebra mussels, and they explored whether zebra mussels in Lake Champlain have unique characteristics that facilitate their use as prey by bottom-feeding fishes. They concluded that fish predation on zebra mussels by sheepshead, pumpkinseed, yellow perch, and rock bass regularly occurs at a number of sites throughout Lake Champlain. The large numbers of these species in the lake suggest these fish have the potential to significantly reduce the abundance of zebra mussels over time. *Because the calcium concentration in Lake Champlain water is very low, the zebra mussels in Lake Champlain have very thin shells, which may make them especially vulnerable to predation.* This may explain why they are seeing more predation on zebra mussels in this lake than in other North American locations. The relationship found between temperature, and fish presence and foraging activity, clearly suggests seasonality in the use of the zebra mussel beds. If researchers can characterize the combination of water temperature, bottom habitat structure, water currents, and other factors that influence fish distribution, this may help to estimate the overall impacts of fish predation on zebra mussels in Lake Champlain. *(Heavily excerpted from "Will fish become*

Significant Predators of Zebra Mussels in Lake Champlain", by Mary Watzin et al.) See more information on this study at [http://www.angelfire.com/home/lake/zebrafood.html]

New York State Museum Receives Mussel Grant. In November, the New York State Museum received a $1 million federal grant to conduct a new research project aimed at protecting endangered species of native freshwater mussels from the lethal fouling impacts of invasive zebra mussels. With a grant from the U.S. Environmental Protection Agency (EPA), through its Great Lakes Restoration Initiative, Museum scientists will use their environmentally safe invention – a biopesticide (*Pseudomonas fluorescens)* – to continue their research, with a new emphasis on open water applications. The project will be led by Museum research scientists Daniel Molloy and Denise Mayer. To see the full press release, go to: [http://www.nysm.nysed.gov/press/2010/mussnovten.cfm]

Other West Coast News

GMO Bentgrass Discovered in Oregon. Roundup Ready creeping bentgrass has been found growing in several miles of irrigation canals and on field borders in Eastern Oregon's Malheur County. When a Malheur County resident discovered the grass could not be taken out with Roundup, he alerted Oregon State University to its presence in October. A sample has tested positive for the transgenic gene. Carol Mallory-Smith, an OSU weed scientist, said she found the genetically engineered bentgrass in large canals, laterals, and spreading up from canals into fields. She speculated the plants spread from a seed field near Parma, ID planted to the grass in 2005, and just across the river from Malheur County. Roundup Ready creeping bentgrass is being developed by Scotts Company for the golf-course market. The grass has been tied up in the federal deregulation process since 2003, when Scotts and Monsanto Co. first petitioned the USDA Animal and Plant Health Inspection Service to deregulate the crop. *(Excerpted heavily from a Capital Press article by Mitch Lies, November 9, 2010.)* [http://www.capitalpress.com/oregon/ml-gmo-bentgrass-111210].

Oregon Invasive Species Blogs. A new OR invasive species blog comes out approximately weekly. See Dan Hilburn's blogs at [www.oregoninvasivespecies.blogspot.com].

Oregon to host *Arundo donax*/Biomass Meeting. Portland General Electric's has floated a proposal to use Giant Cane (*Arundo donax)* as a potential biomass substitute for coal at its Boardman, Oregon power plant. To further discuss this issue, The Oregon Invasive Species Council and the Oregon State Weed Board are hosting a panel discussion on Giant Cane February 23, 2011, from 8:30am to 11:00am at the Oregon Department of Fish and Wildlife Commission meeting room at 3406 Cherry Avenue NE, in Salem. The panel consists of a variety of experts, with both differing backgrounds and perspectives. For further information contact OISC Coordinator Lisa DeBruyckere at <lisad@createstrat.com>.

Washington AIS Bill Introduced. On January 12, Senate Bill 5061 was introduced into the Washington State legislature. The purpose of the bill is to repeal the sunset date on resident watercraft registration surcharges that provide funding for the Washington Department of Fish and Wildlife's (WDFW) AIS Prevention and Enforcement, and the Washington Department of Ecology's Freshwater Aquatic Algae Control programs. The request keeps the AIS boater fee funding at its current level. Fees help pay for WDFW's early detection monitoring, mandatory check stations, and rapid response to infested watercraft, and for Ecology's testing and funds to control toxic algae blooms. If the bill does not receive approval, the AIS Enforcement & Prevention programs would no longer be funded after July 1, 2012. For AIS information, contact Allen Pleus <Allen.Pleus@dfw.wa.gov>; for Aquatic Algae information, contact Kathy Hamel <Kham@ecy.wa.gov>.

Asian Carp Pilot Sampling Program. Paul Heimowitz is coordinating with the Asian carp eDNA research team at Notre Dame, The Nature Conservancy, and the USFWS Midwest Region to explore development of a

pilot silver and bighead carp early detection program (eDNA) in the Columbia River Basin. This may be done in cooperation with dreissenid early detection research/monitoring by BOR, USGS, states, and other Western partners. A 2008 USFWS Asian carp risk evaluation showed that the Columbia Basin is vulnerable to invasion by Asian carp. For more information, contact Paul at <paul_heimowitz@fws.gov>.

Oregon Nutria Project (Update). Portland State University PhD student Trevor Sheffels is using VHF telemetry to assess the influence of human feeding on nutria activity and movement patterns. He will also be comparing the efficacy of a new nutria multiple-capture trap vs. a standard live cage trap on Sauvie Island, OR. Other research includes the detection of Salmonella bacteria in nutria feces and the development of current and future nutria habitat suitability models. Sheffels also recently participated in the filming of a one hour nutria documentary to discuss the Oregon nutria problem and highlight current research. The documentary is scheduled to air on the National Geographic Channel in the coming months. Federal legislation was proposed in the last congress that included $1 million per year over five years, for Oregon and Washington nutria research and management. For additional information, contact Trevor at <sheffels@pdx.edu>.

Oregon ODA Phases Out Exotic Animal Permits. As of January 1, 2011, the Oregon Department of Agriculture (ODA) no longer issues new permits for exotic animals in OR, and it is now illegal for anyone to own a listed exotic animal without a permit. The sunset of Oregon's exotic animal permitting will eventually remove all responsibility for permitting animals from ODA. "As long as the currently permitted animal is alive, the owners will be able to have it legally," says State Veterinarian Dr. Don Hansen. "Once the animal dies or the owners are obliged to sell it, that's the end of the permit. When all the existing permitted animals die or leave the state, no more permits will be issued for listed animals… which was the intention of the Legislature when they amended the law." Oregon's exotic animal law currently requires a permit for felines not indigenous to OR (except for domestic cats); non-wolf canines not indigenous to OR (except for domestic dogs); non-human primates; bears (except the black bear); and members of the crocodile family. Currently ODA has issued 49 permits for 88 exotic animals: 24 for exotic felines (includes servals, caracals, an ocelot, lynx, margay, and a Geoffray cat); 15 for non-human primates (includes capuchins, lemurs, Rhesus macaques, tamarins, a squirrel monkey, chimpanzee, vervet, cotton top, and African green; 3 for exotic canines (includes Fennec fox and silver red fox). Under the newly amended law, there are three permits for alligators, and no permits issued for bears. Most states do not issue permits for exotic animals, and exotics are either unregulated or specifically prohibited. The law is designed to protect the public against health and safety risks posed to the community by exotic animals, but it will also likely aid in preventing unwitting establishment of wild populations which could become invasive. For more information, contact Dr. Don Hansen at (503) 986-4680. *(Thanks to Bruce Pokarney, ODA)*

Washington Permits Webpage. WA guidance on EPA's Vessel General Permit and vessels in general is available at: [http://www.ecy.wa.gov/programs/wq/permits/VGP/index.html]. The WA whole effluent toxicity (WET) webpage is found at: [http://www.ecy.wa.gov/programs/wq/wet]. *(Thanks to Randy Marshall)*

Puget Sound Tunicates (Update). Based on a citizen report, WDFW confirmed the presence of the solitary tunicate *Styela clava* at Sandy Point, on the northern spit of Lummi Bay. This is a new location in Puget Sound. A cursory investigation of docks (not a dive survey) found densities similar to those in Blaine and Pleasant

Harbor. *Styela clava* was first discovered at Blaine marina, in Drayton Harbor in 1998. The native range of *S. clava* probably includes Russia, Japan, Korea, and northern China. It has spread worldwide in temperate waters, including but not limited to the UK, the east and west coasts of Canada and the U.S., New Zealand, and Australia. The most likely transport pathways include watercraft hulls and sea chests (water intake ports). Based on strategies currently employed for Pleasant Harbor and Blaine, WDFW plans to have divers remove tunicates attached to boat hulls in the spring, prior to spawning. WDFW will also convene a TRAC (Tunicate Response Advisory Committee) to discuss management options. For more information contact <Larry.LeClair@dfw.wa.gov>.

Oregon Tunicate Invasion(s) (update). The colonial tunicate *Didemnum vexillum* was discovered in Winchester Bay, OR, in February 2010, in Charleston, OR, in April 2010, and then in Sitka, AK , in June 2010. The Winchester Bay find has been complicated by the fact that the infested area includes an oyster farm, and the farm is for sale. Further complicating the infestation, there is no precedent for controlling tunicates on turbulent rock jetties. Agency staff have been working with the oyster farm on eradication options. Subsequently, a barge was discovered in Yaquina Bay, infested with both *Didemnum* and *Molgula sp*. It was wrapped in plastic. While there was a high kill rate, not everything was killed, but there were a number of lessons learned from these incidents:

- Early detection is credited to a strong citizen science effort
- OR can implement an adaptive management control and education program
- Someone has to take leadership
- A statewide marine AIS invertebrate management plan is needed
- We know less than we should about invasion biology, fate and impacts from tunicates
- If early detection and rapid response is to succeed, we must avoid the urge to claim "it is here, the sky is falling, so we can't do much "
- The incidents led to monitoring and treatment of ship hulls under construction at the new NOAA Pacific Fleet HQ in Newport, OR. *(Thanks to Sam Chan).*

Imported Firewood as a Pathway (Update). The invasive species councils in Oregon, Washington, and Idaho have issued a joint press release warning people about the dangers of transporting firewood. All three states have websites with information about firewood, and their state Departments of Agriculture also have information about best management practices or rules and regulations relating to firewood. Additional information on firewood is also available at [www.dontmovefirewood.org]. The newly revised (January 5) Oregon Q & A flyer on firewood '*Moving Firewood Can Spread Invasive Species"* is now available. For a copy, contact Lisa DeBruyckere, at <Lisad@createstrat.com>.

National Mudsnail Conference. University of Idaho will host the 6th National New Zealand Mudsnail (NZMS) Conference on March 15-17, 2011, in Moscow, ID. Topics include: revitalizing the NZMS National Management and Control Plan; data sharing and access; standards for monitoring; early detection via molecular techniques; field gear disinfection; hatchery risk assessment, decontamination, control, and certification;

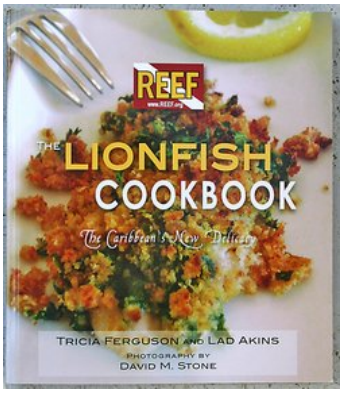
challenges of biological control; rapid response and long-term management in open water systems; models of optimal habitat and risk; impacts: do we still care about NZMS? Abstract titles are due January 14, and registration, hotel reservations, and abstracts are due February 14. The conference website is [http://www.cnr.uidaho.edu/nzms/].

OR Felt-sole Ban Proposed. The Oregon Legislature this session will consider a bill to phase out the felt soles on wading shoes, which can spread fish-killing viruses such as whirling disease, "rock snot" and other organisms. House Bill 2338 would prohibit sale and use of felt-soled waders and felt-soled boots in Oregon, and beginning January 1, 2015). Go to the Oregon State Legislature's webpage to track this bill [http://www.leg.state.or.us/]

OR Ballast Water Bill Introduced: Oregon Senate Bill 81 requires the Department of Environmental Quality to collect fees for trips by vessels regulated under state ballast water statutes. The bill establishes a Ballast Water Fund and requires that Oregon DEQ collect a fee of $70 for each trip by vessels regulated under ORS 783.625 to 783.640. Go to the Oregon State Legislature's webpage to track this bill: [http://www.leg.state.or.us/]

Elsewhere Around the U.S.

Another Cookbook. *The Lionfish Cookbook*, a 125-page book from The Reef Environmental Education Foundation, based in Key Largo FL, features 45 lionfish recipes largely created by Tricia Ferguson, a professional chef living in the Bahamas, where lionfish have been a problem for some time. The first run of the copies has been printed, and you can order a copy for $16.95 through REEF's website: [www.REEF.org]. Photos by noted wildlife photographer David Stone illustrate the cookbook, and proceeds benefit marine-conservation efforts by REEF and others. *(Excerpt from a Kevin Wadlow article, December 25, in keysnet.com)*



[Ed Comment: During the holidays, my grandmotherly instincts naturally turn to food, so my apologies for the large number of invasive-related food articles in this issue (although my mailbox shows a surprising number of readers apparently collect invasive recipes!) For those of you interested in this topic, also keep an eye out for another upcoming book "Eating Aliens," by Jackson Landers, (and a pilot TV show as well).

iPhone App Helps Identify Reptiles in South Florida. The recently released IveGot1 app is a field guide to help identify some of the reptiles in South Florida. The app was created by researchers at the University of Georgia's Center for Invasive Species and Ecosystem Health. For now, the app provides information on 15 reptiles in South Florida, but they hope to add more species and regularly update the list. *(Excerpted from an October 16, 2010, Palm Beach Post article by Christine Stapleton.) (Thanks to Kevin Aitkin)*

Biofuel Potential: Russian Olive and Saltcedar. Converting invasive plants to fuel is an intriguing idea that's being investigated by partners in a six-state regional project headed by the Montana State University Center for

Invasive Plant Management (CIPM) and the Missouri River Watershed Coalition, said project director Liz Galli-Noble, CIPM director. The partners were recently awarded $1 million from the NRCS Conservation Innovation Grant program, to develop innovative ideas for managing invasive plants and to work with public and private partners in MT, ND, SD, WY, CO and NE. Invasive plant prevention and control are crucial management issues in the Missouri River Watershed; dense invasive plant infestations choke river systems; restrict access for irrigation, wildlife and recreation; reduce water quality and quantity; and degrade or eliminate habitat for wildlife and livestock. Turning the plants into fuel could remove them and make some money at the same time. The six states in the upper Missouri watershed contain hundreds of thousands of tons of invasive plant biomass, and according to weed experts throughout the region, Russian olive (*Elaeagnus angustifolia*) and salt-cedar (*Tamarix spp*.) alone could supply biomass far into the future. More than a million acres in the western US are infested with Russian olive and saltcedar alone, and "It's a huge supply of currently unwanted and untapped biomass," said Galli-Noble. *(Excerpted from an October 6, 2010, MSU News Service article by Evelyn Boswell.)* To read the entire article, go to: [http://www.montana.edu/cpa/news/nwview.php?article=8903].

Midwestern Carp Problems

[Ed. Comment: Carp are in the News just about as much as zebra mussels these days, but you have to admit, they are much more interesting creatures! And don't they look absolutely joyful here?]

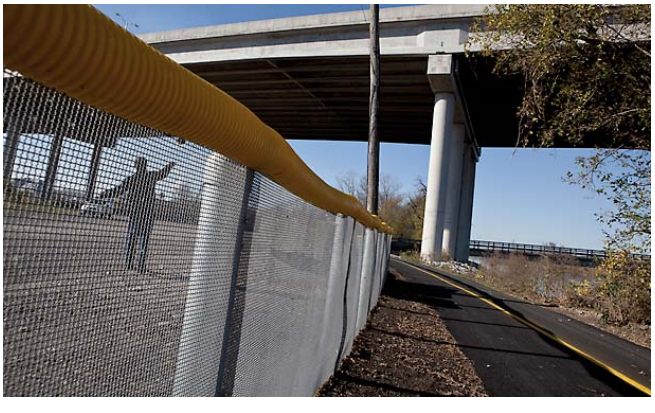
Carp Removal - Sell 'Em Back to China. While others work feverishly to block Asian carp from getting into the Great Lakes, Big River Fish Corporation of Pike County, IL, has recently secured a $2 million grant from the Illinois Department of Commerce and Economic Opportunity to expand its harvesting operations, and they have now signed a contract with Beijing Zhuochen Animal Husbandry Co., Ltd., to ship 30 million pounds of the fish to China, (where it originally came from) and where it's considered a delicacy. Big River Fish says

they are the Country's largest purchaser of Asian carp, and they rely on more than 90 commercial fishermen to ensure a supply of fresh catch. They are able to ship 40,000-pound containers of fresh frozen carp at a time. The Ross Harano, Big River Fish's director of international marketing, markets it as 'a wild Mississippi River fish that has so much energy it dances off the water'. The Chinese are also excited by the promise of river-raised fish. When a Beijing representative visited Big River Fish earlier this year, after he was served fresh-cooked Asian carp, he signed a memo of understanding on the spot. Big River Fish plans to use the $2 million grant and $1.5 million of its own funding to move into a larger facility, and hopes to employ up to 61 people in its Asian carp export business. The plan is among a growing number of business initiatives in IL that look to create a market for the fish. Fifty miles downstream, in Grafton, IL, a group of local businessmen plans to build their own fish processing plant, to cater to the U.S. market. They have enlisted the aid of celebrity chef Philippe Parola (famed for his nutria dishes) to help market the fish in the U.S. Businessman Oliver Ready, a member of

Grafton Summit Enterprises, said the group's fish processing plant would employ 60 people and put 10 more boats on the Mississippi and Illinois rivers. *(Excerpted from 'Illinois company receives grant to export Asian carp to China', by Chris young, October 24, in the State Journal register, and a similar article in The Telegraph.)*

Carp Remedy? - Ecological Separation Study. Asian carp have been migrating northward from the Mississippi and Illinois rivers and threaten to enter Lake Michigan via man-made waterways in the Chicago area. A key line of defense is an electrical dispersal barrier system operated by the Army Corps of Engineers on the Chicago Sanitary and Ship Canal, but in early 2010, new DNA monitoring techniques detected evidence of Asian carp beyond the dispersal barrier. And in June, a live Asian carp was captured in Lake Calumet. Many observers in the Great Lakes region believe that a long-term and permanent solution is needed, and that this must entail separating the Great Lakes and Mississippi River watersheds, beginning in the Chicago area. Separation would avoid continued reliance on control measures that are likely to fail, while at the same time accommodating the substantial benefits currently provided by the Chicago Area Waterway System (CAWS). Ecological separation would impact a complex system of rivers, canals and navigation structures used for commercial and recreational boating, wastewater management, flood control and emergency response. Achieving eco-separation would likely require modifying existing water infrastructure or building physical barriers to stop the flow of water while maintaining the system's benefits.

Carp Control- a New Fence. The latest weapon in the war on Asian carp is a 13-mile concrete and steel mesh fence designed to keep the carp from traversing the narrow split between the Des Plaines River and the Chicago Sanitary and Ship Canal during high flood events. The two rivers run parallel through the south suburbs,


(Zbigniew Bzdak/ Chicago Tribune)

and the distance between the two is only a couple of hundred feet, in some low-lying areas that are prone to flooding. The mesh fence is located above the electrical barriers in place further down-river, and it runs along the Centennial biking trail between Romeoville and Willow Springs. It is only three-feet high in some areas, but rises as high as eight feet in areas where flooding is deeper. The $4.5 million project, funded by the federal Great Lakes Restoration Fund, was fast-tracked by state, county and city officials and completed in just about a year. Though the fence may look simple, the mesh openings are designed to block passage for all but the smallest fish eggs and water. John Goss, an Indiana wildlife expert who oversees the national effort to prevent the advancement of Asian carp into the Great Lakes, said. "It was obvious with floods in the last couple of years that there are several points around the Great Lakes where flood waters could possibly allow Asian carp to move into the Great Lakes. That is the focus of this project and in the next few months, as we look across the other states for other potential connections like this." *(Excerpted from an article by Joel Hood, Chicago Breaking News Center, October 29, 2010)*

Currently eco-separation is a concept but not a readily conceivable reality. If done right, eco-separation will be accomplished in a way that improves commercial transportation and water quality, and ensures that the flood control, tourism and recreational benefits currently provided by the CAWS are accommodated and enhanced.

To address this challenge, the Great Lakes Commission and the Great Lakes and St. Lawrence Cities Initiative (Cities Initiative) are leading a project to develop and evaluate options for ecologically separating the Mississippi River and Great Lakes watersheds in the CAWS. The project will evaluate potential options for eco-separation, including their costs, benefits and impacts. These options should prevent the transfer of aquatic invasive species while also maintaining, if not improving, other aspects of the system, including transportation of goods and people, water quality (*Excerpted from the Project Fact Sheet, at* [http://www.glc.org/ans/pdf/Chicago%20Waterway%20Study%20Project%20Factsheet_Dec%2016.pdf] *and 'Envisioning a Chicago Waterway System for the 21st Century', Great Lakes Commission.)*

Carp Control - Pheromone Research. In groundbreaking research, Columbia, Missouri based scientists are looking at ways to use carp alarm pheromones, attraction pheromones, or commercial bait scents, to control the movement of carp populations that have taken over many Midwest waterways. Research now under way by Robin Calfee and Ed Little at the U.S. Geological Survey's Columbia Environmental Research Center (CERC) laboratories might hold the key to preventing the carp from spreading farther. "The idea would be to keep them away from something like the entrance to the Great Lakes," said Duane Chapman, a USGS research fish biologist. "Also, we have very few accessible backwaters in the Missouri River, so we could use it to keep fish out of backwaters where juveniles would grow."

The researchers have evaluated the effectiveness of using alarm pheromones or "schreckstoff" to control Asian carp. In experiments, Calfee has taken a live carp and made incisions with a scalpel to simulate the attack of a predator. Then she lets the fish sit in a tub of water for a short time, extracts the water, and releases it into a carp tank. She said the response is almost immediate: other carp exhibit heightened swimming in a school formation, and attempt to quickly escape. Calfee said once a fish is attacked, the cells in the epidermis are broken and release these alarm cues, that signal the rest of the school that there is a predator, and they should swim away. Calfee and Little also are working with sex pheromones and with commercially available baits in flavors such as fruit, Irish cream, squid, and liver to determine what attracts carp best. The team will also collaborate with Peter Sorensen of the University of Minnesota, who has already identified and documented 260 chemical substances in the pheromones of the common carp, and they will monitor which pheromones produce the greatest response. "Hopefully, we'll come up with a magic cocktail," Little said. *(Excerpted from 'Fish give biologists a challenge', Columbia Daily Tribune, by Reach T.J. Greaney, October 25)*

Carp eDNA (Update). Scientists, whose genetics-based research became a lightning rod in the debate over protecting the Great Lakes from Asian carp, say at least some of the carp have gotten beyond an electric barrier meant to block their path to Lake Michigan. In a paper released January 4, the four-member team reports Asian carp DNA was detected in 58 water samples taken over nearly a year, from Chicago-area rivers and canals beyond the barrier. They caution that while the findings suggest the presence of live bighead (*Hypophthalmichthys nobilis)* and silver carp (*H. molitrix)*, it's unclear how many were in the waterways, because individual fish could be responsible for multiple positive hits. Still, the researchers argue that the "environmental DNA," or "eDNA," has proven a more effective means of detecting Asian carp than conventional methods such as electroshocking and netting. They predict it will become a valuable tool in efforts to prevent exotic species invasions and preserve species that are threatened or endangered. The discovery of Asian carp DNA by Lodge and colleagues in 2009 has been at the center of a legal dispute over whether to close shipping locks on Chicago waterways that could serve as doorways to Lake Michigan for the unwanted fish. Federal officials contend the electric barrier about 25 miles south of Lake Michigan is thwarting the carp's advance, but five states have sued in federal court to close the locks, a move resisted by barge operators and businesses that rely on cargo shipping in the Chicago area. The U.S. Supreme Court and U.S. District Judge Robert Dow last year denied requests to close the locks. *(Heavily excerpted from 'Scientists admit mistakes controlling Asian carp', in the Observer Reporter, January 9).*

Lacey Act Amended to Include Asian Carp. On December 14, President Obama signed the *Asian Carp Prevention and Control Act* (S. 1421) into law. This law amends the Lacey Act to add bighead carp

(*Hypophthalmichthys nobilis)* to the list of injurious species prohibited from being shipped or imported into the United States. Silver carp (*H. molitrix)* are already on the banned list. For more information about efforts to prevent Asian Carp from establishing a self-sustaining population in the Great Lakes, see [www.asiancarp.org].

Decontamination Protocols for Chytrid and Ranaviral Disease. The chitrid fungus is affecting amphibians worldwide. A new article *Minimising [sic] exposure of amphibians to pathogens during field studies,* by Australian authors Andrea Phillott et al., will be published online January 27, in the Journal *Diseases of Aquatic organisms*. An excerpt of the abstract from the preprint article: Many of the recent global amphibian mass mortalities, declines and extinctions have been attributed to the emerging infectious disease chytridiomycosis. There have been mass mortalities due to ranaviral disease but no major declines or extinctions. Controlling the transmission and spread of disease is of utmost importance, especially where there is the potential for human involvement. Authors reviewed current hygiene guidelines for working with wild frogs, identified potential flaws, and recommended those most suitable and effective for the field environment. Their within-site hygiene measures aim to reduce the risk of transmission among individuals. These measures encompass the capture, handling and holding of amphibians, skin disinfection before and after invasive procedures, marking frogs, sealing open wounds and treatment of accessory equipment. Their between-site hygiene measures aim to mitigate the risk of pathogen spread among populations. They have designed a risk calculator to help simplify and standardize the decision-making process for determining the level of risk, and appropriate risk mitigation strategies to reduce the risk of increasing pathogen spread above background levels. Calculation of an overall risk score for pathogen spread takes into account the prior activity of field workers, the proposed activity, remoteness of the site, presence of known pathogens and the consequences of increased pathogen spread for amphibians in a given area. Contact the primary author, Andrea Pillott, at <andrea.phillott@jcu.edu.au>. *(Thanks to Larry Dalton)*

White-Nose Syndrome (Update). To slow the spread of White Nose Syndrome (WNS), a fungal disease in bats, government agencies are systematically closing caves to the public. WNS has killed at least 1 million bats since 2006, and threatens some bat species with extinction. Since being identified in upstate NY just four years ago, WNS, named for distinctive growths of *Geomyces destructans* fungus on the noses of afflicted bats, has

now spread to caves in 14 eastern states, plus Ontario and Quebec. The vector was likely a tourist who carried *G. destructans* from Europe, where bats seem resistant to the disease. At least six cave-dwelling bat species are vulnerable to the fungus, which eats through their wings and wakes them from winter hibernation, depleting fat reserves needed to survive until spring. The 1 million bats may be a small fraction of the actual toll, as most occur underground, and out of sight. At Vermont's Aeolus Cave, once home to 300,000 bats, barely one-tenth remain.

To prevent *Geomyces* spores from being carried between caves on visitors' shoes and clothing, the USFS has closed all its caves - with or without bats - in the eastern and southern United States, Rocky Mountains, and much of the Great Plains. The USFWS has also declared caves in national wildlife refuges to be off-limits. The BLM, which controls much of the non-forested public land in the western states, is closing only those caves and abandoned mines that appear to be prime *G. destructans* habitat. However, a federal White Nose Syndrome Management Plan now being drafted could ultimately make blanket closings a nationwide reality. Predictably, the organized caving community opposes the restrictions, insisting that they follow thorough decontamination protocols, and that they (cavers) present far less of a disease-spreading risk than the bats themselves. And as both public and private caves are shut, people lose access to a world of extraordinary geological formations and biological adaptations. "We just need time to figure this out," said Vermont state biologist Scott Darling. "There will be a time when the caves and mines are open again. But we can't take that risk at a time when we're seeing the largest decline of mammalian species in a very long time on Earth." *(Excerpted from 'Bat Disease Threatens to Close America's Caves' by Brandon Keim, Wired Science, October 18, 2010).* For more information on WNS, visit [http://www.fws.gov/whitenosesyndrome/].

REE NET Fights Brome Grass. Idaho State University (ISU) associate professor Matt Germino is the lead on a $200,000 project to form the *Bromus* Research, Education, and Extension Network project (REE NET), a working group in the Great Basin Research and Management Partnership. REE NET is designed to foster communication among many of the *Bromus* specialists in the western U.S., leading to ideas for transformative research and extending understanding on control of exotic cheatgrasses in semiarid rangelands. The group has 27 core participants from universities and agencies in ID, UT, NV, CO, WA, CA, OR and MA, and it collects data and advises land managers about a family of invasive exotic grasses that include Cheatgrass (*Bromus tectorum*).

Large stands of native sagebrush and grasslands in arid and semi-arid areas of the western United States have been replaced by millions of acres of cheatgrass. Cheatgrass dramatically alters the landscape and its ecology, and cheatgrass impacts affect everything from grazing practices to the restoration of endangered species. One of its biggest impacts is the ability to alter fire regimes, making rangeland fires larger and more frequent. The secondary impacts of these fires is immense – ISU researchers have documented a wildfire area dominated by Cheatgrass that lost up to five inches of top soil in the first year following the fire. The desert dust from wildfires on Idaho's Snake River Plain has even been found tainting the glaciers at the upper elevations of the Teton Range in WY, which in turn has accelerated the melting of the snowpack, resulting in less high-mountain water storage. Now in its second year, this group aims to produce reports and guides to advise land managers and agencies on specific actions to address the *Bromus* problem. They are not only looking at past and current problems, but are also trying to determine what effects *Bromus* will have in the future. Germino said, "We want to identify the socioeconomic and biological tipping points, identify emerging problems, and help make decisions and develop treatment plans to prioritize and address problems, integrating our efforts." The group has established a website and database at [http://greatbasin.wr.usgs.gov/GBRMP/BromusREENET.html]. *(Excerpted from ISU Headlines, January 3).*

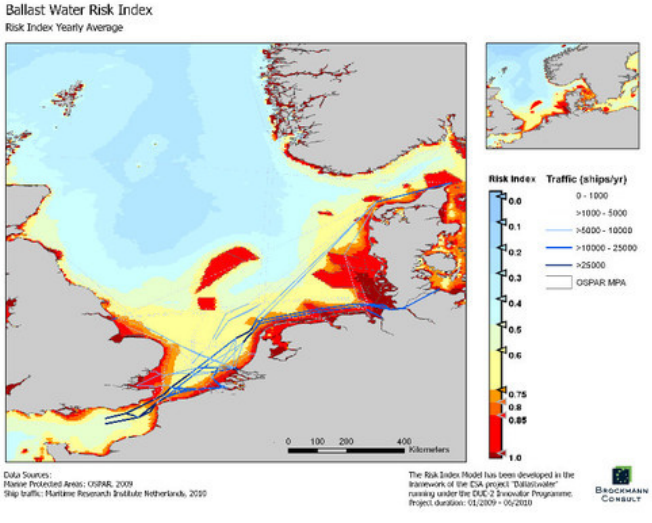
National Ballast Water Standards Rulemaking (Update). On December 20, 2010, the U.S. Office of Management and Budget published the revised schedule for the Ballast Water Discharge Standard rulemaking. The rule is now expected by April 30, 2011. Details are available online. For more information go to: [http://www.uscg.mil/hq/cg5/cg522/cg5224/bwm.asp] *(Thanks to John Morris, USCG, via Allen Pleus)*

Wisconsin Proposes Relaxing Its Ballast Water Standards. Wisconsin is now proposing to change its requirements for oceangoing ships arriving in its Great Lakes waters. The WI ballast water discharge general permit, effective February 1, 2010, required determining, by the end of 2010, if effective treatment systems would be available by the implementation date. The Ballast Water Collaborative, a group of experts from academia, government, the shipping industry, testing facilities, treatment vendors, and nonprofit organizations, has reviewed existing information and concluded that technology does not yet exist to verify whether a

treatment system is effective enough to meet Wisconsin's standard. A feasibility report based on their findings is available at [http://dnr.wi.gov/org/water/wm/ww/drafts/ballastwaterfeasibilityreport.pdf]. Wisconsin is now proposing to set the discharge standards in the permit to those required by the International Maritime Organization. Under the proposal, WI would continue to require oceangoing ships to flush their ballast tanks at sea to reduce the remaining organisms to a level that meets the international numerical standard. The proposed modifications will be the subject of a public hearing January 26. Other requirements will phase in over time, specifically the numerical treatment standard that would apply only to oceangoing ships. New ships must meet the requirement in 2012, and existing ships in 2014. These implementation dates will remain effective in the proposed permit modification. (*Excerpted from a Madison DNR News Release, Dec 24).*

Around The World

Satellites and Ballast Water Risk Assessment. The European Space Agency (ESA) has partnered with the International Maritime Organization and several national agencies to find ways to support the International Convention for the Control and Management of Ships' Ballast Water and Sediments, slated to take effect in 2013. Their solution is to track the areas most at risk from ballast-transferred invasive species, and create charts showing when and where it is safe to take on and unload ballast water. The key tool for this mission is the ESA's network of satellites. Determining risk involves modeling several different factors measured by satellite images, including water temperature (colder waters tend to be hospitable to a wider variety of species); water color (assesses the types and amounts of algae present in the water, and indicates how well the local food chain might be able to support introduced species); and water clarity and turbidity (a fairly direct indication of the amount of nutrients and small organisms present for introduced species to feed on). By combining this

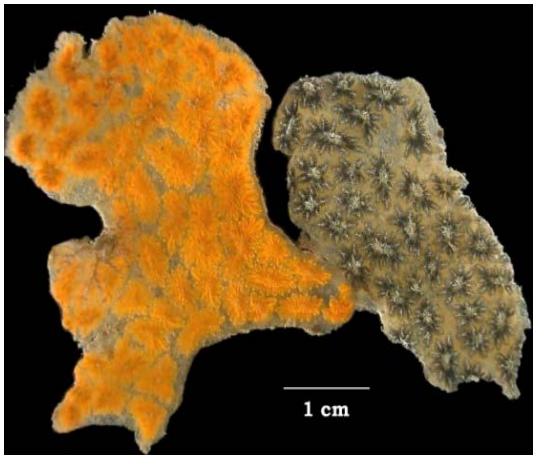


information, scientists can create a Ballast Water Risk Index, and locate areas where it is safe to unload ballast water, because the conditions there would discourage organism survival. They can even select specific areas where unloading is safe based on where the ballast water was taken on, by finding conditions not hospitable to the organisms likely to be transferred. They hope to eventually funnel the data to a website that can provide real-time information on ballast risk. *(Excerpted from a post by Ed Grabianowski, 'European space agency fights alien invasion', on io9.com, December 30.)*

Seventh International Conference on Marine Bioinvasions. The seventh annual marine bioinvasions conference, *Advances and Gaps in Understanding Marine Bioinvasions*, will be held at the Cosmo Caixa Science Museum in Barcelona, Spain, on August 23-25, 2011. The conference themes include development and tests of invasion theory; drivers of invasibility; patterns of invasion and spread at local, regional, and global scales; impact of bioinvasions on ecosystem structure and function, including the biology and ecology of

invasive species; and new tools for identification, monitoring, risk assessment, and management. Learn more about the conference at their website: [http://www.icmb.info/].

Golden Star Tunicate Found In New Brunswick. The golden star tunicate *(Botryllus schlosseri)*, an aquatic invasive species never seen before in New Brunswick, has been spotted off Caraquet on the Acadian Peninsula in Canada. The Department of Fisheries and Oceans is investigating to determine the pathway and extent of the



(USGS NAS photo)

infestation, and beginning to develop a response plan. Invasive tunicates have been a problem in Atlantic Canada for at least 40 years, and a new invading tunicate species has been reported in local waters at least once every five years since 1970. Tunicates can arrive through ballast water, attached to boat hulls, or on fishing gear, and they encrust and suffocate mollusks, causing high mortality rates among shellfish. *(From the CBC News, October 11*)

Other Resources and Materials

Noxious Weed Short Course. The Western Society of Weed Science will sponsor a Noxious Weed Short Course, in Loveland, Colorado, April 18-21. This is an intensive three-day study of current technologies and best management practices associated with noxious and invasive weeds in the Western U.S., and it targets local, state, and federal government, and other land managers throughout the West. The Short Course is designed to benefit both those new to invasive plant management and experienced professionals seeking a comprehensive update in western invasive weeds and their management. Enrollment is limited to 48 participants and applicants will be accepted on a first-come, first-serve basis. The registration fee ($650.00) provides each attendee the educational program, an electronic version of the Power Point presentations, course manuals, laboratory sessions and related course materials, other supplies, and daily refreshment breaks. Lodging is separate. To register or for further information go to [www.wsweedscience.org/Shortcourse/shortcourse.asp], or contact Sandra McDonald, <Sandra@MountainWestPEST.com>. *(Thanks to Wendy DesCamp)*

CBD Technical Series Papers. The Convention on Biological Diversity (CBD) has a series of great papers online, related to biodiversity and invasive species. At this writing, there are 55 papers in the series; I assume more will follow. The papers cover diverse topics, such as #48 (Pets, aquarium and terrarium species- best practices for addressing risks to biodiversity), #1 (Assessment and management of alien species…), #15 (Biodiversity issues for consideration in planning, establishment and management of protected areas…) etc. Check out their website to see which papers appeal to you, at [http://www.cbd.int/ts/]

Great Ballast Water Film. The award-winning IMO documentary film "Invaders From the Sea" gives a unique insight into the transfer of harmful organisms in ships' ballast water. Filmed by the internationally

renowned BBC Wildvision, this amazing story looks at how ballast water is affecting our coasts and millions of lives around the world, and the measures taken by the global community to fight against these alien stowaways. See it at [http://globallast.imo.org/index.asp?page=Invaders.html&menu=true] (Thanks to Tammy Davis, who noticed it and passed on the location.) *[Ed. Comment]: Nutshell discussed the production of this highly rated and very informative video on global ballast water issues back in at least 2007, so it has been around quite awhile. I tried unsuccessfully for a long time to get a copy, finally gave up trying, and forgot about it. But at some point, it was finally put on the web, for anyone to see. It's amazing- and about an hour long, so be prepared. But if you haven't seen it, do so!*]

Paper on Knotweed, Nitrogen and Leaf Litter. In case you missed it, check out "*Community and ecosystem consequences of giant knotweed (Polygonum sachalinense) invasion into riparian forests of western Washington, USA"* by Urgenson et al., in Biological Conservation 142 (2009) 1536-1541. A study conducted in the mid-lower Skagit River basin of Puget Sound, WA, researched the effects of knotweed invasion on the abundance and diversity of forest understory plants, and the quantity and nutrient quality of leaf-litter inputs in western Washington riparian forests. This was the first attempt to quantify the ecological consequences of knotweed invasion along riparian corridors in the Pacific Northwest. They evaluated nine measures of native plant abundance and diversity, and compared differences in quantity of litter fall in knotweed invaded and non-invaded locations. There were significant negative relationships between knotweed stem density and each of the nine response variables (species richness, density of juvenile conifers, red alders, broadleaf trees, shrubs, native herbs, etc.), and highly significant negative relationships between knotweed stem density and most measures of native community structure and diversity. These relationships are consistent with those from Europe, and suggest that knotweed can displace resident species in riparian habitats throughout its invaded range. Invaded sites showed a large and highly significant reduction in litter mass of native species. Estimates of re-sorption of leaf N prior to litter fall suggested very large differences between knotweed and native wood species (76% in knotweed and only 5% and 33% in red alder and willow, respectively). Replacement of native woody species by knotweed may change the quality of litter, with important consequences for nutrient cycling and related processes in riparian systems. Regenerating native trees were also found to be displaced. Reduced regeneration of red alder has important implications for nitrogen cycling in these environments, where N is limiting. Due to its efficient use of C and N, knotweed may have a competitive advantage over native species at the community level. At the ecosystem level, changes in the quality of leaf-litter inputs can affect nutrient cycling and productivity of both riparian forest soils and aquatic food-webs. These changes may reflect the direct effects of N uptake and storage in knotweed, and the indirect effects of knotweed's suppression of the primary N-fixing species, red alder. By reducing litter from native species and replacing it with litter of lower nutritional quality, knotweed invasion could affect the productivity of macro-invertebrate communities and in turn, the fish that use these invertebrates as a primary food source, thus having cascading effects through food-webs. Given all this, removal of *P. sachalinense* should be a primary goal of riparian restoration activities. *(From Brady Green, thanks to Kevin Aitkin)*

ICAIS Presentations and Final Abstract Book Now Online PowerPoint files (PDF format) from the 17th International Conference on Aquatic Invasive Species (ICAIS) are now available online. Security features ensure that the content and images cannot be extracted or altered. Access the presentations at [http://www.icais.org/html/previous17th.html]. The final abstracts book is also available online as PDF at [http://www.icais.org/html/previous17th.html]. *(Thanks to Lisa Carmody)*

Readers Respond

Great Lakes Clams - From Joseph Furbish, USFS: **"**…. I was especially interested in the article about invasive mussels of the Great Lakes and the mention of "big clams" (Nutshell issue #29). Since I work on

native mussel conservation and am aware that this is one of the most imperiled groups of organisms on the planet, I was interested to know what species this might be. *Can you help me out with an identification of what was meant by "big clams"? What species are they?* (The excerpt: "Among the first casualties were the big clams Professor Hebert's students were sampling for pollutants back in 1988. Within two years of his study, they had been all but wiped out. 'The Lake St. Clair bottom went from being the rich mussel bed it had for many thousands of years, to being stripped. The most charismatic of the big mollusks in the Great Lakes were gone, because of this single invading species…. They were some of the oldest organisms in the Great Lakes - certainly the oldest organism on the bottom - and they were destroyed in one fell swoop.' " Readers: Do any of you clam folks know the species referred to here?

Major Upcoming Invasive Meetings

February 16-17, 2011. Landscape Ecology of Tamarisk, 2011 Research Conference, Tucson, AZ. [http://www.tamariskcoalition.org/2011ResearchConference.html].

February 28 – March 4, 2011. 2nd Annual National Invasive Species Awareness Week, Washington, D.C. [http://www.nisaw.org/]

March 5-9, 2011: Global Conference on Entomology, 2011, Thailand. Advances in entomological research and development. [http://entomology2011.com/]

March 7-10, 2011. Western Society of Weed Science (WSWS) meeting, Spokane WA. [http://www.wsweedscience.org/Meeting/2011/WSWS%20symposium%20description%20FINAL.pdf]

March 15-17, 2011. 6th New Zealand Mudsnail conference, Moscow, ID [http://www.cnr.uidaho.edu/nzms/]

April 18-21, 2011. Western Society of Weed Science, 2011 Noxious Weed Short Course, Loveland, Colorado [http://www.wsweedscience.org/Shortcourse/shortcourse.asp]

May 4 - 6, 2011. Aquatic Nuisance Species Task Force Meeting. Little Rock, Arkansas. [http://www.anstaskforce.gov/default.php]

August 23-25, 2011. 7th International Conference on Marine Bio-invasions, Barcelona, Spain. [http://www.icmb.info/]

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