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What lurks within the depths of Washpool's Rainforests ?



↑ The unusual vivid blue *Euastacus* found around the southern edges of Washpool National Park during preliminary surveys. The specimen appears broadly similar to *E. suttoni* in morphology, and may in fact be a striking color morph of that species – detailed morphological and genetic analysis is underway to clarify its taxonomic status.

The Washpool National Park is located on the Gibraltar Range half way between Glen Innes and Grafton along the Gwydir Highway in North Eastern NSW. Washpool National Park encompasses some of the most diverse and least disturbed forested country in New South Wales. The Park contains a stunning landscape of granite boulders, expansive rainforests, tall trees, steep gorges, clear waters and magnificent scenery over wilderness forests. Altitudes range from approximately 200 to 1,490 metres above sea level. Approximately one third of the area is included on the World Heritage list as part of The Gondwana Rainforests of Australia. Washpool contains the largest remaining stand of coachwood dominated warm tem-

perate rainforest in the world and constitutes an important centre of endemism for plant and animal species. It is one of the most important and floristically diverse areas in NSW. This is due to a range of factors including the natural isolation of the area, the variation in geology and the large range of elevation, topography and soil types. The park provides habitat for 331 vertebrate species, including 179 species of birds and 10 species of fish.

Rainforest habitats have been closely linked to many species of *Euastacus*, a spiny crayfish genus extending almost the entire length of the eastern Australian mainland (spanning latitudes from around 16°S to 39° S). The large piece of rainforest at Washpool

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James M. Furse
IAA President (Australia)

President's Corner

Dear IAA members:

I hope this issue of *Crayfish News* finds you all well, and I trust our members from the Northern Hemisphere are enjoying the summer, and hope that everyone in the temperate regions of the Southern Hemisphere are keeping warm. The winner of our most Southernly and probably coldest IAA member competition is Smita Apte at -45°S in Dunedin (New Zealand), with Alastair Richardson in a close second place at -42°S down there in Hobart, Tasmania (Australia) – congratulations to you both! Thank you to everyone who responded to the message (in the last issue of *Crayfish News*), from Jim Fetzner and myself about the problems we experienced with delivery of *Freshwater Crayfish* 16. We will ensure that your copies are delivered to you as soon as possible.

I understand that *Freshwater Crayfish* 17 is progressing very nicely indeed, and with nearly 50 manuscripts submitted: it promises to be an excellent volume. The manuscripts are now in the revision stage, and when revising your manuscripts, I encourage all authors to pay close attention to the “new” formatting specifications and instructions to authors that were implemented in *Freshwater Crayfish* 16. The instructions were revised to both standardise the presentation, and to speed and simplify the production of our associations flagship publication (i.e. we have dis-

pensed with much unnecessary punctuation). To assist authors during preparation of their manuscripts, Jim Fetzner had kindly prepared a *Freshwater Crayfish* EndNote Style, and this can be downloaded from the “Users Guide” page of the IAA Manuscript Submission & Tracking System website. This can save you, and the editors a lot of time, so please take advantage of this if possible.

There was some discussion at the last IAA Board Meeting (in Kuopio 2008) about ways of increasing the distribution, and enhancing the accessibility, profile, and impact of *Freshwater Crayfish*. Myself and others have been investigating and working on this important matter, and we are pleased to announce that *Freshwater Crayfish* has been accepted for inclusion by one of the larger indexing services, and I anticipate that we should be accepted for listing by others in the near future.

One important avenue for increasing the accessibility of material published in *Freshwater Crayfish*, to other non-IAA researchers, is ensuring that copies of *Freshwater Crayfish* are distributed and lodged in library collections around the World (of course this will also improve the impact of our journal, and citation rates for individual authors). I would appreciate it if IAA members could please kindly take a little time and investigate the possibility of your institution's library joining

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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*.

Secretariat:

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IAA Board Members:

In addition to the IAA Officers, the board includes Arnie Eversole (USA), Paula Henttonen (Finland), Jay Huner (USA), Julian Reynolds (Ireland), Stephanie Peay (UK) and Alastair Richardson (Tasmania).

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This issue edited by James W. Fetzner Jr.



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the IAA (as an Institutional Member), and remember that the cost of membership is very reasonable indeed (2 years Institutional Membership is only US \$80.00), and allows access to an increasingly large number of IAA publications.

The 18th Biennial Symposium of The International Association of Astacology (IAA18) is now almost exactly 12 months away, and the IAA18 team up there in Missouri are doing nothing less than a magnificent and very thorough job of the preparations. As is always the case with IAA meetings, I can hardly wait to get there. I just love meeting up with everyone again, seeing what's new in the world of astacology, sampling the local delicacies (Kalakukko is hard to beat) and viewing the local scenery, wildlife and of course crayfish. As before, I encourage all IAA members to do whatever they can to attend IAA18, and most importantly, if you have any students, try and bring them along as well. Our Symposia are magnificent opportunities for students to present their work, forge new networks, and become part of the IAA family.

My very warmest regards to you from a very chilly Gold Coast (maximum daily temperature only 18°C). H

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IAA Related News

Crayfish Conference 2009

A very successful one day conference was held in Leeds, England; hosted by British Waterways and organized by consultants, Crayfish Survey and Research. Sixty delegates attended and listened to a range of talks covering topics from the distribution of non-indigenous crayfish, to selecting ARK sites to conserve the declining populations of *Austropotamobius pallipes*.

The day was kicked off by David Holdich, giving a thorough overview of NICS and ICS in Europe (Photo 1); NICS being non-indigenous crayfish and ICS being indigenous. Zara Gladman gave a good account of the distribution of *Pacifastacus leniusculus* in Scotland and was followed by Julian Reynolds with an overview of *A. pallipes* in Ireland. Adrian Hutchings summarized a long running project, monitoring *A. pallipes* in southern chalk streams. There were two presentations on crayfish diseases; porcelain disease was covered by Emily Imhoff, and David Rogers talked about crayfish plague.

Mark Horton gave a fascinating insight into the breeding and re-introduction work being carried out at the Ballinderry Fish Hatchery, Northern Ireland. This linked nicely to Stephanie Peay and her presentation on the selection criteria for



Photo 1. David Holdich showing off his new T-shirt for non-indigenous crayfish.

ARK sites, and also Paul Bradley's, 'Prioritizing conservation actions for white-clawed crayfish'. Jen Nightingale described an exciting project that is taking a strategic approach to crayfish conservation and this was supported by a joint presentation by Buglife personnel, Vicky Kindemba and Andrew Whitehouse, who are putting some of that work into practice.

To compliment the work being talked about and the work being done, were two high quality presentations on current research projects delivered by research students Heather Ream (University of Durham) and Neal Haddaway (University of Leeds).

The sessions were chaired by Jonathan Brickland, Mark Robinson and Julian Reynolds. Proceedings are being sponsored by the Environment Agency and will be completed later this year; they will be edited by Jonathan Brickland, David Holdich and Emily Imhoff. H

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Freshwater Crayfish Volume 16 Now Available !

Published in 2008, *Freshwater Crayfish 16* is the latest volume of the *Freshwater Crayfish* series, and it is now available for purchase. See the [IAA website](http://www.iaa.org.uk) for more details.

In addition to 21 papers, this 202 page volume contains a complete bibliography of the more than 800 papers that have been published in *Freshwater Crayfish* volumes since 1973, and a copy of the revised *Freshwater Crayfish* instructions to authors.

The price for members of the IAA is US \$14.00 (plus shipping), and for non-members is US \$24.00 (plus shipping).

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Short Articles

Effects of Sex Steroids on the Reproduction of the Yabby *Cherax albidus*

INTRODUCTION

“Yabby” is the aboriginal name for the crayfish *Cherax albidus*. *Cherax albidus* has been termed the “white yabby” in order to distinguish it from *Cherax destructor*, the “common yabby”. Since 1936, scientists and farmers have distinguished *Cherax albidus* from *Cherax destructor* based on morphological characteristics. More recently, it has been proposed that *Cherax albidus* be reclassified as a subspecies of *Cherax destructor* and renamed *Cherax destructor-albidus*. Regardless, the yabby industry continues to use the name *Cherax albidus* (Lawrence 2001). Farmers in Australia raise yabbies for domestic or export sales, typically as a live product.

Yabbies are adapted to a wide range of temperatures, being able to survive in water temperatures between 1°C and 35°C, although when water temperatures drop below 16°C, the yabby falls into a state of partial hibernation where metabolism, feeding and growth virtually cease. Temperatures higher than 35°C will result in cessation of growth, and eventually mortality. The ideal temperature range for optimum



Photo 1. Nursery Tanks used to rear crayfish.

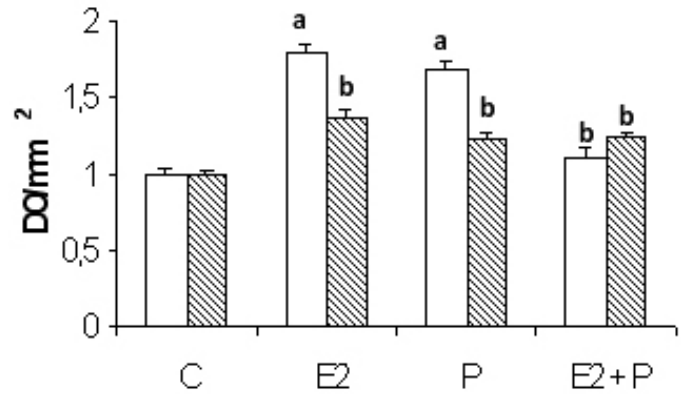


Figure 1. Effect of steroids on the expression of vitellogenin (VTG) mRNA in the hepatopancreas of *Cherax*. The ordinate axis reports the levels of VTG mRNA expressed as a value \pm standard error relative to the control, which is set to 1. On the abscissa, the injected hormones are indicated (C = saline solution; E₂ = 17 β -estradiol; P = progesterone). The white bars refer to the results obtained from females in early vitellogenesis, while the hatched bars refer to the results obtained from females in full vitellogenesis. Statistical analyses have been done on at least 6 independent experiments, in triplicate, for each measurement. Letters indicate statistically significant values.

growth is between 20°C and 25°C. Similarly, yabbies are able to tolerate a wide range of dissolved oxygen levels and elevated salinities. For its robustness and resistance to changing environmental circumstances, yabbies have been successfully raised for commercial purposes all around the world. In Italy, a pilot regional centre for yabby farming has been created in Sicily, thanks to public funds, with the purpose of studying, and consequently improving, yabby reproduction and growth. In this facility, several lines of research are being pursued, including the study of the neuroendocrine mechanisms underlying reproduction. Reproductive physiology in crustaceans is highly controlled and regulated by the nervous and endocrine systems. The endocrine control of female reproduction is governed by a variety of hormonal and neuronal factors which involve neuropeptide hormones, such as gonad stimulating hormone and vitellogenin inhibiting hormone; terpenoids, such as methyl farnesoate, a stimulator of vitellogenesis; and ketosteroids, such as ecdysteroids. Vertebrate steroids are present in crustaceans, but their role is still not fully understood (Huberman 2000). In this study, we investigated the role of 17 β -estradiol and progesterone in the reproduction of the crayfish *Cherax albidus* by using vitellogenin (VTG) transcription in the hepatopancreas as a biomarker. The understanding of the biological mechanisms underlying VTG synthesis is particularly relevant due to use of crayfish in aquaculture, and as environmental biomarkers.

MATERIALS AND METHODS

Early-vitellogenic, full-vitellogenic and non-vitellogenin females of *Cherax albidus* coming from the “Centro pilota regionale per l’acquacoltura e l’allevamento intensivo dello yabby” (Siculiana AG) were treated with 17 β -estradiol and/or progesterone (10⁻⁷ M/crayfish), for four weeks. Levels of

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Photo 2. Female with eggs..



Photo 3. Large male yabby.

vitellogenin (VTG) mRNA in the hepatopancreas were detected by semi-quantitative PCR carried out with specific primers designed for the *Cherax quadricarinatus* VTG gene. The PCR product was sequenced and matched with the *Cherax quadricarinatus* VTG mRNA nucleotide sequence published in the literature.

RESULTS

The nucleotide sequence of the PCR product showed 92% homology with VTG mRNA of *Cherax quadricarinatus* (GenBank accession no. AF306784). Both 17β -estradiol and progesterone increased VTG mRNA in early-vitellogenic females, and to a lesser extent, in full-vitellogenic females, but not in non-vitellogenic females (Figure 1). 17β -estradiol was found to be more effective in eliciting a response than was progesterone. The effect of the sex steroids was not additive.

CONCLUSIONS

These data show that there is a high degree of homology between *Cherax albidus* and *Cherax quadricarinatus* VTG se-

quences, and supports the conclusion that the hepatopancreas is the site of synthesis of VTG in decapods (Chen et al., 1999). As reported in other decapods (Rodriguez et al. 2002) both 17β -estradiol and progesterone influence VTG synthesis although, based on our data, they act through different pathways and are not effective until the proper hormonal environment is established, as demonstrated by their inefficacy in non-vitellogenic females. H

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Non-native Crayfish - A Community Research and Trapping Initiative on the River Lark, Suffolk

The issues caused by growing populations of non-native crayfish are well documented in the United Kingdom. This article aims to outline the work of the Lark Angling and Preservation Society, and the author, in the Brecks area of East Anglia. This natural area is fortunate in having two populations of the native white clawed crayfish (*Austropotamobius pallipes*). However, as these watercourses are not isolated, and only one is on private land, they are still extremely vulnerable.

In the summer of 2000, the Lark Angling and Preservation Society (LAPS) contacted the Environment Agency (EA) after becoming aware of a large number of non-native crayfish in their river. The presence of *Pacifastacus leniusculus* — the Signal crayfish — was confirmed and a small scale trapping initiative (30 minnow traps used weekly from April to September) began.

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Figure 1. Examples of informational work and graphics produced by the partnership.

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In the autumn of 2004, Richard West (chair of the Lark Angling and Preservation Society) gave a talk to the Lark Valley Association (LVA) about the River Lark and their crayfish studies. This led to collaboration between LAPS and the Brecks Countryside Project (now the Brecks Partnership). Since that time, a number of studies and initiatives have taken place involving LAPS, the local community, land managers and landowners.

Crayfish Day Events & Publicity

Over 300 people were present at some of these days aimed at informing and educating local people about the damaging effects of non-native crayfish. Many took part in hand-lining for crayfish (dangling a piece of bacon on a weighted string). The total lengths (TL) of crayfish caught **were recorded, along with the individual's sex and the presence of any eggs or larvae.** Small waterproof information booklets were provided to all participants, giving them vital information about identification, crayfish plague, Weil's dis-



Figure 2. Richard West and Rodger Pigerham of the Lark Angling and Preservation Society.

ease and Health and Safety. In this booklet, and subsequent publications the group decided to refer to the signal crayfish (*Pacifastacus leniusculus*) as the Alien Red Signal to clearly separate it from the native white clawed crayfish – *Austropotamobius pallipes*. Much of the informational work and graphics produced by this partnership has been targeted at the non-scientific community.

Pilot Trapping and Research Feasibility Study

In 2005, a number of individuals and landowners were encouraged to carry out research trapping on their stretch of the River Lark. In essence, this study allowed the refinement of our trapping protocols and to gain greater insight into the population spread along the River Lark between Judes Ferry and Isleham, passing through Barton Mills and on to Fornham End near Bury St. Edmunds. Much of this work is due to be repeated in 2010.

Cut-off Channel De-watering

In 2005, the author became aware of a planned de-watering to take place during a bridge replacement on the cut-off channel linked to the River Lark. LAPS were aware of the existence of Signal crayfish in the cut-off channel and this seemed an ideal opportunity to compare trap catches with crayfish found on de-watering. Inevitably, there were issues around access to the working area which were circumscribed with the help of May Gurney Construction site staff, who collected the crayfish on our behalf. Only one sample was barbecued before being sexed and measured! It is regrettable that trap data obtained on this occasion bore no details of size or sex, but with such a busy group of volunteers, such data gaps are inevitable. This data set is currently being written up as part of the authors' postgraduate studies.

Commercial Trapping

Commercial trapping was facilitated in 2005 and 2006, with yields decreasing so that by 2007, trapping effort was financially subsidised so that trappers' costs could be covered. The 'commercial trappers' knowledge of fisheries and populations ensured that they fully understood the implications for both the River Lark and it's fish if a monoculture of non-native crayfish continued to develop. Regular contact via 'Trappers Pub meetings' kept everyone involved and informed. The use of commercial trappers meant that the Lark was being trapped using 100+ commercial 'D' traps set from a boat and rolled continuously up and down the river. The first two months of commercial trapping in 2005 yielded over 100,000 crayfish.

Throughout this work, the Brecks Countryside Project benefited from the assistance of an American volunteer, Dawn Smith, who designed the long-term trapping study. When Dawn returned to America, another national of that country, Amy Stewart, ably assisted.

Long-term Trapping Study

Sites were chosen to exemplify areas where commercial trapping was taking place, with other sites acting as controls.

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The standard methodology included the use of one adapted minnow trap (enlarged opening) and one Swedish Trappy. Throughout the various studies we have used a standard fish-based cat food. Traps have been set once every two weeks throughout the year and left for ~24 hours before being emptied, and the catch recorded. Measurements of water temperature and flow were taken on each trapping occasion, and all caught crayfish were sexed and their TL measured. The entire catch in each trap was weighed and the presence or absence of eggs and/or larvae noted. This study is now in its fourth year and is ongoing. This data is currently being written up by the author as part of a post-graduate research project with a number of people to thank for data collection, including Richard West, Rodger Pigerham, Martyn and Kate Mackinnon, Lesley Pigerham, Mike Toms and Paul Stancliffe.

Erosion Study

Baseline monitoring of erosion at a number of sites along the River Lark was started in 2006, with some sites **monitored annually (when the author's work with LAPS started, the group estimated that a metre a year of river-bank was being lost due to crayfish burrowing)**. Three sites are included in this survey in some of the most heavily affected areas. Transects of 10 metres are permanently marked and the distance to the rivers edge is measured at one metre intervals. In one area, the markers will need to be moved further up the bank this year as the bank is now eroded to this point.

Re-visiting Baselines

In 2005, an MSc student studying Biodiversity (Imperial College, London - Vicky Stoneman), undertook an evaluation of invertebrate diversity and density on 3 rivers in the Brecks with differing crayfish populations. This study was repeated by the author and Vicky Stoneman in May 2009.

The Value of a Community Initiative

Working with local people and groups helps ensure that long-term monitoring and solutions stay in place, with lasting information and skills remaining in the area. Much is gained from the array of local knowledge, contacts and **history of an area contained within its' community members**. One Brecks volunteer, Dave Shearing, used his past angling experience and newly gained white-clawed crayfish licence to locate a previously unrecorded population of our rare and threatened native crayfish on the Norfolk/Suffolk border.

In addition to work carried out on non-native crayfish with LAPS, the author has also been involved with a number of pieces of work aimed at raising awareness in areas of native crayfish populations.

Acknowledgments

The author gratefully acknowledges the support of the Brecks Partnership, The Environment Agency and The Lark Angling and Preservation Society, and in particular Dawn Smith, Rodger Pigerham, Richard West, Lesley Pigerham & Dr. Toby Carter of Anglia Ruskin University.

The author is very interested in the differing approaches taken to study all species of crayfish across Europe. She would like to make contact with colleagues, especially those who are working with crayfish, communities and/or fishing groups, or who have contact with others who may be involved in such work, or those involved in policy making and regulation in relation to native and non-native crayfish. H

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Spiny-Cheek Crayfish *Orconectes limosus* (Rafinesque, 1817) in Belarus

The spiny-cheek crayfish was found in 1997 in the Grodnenskaya region (Belarus) in the rivers along the border with Poland and Lithuania, including: Chernaya Gancha, Shliamitsa, and Mariha (in the Neman River basin) and the Neman River proper (Alekhnovich et al., 1999). This crayfish is thought to have entered Belarus through the Augustov Canal via Poland. Today, spiny-cheek crayfish are found in the Neman River starting at the Lithuania border up to the Lunna, Morino and Mosti settlements.

Sampling was carried out with the help of a hydrobiological net in the littoral zone of the river, up to 1.5 meters in depth. Various biotopes were investigated, including: sand, stony-gavel, tangy coastal macrophyte, and run soil. All specimens collected were caught in inshore macrophytes at a depth of less than 0.5 meters with low stream flow.

The second route of introduction includes the rivers and channels of the Belavezhskaya Pushcha. In 2006, *Orconectes limosus* was found in the Kolonka River, which is the right tributary of Narev River. The Kolonka River is 3-5 meters in width, with a strong flow, rapids and macrophytes. Spiny-cheek crayfish are also found in the Narev and Narevka Rivers (V. Sidorovitch, personal communication).

In 2009, spiny-cheek crayfish were found in the Lesnaya Levaya River in large quantities (up to 15 individuals per sq. meter). The Lesnaya Levaya River belongs to the Narev River basin. All the rivers mentioned above belong to Baltic drainage basin.

Thus, the invasion of this crayfish into Belarus seems to be occurring against the main river flow (i.e., upstream). It is also possible that the spiny-cheek crayfish has gotten into the Chernomorskii drainage basin, considering the fact that the Yaselda

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Table 1. The biometric measurements of spiny-cheek crayfish, *Orconectes limosus*, from populations collected from the Levaya Lesnaya River (Belavezhskaya Pushcha – the national park) from 1-3 May 2009.

Gender	Whole Length (cm)	Carapace length (cm)	Wet Weight (g)	Egg Diameter (mm)	Egg Wet Weight (mg)	Clutch Wet Weight (mg)	Fecundity
Female	6.6	1.3	8.0	1.1	0.42	78.5	187
Female	6.8	1.3	7.5	1.1	0.42	50.0	119
Female	6.6	1.3	8.0	1.1	0.42	89.4	213
Female	7.0	1.4	10.0	1.1	0.42	65.9	157
Male	6.7	1.4	9.5	-	-	-	-
Male	7.0	1.5	10.5	-	-	-	-
Male	7.9	1.6	13.0	-	-	-	-
Male	7.0	1.5	10.0	-	-	-	-
Male	7.4	1.5	12.0	-	-	-	-
Male	7.5	1.6	13.0	-	-	-	-
Male	7.4	1.5	12.0	-	-	-	-

River (a watershed of the Black Sea) originates from a swampy area, just like the above mentioned rivers. We recorded some of the biometrical parameters of spiny-cheek crayfish caught 1-3 May 2009 in the Lesnaya Levaya River (Table 1).

Conclusion

On the basis of the current information, we can conclude that the alien spiny-cheek crayfish, *Orconectes limosus*, is widely distributed in the Baltic drainage basin of Belarus and that there is also a threat for its introduction into the Black Sea drainage basin in Belarus. H

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Development of a Northern Ireland Crayfish Group to Conserve the Threatened White-clawed Crayfish *Austropotamobius pallipes* (Lereboullet)

Ireland is considered an important site for the conservation of the white-clawed crayfish, *Austropotamobius pallipes*. This is due to the absence of invasive crayfish species on the island, and the relatively large populations found across several freshwater habitats, such as lakes, streams, and rivers. Due to anthropogenic influences, such as habitat destruction, pollution events, cattle poaching and dredging of river beds, as well as occasional natural incidences such as heavy flash floods, some previously large populations have become fragmented, resulting in small, isolated populations dotted along river courses where previously they were found in abundance.

In Northern Ireland, an amalgamation of people interested in the conservation of *A. pallipes* was formed in 2006 as part of the Ballinderry White-clawed Crayfish Breeding and Re-introduction Programme (BWBRP). The project was established by the Ballinderry River Enhancement Association, a local river trust, in response to the declining numbers of crayfish being seen in the Ballinderry River system,

County Tyrone. Since 2006, the project has established Ireland's first ARK site for *A. pallipes*, in partnership with an aggregates company, the Acheson and Glover Group. The project has created public interpretation materials to raise awareness of the species, built an educational observation tank for the visiting public at Ballinderry Fish Hatchery and carried out the most detailed survey of crayfish distribution in a river system in Ireland, in partnership with Naomi Wilson, a PhD student researching *A. pallipes* at the Queens University, Belfast. The project Steering Group brought together people who were interested in the conservation of *A. pallipes*, representing various government departments and environmental non-government organisations, researchers studying *A. pallipes* in Northern Ireland, and local community members. Mark Horton, (Co-ordinator of the BWBRP) chaired the meetings and discussions in how to assess both current concerns over *A. pallipes*' declining presence in the river (based on anecdotal and survey evidence), and future plans in educating the public about local wildlife and conservation work.

The efforts of this group have included a submission of amendments to the Wildlife Order (NI) 1985. This asks that *A. pallipes* be given full protection in Ireland, with the island

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Figure 1. Members of the BWBRP Steering Group at the education observation tank at the Ballinderry Fish Hatchery, Cookstown. From left to right – John Early (NIEA), John Kane (DCAL), Mark Horton (BFH), Mary Gallagher (NIEA), Charlotte McNaught (Ulster Wildlife Trust), Naomi Wilson (Queens University), Lyle Cairns (Acheson and Glover), Laverne Bell (OPA -NI), and Alan Keys (BREA).



Figure 2. One of the crayfish with its fresh moult (on the left) at the education observation tank, Ballinderry Fish Hatchery.



Figure 3. Children from a local primary school learning about crayfish at Ballinderry Fish Hatchery's observation tank.

being declared a 'no-go' area for other crayfish species, along with all the controls and protections this will entail. This would give the species a level of protection in Northern Ireland that it has not had previously - the only protection it has at present prevents it from being trapped or moved from areas designated as ASSIs (Areas of Special Scientific Interest) or SACs (Special Areas of Conservation).

In addition to the Ballinderry Project and its Steering Group, there are a number of other projects and interested people across Northern Ireland that are contributing to the conservation of the species. A second ARK site has been created by Fermanagh District Council for the Sillies River and an ongoing project at Dundrum Fishery, Newcastle, County Down, has become very successful in artificially hatching and growing *A. pallipes* from eggs collected from berried females. There is now interest in expanding the Ballinderry Steering Group, bringing all of these projects and interest together, to form a Northern Ireland *A. pallipes* Conservation Group. With advice from Mark Horton, Dr. Julian Reynolds (Trinity College Dublin) and John Early (Northern Ireland Environment Agency), an initial meeting of these groups was held in March, and there is the hope that in the future there will be enough interest to expand the group further into becoming an all-Ireland (bio-region) group, and include members from both the Republic and Northern Ireland.

At present, the Northern Ireland group is about to attend its inaugural meeting in September, with preparation for the event taking place in the summer. This includes the development of a brochure aimed at education about the white-clawed crayfish and its greatest potential threat, the introduction of the American signal crayfish, *Pasifastacus leniusculus*. The distribution of the leaflet will be aimed at angling clubs and groups that use the amenities provided at freshwater tourist sites, such as Lough Neagh and Lough Erne, which sees a great influx of tourists over the summer months. There is also interest in creating a website which would allow users to learn more about the threatened species and create an interface between the public, researchers and conservationist, report sightings of *A. pallipes* and create a more comprehensive distribution map of its presence in Northern Ireland. This method has been employed by a cetacean conservation group, which encourages members of the public to submit sightings of dolphins to the website. Also, as anecdotal crayfish sightings are not scientific, there is research into developing a standardised method of trapping and estimating population size, allowing for a more accurate picture of the current status of *A. pallipes* to be developed.

As with all groups initially, it is best to ask others for advice and help in creating an efficient, functional group. Correspondence is welcome from anyone with either ideas or advice in how to progress to the next step of a Northern Ireland (and hopefully all Ireland inclusive) crayfish conser-

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vation group. These can be sent to the addresses below. H

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News Items From Around the World

Crustacean Frustration: Biologists have to dig deep to trap, identify burrowing crayfish

(Appeared: Monday, April 30, 2007 in the *Knoxville News Sentinel*)

TELLICO PLAINS - First they dug with shovels, then with their bare hands. The mud was the consistency of wet cement, and the water at the bottom of the hole was black and cold. A steady downpour fell, and the crayfish team was soaked.

"It could be worse," joked Rick Bivens, stream biologist for the Tennessee Wildlife Resources Agency. "It could be raining."

It takes hard work — and a sense of humor — to catch crayfish. Just ask Bivens, Carl Williams and Bart Carter, three TWRA stream biologists who have spent the last 17 years catching and identifying these 10-legged, aquatic cousins of lobsters and crabs.

Last week the team ventured into the Cherokee National Forest in search of a group of crayfish that has become so specialized at burrowing, they spend most of their lives underground.

Tennessee is home to at least 80 species of crayfish, more than any other state. And while little is known about the life history of crayfish in general, even less is known about true burrowing crayfish because their habitat makes them so difficult to study.

The team's first attempt to collect a burrowing crayfish is one they'll never forget. It was 1990, in Greene County, and after an hour and a half of digging, the hole was 5 feet deep.

"Rick had to hold me by the ankles," Williams said. "We soon learned to estimate the depth of the burrow by looking at the nearest stream."

During their recent crayfish expedition to the national forest, the team set out traps overnight near McNabb Creek, which originates at about 3,400 feet and flows down the mountains into the North River.

Each trap consisted of a 10-inch-long PVC pipe, with a tiny aluminum trap door at the bottom. Sunk into the ground at the mouth of the burrow, the trap would catch a crayfish as it crawled up to investigate.

Three of the traps had crayfish, which confirmed the team's hunch that there is an easier way to collect burrowing crayfish than by digging. All three were the same species, *Cambarus carolinus*, commonly known as the red burrowing crayfish.

Williams said a species of burrowing crayfish known as *Cambarus dubius* has a red body and blue legs on the Cumberland Plateau, while the same species in the Blue Ridge Mountains north of the French Broad River is solid blue.

"Burrowers are almost always prettier than stream crayfish," Williams said. "That's just one of the mysteries."

Tennessee is known to have 12 species of burrowing crayfish. They dig elaborate tunnels down to the water table, and in dry conditions, their burrows can be 8 to 10 feet deep.

A mud chimney usually marks the burrow at the ground surface. The crayfish like to forage at night. They feed on plants, insects and worms and are especially active when it rains.

After checking the traps, the team tried their hand at digging out a few burrows. By now it was pouring rain, which meant crawling around in the mud.

The water table was about 15 inches below the ground surface. The crayfish's main chamber was usually at the water line; from there, the burrow veered off into side chambers that spread horizontally.

Williams said the only species of burrowing crayfish that makes him think twice about reaching into a hole is *Cambarus thomai*, commonly known as the little brown mudbug. "They come after you," Williams said. "They'll pinch you good."

The TWRA biologists are gathering crayfish data mostly as a sideline to their regular stream surveys. Eventually, they hope to produce the first comprehensive guidebook to the crayfishes of Tennessee.

The only crayfish they dug up that day was a juvenile red burrowing crayfish just an inch long.

None of the holes compared to the one they dug six

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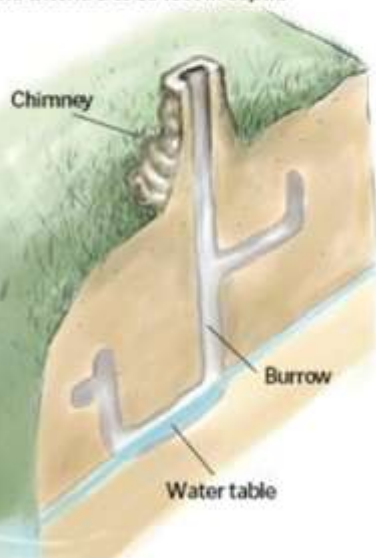
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INSIDE THE CRAYFISH BURROW

Most species of crayfish burrow occasionally, but a true burrower, known as a primary burrower, completes most of its life cycle within the burrow. The burrows can be complex and extend 8 to 10 feet in depth.



The red burrowing crayfish is armed with large claws used for excavating and defense. Crayfish are considered omnivorous, feeding on animal flesh, aquatic insects and worms.



Source: TWRA

DON WOOD/NEWS SENTINEL

weeks ago, when a woman on the Cumberland Plateau called them to investigate a crayfish she spotted as she was digging near a spring.

After locating the burrow, they began to dig. Two hours later they had a hole 3 feet deep and 4 feet wide, but no crayfish. The tunnel system was complex, and just as they were ready to call it quits, the crayfish, an upland burrowing species with a red body and blue legs, came crawling out into the open.

"That lady wanted to dig out a spring head for her water supply," said Carter. "We certainly helped in that respect." H

Morgan Simmons
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Biology of Freshwater Crayfish (Holdich, 2002) – available at last!

At long last the publishers have decided to make this book available again:

Holdich, D.M. (ed.) (2002). *Biology of freshwater crayfish*. Blackwell Science, Oxford. 702 pp. ISBN 0-632-05431-X

It is available on the new 'print-on-demand' system and can be ordered through normal ordering channels in all territories worldwide. Prices are as follows, dependent on territory: £165, Euros 198, US\$299.99, Aus\$412.50

If you experience any problems in getting a copy then please contact David Holdich: david.holdich@ntlworld.com.

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EIFAC Working Party on Crayfish

The 25th session of the European Inland Fisheries Advisory Commission (EIFAC) re-established the Working Party on Crayfish. The Session took place in Antalya, Turkey, 21-28 May 2008. More info on the organization and the meeting, see <http://www.fao.org/fishery/rfb/eifac>.

The session adopted the Terms of Reference (TOR) of the Working Party as follows:

- Monitor the change in distribution of crayfish species to better protect native species.
- Collect data on crayfish catch, effort and aquaculture production in member countries.
- Facilitate and support studies on crayfish ecology and restoration activities.
- Determine the socio-economic value (catch, processing, marketing, etc.) of crayfish from inland waters (environment) and aquaculture.
- Prepare guidelines for the responsible use of crayfish species in aquaculture and inland fisheries, and for conservation or sustainable management of native crayfish stocks.
- Improve communication between stakeholders, and other interest groups, in relation to crayfish aquaculture, management of stocks and in the early detection and control of diseases (especially plague).
- Take other necessary actions involving emerging issues in the crayfish world.

The Working Party will be active in 2008-2012. The preliminary program of activities are:

- The Convenor will organize an *ad hoc* meeting in connection with the 17th IAA symposium in Kuopio, Finland 4-8 August 2008. The items that need to be discussed are the participation, the activities and program schedule.
- In general the meetings and workshops should follow the focus of the TOR: in the first period items a. (distribution change) and b. (production figures), the second c. (role of crayfish in ecosystems) and d (socio-economic matters), and finally e. (responsible management) and f. (communication & diseases).
- The first meeting or workshop will be held in 2009. The possibility of organizing a meeting (workshop) in connection with the Vodnary (Czech Republic) meeting will be investigated by the convenor. (*proposal, discussed in Kuopio*).
- The second meeting in Poitiers (France) in late 2010 as proposed by Catherine Souty-Grosset (*proposal, discussed in Kuopio*), and the last meeting in late 2011 in Finland.
- All meetings or workshops will report to EIFAC Sub Commission 1, and the presentations and other documents should be published in a suitable series.
- EIFAC web pages should also be taken into account in distributing the results of the Working Party.

The Convenor of the Working Party is IAA member Markku Pursiainen (Finland). Opinions, proposals, etc., are most welcome and can be sent to markku.pursiainen@rktl.fi. H



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Please contact the IAA Secretariat (Bill Daniels: daniewh@auburn.edu) to order your copy of FC16 today. H

News about IAA18 Columbia, Missouri, USA

It's gotten hot, hot, hot in Columbia and IAA18 is looking even hotter! We had a great response from the interest survey: 70 individuals responded: 44% from the USA; 31% from Europe, 16% from Australia, and 9% from 'Other'. More than 50% said they most likely will be attending (Yeah!), with about 30 participants saying they intended to bring an accompanying person(s). As expected, we received comments that funding will be an issue for attending the meeting. We are working to keep costs down and are constantly looking for additional sponsors to defray costs. We're busy organizing an additional workshop, conference trip, social events, and post-conference trip(s). We hope to have the website updated with this exciting news, scholarship opportunities, and registration costs by early September 2009. Please continue to check the IAA18 website (<http://muconf.missouri.edu/IAA18/index.html>) for the updates, and please don't hesitate to contact us with questions, concerns or suggestions! We're including photos to demonstrate the lengths to which we'll go to insure a fantastic IAA18! "Orconectes bob" and his sympatric band of Crawdettes hope to see you in July 2010! H

The IAA18 Organizing & Advisory Committees

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"Orconectes bob" wants you in Missouri !



Freshly Molted Crawdettes.



We'll be celebratin' your migration...with endemic displays of welcoming behavior. Trust us – IAA18 is going to be great !



(Continued from page 1)



Figure 1. A presumed blue color phase of *E. suttoni*. See front cover for additional details and a dorsal view of this crayfish.



Figure 2. *Euastacus suttoni*, in its common red-black form. This relatively widespread species is certainly present in the Washpool area, including sites in close proximity to the unusual blue-white specimens above. The Washpool region is situated near the southern limit of this species, which also extends north into southern Queensland, and inhabits a range of forest types at high altitudes.



lies somewhere near the middle of this overall latitudinal range of *Euastacus*, and contains numerous highland streams and rivers that flow through ideal *Euastacus* habitat. If ever there was a place that might hold some deep secret about these intriguing spiny crayfish, it would seem that Washpool was that place.

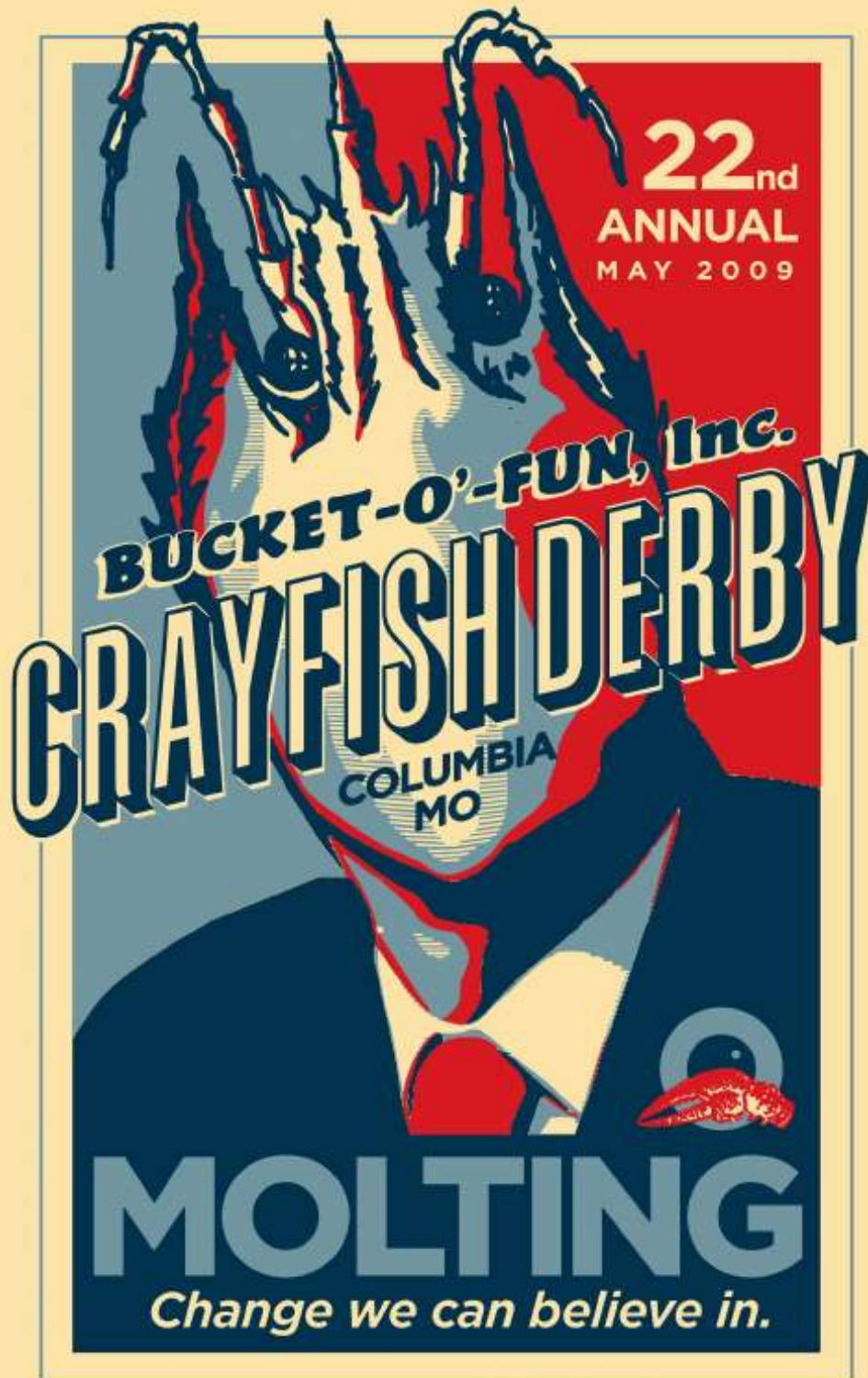
However, despite all that Washpool offers in the way of ideal *Euastacus* habitat, it has essentially been overlooked by crayfish surveys. Perhaps because of its substantial size and wilderness, the only survey attempts to date have merely been scratching around the edges of this vast park. Even these peripheral surveys have revealed some interesting findings, including an as yet uncertain taxon that is broadly similar to *E. suttoni*, although strikingly different in colouration (see Figure 1 & front cover image). The widespread *E. suttoni* itself is also known to occur in the park (see Figure 2), and this species is likely to occur in many of the main rivers and streams that run through the park. However, a deeper exploration of the park may reveal further species. In particular, a distinct ecological group of small, poorly spinose *Euastacus* that inhabit minor and semi-aquatic habitats between North Queensland and central New South Wales are not yet known from the Washpool area. Exploration of minor gullies and soaks in Washpool National Park may fill in some important knowledge gaps in the taxonomy and distribution of this group, and the genus generally.

We are currently looking to initiate a project that explores this important area more thoroughly, in the anticipation that it holds more clues to help us understand the zoology of this intriguing genus. To that end, we are seeking funding to cover research costs, and would like to hear from any potential collaborators or graduate students that would like to be involved in a rewarding research project in one of the most breathtaking settings of subtropical eastern Australia. H

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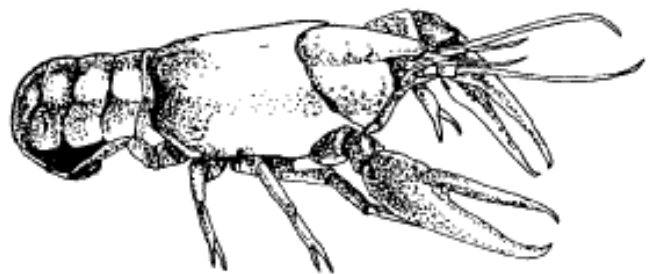




Logo created for the recent 22nd annual Crayfish Derby held in Columbia, Missouri. The logo is based on a Barack Obama presidential campaign poster. Submitted by Bob DiStefano.



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