



ISSUE 31

January-March 2011

AQUATIC INVASIVE SPECIES NEWS IN A NUTSHELL

Joan Cabreza, Editor

This newsletter focuses primarily on Western U.S. and aquatic issues, but it also contains terrestrial, national, and international news of interest. Contents do not necessarily reflect views of the PSMFC. We welcome questions, comments, and news items; to submit these, or to subscribe/unsubscribe, contact the Nutshell editor at <joancabreza@msn.com>. For past Nutshell issues 1-30, go to [<http://www.aquaticnuisance.org/newsletters>].

[This Quarter's Weird News](#)

A New Way to Monitor? A Russian waterworks company is using six Giant African snails (*Achatina fulica*) to monitor pollution released from a sewage incinerator located on the outskirts of Saint Petersburg. The snails are common in sub-Saharan Africa, and considered an invasive species. The snails have been fitted with heart



monitors, and the plan is for the snails to breathe in the plant's smoke, and then have their readings compared to a control group. This particular snail was chosen because, according to the Vodokanal state utilities company, "they have lungs and breathe air like humans". While the waterworks company hopes that the snails successfully monitor pollution, they are facing scrutiny by various activist groups. Vodokanal reportedly refused Greenpeace access to their site last year, and the group is concerned. Greenpeace head Dmitry Artamonov stated, "I don't know if snails get cancer, but even if they do, it won't happen straight away, and we will not hear about it from Vodokanal." (*Excerpted from 'Giant snails monitor air pollution in Russia', Joanna Zelman, Huffington Post, January 23*)

(Ed Comment: Maybe I am missing something here, but... Snail heart monitors?? What's wrong with good old air pollution monitoring?)

[Successes & Lights at the End of the Tunnel](#)

Whirling Disease (WD) Impact Less Than Anticipated. The whirling disease parasite, *Myxobolus cerebralis*, first described in Germany in 1903, was accidentally introduced into North America in the 1950s. The parasite imbeds itself into fish, injecting spores that attack and eat cartilage. Young fish, which are more

cartilage than bone, eventually bend in two and swim in circles, unable to eat or avoid predators. Within a year of its 1994 discovery in Montana, whirling disease had spread to 14 streams, and officials called it the "single largest threat to wild, naturally reproducing trout populations in the Rocky Mountain Region." But today, some fish biologists believe the crisis never materialized, in part because of fish behaviors.

The Whirling Disease Initiative was established in 1997; \$9 million was spent on more than 120 research investigations that provided a variety of valuable information. "We learned it (WD) manifests itself differently in different places; that different species have different resistance; and that the cleaner streams [are] less likely to host the worms that carry it. It's also interesting that ...nature selected ways for the fish to be resistant," said Bruce Farling, Executive Director of MT Trout Unlimited. A four-year trout spawning behavior study also determined that in a 74-mile stretch of the Missouri River, 46 percent of the habitat either had no infection or was lowly infected, and 43 percent of the rainbow trout used that habitat. This is one reason there was no population collapse. Another study surgically implanted radio receivers in fish to see where they spawned, and it showed trout are very mobile, traveling an average of 42.8 miles over a three-year period, with one putting on 324 miles surprisingly. It found rainbow trout often spawned at least 4 miles away from their previous year's location. "It's a highly diverse spawning strategy. That straying mechanism helps them avoid unfavorable conditions and helps them combat that disease," said state biologist Grant Grisak. Today, Grisak estimates they have 2,818 rainbow trout per mile on the Missouri River, compared to a long-term average of 2,933.

Ron Spoon, another state biologist, feared a complete collapse of the rainbow population when whirling disease was found in the Jefferson River, but a study showed that the temperatures that prompted trout to spawn weren't conducive to whirling disease. "So it missed the rainbows there because of the timing of their life cycles. The drought had a much bigger effect on the population than the disease, even though it's still there at low levels", Spoon said. But some former spawning grounds still aren't nearly as productive, due to the disease. In other places, the fishery changed dramatically from rainbow trout 15 years ago, to predominantly brown trout today. Browns spawn in the fall, when temperatures are cool, and their young hatch earlier in the spring than rainbows, which researchers say makes them much less susceptible to the disease. Brown trout also evolved with whirling disease in Europe and are somewhat more resistant to it. "I think cutthroat benefited too; there seems to be a few more. So there was a shift in the community, rather than the loss of an opportunity, and we all kind of adapted to it," said Spoon. Eileen Ryce, MT aquatic nuisance species coordinator said. "There are some places in the state we're still very concerned about, but overall we're just monitoring it and hoping it doesn't spread."

(Excerpted from Whirled Away, by Eve Byron, in the Independent Record, February 17.)

[Zebra/Quagga Mussel News](#)

Lake Texoma, Texas Zebra Mussel Update. The North Texas Municipal's Water District's (NTMWD) Lake Texoma pump system hasn't been turned in almost two years and they will stay that way until a strain of destructive zebra mussels dies down (See Nutshell #30). The strain has become so invasive that the NTMWD announced they would move to a "Stage 1 Water Conservation" level starting April 19 for cities including McKinney. Stage 1 consists of a heightened level of awareness about the water conservation efforts, in which residents are urged to reduce their water usage and look for leaks in need of repairs at their homes and businesses. Anna Folmnsbee, city spokeswoman, said the Stage 1 awareness level will not affect the city's watering ordinance that allows residents to water their lawns and landscaping up to two times a week before 10 a.m. or after 6 p.m. The pumps for Lake Texoma haven't been operating since the population was discovered, Hickey said. "So far, the lack of pumping from Lake Texoma has reduced the water supply by nearly 25 percent as crews try to find a way to limit the spread of the mussels. The lack of rain has also aggravated the problem, Hickey said. *(Excerpted from 'Zebra Mussels Force Stage 1 Water Conservation', by Danny Gallagher, in the Star Local News, March 26.)*

First Water Filtration Station for Elimination of Zebra Mussel in Spain. The first water filtration station for the elimination of the zebra mussel on the irrigated terrains in Oion, in the Basque province of Álava/Araba, has been inaugurated. Mr Xabier Agirre, Chief Deputy of the province, said, “Despite the fact that, only a few metres away, other administrations have opted to do nothing in the control of the zebra mussel, the Álava/Araba provincial government has taken concrete measures. The latest and most pioneering decision was the water filtration station, a project with a clear objective: to eliminate the zebra mussel population that has settled along the 47 kilometres of piping and the two regulating tanks of the Oion irrigation system”. He pointed out the environmental and economic consequences arising from the presence and expansion of this invasive species. The work involved improving the current installations for reception and pumping of water of the Community of Irrigators of Oion, with the goal of controlling damage to the irrigation system due to the presence and multiplication of the zebra mussel in the Ebro basin. The investment undertaken has enabled the installation of a new physical barrier which impedes the entrance of the zebra mussel into the irrigation system – through the incorporation of automatic mesh filters of 50 microns and 25 microns, the substitution of the three impulsion pumps and the construction of buildings and ancillary public works. For the full story go to: [http://www.basqueresearch.com/berria_irakurri.asp?Berri_Kod=3238&hizk=1]

Tahoe Bill Includes AIS Funding. Hoping for better luck this year, Nevada and California lawmakers are pushing for congressional passage of a bill providing \$415 million in federal funds over a decade to pay for environmental improvements at Lake Tahoe. U.S. Sen. Dianne Feinstein introduced the Lake Tahoe Restoration Act of 2011 (S. 432). Co-sponsors are U.S. Sen. Harry Reid, U.S. Sen. John Ensign, and U.S. Sen. Barbara Boxer. The act was introduced in 2009 but failed to clear Congress. It was approved by a Senate committee last year but again stalled before Congress adjourned. The original Lake Tahoe Restoration Act of 2000 expired last year. Describing Tahoe as a "treasure that we have a duty to protect," Feinstein said passage of the bill is important toward continued success in restoring Tahoe's troubled environment. Gains have been made over the last 15 years, Feinstein said, and "this bill gives us the opportunity to continue to confront those challenges and make sure we do our best to preserve Lake Tahoe for generations to come." The bill would provide \$20.5 million to prevent introduction of invasive species such as the quagga mussel, funding boat inspections and similar programs. (*Excerpted from Lawmakers Seek Federal Funding for Lake Tahoe, by Jeff DeLong, Reno Gazette Journal, March 2.*)

Good News: NY Native Mussels Stage Comeback Against Zebra Mussels. In New York's Hudson River, zebra mussels (*Dreissena polymorpha*) appear to be declining, as displaced native species stage a comeback. Researchers from the Cary Institute of Ecosystem Studies in Millbrook, NY, had been regularly sampling plankton and water chemistry in the Hudson's 150-kilometer freshwater estuary for 5 years, and had started sampling riverbed invertebrates the previous year. So when zebra mussels appeared in 1991, ecologist David Strayer and colleagues were prepared to study their effects. The data set's unparalleled length and continuity enabled Strayer's team to detect population changes and the effects of mussels that have eluded researchers elsewhere. Zebra mussels hit the Hudson hard; they quickly ate most of the river's plankton, and native mussels, clams, and other invertebrates plunged to as little as 1% of their original populations. Then to everyone's surprise, around 2001 the native mussels stopped declining. The trend persisted, and in 2007, researchers reported a solid, although incomplete, comeback. This summer, they documented native zooplankton rebounding, too, and an increased death rate among large zebra mussels. In a study, published in the January 2011 issue of *Oecologia*, Strayer and colleagues analyzed their long data set, estimating the survival rate of each age class of zebra mussels over time, and the amount of water the mussels filter as they feed. They also looked for population trends in native invertebrates, including clams, nematodes, and flatworms. Compared to the initial zebra mussel invasion in the Hudson, the team found mussel survival rate has fallen by 99% and their water filtration by 82%. Possibly native blue crabs or other predators are eating more zebra mussels or their larvae, or perhaps some undetected pathogen or parasite is keeping them in check, but *native invertebrates are approaching their pre-invasion numbers*. Still, the Hudson's recovery is far from complete. Worryingly, phytoplankton have not returned. Without knowing the reasons behind the river's apparent

turnaround, Strayer and colleagues can't predict whether it will continue, or whether other waterways might follow a similar path.

Biologist Thomas Nalepa of NOAA in Ann Arbor, MI, says something similar may be happening in at least one corner of the Great Lakes. Nalepa has preliminary data in Lake Huron's Saginaw Bay showing both invasive mussel species declining and lake-bed invertebrates recovering. Elsewhere, however, there are no signs of recovery, but Nalepa says, "but then again, there aren't very many studies out there that look at changes over the long term." (*Excerpted from 'Musseled-out native species return to the Hudson', by Rebecca Cutler, in Science Now, January 21.*) Read more: [http://www.upi.com/Science_News/2011/01/21/Zebra-mussels-lose-stranglehold-on-Hudson/UPI-92791295659484/#ixzz1C6JrD6Rz]

Good News for Flathead Lake. On February 8, Montana Fish, Wildlife and Parks announced there appear to be no quagga/zebra mussels in Flathead Lake, MT. The announcement followed a scare last fall when microscopic larvae suspected to be from zebra or quagga mussels were found in plankton samples collected from the Woods Bay area. Three USGS divers searched for mussels in likely locations at the north end of Flathead Lake in December. Water samples were also sent to labs at the U.S. Bureau of Reclamation and the California Department of Fish and Game for DNA testing, but no signs of the mussels were found. Most recently, a scientist at the University of Montana Yellow Bay Biological Station studied the suspected organisms, and determined them to be "a dinoflagellate", a tiny plankton common to Flathead Lake. Montana recognizes they cannot let their guard down, but for now, this is good news! (*Excerpted from a MFWP Press Release, February 8.*)

New Article: Susceptibility of Quagga mussels to Hot-water Sprays as a Means of Watercraft

Decontamination. A new article reports on a study (funded by USFWS/PSMFC) led by Dr David Wong of UNLV on the efficacy of hot pressure wash decontamination. Abstract: The recent spread of dreissenid mussels to various bodies of water in the western US has sparked interest by many state and federal agencies to develop protocols to stop further expansion. Quagga mussels (*Dreissena rostriformis bugensis*) are of particular importance as they are currently the most widespread dreissenid species in the region. This project examined the susceptibility of quagga mussels to hot-water sprays at different temperatures and durations of spray contact at Lake Mead (Nevada-Arizona, USA). Emerged adult quagga mussels were exposed to hot-water sprays at 20, 40, 50, 54, 60, 70, and 80°C for 1, 2, 5, 10, 20, 40, 80, and 160 s. Sprays at $\geq 60^\circ\text{C}$ for 5 s were shown to be 100% lethal. Sprays of 54°C for 10 s, 50°C for 20 s, and 40°C for 40 s also resulted in 100% mortality. A spray temperature of 60°C for 5 s is recommended for mitigating fouling by quagga mussels. For the full article go to [<http://www.informaworld.com/smpp/content~db=all~content=a934522631~frm=titlelink>], or contact Dr. Wong, at <David.Wong@unlv.edu>.

New Report: Zebra Mussel Detection Methods. A new report, *Reliability of Early Detection of Dreissena spp. Larvae by Cross Polarized Light Microscopy [CPLM], Image Flow Cytometry, and Polymerase Chain Reaction Assays: Results of a Community Double-Blind Round Robin Study (Round Robin Study Phase II)*, by Marc E. Frischer, Sandra A. Nierzwicki-Bauer, and Kevin L. Kelly, is now available. An excerpt from the conclusion section: "Based on the results of this study and the previous one (Frischer and Butler, 2009), it is apparent that, at the present time, CPLM is the most reliable of the available *Dreissena* spp. mussel detection assays. Impressively, eight of the nine participating laboratories returned perfect results with respect to presence and absence detection, and no systematic quantification errors were apparent. Thus, it can be concluded from this study that most practicing laboratories are sufficiently expert to conduct these analyses." This document is posted at [www.MusselMonitoring.com], as well as via a link at [<http://100thmeridian.org/>] (*Thanks to Stephen Phillips.*)

New Article: Invasion Consequences. A new article, *Potential ecological consequences of invasion of the quagga mussel (Dreissena bugensis) into Lake Mead, Nevada-Arizona*, by Wai Hing Wong et al., is now available in *Lake and Reservoir Management*, 26:306-315, 2010. Abstract. "The recent invasion of the quagga

mussel (*Dreissena bugensis*) in Lake Mead, Nevada–Arizona, USA has the potential to alter biological relationships in this western reservoir. We evaluated the potential impacts by examining several measurements in the Boulder Basin of Lake Mead after the introduction of quagga mussel (2007–2008). Analysis of variance did not reveal any basin-wide changes in chlorophyll *a* concentrations or water clarity (Secchi disk depth). Although significantly lower chlorophyll *a* concentrations were found in the outer basin, this reduction was likely related to the decline of dissolved phosphorus concentrations. The abundance of cladocerans, copepods or rotifers has not changed since 2007. Overall, the results suggest that there are no statistically significant changes to many of the standard water quality indices routinely measured in the Boulder Basin of Lake Mead; however, given the complexity of biological, chemical and physical processes driving this ecosystem, the long-term impacts of quagga mussels remain uncertain. This manuscript identifies impacts known to be altered by quagga and zebra mussels in other systems, and aims to help lake managers develop experimental and monitoring programs that will accurately address the impacts of quagga mussels.”

New Article: Zebra Mussels and Artificial Substrates. A new article, *An evaluation of artificial substrates for monitoring the quagga mussel (Dreissena bugensis) in Lake Mead, Nevada–Arizona*, by S.A. Muetting et al., is now available in *Lake and Reservoir Management*, 26:283–292, 2010. **Abstract:** “This experiment was conducted to determine if quagga mussels will settle and grow on different types of artificial substrates preferentially in Lake Mead, Nevada–Arizona, one of the first known populations of the mussel in the western United States. Six substrates (acrylonitrile butadiene styrene (ABS) plastic, high density polyethylene (HDPE) plastic, concrete underlayment board (CUB), aluminum, stainless steel and fiberglass) were cut into 10 cm squares and placed in a modified randomized block design at different depths in the Boulder Basin of Lake Mead, for approximately one year. Half the substrates were removed and replaced every 2 months, and the other half remained in the water for the study duration. No substrate type preference could be determined, but settlement was limited by depth. Mussel settlement on substrates at depths from 6–28 m was significantly greater than on substrates from 32–54 m. The divergence in settlement at different depths is likely due to the water quality characteristics at these depths. No relationship was found between mussel settlement on substrates and veliger concentrations in the water column. Mussel settlement was limited when the lake was destratified between January and March 2009. Based on this experiment, materials placed in Lake Mead below 32 m will have greatly reduced mussel settlement, especially if deployed when the lake is destratified.”

New Article: Zebra Mussel Mortality. A new article, *Hydrodynamic forces affect larval zebra mussel (Dreissena polymorpha) mortality in a laboratory setting*, by Thomas G. Horvath and Lori Crane, is now available in *Aquatic Invasions* (2010) Volume 5, Issue 4: 379–385. **Abstract.** “Mortality of zebra mussel, *Dreissena polymorpha*, larvae was quantified in a laboratory experiment that was designed to assess the role played by both intensity and duration of the exposure to hydrodynamic forces. Larvae were collected by plankton net and distributed in 100-ml aliquots to 125-ml Erlenmeyer flasks. The flasks were spun on an orbital shaker at different speeds, 100 rpm and 400 rpm, to change the intensity of the hydrodynamic forces experienced by larvae inside the flasks. Actual shear forces were not quantified. A parallel set of control flasks was not spun. Flasks were spun for 1, 24 and 48 hours. Mortality was highest in the 400 rpm, 48-hr trial. Both intensity and duration were highly significant variables in the ANOVA model ($p < 0.001$). However, the interaction term was also highly significant ($p < 0.001$). Larval mortality was significantly higher in the treatments than in the non-spun flasks in only the 400 rpm, 24-h and 400 rpm, 48-hr trials. Thus, longer duration of exposure to high intensity hydrodynamic forces increases larval mortality. These results help explain natural recruitment patterns of zebra mussels in natural streams and may be of interest to management and conservation efforts.”

Utah 2010 Mussel Report. Utah's 2010 *Annual Report for Dreissenid Mussel and Other AIS Operations* is now available; you may also want to compare it to the 2009 report. Both reports are available online at [<http://wildlife.utah.gov/dwr/learn-invasive-mussels.html>], under Technical Resources, as AIS Summaries. (Thanks to Larry Dalton)

Utah Boat Decontamination Forms. Rule R657-60 requires that each boater to fill out and properly display a Decontamination Certification Form in their launch vehicle prior to every launch. In Utah, two such forms exist--a single-use form, which is a simple download, and a multi-use form, which requires participation in a 45 minute online orientation/certification course. Both forms are available on UDWR's mussel web site at [http://wildlife.utah.gov/mussels/form_options.php]

Colorado Infested Waters Status. Pueblo Reservoir, Granby Reservoir, Grand Lake, Shadow Mountain Reservoir, Willow Creek Reservoir, Tarryall Reservoir and Jumbo Reservoir are all considered positive for zebra and/or quagga mussels. In April 2009, Blue Mesa Reservoir was classified as 'suspect' for quagga mussels (a classification used by multiple states in the west following inconclusive genetic analysis of juvenile mussel veligers). Mussel veligers were also detected in Pueblo Reservoir in 2009. However, there were no positive detections for zebra or quagga mussel veligers or adults in any Colorado water in 2010. (*Excerpted from State Aquatic Nuisance Species (ANS) Program Summary for Colorado Legislators, CO Division of Wildlife and CO State Parks, January 2011*) (Thanks to Steve Phillips)

Zebra Mussel Impacts. Last issue, a reader asked which species of big clam previously in the Great Lakes was said to be extirpated due to zebra mussels (see 'Readers Respond' in Nutshell 30). No concrete answers magically appeared in my in-box, but reader Cynthia Tait mentioned an article I thought some of you might like to check out: *Changes in freshwater mussel community of Lake St Clair; from Unionidae to Dreissena Polymorpha in eight years*, by Thomas F. Nalepa et al. (1996. J. Great Lakes Research 22(2):359-369). While Lake St. Clair is not one of the Great Lakes, and these species aren't clams, it shows the impact mussels can have on indigenous lake fauna. Download the whole article at [<http://www.glerl.noaa.gov/pubs/fulltext/1996/19960005.pdf>].

More WIT Training Offered. More courses in Level II Watercraft Inspection and Decontamination Training (WIT) for quagga/zebra mussels will be offered on April 19-20 and May 3-4 at Lake Mead. (Fall 2011 classes will also be held, dates still TBD). The two-day, intensive, hands-on training course is provided free of charge, but attendees are responsible for their own travel expenses. Class size is restricted to 10-12 people, and registration is on a first-come first-served basis. *There are only a few openings left.* The course is designed for individuals who are currently or soon to become active in setting-up or implementing WIT programs for their respective agencies, organizations or businesses. The course focuses on actual inspections of various watercraft types and the use of several decontamination systems. The course is certified by 100th Meridian Initiative member agencies, and successful graduates will also be qualified as incident responders and Level One Trainers. If you are interested in attending or sending someone to this class, contact Bill Zook as soon as possible, at <Bjzook2@msn.com>. For further information on the trainings, go to [<http://www.aquaticnuisance.org/wit>].

Mussel Infested Boat Prevented From Launching at Lake Powell. On March 24th, a vessel infested with live adult quagga mussels was prevented from launching on Lake Powell in Glen Canyon National Recreation Area. The mussels were discovered by an employee at Antelope Point Marina during a routine inspection. Park staff decontaminated the vessel and placed it in quarantine for 30 days to ensure that all associated mussels will die before it is launched. The vessel had been moored in a "lower Colorado River reservoir" that is infested with quagga mussels. To read the full press release go to [<http://www.nps.gov/glca/parknews/mussel-infested-boat-prevented-from-launching-at-lake-powell.htm>]

[Around the West Coast](#)

AIS Resolution Passed by ATNI. In February, the Affiliated Tribes of Northwest Indians of the United States passed the resolution "Threats of Aquatic Invasive Species to the Natural Resources of ANTI Member Tribes."

It includes the following: “ATNI and its member tribes will pursue partnerships, cooperatives, and other funding opportunities that will allow its member tribes and tribal members to become more directly involved in efforts to control and prevent the spread of aquatic invasive species throughout the Pacific Northwest, to protect the first food resources so critical to our culture, heritage, and future existence.” To see the full text, go to the 2011 Conference Resolutions at [<http://www.atnitrines.org/resolutions/>].

WA Aquatic Invasive Species Permit: Ecology’s Aquatic Plant and Algae Management Permit became final March 18. The Aquatic Invasive Species Management General Permit is awaiting final management approval. For more information, go to: [<http://www.ecy.wa.gov/programs/wq/pesticides/invasive.html>] or contact Kathy Hamel at <kham461@ecy.wa.gov>.

OR Nutria YouTube Video. Oregon is one of 15 states to have stable or increasing nutria (*Myocastor coypus*) populations. These wetland-destroying rodents are native to South America, and were introduced to the U.S. as early as 1899 for fur farming. Pangolin Pictures is filming an upcoming three-part special for National Geographic, titled *Animal Invasions*, which will include a segment on nutria in the Pacific Northwest. Dates for the upcoming National Geographic segment have not been released, but you can see a 4 minute YouTube video featuring Paul Heimowitz (USFWS AIS Coordinator); Trevor Sheffles (Portland State University researcher); and Peter Schmidt (Tualatin River National Wildlife Refuge biologist) at [<http://www.youtube.com/usfws#p/c/0/dxWGHfeAEGI>].

WA Conducts Another NZ Mudsnail Freeze-Out. In February, WA began lowering the water level in Olympia’s Capitol Lake, in another attempt to freeze out some of the New Zealand mudsnails (*Potamopyrgus antipodarum*) that infest the lake. The lake will remain drawn down as long as the cold spell stays in place. A similar lake draw-down in December, 2009, resulted in a 98 percent mortality rate in test plots over a five-day period. Freezing isn’t expected to eliminate the snails, but should help reduce the mudsnail population. The snail infestation was first discovered in the lake in fall, 2009. The lake remains closed to boating and other uses until further notice because of the danger of spreading the snails, which can overwhelm lake habitat for native species and threaten the long-term water quality. (*Excerpted from ‘Cold a chance to kill snails’, by John Dodge, in The Olympian, February 24.*)

AK Lawmakers Focus on Genetically-Engineered Salmon. In February, Rep. Don Young of AK introduced two pieces of legislation; one would require the labeling of genetically engineered (GE) fish, and another would impose an outright ban such fish in the United States. The legislation comes in response to a proposal by AquaBounty Technologies (ABT) of Waltham, MA, that is currently being considered by the Food and Drug Administration (FDA). ABT has pioneered the genetic modification of salmon that would allow the fish to grow to full-size in half the time it now takes for natural salmon. The fish would receive a growth gene from the Pacific Chinook salmon and genetic material from the ocean pout, which would allow it to grow in both summer and winter. Because the process alters the structure and/or function of the animal, ABT had to file a new animal drug application with FDA. An FDA preliminary analysis released in August concluded that the salmon are safe to eat, and not expected to have a significant impact on the environment. ABT says that the risk of escapement and the potential intermingling with wild salmon stocks is eliminated with geographical and geophysical containment provided by the location of the egg production and grow-out sites. The environment surrounding the egg-production site (a hatchery on Prince Edward Island off the east coast of Canada) is inhospitable to early-life stages of Atlantic salmon, due to high salinity. And the environment downstream of the grow-out site in Panama’s highlands is inhospitable to all life stages of Atlantic salmon, due to high water temperatures, poor habitat, and physical barriers (e.g., several hydro-electric facilities). Biological containment is accomplished through the production of all-female triploid (sterile) fish, which reduces the chance of breeding with native species, and significantly reduces the risk of transgene propagation in the environment

If ABT’s proposal is approved, it would be the first transgenic animal in the country ever approved for sale for human consumption, Young said. “The assessments of these ‘fish’ are flawed at best and the threat to the

population of our wild salmon stock is unacceptable.... We cannot allow these alien fish to infect our stocks and I will put forth every effort to ensure they stay in the labs where they belong.” In February, AK senators Mark Begich and Lisa Murkowski also introduced a bill, co-sponsored by WA Senator Patty Murray, to ban genetically engineered salmon. But because it looks likely that the FDA will approve the fish, the senators introduced a second bill, co-sponsored by Murray and Senator Ron Wyden of OR, that would require labeling of GE salmon in the event that such fish are approved for consumption. Murkowski expressed strong opposition to an FDA approval in a press release, saying “It is completely irresponsible for the FDA to even consider this action without evaluating the impacts on Alaska’s wild salmon fisheries....The FDA has not studied the environmental effects, let alone the economic impacts on the salmon and seafood markets that would result from approval.” (*Excerpted from the February 25, 2011, Columbia Basin F&W News Bulletin*)

New Article: PNW Crayfish. A new article, *State of crayfish in the Pacific Northwest*, is now available (Larson, E.R. and J.D. Olden. 2011. Fisheries 36:60-73). **Abstract:** “We summarize the state of knowledge on crayfish in the Pacific Northwest region of the United States and Canada, emphasizing distributions and conservation status of native species, as well as known introductions and distributions of alien crayfishes, and fishing regulations relevant to crayfish across five states and provinces. We found the present distribution and ecology of native crayfishes in this region to be poorly known, inhibiting accurate conservation assessments and management. The number of alien crayfishes established in the region, ranging in distribution from localized to widespread and including several major invasive species, now exceeds the diversity of native crayfishes. The treatment of crayfish by fishing regulations and laws varies among states and provinces, potentially impairing successful management and conservation of these species in shared ecosystems such as the Snake and Columbia rivers. We conclude with recommendations for crayfish management and regulation, and a call for more research on the ecology of crayfish in the Pacific Northwest.” To view the article go to:

[http://www.aquaticnuisance.org/wordpress/wp-content/uploads/2011/03/Fisheries_2011_State_of_Crayfish.pdf] (*Thanks to Julian Olden*)

New Article: PNW Aquarium Trade. A new article, *The aquarium trade as an invasion pathway in the Pacific Northwest*, is now available (Strecker, A.L., Campbell, P.M. and J. D. Olden. 2011. Fisheries 36:74-85.) **Abstract:** “The aquarium trade moves thousands of species around the globe, and unwanted organisms may be released into freshwaters, with adverse ecological and economic effects. We report on the first investigation of the ornamental pet trade as an invasion pathway in the Pacific Northwest region of the United States, where a moderate climate and a large human population, present ample opportunities for the introduction and establishment of aquarium trade species. Results from a regional survey of pet stores found that the number of fish (n=400) and plant (n=124) species currently in the aquarium trade is vast. Pet stores import thousands of fish every month, the majority of which (58%) are considered to pose an ecological threat to native ecosystems. Our propagule pressure model suggests that approximately 2,500 fish (maximum ~21,000 individuals) are likely released annually to the Puget Sound region by aquarists, and that water temperatures in many parts of Washington are suitable for establishment of populations. In conclusion, the aquarium trade may be a significant source of past and future invasions in the Pacific Northwest, and we recommend enhanced public education programs, greater regulation of the aquarium industry, and improved legislation of nonnative species in the ornamental trade.” To view the article, go to:

[http://fish.washington.edu/research/oldenlab/pdf/2011/Fisheries_2011b_Aqua.pdf]
(*Thanks to Julian Olden*)

New Montana Weed Publications. Four new publications are available from Montana State University Extension that describe the biology, ecology, and management of the noxious weeds of the knotweed complex (*Polygonum spp*; publication EB0196), flowering rush (*Butomus umbellatus*; publication EB0201), Scotch broom (*Cytisus scoparius L.*; publication EB0202), and yellow starthistle (*Centaurea solstitiali*; publication MT201101AG). Publications can be ordered through MSU Extension publications, or downloaded online at

[<http://www.msuextension.org/store/>]; by calling (406) 994-3273; or by sending an email to <orderpubs@montana.edu>. (From *MSU News Service*, January 28, 2011)

Oregon Weed Biocontrol Program. During the past several months, the Oregon Department of Agriculture (ODA) has been developing a spreadsheet of weed biological control information. They have now announced a new Classical Biological Control of Weeds data spreadsheet. It is a single source of important data to help coordinate and plan biocontrol activities. The project was revised with input received at the Oregon Interagency Noxious Weed Symposium last December. Some of the key features include: target weeds (web-linked to USDA and ODA maps and data), biocontrol agents (web-linked to ODA maps and data), and important biocontrol agent information including attack rate, ability to control weed, collection information, timing, and techniques. Additional sheets (see bottom tabs) can help to plan biocontrol activities by month. ODA hopes to have all of the biocontrol agents web-linked to the ODA website by the end of March, although they have only included the biocontrol agents that are generally available. Check out the [website](http://oregon.gov/ODA/PLANT/WEEDS) at [<http://oregon.gov/ODA/PLANT/WEEDS>]. (Thanks to *Eric Coombs, ODA*)

Sahara Mustard: Another Desert Threat. California's Morongo Basin ecology is under siege by non-native Sahara mustard plants (*Brassica tournefortii*) that are appearing in greater numbers throughout Joshua Tree National Park (JTNP) and on other lands across the Hi-Desert. The mustard is a native of North Africa, the Middle East and the Mediterranean, and it was first discovered in California in 1927. It is believed to have been introduced in the 1900's from date palms that were imported into the California Coachella Valley from the Middle East. Josh Hoines, vegetation program manager at JTNP, said "most weeds aren't necessarily a big deal [but] this plant in particular could have some far-reaching consequences." It crowds out native plants and takes up space and resources, creating a monoculture that "introduces a whole level of instability to the natural ecology". Sahara mustard is an annual weed that thrives in the desert's dry climate, beginning its germination process during cold, wet months and emerging just as the climate warms up in late February or early March. It has now spread beyond California's borders into Arizona and Nevada. A 2005 study of its ecological effects found the Sahara mustard directly contributes to a decrease in native plants, which causes a decline in the desert's lizard, squirrel and kangaroo rat populations, as well as several insects. The study was conducted by University of California Riverside's Center for Conservation Biology and the Center for Natural Lands



1998



2005

"What we have lost: These two scenes were both photographed in the northern end of the Mohawk Dunes in western Arizona. In 2005 Sahara mustard covered 70-90% of the surface area at this location. Almost no native wildflowers bloomed here in 2005." (From the Desert Museum Invaders [http://www.desertmuseum.org/invaders/invaders_saharamustard.php])



Wash infested with Sahara mustard, by Char R, flickr.com

Management. “Because the weed doesn’t have any known diseases or predators in the desert climate, removing the plant is crucial; try to get it early before the seeds are developed. With an annual plant, ... you want to...rob it before it gets a seed bank, limiting its potential for regeneration,” Hoines noted. If you get it while the seed pods are present, disposing of the weeds in a black plastic trash bag will reduce the risk of the seeds being scattered. Eradication is already under way in the Coachella area, and JTNP is planning weekly Sahara mustard weed pulls throughout March. (*Excerpted from ‘Invasive mustard strongarms desert plants, animals’, by Courtney Vaughn, in The Desert Trail, February 9, 2011*)

New OR Invasive Species Bills There are a number of new invasive species-related bills moving through the Oregon Legislature:

- HB 2122: Prohibits importation of untreated firewood into the state.
- HB 2188: Changes the definition of IPM (integrated pest management).
- HB 3121: Eliminates the AIS permit requirement for hand-propelled boats.
- HB 3157: Permits removal of invasive species under Oregon Adopt-a-River Program.
- SB 81: Requires Department of Environmental Quality to collect fees for trips by vessels regulated under ballast water statutes.
- SB 342: Revises statutory provisions relating to lottery moneys constitutionally directed toward financing restoration and protection of native fish and wildlife, watersheds and water quality.
- HB 2632: Provides that fish habitat improvement projects may be designed only for benefit of native fish; Prohibits State Fish and Wildlife Commission from establishing bag limits, size restrictions or closed seasons for species of fish that are not native fish; Prohibits state agencies from enhancing, protecting or fish that are not native fish.
- HB 3358: Requires State Department of Agriculture to establish program for issuing grants to counties for noxious weed control.
- HB3399: Authorizes the State Department of Fish and Wildlife, State Marine Board, and State Department of Agriculture to require persons to stop and submit recreational or commercial watercraft for aquatic invasive species inspections. (*Thanks to Lisa Debruyckere*)

Two NEW MT Invasive Species Bills. **SB 343** revises definitions, authorizes quarantine measures, and vessel impoundments for decontamination, enforcement, and amends sections 80-7-1002, 80-7-1003, 80-7-1006, 80-7-1007, 80-7-1008, 80-7-1011, and 80-7-1014, MCA. [<http://data.opi.mt.gov/bills/2011/billpdf/SB0343.pdf>]
SB 363 establishes a special revenue account for invasive species detection, control, and related measures. It amends section 87-1-209, MCA [<http://data.opi.mt.gov/bills/2011/billpdf/SB0363.pdf>]

WA State Noxious Weed List Changes. Following a public hearing and meeting in November 2010, the Washington State Weed Board approved the following changes to the State Noxious Weed List:

- Yellow archangel, *Lamiastrum galeobdolon* (changed from Class C to Class B, designated in Clallam, San Juan, Cowlitz, and Skamania counties);
- Hairy willow-herb, *Epilobium hirsutum* (changed from Class C to Class B, designated everywhere *except*

Whatcom, Island, Thurston, Grant, Whitman, Skamania, Klickitat, Benton, and Franklin counties);

- Hoary alyssum, *Berteroa incana* (will now be designated south of Hwy 20 in Ferry County);
- Eurasian watermilfoil, *Myriophyllum spicatum* (designated in Chelan and Okanogan counties);
- Houndstongue, *Cynoglossum officinale* (designated in Region 5 - Grays Harbor, Mason, Kitsap, Pierce, King and Thurston counties)

[Around the U.S.](#)

Ballast Water: Appeal on EPA Vessel General Permit Finally Settled. On March 8, the Environmental Protection Agency (EPA) entered into a settlement agreement with the Natural Resources Defense Council (NRDC) and other environmental advocacy groups that had challenged the ballast water management aspects of the Vessel General Permit (VGP) program. Environmental groups said they filed the lawsuit because the EPA's 2008 effort at ballast regulation was too weak and didn't uphold the Clean Water Act. Under the settlement, the EPA has agreed to publish a draft of a new VGP by November 2011, and to issue a new permit by November 2012. The permit would become effective on January 1, 2014, when the current VGP expires. EPA has also agreed to:

- allow states at least 6 months for CWA §401 certification actions;
- facilitate regional communication and coordination between states prior to and during the CWA § 401 certification process;
- include either technology-based or water quality-based numeric effluent limits for organism concentrations in ballast water discharges;
- include components for macrofauna/zooplankton, phytoplankton, and indicator microbes in the numeric limits for ballast water discharges;
- encourage states to develop regionally consistent approaches to setting ballast water standards. (Right now, six of eight Great Lakes states have regulations that reflect the international standard, while NY's standard is far more stringent);
- include monitoring requirements in the VGP, and explain the reasonable potential determination and limit setting process in the Fact Sheet; and
- rely on a report from the National Academy of Sciences (on approaches to setting ecologically protective numeric limits), and a report from EPA's Science Advisory Board (on the availability and performance of existing ballast water treatment technologies). The reports are due May 31, 2011.

On February 11, 2011, the EPA and US Coast Guard also signed an MOU outlining cooperation in enforcing the VGP. The Commandant of the USCG distributed the same day guidance and a checklist for personnel to use to expand inspections to cover VGP compliance. *Guidelines for evaluations of compliance with the EPA vessel general permit can be found at* [http://www.brymar-consulting.com/wp-content/uploads/incidental%20discharges/POL_11-01.pdf]. (*Thanks to Randall Marshall, Keith Strieck, and others*).

EPA Seeks Public Comments on Management Practices for Recreational Vessels. In 2008, Congress passed the Clean Boating Act (CBA) as an amendment to the Clean Water Act. The CBA directs EPA to take steps to limit the impact of pollution and the spread of invasive species associated with the discharge from boats. The EPA is now seeking public comment from boaters and other stakeholders to help develop proposed regulations to reduce water pollution and the spread of invasive species in the nation's rivers, lakes and other waters. As an alternative to permits that are required for commercial vessels, the act directs EPA to develop and promulgate management practices for recreational vessels. The input received through this process will help guide the development of proposed regulations to mitigate adverse effects from recreational boat discharges such as bilgewater, graywater, and deck runoff that may contain substances harmful to water quality or spread invasive species. As part of the public input, EPA is also seeking information from states that already have standards to limit the impacts of boat discharges on waterways. Based on the input received, EPA will develop appropriate management practices and performance standards that protect waterways while also working with

the U.S. Coast Guard, which will establish regulations governing the design, construction, installation and use of management practices. Implementation of these management practices will allow boaters to continue enjoying our nation's waters while protecting water quality. EPA is holding listening sessions and conducting webinars in Annapolis, MD, on March 18 and April 29, to inform interested parties about the Clean Boating Act and receive public input. For more information on the CBA, go to:

[<http://water.epa.gov/lawsregs/lawsguidance/cwa/vessel/CBA/about.cfm>] For more information, contact Richard Yost, yost.richard@epa.gov. (Excerpted from an EPA news release, March 7.)

Guam Invasive Species Bill. Guam Senator Chris Duenas has introduced a much-needed invasive species bill. Last year, the Camacho Administration created an invasive species council through executive order, but provided no source of funding. Bill 111 would not only provide funding, but it would establish a Bio-Security Division and create a rapid response team to address invasive species problems right away. "So that not just the council is put into place, but you have actual cash to stand up the staff that's going to be needed and required under the Department of Agriculture and the University of Guam, to be able to enforce and do the inspections and ensure that we really aggressively go after invasive species." said Duenas. The funding would come from a one dollar fee per ton of cargo coming into Guam's port. This money will start up the division and will lead to future federal funding to maintain support of bio-security efforts. The Department of Agriculture estimates that in the last 10 years, at least 25 invasive species have decimated vegetation around Guam, among them, the "Canopy Vine", which has led to soil erosion. (From 'Duenas bill would provide funding for invasive species council,' by Josh Tyquiengco, March 16, Guam News.)

[Ed. Comment: When change occurs slowly over time, it is easy to miss it. When you see a landscape spread apart by time, that's when the impacts become obvious. As a former Guam resident, I returned to visit two years ago after a 30 year absence, and I can tell you the change was dramatic! But when I mentioned the vine to my friends who had never left the island, no one even seemed aware of the invasion. I suspect the "canopy vine" referred to is the 'cadena de amor' (Antigonon leptopus), which seems to be smothering everything.]



Antigonon leptopus

Hawaii's "Huki Project" Removes 3 Million Pounds of Algae. Over the last year, workers have pulled three million pounds of the invasive marine algae, leather mudweed (*Avrainvillea amadelpha*) from Paiko Reef on Oahu's Maunalua Bay. The mudweed was first reported in Hawaii in 1981. It grows slowly, but has continued to expand; it is believed a series of severe storms and two hurricanes in the 1980s and early 1990s damaged areas of the seafloor, allowing it to colonize. Maunalua Bay now has 54 acres of extremely dense infestation.



Before (April 2009) and after (August 2010) (photos from TNC)

Avrainvillea is found from intertidal areas down to 70 meters in depth. It overwhelms native algae and pastures of the endemic seagrass, *Halophila hawaiiiana*, and attracts and traps sediment, creating an oxygen-starved environment which prevents some native marine life from flourishing. In areas where volunteers have removed mudweed, native marine life is now returning. The Huki Project (“huki” is Hawaiian for “pull”) was funded by \$3.4 million of federal stimulus money, and is managed by the Nature Conservancy and a non-profit group, Malama Maunalua. The project cleared 23 acres, created 50 new jobs, and allowed retention of an additional 20 jobs. As a bonus, **none of the algae went to a landfill; it was composted and sent to five local farmers for growing vegetables. Because the original work was finished ahead of schedule, the jobs created will now be extended through April.** (Excerpted from a variety of sources.) For a fact sheet on leather mudweed, go to [http://www.hawaii.edu/reefalgae/invasive_algae/pdf%20files/avrainvillea_amadelpha.pdf]

Valentine’s Day Flowers Bring Unwanted Pests. More than eight out of every 10 cut flowers imported to the U.S. during Valentine season pass through Miami International Airport, and Colombia and Ecuador are by far the largest sources of roses, chrysanthemums, gerbera daisies, Peruvian lilies and dozens of other varieties. More than 272 million individual cut flowers passed through the Miami airport between January 1 and February 14 last year, a number officials say would be surpassed in 2011. At a chilly refrigerated warehouse, federal agents and agricultural specialists spot-check hundreds of boxes of flowers, shaking them down for insects and using X-rays and other methods to detect illegal drugs. Gerard Russo, who runs Customs and Border Protection’s agricultural operations at the airport, says it’s common for inspectors to find 90 pests a day (!) that could be dangerous if set loose on U.S. soil. These include moths, miner flies, aphids and thrips that could thrive in the year-round warm climate of South Florida. The area is a key source of winter vegetables ranging from tomatoes to green beans, and fruit such as avocados and mangoes. Usually the flowers in a particular shipment associated with a pest are quarantined and then fumigated to kill the insects. Sometimes something not previously in the U.S. appears, and occasionally insects have to be sent to the Smithsonian Institution in Washington for positive identification. (Excerpt from an AP article by Curt Anderson, February 8.)

Hawaii Breeds Sea Urchins for Algae Cleanup. Kaneohe Bay has the only barrier reef system in the United States, and it contains some of the best coral reef in Hawaii. But now, blankets of non-native algae are smothering it. State scientists, environmentalists and a local canoe club have released about 1,000 sea urchins (*Tripneustes gratilla*) into Kaneohe Bay, hoping they will control two species of seaweed (*Kappaphycus alvarezii* and *K. striatum*), also known as “smothering seaweed”, which are invading the bay. The algae were introduced to Hawaii for commercial applications, such as texturizing ice cream, but they escaped from the lab when the industry failed. This was first time anyone successfully bred sea urchins to counter an alien seaweed in Hawaii. David Cohen, urchin hatchery manager at the Anuenue Fisheries Research Center, said he spent



Photo: Cindy Ellen Russell

about a year developing the method to breed sea urchins in captivity; the delicate young have to be kept suspended in the water column for weeks. The urchins were fed a diet of native seaweed. He used about a million larvae to produce 25,000 sea urchins. They reached about 15 millimeters in diameter after about five months. Of that group, 1,000 juveniles were gently placed on a 500-square-meter patch of reef by divers. The goal is to expand and release 10,000 to 25,000 urchins per month. Cohen said *Tripneustes* was chosen because

it is native to Hawaii, it stays on the reef, and is an effective algae grazer. For years, the state used its Super Sucker machine to remove the algae as a temporary measure (at one time taking away 10,000 pounds of it), until scientists could find a long-term solution. In 2009, scientists gathered urchins from other parts of the state and released them in Kaneohe Bay, and a year later found the urchins had successfully kept the seaweed down. But many sea urchins are needed; about four urchins per square meter are desirable, and some urchins will inevitably be eaten by fish and octopus. Cohen is working on another batch, and hopes to have about 20,000 urchins ready to release by April. (*Excerpted from 'Sea urchins bred to clean up reef,' Honolulu Star Advertiser, February 4, By Rob Shikina.*) For a [video](http://www.kitv.com/r/26664243/detail.html), go to [http://www.kitv.com/r/26664243/detail.html]

Reduced Effectiveness of Herbicides: Another Global Warming Impact? Global warming is associated with increased carbon dioxide levels in the atmosphere, and the levels have increased greatly in the past two decades: preindustrial carbon dioxide levels were rated at 280 parts per million (ppm); by 2005, levels reached 379 ppm; and it is predicted that carbon dioxide will reach 700 ppm by 2100. Carbon dioxide acts as a fertilizer, resulting in higher growth rates and larger leaves of invasive exotic grasses. Now new research finds these stronger plants are also proving more resistant to the world's most important herbicide, glyphosate, commercially known as Roundup. A study published in the current issue of the journal *Weed Science* reports the effects of elevated carbon dioxide levels on four species of invasive exotic grasses in Australia that were previously chemically controlled with glyphosate. The plants were grown in glasshouse experiments at ambient and elevated carbon dioxide levels, and mature plants were then sprayed with the recommended amount of glyphosate. When treated with the herbicide, three of the four species showed a significantly higher survival rate when grown under the elevated carbon dioxide level, as compared with ambient levels.

Glyphosate works by inhibiting an enzyme plants need for biosynthesis. However, when the plant is exposed to higher levels of carbon dioxide, it increases its growth and biomass production in a way that heightens its tolerance to glyphosate. The plant experiences reduced stomatal conductance and creates greater total leaf area. With carbon dioxide helping to create better weeds, herbicide use may be increased to counter the effect. More weeds and the use of larger amounts of herbicides could have significant economic and environmental impacts. The full article, *Exotic C4Grasses have increased tolerance to glyphosate under elevated carbon dioxide* in *Weed Science*, Vol. 59, No. 1, January-March 2011 is available at: [http://www.wssajournals.org/doi/full/10.1614/WS-D-10-00080.1] (*Excerpted from the Western Farm Press, February 17, 2011*)

Online and Rare Plant Sales Cause Problems. People are increasingly, and often illegally, obtaining and moving endangered or threatened plants outside their native range. According to an article in the journal *Nature*, by Patrick Shirey and Gary Lamberti, last year nearly 10 percent of the 753 plants listed as threatened and endangered under the US Endangered Species Act are being sold, or at least advertised, online. Many buyers are horticulturalists who want flowers for their gardens. But increasingly, anecdotal evidence suggests that online shoppers include individuals and citizen groups involved in 'assisted colonization' projects. Here, species or genetic subtypes at risk of extinction are moved to non-native environments where they might thrive. But the transfer of plants to new environments can also spread plant pathogens and pests. The authors urge government agencies to take more of a leadership role in monitoring translocations because of the risks associated with introducing new species. They urge the USFWS to better monitor the movement of plants around the world and enforce existing legislation. As a first step in enforcing existing legislation, Shirey says that the USFWS should establish surveillance teams to monitor online transactions. They also urge the agency to restrict consumers' ability to purchase hybrids bred from endangered species, which have serious implications (both good and bad) for wild populations. On a worldwide scale, exporting and importing countries must also enforce existing laws such as the Convention on International Trade in Endangered Species of Wild Fauna and Flora. (*Excerpted from 'Biologists Call for Regulation of Rare Plant Sales,' in Science Daily, January 27, 2011.*)

Michigan Declares Feral Pigs an Invasive Species. Michigan's Department of Natural Resources and Environment (DNRE) has declared feral pigs (*aka* wild pigs, wild hogs, wild boars or razorbacks) an invasive species. There are 3,000 to 5,000 feral pigs in 65 of the 83 counties in the state. The DNRE said the majority of the feral pigs have escaped from the 65 or more hunting or breeding facilities in the state, although owners of the hunting preserves say they have adequate security to keep the pigs from escaping. Michigan does not regulate wild boar breeding and hunting ranches, and boars are not listed as a game species in Michigan. But the pigs inflict a vast amount of damage; they can destroy acres of corn and wheat overnight, and they will eat practically anything, from farm crops, game bird eggs, small fawns, and reptiles, to endangered wild plants. They also dig wallows up to 3 feet deep and 5 feet wide, which are a danger to farming equipment. Russian boars average 100-200 pounds, but if they interbreed with domestic hogs, their offspring can grow up to 300 pounds, and females can produce two litters of 8-10 piglets a year. In December, outgoing DNRE Director Rebecca Humphries signed an order making feral swine and wild boar an invasive species in Michigan. The order will become effective on July 8, 2011, which should give the Legislature time to enact laws to provide regulations for the facilities that breed and provide hunting of the wild boars. If laws are not passed, the invasive species order will go in to effect, making it illegal to possess wild boar in Michigan. Patrick Rusz, Director of Wildlife Programs for the Michigan Wildlife Conservancy, said "I can't imagine a nastier animal. Yet, this still is slipping under the public's radar." DNRE's advice is to shoot the pigs on sight. (*Excerpted from 'Feral pigs declared an invasive species by Michigan officials', in Digital Journal, February 5, and 'Michigan declares feral pigs an invasive species' in the Chicago Tribune February 7.*) For a short video of the Michigan pig problem, go to: [<http://www.digitaljournal.com/article/303344>].

Microchip Pays Off. The owner of a 14-and-a-half-foot African rock python (*Python sebae*) has been found, thanks to a microchip ID, commonly called a "PIT tag," embedded in the snake. The python was found sunning itself in Tarpon Springs, Florida, and was captured by a wildlife rescue group. Scott Konger, the owner of



Tarpon Springs Aquarium, reported the animal stolen from his business at the Tarpon Springs sponge docks in 2009. Konger was in compliance with all requirements of ownership when the snake was reported stolen, so no citations have been issued. He currently has no valid permit for the snake, but he may reapply while the snake remains at the permitted facility where it is currently being housed. Northern African and Southern African rock python species are two of eight species of lizards and snakes classified as "conditional species" in FL, and there are stringent requirements for ownership. In addition to the microchip, permitted owners are required to have cages that meet specific size, design, locking, and safety standards; have a critical incident plan for emergencies; and report escapes. In the wild, African rock pythons are a threat to pets and wildlife, but they generally avoid humans. Anyone having information regarding the theft of this animal can report it to the Wildlife Alert Hotline at 888-404-3922. Citizens who report violations of wildlife laws can remain anonymous and may be eligible for a reward if the information leads to an arrest. (*Excerpted from 'Microchip helps locate owner of python found wandering in Tarpon Springs', by Christopher Collette, in 10 News, WSTP.com*).

Starry Stonewort: A Less-Known Michigan Invader. Starry stonewort, (*Nitellopsis obtusa*), an invasive algae that looks like a rooted plant, is threatening to disrupt the ecological balance in Michigan lakes and waterways. It is native to Europe and Asia, and was first discovered in the St. Lawrence River in 1978. In

1983, it was found in the Detroit River near Belle Isle, and has since infested numerous Michigan lakes. It resembles the native aquatic plant *Chara*. But unlike *Chara sp.*, which is generally considered to be a beneficial plant, starry stonewort has a tendency to colonize deeper water, and it can form dense mats several feet thick that impede navigation and limit growth of more beneficial plants. Compared to many other aquatic plants, starry stonewort may begin growing later in the season and persist longer. It can change the lake ecology because it lowers the reproduction of fish species and ruins the habitats needed for fish and aquatic insects, said Gary Crawford, a biological consultant at Environmental Counseling & Technology Inc., in Ann Arbor. It can also increase the potential for winterkill when lakes freeze over because the algae take up oxygen that fish need to survive. Fish also have a harder time surviving because of the thick weeds. Crawford said the plant has impacted more than 90 inland lakes, primarily in Southeast and Southwest Michigan, the Upper Peninsula, the northern Lower Peninsula and Indiana. In addition, it is spreading along the northern coast of Lake Michigan,



(Chara left, Stonewort on right) Photo: Trenton Johnson, NY Sea Grant

and is beginning to move closer to shore. The starry stonewort can tolerate low nutrient and light levels, and can be found at three to 20 feet deep in lakes or slow-moving rivers. Compared to fast-moving invasive species such as the zebra mussel, it has taken the starry stonewort nearly 30 years to become conspicuous in Michigan inland lakes. Like many waterweeds, starry stonewort is easily transported in aquatic plant debris that may be caught on boat trailers. One control option is raking, but it is labor-intensive and can cause fragmentation, which allows the algae to develop faster. Other options include chemical treatment and increasing water movement. Agencies are now looking for the best way to stop the problem. (*Excerpted from 'Alien algae alarms aquatic experts', in the January 11 Great Lakes Echo*) and '*Stony Starwort*', by Tony Groves, Pam Tynning, and Paul Hausler, in *Michigan Lake Info*, April 2010)

National Aquatic Animal Health Plan (Update). The National Aquatic Animal Health Plan (NAAHP) proposes ideas on how the Federal government and stakeholders should develop policies, programs, and if needed, regulations, to address aquatic animal diseases. The purpose is to benefit U.S. aquaculture and aquatic animal resources. The US Departments of Agriculture (USDA), Commerce, and Interior are leading NAAHP development and implementation, and the plan will be updated every 5 years. The plan was released in 2009, and over the past year, the Federal agencies have been working with stakeholders to develop a National Aquatic Animal Pathogen Testing Network. This effort is intended to provide testing standards and oversight for existing laboratories that conduct testing for movement and surveillance purposes, and it will increase confidence in the laboratory results and in the health status of animals in movement. This is also intended to assure international trading partners of the U.S. government's ability to make assurances regarding aquatic animal disease reporting, and to control the movements of pathogens in the U.S. and via international trade. Because the paperwork process needed to move live aquatic animals can be burdensome and time consuming, the Agencies are also evaluating commercial off-the-shelf computer programs that can provide services electronically and more efficiently, which will also facilitate international and interstate trade. USDA has also restructured its existing 'Foreign Animal Disease Advisory Committee' into an 'Animal Health Advisory Committee' under which subcommittees can be formed to address specific technical and scientific issues. The establishment of an Aquatic Animal Health Subcommittee is a priority for USDA, based on the NAAHP

recommendations. The full committee has been selected, and held its first meeting on January 20-21. The plan is available at: [http://www.aphis.usda.gov/animal_health/animal_dis_spec/aquaculture/downloads/naahp.pdf]. (January 2011 Update, thanks to Susan Mangin)

Controlling Kudzu with Naturally Occurring Fungus. Kudzu, "The Vine that Ate the South," (*Pueraria lobata*) could meet its match in a naturally occurring fungus that Agricultural Research Service (ARS) scientists have formulated as a biologically-based herbicide. By one estimate, kudzu spreads at the rate of 150,000 acres annually, easily outpacing the use of herbicide spraying and mowing, as well increasing the costs of these controls by \$6 million annually. But ARS plant pathologist Doug Boyette and colleagues with the ARS Southern Weed Science Research Unit in Stoneville, MI, are testing the fungus, *Myrothecium verrucaria*, which



infects kudzu with an astonishing speed of its own. Kudzu plants sprayed with it in the morning start showing signs of damage by mid-afternoon. In greenhouse experiments, spray formulations killed 100 percent of kudzu seedlings, and 90 to 100 percent of older plants in outdoor trials. *Myrothecium* also worked under a wide range of conditions, including the absence of dew. Additionally, host-range tests in 2005 showed that *Myrothecium* caused little or no injury to many of the woody plants known to occur in kudzu-infested habitats, including oak, cedar, pine, hickory, pecan, sassafras and blackberry. A few companies expressed interest in the fungus, but only if the fungus' production of trichothecene toxins could be reduced or stopped. Boyette's group examined several approaches, settling on a method of growing *Myrothecium* in a fermenter on a liquid diet instead of a solid one. This not only stopped trichothecene production or reduced it to acceptable levels, but it also extended the fungus' shelf life and potency under field conditions. *Myrothecium* has also shown potential as a pre-emergence bioherbicide, for controlling purslane and spurge in transplanted tomatoes. (Heavily excerpted from *Science Daily*, July 20, 2009)

Ed. Comment: Kudzu is apparently a plant of many "talents" in addition to its "smothering" ability:

- Kudzu is a major contributor to large-scale increases of surface ozone, according to a study published the week of May 17, in the journal *Proceedings of the National Academy of Sciences*. (*Science Daily* May 18, 2010)
- Root extracts from kudzu show promise as a dietary supplement for metabolic syndrome, a high-risk condition that affects almost 50 million people in the United States alone. (*Science Daily* August 27)
- Kudzu and its extracts and flowers have been used in traditional Chinese folk medicine to treat alcoholism for about 1,000 years. Kudzu contains daidzin, an anti-drinking substance that inhibits human aldehyde dehydrogenase 2 (ALDH-2), which promotes the accumulation of acetaldehyde, and has aversive effects. (*Science Daily* Aug. 13, 2009)
- Menopausal women are at relatively high risk for memory loss, high blood pressure and diabetes. Grape, soy and kudzu are naturally occurring dietary polyphenols, shown to have some beneficial effects similar to hormone replacement therapy (HRT), but without the appreciable adverse effects. (*Science Daily*, Aug. 14, 2007)

Another Stink Bug. Head's up about another invasive stink bug making its mark on the U.S. map: the bagrada bug (*Bagrada hilaris*). Those growing brassicas in particular need to pay attention, but other key economic



crops such as potato are listed as hosts as well. While its current distribution is limited to southern CA and AZ, entomologists warn it is likely to spread further. More information and images can be found at [http://oregonstate.edu/dept/nurspest/Bagrada_bug.html]. (Thanks to Robin Rosetta)

The Carp Saga Continues

Carp Bill. The Stop Asian Carp Act, introduced by U.S. Rep. Dave Camp, directs the Army Corps of Engineers to develop a plan to hydrologically separate the Great Lakes and Mississippi River basins to prevent the transfer of Asian carp and other invasive species. The basins were once naturally separated. An identical bill was introduced in the Senate by Sens. Debbie Stabenow and Dick Durbin. (Excerpted from Staff reports in *The Holland Sentinel*, March 07, 2011.)

Carp Barrier Study. The U.S. Army Corps of Engineers says it will soon release a study evaluating the effectiveness of its electric Asian carp barrier on the Chicago Sanitary and Ship Canal. The barrier is currently operating at half its maximum voltage. When completed in early 2009, it was built to send as much as four volts per inch into the water, but the Army Corps initially capped its voltage at one volt per inch to prevent sparks from flying between barges operating on the canal, since many of them carry flammable materials. That voltage was believed to be enough to repel adult carp, but not strong enough to deter juveniles from swimming past the barrier toward Lake Michigan. The lower voltage wasn't considered a major issue until the summer of 2009, when the first e-DNA samples taken from waters just below the barrier revealed that the migrating carp were closer to the barrier than biologists previously believed. The Army Corps responded by cranking up the electricity to two volts per inch. The question now is whether that is strong enough to repel all sizes of Asian carp. Chicago district commander Col. Vincent Quarles said that previous Army Corps studies show that two volts are enough to repel fish about 5 1/2 inches or longer. He said the new round of studies looked at fish as small as 2 or 3 inches. So is the barrier working to repel fish that small? "That would be getting into the content of studies we haven't published yet," Quarles said. Quarles said people need to realize this report is just one component of a larger study looking at the overall effectiveness of the barrier system. Other reports will look at things such as barrier safety and where the leading edge of the carp invasion is likely to be. Army Corps officials say the optimal voltage study will be released in mid-March. A separate study conducted in 2009 for the state of Illinois, at the barrier site and using a different fish species, showed that fish as small as 2.6 inches were indeed incapacitated by a two-volt jolt. Asian carp expert Duane Chapman said if the barrier as it is currently operating isn't strong enough to repel fish smaller than 6 inches, "there would still be a very substantial degree of protection" for the Great Lakes. The reason, he said, is that substantial Asian carp hatching doesn't occur on the Illinois River "until you get a good long ways below Starved Rock Dam," about 70 miles downstream from the barrier. (Excerpted from a *Journal Sentinel* article by Dan Egan, February 28, 2011, in *JSOnline*.)

Man Fined for Carp Transport. A Markham, Ontario, trucker who tried to bring a truckload of live Asian carp into Canada has been fined \$50,000 in court. Feng Yang, 52, violated the federal Fisheries Act when he tried to bring 1,860 kilograms (4000 pounds) of live bighead carp and grass carp into Canada near the Windsor border crossing on November 4. The federal Fisheries Act makes it illegal to possess live invasive species. Yang, who represented himself in the case, pleaded guilty. It's not his first conviction for the offence; in 2006, he was fined \$40,000 for possessing the same invasive species. Yang is a live-hauler, a trucker who drives a semi outfitted with fish tanks. On the day in question, his truck had 11 giant tanks, three meters wide and one meter high, but instead of being filled with water, they were filled with hundreds of flopping Asian carp. The carp can "survive extended periods of time out of water," explained Ingham, an investigator with the provincial Ministry of Natural Resources. Yang's carp were likely headed for Asian markets in the Toronto area, where they are a popular ethnic delicacy. So far in 2011, investigators have stopped two truckloads of live Asian carp on its way north. Asian carp pose a serious threat to both U.S. and Canadian multi-billion dollar fisheries industries, and both countries are working together through a bi-national risk assessment to contain the threat. *(Excerpted from 'Asian carp load nets \$50K fine,' by Sarah Sacheli, The Windsor Star, March 4, 2011.)*

[Ed comment: Caught twice with a big fine. Either Yang is a slow learner, or he succeeds often enough to make it worthwhile to pay the occasional large fine. Wonder how many times in the last five years he has been able to drive through unstopped? And imagine what happens if his truck happens to overturn near a waterway...]

Third Carp Barrier Ahead of Schedule. The Army Corp of Engineers is overseeing the building and operation of three electrical barriers designed to shock and stun fish swimming toward Lake Michigan in the Chicago Sanitary and Ship Canal. The third and final electrical barrier in the Chicago is about to go online, a year ahead of schedule, because of stimulus spending from the federal government. The last electrical link in the battle to keep the Asian carp out of the Great Lakes had its final operational test at the end of January. Colonel Vincent Quarles, the District Commander, says three weeks are then needed for safety testing so the new barrier isn't a shocking experience for commercial vessels. *(Excerpted from 'Shock the carp third barrier almost ready', in BusinessNorth.com, January 28.)*

Another Carp Barrier: Coon Rapids Dam. A consultant says a \$16-17 million upgrade could turn the 97-year-old Coon Rapids Dam into an effective barrier against Asian carp migrating up the Mississippi River. New gates, a repaired underwater apron, and revised operating rules to keep upstream water at summer levels year-round, could make the dam 99 to 100 percent effective at stopping the carp from jumping upriver to Minnesota's prime game fish lakes, said Martin Weber, principal water resources engineer for Stanley Consultants. Weber reported his findings to the Coon Rapids Dam Commission, a panel of public officials and citizens established by the Legislature, and on February 22, the commission issued a recommendation to the legislature that the state fund the upgrade. If legislators approve and fund the improvements this year, the work could be done by 2013, Weber said. Without the improvements and operating changes, the dam is 89 percent effective as a fish barrier, he said. The Coon Rapids Dam's main function now is to create a 6-mile pool for recreation. Since 1968, the water level has been lowered in the winter to protect private docks and boat houses from ice damage. Before then, they maintained a constant level year-round. Water levels would have to stay at summer levels to make the dam an effective fish barrier. Weber said, "By keeping the winter pool higher you reduce the opportunity for fish to swim upstream." *(Excerpted from articles on the Coon Rapids Dam, by Laurie Blake, in the Star Tribune, January 12 and February 22.)*

Around The World

Illegal 'Zoo' in 3 Suitcases. An Indonesian man was arrested February 9 at the airport in Bangkok, Thailand when he attempted to smuggle out more than 200 live animals inside three suitcases. He was stopped after the regular luggage scanning process at the airport showed images of an array of animals stuffed inside his three

black bags. "It's not unprecedented to find numbers - sometimes even hundreds - of live animals inside luggage like this," said Richard Thomas, of the international wildlife monitoring group TRAFFIC. "What makes this



case unusual is the wide variety of wildlife in the cases..." The three suitcases above contained dozens of animals: 88 Indian Star tortoises; 33 elongated tortoises; 34 ball pythons; 22 common squirrels; 19 bearded dragons; 18 baboon spiders; 7 radiated tortoises; 6 Argentine horned frogs; 6 mata mata turtles; 4 spiny tailed lizards; 4 striped narrow-headed turtles; 3 aldabra tortoises; 2 boa constrictors; 2 Sudan plated lizards; 2 corn snakes; 2 king snakes; 1 ploughshare tortoise (world's rarest turtle); 1 pig-nosed turtle; 1 African gray parrot; 1 milk snake; and 1 hog-nosed snake. The suspect "admitted to authorities that he had purchased the animals from Chatuchak Market," an outdoor trading area in Bangkok where rare and endangered species are bought and sold. "One really has to question how Chatuchak Market, which is located just down the street from both Wildlife Protection and Nature Crime Police Offices, can continue these illegal mass sales," TRAFFIC Regional Director William Schaedla said. "The situation is totally unacceptable in a country that claims to be effectively addressing illegal wildlife trade..... Some retailers have openly acknowledged to TRAFFIC staff that many of the species they sell have been illegally obtained, and even offer advice on how to smuggle them out of the country, in contravention of national laws and CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora)" TRAFFIC stated. The suspect remains in custody and is expected to face a variety of smuggling charges. (*Excerpted from 'Illegal 'Zoo' in 3 Suitcases gets man arrested', by Miguel Llanos, msnbc.com, February 10, 2011*)

[Ed Comment: Anyone these days who still thinks luggage like this could pass an airport security system must be brain-dead. But since the Bangkok authorities obviously turn a blind eye to this illegal trading, maybe he just assumed the airport security operated in the same way.]

Blue Stain Fungus Teams Up With Mountain Pine Beetles. A University of British Columbia (UBC), Canada, study has decoded the genome of the fungus that helps mountain pine beetles (*Dendroctonus ponderosae*) infect and kill lodgepole pines. Also known as blue stain fungus (*Grosmannia clavigera*), because of the stain it leaves in the wood of infected trees, is carried to the host trees by pine beetles, where it weakens the trees' natural defense system, allowing pine beetles to feed and reproduce in the tree bark. A successful beetle-fungus attack ultimately causes tree death. Now, researchers from UBC and the BC Cancer Agency's Genome Sciences Centre have conducted a detailed genome analysis and identified genes in *Grosmannia* that are responsible for the fungus's ability to bypass the lodgepole pine's natural fungicide and use it as a carbon source for fungal growth. The study was recently published in the *Proceedings of the National Academy of Sciences*. "We found that the fungus cannot only survive, but thrive when exposed to the normally fungicidal resin chemicals of pines," says co-author Joerg Bohlmann, a professor at UBC. "Our study helps to clarify how the fungus has evolved to successfully infect lodgepole pine, and gives us a better understanding of the intricate chemical interaction between the tree, beetle and fungus.... This new knowledge could inform strategies to prevent future outbreaks, such as selecting trees with improved resistance to pine beetles and their associated pathogens." The current outbreak of mountain pine beetle has destroyed more than 16 million hectares of forest in B.C., an area roughly twice the size of New Brunswick, or more than 32 million football fields. It has also crossed the Rocky Mountains, and is now in the boreal pine forests, moving east. The devastation of large areas

of pine forest is anticipated to have major consequences for global carbon balance and sequestration. The study was led by Bohlmann, Colette Breuil, in the UBC Department of Wood Science, and Scott DiGuistini, in the UBC Faculty of Forestry, and funded by a variety of provincial and federal partners. (*Excerpted from Science Daily, January 24, 2011*)

Vigilance Pays Off in New Zealand. Kapiti, a tiny island five miles off the coast of Wellington, New Zealand, is one of the last refuges for a variety of wildlife driven to near-extinction elsewhere by invasive species. Since the late 1980s, when all non-native animals were meticulously cleared from the island, it has been designated as a sanctuary for species on the brink of extinction, and used as an important breeding and recovery site for a host of bird species unaccustomed to predatory mammals. The Department of Conservation (DOC) closely guards the island from foreign intruders -- with strict limits placed even on human visitors. So late last year when a staff member spotted a stoat (*Mustela sp.*), a weasel-like animal native to Eurasia and North America, and the first invasive species seen on the island in a decade, the DOC mobilized quickly. DOC officials suspect that the animal made the 5 mile swim from the mainland. Over several months, they set 160 treat-laden traps strategically around the island, but the stoat proved to be quite elusive. So, on the hunch that the stoat was a male, staffers baited the traps with bedding material of a female, and in February, the stoat was found dead in one of the traps. Stoat-sniffing dogs will also be brought in soon to make sure no additional animals have arrived. (*Excerpted from: 'Island's killing machine finally captured', by Steven Messenger, Treehugger, February 17.*)

Another Pathway: "Karma" Fish Releases. The increasing number of reports of exotic fish species turning up in Australian waterways well outside of their natural habitats has led to a growing concern among anglers about so-called "karma" fish releases. "Karma" releases involve the releasing of fish, usually exotic fry or small fish, into waterways. This is a custom among some Buddhists, who view the liberation of fish as an act of compassion that will be rewarded with good karma. Industry & Investment New South Wales, in Western Australia, receives applications each year from groups who wish to release fish for religious or ceremonial purposes. In the past, NSW Fisheries has provided such groups with a permit to stock species endemic to the waters proposed to be stocked, and has observed the stocking event. But over the past few weeks the I&I NSW has indicated the department plans to step up its education program on this issue. (*Excerpted from 'Karma heads needed to prevent exotic fish releases', January 27, 2011, Fishing World.*)

Introduced Plants Evolving Rapidly in Australia. A number of introduced plant species in Australia have become more like natives, suggesting rapid evolution could happen far more frequently than previously thought, according to new research from the University of New South Wales (UNSW). On the upside, the result suggests plants may be able to adapt to climate change. On the downside, it means that invasive plants will become even more problematic over time. Using pressed plant specimens from NSW dating back around 150 years, researchers found that the majority of introduced herbaceous plants, such as clover and wild geranium, show significant change since being introduced to Australia. "When people brought these plants with them from Europe around 100 to 150 years ago, they unintentionally set up a great experiment by exposing the plants to very different climate conditions from the ones they were used to at home," says lead author Joanna Buswell. "This means that scientists are now able to study the way the plants have changed over time in response to their new environment." The study results, just published in the *Journal of Ecology*, show that significant changes such as plant height and leaf shape have occurred in 70 per cent of the 23 study species. The researchers studied more than 1,900 specimens from organizations, including Sydney's Botanic Gardens, for the work. The changes were surprisingly large: one species now grows to less than half the height it was 100 years ago, while another species' leaves are now twice the size they were a century ago. "Almost a third of the plants actually decreased in height, particularly in far western NSW," says Buswell. In Charles Darwin's time, evolution was thought to occur on timescales of thousands to millions of years, but the research suggests that rapid evolution might be a common phenomenon. "This exciting result has important implications for understanding how introduced plants become problem weeds, as well as the way plants will respond to climate change," says Buswell. One of the

paper's co-authors, Dr. Angela Moles, from the School of Biological, Earth and Environmental Sciences, is now investigating the genetic basis for the changes. (Excerpted from *Physorg.com*, January 31, 2011)

Canada Fines Mitten Crab Smuggler. A man who pleaded guilty of trying to smuggle Asian mitten crabs (*Eriocheir sp.*) into Canada has been fined \$2,000 in Richmond provincial court. Wei Guo Chen arrived at Vancouver International Airport on Sept. 30, 2010, with 17 Asian mitten crabs inside a cardboard box. He had declared in writing that he was not bringing any animals into Canada, but a Canadian Border Security (CBSA) officer found the box on Chen's luggage cart during a secondary inspection. The importation of live mitten crab of the genus *Eriocheir* is prohibited under the Fish Inspection Regulations. "The mitten crab is a highly invasive species that can both affect human health and cause major ecological and economic damage," CBSA said in a news release. The crab is now established throughout much of Europe, including in the River Thames in England, and the U.S. In Europe, it is thought to have arrived decades ago, as tiny larvae in ballast water in ships from Asia. In Asia, mitten crabs are often infected with a parasite that can affect humans, and people who eat infected mitten crabs are vulnerable to a tuberculosis-like illness that can be fatal. (Excerpted from 'Man guilty of smuggling invasive Asian mitten crabs into Canada', *Vancouver Sun*, February 7, 2011)

American Crayfish Damage British Canals. British Waterways has been forced to use special measures to protect the Kennet and Avon Canal from damage by the American signal crayfish, *Pacifastacus leniusculus*. The crayfish, already competing with endangered native crayfish species, are now being blamed for causing extensive damage to the canal banks. They burrow into the canals, using their tails as scoops, and it can affect the banks' stability. Engineer David Berezynskyj of British Waterways, says "Some of these banks are like Swiss cheese. "We need to act to avoid any serious damage and reduce the risk of the embankment breaching." British Waterways, the organization which cares for 2,200 miles of the country's canals and rivers, is now layering woven sheets of polypropylene into the K&A canal banks as part of their dredging process. The work will repair and stabilize the canal bank from Hambridge Road to Bulls Lock and Greenham Lock. It was started on January 21, will cost £250,000, and take 10 weeks to complete. (Excerpted from *Newburytoday.co.uk*, 'Burrowing crayfish damage canal banks' February 06 2011, by Eddie van der Walt)

South American Feverfew and Paraffin Bush Threaten Tanzanian Crops. Tanzanian authorities, already facing a possible food insecurity situation this year, could soon be grappling with another problem of how to control the spread of two South American weeds, Santa Maria feverfew (*Parthenium hysterophorus*) and Paraffin bush (*Chromaleana odorata*), that have severe impacts on agriculture and native vegetation. Even more worrying, the weeds have reportedly been sighted in the Kilimanjaro and Mara regions, which are among the best areas for food crop cultivation, and which feed hundreds of thousands of Tanzanians. Ecologist Sue van Rensburg, an expert with the Grumeti Reserve located in the Serengeti plains in Mara, says "[these weeds] are well known internationally as two of the worst invasive weeds, because they have had severe impacts on agriculture and native vegetation, and they have also been the cause of well-documented health risks to humans."



Parthenium hysterophorus



Chromaleana odorata

The impacts of *P. hysterophorus* have been studied and documented in Ethiopia, where the weed has taken over both native vegetation and food crops, and Van Rensburg adds that in these areas, reduced crop yields have been reported at between 30 and 40 percent, while grazing capacity has been cut by up to 90 percent.

The plant, which produces 10,000-25,000 seeds, has been found in Arusha, Moshi and near Kilimanjaro Airport. Jo Anderson, director of Ecological Initiatives Ltd. says "These two plants could cause serious problems for Tanzania, impacting tourism and grazing areas, both of which could have serious economic impacts... This is not a problem that Tanzania can afford to ignore." She adds: "Although invasive plants are difficult to identify and are not seen as a big problem by many Tanzanians, the economic and environmental impact of allowing them to become established could be crippling for a country already wrestling with development issues and food production challenges."

C. odorata is known to invade savannah ecosystems and forest edges that are disturbed by fire and degradation. It is known as the paraffin bush due to its flammability. When it burns, it destroys everything in its path, and it has even caused human deaths in homesteads when fires get out of control. In South Africa, where authorities have been fighting it for more than 20 years, it forms impenetrable thickets in wildlife areas, making it impossible to view animals, dramatically impacting tourism revenue. It cannot be eaten by domestic animals, and it prevents access to grassland resources. It has been found in Mara Region to the north and east of the Serengeti National Park, following a well-observed pattern of invasion along major highways from Kenya to the north. Van Rensburg calls for a dedicated action plan to address this problem in Tanzania, emphasizing that an early detection and rapid response are needed to tackle the threats posed by these plants. Many control techniques, including bio-control, herbicides, and manual weed clearing have been tested in other countries. She suggests engaging international bodies which can provide support to existing government structures, to effectively design and implement eradication and control strategies. (*Excerpted from 'Food insecurity warning issued over destructive S. African weed', by Lucas Liganga, in The Citizen Chief Reporter, January 15.*)

Welsh Bay "Killer Shrimp" Invasion: a Zebra Mussel Connection? The so-called "killer shrimp" (*Dikerogammarus villosus*), (actually an amphipod) was discovered in November at Cardiff Bay and Eglwys Nunydd, in Wales. University investigations show that the Cardiff Bay population is well-established and already extremely large. Cardiff researchers are now working with other agencies to control the population in



Wales, and to understand its potential effects. While studying the invasive zebra mussel, student Caroline Rees found *Dikerogammarus* distributed across large areas of the 200 hectare Bay, at densities sometimes over 4,000 per square meter. Cardiff Bay now contains many millions of zebra mussels, which like *Dikerogammarus*, originate in the region around the Black and Caspian seas. This could explain why the amphipod has done so well since its chance arrival in the Bay. Professor Steve Ormerod, School of Biosciences, said: "The killer shrimp population must have developed very rapidly over the last one to two years, because we did not find it during very extensive zebra mussel surveys in 2006-2009. It appears to be taking advantage of the large aggregations of the zebra mussel...using the zebra mussel beds as habitat, and it may well be feeding on their waste." The amphipod worries environmentalists because of its potential effects as a predator and competitor with other freshwater species. It has also been found at one other UK location, Grafham Water in Cambridgeshire. A national Task Group has been established to tackle it in England and Wales, and the group urges anyone using waters where it is present to take steps to prevent it from spreading, such as cleaning and drying equipment thoroughly after use, and checking equipment when leaving the water. Professor Ormerod said: "The presence of zebra mussels is a complicating factor at the Cardiff site, and stringent biosecurity should benefit the battle to contain this species as well. Zebra mussels now number many millions in Cardiff Bay, and in the summer every single litre of water contains 10-15 of their larvae which

could so easily be transported to other lakes." (*Excerpted from 'Cardiff invaded by killer shrimps', in NewsWales, environment section, March 3*)

[*Ed. Comment: It might not be a bad idea to keep a lookout for this one in the U.S. as well. Go to [http://el.erdc.usace.army.mil/ansrp/dikerogammarus_villosus.pdf] for a USACE fact sheet on this species. Or see Europe's DAISIE database at [http://www.europe-aliens.org/pdf/Dikerogammarus_villosus.pdf]*]

Alberta E-newsletter. Although it has apparently just starting its fifth year, I have just seen my first issue of the Alberta Invasive Plant Council (AIPC) e-newsletter. It's beautifully done, and many of its articles will pertain to plants that are problems in the USA as well. To see a copy, or to get on their mailing list, contact Virginia Battiste, at <aipc.coordinator@gmail.com>. For more information on the Council, go to their website at [www.invasiveplants.ab.ca].

Spain Hosts Seventh International Conference on Marine Bioinvasions. Abstract submissions for oral and poster presentations at the Seventh International Conference on Marine Bioinvasions (23-25 August 2011). are being solicited. The deadline is April 15. Papers are encouraged along the following or related themes: Development and tests of invasion theory; Drivers of invasibility; Patterns of invasion and spread at local, regional, and global scales; Impact of bioinvasions on ecosystem structure and function, including the biology and ecology of invasive species; and New tools for identification, monitoring, risk assessment, and management. Learn more about the conference at [http://www.icmb.info/]

Major Upcoming Invasive Meetings

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

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

May 27, 2011. Oregon Invasive Species Awareness Day, Salem, OR

Week of June 13, 2011. Invasive Species Advisory Committee (ISAC). Denver, CO.
[http://www.invasivespecies.gov/index.html]

July 20, 2011. PNWER Invasive Species Conference. Portland, OR. Space limited; Contact
<megan.levy@pnwer.org>. [http://pnwer.org/invasivespeciesconference.aspx]

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

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Aquatic Invasive Species News In A Nutshell: Published by the Pacific States Marine Fisheries Commission, 205 SE Spokane Street, Suite 100, Portland, Oregon 97202 phone (503) 595-3100 fax (503) 595-3232. [http://www.psmfc.org/]. Executive Editor: Joan Cabreza (Consultant to the PSMFC), email <joancabreza@msn.com>. Managing Editor Stephen Phillips, ANS Program Manager, Pacific States Marine Fisheries Commission, email <sphillips@psmfc.org>