

Crayfish NEWS

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IAA17



August 2008
KUOPIO, FINLAND

Invasive Rusty Crayfish Spreading in Maryland Waters



↑ Maryland DNR biologists, in cooperation with Hood College and the University of Maryland Appalachian Lab, will launch a monitoring survey in the Monocacy River for the rusty crayfish, an invasive species that has been found recently in Maryland waters. [Photo by Dylan Slagle/Carroll County Times].

The Maryland Department of Natural Resources (DNR) is asking fishermen and residents to be more cautious about releasing any live bait or unwanted pets into the wild because of another non-native species found spreading throughout Central Maryland's waters.

DNR officials gathered in the town of Detour at Millers Bridge on the Monocacy River to publicize rusty crayfish, a new non-native invasive species that was discovered in the northern portion of the Monocacy in June and later in a small portion of the Susquehanna River.

Native to the Ohio River watershed, the

rusty crayfish is slightly larger and more aggressive than other native species of crayfish found in Central Maryland, such as the spiny-cheek crayfish and Allegheny crayfish, said Jay Kilian, a natural resources biologist with the DNR.

Rusty crayfish also grow more quickly and have more offspring than native crayfish. More than 800 rusties were caught in 75 meters of the Monocacy River in one day when they were first found during a routine monitoring of the river in June, said Ron Klauda, director of the DNR monitoring and nontidal assessment division.

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Catherine Souty-Grosset,
IAA President (France)



President's Corner

Dear IAA members,

Another year has past us by, and it is time for our last issue of *Crayfish News* for 2007. With the beginning of the New Year, we are expecting the "birth" of the next issue of *Freshwater Crayfish* (FC16), the proceedings from the Symposium organized by James Furse on the Gold Coast of Australia (Aug 2006). James is now eagerly awaiting revised manuscripts from contributing authors.

We are also now very eager to participate in the upcoming IAA17 conference, to be held at Kuopio University (Finland) and organised by Paula Henttonen and Japo Jussila. As you know, during each IAA meeting, we hold an election for a new society president, president-elect, and secretary. Typically, the current officers are retained on the ballot (in new offices) for an upcoming election, but this means there is a vacancy for the office of secretary. Therefore, we are making a call for interested candidates and will make a selection via committee for the best choice among all submitted candidates. This committee will be composed of the current IAA officers and the IAA Board members (which are listed at the bottom of this page). We would like to receive the names of potential candidates before the end of January 2008.

We have also made a call for proposals to host the IAA18 symposium, to be held in 2010 somewhere in North, Central, or South America (letters of intent are due by December 31, 2007, see pg. 7 for details). At the moment, I have

received two letters of intent: (1) Auburn, Alabama Team with David Rouse, William Daniels, Antonio Garza and (2) Columbia, Missouri Team with Annie Allert, Susan Adams, Bob DiStefano, and Chris Taylor, as organizers. At the beginning of March, the completed venue proposals are due and these should give us all the various details so that a final decision on the venue location can be made by the membership during the IAA17 symposium.

During the meeting in Kuopio, Finland, the IAA officers are charged with the task of forming a publications committee, which will help future organizers of IAA meetings and assist in editing our journal, *Freshwater Crayfish*. As you know, James Furse is the first to use the new **MS&T system** and will be the first helper of choice for future volumes. I am in charge of finding other IAA members to sit on this committee, so please let me know if you are interested.

With the upcoming IAA membership renewals, we are sure of your faithfulness and your willingness to disseminate 'crayfish news', but we also ask that you encourage new young scientists interested in freshwater crayfish to join the International Association of Astacology. H

Merry Christmas and Happy New Year !

My best crayfishes,
Catherine Souty-Grosset
IAA President

The International Association of Astacology (IAA), founded in Hintertal, Austria in 1972, is dedicated to the study, conservation, and wise utilization of freshwater crayfish. Any individual or firm interested in furthering the study of astacology is eligible for membership. Service to members include a quarterly newsletter, membership directory, bi-annual international symposia and publication of the journal *Freshwater Crayfish*.

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Statements and opinions expressed in *Crayfish News* are not necessarily those of the International Association of Astacology.

This issue edited by James W. Fetzner Jr.



IAA 17 TAKES PLACE IN KUOPIO, FINLAND,
AUGUST 4-8 2008

The next IAA symposium will take place in Kuopio, Savo, Finland, Northern Europe. Kuopio is a lake-surrounded city in central Finland and famous for its nature, vendace, special gourmet food such as kalakukko, Savo culture, and the *Kuopio University Crayfish Team*. The first week of August will be freshly mild weather-wise, with sunny days and warm, dark nights, which suits conference delegates just fine.

The symposium will be held on the Kuopio University campus, with all the lectures in one place. Kuopio University is situated close to the city center (20 min walk, less with a bike, bus or car) and all symposium accommodations will be close to the symposium venue, with the closest hotel just 1 km from the campus and the rest in the city center. There will be a tight and strictly scientific program for those interested in crayfish, with special emphasis on conservation of native species and crayfish diseases. Not to mention, ecology, physiology, genetics, crayfish farming, and other hot topics will also be covered. A social program will balance the days and cater specially for accompanying persons. It will be crayfish and fun, for everyone!

There will be a special website on IAA 17 covering all of the innumerable details about the symposium. The address will be www.IAA17.net and the site will open later this year (the planned date is by the end of October). Keep your browser ready and please spread the word.

The organizers, Department of Biosciences of the University of Kuopio, and the Crayfish Innovation Center, will strongly encourage all of our crayfish loving friends to make mental notes of the dates of the IAA 17 Symposium. One could even start discussions with those who run the finances on the possibility to hear, see, feel, taste and discuss crayfish in Kuopio with a special group of friends. We warmly welcome everyone to Kuopio, Savo, Finland next August. Crayfish rule!

On behalf of the organizing committee,
Paula Henttonen and Japo Jussila, IAA 17

IAA17



August 2008
KUOPIO, FINLAND



News Items From Around the World

A Sixth Alien Crayfish for the UK

Recent work in the waterways of the River Lee catchment of north London have revealed a new North American crayfish species now establishing itself in the UK. Originally recorded as the spiny-cheek crayfish, *Orconectes limosus*, the new residents have now been confirmed as virile crayfish, *Orconectes virilis*. Previously, the only European records for *O. virilis* were from the Netherlands (Souty-Grosset et al., 2006).

They can be added to the previous list of alien crayfish found in British waters (Souty-Grosset et al., 2006; Holdich & Black, 2007), i.e., noble crayfish, *Astacus astacus*, and narrow-clawed crayfish, *Astacus leptodactylus*, from continental Europe; and signal crayfish, *Pacifastacus leniusculus*, red-swamp crayfish, *Procambarus clarkii*, and spiny-cheek crayfish, *Orconectes limosus*, from North America. This brings the total of alien crayfish species within the River Lee catchment, the site of the 2012 Olympic development, to three (i.e., *A. leptodactylus*, *P. leniusculus* and *O. virilis*). In addition, *P. clarkii*, occurs in an adjacent catchment.

The new arrivals are believed to have dispersed from a pond where their previous owner deposited them after moving house in 2004. They appear to be colonising the adjacent watercourses at quite a rate and shortly an Environment Agency scheme is to start to monitor them. This may offer some unique opportunities to study a recent “aquatic invader” and its ecological impact in the UK.

Czech workers who have recently carried out a genetic analysis of specimens from the London population of *Orconectes* believe that it may be a species close to *virilis* but not *virilis* itself - watch this space! H

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- Souty-Grosset, C., Holdich, D. M., Noë, P. Y., Reynolds, J. D. & Haffner, P. (eds). (2006). *Atlas of Crayfish in Europe*. Museum national d'Histoire naturelle, Paris, 187pp. (patrimoines naturels, 64).



A virile crayfish, *Orconectes virilis*, found in the River Lee, North London. (Photo: A. Ellis).

Freshwater Crayfish in Lake Kariba, Zambia

Freshwater crayfish are now present in Lake Kariba at Siavanga, Zambia, and are being regularly caught in good quantities by the local fisherman. There is a good market for them and they are being eagerly sought after by all races. These crayfish are not to be confused with large freshwater prawns, once present, but now absent from the lake.

Based on a description provided to me, I was under the impression that the crayfish were *Procambarus clarkii* whose apparent source dated back 15 years to when an American tour operator arrived at Lake Kariba. The individual brought *Procambarus clarkii* by float plane where he stocked them into a pond near the lake. He sold breeding stock to some missionaries, and they also apparently bred them. I went to Kariba Town, Zimbabwe, to see the missionaries about their crayfish, but they told me that they had lost most of the crayfish. They expressed interest in coming to my farm in Livingstone to secure new stock, but they never came. I presume that they could not secure the necessary permits, as I had agreed to supply the crayfish.

I subsequently contacted Mr. Maurice Diamond about the crayfish in Lake Kariba in Zimbabwe. Mr. Diamond examined photographs of *Procambarus clarkii* that I sent to him and I spoke with him by phone about the identification. Mr. Diamond felt that the crayfish were *Cherax* and likely *Cherax destructor*, yabbies. It is clear, however, that the crayfish are almost certainly *Cherax quadricarinatus*, redclaw. Redclaw is now very common in the Kafue River, a tributary to Lake Kariba. Mr. Diamond stated that everyone was very pleased about the presence of the crayfish. He was certain that the fisheries for the crayfish will become a lucrative business.

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Although I am unable to travel in my old age, I will do my best to follow up on introductions of freshwater crayfishes in my region. I will certainly advise fellow IAA members immediately if there is any error in this report. H

C. J. Grubb (as related to Jay V. Huner)
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ZAMBIA

Rusty Crayfish Invades Maryland

On June 28, 2007, the rusty crayfish (*Orconectes rusticus* Girard) was discovered in the Monocacy River, a tributary to the Potomac River in Maryland. Rusty crayfish were also documented in Maryland's portion of the Susquehanna River above Conowingo Dam on September 10, 2007. These are the first records of this invasive, non-native species in Maryland. Rusty crayfish were first introduced into Pennsylvania tributaries to the Monocacy River via bait buckets and have since dispersed downstream into Maryland. Bait bucket introduction is also likely responsible for the Susquehanna population.

In October 2007, the Maryland Department of Natural Resources began a multi-year survey of rusty crayfish in the Monocacy River. The objectives of this survey are to monitor the dispersal of rusty crayfish over time and document its effects on native crayfishes in the watershed. Preliminary results indicate that rusty crayfish is established in the northern 18 river kilometers of the Monocacy River mainstem in Maryland. Native crayfishes were not collected in this portion of the watershed, but remain abundant in downstream areas where rusty crayfish were absent.

The rusty crayfish joins the growing list of non-native crayfishes (five species to date) in Maryland. In an attempt to slow the spread of invasive crayfishes already in the state, and to prevent future introductions, the Maryland Department of Natural Resources is drafting new regulations prohibiting the sale and use of live crayfishes as bait. H

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First documented *Orconectes rusticus* from Maryland. Pictured bucket shows collection of over 800 crayfish from a 75 meter stream segment. [Photo credit: Matt Sell].

A French population of *Pacifastacus leniusculus* bears the North American parasite branchiobdellidan ectosymbionts *Xironogiton victoriensis*

A fisherman (M. Lucien BOULET) observed large crayfish in the River Lot, a tributary of the River Garonne, in southwest France. These were identified as the North American signal crayfish, *Pacifastacus leniusculus* and they appeared to carry small worms. Samples of the crayfish with worms were preserved in ethyl alcohol and sent to Dr. Stuart R. Gelder at the University of Maine at Presque Isle, USA. He identified the worms as the ectosymbiotic branchiobdellidan, *Xironogiton victoriensis*. This species of branchiobdellidan has already been reported in Europe from Sweden, Spain and Northern Italy. The ectosymbionts were imported on signal crayfish into Sweden in the early 1960s.

It has not been possible to find out, from either sport fishermen clubs or from the administrative authorities, how and when these alien crayfish were introduced into the Lot River. Such an introduction of exotic crayfish species into

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the wild is illegal in France. The Lot River is, for the moment, the sole place in France where these branchiobdellidans have been reported. However, as has happened in many other places, more records will appear as fishermen become aware of this associate.

My thanks to Dr. Stuart R. Gelder for identifying the branchiobdellidans, and his suggestions for this article. H

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Crayfish in Takeout Breakout

Police had to round up a cluster of crayfish after the crustaceans broke out of an Asian food shop and scuttled down the street, police in the German city of Stuttgart said on Monday. A surprised pedestrian notified authorities after seeing the crayfish crawling down the road early on Sunday, a local police spokeswoman said. They had escaped by squeezing through gaps in the grating on their tanks and leaving by the store's front door, which had been left ajar. H

ABC News (Australian Broadcasting Corporation)
Posted Tue Oct 23, 2007

Intermittent creeks a thread in fabric of life downstream

Editor, the Tribune: Your Oct. 10 edition contained Steven Wise's letter about the intermittent stream to be affected by proposed Highway 63 construction. I thought this discussion could benefit from relevant scientific facts.

All streams flow downhill. Intermittent streams, including the one Wise calls a ditch, are recognized worldwide by biologists as important habitats contributing much to the value and quality of downstream rivers, lakes and wetlands and their fish and wildlife. They also support surrounding terrestrial habitats and wildlife. Intermittent streams, even those flowing just below the visible surface - trickles - contain diverse biological communities providing abundant food to downstream fisheries and wildlife. They recharge groundwater supplies for drinking, bathing and irrigation. They filter and improve downstream water quality for those uses and for recreationally and economically important fish and wildlife. They help control floods. They trap harmful erosion sediments, thereby reducing degradation of downstream habitats. Many endangered and economically important species rely on intermittent streams, such as many fish that swim upstream into them to spawn.

Many studies document that when these streams are altered, their ability to perform such services is diminished or eliminated, even when engineers attempt to minimize impacts. Adjacent road construction is repeatedly demonstrated to degrade their physical structure and water quality. Hence, we have rules protecting them or to provide mitigation of lost values. The stream in question is only one stream, but such construction is widespread, and every lost stream takes its toll. H

Robert DiStefano

Published in the Columbia Daily Tribune
Wednesday, October 24, 2007
<http://archive.columbiatribune.com/2007/oct/20071024comm007.asp>

COLUMBIA DAILY
TRIBUNE

State warns about invasive crayfish

In 2003, Perry bait distributor Vince Smith bought 10,000 crayfish from a wholesaler in Wisconsin. The order arrived in early spring, and Smith quickly sold the creatures to bait shops around Missouri, congratulating himself for getting a jump on the competition.

Later he received a call from Missouri Department of Conservation officials, who said the creatures were "rusty crayfish," a large-clawed, non-native and invasive species. Named for brown splotches on their sides, rusty crayfish rapidly breed and destroy aquatic habitat.

"I had no clue," Smith recently said. "To me, I always thought a crawdad was a crawdad was a crawdad."

Bait-shop owners are facing an increasing threat from invasive species. Recent studies have shown high numbers of foreign creatures being sold as bait in Missouri, presenting a high potential of getting into waterways.

"I don't want to sound like it's all doom and gloom, but it is this problem that seems to be growing," said Brian Canaday, the conservation agency's former invasive species coordinator. "We are a global community; the world is getting smaller; and we can find things now being distributed intentionally and accidentally" from all over the world.

- In June 2006, Canaday said, boaters found zebra mussels underneath a dock at Lake of the Ozarks. The Russian mussel is known to rapidly spread and blanket flat spaces, filtering life-giving plankton from water. Earlier this year, the mussels showed up in Lake Taneycomo near Branson.

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Rusty crayfish are an invasive species state officials seek to eliminate. [Photo courtesy of Missouri Department of Conservation].

- Big head and silver carp, introduced from China in the 1970s, have become some of the most plentiful fish in the Mississippi and Missouri rivers.

"The way I explain it to people is basically, invasive species can out-compete native ones," Canaday said. "You may have foreign plants in your front yard, and it might not be a problem. But an invasive plant will take over the entire flower garden and climb up your balcony."

Jim Mertens of Mertens Live Bait and Tackle in Jefferson City has been in business for 20 years. He said he and his wife refuse to deal with dealers who try to sell bait without documentation. "We've been in business too long to take a chance with anything," he said. "If somebody's not a reputable dealer, he's not going to bring anything in these doors."

An influx of rusty crayfish could be particularly ugly, officials said. The three-quarter-pound crayfish is native to the northern United States and Canada but have spread as far south as Maryland, where they're now eating native species and clearing out fish-spawning grounds.

"They're sort of notorious for eliminating aquatic plant beds that serve as spawning grounds and nurseries for fish," said Bob DiStefano, a resource scientist and crayfish specialist with the conservation agency. "We've seen sport fisheries in remote, provincial parks that have been decimated. They can cause a lot of damage."

Smith did not want his bait shop to be part of the problem. He acted fast, driving to shops from Kirksville to south of St. Louis, destroying or freezing the animals while reimbursing merchants. The experience cost him thousands of dollars. He said he now tries to educate bait shops about the dangers of invasive species.

DiStefano and other researchers are about to publish results of a study where they purchased crayfish from every bait shop in Missouri that sells them. The findings show that

16 percent of the crayfish sold here are rusty crayfish, and the bait originated from five outside states.

Few, if any, bait shop owners know what they're selling. Only 13 percent claimed to know the species of crayfish they sell.

Officials said education is the key. In recent years, DiStefano and others have instituted a statewide registry of bait shops, and they've begun to educate shop owners and fishermen with posters and bumper stickers. They've also created a guide to crayfish, so people can easily identify harmful species.

"The odds of an enforcement officer observing someone actually dumping bait into the water are very minuscule, and once these invasive species are actually in a body of water, there's very little we can do," DiStefano said. "We're absolutely convinced that education is our greatest tool." H

By T.J. GREANEY of the Tribune's staff
Published in the Columbia Daily Tribune
Saturday, October 27, 2007

COLUMBIA DAILY
TRIBUNE

CALL FOR PROPOSALS TO HOST THE 2010 IAA SYMPOSIUM

The 2010 IAA symposium (IAA 18) is scheduled to be held somewhere in the new world (North, Central, or South America). If you are interested in hosting this meeting, please **submit a letter of intent to host IAA18** directly to the IAA President (**Catherine Souty-Grosset**) via e-mail by **31-December-2007**, and then expect to submit a full proposal by the March deadline listed below.

All qualifying proposals should include the following information in order to supply the IAA board with sufficient information to evaluate your application and the proposed venue site. Please include a description of the meeting location (maps and photos are also helpful), a complete list of the proposed organizing staff, access to and estimated costs for local accommodations, possible crayfish-related field trips, any potential meeting sponsors, and a breakdown of the estimated meeting costs to attendees. Please also include any other information that you think would help in the evaluation of your proposal. Please note that meeting registration costs should also incorporate publication costs for *Freshwater Crayfish*.

You should **submit your final venue proposal** to the IAA president (**Catherine Souty-Grosset**) via e-mail no later than **1-March-2008**. If proposals for multiple venues are submitted, presentations will be given in Kupio by each organizing committee and the final meeting venue will be selected by the membership via ballots during the general assembly meeting. The final venue selection will be announced at the conclusion of the general assembly meeting. If you have any questions or require any further information on submitting a proposal, please feel free to contact one of the IAA officers (see page 2). H

Jim Fetzner, IAA Secretary



Marron Research Report Available

I thought IAA members might be interested to know that we recently published the FRDC marron research report. It is available in hard copy from the Department of Fisheries in Western Australia.

The report is also available in electronic version on the Department of Fisheries web site. It is titled "Fisheries Research Contract Report No. 17 Improved performance of marron using genetic and pond management strategies" and can be downloaded from the following link

<http://www.fish.wa.gov.au/docs/frr/frcr017/index.php?0401>

I am in the process of preparing selected chapters from the report for publication in scientific journals, these papers will come out in due course as time permits. H

Craig Lawrence
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Report Citation:

Lawrence, C. (2007). Improved performance of marron using genetic and pond management strategies. Final report to Fisheries Research and Development Corporation on Project No. 2000/215. Fisheries Research Contract Report No. 17, Department of Fisheries, Western Australia, 178p.

New Marmorkrebs Resource

I've created a resource geared at providing resources concerning Marmorkrebs, the parthenogenetic crayfish that showed up in the German aquarium trade in the 1990s, at: <http://marmorkrebs.org/>

The "news" section links to a blog, which is currently the most active and content-filled part of the site. I am trying to have at least one update a week, usually on Tuesday.

And today's update is one I would like some feedback on: <http://marmorkrebs.blogspot.com/2007/12/pic-of-moment-11-december-2007.html>

I'm noticing what I think are fungal infections on juvenile crayfish, which worries me somewhat. If anyone has tips on fighting fungal infections (if that's what these are) in crayfish or other freshwater crustaceans, I'd be pleased to know! Thanks! H

Zen Faulkes
Department of Biology
The University of Texas-Pan American
<http://w3.panam.edu/~zfaulkes>

Crawfish oddity or invasion? Fish and Game out to seek, destroy crustaceans in Kenai River, Alaska

A crawfish surprised a king salmon netting crew when it fell from a gill net and into the river last Monday. The crew was doing assessment just below the king salmon sonar site at mile 8 of the Kenai River when the clawed crustacean found its way into their net.

"The thing was still alive when they retrieved it out of the river," said Rob Massengill, a sport fishery biologist with the Department of Fish and Game. "It died in their boat. It was barely moving when they caught it, which is a good sign."

Commonly called a Louisiana red swamp crawdad in the southeast United States, Massengill said this is the same species of crawfish as the one found near Sears Elementary in 2004 after an Anchorage girl rescued it from a boil. The crawfish is currently sitting in Fish and Game's freezer awaiting the formaldehyde jar.

"Crawdads are not native to Alaska," Massengill said. "We have had crawdads illegally introduced up here before, but on the Kenai Peninsula we don't know of an established population."

Figuring out how a crawfish — an animal typically found in the warmer waters of the south — found its way into the mainstem of the Kenai River is Fish and Game's objective now.

"We have no idea if it represents a viable population in the river now, but we are putting traps in different locations," Massengill said. "Hopefully we won't find any."

Robert Begich, fishery biologist with Fish and Game, said the department has laid traps out where the crawfish was discovered this year as well as in the creek where the 2004 incident occurred.

"The worst thing is that they have become established," Begich said, adding that Fish and Game will continue to set traps, "until we're satisfied that there isn't any in that area."

Out of more than 500 crawfish species worldwide, 350 live in the U.S. Robert Romaine, an aquaculture professor with Louisiana State University, said Louisiana red swamp crawfish are native to the southern United States and northern Mexico, but have made a foothold to points as far north as southern Sweden. In colder climates, he said, the introduction of predatory fish such as pike has kept the crawfish population in check, but the crustacean has caused problems in warmer climates.

Romaine said non-native Louisiana red swamp crawfish often displace native species of crawfish and could have a detrimental impact on aquatic plants, insects and snails.

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"Some snails that were endangered have disappeared because of crawfish," he said.

In warm waters a crawfish will reach sexual maturity within a year of being born, Romaine said. In colder climates it could take a crawfish three to four years to reach reproductive maturity, but once they have they can produce between 100 and 700 eggs a year.

"A good average in Louisiana would be about 250 per female," Romaine said.

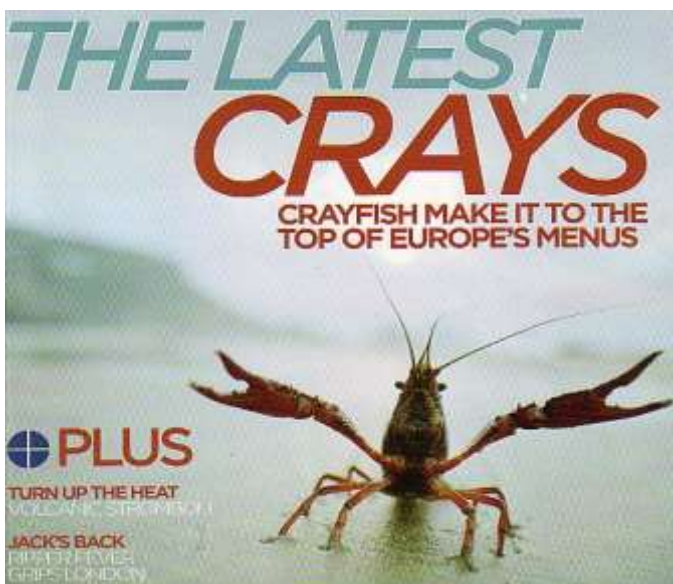
Although Romaine said it's a possibility the crawfish let go near Sears Elementary three years ago could have reproduced, Fish and Game isn't making any guesses one way or the other. Tim McKinley, a fisheries biologist with Fish and Game, said the crawfish traps have yet to yield any crustaceans.

"We can't say absolutely one way or the other," McKinley said. "We've found them before, we've found them again. Whether they're related, we don't know."

One thing Fish and Game does know is it's illegal to let an exotic animal go in Alaska waters, and they're asking for the public's help in uncovering non-native species. Massengill asked members of the public to call him at 262-9368 if they have any more information.

"Them being our eyes and ears is really helpful," Massengill said. "Not only is it illegal, but there are real ecological consequences to releasing a non-native species."

By Jessica Cejnar
Reporter, Clarion Peninsula
Posted Tuesday, July 17, 2007



An alert IAA member noticed this airline magazine cover while on a recent trip.

Short Articles

Managing Water Quality Following Fall Flood-Up

As we enter the month of November a majority of producers have completed flooding of their ponds or are in the process of completing filling of ponds. With flooding comes opportunity for a promising crawfish season, but also potential problems that the producer must be aware of and manage for. Fall flooding from mid-September through early November coincides with peak spawning (reproduction) of females. Early flooding of ponds may not offer significant advantages of early season harvest for the producer if a majority of females have not yet laid and hatched eggs. By late October a majority of females have laid eggs and young hatchlings are ready to emerge. Rainfall in October and November assists in the emergence of females from the burrows, particularly those located high on the levees.

The largest concern at this time of the year in crawfish pond management is maintenance of water quality that will insure good survival of the young and fast growth. Good water quality in the fall is synonymous with having an adequate concentration of oxygen dissolved in the water. Although crawfish have the ability to survive exposure to relatively low oxygen levels for short periods, research has shown significant mortality, or slow growth, of young can occur when oxygen levels remain below 1 part per million (ppm) for an extended period of time. Measure oxygen with a chemical test kit or an oxygen meter.

The most important factor that influences oxygen levels in ponds is water temperature. Although warm water is advantageous to the growth of crawfish, at the same time, the warmer the water is in a newly flooded field, the more rapidly oxygen will be consumed and depleted in the breakdown or decomposition of vegetative forage that was established during the summer as a food resource for crawfish. Just about all ponds will have some degree of problem associated with low oxygen in the first month or two following fall flood-up. The severity and length of the problem will depend on several factors, including water temperature, the type and quantity of vegetation in the pond at flood-up, and the depth to which the pond is flooded in early fall.

Usually oxygen problems develop about two weeks after ponds are flooded, and continue until such time that water temperature cools to around 60 F, usually sometime from mid-November into December. The warmer the temperature the higher the rate of vegetative decomposition and the more severe will be the problem with low oxygen. Oxygen is consumed in the decomposition of vegetation. Also, warmer water cannot hold as much oxygen as colder water.

(Continued on page 10)



Of course the producer has no ability to control and manage water temperature, but several steps can be taken to minimize the impact of low oxygen concentration on crawfish health. Usually oxygen problems are less severe in monocropping ponds in which rice is planted as forage in August and is still green at flood-up. Ponds in rice-crawfish rotations with significant amounts of rice straw spread throughout the field following grain harvest can usually be expected to have more severe oxygen problems extending over a longer period of time. Ponds with non-planted volunteer forage, particularly terrestrial grasses, will usually have more severe water quality problems than ponds with rice or other planted forages. Ponds with sorghum-sudangrass as forage appear to have somewhat more severe oxygen problems than ponds with rice, but it is manageable if ponds are not flooded too early or too deep in the fall.

Ponds need not be flooded to full depth during the 1- to 2-month period in the fall when brood crawfish and their young emerge from their burrows. Shallow flooding in the early fall reduces the amount of vegetation that is underwater and subject to decomposition. This can reduce the severity of low oxygen. It is also cheaper to replace four to six inches of water in a pond that is deficient in oxygen than 12 to 18 inches if flushing the pond is warranted. Young crawfish can successfully grow in as little as four to six inches of water, especially if abundant vegetation provides cover. During the period following initial flooding, maintaining high oxygen levels is more important than filling the pond to its full depth. The pond should be filled to maximum depth when oxygen problems subside in early winter.

If you have low oxygen what can you do? We use to routinely recommend "pumping and flushing" ponds to improve oxygen levels, but given the high cost of fuel and size of many ponds this might not be the most effective management plan. Managing low dissolved oxygen by flushing out low oxygen water and pumping in good, oxygenated water can be a hit or miss proposition for many producers. First, many farmers do not have sufficient pumping capacity to effectively flush ponds to maintain adequate concentrations of oxygen. If you are not capable of filling your pond(s) in four to five days after the ground is wet, you likely do not have sufficient capacity to effectively manage oxygen by flushing. Pumping and flushing if you do not have sufficient pumping capacity is expensive and not likely to improve production. If you do have adequate pumping capacity to completely exchange water in your pond(s) in four to five days, measure your oxygen and consider flushing when oxygen levels drop below two ppm.

When flushing a pond to replace low oxygen water, it is better to drain some of the low oxygen water from the pond, usually by dropping the water level by $\frac{1}{2}$ to $\frac{3}{4}$, and then refilling the pond to the previous level. This is more effective than pumping and draining at the same time. Of course, be sure you have an effective aeration screen to aerate incom-

Table 1. Trapping guidelines for establishing harvesting row (lanes) for optimal trap placement.

Distance Btw Rows	Distance Btw Traps	Traps/ Acre
40	30	36
40	40	27
40	50	22
40	60	18
50	40	22
50	50	17
50	60	15
60	30	24
60	40	18
60	50	15
60	60	12
70	30	21
70	40	16
70	50	12
70	60	10

ing water whether pumping from a well or surface waters source.

What about Supplemental Feeds?

Although we hope you were able to establish a good forage crop this past summer to carry you through the production season, it is not uncommon for a variety of reasons for some producers to have a lack of adequate forage. We are frequently asked what can be done to supplement the food supply or, if addition of supplemental feeds or hay to a pond is an effective management tool. Considerable research has been conducted for nearly 30 years on this topic which has involved evaluating dozens of potential supplemental crawfish feeds ranging from low cost agricultural by-products and hay, to higher cost formulated feed pellets developed for fish and shrimp. The bottom line of all these studies is that little or no noticeable cost-effective benefit is predictably derived from supplemental feeding of crawfish in commercial ponds. Thus we do not currently recommend supplemental feeding as a practical management tool in crawfish farming at this time. Practical logistical issues of handling feed, distribution of feed supplements throughout the pond and frequency of feeding are larger issues associated with supplemental feeding in crawfish ponds than nutritional considerations of the crawfish themselves. We will speak more on this topic in future newsletters.

Preparations for Crawfish Harvest

Before you know it, we will be just around the corner starting crawfish harvest. As most of you know, labor and bait associated with harvesting is among your highest expenses in farming crawfish. It pays to be as efficient as possible. Your goal should be to use the least amount of labor and bait to remove your crawfish crop from ponds over the next five to six months. Now is a good time to review basic

(Continued on page 11)



(Continued from page 10)

trapping guidelines in preparation for the upcoming harvest season. If you have not already done so, first you will need to establish harvesting rows (lanes) for your traps (Table 1). The following table will provide you with information on how wide your trapping rows should be spaced and distance between your traps to obtain your desired number of traps per acre. For example, if you are targeting fishing 18 traps per acre in your pond your distance between trapping lanes or rows should be about 40 feet and distance between traps in the row should be about 60 feet, or you could place your rows at 60 feet intervals and space your traps at 40 feet intervals.

Pyramid traps made from ¾-inch square welded wire will catch on average about ⅓ more crawfish by weight than ¾-inch hex-mesh traps or traps made from ⅝-inch square wire because they retain smaller crawfish. But this can differ from pond to pond depending on crawfish density and crawfish size. In low density ponds with exceptionally large crawfish you may not see much difference in size or catch between traps made with different types of wire or mesh size.

Trap Density and Spacing

Evenly distribute traps at a rate of 18-22 traps per acre for high crawfish density ponds. High crawfish density ponds are usually those in which the pond is managed solely for crawfish (crawfish monocropping) and crawfish are produced in the same pond year after year.

Distribute 10-15 traps/acre for low crawfish density ponds. Low density crawfish ponds are usually those in which crawfish are not grown in the same field year after year, such as is practiced in rice-crawfish field rotational systems. We will discuss baits, baiting recommendations, and frequency of trapping in the December newsletter.

Production Manual and Other AgCenter Resource Information. If you do not yet have a copy of the updated "Louisiana Crawfish Production Manual" contact your county agent to receive one. Other publications on crawfish can be found on the LSU AgCenter website at http://www.lsuagcenter.com/en/crops_livestock/aquaculture/crawfish/

If you have any questions about your particular situation, contact one of the crawfish specialists with the LSU AgCenter for assistance. H

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(Continued from page 16)

Zhou, Q, Qi, Y-P and Yang, F (2007). Application of spectrophotometry to evaluate the concentration of purified White Spot Syndrome Virus. *Journal of Virological Methods* 146(1-2): 288-292

Crayfish Research in Southern Ontario, Canada

Just a short update on my research this summer: I conducted crayfish surveys in Southern Ontario (mostly looking to get a handle on *O. rusticus* in target areas of the Province. I also worked on developing an official Crayfish Sampling Protocol (for the Ministry of Natural resources Ontario). This would allow all stakeholders (scientists, naturalists, volunteer groups, etc.) in Ontario to sample crayfish using the same methods and therefore make the data comparable and useful. Should be out this spring and also I hope to give talk on it at IAA 17. Here are some (fun) photo highlights. H

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Premek Hamr conducting stream sampling for crayfish in southern Ontario, Canada.

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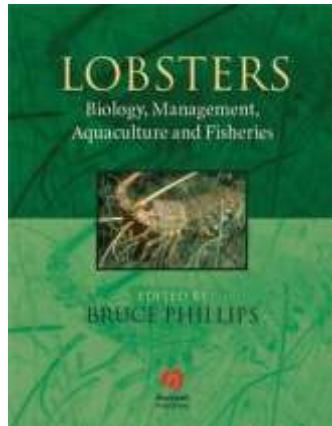


Photos from summer research in Ontario. A) Premek sampling at Bridal Veil Falls, Manitoulin Island. B) Rusties are bad but taste good! C) *Orconectes propinquus* from SW Ontario. D) A hybrid *O. rusticus* x *O. propinquus* E) A hypnotized crayfish.



Books & Multimedia

Lobster book



I have a new copy of a book on lobsters written in the same style as Holdich (2002) 'Biology of freshwater crayfish.' If anybody is interested in obtaining this book at a much reduced price then please contact me. Details: B. Phillips (2006) (ed.). *Lobsters— biology, management, aquaculture and fisheries*. 528 pp. Blackwell Publishing, Oxford.

(ISBN 1405126574). [List price: US \$225.00]

For more information on the book see <http://www.blackwellpublishing.com/book.asp?ref=9781405126571&site=1> H

David Holdich
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New AR Crayfish Poster Available

The Arkansas Game and Fish Commission (AGFC) recently completed publication of a poster highlighting some of the diverse array of crayfish found in "The Natural State". The poster was designed by AGFC's Communications Staff based on input from Brian Wagner, AGFC Nongame Aquatics Biologist, and Dr. Henry Robison, Southern Arkansas University. The poster features the stunning photography of IAA member Chris Lukhaup. To accompany the poster, an elementary school activity book was also produced. Copies of the poster or the activity book can be requested by emailing Katrina Heath (kaheath@agfc.state.ar.us) or Marilyn Moore (mvmoores@agfc.state.ar.us) in AGFC's Communications Division. H

Pennsylvania Crayfish Poster Available

The Pennsylvania Department of Conservation and Natural Resources (DCNR) has issued a new crayfish poster through their Wildlife Resource Conservation Program. The species photos that appear on the poster were produced by Chris Lukhaup and the text and graphics on the back of the poster (not shown) were created by Jim Fetzner. Poster layout was created by DCNR staff. The poster can be obtained by contacting Debra Miller at the DCNR at (717)787-3212 or via e-mail at debmillers@state.pa.us. H



Crayfish posters available from Arkansas and Pennsylvania.



Meeting Announcements

Southeastern Crayfishes: Conservation, Natural History, and Ecology Symposia

A symposium on the natural history, conservation, and ecology of crayfishes of the Southeastern United States will be held in association with the 2008 Southern Division of the American Fisheries Society Spring meeting (February 28 – March 2). Given that this region harbors the most diverse crayfish fauna in the world, and many of these species are currently under various threats, this symposium is rather timely in disseminating information on life and natural history, conservation, and ecology of crayfishes in the Southeastern region.

Emphasis will be placed on natural history, life history, autecology and conservation biology projects within the Southeast, Mid Atlantic and Ozarks. The meeting will be held during February 28 – March 2 at Oglebay Resort and Conference Center, Wheeling, West Virginia (meeting details are currently under construction at the following web page – <http://www.sdafs.org/meetings/2008/>.)

Abstract submittal, information on paper presentations and poster presentations, and meeting registration and lodging costs will be available in the near future via the meeting web page. The deadline for abstract submittal is listed on the webpage as 1 Dec 2007. We plan to publish the proceedings of the symposium, and will be working with Author House Press in association with the Indiana Biological Survey.

All presenters will be given the opportunity to submit a manuscript in association with their presentation or poster. Manuscripts can be submitted at the meeting, or no later than 30 March 2008. In addition to abstract submittal (prior to the deadline) via the meeting webpage, presenters need to email a presentation title and indicate whether or not you plan to submit a manuscript for the proceedings of the meeting to Zachary Loughman at zloughman@gmail.com to track interest in the meeting. Please feel free to forward this information on to other people who would be interested in participating! H

Zachary Loughman
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"They get into these areas and just explode," Kilian said. "They eat other crayfish and they out-compete them for prime shelters."

Since the rusty crayfish were first found, DNR workers have performed stream surveys throughout the Monocacy watershed, testing two spots upstream at each tributary, including Double Pipe Creek in Carroll, Kilian said. So far all the specimens have been found north of Sixes Bridge Road, he said, and the streams will be sampled again next year to see how far the crayfish have spread.

The problem started in Southern Pennsylvania, Kilian said, where natural resources officials told him they've been dealing with rusty crayfish for the past 10 years. They believe the source of the infestation was not intentional, Kilian said, but a case where fishermen emptied their bait buckets at the end of a day with enough live specimens that were able to survive and reproduce.

Bait bucket dumping is a common source of invasive species spreading, Kilian said. Varieties of darters, minnows and even earthworms are transferred across large portions of land they would never be able to cross on their own if it weren't for them being released as bait, he said.

Residents releasing unwanted pets in local waterways is another way non-native species spread, he said. The snakehead fish in Crofton was the most famous example of this in Maryland, he said, and DNR officials recently found an oriental weatherfish, native to Asia, in the Gwynn Falls in Baltimore.

Drew Ferrier, a biology professor at Hood College in Frederick, said his environmental biology students have assisted the DNR with stream surveys, particularly in Owens Creek and Israel Creek. Ferrier said some students are planning to use the rusty crayfish or the virile crayfish — another non-native invasive that has been living in Central Maryland for more than 30 years — for their research projects this semester.

Virile crayfish have become the most common crayfish species in many Maryland streams, Kilian said, and have had a negative impact on native species. However, the rusty crayfish pose an even larger threat because of their larger size and quick reproduction. They may even be a threat to local small-mouth bass reproduction, Klauda said, because of their habit of eating fish eggs.

"We sort of have I guess a battle really going on here between two non-native invasive crayfish species and it will be interesting to see who wins it out," Klauda said. "We'll hopefully track this over time." H

[Editor's Note: Find additional details on the invasion of the rusty crayfish in Maryland by reading the related article found on Page 5.]

By Carrie Ann Knauer
Times Staff Writer, Carroll County Times
Published Thursday, October 18, 2007
carrie.knauer@carrollcountytimes.com



IAA Related News

IAA Website Visits By Geographic Region for Second Half of 2007



The above map depicts: 4,185 visits to the IAA home page from 31 May 2007 to 13 Dec 2007. Dot sizes (see key) indicate the number of visits from a particular location.

Site Visits: ● = 1,000 + ● = 100 - 999 ● = 10 - 99 ● = 1 - 9

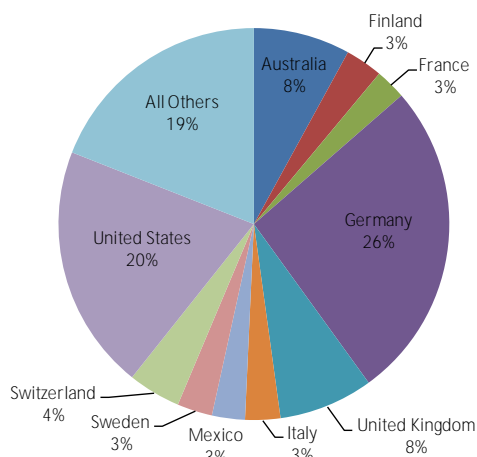
Current IAA Membership:

As of December 2007, the IAA had 509 active members (+ 53 inactive) from 50 different countries. Members from Germany (including [Forum Flusskrebse](#)) made up 26% of all members, followed closely by the United States (20%) and then Australia (8%) and the United Kingdom (8%). Overall, 10 countries made up 81% (~412 members) of the society memberships, while the remaining 40 countries made up 19% of the total membership, with each generally accounting for <2% of the total.

As the ClusterMap™ above shows, there are frequent visits to the IAA website from many regions of the globe, clearly showing that there is an interest in crayfish (and the society in general) in many places where we do not currently have active members (e.g., Argentina, Africa, India, China, Indonesia, etc.). We would like to ask current members of the IAA to be sure that they encourage all their colleagues and students, especially those who might have a direct interest in freshwater crayfish, to join the IAA. Blank membership applications are available for download directly from the IAA website (see the membership page), and are also attached to the end of each issue of *Crayfish News*. Help our society to grow by passing along one of these membership application forms.

Also, we want to remind all active (and inactive)

IAA Memberships by Country



members that 2008-2009 membership fees are due at the end of this month. So, don't forget to fill out your own application and send it in to keep your membership active.

Also, if you are planning on attending the IAA17 symposium in Kuopio, Finland, remember that members in good standing will receive a break on the registration costs for the meeting. Hope to see you all there. H

Happy Holidays,

Jim Fetzner
IAA Secretary



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[Note: It is possible to make direct payments to IAA accounts in France, and Australia . See following pages for details.]

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Last Updated: Aug-2007