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BALLOTS for the next IAA Symposium are now available at the end of the newsletter and on the IAA website. **Please return to the IAA Secretariat by 27 July 2006.**

PRESENT STATE OF CRAYFISH IN WEST HUNGARY



✦ An 80+g male *Astacus astacus* from Zalacsány reservoir. Photo by: Dr. Paul Kiszely

Introduction

Hungary had a very admirable crayfish population in the past. Originally there were three native crayfish species in the country. The noble crayfish (*Astacus astacus*) was dominant in Western and Northern Hungary, while the slender claw crayfish (*Astacus leptodactylus*) used to populate mostly the lakes and rivers of the Great Hungarian plain in the East. The third species, *Autropotamobius torrentium* was the rarest, it lived only in some small brooks in the Buda and Pilis Hills near the Danube Band in the vicinity of Budapest.

After the great plague at the end of the 19th century, crayfish disappeared from the most significant wa-

ters. Nevertheless all crayfish species survived the pest and slowly repopulated most of the rivers and lakes of Hungary.

Despite the shocks caused by the extreme use of fertilizers and pesticides in the mid 20th century, even today, all three native crayfish are present in Hungarian waters.

Besides these natives two alien species have been reported from Hungarian rivers: *Orconectes limosus* is abundant in the Danube and its tributaries, a resident there since the eighties, and the signal crayfish (*Pacifastacus leniusculus*) was recorded from the Gyöngyös River, along the Austrian border back in 2002.

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Francesca Gherardi,
IAA President

Presidents Corner

Dear IAA members:

At the very end of my term, I would like to thank all of you who have been so wonderful in your support and dedication to the Society. I have been very fortunate indeed to have received great help and guidance from the fine people who served as IAA officers in these years. They have always found the time to offer their counsel whenever the Society needed it, regardless of how busy they were. Working with them has made my role less difficult than what I expected. Their advice always encouraged me.

Please don't forget to vote for the new officers using the ballot enclosed herein. Please send it by e-mail or by regular mail to the IAA Secretariat (Bill Daniels, see contact information below). If you prefer, you can also cast your

vote when you arrive at IAA16 on the Gold Coast... Remember: in a few days the Society will meet again in Australia. At the IAA 16 Symposium we expect extraordinary news about crayfish from around the world, heated discussion about the IAA's future, and relaxed bathing in a warm ocean.

Best wishes to you all and see you soon. ♪

Francesca Gherardi
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and Genetics
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The International Association of Astacology (IAA), founded in Hintertal, Austria in 1972, is dedicated to the study, conservation, and wise utilisation 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*.

Secretariat:

The International Association of Astacology has a permanent secretariat managed by **Bill Daniels**. Address: IAA Secretariat, Room 123, Swingle Hall, Department of Fisheries and Allied Aquacultures, Auburn University, AL 36849-5419, USA.

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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.



(Continued from page 1)

The Crayfish project

After a successful project application, the Research Institute for Fisheries Aquaculture and Irrigation launched a project in order to investigate the present state of crayfish populations in West Hungary.

The research area has been divided amongst three biologists. Mr. Károly Györe works on the Northern Danube basin, Mr. Miklós Puky investigates the Southern Trans-Danubius and I am working in the Zala and the Rába River catchment area.

This later area is interesting from two points of view, the Zala River and its catchment was historically the most famous crayfish area in Hungary. The noble crayfish grew to a very big size here and it used to be sold as far away as the markets of Vienna. On the other hand, the Gyöngyös River, where the first signal crayfish sightings were made, is the tributary of the Rába River, which connects with the Danube. It is very important to detect the present spread of this alien species as it is a vector of *Aphanomyces astaci*, the pathogen of the crayfish plague. This statement is twice as true today since samples from Gyöngyös were brought to Munich (2003) and Prague (2005), where they were tested by the PCR method, and in both cases some of the specimen proved to be a carriers of the plague.

Methodology

We use different methods to map crayfish populations. First of all we collected a lot of information from naturalists, fishermen and from the responsible authorities.

For evidence of the presence of crayfish we capture them by several different methods. I use 10 Jattimerta and two Rapumökki Finnish traps baited with pieces of fish, trout pellets and a maize mixture. While the traps are waiting for their visitors I manually inspect the shoreline, the riverbed and any holes in the river bank.

I am at the beginning of my work. I made two excursions on the Zala area so far. The presence of noble crayfish was documented in the Zalacsány Reservoir and Borostyán Lake, where one can find a stable population. A third water body, the Kerca River, which flows from Slovenia, has the most abundant crayfish population. Information from fishermen, anglers and amateur naturalists suggests that the noble crayfish is the dominant species in the Zala River catchment area, and is widely dispersed and abundant.

Other crayfish species have not been detected in the Zala area.



A nice catch of crayfish.

During the two summer months this year we are going to complete this crayfish faunal project. We plan to publish our results in *Crayfish News* with a Summary of the Final Report at the end of this year. ♪

Dr. Paul Kiszely

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EDITOR'S NOTE: The following message was received from Stephen Chara for IAA16 delegates.

Anyone attending the IAA16 symposium, and planning a trip to Victoria afterward, is invited to see the crayfish I have on display.

I have the following species on display and all with appropriate permits. Blue *Cherax albidus*, 300 gm *Cherax destructor*, 250 gm+ *Cherax rotundus*, *Geocherax*, *Euastacus armatus*, *Euastacus kershawi*, *Euastacus yarraensis*, and *Euastacus woiwuru*. For directions see: <http://www.fastnfun.com/crayfish/LocationMap.htm> ♪

Regards,

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<http://www.fastnfun.com/crayfish/introductionOY.htm>



Short Articles

Assessing the effects of the 2005 bushfires on the unique crayfish fauna of the Grampians National Park in south-west Victoria, Australia

In 2003 *Kerrylyn Johnston* of Deakin University started a PhD study of the unique crayfish fauna of the Grampians National Park in south-west Victoria, Australia. Five species of freshwater crayfish (*Euastacus bispinosus*, *Cherax destructor*, *Geocharax falcata*, *Gramastacus insolitus*, and *Engaeus lyelli*) from five genera co-occur in the Grampians National Park, with some living in sympatry. All of these species are endemic to Australia and several of them exist only in South Australia and south-west Victoria, or south-west Victoria and Tasmania. Nowhere else in the world are so many freshwater crayfish species known to co-occur, yet almost nothing is known about their ecology and biology. In particular, we do not know what their habitat requirements are, so there is a risk that management actions may unwittingly threaten these species. Consequently, Kerrylyn's PhD project aims to investigate the habitat requirements, diets, life histories, population characteristics, reproductive timing, activity patterns, general behaviour, and interaction of these species.

On 20th January 2006 a lightning strike ignited a major bushfire in the Grampians National Park, which spread rapidly due to extreme weather. Flames consumed more than 130,000 hectares of national park, public land and pasture land before being controlled on 9th February 2006. Approximately 47% of the National Park, and the majority of Kerrylyn's study sites were affected.

In addition to writing up her PhD thesis, Kerrylyn is now back in the Grampians National Park, and with the assistance of Andrew McIntyre is conducting follow-up research to assess the effects of the bushfire on the crayfish fauna. This follow-up data will be compared to the broad baseline ecology data Kerrylyn has already collected.

A study trip conducted (as a soon as was safely possible) after the bushfire revealed that crayfish were still living in most of the sites previously studied. However, we believe that the worst effect of the fires is yet to come, and may last for several years until the landscape stabilizes. If there are heavy rains before vegetation re-establishes, then even lightly burnt areas are going to suffer erosion, and the resultant siltation has already transformed what were rocky stream beds into almost clay/sand substrates. In the more intensely burnt areas, this erosion may continue for several years and substantially change the hydrology of lengthy tracts of some streams. As

yet we do not know what impact the expected rapid change in hydrology, substrate type and water quality will have on the crayfish species.

Kerrylyn will be presenting part of her PhD research at the upcoming IAA conference in Queensland. ♀

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Many Bird Species Utilize London's Crayfish

There is a crayfish population in the Serpentine Lake in Hyde Park in central London, which is generally unnoticed by the many park users. On 9 October 2005 I observed and photographed a young heron by the Serpentine eating something unusual, which proved to be a Turkish crayfish (*Astacus leptodactylus*) [Note in press in *The London Naturalist*]. On 22 December, I photographed a lesser black-backed gull also feeding on crayfish. Then during 17-19 June 2006 still sunny weather caused oxygen depletion in this relatively shallow water-body, resulting in the deaths of both fish and crayfish. Many crayfish tried to leave the water and were seen by passers-by, while gulls and carrion crows scavenged dead and dying specimens. The lesser black-backed gull seems to be the most effective predator - on 3 July one was seen to swoop and snatch a crayfish from the centre of the lake. ♀

Elinor Wiltshire

(Submitted by **Julian Reynolds**,
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Parental Care of Spiny-cheek crayfish

Orconectes limosus

Parental care in freshwater crayfish is well known. Crayfish's eggs are attached to the female pleopods under the abdomen for several weeks. There the eggs were cleaned and dead eggs will be removed by thoracic appendages (Gherardi 2002). Movements of the pleopods aerate the eggs. The rate of pleopod movements increases when environmental conditions become unfavourable (Gherardi 2002). All these descriptions refer to the behaviour of crayfish in freshwater conditions.

In a 60 liter tank with three breeding females of *Orconectes limosus* as occupants I could easily observe their parental care. There was no air-pump in the tank, the bottom was muddy and water temperature rose during the daytime to more than 30°C. Under such bad water and oxygen conditions all three females of *Orconectes limosus* moved above the water line. After sunset, they all climbed a stone that forms a kind of bank to directly utilise atmospheric oxygen. After arriving there, they slowly moved their pleopods in order to aerate the eggs, thus utilizing the better conditions found on land. I observed this behaviour for at least four nights in a row.

It seems to support the often mentioned statement, that *Orconectes limosus* tolerates water pollution well (Kossakowski 1973, Spitzky 1973, Momot 1988, Troschel & Dehus 1993).

This observation demonstrates one more reaction of this species to low oxygen levels in the water. Female *Orconectes limosus* can leave the water for at least a short period of time during the night and thus protect their brood. Whether this kind of parental care was successful in this case could not be observed.

♂

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Spitzky, R. (1973). Crayfish in Austria, historie and actuel situation. *Frehwater Crayfish* 1, 9-14 (Printing Services University of Southwest Louisiana) Lafayette

Troschel, H. J. & P. Dehus (1991). Distribution of crayfish species in the Federal Republic of Germany with special reference to *Austropotamobius pallipes*. *In*: *Freshwater Crayfish* 9: 390-398, (Printing Services University of Southwest Louisiana) Lafayette

Acknowledgement to Dr. Amelie Schmolke for reading the manuscript.

Production of a Narrow-Clawed Crayfish Population of *Astacus leptodactylus* (Eschscholtz, 1823) in Belorussian Polesian Waterbodies

In Belarus there are two major regions where you can find a great number of lakes – The Northern Poozerie and Southern Belarussian Polesie. Belarussian Polesie occupies the southern part of Belarus and has a low-lying and waterlogged relief. Numerous natural and artificial water-bodies are typical for the Polesian region. There are many shallow lakes, rivers, former river-beds and reservoirs with waterlogged banks.

Narrow-clawed crayfish *Astacus leptodactylus* can be found almost everywhere in water-bodies of Belarussian Polesie. The number of crayfish in waters varies from almost zero to a few individuals per 1 m². We have estimated the production of narrow-clawed crayfish from the shallow eutrophic Lake Oltush. It has a surface area of 200 ha.

We analyzed crayfish caught by traps. Their length was measured from the end of the rostrum to the end of the telson.

The production of each yearly age group was estimated with the help of the following formula:

$$P_{t, t+1} = D W_{t, t+1} (N_t + N_{t+1}) / 2, \quad (1)$$

where P = the crayfish production at the age of t to t+1; W = the average individual mass increase during t to t+1 years; N_t, N_{t+1} = the number of crayfish individuals of the same age.

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The age of individuals was estimated by analyzing the size structure of populations (Table 1).

The mass of individuals was estimated by the equation below of the relationship between mass and length that is common for male and female individuals:

$$W = 0.0296 L^{2.977}, \quad R^2 = 0.991, \quad (2)$$

where W = the raw mass of an individual, in grams; and L = the length, in cm.

The number of crayfish individuals was estimated by tagging and repeated catching. The calorificity of raw crayfish eggs was estimated at 3.12 ccal/g, while that of the body was 0.7 ccal/g.

Population production.— An estimate of the crayfish population found in Oltush Lake is approximately 1.0 ± 1.3 million individuals. The male to female ratio was 0.49 : 0.51, the average density was 0.53 individuals/m².

The total biomass of males was 16,471.6 kg, total somatic production = 8,945.6 kg/year. Correspondingly the P/B coefficient of males was 0.54. The total biomass of females was 17,367.2 kg, somatic production = 9077.3 kg/year. The P/B coefficient of fe-

males was 0.52 (table2).

The crayfish harvest in Oltush Lake (10 tonnes) makes up 55.5% of the total production (18 tonnes) of population.

The narrow-clawed crayfish is a long-lived, repeatedly reproducing species. Oviposition takes place in November-December, with hatching occurring at the end of May-beginning of June. In the lake, females begin to mature at the age of 2+, and at the age of 3+ all of them become mature. With the increase in individual female mass, the mass of eggs also increases.

This relationship can be described as a rectilinear function:

$$W_{ov} = 0.061 W_f - 0.248, \quad R^2 = 0.548, \quad (3)$$

where W_{ov} = raw egg mass, in grams; W_f = female individual raw mass, in grams.

We estimated the female individual egg production using the relationship between the female mass and the egg mass and changes in number of mature females (Table 2). At the age of 3+ females produce 301.1 kg of eggs, 4+ = 134.6, 5+ = 71.5 kg respectively. The total egg production of Oltush Lake crayfish is 507.2 kg/year. Taking into account the genera-

(Continued on page 7)

Table 1. Age-specific structure of narrow-clawed crayfish in Oltush Lake.

Age, years	Male				Female			
	Number, thousands	Individual mass increase, g	Biomass, Kg	Production, kg	Number, thousands	Individual mass increase, g	Biomass, Kg	Production, kg
2+	147.0		2043.3		140.2		2103.0	
3+	242.06	18.6	7868.2	3618.2	281.0	18.4	9385.4	3875.6
4+	69.09	24.7	3952.5	3842.7	55.6	25.1	3252.6	4224.3
5+	28.91	22.5	2303.3	1102.5	25.5	16.3	1907.4	660.9
6+	2.94	24.0	304.3	382.2	7.6	19.1	713.6	316.6

Table 2. Production of captured part of narrow-clawed crayfish population in Oltush Lake.

Age, years	Male individuals				Female individuals			
	Length range, cm	Average length, cm	Average mass, g	Number, %	Length range, cm	Average length, cm	Average mass, g	Number, %
2+	6.6—9.3	7.9	13.9	30.0	6.5—8.9	8.1	15.0	27.5
3+	9.4—12.3	10.5	32.5	49.4	9.0—12.3	10.6	33.4	55.1
4+	12.4—13.8	12.7	57.2	14.1	12.4—13.4	12.8	58.5	10.9
5+	13.9—15.0	14.2	79.7	5.9	13.5—15.0	13.9	74.8	5.0
6+	15.1—15.5	15.5	103.5	0.6	15.1—15.4	15.4	93.9	1.5



(Continued from page 6)

tive production, the annual P/B coefficient of female individuals is 0.65.

Consequently, the harvested share of the narrow-clawed crayfish population of Oltush Lake produces 7.1 ccal/m² per year, 6.3 ccal/m² is produced due to individual growth and 0.8 ccal/m² is produced due to egg production. ♀

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Crayfish of the world

Over the last few years close to 300 species of crayfish have been collected and photographed by us. We have made collecting trips to the USA, to Mexico, Chile, Australia, Cuba and of course many trips in Europe.

In a new project we try to show the crayfish of the world in Educational Posters.

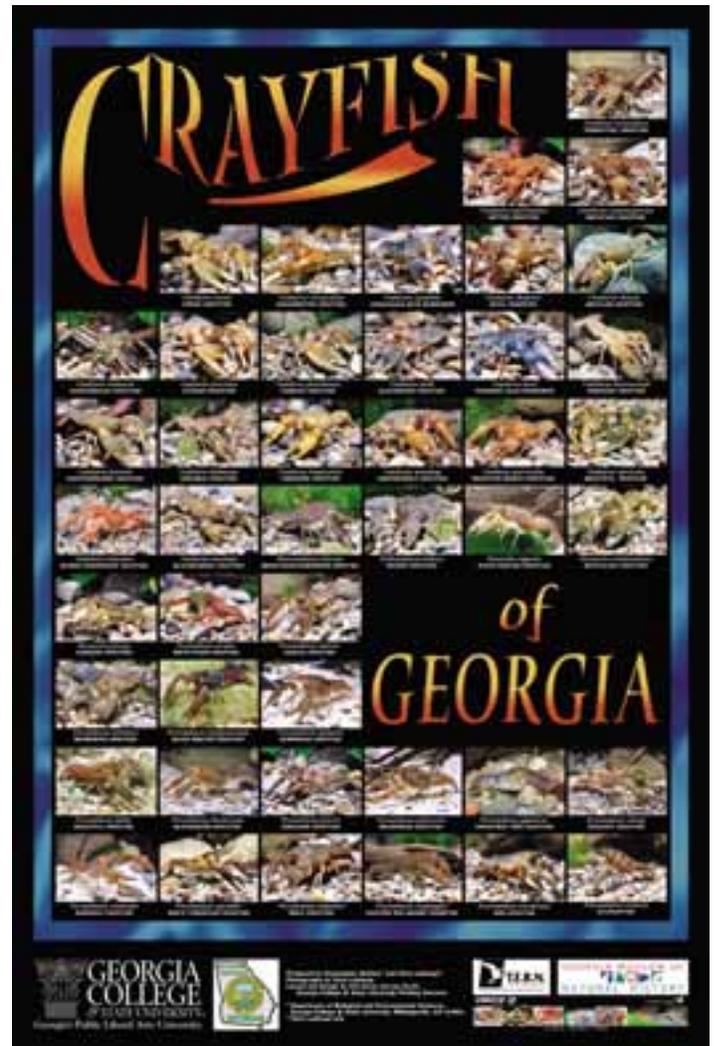
Georgia Trip

The first trip was made to Georgia. Together with **Dr. Christopher E. Skelton** from Georgia College & State University, Milledgeville we have collected about 90% of the crayfish of Georgia and photographed them there as well. Free copies of the Crayfish of Georgia poster can be ordered here:

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Cambarus truncatus. Photo by Chris Lukhaup.



Crayfish of Georgia poster.



Chris Skelton (center) and students.

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Oklahoma Trip

In the second project together with **Liz Bergey** (University of Oklahoma) and **Michi Tobler** (University of Zurich & University of Oklahoma) we tried to collect all the crayfish reported from Oklahoma. All species but one were collected and photographed.

About 30 species of crayfish have been reported from the state of Oklahoma. However, we have only limited knowledge on their distribution, ecology and conservation. Furthermore, although many preserved specimens lie in museums, photographs of living specimens documenting the beauty and diversity of Oklahoman crayfish are so far lacking. Therefore the poster is a good and necessary contribution for their protection and to increase knowledge and awareness about crayfish and will be published in the fall of 2006. Also, a new website about the crayfish of Oklahoma has been published on the web. <http://faculty-staff.ou.edu/T/Michael.Tobler-1/crayfish/crayfish.htm>

Arkansas Trip

The next project and challenge was to collect and photograph the Crayfish of Arkansas. In May 2006 we met our friend **Dr. Henry W. Robison** in Arkansas to sample and photograph the crayfish of the state. Dr. Robison already collected several species with **Dr. Keith Crandall** before our arrival so that we had already many species before the trip started. With our collecting team it was possible to sample and photograph about 90% of the state's crayfish.

The Poster of Arkansas crayfish will be published hopefully in 2007.

A poster about the Crayfish of Europe was published this year by Craynet, Catherine Souty-Grosset from the Université de Poitiers / France and Crusta-10.

We hope that we can continue our work and that it is possible to show the crayfish of the world in colour photos. 🦞

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Captions for photos on page 10.

A.) *Procambarus liberorum*, B.) *Cambarus causeyi*,
C.) *Bouchardina robisoni*, D.) *Cambarus tartarus*, E.) Isidora Lopez collecting some crayfish. F.) Isidora with crayfish.



Chris Lukhaup (Left) and Henry W. Robison (Right) by burrows of *Fallicambarus harpi*.



Henry W. Robison (Left) and Chris Lukhaup (Right) down at the river.



Isidora Lopez digging for burrowing *Fallicambarus harpi*.

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Crayfish of Europe Poster.



The Crayfish Collecting Team — Arkansas 2006.

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Meetings and Workshops



International Workshop: *Chemical Ecology in Aquatic Systems*

October 16 –18, 2006, Florence, Italy

First Circular

An increasing interest is directed today to the understanding of the role of chemical communication in aquatic systems. It seems axiomatic that, in aquatic organisms, the use of vision may be reduced by high habitat complexity and poor light transmission, especially in turbid waters. Chemical communication may aid the location of prey, predators, food, and partners and may be used in kin recognition. Also, waterborne chemicals are important for navigation among long-distance migrating organisms, such as salmonids. Finally, the use of chemicals, e.g. sexual pheromones, may facilitate the control of the several nuisance species that have invaded natural waterbodies throughout the world.

Notwithstanding the flood of studies centered on several aspects of chemical ecology, there is still a general lack of theories explaining mechanisms of action and functioning of chemical substances in the aquatic medium. The workshop aims at assessing the state-of-the-art of our knowledge in this area, stimulate discussion, and identify future research directions and collaborations. It will gather scientists from all over the world working within different disciplines that range from ethology and sensory physiology to conservation biology.

Under the auspices of:



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ROBERTO BERTI - University of Florence (Italy)
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Conference Location

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Format

Two 40-min invited papers.
A panel sessions on general
issues. Oral presentations
and posters are welcomed.

Registration Fees

Full Registration € 70
One-day Registration € 40
Students € 30

Hotel Accommodation

The Workshop venue is located
near several accommodation op-
tions. Hotel rates range from € 40
to € 200 per night.

Conference Registration

Deadline for registration and
abstract submission is **July 31,
2006**, but pre-registration (by e-
mail to cheas2006@unifi.it) would
greatly help in the early planning
stage.
The web site of the Workshop will
be available soon at the URL
www.dbag.unifi.it/cheas2006

Keynote Speakers

JELLE ATEMA – Boston
University Marine Program,
Woods Hole (USA)
THOMAS BREITHAUPT –
University of Hull (UK)





The proceedings from the final CRAYNET meeting (Florence, Italy) have now been published. The table of contents from volume 380-381 of Bulletin Français de la Pêche et de la Pisciculture can be viewed below or online at http://iz.carnegiemnh.org/crayfish/IAA/BFPP4_toc.htm.

B.F.P.P. No. 380-381 (2006 - 1 & 2)
Knowledge and management of aquatic ecosystems

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News From Around The World

Pulp Mill Plan Could Adversely Impact the Giant Tasmanian "Lobster"

In a news article published in *The Australian* by newspaper columnist Matthew Denholm ("Pulp mill to feed on native forests", 11-July-2006) it was stated that "A LEAKED document confirms conservationists' worst fears about Gunns's proposed \$1.2billion pulp mill, revealing it will initially rely on native forests for up to 80 per cent of its pulp wood resource." If true, this would impact 2000 km² of native Tasmanian forest, including the slopes of the Blue Tier, Ben Lomond, and the Dazzler Range. "This would most likely lead to local extinctions of wedge-tailed eagles, spotted-tailed quolls and freshwater crayfish," according to Wilderness Society campaign coordinator Geoff Law. A government spokesman said it would be inappropriate to comment given that Gunns's final impact statement — expected within weeks — would go to an independent planning commission. To read more on this issue, see the original article at <http://www.theaustralian.news.com.au/story/0,20867,19750159-30417,00.html>.

Columbia River Toxins Now Affecting Multiple Levels of The Food Chain

In a news article published in *The Seattle Times* by staff reporter Craig Welch ("Columbia River toxins moving up food chain", -July-2006) it was revealed that the Columbia River pollution problem has gotten worse. Testing of various organisms from the river near Vancouver, Washington has revealed a surprising level of contamination. "First were the crayfish near Bonneville Dam, so loaded with toxins that scientists wondered how they could still be alive." "The river bottom near the dam was so high in cancer-causing polychlorinated biphenyls (PCBs) that crayfish, a favorite of local fishermen, had 15,000 times more PCBs than is considered safe." The river is threatened by other chemicals, pesticides and even highly radioactive materials found in the groundwa-



Photo by : MIKE SIEGEL / THE SEATTLE TIMES (cropped from original)
From Crown Point on the Oregon side of the Columbia River looking eastward up the Columbia Gorge.

ter. Other wildlife with high levels of contamination include various fishes, birds, and clams. For more information on this topic, see the original article at http://seattletimes.nwsourc.com/html/localnews/2003116801_columbia10m.html

Louisiana Crawfish Industry Suffering After Bout with Mother Nature

In an article by Andrew Bell ("Production, market down for crawfish", 14-June-2006) which appeared in the *Delta Farm Press*, it was reported that the weather is still negatively impacting the crawfish industry in Louisiana. Last year, hurricane storm surges (the influx of saltwater into freshwater areas) resulted in the alteration of crayfish brooding schedules. This year, drought conditions and a short supply of crawfish may push many producers out of business altogether. The U.S. Department of Agriculture has earmarked \$4.7 million in relief for farmers affected by last years storms. For more information on this topic, see the original article at <http://deltafarmpress.com/news/060614-crawfish-production/>

Crayfish Plague, Signal Crayfish, and UK White-claws

In a story published by *BBC News, Newcastle*, by columnist James Lynn ("Plight of the white-clawed crayfish", 11-July-2006) the plight of the endangered white-clawed crayfish due to introduced Signal crayfish (*Pacifastacus leniusculus*) and the devastating effect of the crayfish plague on UK populations. For more information or to read the original article see http://news.bbc.co.uk/go/pr/fr/-/2/hi/uk_news/england/cumbria/5165048.stm

IAA Related News

The Crayfish News Archive is now complete !! You can login to the IAA website and download copies of every issue from volume 1, issue 1 up to the present.

Freshwater Crayfish Update.

Electronic versions FC2 & FC3 are nearing completion and will be made available to IAA members sometime in the next few months. Check the IAA website for updates.

FC14 still appears to be in limbo in Mexico. Please rest assured that we are trying everything we can to get copies into the hands of the membership.



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