Ed Comment. In March, 2003, Nutshell began as a small internal EPA memo, to inform a few EPA managers of my progress in a new temporary invasive species assignment. Somehow other people began to request copies, and “subscribers” multiplied, first throughout EPA, and then throughout other federal and state agencies and into the private sector- a testament to the dearth of shared information, but growing amount of interest, in the field of invasive species. When I retired from EPA in 2008, Nutshell had a following of somewhere over 1200 recipients. PSMFC graciously agreed to pick it up and fund its continuation. Thanks to the internet, it has “gone viral” and we continue to gain subscribers from areas as diverse as New Zealand, Guam, and even Zaire (the reason for Nutshell’s more international feel over the years). I have really enjoyed writing and watching Nutshell grow. But other interests are calling me, and I am now ready to “fully retire”, so this will be my last issue. PSMFC may choose to continue it in some form, as funding allows; if so, I assume it will change somewhat in content and format. Thank you for being such loyal followers; I have enjoyed your friendships and the greetings that arrive following the publication of each issue. Keep up the fight! Perhaps I will see you on the ground, at an invasive species removal! JC

This Quarter’s Unusual News

Divers Train Sharks to Fight Lionfish. Divers delighted with the arrival of the beautiful lionfish (Pterois volitans) in the Caribbean were soon dismayed, as they realized the increasing population, with no natural predators, may disrupt the reef food chain balance. Lionfish have proliferated so rapidly that the invasion has been highlighted as one of the top 15 threats to global biodiversity. Regional programs have been started to encourage lionfish removals during dive outings, and divers began spearing them, but the invaders are everywhere. In the waters off Roatan, Honduras, only a small percentage of area is visited by divers. Sergio

Antonio Bustello, Google images
Tritto, an innovative dive professional in Roatan, was spearing lionfish in an area where he conducted shark-feeding dives, when it occurred to him the sharks might be interested in his kills. He experimented by releasing his dead kills, and to his surprise, the sharks gobbled them up, spines and all. He expanded his efforts to just wounding and releasing the lionfish live, and he hardly had time to move aside before the sharks swooped in. The sharks very quickly learned to associate the lionfish-hunting divers with a free meal. [Ed. Comment: Does this make anyone else nervous?] Within weeks, the combined efforts of divemasters and sharks made Tritto’s area of the reef virtually lionfish-free. Tritto’s ambitious goal is now to teach the sharks to prey upon healthy lionfish. Lionfish have been observed at depths of over 1000 feet- way too deep for divers. If his idea can succeed, and sharks get turned on to the lionfish as a regular prey item, the sharks would be able to go to depths and reach areas the divers never could. But it remains to be seen if he can succeed, and for now, diver removal is the only really effective method of control. [Ed. Comment: Although they may initially like the easy meal, I have to wonder, how well shark stomachs can deal with the 18 venomous needle-sharp spines in the long run. Hopefully it doesn’t result in dead sharks!] (Excerpted from ‘Reports from the lionfish front’ by Lad Atkins, in Alert Diver, Spring 2012.)

🎵 Successes & Lights at the End of the Tunnel 🎵

**American Chestnut Returns to New York City.** The majestic American chestnut (*Castanea dentata*) was once a dominant species in forests of the eastern United States. A healthy tree can grow more than 100 feet tall and measure 10 feet in diameter. There were estimated to be over three billion American chestnut trees in eastern North America, and this was a key species in the eastern forest; chestnuts comprised 25 percent of the trees in the Appalachian Mountains. It produced nuts that were very important for both wildlife and human consumption, and the lumber industry valued it as a rot-resistant, fast-growing wood. But the tree was virtually wiped out by the Asian bark fungus (*Cryphonectria parasitica*, formerly *Endothia parasitica*) that was accidentally introduced into North America on imported Asiatic chestnut trees. The disease was first noticed on American chestnut trees in 1904, in what was then the New York Zoological Park. The airborne bark fungus spread 50 miles (80 km) a year, and in a few decades, it had killed up to three billion chestnut trees. But on April 18, 2012, the tree returned to the area where it was first discovered in the Bronx. Dr. William Powell and his colleague Dr. Charles Maynard, researchers from the SUNY College of Environmental Science and Forestry (ESF) in Syracuse, NY, with supporters from The American Chestnut Foundation, planted 10 transgenic American chestnut trees at a test site in The New York Botanical Garden. They say there is reason to believe this field trial will reveal a variety of American chestnut that can survive a blight attack. They are enthusiastic about a gene derived from wheat that they have shown to increase resistance to a fungal pathogen in hybrid poplar, and they believe this gene will also be effective in the American chestnut, because it detoxifies the oxalic acid produced by the blight pathogen. Oxalic acid kills the trees by attacking the cambium, the part of the tree that allows it to continue reproducing cells. A canker forms and everything above the canker dies. The roots can remain healthy and continue to send up shoots, but the trees die back to ground level within a few years. “We really want to bring it back. The only way it can come back is to make a resistant tree, because no one has been able to control the blight any other way. If we can eliminate the oxalic acid, we probably will get a resistant tree,” Powell said. The trees being planted at the Botanical Garden are among more than 100 varieties of transgenic American chestnuts that are being tested in field trials or waiting to be tested for blight resistance. (Excerpted from ‘American Chestnut Returns to New York City’ in ScienceDaily, April. 12, 2012, and Wikipedia.)

**CA Grapevine Quarantine Partially Lifted.** In September, 2009, the European grapevine moth (EGVM, *Lobesia botrana*), managed to destroy an entire Napa County vineyard's crop at peak harvest time before anyone recognized the new invader. Detection of the moth, one of the grape industry's most feared pests, triggered an aggressive state and federal eradication campaign, but intensive spraying and a quarantine failed to contain it. It quickly spread into neighboring Sonoma County, to the southern Central Valley, and then to the
coast and a small area of the Sierra foothills. Scientists from France, Italy, Chile and Germany traveled to California to help form an eradication plan. But now, two years of testing and trapping have shown that the invasive species that led to vineyard quarantines across Northern California and threatened the state’s wine industry, has been eradicated in Fresno, Mendocino, Merced, and San Joaquin counties. Quarantines remain in effect in Napa, Solano, Sonoma, Santa Clara, Santa Cruz and Nevada counties. Mexico is one of California’s top five export markets, and removing the quarantines means exports of commodities such as grapes and stone fruit from those counties can resume without the additional inspections, treatments or special package markings that have cost growers an estimated $10 million a year. Barry Bedwell, president of the California Grape and Tree Fruit League said "our focus now is on that core area in Napa where it still exists." As the weather warms and larvae emerge from eggs laid last year, traps in Napa County have shown few bugs, which Bedwell hopes will mean the eradication of the moth in California’s premiere grape-growing region and the eventual lifting of all quarantines. Nobody yet knows how the moth got here, although some suspect it hitchhiked in on smuggled grapevine cuttings. Life cycle and other information on EGVM is available at [http://www.ipm.ucdavis.edu/EXOTIC/eurograpevinemoth.html] (Excerpted from ‘Grapevine quarantine partially lifted’ by Tracie Cone, Seattle times, June 4, and a USDA News Release, June 5.)

**Invading Mite Helps Fight Invading Scotch Broom.** Scotch broom (*Cytisus scoparius*) was imported and sold for years as an ornamental bush and a soil-stabilizer. Now is the most expensive weed to deal with in Oregon. Its ability to produce nitrogen in low-nitrogen soils gives it a big advantage over native plants, especially in disturbed areas. It also produces large volumes of seeds that help it spread quickly, and can germinate up to 80 years later. But a microscopic gall mite has now been found in southern OR that is giving hope in the battle against Scotch broom. The mite, like the broom, is native to Western Europe. Six years ago, the gall mites (*Aceria genistae*) were found on Governor’s Island in the Columbia River in 2006, and now they are being found as far south as Jackson County. The Ashland mites are the most southerly known population since biological control entomologist Eric Coombs discovered them. Two clusters of gall mites found in April near Eagle Point and in Ashland’s Siskiyou Mountain Park are being welcomed by plant devotees because these microscopic bugs exist solely to prey on Scotch broom. The tiny mites, which look “like little white sausages with white legs,” attack Scotch broom buds, causing the creation of galls over the bud, in which the mites live and reproduce, while reducing the broom’s ability to reproduce. “We’re hoping this will have a big impact on broom,” Coombs said. “It [the mite] seems to be spreading itself, and rather quickly,” said Kristi Mergenthaler, program coordinator for the Siskiyou Native Plant Society. Researchers hope to persuade the USDA to permit the mites’ use as a biological-control agent. Mergenthaler acknowledges the irony that those who advocate for native plants are now welcoming the discovery of a non-native insect. “It is a strange path to be jumping up and down on,” Mergenthaler says. “But I’m happy to know that Scotch broom has at least one predator.” (Excerpted from ‘Non-Native Bugs Could Be Answer To Controlling Scotch Broom’, in the Medford Mail Tribune, April 2.)

**Around The U.S. West Coast**

**WA Least-Wanted List.** The Washington Invasive Species Council has evaluated more than 700 invasive species in and around Washington to determine which pose the greatest threat to the state’s environment, economy, and human health. The Council selected 50 priority species for action in the short term, and developed an assessment tool to evaluate all of the species on their impact and ability to be prevented. The scores were plotted on a species management priorities grid, which is used as a management tool to guide Council action. The statewide list represents the top threats from plants, animals, insects, algae, and pathogens. The list, (with associated fact sheets and pictures) is at: [http://www.invasivespecies.wa.gov/priorities.shtml](http://www.invasivespecies.wa.gov/priorities.shtml) (Thanks to Wendy Brown, WISC)

**Idaho Milfoil Update:** Eurasian watermilfoil (*Myriophyllum spicatum*) treatments in Idaho are scheduled to begin in mid-July. Treatments will utilize herbicides, diver removal and benthic barriers to treat priority areas in lakes Hayden, Cocolalla, Coeur d’Alene, Priest, Pend Oreille and Payette (Thanks to Tom Woolf, IDA)
San Francisco Bay Undaria Infestation (Update). For the past three years, the highly invasive Japanese brown kelp, often referred to as Wakame (*Undaria pinnatifida*), has spread throughout San Francisco Bay. Since it was discovered at the San Francisco Yacht Harbor and the South Beach Harbor in 2009, it has already drastically altered the Bay's ecosystem by driving out native kelp. Last year, the Smithsonian Environmental Research Center also found it along the Bay at Fort Mason, Pier 39, Fisherman's Wharf, and Hyde Street pier. The worst areas of infestation are around AT&T Park and Half-Moon Bay. Wakame is also responsible for wreaking havoc on ecosystems in Argentina, New Zealand and parts of Europe. It grows over an inch a day on almost any surface, and it can reach more than nine feet in length. It thrives in both cold and warm saltwater, but can be killed by immersion in fresh water or subjecting it to heat. There is currently no money to fund these tactics, and so removing the seaweed is currently an all-volunteer effort. If the seaweed is not checked, it will eventually eradicate native California counterparts, including the iconic giant kelp, and the fish and other animals that rely on the giant kelp to survive will also suffer as a result. (Excerpted from ‘Invasive Brown Kelp from Japan Threatens California Ecosystems’, by Sarah Medina, SF Huffington Post, June 20.)

CA Undaria EDRR Network Invites Participants. Asian kelp, *Undaria pinnatifida*, is an opportunistic, fast-growing kelp ranked among the world’s “100 worst invaders” by the ICUN. It can become a pest species on boat hulls, docks, and aquaculture species and structures, and is capable of having profound effects on native ecosystems. It can spread by hitchhiking on boats, anchors, floats and aquaculture gear. The highly invasive kelp has been in Southern and Central California for 12 years, but in 2009, it made a sudden jump northward approximately 90 miles to Half Moon Bay and San Francisco Bay. *Undaria* is expected to continue spreading northward, potentially as far north as Southeast Alaska. A new group is hoping to stop the spread of this invader by organizing an early detection and rapid response network (*Undaria* EDRR) for points north of San Francisco Bay. They believe that community-based early detection, combined with a coordinated multi-agency response to early outbreaks, can be an effective and cost-efficient approach to slowing or stopping the spread of non-native species. They are inviting volunteer participants to help distribute watch cards, posters and fliers to local organizations and businesses, to involve them in finding and reporting new locations of *Undaria*.

If an *Undaria* sighting is confirmed, volunteers will be asked to make an initial population survey to determine the extent of the population. Volunteers will also participate in a discussion of possible management strategies. By organizing now around *Undaria*, the network will also establish a framework for dealing with future marine invaders. They are soliciting volunteers. Suspected sightings can also be reported to the website at [Undaria.nisbase.org](http://Undaria.nisbase.org). Photographs can also be uploaded to this site, which provides details on identification and sample collection, as well as further information on *Undaria*. To join the network, to suggest agencies or people they should contact, or just to get additional information, contact Chela Zabin at <zabinc@si.edu>.

Tsunami Debris Brings Undaria To Oregon. The March, 2011, tsunami washed a staggering 1.5 million tons of Japanese debris into the ocean. Not just plastic bottles and small things, but massive objects like a floating dock the size of a boxcar and a shipping crate with a motorcycle and set of golf clubs still inside. The debris is already washing up on North American coastlines about a year before it was expected it to arrive, and it could...
have drastic long-term impacts on our already struggling marine environments. On June 4, 2012, ocean shore visitors first reported seeing a loose dock floating offshore near Agate Beach, one mile north of Newport, OR. It was one of the docks from the Japanese port of Misawa, which lost three of its docks during last year’s tsunami. The dock has now washed ashore, and it is large and heavy: 66’ long, 7’ tall, and 19’ wide. It is made primarily of concrete and metal, but is clearly designed to float. The dock is covered with about 13 pounds of organisms per square foot, including mussels, barnacles and marine algae. One invasive marine algae in particular, the brown kelp *Undaria pinnatifida*, commonly called wakame, is present on the structure. Wakame has already colonized San Francisco Bay (see above) and displaced native kelp that fed native organisms (now gone). The Oregon Department of Fish and Wildlife coordinated a group of volunteers to scrape the organisms from the dock and then sterilize the top and sides of the dock with torches. They removed about a ton and a half of plant and animal material, and placed it in an eight feet deep hole excavated far above the furthest reach of high tides and storm surges. Since the organisms require salt water to survive, this disposal method is considered safe and reliable. Two basic options are under review for dock disposal: towing it to a nearby port or harbor, or demolishing it on site and disposing of it in a landfill. No further information is available about the feasibility or potential costs of either method. On March 30th in Seattle, WA and AK Senators Cantwell and Begich called on President Obama to allocate emergency resources to mobilize National Science Foundation research to help track and respond to tsunami debris. Expediting NSF grants would help coastal communities get more specific estimates of what might hit shores, and when. To see updates and photos online, go to [http://www.oregon.gov/OPRD/PARKS/agatebeach_dock.shtml]. (Excerpts from the above website, plus many other articles.)

**Tsunami Blog.** Check out the a blog on the dock “Asian Docks and Philosophy (6/12/12)” at [www.oregoninvasivespecies.blogspot.com]. *(Thanks to Lisa DeBruyckere, OISC)*

**Other Tsunami Websites.** For further information on the Tsunami Debris issue go to

- NOAA: [http://marinedebris.noaa.gov/tsunamidebris/]
WA Citizen Science EDRR Project Is Recruiting Volunteers. The PNW Invasive Plant Council and partners are working to develop a Citizen Science Early Detection Rapid Response (EDRR) program in Washington, and they are recruiting volunteers to participate. The goal is to find and remove newly established invasive populations before they have a chance to spread and cause serious ecological and economic damage. As they explore and enjoy the outdoors while camping, hiking, horseback riding, kayaking etc., volunteers will be asked to search for a suite of invasive plants, and then report any they encounter. Volunteers will also have the opportunity to concentrate on certain "red-flag" areas. The Council is piloting surveys in Cooperative Weed Management Areas in the Nisqually, Yakima, and Chehalis River watersheds, and in HWY 12-SR 410, which includes Mt. Rainier National Park. Mid-July trainings will teach volunteers to identify plants, and collect and report data to the Council, who will alert local weed managers so they can act to remove these invaders. To participate in helping to detect newly established invasive species, to obtain more information, or to sign up for one of the trainings, contact Julie Combs <pnw.ipc.org@gmail.com>. Training dates and locations will be announced based on volunteer response. (Thanks to Wendy Brown, WISC)

IHN Detected Near Bainbridge Island. Infectious hematopoietic necrosis virus (IHNV) has been detected in three privately-owned Atlantic salmon marine pen complexes near Bainbridge Island, WA. IHN is not new to Puget Sound; it is found each year at some level in sockeye returning to spawn. However, this is the first reported detection of IHNV in Atlantic salmon marine net pens in Washington. The virus was confirmed on May 8, and American Gold Seafoods, which owns the Orchard Rocks, Fort Ward and Clam Bay complexes, expected to harvest or destroy at least 400,000 fish from the three sites by mid-June. The virus likely was picked up from infected fish in marine waters, possibly from out-migrating sockeye smolts from the Baker, Cedar and Ozette watersheds, where IHNV was detected last year. Although Atlantic salmon are more susceptible to IHNV than native Pacific salmon, Tribal fisheries managers are concerned that native salmon will be infected as they migrate through the area. NW Indian Fisheries Commission (NWIFC) is working with the Suquamish Tribe to beach seine chinook, chum and pink salmon in Rich Passage and test them for the virus. “We do not know what effect, if any, virus exposure will have on these fish,” said Bruce Stewart of NWIFC. Another concern is the risk to captive broodstock from endangered runs being reared at the NOAA’s Manchester facility. “Several tribes are rearing salmon at Manchester as part of recovery programs, [and] Manchester’s saltwater intake is very close to the Clam Bay net pen site where the virus has been found”, Stewart said. For more information, contact Bruce Stewart, at <stewart@nwifc.org>. (Excerpted from the NW Indian Fisheries Commission newsletter, May 30, Thanks to Kevin Aitkin)

Also, in May approximately 560,000 Atlantic salmon were destroyed at Mainstream Canada’s Dixon Bay farm (north of Tofino) in British Columbia because of an IHN outbreak there (For more information go to: http://www.vancouversun.com/technology/Fatal+virus+dected+Atlantic+farmed+salmon+first+time+since+2003/6627628/story.html).

New Plant Mapping Website from Cal-IPC. CalWeedMapper [calweedmapper.calflora.org] is a new website for mapping invasive plant spread and planning regional management strategies. It includes more than 200 terrestrial and aquatic invasive plants. Users can generate a report for their region that synthesizes information into strategic opportunities for surveillance, eradication and containment. Land managers can use these reports to prioritize their invasive plant management, to coordinate at the landscape level (county or larger) and to justify funding requests. For some species, CalWeedMapper also provides maps of suitable range that show where a plant might be able to grow in the future. The system was developed by the California Invasive Plant Council [www.cal-ipc.org] and is designed to stay current by allowing users to edit data. (Thanks to Elizabeth Brusati)
Four New Invasive Species Found in San Francisco Bay. CDFG’s Marine Invasive Species Program (MISP) monitors California coastal and estuarine waters for new nonnative aquatic species introductions. Their new triennial report, covering July 2008 through June 2011, includes the first records of the appearance in the San Francisco Bay of four species previously found only in other parts of the coast:

- *Caprella simia*, a Caprellid, or “skleton” shrimp, first discovered in California’s Long Beach Harbor in 2000, is now widespread in San Francisco Bay and it is considered likely to spread north. It is a Japanese species, probably introduced by fouling or ballast water.
- *Nicolea sp.*, an undescribed polychaete worm, was first found in California in 2000, in San Diego Bay and Los Angeles/Long Beach Harbor.
- *Grateloupia lanceolata*, a red alga native to Japan and Korea, has been found for the first time in the Port of Oakland and in Richardson Bay. It was previously found at Santa Catalina Island, Port Hueneme and Moss Landing, and has been working its way up the coast.
- *Amphibalanus eburneus*, the ivory barnacle, collected from Richmond and San Francisco marinas, confirmed a new distribution record for San Francisco Bay. Although one specimen was collected from a ship’s hull around 1938, no other occurrences have been documented in the Bay. More recent California observations of this North Atlantic native were limited to Colorado Lagoon (Long Beach) and Huntington Harbor.


2013 WA Weed List Proposals. The WA State Weed Board has received nominations to add four new species to the Noxious Weed List. The Noxious Weed Committee met on May 29 to review the proposals, and will develop an initial recommendation for a public hearing to be held in November. The plants proposed include:

- **French Broom** (*Genista monspessulana*): an aggressive pioneer species. In California, large infestations displace native plant species and significantly increase the costs of reforestation in commercial timelands; proposed listing as a Class A Weed.  
- **Tall Hawkweed** (*Hieracium piloselloides*): one of many species of invasive hawkweed spreading in the U.S. and Canada. It impacts mountain meadows and rangeland, especially at higher elevations; proposed listing as a Class B Weed.  
- **Common Teasel** (*Dipsacus fullonum*): a perennial weed common along roadsides, fields, and pastures. Each plant can produce 2,000 seeds a year, and spread can be rapid; proposed listing as a Class C Weed.  
- **Common Barberry** (*Berberis vulgaris*): a deciduous shrub, reaching 8-10 feet tall. It produces a large number of seeds and forms spiny dense stands that shade out and limit the native plant growth, reducing wildlife habitat and forage. It is also an alternate host for wheat rust, and could increase damage to wheat crops; proposed listing as a Class C Weed.  

- the Weed Board also received a proposal to remove the limitation listing **Japanese eelgrass** (*Zostera japonica*) for commercial shell fish beds only, and to designate it as a Class C Weed everywhere in the state.

New Paper: Knotweed Impacts in Riparian Systems. A new Knotweed paper, ‘Multiple competitive mechanisms underlie the effects of a strong invader on early- to late-seral tree seedlings’, by Lauren S. Urgenson et al., assesses the mechanisms by which bohemian knotweed (*Polygonum x bohemicum*) regulates seedling growth and survival among early-, mid-, and late-seral tree species in a Pacific Northwest riparian forest ecosystem. Authors used general linear mixed models to compare seedling performance (survival, height and diameter growth, biomass allocation and ectomycorrhizal colonization of root systems) in paired experimental plots over two growing seasons. Seedling performance was assessed relative to the effects of knotweed on light and soil resources and the traits of the native species. Paired t-test results suggest that knotweed significantly (>85%) reduced light availability, but has small, mostly non-significant effects on measured soil properties. Knotweed had strong impacts on growth and survival of all three tree species.
Reduced survival of early- and mid-seral species was correlated with light limitation beneath knotweed: light transmittance was significantly higher (79%) above surviving seedlings. Knotweed also exerted strong control on the late-seral species, reducing their survival by 24%, and height and diameter growth by 91–122% and 37–55% respectively. These effects were not correlated with reductions in light. Instead, in the presence of knotweed, ectomycorrhizal colonization was significantly reduced (64%) and root/shoot ratio was significantly increased, suggesting a disruption of soil mutualisms. This is thought to be the first study to relate community-level impacts of an invader to the combined effects of resource exploitation and interference of below-ground mutualisms. Where invaders have the ability to displace early-to-late seral dominants, the consequences for community structure and ecosystem functioning can be profound. The paper is available early on-line from the Journal of Ecology web-site. 

(Thanks to Lauren S. Urgenson, UW)

Kalispel Tribe Battles Northern Pike. The Kalispel Indian Tribe has developed an innovative and effective program to deal with Northern pike (Esox lucius). “Northern pike shouldn’t be thought of as a game fish anywhere in the [Columbia] basin,” said Deane Osterman, executive director of natural resources for the Tribe. “They should be persona-non-grata and should be killed on sight.” The threat is real; unchecked, they breed like water rabbits, and eat native fish by the thousands. Tissue samples show bio-accumulated mercury, PCBs and dioxins. Washington now advises women and children to eat no fish longer than 24 inches, and no more than two meals per month. [Ed. Comment: But for men it’s still ok???] On March 19, the Tribe began reducing the pike population by netting on the Pend Oreille River. The recently concluded efforts netted 5,593 pike as of June 2. About 16,000 other fish, primarily yellow perch or tench, were also caught, but 90% of those were returned to the water unharmed. The roughly 1,600 fish that died “is a whole lot less than the removed pike would have eaten,” said Jason Connor, the tribal fisheries project manager. “We’ve seen pike with up to 35 prey items in their stomachs in a single meal.” The Kalispel Tribe began monitoring the pike population in 2005 and conducted a spring index netting survey starting in 2010 to profile annual changes in the fish’s population. They found exponential growth; between 2006 and 2010, pike numbers grew from 400 adults to 5,500 adults. Pike were also discovered in Boundary Reservoir and the un-dammed parts of the Columbia River in Canada, as well as Lake Roosevelt and two lakes in Spokane County. They now extend from the upper Columbia River near Castlegar, British Columbia, downstream to Lake Roosevelt, where they are still in low numbers. Only the Grand Coulee and Chief Joseph dams separate them from anadromous runs of salmon and steelhead. The spring netting survey in 2010 yielded an average of 12.5 pike per net. In the beginning of 2011 it was 13.2. The Kalispel are fishing twenty nets a day; they’re all 150 feet long with thirty-foot panels. Over the next two years the Kalispel plan the same level of activity, to keep pike 87% below 2010 levels. “After our initial five weeks of suppression this year we were at 2.9 pike per net night,” Connor said. “Our goal of 87 percent reduction would be 1.7 northern pike per net night.

Washington state agrees with the Tribe, and it has changed pike’s classification from Game Fish to Prohibitive Species. The Tribe is also holding two pike-fishing derbies this summer, on June 29–July 1 and August 3–5, and offering cash and prizes. “Now we have several tons of fish flesh to deal with when we remove it from the reservoir,” said Connor. “It would be completely irresponsible to distribute those to any needy group.”
benefits are a decade out, said Osterman, but without this step the future could be much worse, especially if pike were to reach salmon and steelhead waters. (Excerpted from ‘Kalispel Tribe battles to keep voracious predator from decimating native fish populations’, by Jack McNeel in Indian Country Today, June 25, 2012)

**Aquatic Invasion Risk Prediction.** The OSU Sea Grant project Aquatic Invasion Risk Prediction and the Economics of Early Detection and Rapid Response in the Pacific Northwest, led by Dr. Gopinath, is developing an AIS invasion risk assessment model. It will have three components: spatial dispersal risk; estimated damages of AIS and expected management costs; and an estimate of minimum total cost to evaluate alternative management strategies. With global warming, higher water temperatures may cause more calcium to be retained, possibly making waters better for mussel survival. For more information on this project, contact Sam Chan at <samuelchan@oregonstate.edu>.

**Columbia River Commercial Shad Harvest With Experimental Gear Approved.** In June the Columbia River Compact approved a tribal request that commercial fishing be allowed in reservoirs above Bonneville Dam with “experimental” fishing gear such as drift gill nets, fish wheels, purse seines and beach seines. The decision allowing the catch and sale of shad stretches from June 21 through July 31. It requires that any other fish species caught during shad fisheries be immediately returned to the water unharmed. The American shad is a native of eastern North America with a historic range from Florida to Newfoundland. The fish were brought west in the 1870s and transplanted into northern California’s Sacramento River. Many of the fish survived and spread. The first recorded sighting in the Columbia was in 1876. The American shad can now be found from Baja California, Mexico, to Alaska and has even been spotted across the Bering Strait in Russia. In recent decades shad returns to the Columbia River have risen to as high as more than 6 million fish in 2004 with 5.4 million of those fish being tallied at Bonneville Dam (river mile 146) on their way to spawning grounds upriver. Bonneville counts since 2004 have stair-stepped downward with a tally of only 1.04 million in 2010 and only 948,000 in 2011. (Excerpted from ‘Commercial Shad Harvest With Experimental Gear Approved; Over 2 Million Fish Across Bonneville’, in Columbia Basin Fish & Wildlife News Bulletin; http://www.cbbulletin.com/421413.aspx)

**Western Zebra/Quagga Mussel News**

To learn more about the western zebra/quagga mussel infestation (*Dreissena spp.*), visit the 100th Meridian web site at [http://www.100thmeridian.org].

**Fact to ponder:** “In the five years since they were first discovered in Lake Mead, the population of invasive quagga mussels has grown tenfold. UNLV researcher David Wong estimates that more than 1.5 trillion adult quaggas and 320 trillion microscopic mussel babies now populate the reservoir. That’s 80 to 160 quaggas for every gallon of water in the nation’s largest man-made lake. If mussels were dollars, there would be enough of them to pay off the national debt 20 times over, with a few trillion bucks to spare.” (From the LV Review Journal, May 28.)

**Zorinsky Lake Zebra Mussel Eradication.** Scientists and government workers may have accomplished the near impossible at Zorinsky Lake, NE: eradicating the zebra mussel. To-date, only one U.S. lake, a small Virginia quarry, is known to have eradicated an infestation. After lowering the lake 17 feet in December 2010, detailed inspections at eight sites around the lake found only 907 mussels, and all were in the top 10 feet of the exposed lake bed. (By comparison, in the Great Lakes, densities of 900 mussels can be found in six square inches.) Scientists hope that when the lake was the lowered, the remaining mussels froze to death or dried out.
Zorinsky has now reopened to boating and fishing, but no one dares declare victory. “I'm not comfortable saying we eradicated it, but we really, really did take a good chunk out of it,” said John Hargrave, a biologist with the Corps, which owns the lake. But none of the Zorinsky efforts will matter without public diligence. John Remus, the ACOE regional chief who oversees water quality and control in reservoirs, says wherever the mussels came from, they can come again, particularly if people don’t properly clean, drain and dry their boats. (Excerpted from ‘Invaders muscled out at Zorinsky’, By Nancy Gaarder, World Herald, April 26.)

**Arizona Citations.** AZ Game and Fish officers have recently issued citations to two individuals who brought quagga mussel contaminated boats to Lake Powell, and citations are pending in a third case. “Fortunately, in these instances the quagga mussels on the boats were discovered at Lake Powell’s decontamination station prior to launching,” said Tom McMahon, invasive species coordinator for the Game and Fish Department. One of the vessels had mussels on its anchor, which many people forget to clean, and the boat owner neglected to remove the plug before leaving Lake Pleasant, which is another violation. “About a quarter of the boats showing up at Lake Powell with quagga mussels have been in violation due to mussels being attached to the anchor,” McMahon said. (Excerpted from ‘Invasive mussels discovered at Lake Powell decontamination station’, in AG&F, June 18.)

**Idaho Inspections (Update).** Through July 9 Idaho’s watercraft inspection program has inspected over 14,000 vessels and has intercepted 47 with zebra/quagga mussels (!) For more information go to: [http://www.agri.idaho.gov/Categories/Environment/InvasiveSpeciesCouncil/Inspection_Stations_2012/Inspection_Stations_2012.php]. (Thanks to Tom Woolf, IDA)

**Idaho Environmental Forum Briefed on Quagga Threat.** North Idaho Rep. Eric Anderson’s nightmare involves invasive quagga and zebra mussels slipping into Idaho’s waterways and altering the very nature of the state. He was a featured speaker at the May 29 Idaho Environmental Forum, a periodic forum on environmental issues facing the state, and he had a chilling warning: Only five states – Idaho, Washington, Oregon, Wyoming and Montana – have yet to be invaded by the tiny, fast-reproducing shellfish that chokes out native species and encrusts everything that touches the infested water. And more and more mussel-infested boats are being intercepted on the way to Idaho, with the vast majority coming from the Lake Mead area. Two more fouled boats were caught on I-90 in North Idaho on May 25, for a total of 41 so far this year – and the summer boating season is just beginning. Anderson said the biggest problem is boats that are moored for the winter in Lake Mead, then pulled out and brought to the Northwest; they require extensive decontamination after that much time in the mussel-infested waters. He’s hoping to spur a federal crackdown on Lake Mead officials to stop them from letting infested boats leave without decontamination, rather than leave the five as-yet uninfested states to try to track them down at their borders. “I'd like to see 'em just curtail any boats going in if they can’t clean the boats coming out,” he said. (Excerpted from ‘Mussel infestation threatens NW waters’ by Betsy Russell in the Spokesman- Review, May 30, 2012; for full article go to http://www.spokesman.com/stories/2012/may/30/mussel-infestation-threatens-nw-waters/)

**CA Quagga Bill.** The California Assembly approved a bill in June aimed at establishing a sustainable funding source for state and local efforts to prevent the spread of quagga mussels in waterways. AB 2443, by Assembly member Das Williams, would establish a surcharge on recreational boat registration fees to help fund local and state infestation prevention efforts. The bill could save local governments millions of dollars and help prevent further spread of quagga and zebra mussels that already have affected 25 California reservoirs. The surcharge would not exceed $10 and would help cover the costs of mussel monitoring, inspection and eradication programs. (Excerpted from Bills Advance on Desalination, Metal Theft and Quagga Mussels’ by Lisa Lien-Mager, in Association of California Water Agencies, June 1.)

**Kootenay Gets Its First Decon Station.** East Kootenay, British Columbia, is getting its first $30,000 mobile decontamination station for washing mussels and other invasive species off of boats. The station has the capability to wash a boat at 60 C, and the necessary pressure to kill zebra and quagga mussels, said Marty
Hafka, with the East Kootenay Invasive Plant Council. Canada and the U.S. spend about half a billion dollars a year reacting to zebra/Quagga mussels, but the mussels haven't come to B.C. - yet. "In Idaho they have intercepted boats that have been infested with mussels travelling across the U.S. from the Great Lakes, and if a boat can travel from the Great Lakes to Idaho, there's no reason why a boat couldn't travel from the Great Lakes to Alberta or British Columbia" he said. The decontamination station is scheduled to arrive on Kootenay lakes this summer. (Excerpted from ‘East Kootenay combats zebra mussels’ in CBC News June 16.)

**Equipment Inspection and Cleaning Manual -2012 Update.** The Bureau of Reclamation (BOR) has updated their *Equipment Inspection and Cleaning Manual to Prevent Spread of Invasive Species, a Manual for Equipment and Vehicles.* Additions to this version of the manual include diving equipment, a quick find subject directory, new graphics, and a new flowchart that walks the user through multiple steps of inspection and cleaning actions. This manual will also be the reference standard that contractors must follow while working on BOR facilities and lands. Download the updated manual at [http://www.usbr.gov/mussels/](http://www.usbr.gov/mussels/) (Excerpted from a BOR press release June 28.)

**eDNA Working Group.** Presently environmental DNA is used mostly for Asian carp detection in the Great Lakes, but it may become the monitoring and evaluation tool of the future. Paul Heimowitz and Joanne Grady (USFWS) led a February conference call with a number of eDNA researchers to identify coordination needs, including a proposed workshop during 2012. Nobody has specifically planned such a workshop, but some participants are now developing materials to better document existing research projects. FWS regional geneticists are also getting more involved in national coordination efforts for Asian carp eDNA and other applications. (Thanks to Paul Heimowitz, USFWS)

**MN Doubles AIS Fines.** Civil fines for violating Minnesota aquatic invasive species (AIS) laws will double beginning July 1. The fine for transporting a watercraft or water related equipment with attached aquatic plants will go from $50 to $100, and the fine for possessing or transporting a prohibited invasive species will now be $500. Minnesota Department of Natural Resources (DNR) has also considerably ramped up its boat inspections, enforcement efforts and educational campaign to prevent the spread of AIS. About 140 watercraft inspectors will be checking boats for AIS around the state. The DNR will also deploy 23 decontamination units at various water bodies, and concentrate inspectors and decontamination efforts at currently infested high-use waters. Other new AIS laws also go into effect July 1: Boat lifts, docks, swim rafts and other water-related equipment (boats and other watercraft excepted) that are removed from any water body may not be placed in another water body for at least 21 days. Boat clubs, yacht clubs, marinas, and similar organizations are now also considered to be lake-service providers. This requires permits for the clubs, and staff must take AIS certification training. (Excerpted from ‘Boaters, Fishermen take note: Aquatic invasive species laws change July 1, fines double, in the Brainerd Dispatch, June 29.)

**Fall 2012 Level Two WIT Training Scheduled.** More Watercraft Inspection and Decontamination (WIT) training classes for Quagga/Zebra Mussels are scheduled for October 16-17, October 30-31 and November 13-14, at Lake Mead, NV. This two-day, intensive, hands-on training is provided free of charge. Class size is restricted to 10-12 people, and registration is on a first-come first-served basis. Attendees are responsible for their own travel expenses. The course is designed for individuals active in setting-up or implementing watercraft inspection and decontamination programs for their respective agencies, organizations or businesses. It focuses on actual inspections of various watercraft types and the use of several decontamination systems. The course is taught by Dee Davis and Wen Baldwin, and certified by 100th Meridian Initiative member agencies, and successful graduates will also be qualified as incident responders and Level One Trainers. Go to [http://www.aquaticnuisance.org/wit/level-two-wit-training](http://www.aquaticnuisance.org/wit/level-two-wit-training) for more information about the course. If interested in attending, contact Bill Zook at <Bjzook2@msn.com>.

**Dreissenid Workshop.** A Dreissenid Mussel Early Detection Monitoring Methods and Quality Assurance Workshop was held on February 7-10, 2012, at Texas Christian University. The first workshop (February 7-8) focused on best analytical practices and the identification of quantitative larvae (veliger) detection limits for the
available three primary detection methods (cross polarized light microscopy (CPLM), image flow cytometry (IFC), and Polymerase Chain Reaction (PCR)-based assays). The second workshop (February 9-10) examined the need for a laboratory accreditation program or a laboratory personnel certification program, and the development of a roadmap for creating these programs in the Western region. The Society of Freshwater Science also offered a quagga veliger ID technician certification program; they currently have a similar program for invertebrate identification. Go to [http://musselmonitoring.com/2012workshop.asp](http://musselmonitoring.com/2012workshop.asp) for an executive summary of the workshop. (From the March 100th Meridian meeting notes).

**New CA Mussel Video.** Check out the California Department of Fish and Game's new quagga mussel video at [http://www.facebook.com/CaliforniaDFG](http://www.facebook.com/CaliforniaDFG) or [http://www.youtube.com/CaliforniaDFG](http://www.youtube.com/CaliforniaDFG). (Thanks to CDFG)

**New MN Public Service Announcements.** Eleven new 30-second public service announcement (PSA) videos promote simple actions: Clean, Drain, Dry to prevent the spread of aquatic invasive species. Videos feature zebra mussels, flowering rush, spiny waterfleas, and Eurasian watermilfoil. To view or download the videos, go to [http://www.naturalinnovations.org/aispsa/psadownload.html#formats](http://www.naturalinnovations.org/aispsa/psadownload.html#formats). The PSAs can be posted on the Web or used on commercial, cable, or PACT TV. (Thanks to Joanne Grady)

**BOR Antifouling Coatings Report Available.** A much awaited report by the Bureau of Reclamation, ‘Coatings for Mussel Control- Three Years of Laboratory and Field Testing’, Technical Memorandum No. MERL-2012-11, was released March 12, 2012. The publication evaluated the anti-fouling abilities of over 50 coatings and metal alloys. The coatings and alloys can be divided into six broad categories: conventional epoxies; foul release coatings; antifouling coatings; fluorinated powder coatings; metallic coatings; and metal alloys. General conclusions: The conventional epoxies performed poorly; in general, those test samples were heavily fouled by mussels within 6 months. Four of the silicone foul release coatings remained mussel-free after three years. The antifouling coatings performed well for up to 2 years. The copper metal filled polyester coating remained mussel-free in static water after 3 years, but allowed mussel attachment in flowing water within 2 years. The fluorinated powder coatings were easier to clean than the conventional epoxies, but eventually (within 1 year) mussels did attach to these coatings. Zinc metalizing and galvanizing had poor performance in flowing water and fouled heavily within 6 months. The copper, bronze, and brass controls remained mussel-free for three years, but their toxicity to other aquatic organisms makes them generally unfavorable for large scale use at Reclamation facilities. ASTM A788 Steel and 304 stainless steel substrates fouled at an alarming rate - within 6 months the mussels completely blocked the 1-inch grate spacings.

The silicone foul release coatings are the most promising at deterring mussel attachment in both static and dynamic conditions. However, the silicones did exhibit fouling by bryozoans and algae, which provide a location for the mussels to eventually attach. The algae and bryozoans can be cleaned with minimal force to remove the fouling. Unfortunately, the majority of these coatings are soft and not very abrasion or gouge resistant, although for conditions that do not expose structures to heavy debris impacts, these coatings may perform well. Surprisingly, although they are soft, the silicone foul release coatings have superior erosion resistance compared to epoxy coatings for sediment and silt laden waters, and in this respect are comparable to abrasion-resistant ceramic epoxies. Download the report at [http://www.aquaticnuisance.org/wordpress/wp-content/uploads/2009/01/Coatings_for_Mussel_3_yr_lab_and_field_BOR_2012.pdf](http://www.aquaticnuisance.org/wordpress/wp-content/uploads/2009/01/Coatings_for_Mussel_3_yr_lab_and_field_BOR_2012.pdf).

**Ontario Invasive Species Plan** Ontario has developed a plan to combat invasive species in order to protect the province’s environment and its economy. The Ontario Invasive Species Strategic Plan outlines Ontario’s approach to the prevention, early detection, and rapid response, to new invasive species and the effective management of existing invasive species like round goby, zebra mussels and the emerald ash borer. Several ministries will work together under the plan to ensure threats to the province’s biodiversity and its economy are dealt with as effectively as possible. The government has also committed to renew its partnership with the Ontario Federation of Anglers and Hunters to promote greater public awareness of invasive species through
education and outreach — a major goal in the plan. (Excerpted from ‘Ontario Releases Plan to Combat Invasive Species’, Ontario Newsroom, July 3.)

**Ballast Water**


**Federal Ballast Water Bill.** Sen. Mark Begich has introduced bipartisan legislation to set uniform, national standards for cleaning ballast water in an effort to halt discharges of invasive species. The bill (S. 3332) would require the Coast Guard and EPA to set national ballast water standards that would supersede the current patchwork of federal and state rules. Standards would be based on the best available technology economically achievable, and the bill includes a certification process for treatment technology. Begich said the measure was requested by the maritime industry so they don't face different regulations in every port. “In the end, it should save time and money and allow those facing the regulations to know what to expect, and be able to prepare for meeting the guidelines wherever they go,” he said. The legislation would require that a final rule be issued based on the Coast Guard regulations proposed in 2009. If a more stringent standard is deemed feasible according to a process laid out in the bill, then that more stringent standard would be adopted. Two years after being enacted, the bill would also require that a rule be issued for discharges other than ballast water. Then, by January 2020, a final rule would be issued setting a rule 100 times tougher than the original standard- but only after a feasibility review. Begich's bill includes, among other exemptions, permanent waivers for fishing boats, recreational boats and commercial vessels of less than 72 feet. The bill comes after an EPA official told Congress the agency intends to finalize ballast water rules consistent with new Coast Guard rules and international maritime standards. Environmentalists say such standards are too weak. (Excerpted from ‘Bipartisan Senate bill would set national ballast-water standards’ by Paul Quinlan, E&E reporter June 22, 2012.) (Thanks to Edith Thompson)

**CA 401 Water Quality Certification for the EPA VGP.** The USEPA has requested the CA State Water Board to issue a Section 401 water quality certification for the Vessel General Permit (VGP) and the small Vessel General Permit (sVGP) under the USEPA National Pollutant Discharge Elimination System vessels program. The VGP applies to discharges incidental to the normal operation of commercial vessels and non-recreational vessels greater than or equal to 79 feet in length, and the sVGP applies to discharges incidental to the normal operation of commercial vessels and non-recreational vessel less than 79 feet in length. A draft VGP certification and a draft sVGP certification are available for public review at [http://www.waterboards.ca.gov/water_issues/programs/beaches/vssl_prmt.shtml](http://www.waterboards.ca.gov/water_issues/programs/beaches/vssl_prmt.shtml).

**WA 401 Water Quality Certification for the VGP (Update).** The USCG published final ballast water rules on March 23, 2012 that set standards for the discharge of living organisms in ballast water at about the same concentrations as the International Maritime Organization’s standards, although environmentalists had hoped for more stringent standards. EPA has written ballast water requirements into the Vessel General Permit (VGP), and the USCG standards for living organisms in ballast water are incorporated into the VGP as enforceable discharge limits. The draft VGP contains a table listing when vessels must install ballast water treatment to meet the discharge limits. The dates for ballast water treatment vary: (1) new vessels constructed after January 1, 2012 - as soon as delivered; (2) vessels with < 1500 m³ ballast water capacity - first drydocking after January 1,
2016; (3) vessels with 1500 - 5000 m$^3$ ballast water capacity - first drydocking after January 1, 2014; and (4) vessels with > 5000 m$^3$ ballast water capacity - first drydocking after January 1, 2016. The VGP also requires a ballast water management plan, proper management of ballast tank sediments, both ballast water exchange and treatment for vessels entering the Great Lakes from outside, and monitoring for treatment effectiveness and residual biocides. Washington is evaluating whether the VGP meets water quality standards (WQS) and is eligible for CWA § 401 certification. The state has a draft set of conditions for EPA to add to the VGP to increase confidence that WQS are met. The deadline for 401 certification and conditions is July 2, 2012 (Thanks to Randy Marshall, WA Dept. of Ecology)

**The Great Lakes Carp Saga Continues...**

**Carp DNA Evidence Grows.** Asian carp DNA evidence continues to come in from above the electric barrier on the Chicago Sanitary and Ship Canal. The percentage of DNA-positive water samples taken above the barrier this year appears to have grown tenfold over last year. The Army Corps of Engineers (Corps) reported that 34 of the 2,378 water samples taken throughout 2011 in the canal system above the electric barrier were positive. This year, after just one day of sampling above the barrier, the Corps reports 17 positive results from 114 water samples (almost 15%). The electric barrier is about 30 miles downstream from the Lake Michigan shoreline, and 25 miles downstream from that barrier the waters are known to be home to a robust population of bighead (*Hypophthalmichthys nobilis*) and silver carp (*H. molitrix*). All of the positive samples taken above the barrier for 2011 and 2012 so far have been silver carp. Most of the recent positive samples were taken from Lake Calumet, a water body about six miles south of Lake Michigan, but one with a direct hydrologic connection to Lake Michigan. Kevin Irons of the Illinois Department of Natural Resources, said the positive results triggered two days of intense netting and electro-shocking in nearby waters, and that "phenomenal effort" yielded zero Asian carp. Crews also took another 45 water samples on June 11, but the results won't be known for a couple of weeks. The Corps maintains that a positive sample doesn't necessarily mean evidence of live fish above the barrier. The University of Notre Dame researchers who helped pioneer the DNA sampling agree that some Asian carp DNA likely has gotten beyond the barrier by means other than a live fish, but they say the overall pattern of positive samples during the three years of testing the canal waters is powerful evidence that at least some live fish are now swimming above the barrier. The Corps acknowledges that Asian carp pose a significant threat to the Great Lakes ecology, and it is looking at what it will take to permanently separate Lake Michigan from the Asian carp-infested Mississippi River basin. In the meantime, they maintain that the electric barrier continues to provide adequate defense for the lakes. Conservation groups and Illinois'
neighboring states (five of which have sued the Corps to force it to do more to stop the fish), remain dubious.  "This is the third summer we've seen positive eDNA hits in Chicago, and the third summer that the Corps says it needs more time to act. A real solution has to move faster than the carp," said Thom Cmar, an attorney with the Natural Resources Defense Council. "Seventeen eDNA hits in one day suggests that isn't happening."

(Excerpted from JSOnline, June 18, ‘DNA evidence of Asian carp above electric barrier grows’, by Dan Egan; Thanks to Cynthia Tait, USFS)

**Electric Barrier Has a Power Outrage.** Chicago’s electric barrier is designed to prevent Asian carp and other invasive species from migrating between Lake Michigan and the Mississippi River system, by sending out electrical pulses to scare fish away, and zapping those that come too close. The barrier had a 13-minute power outage in early May. According to the Corps Lt. Col. James Schreiner, two barriers were operating at the time, and the power to both failed. The backup systems also failed. Crews rushed to fix them, but the complete outage left a brief window for the voracious carp to make its way into the Great Lakes. It is unclear if any carp actually made it past the barrier. Schreiner said experts are looking into that, [Ed comment: that sure seems like a bit like a wild goose chase at this point….] as well as what caused the outage. This is the second outage of the electric fence that serves as the final barrier between the Asian carp and the Great Lakes. "While the Corps was fortunately able to respond quickly to the barrier losing power, this glitch illustrates what we already know - electric barriers and chain-link fences will not hold back Asian carp forever," Rep. David Camp (D-MI) said.

Stabenow and Camp co-sponsored bills that would order the corps to speed up development of a plan to prevent migrations between the Mississippi and Great Lakes watersheds. (See below.) Agencies have identified 39 species that could slip from one drainage basin to the other and disrupt native ecosystems. (Excerpted from NBC Chicago, May 6 ‘Shocked? Power Fails on Asian Carp Barrier’)

**Legislation Introduced: Corps to Speed up Carp Plan.** The bipartisan Stop Invasive Species Act (H.R.4406 and S.2317) legislation introduced by U.S. Senators Rob Portman (R-OH) and Debbie Stabenow (D-MI) in the Senate and Representative Camp (D-MI) in the House, passed both houses of Congress as part of the highway bill (H.R. 4348). President Obama has said he will sign it. The Act requires the Corps to submit an expedited action plan to Congress, with options for stopping Asian carp from penetrating the Great Lakes across 18 possible points of entry to the Great Lakes, and it requires the Corps to submit a progress report to Congress and the President within 90 days of the law's enactment. The full plan would need to be completed within 18 months, meaning the Corps would have to complete its work sometime in 2013, rather than the previous 2015 timeline. After this legislation was introduced in the Senate and House, the Corps voluntarily said they would begin work on a plan for permanent solutions for stopping Asian carp. While that announcement was welcome news, the Corps’ plan would not present fully completed solutions, and it would focus primarily on the Chicago Waterway System, rather than all of the carp’s possible points of entry. The Stop Invasive Species Act requires a completed plan, with proposed solutions for all 18 possible entry ways. The plan would include proposals for engineering and infrastructure projects to block Asian carp from entering the Great Lakes while still allowing shipping transportation across these waterways to continue. Under the revised strategy, the Corps would no longer devise a single preferred method, and will instead put forward several options and let Congress and the public decide which one they prefer. Officials acknowledged the new approach won't guarantee that a final solution will be carried out any sooner. The solution will depend on Congress, which must choose a plan and pay for it. But lawmakers and their constituents will get an earlier start on debating the alternatives. The change also means the Corps won't spend the next several years crafting a single plan that Congress might reject. Instead, the Corps will wait until Congress makes a selection to do more detailed feasibility and design work.  

The bill is supported by the Great Lakes Commission, The Great Lakes Fishery Commission, Alliance for the Great Lakes, Healing our Waters Coalition, National Wildlife Federation and Trout Unlimited. (Excerpted from Portman, Stabenow Legislation to Stop Asian Carp Passes Congress, Politicalnews.me, June 30; ‘Portman Welcomes New Army Corps Commitment to Provide Options to Stop Carp’, May 8 press release; ‘Corps of Engineers to Devise Faster Plan to Protect Lakes From Invasive Species’, New York Times, May 8; and ‘Army Corps to expedite Asian carp study’ in the Stillwater Gazette, May 9.)
**Two Bighead Carp Caught in Chicago Lagoon.** Biologists netted two bighead carp in a Garfield Park (Chicago) lagoon as part of a stepped-up effort to track and remove the invasive species from Illinois waterways. The carp were about 60 pounds apiece and probably had been there for many years. The lagoon is not connected to Lake Michigan or canals that connect the lake to the Illinois River, and the fish could not have gotten out on their own, or been able to breed in the still water, but the DNR wants to find and remove any live bighead or silver carp in the Chicago area. The Asian Carp Regional Coordinating Committee plans to spend $12 million this year on efforts to stop the voracious eaters from reaching Lake Michigan. Plans include sampling urban fishing ponds, surveying fish markets for live fish, and random electrofishing and netting along a network of canals that connect Lake Michigan to the Illinois River. Anyone who nets an Asian carp should get it out of the water and make sure it’s dead, take a photo of the fish and call the DNR. *(Excerpted from ‘Two 60-pound Asian carp found in isolated Chicago lagoon’, JSOnline, May 24.)*


**Around The U.S.**

**Aquatic Nuisance Species (ANS) Control Paper.** The Great Lakes and Mississippi River Interbasin Study (GLMRIS) Team has completed the Aquatic Nuisance Species (ANS) Control Paper: Inventory of Available Controls for Aquatic Nuisance Species of Concern – Chicago Area Waterway System. The purpose of the ANS Control Paper is to identify the range of options or technologies available to prevent the transfer of ANS of Concern-CAWS. Each selected Control was identified as one that is potentially effective at preventing the transfer of the 39 ANS of Concern-CAWS via aquatic pathways. These organisms were previously identified as non-native species to be the initial focus of GLMRIS. The ANS Control Paper does not contain specific recommendations, rank the effectiveness of the Controls, or identify constraints, impacts, regulatory requirements or technological feasibility of control application. Go to [http://glmris.anl.gov/documents/interim/anscontrol/index.cfm](http://glmris.anl.gov/documents/interim/anscontrol/index.cfm)

**Clean Your Submarines!** Deep-sea limpets were first discovered as stowaways on the research submarine *Alvin* in 2004. A closer look at the preserved specimens confirmed the scientists’ fears that the limpets were not native to the Washington area where they were discovered. The 38 limpets were hundreds of miles from their known range, and far from the hydrothermal vents where they usually live. Their morphology, DNA sequence, sex ratios, bacterial colonies, and isotopes of this population exactly matched those of a previous sample taken by *Alvin*. The limpets were from Gorda Ridge, a deepwater site 400 miles away, and had survived the pressure changes that came with rising 8,900 feet through the water column on the submarine. “In retrospect, we should have cleaned the sampling gear more thoroughly, but we honestly believed that no animals could survive on
Alvin at sea level pressure for the more than a day it took to get to the next dive site," lead researcher Janet Voight said. Since 1964, Alvin has made thousands of scientific dives, from surveying the Titanic to exploring hydrothermal vents. The sub and its sampling gear are cleaned between each dive, but this new limpet discovery suggests a mistake happened somewhere. [ED. Comment: “suggests”? For researchers, disturbing the very ecosystems they’re trying to study is bad for both science and the environment. They don’t want misinformation about where species live nor do they want invasive species to spread and disrupt the deep sea ecosystem. There is now talk of upping the standards for cleaning equipment. (Excerpted from ‘Invasive Species: Snail stowaways on submarines could change ecosystems’, in Greenwire, May 24, Thanks to Linda Lyons, FWS, and from ‘Alvin, the Deep Sea Research Sub, Has Spread Invasive Species in the Ocean’, in Discover Magazine May 25.)

New USDA Risk Assessment for Arundo donax. USDA APHIS has recently released the ‘Weed Risk Assessment for Arundo donax’, June 14, 2012. The giant reed is considered a high risk plant that is limited mainly by cold temperatures, so it could establish in plant hardiness zones 6-13 (57% of US and 2% of Canada). A. donax has a strong history of invasion elsewhere, including parts of the US, and it is present throughout much of the suitable area already, with the exception of WA, OR and some of the north-eastern states. A. donax is a serious invader of riparian areas, and is considered by some to be a “transformer” species because it dramatically alters habitats and ecological processes. In Canada, southwestern and south-central British Columbia, southern Ontario, and parts of the Maritime provinces are most at risk from A. donax. Much of the U.S. is at risk, with the exception of the coldest areas of central and extreme north-east (below Plant Hardiness Zone 6) and Alaska. Control is very expensive and requires destruction or devitalization of the entire rhizome system. One study calculated the cost of control in areas of coastal California at $25,000 per acre. The reed has a long history of cultivation, and it has been used for a wide variety of purposes including reed-making for musical instruments, basketry, construction materials, medicinal and culinary purposes, and erosion control. Its very fast growth has also drawn interest as potential biofuel, and for fiber, and pulp. The risk report does not appear to be online as of this printing, but hopefully it should be up soon. In the meantime, the USDA page has a good compilation of other Arundo resources at [http://www.invasivespeciesinfo.gov/aquatics/giantreed.shtml], and Dan Hilburn, <dhilburn@ODA.state.or.us> can also send you a PDF of it in the meantime.

New Great Lakes Invasives Cost Study. To better understand the true costs of aquatic invasive species in the Great Lakes (GL) basin, The Nature Conservancy recently commissioned an economic study by the Anderson Economic Group. While the study does not provide a single number for total cost because there isn’t enough solid research on all aspects of the issue, it reports with confidence that the direct annual cost of aquatic invasive species to the Great Lakes basin is more than $100 million, and likely significantly more. Six main industries bear the brunt of these direct, out-of-pocket costs: sport and commercial fishing, power generation, industrial facilities, shipping-related businesses, tourism and recreation, and public water supply facilities. But these costs trickle down to everyone; the 40 million people who get their drinking water from the Great Lakes pay higher water bills; costs incurred by power plants to remove zebra mussels from intake pipes will be passed on to consumers; and Great Lakes fish are more expensive, less available, or both, due to the impacts of
Invasive species. Today, most of the money spent on aquatic invasives goes to management. But prevention is the first line of defense and the most cost-effective strategy.

The report, *The Costs of Aquatic Invasive Species to Great Lake States*, breaks down the costs by industry across the Great Lakes Basin. Some of the cost estimates the Anderson Group uncovered are startling:

- **All Industries**: $50 million annual cost of reduced demand for industries and tourism in the Great Lakes; $34 million annual cost of control and research by the Great Lakes Fishery Commission; $18 million Sport and Commercial Fishing; $3.9 Great Lakes Fishery Commission sea lamprey control program; $7.1 million annual benefit to anglers in the St. Mary’s river system of a sea lamprey control program
- **Power Generation**: $1.2 million annual cost for one power plant to monitor and control zebra mussels; $1.7 million annual cost for researching better control methods for zebra mussels
- **Industrial**: $1.97 million to remove 400 cubic yards of zebra mussels from one Lake Michigan paper plant; $144,000 - $685,000 annual cost to monitor zebra mussels at an industrial facility; $21.6 million budget for AIS control for 2006 St. Lawrence Seaway Development Corp.
- **Water Treatment**: $480,000 - $540,000 annual cost of zebra mussel control for a water treatment plant; $353,000 annual cost of zebra mussel control for a municipal water treatment facility.


**Maryland Puts Gift Card Bounty on Snakeheads.** Wildlife officials in Maryland have put a bounty on the snakehead (*Channa argus*), the so-called “fish from hell”. The fish are hardy enough to survive up to four days on land, and can migrate up to a quarter mile between water bodies by wriggling on their fins. They can grow to more than 2 feet long, and are voracious carnivores that devastate lakes, ponds and streams. The state will give out $200 gift cards for Bass Pro Shops, as well as other prizes for catching and killing the fish. The snakehead is native to Africa and Asia, but is believed to have come to America through Asian seafood merchants. The first time a snakehead was seen in Maryland, an angler caught an 18-inch specimen in 2002 in Crofton Pond, 20 miles north of Washington, D.C. Since then, the population has grown, and they've been caught in dozens of bodies of water, including the Potomac River and tributaries, and at least seven states. “We don’t expect that anglers will eradicate the snakehead population,” said Joe Love, a state's Department of Natural Resources program manager, “[but] we do believe this promotion and inspiration of anglers can help control the snakehead population. The information we gain from Angler’s Log reports are [sic] also helpful in assessing abundance, spread and impact of these feisty fish.” The appetite that can destroy native populations actually works against the fish when humans go after them, because they bite at any type of bait. To enter the contest, anglers must catch, kill, and then post a picture of themselves with a dead snakehead fish, caught in Maryland, on the DNR Angler’s Log webpage. Winners will be drawn on November 30. Last year, 69 anglers entered the contest, killing 82 fish. *(Excerpted from ‘Maryland puts gift card bounty on ‘fish from hell’, in foxnews.com, April 5.)*
Snakehead Captured In BC. A northern snakehead (Channa argus) was caught in June in the Burnaby lagoon in Vancouver BC. Matthias Herborg, an invasive species expert with the Ministry of Environment, said officials used a small dip net to capture the snakehead, which measured two-thirds of a metre long. The lagoon where it had been living had previously been drained of much of its water. As a result of the incident the Invasive Species Council of Metro Vancouver, formerly the Invasive Plant Council, says municipalities currently deal with the spread of invasive plants and animals in a patchwork manner. The Invasive Species Council of Metro Vancouver, formerly the Invasive Plant Council, says municipalities currently deal with the spread of invasive plants and animals in a patchwork manner. "Many of the jurisdictions are working alone on these sorts of issues and in isolation," said council spokesperson Jennifer Grenz. "So they might be having some success within their jurisdiction, but right on the other side of the boundary, someone — say another jurisdiction — that’s doing nothing could be spreading species into the jurisdiction that is actually doing something." Grenz said Metro Vancouver’s climate and geography make it a perfect host for invasive species like the snakehead fish, which was pulled from a Burnaby pond last month, or giant hogweed, which has turned up in several B.C. municipalities. "That’s why it’s so critical that we have a strategy to make sure that we’re all working on the same things together — and in the right ways." Grenz will make her pitch Wednesday for Metro Vancouver to contribute $40,000 to the development of a regional strategy. The council intends to raise an additional $35,000 for the project from provincial and local governments, First Nations and other grants. To ensure the snakehead cannot be brought live into British Columbia, the provincial government has announced its intent to adjust its Controlled Alien Species Regulation to include the animal. (Excerpted from 'B.C. snakehead fish import ban in place by fall' June 9, 2012, CBC News, and 'Metro Vancouver urged to develop invasive species strategy', July 3, 2012, CBC News)

New NWF Report: Invasive Potential of Bioenergy Feedstocks. Bioenergy is a homegrown source of renewable energy that could help meet America’s energy needs. But we must be mindful of how short term economic decisions can have unintended consequences and high long-term costs to society and the environment. Bioenergy must be produced in a way that has long-term economic viability, helps address climate change, and protects and enhances native habitats and ecosystems. In April, the National Wildlife Federation released a report warning that many crops grown or being considered for biofuels come with a high risk of escaping crop fields, and invading and damaging habitat. The report, Growing Risk: Addressing the Invasive Potential of Bioenergy Feedstocks, contains case studies of six feedstocks (giant reed Arundo donax; a grass – Miscanthus sp.; genetically modified Eucalyptus sp; reed canarygrass Phalaris arundinacea; algae, and Napiergrass, Pennisetum purpureum). While the NWF remains in favor of bioenergy, they warn of missing the opportunity to prevent widespread ecological damage. "We truly have the chance to get ahead of the risk," said Patty Glick, National Wildlife Federation senior climate change specialist. "We need to focus on prevention. Most of state and federal efforts to control invasive species have been largely piecemeal and reactionary." The report recommends "vigorous screening” of candidate crops to evaluate their invasive potential and suggests feedstock producers bear the cost of monitoring and controlling escapees themselves. It also recommends some key actions to help ensure that the next generation of bioenergy does not fuel the next invasive species problem.
Kauai Traps a Mongoose. The mongoose (Herpestidae) has wreaked havoc on native birds on the islands of Maui, Oahu and Molokai for more than a century, and now, it seems that it is spreading. For the first time, one has been trapped on Kauai. Keren Gundersen, project manager for the Kauai Invasive Species Committee and responsible for bagging the mongoose, was just reaching the end of funds for a mongoose-trapping initiative when her group began hearing from locals who had spotted the elusive little carnivore around the Kauai Lagoons resort. They set dozens of live traps, relentlessly monitored them, and two months later, they trapped a mongoose. The trapped mongoose, a mature male, was humanely euthanized before its body was sent off for Genetic analysis. Gundersen hopes that genetic analysis will show whether the mongoose came from one of the other islands. Mongoose were intentionally introduced to Hawaii to control rat populations. In 1883, in a colossally uninformed approach, mongoose were let loose in the sugar fields. Since rats are nocturnal and mongoose are diurnal, the exotic predators never came in contact with their rodent prey, and native bird populations began crashing instead. Mongoose have non-retractable claws that enable them to dig for insects and pry apart eggs, and today, mongoose continue to eat their way through native nestlings and turtle eggs. Mongoose-proof fencing and costly eradication programs are the only way to keep the mongoose out of nature sanctuaries and reserves. Kauai never introduced themongoose, but there have been about 70 sightings reported in the last 10 years alone, and since mongoose lifespan is about six years, Kauai may now host an established population. There is no way of knowing how many mongoose may be present on Kauai or how they arrived there. In the meantime, Gundersen’s group is increasing its mongoose monitoring, and asking locals to keep watch for the animals. “I don’t know that equilibrium with a mongoose would be possible without extirpation of many native birds,” she said. “We have a lot to eat over here. We definitely should be worried.” (Excerpted from ‘An Invader Advances in Hawaii’ By Rachael Nuwer, in the New York Times, June 11.)

Now Its Grass Carp…. In the last few issues Nutshell has discussed illegal selling of Asian silver and bighead carp. Now its grass carp (Ctenopharyngodon idella). Michigan has charged David Shane Costner, of Harrisburg, AR, with 12 felony counts of illegally selling live Asian carp. The Michigan Attorney General's office said he had been driving around the southern part of the state selling the carp from store parking lots, for use in ponds, where they eat nuisance plants. He sold two grass carp last month in Midland to undercover officers from the state Department of Natural Resources. Grass carp were imported decades ago to clear fish ponds and sewage treatment lagoons of unwanted vegetation or grubs. Release of sterile grass carp is still allowed, by permit, in some states. (Excerpted from, ‘Man charged with selling live Asian carp in Michigan’ by John Flesher, in the Seattle PI, June 5.)

Mobile Invasive Species Aquarium. The Lake Superior Research Institute at University of Wisconsin is introducing a mobile aquarium that features at least 6 different aquatic invasive species, all caught in local waterways. Carrie Sanda, the Douglas County AIS Coordinator, travels around to different locations, teaching people about invasive species and the threat they pose to our lakes. "People always love seeing live animals and..."
New Fusarium Fungus Species. A University of California plant pathologist has identified a fungus that has been linked to the branch dieback and general decline of several backyard avocado and landscape trees in Los Angeles County. The fungus is a new species of Fusarium, transmitted by the Tea Shot Hole Borer (Euwallacea fornicatus), an exotic ambrosia beetle smaller than a sesame seed. The disease it spreads is referred to as ‘Fusarium dieback’. “This beetle has also been found in Israel and since 2009, the beetle-fungus combination has caused severe damage to avocado trees there,” said Akif Eskalen, an extension plant pathologist UC Riverside, whose lab identified the fungus. To date, the Tea Shot Hole Borer has been reported on 18 different plant species worldwide, including avocado, tea, citrus, guava, lychee, mango, persimmon, pomegranate, macadamia and silk oak. The beetle and fungus have a symbiotic relationship; when the beetle burrows into the tree, it inoculates the host plant with the fungus it carries in its mouth parts. The fungus then attacks the tree’s vascular tissue, disturbing water and nutrient flow, and eventually causing branch dieback. The beetle larvae live within the tree and feed on the fungus.

Although the beetle was first detected in Los Angeles County in 2003, reports of its negative impact on tree health received no attention until February 2012, when Eskalen found both the beetle and fungus on a backyard avocado tree showing dieback symptoms. ”The California Avocado Commission is concerned about the economic damage this fungus can do to the industry in California”, Eskalen said. For now, they are asking gardeners to watch their trees and report any sign of the fungus or beetle. “Symptoms in avocado include the appearance of white powdery exudate in association with a single beetle exit hole on the bark of the trunk and main branches of the tree. The exudate could be dry or it can appear as a wet discoloration.” A team has been formed to study Fusarium dieback in Southern California. Eskalen and Alex Gonzalez, a field specialist, are already conducting a survey to determine the extent of the beetle infestation and the likely extent of the fungus infection in avocado trees and other host plants. Report it by calling (951) 827-3499 or emailing aeskalen@ucr.edu (Excerpted from ‘Beetle-Fungus Disease Threatens Crops and Landscape Trees in Southern California’, in ScienceDaily, May 8.)

New EDRR Paper. A new paper in Biological Invasions, ‘Developing cost effective early detection networks for regional invasions’, by Alycia W. Crall et al., provides a new approach to early detection and rapid response (EDRR). As part of the Great Lakes Early Detection Network, authors asked stakeholders to indicate their needs for an effective EDRR communication tool. This led to the development of a website with five primary features: (1) the ability for casual observers to report a sighting; (2) a network of professionals to verify new sightings; (3) email alerts of new sightings, including data from all data providers across the region; (4) maps of species distributions across data providers; and (5) easy communication channels among stakeholders. This cost-effective framework integrates data and develops networks through a virtual community, to provide real-time data on current species distributions and improve cross-jurisdictional collaboration with limited oversight. Find more information at [http://www.springerlink.com/content/g7jgu612673511v5/fulltext.pdf?MUD=MP] (Thanks to Susan Jewell, FWS)

NC Facing Possible Tiger Shrimp Invasion. The Southeast may be on the brink of a population explosion of invasive shrimp. There has been an ominous spike in catches of Asian tiger shrimp (Penaeus monodon) in North Carolina and across the Southeast. The tiger shrimp is native to the Pacific and Indian Oceans, and can grow up to 14 inches long and weigh as much as 23 ounces. It is farmed commercially across the globe, but there are no known U.S. aquaculture facilities. It may have come to the U.S. in ballast water or arrived on ocean currents from wild populations in the Caribbean or elsewhere. In 2010, there were 32 reported sightings of the tiger shrimp in Gulf and Atlantic water; in 2012, those reports jumped to 331, according to Pam Fuller,
who runs the USGS Nonindigenous Aquatic Species database. “We can confirm there was nearly a tenfold jump in reports of Asian tiger shrimp in 2011, and they are probably even more prevalent than reports suggest because the more fisherman and other locals become accustomed to seeing them, the less likely they are to report them.” Carolina’s coast is basically the northern extreme of the tiger shrimp’s invasive range, as they can’t live in water cooler than about 55 degrees. The first of the oversized crustaceans was caught in 2006 in Pamlico Sound. Only two were reported in 2010, but then the number jumped to 19 in 2011. Like its smaller cousins, the shrimp is a bottom feeder, nibbling detritus, small plants and animals, but the large ones can eat larger creatures, and they tend to be more carnivorous than native shrimp. The extraordinary size of the tiger shrimp is one of the biggest wild cards in trying to predict its effect. There is nothing else quite like it in the area. It’s possible that if populations zoom, the tiger shrimp could turn out to be a better competitor for food and would edge out native shrimp and fish species. But for now, researchers are tracking the population size and waiting to see what happens. If the population does soar, sautéing could be at least part of the solution, as the giant shrimp have an established culinary reputation in Asia and elsewhere, and often are sold under the name Giant Tiger Prawns. (Excerpted from ‘Scientists see increase in tiger prawn sightings’ by Nikki Buskey, in the dailycomet.com, April 27, 2012, and ‘Lobster-sized shrimp moving into N.C. waters’, by Jay Price / News & Observer WCNC.com May 25.)

**New Journal.** BioInvasions Records, is a new open access, rapid peer-reviewed, international journal. It focuses on applied research on alien species and biological invasions in aquatic and terrestrial ecosystems of Europe, North America and other regions. The very first edition of BioInvasions Records is now online at [http://www.reabic.net/journals/bir/2012/Issue1.aspx](http://www.reabic.net/journals/bir/2012/Issue1.aspx). The journal provides the opportunity of timely publication of first records of aquatic and terrestrial invaders and other relevant information needed for risk assessments and early warning systems. Relevant technical reports and conference proceedings can also be considered for publication in this journal. (Thanks to Joanne Grady, FWS)

**Bill To Strengthen the Lacey Act.** On May 30, Rep. Louise Slaughter and a bipartisan group of nine co-sponsors introduced H.R. 5864, the Invasive Fish and Wildlife Prevention Act of 2012. The bill would strengthen the USFWS ability to designate animals as “injurious,” a category which would prohibit their import or shipment between states without a permit. The legislation would empower FWS to become proactive rather than reactive in its listing and restriction process. It would implement a new regulatory process to more rapidly evaluate risks of importing non-native wildlife, and restrict those species that pose serious risks before they are imported to the United States. Current legislation regulating animal imports does not require animals being imported to first be screened for invasiveness, for diseases they might carry, or for the risks they pose to human or wildlife health. This proposed legislation will create a new FWS screening system within six years, while immediately giving the agency greater flexibility and authority to make science-based decisions regarding prohibiting or restricting live animals in trade. The FWS also would receive emergency authority to respond to the animal and human health threats posed by the live animal trade, a known potential vector for pathogens such as the West Nile and monkeypox viruses. “The existing 112-year-old regulatory process is very slow and utterly inadequate for the massive trade of live wild animals that is occurring in the 21st Century. It’s like continuing to use a musket in the age of unmanned drones,” said Peter Jenkins, of the National Environmental Coalition on Invasive Species. To read the entire press release, go to [http://www.marketwatch.com/story/us-
Goats: A Cheap Restoration Assist. The New York City Parks Department is using goats as its latest weapon in the war on Phragmites, an invasive reed that chokes the shoreline. Goats are part of the first phase of a wetland restoration at what will soon be Freshkills Park. The area is in transition from its former life as the world’s largest landfill to its future as the largest park to be developed in New York City in more than a century. The city is renting the goats ($20,625) for six weeks, and Parks officials are counting on them to clear the Phragmites from acres of wetlands that will eventually be cultivated with native grasses like Spartina and black needle rush. They hope the goats will weaken the Phragmites, setting the stage for the second phase of attack, which will be to apply herbicide, scarify the earth, and lay down sand. “We want to introduce the idea of using goats to help in vegetation management,” Eloise Hirsh, park administrator. “The sanitation department mows us once a year. But this is 2,200 acres. We need help.” As Freshkills Park is developed in phases over the next three decades, it will be a laboratory for green practices; there are plans for composting toilets, green roofs, rain gardens and a native seed farm. The official opening of the park is two or three years off, though it is open periodically for tours. Three of the four giant mounds formed by garbage are now capped, and the parks department will soon solicit bids on the first stage of development- 21 acres with walking paths and a bird observation tower overlooking the wetlands. If the goats prove successful, Freshkills Park may one day have a permanent herd. “It’s exciting to be able to replace what would be a carbon-polluting mowing strategy with a more natural approach,” said Andrew Deer, a landscape architect for the parks department. While goats have been deployed for Phragmites duty elsewhere, some ecologists are skeptical. “I’m not a big fan of goats,” said Bernd Blossey, an associate professor at Cornell University. “I understand why people are desperate to try them. But they will eat the leaves but not the stems, and they also don’t like getting their hooves wet.” Blossey is experimenting with moth caterpillars, which can weaken Phragmites. But as the goats made their debut in mid-June, any such doubts were pushed to the background. Ms. Hirsh was already looking ahead to a day when goats not only keep phragmites in check, but also put Staten Island on the food map. “We would like to have a cheese manufacturer here,” she said. “I know there will be lots of skepticism. But it would be a pretty eloquent statement about how you really can restore land that was formerly very damaged.” (Excerpted from ‘To Tackle an Invasive Weed, Bring In the Hooved Pros’, in the New York Times, June 21.)

New Emerald Ash Borer (EAB) Calculator. A new version of the EAB cost calculator is now available. Driven by an invasion wave model, authors estimate costs under the assumption that management would be most aggressive during the initial invasion. After most untreated trees are killed, the population pressure and the management needs would be far lower. The calculator [http://extension.entm.purdue.edu/treecomputer/v2beta/](http://extension.entm.purdue.edu/treecomputer/v2beta/) comes with an online tutorial, and is one of several online tools available on the Indiana EAB homepage, [EABINDIANA.INFO](http://www.eabindiana.info) website. Other available tools include:
- Neighbors Against Bad Bugs, a program that gets communities to act collectively in a timely manner that helps them save money and trees [http://extension.entm.purdue.edu/eab/index.php?page=management/nabb](http://extension.entm.purdue.edu/eab/index.php?page=management/nabb)
- Arrest That Pest, a guide for youth leaders, naturalists and secondary school teachers to fight invasive species...
through education [http://extension.entm.purdue.edu/arestthatpest/]. For more information, contact Clifford S. Sadof < csadof@purdue.edu>. (Thanks to Sharon Collman, WSU Extension)

**Emerald Ash Borer (EAB) Information Sources.** Other EAB websites of interest:  
[http://www.emeraldashborer.info/index.cfm] - seems to be a clearing house of EAB info for homeowners, tree ID, posters, etc.  
[http://www.emeraldashborer.info/map.cfm] seems devoted to EAB and has some distribution maps. A USDA map of eastern states and counties with EAB is available at  
(Thanks to Sharon Collman, WSU extension.)

**Marsh Dog© Nutria Treats.** Louisiana’s wetlands sustain one of the world’s best fisheries, provide essential habitat for over five million waterfowl, and protect communities from storms. But each year LA loses over 25 square miles of coastland to erosion. And nutria (*Myocastor coypus*) significantly contribute to this alarming problem by eating critical marsh vegetation. LA spends millions of dollars annually to reduce the nutria population and address nutria damage. Now residents Hansel and Veni Harlan have begun using the high-quality nutria meat in dog treats. With a grant from The Barataria-Terrebonne National Estuary Program, Marsh Dog© was born. Marsh Dog’s premier product “Barataria Bites” is named after the Barataria-Terrebonne National Estuary, which, notably, is the fastest disappearing land mass in the world. The nutria used by Marsh Dog© are harvested from this estuary. The biscuits are then prepared, baked, and packaged in Baton Rouge. Marsh Dog© supports local farmers by using Louisiana products such as brown rice and sweet potatoes in its biscuits. Currently you can only buy “Barataria Bites” at three local Baton Rouge businesses, but Marsh Dog© hopes to be in other markets soon.  

**Can Cancer Research Help Prevent Spread of Invasives?** A new article in the May-June issue of American Scientist (volume 100, # 3), *Aquatic Invasive Species: Lessons from Cancer Research*, by Adam Sepulveda et al., may be worth checking out. Aquatic invasive species are increasingly disrupting ecosystems, and successful control of these invasions has been rare. In contrast, the medical community has long worked to develop tools for preventing and fighting cancer. Its successes are marked by a coordinated research approach with multiple steps: prevention, early detection, diagnosis, treatment options and rehabilitation. The authors discuss how these steps can be applied to aquatic invasive species to expedite tool development and implementation and achieve biodiversity conservation goals. (Thanks to Mark Sytsma, PSU)

**USDA Hungry Pest Campaign.** USDA’s Animal and Plant Health Inspection Service (APHIS) has announced a new, multi-state, public education initiative to enlist public support for preventing the spread of invasive species. The major multi-year campaign, dubbed "Hungry Pests," focuses on USDA’s most wanted invasive species, and its launch coincided with the observance of Invasive Plant Pest and Disease Awareness Month in April. The Hungry Pests initiative includes a new television public service announcement that features a computer-generated creature made of invasive pests, who fancies himself a tourist and tries to hitchhike with passing motorists. The ad urges people to "Leave Hungry Pests Behind." View it at [www.hungrypests.com/pr-psa/]. The USDA has also identified a list of invasive pests that pose big threats to agriculture and economy, including four moths (European grapevine moth, false codling moth, European gypsy moth, and light brown apple moth); three flies (Mediterranean fruit fly, Mexican fruit fly and Oriental fruit fly); two beetles (Asian longhorn beetle and emerald ash borer); plant diseases (sudden oak death, and citrus greening), a mollusk (giant African snail), and a disease carrier (Asian citrus psyllid). USDA stresses that the more people know about hungry pests, the more they can do to stop them. Go to [www.HungryPests.com] to learn more about the dangers posed by these species, and get involved on Facebook at [www.facebook.com/hungrypests].  
(Excerpted from a USDA press release, Marketwire, April 3.)

**Think We Didn’t Have Many Invasions in the 70s?** Sharon Collman, WSU, writes: “We are getting our share of new pests. I was clearing out files and found a USDA ‘List of intercepted Plant Pests’ Oct. 1, 1978 to
Sept 30, 1979. What an eye-opener, in terms of numbers and host plants: 169 pages of tiny print, including cross-referenced lists. [There were] 18,644 total interceptions; insects (14002), mites (170), mollusks (815), Diseases, (3,630) and nematodes (27). And that was before our new trade agreements." [Ed Comment: wouldn’t it be interesting to see today’s statistics?]  

INTERACTIONS

Co-Evolution, As Native Species Fight Back. Invasive species can devastate ecosystems, and, until now, scientists have had little reason to believe that native plants could mount a successful defense. A new study shows that some native clearweed plants (Pilea pumila) have evolved resistance to invasive garlic mustard (Alliaria petiolata) - and that the garlic mustard appears to be waging a counterattack. The study, published in the early edition of the journal Proceedings of the National Academy of Sciences, is thought to provide the first evidence of co-evolution between native and invasive plant species. "The implications of this study are encouraging because … the study suggests that if you were to take a longer view—a timescale of centuries—that exotic species could become integrated into their communities in a way that is less problematic for the natives," said study author Richard Lankau, assistant professor at University of Georgia. Garlic mustard was introduced to the U.S. from Europe roughly 150 years ago, first in NY and VA, and then in the Chicago area. It continues to spread rapidly throughout the Northeast, Midwest and Southeast. It can form dense carpets in the forest understory and, even after being physically removed from an area, it can reestablish within a year. Much of the plant's success is a result of the chemical warfare it wages with a compound known as sinigrin, which kills fungi that help native plants extract nutrients from the soil. Sinigrin is relatively new to North America, and this novelty gives garlic mustard a huge competitive advantage. Through three years of greenhouse and field experiments conducted over in five states, Lankau showed that invasive garlic mustard produces more sinigrin in areas where more local plants are present. He found that native clearweed plants, which were chosen for the study because they occupy the same forest understory habitat, show higher levels of resistance to sinigrin in areas where the two species have a longer history of coexistence. (Excerpted from ‘Study provides first evidence of coevolution between invasive, native species’ on phys.org, June 28.)

Ecological Interaction Chains: Linking Native Trees to Manta Ray Populations. A new study by Douglas McCauley and Paul DeSalles, published in Scientific Reports, describes one of the longest ecological interaction chains ever documented. Their findings shed light on how human disturbance of the natural world may lead to widespread, yet largely invisible, disruptions of ecological interaction chains. This, in turn, highlights the need to build non-traditional alliances- among marine biologists and foresters, for example- to address whole ecosystems across political boundaries. Last fall, McCauley and DeSalles were in remote Palmyra Atoll in the Pacific, a unique spot where scientists can compare largely intact ecosystems within shouting distance of recently disturbed habitats. They were using acoustic tags to track manta ray movements for a predator-prey interaction study, and noticed the mantas kept returning to coastlines of certain islands. Meanwhile, graduate student Hillary Young was studying palm tree proliferation's effects on bird communities and native habitats.

As everyone discussed their work and traded theories about their observations, a picture of what was actually happening out there took form, McCauley said. Through analysis of nitrogen isotopes, animal tracking, and field surveys, they showed that replacing native trees with non-native palms led to about five times fewer
roosting seabirds, which led to fewer bird droppings to fertilize the soil below, to fewer nutrients washing into surrounding waters, to smaller and fewer plankton in the water and to fewer hungry manta rays cruising the coastline. "This is an incredible cascade," said researcher Rodolfo Dirzo, a professor of environmental science and senior fellow with the Stanford Woods Institute for the Environment. "As an ecologist, I am worried about the extinction of ecological processes. This dramatically illustrates the significance of such extinctions.

"Equally important is what the study suggests about these cascades going largely unseen… Such connections do not leave any trace behind," said researcher Fiorenza Micheli, an associate professor with the Stanford Woods Institute. "Their loss largely goes unnoticed, limiting our understanding of and ability to protect natural ecosystems." By way of comparison, researcher Robert Dunbar, a Stanford Woods Institute senior fellow, recalled the historical chain effects of increasing water demands from Central California's rivers. When salmon runs in these rivers slowed from millions of fish to a trickle, natural and agricultural land systems lost an important source of marine-derived fertilizer. These lost subsidies from the sea are now replaced by millions of dollars' worth of artificial fertilizer applications. "Humans can really snip one of these chains in half," Dunbar said. (Excerpted from 'Intricate, Often Invisible Land-Sea Ecological Chains of Life Threatened With Extinction Around the World', in ScienceDaily, May 18, 2012)

**Purple Loosestrife Disrupts Ecosystem Interactions.** A new study shows that purple loosestrife (*Lythrum salicaria*) triggers a chain of interactions crossing traditional ecosystem boundaries, and connecting aquatic to terrestrial systems through dragonflies that exploit, at different life stages, both the water and the land resources. "It's easy to say that everything is connected in some way, but how much these connections matter is something that we don't always know," says Kevin Smith, PhD, associate director of the Tyson Research Center, a 2,000-acre field station. His experiment, published electronically May 24 by the journal *Oecologia* in advance of print, will help inform decisions about biological control of invasive species, restoration of degraded habitats, and similar ecological issues. The experiment was inspired by the 2005 work of his colleague Tiffany Knight, showing that plants do better if they are near ponds with fish, because the fish eat dragonfly larvae, reducing the population of dragonflies that prey on plant pollinators. Intrigued by the study because the effect was indirect and cut across traditionally defined ecosystems, Smith wanted to see if he could find links that connected land to water impacts instead of water to land impacts. If fish affected land plants, could plants affect fish or aquatic communities? Working with Loosestrife, a prolifically flowering invasive, in summer, 2009, Smith and colleagues created eight artificial wetlands, each consisting of a central stock tank and four smaller surrounding pools. The tanks were stocked with six aquatic plant species and three snail species, and inoculated with smaller zooplankton and phytoplankton from local ponds. The remainder of the aquatic community, such as frogs, dragonflies, flies, beetles and bugs, was allowed to assemble naturally. Potted loosestrife plants were placed in each of the four small pools and separated from the tanks, so that only the flowers, not plant litter and pollen, would play a role in the ecosystem of the central pool. The number of loosestrife flowers in each "wetland" was manipulated to mimic differences in loosestrife density. The loosestrife plants in two wetlands were left alone, but flowers at the other wetlands were picked to reduce their numbers to 75 percent, 50 percent or 25 percent of the flowers at the untouched wetlands. During the experiment, the small insects and dragonflies visiting the pools were regularly counted and categorized. At the end of the summer, the zooplankton and phytoplankton in the eight central tanks were sampled and identified. Smith was able to track the effect of the loosestrife flowers across four trophic levels, and two ecosystems, the terrestrial and the aquatic ones, as follows: Wetlands with abundant flowers attracted more pollinating insects; the insects in turn attracted more of the carnivorous dragonflies; the well-nourished dragonflies laid more eggs in the central ponds; and the voracious dragonfly larvae that hatched from the eggs altered the diversity of the zooplankton communities in the ponds. Smith says, "...we showed the interconnections are actually strong enough to transmit disturbances through and across webs. We pushed on one link and something four links away in another ecosystem moved." (Excerpted from 'Foundational Concept of Ecology Tested: Purple Loosestrife Altered Life in Nearby Ponds', in ScienceDaily, June 23, 2012.)
Ripple Effect of Invasive Species. The summer issue of *The Wildlife Professional* is mostly on invasive species, and several articles are on the ripple effect of invasive species. Here is the link to the whole issue: [http://store.wildlife.org/scriptcontent/Journal/twp_archive/Summer%202012.pdf](http://store.wildlife.org/scriptcontent/Journal/twp_archive/Summer%202012.pdf) (Thanks to Kevin Aitkin)

Lake Huron: Anatomy of a Meltdown. In only three years, Lake Huron went from a salmon fishing Mecca to a ghost of its former self. In 10 small towns, the economic loss was $11 million a year. Many people have forecasted that the carp invasion, if it were to occur, would result in the demise of the salmon fishery and the loss of billions of dollars from sport fishing tourism in the region. This forecast is debatable, but what is lost in the story about Asian carp is that such a collapse has already occurred in Lake Huron, due to changes caused by other invasive species in the lake. Invasive fish, plant and animal species have wreaked havoc on the Lake Huron ecosystem, causing what some scientists term an invasion meltdown. Invasive species, including sea lamprey and alewife in the 1940s-1970s, have drastically altered abundances food sources, habitat, and reproductive cycles of native organisms, even causing several extinctions. The challenges of invasive species expansion were met in the 1960s by major management actions, such as the control of sea lamprey through chemical treatment of spawning streams, as well as reduction of alewife populations by introducing the Pacific salmon as a predator to help control invasive alewife and sea lamprey. The effort was successful, but now other invasive species have populated the lake and led to a collapse of the Lake Huron salmon fishing industry… This is a great article, but way too long to print here and it would not do it justice to try and summarize. (Read the whole article in ‘State of the lake: aquatic invasive species in Lake Huron’, in Earth Sky, May 30.)

New Paper on Bottom Barriers: A new paper, *The Control of an Invasive Bivalve, Corbicula fluminea, Using Gas Impermeable Benthic Barriers in a Large Natural Lake*, by Marion E. Wittmann et al, (Environmental Management, DOI 10.1007/s00267-012-9850-5, March 2012). Anoxia can restrict species establishment in aquatic systems, and the artificial promotion of anoxia can provide an effective control strategy for invasive molluscs. Low abundances (2–20 m-2) of the nonnative Asian clam were first recorded in Lake Tahoe, CA–NV in 2002; by 2010, nuisance level population densities (10,000 m-2) were observed. A non-chemical control method, using gas impermeable benthic barriers to reduce dissolved oxygen concentrations available to the clam, was tested in this ultra-oligotrophic natural lake. In 2009, the impact of ethylene propylene diene monomer (EPDM) sheets on *Corbicula* beds was tested on 1–7 day intervals over a 56 day period in August–September. At an average water temperature of 18 C, dissolved oxygen concentrations under these small barriers were reduced to zero after 72 hours, resulting in 100 % clam mortality after 28 days. In 2010, a large EPDM barrier (1,950 m2) was applied to *Corbicula* populations for120 days (July–November). Abundances were reduced over 98 % after barrier removal, and remained significantly reduced (90 %) 1 year later. Non-target benthic macroinvertebrate abundances were also reduced, with variable taxon-specific recolonization rates. High *Corbicula* abundance under anoxic conditions increased the release of ammonium and soluble reactive phosphorus from the sediment substrate; but levels of unionized ammonia were low at 0.004–0.005 mg L-1. Prolonged exposure to anoxia using benthic barriers can provide an effective short term control strategy for *Corbicula*. (Thanks to Marion Wittman, U. Notre Dame)

### Around the World

**Jellyfish Explosions.** Jellyfish populations are growing in many of the world’s coastal ecosystems, especially in areas affected by pollution, overfishing, and warming waters, according to a new study done by University of
Population trends of native and invasive species of jellyfish. Red: increase (high certainty); orange: increase (low certainty); green stable/variable; blue decrease, grey: no data. Circles represent jellyfish populations with relative sizes reflecting confidence in the data.

British Columbia researchers. “Numerous types and species of jellyfish appear to be increasing; the reported increases are certainly not due to one type jellyfish in particular,” said Lucas Brotz, lead author of the study with the Sea Around Us Project at UBC. “That said, several species of jellyfish that appear to be highly invasive are invading new regions around the globe all the time (probably due to transport from cargo ships)” Brotz said. The most notorious of these is a comb jellyfish, Mnemiopsis leidyi, which occurs in new places every year, and it often rapidly increases in abundance, potentially altering the ecosystems it invades. The study, published in April’s edition of the journal Hydrobiologia, examined data for numerous species of jellyfish for 45 of the world’s 66 Large Marine Ecosystems. They found increasing jellyfish populations in 62 per cent of the regions analyzed, including East Asia, the Black Sea, the Mediterranean, the Northeast U.S. Shelf, Hawaii, and Antarctica. (Excerpted from ‘Jellyfish numbers growing in many coastal ecosystems’, in Summit County Citizen’s Voice, April 19, 2012.)

Ireland’s Bio-Security Guidelines For Scuba Divers. Aquatic Invasive Species (AIS) and fish parasites or diseases are readily transferred from one water body to another on diving gear, boats and protective clothing. These can be very damaging to resident fish stocks, the aquatic habitat and the general environment. To ensure invasive species and fish diseases are not inadvertently transferred into Ireland’s freshwaters from abroad, or within-country from an infested area to one that is free from these organisms, it is essential that all scuba diving equipment is routinely inspected and disinfected following each diving trip. To download the guidelines, go to: [http://www.fisheriesireland.ie/Invasive-species-news/invasive-species-biosecurity-guidelines-for-scuba-diving.html] (From Inland Fisheries Ireland, June 14, thanks to Stephen Phillips.)

**Major Upcoming Invasives Meetings**

**July 18-19, 2012:** 2012 PNWER Invasive Species Conference, Saskatoon, SK, Canada. For more info, go to: [http://www.pnwer.org/InvasiveSpeciesConference.aspx]


**August 30, 2012:** Training course on Non-Native Fish and their Impacts, NW Environmental Training Center (NWETC). Issaquah WA. Register at [www.nwetc.org]
**September 4-7, 2012.** Western Regional Panel on Aquatic Nuisance Species annual meeting, Salt Lake City, Utah. For more info, go to [http://www.fws.gov/answest/meetings.html](http://www.fws.gov/answest/meetings.html)

**October 3-4:** Columbia River Team/100th Meridian Initiative meeting, Spokane WA. For more information contact sphills@spsmfc.org.

**October 8-11, 2012:** 18th Australasian Weeds Conference 2012, Melbourne, Victoria, Australia. For more info, go to [http://www.18awc.com](http://www.18awc.com).

**October 16-17, October 30-31 and November 13-14.** Advanced watercraft inspection and decontamination training for Quagga/Zebra Mussels, Lake Mead. Contact Bill Zook <bjzook@msn.com> ASAP if interested.

**October 29-31, 2012:** Upper Midwest Invasive Species Conference, La Crosse, WI. For more info, go to [www.umisc2012.org for more information].


**March 12-13, 2013:** International Didymo Conference, Providence, RI. Abstracts for papers and posters are due November 1, 2012. For more information, go to: [http://www.stopans.org/Didymo_Conference_2013.htm](http://www.stopans.org/Didymo_Conference_2013.htm)

**April 21-25, 2013:** 18th International Conference on Aquatic Invasive Species, Ontario, Canada. Call for abstracts. For more info, go to [www.icaais.org](http://www.icaais.org).

**End of August 2013:** International Conference on Marine Bioinvasions, Vancouver, Canada. Date TBD