

PAPERS OF INTEREST TO ASTACOLOGISTS

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Crayfish NEWS

ISSN 1023-8174

Vol.22 No.2/3

June 2000

The official newsletter of the International Association of Astacology

IAA MEMBER ELECTED CO-EDITOR-IN-CHIEF OF IMMUNOLOGY JOURNAL

Kenneth Söderhäll has been elected co-editor-in-chief for the *Journal of Developmental and Comparative Immunology* and he informs IAA that the journal welcomes contributions on different aspects of developmental and comparative immunology.

Anybody wishing to have more information about the journal can contact Kenneth Söderhäll by email, telephone or fax; or visit the website of this journal <http://www.elsevier.nl>. In 1998 (the last year for which data are available) it had an impact of articles published of 1.8.

Note: New Address and new email!!
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CRAYFISH OF LUXEMBOURG

Yoichi Machino
13 rue Montorge, F-38000 Grenoble, France.

Luxembourg crayfish studies were carried out by literature research and field observations

between 1996 and 1999. These data show that Luxembourg has now four species of crayfish: *Astacus leptodactylus* (foreign species; one population in a tiny brook), *Austropotamobius torrentium* (native or foreign species?; only one population in a tiny brook), *Orconectes limosus* (foreign species; distributed in Sure and Moselle Rivers), *Pacifastacus leniusculus* (foreign species; many populations). The noble crayfish (*Astacus astacus*, native species) seems to now be extinct.

A. leptodactylus and *A. torrentium* live together sympatrically in the same brook and this is probably unique in the world. Their biology and ecology should be investigated in this brook because these two species normally do not occur together.

P. leniusculus has now been expanding its geographical distribution all over Luxembourg because of continuous stocking by man. If these introductions do not stop, this country will be a paradise for *P. leniusculus* within a few decades, and all native or European species will no longer be able to live there.

Reviving nature and environment seems to be underway in Luxembourg, but with the present situation, only non-European species, particularly *P. leniusculus*, take benefit from nature recovering.

Source: *L'Astaciculteur de France*, 62:2-6, Thonon-les-Bains, March 2000. ISSN 1244-457X (Abstract only).





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

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

President's Corner

The IAA has been a more active organisation than ever over the past two years. We could not have achieved this without good communications (which are greatly assisted by the advent e-mail) and the mutual advice and support in the organisation which I have benefited from during my Presidency.

Following the International Symposium in Germany in August 1998, members have organised regional meetings at three locations dotted around the globe, Astrakhan, Mexico and England, and the organisation for the International Symposium in Perth, Australia in August 2000 is now in its final stages. This is my final opportunity in this column to thank members for their efforts in IAA activities and particularly to thank those who organised meetings where our organisation has not been active before (Astrakhan and Mexico); their efforts have considerably broadened the reach of IAA.

Our regional IAA meeting in Leeds England (also supported by The Environment Agency and English Nature) was a tremendous success. At the conference, the facilities available were filled to their capacity of 90 delegates and unfortunately we had to turn some people away who wanted to come. Many new faces were present and the standard of papers was good enough to publish; a job that we are in the process of doing at present. The opportunity was used to promote the benefits of IAA membership and sell some IAA publications. As with the other meetings, this conference fulfils one of our organisation's aims: to disseminate information of interest to astacologists. A photo from the conference appears on the next page.

I have the following official business to communicate:

- The Nominations Committee supports Francesca Gherardi for the post of Secretary-Treasurer.

- The Time and Place Committee supports a bid from Mexico for the IAA 2002 International Symposium.

- The Honorary Members Committee has not yet decided whom to support for Honorary Member status. Further details of the work of these Committees will be presented at the Symposium in Perth.

You will by now have received ballot papers for IAA Officers and for those of you who are not familiar with the system, I would like to encourage you to complete the form and send it to Louis Evans. You either have to tick the named candidate for each post or alternatively write in your own proposal before sending it. The more ballot papers we receive the stronger the mandate is for improving our organisation, so please complete the form and send it.

I look forward to seeing you in Perth.

David Rogers
IAA President

Editorial

In the last issue I printed a cartoon and gave credit to Bill Daniels. This should have read Mr Todd Daniels. Apologies to Bill and Todd for the confusion, and thanks Todd for your input.

Included with this issue of the newsletter is the next part of the IAA History Booklet. Thanks again to David Holdich for all his efforts in putting this series together. Please contact David for contributions to the next instalment.

IAA 13 is just around the corner and preparations are nearly complete. I totally underestimated the enormity of the task - I'm very fortunate to have good help! There is a good chance that I will not be able to post this issue until after IAA 13. If so, I hope everyone who attended had a good time and I will publish articles on the symposium in the next newsletter.

Glen Whisson, editor

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*Leeds Conference, England
Juliette Benjamin is
delighted to receive the prize
for 'Best Presented Poster'
which was about crayfish
on the Western Bother*

SPECIAL ISSUE OF BULLETIN FRANÇAIS DE LA PÊCHE ET DE LA PISCICULTURE (B.F.P.P. Knowledge and management of aquatic ecosystems) devoted to the European native crayfish: Les espèces natives d'Europe, spécial écrevisses, volume 2, 2000. Bull. Fr. Pêche Piscic., 356, Erick VIGNEUX & Catherine SOUTY-GROSSET Eds.

Scientific committee:
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Conseil Supérieur de la Pêche.

This volume on Europe's native crayfish is a sequel to issue No 347 dedicated to the Atlantic stream crayfish *Austropotamobius pallipes* (Le genre *Austropotamobius*, spécial écrevisses volume 1, 1997). This species was widely distributed up to the 19th Century, but pressures from environmental disturbances led to its decline. *Austropotamobius pallipes*, which is distributed along a North-South axis (Ireland, England, France, Spain, Portugal, Italy and former Yugoslavia), is now considered threatened. Its importance, both as part of the natural heritage and as a potential biological indicator, was implicitly recognised when the species was listed in Annex II and V of the European Directive (92/43/CEE) on "the conservation of natural habitats and of wild fauna and flora".

Two further species are also included in this book:

- the stone crayfish *Austropotamobius torrentium* whose small populations are restricted to circumalpine mountain streams;

- the common or Noble crayfish *Astacus astacus* whose populations are distributed widely in Northern Europe along an East-West line (Norway, Sweden, Germany, Poland, Hungary, Estonia, and Finland).

By publishing the work of European astacologists concerned with the conservation status of native crayfish populations and their management, we are keeping in line with our editorial policy which is to encourage interdisciplinary connections which generate applied management programmes aimed at conserving our aquatic heritage. After Vol. 1 (BFPP 347) was published, scientific teams tightened their collaboration with a view to developing a consistent management and conservation plan for the species concerned. Unifying themes have already emerged for the study of *Austropotamobius*: ecology (Ireland, England), genetics (France), pathology and breeding (Spain), and behaviour (Italy). A new process is taking shape through some common reflection, initiated in Ireland, on how to manage the two native species *Austropotamobius pallipes* and *Astacus astacus*. We hope these proposals will soon become reality as part of a European programme.

Much work is still required on habitat characteristics, on the impact of environmental deterioration and habitat fragmentation, and on the distribution and density of natural populations, so as to clarify how crayfish can be used as bioindicators and to assess which conservation measures are to be promoted.

Further studies should allow us to decide which management strategies are to be implemented for each catchment area. In this context, international collaboration between researchers and the circulation of scientific knowledge among administrators are of the utmost importance.

This book is a good example of the fruitful convergence of various scientific efforts, though these are still too few in the field of astacology where native European species are concerned. This work gives us the opportunity to emphasise once more the importance of contacts between scientists and administrators, with a view to creating the conditions for long term collective responsibility where consideration for - and conservation of - the natural heritage are concerned.

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RALLO A., GARCIA-ARBERAS L.
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GARCIA-ARBERAS L., RALLO A.
Survival of natural populations of *Austropotamobius pallipes* in rivers in Bizkaia, Basque Country (North of Iberian Peninsula)

ALONSO F., TEMINO C., DIEGUEZ-URIBEONDO J.
Status of the white-clawed crayfish, *Austropotamobius pallipes* (Lereboullet, 1858), in Spain: distribution and legislation.

GRANDJEAN F., CORNUAULT B., ARCHAMBAULT S., BRAMARD M., OTREBSKY G.
Life history and population biology of the white-clawed crayfish, *Austropotamobius pallipes* pallipes, in a brook from the Poitou-Charentes region (France)

NEVEU A.
Study of *Austropotamobius pallipes* (Crustacea, Astacidae) populations in a forest brook in Normandy. I. Demographic structures and growth: stability and variability during six years

NEVEU A.
Study of *Austropotamobius pallipes* (Crustacea, Astacidae) populations in a forest brook in Normandy. II. Distribution in relation to habitats structure: stability and variability during five years

SCHULZ R.
Status of the noble crayfish *Astacus astacus* (L.) in Germany: monitoring protocol and the use of RAPD markers to assess the genetic structure of populations

RENZ M., BREITHAUPT T.
Habitat use of the crayfish *Austropotamobius torrentium* in small brooks and in Lake Constance, Southern Germany.

To obtain the two available issues:

- (1) Le genre *Austropotamobius*, spécial écrevisses volume 1, 1997. VIGNEUX E. (ed.), Bull. Fr. Pêche Piscic., 347. (15 papers in English language).
- (2) Les espèces natives d'Europe, spécial écrevisses volume 2, 2000. VIGNEUX E. & SOUTY-GROSSET C.(eds.), Bull. Fr. Pêche Piscic., 356.

Contact: esp.bfpp@ac-amiens.fr

Calls for proposals:

The ever-increasing problem of introductions of exotic species in Europe, and of their impact on native ones, will be the subject of Vol. 3 in this series, to be published at the end of 2001.

We invite you to submit case studies on negative interactions between exotic species and native crayfish (the aliens may include crayfish, but also other species - crabs, birds, fishes and invertebrates) - with associated problems of repopulation in changed communities.

Initially, please submit a title and short abstract to catherine.souty@campus.univ-poitiers.fr. If accepted for consideration, instructions for authors and deadline for submission of the completed paper will be sent.

MEMBER COMPLETES THESIS

Member Kai Westman has completed his doctoral dissertation. The Abstract follows. For further information contact Dr Westman at:

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Abstract

Comparison of the crayfish, *Pacifastacus leniusculus* Dana, a species introduced into Finland, with the native species, *Astacus astacus* L., in allopatry and sympatry.

This review presents the main findings of 30 years of studies on the natural history and development of the introduced *Pacifastacus leniusculus* Dana in some Finnish lakes and compares certain of its characteristics (e.g. growth, reproduction, yields, habitat preferences) with those of the native *Astacus astacus* L. in both allopatry and sympatry. Since 1893, crayfish plague, *Aphanomyces astaci* Schikora, has devastated Finland's most productive populations of *A. astacus*, causing great losses to a once very valuable fisheries and exports. Efforts to halt the spread of the plague having failed, it was decided in the late 1960s to attempt to revive crayfish production and fisheries by introducing the plague-resistant North American *P. leniusculus* into infected waters.

Studies of co-existing populations show that *P. leniusculus* grow considerably more rapidly than *A. astacus* from its very first summer and reaches the most common harvesting size (TL 100 mm) at an age of about 2+ - 3+ whereas *A. astacus* does not attain this size until about 4+ - 5+, females later than males in both species. The higher growth rate of *P. leniusculus* is due to its higher moulting frequency and greater moult increment. Although *P. leniusculus* females tend to become sexually mature at a larger size than *A. astacus* females (85-95 mm v. 70-80 mm), their more rapid growth rate

means that they reproduce for the first time at a younger age, 2+, than *A. astacus*, 3+ - 4+. Further, *P. leniusculus* females attain reproductive activity at a larger size than *A. astacus*. Not all sexually mature females spawn every year. In the study years, the proportion of reproducing *A. astacus* females clearly exceeded that of *P. leniusculus* (68-93% v. 50-72%), possibly to compensate for the stress caused by competition with sympatric *P. leniusculus* and harvesting. Since the number of ovarian eggs in all size groups was greater in *P. leniusculus* (max. 952, i.e. the greatest reported anywhere) than in *A. astacus* (max. 436), the difference in fecundity is innate rather than due to environmental factors.

Substrate was a highly important variable for the abundance of *P. leniusculus*, adult specimens being found on rocky substrates and in other shelter-providing habitats but only occasionally on gently sloping soft bottoms, sandy substrates or muddy shores. *A. astacus* seemed to be less strict in its biotope demands.

The *P. leniusculus* populations studied sustained very high yearly exploitation rates of >100 mm specimens, up to 34-36% of the estimated trappable population, without recruitment overfishing. Although *P. leniusculus* accounted for a smaller proportion of the total catch of trappable individuals (45%) in the co-existing populations in 1979-1994, its share of the total 100 mm harvest (61%) exceeded that of *A. astacus*.

Adult *P. leniusculus* imported from North America were already infected with the crayfish plague. Plague prevalence was high ten years after stocking (47% and 52% in two lakes) but declined by the mid-1990s (18% and 24%), possibly due to culling of large and old individuals with many plague spots. Crayfish plague has not, however, affected *P. leniusculus* populations, and no dead or moribund specimens were found in either lake during the 30-year study period.

The present study shows that *P. leniusculus* could develop into a permanent renewable natural resource in plague-infected waters in Finland and that catches would in all likelihood increase. The slow development of the species in two of the study lakes indicates that it should not be stocked in waters with marked acidity, low Ca concentrations or a shortage of suitable habitats.

Our long-term data on coexisting *A. astacus* and *P. leniusculus* demonstrate that plague-free *P. leniusculus* do exist but that they cannot live with *A. astacus* in sympatry without competition in which *P. leniusculus* would be the stronger. The greater abundance of chelae injury in *A. astacus* than in *P. leniusculus* and the increase in injuries with expansion of the *P. leniusculus* population point to agonistic encounters in which *P. leniusculus* is dominant. However, a similar weakening of the *A. astacus* population at sites with only a minor population of *P. leniusculus* suggests that the elimination of *A. astacus* is due, not to competitive exclusion alone, but to a combination of several interacting mechanisms. I suggest that the main reasons for the initial weakening of the *A. astacus* population were harvest and competition with the more competent *P. leniusculus* but that the ultimate reason for the collapse of *A. astacus* was the almost complete cessation of successful reproduction as a result of reproductive interference between the two species. It is therefore futile to stock productive *A. astacus* waters with plague-free *P. leniusculus* in the expectation of better total catches. *P. leniusculus* should be introduced only into chronically plague-infected waters. Finland bears responsibility to conserve aquatic diversity including preservation of its only native crayfish species, *A. astacus*. This is also important in terms of fishery as only then can its continued participation in crayfish catches and trade be secured. This requires above all the

formulation of an action plan for the conservation of *A. astacus* and a greater input into research, especially on crayfish plague control, crayfish management, and interactions between *P. leniusculus* and *A. astacus*.

FRESHWATER CRAYFISH VOLUMES IN ENGLAND

The following volumes are available from David Holdich in England. Details of prices can be obtained from him by e-mailing: david.holdich@nottingham.ac.uk

Volume 4 (4 copies), Vol. 8 (6), Vol. 9 (10), Vol. 10 (3), Vol.11 (3), Vol. 12 (10).

CURRENT CRAWFISH SEASON IN LOUISIANA

Jay Huner reports that the 1999-2000 Louisiana crawfish season has clearly been the worst in the history of the modern era. Drought limited harvest from the Atchafalaya Basin wetland and adversely affected crawfish ponds. Tabulations have not been made, as yet, but it is likely that the overall harvest will be roughly 30-40% of "normal". Controversy rages around a pesticide used to treat rice water weevils with at least two law suits filed claiming that use of the pesticide caused complete loss of crawfish in treated fields. Even if normal rain patterns resume, it is clear that crawfish production will lag in Louisiana for several years.

CLAWS FOR COMPLAINT

A Parisian restaurant is being threatened with legal action for pain and suffering caused to one diner who had a run-in with an allegedly ferocious lobster. The diner told reporters that when she jabbed her fork into the lobster its claws came up and grabbed her left breast so hard that her scream was heard across the dining room. The chef has absolved himself

from the case, claiming he cannot be held responsible for the behaviour of his ingredients.

STATUS OF *ASTACUS ASTACUS* IN MOROCCAN AQUATIC ECOSYSTEMS

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Abstract

Aquatic fauna native to Morocco include brown trout and different species of barbel. This fauna was enriched by the introduction of other species such as the pike perch, large mouth bass, pike, rainbow trout, common carp, silver carp and herbivorous carp. Parallel to these introductions, our interest was oriented to freshwater crayfish (*Astacus astacus*).

The first introduction of *Astacus astacus* occurred in 1914, but was not successful. Others attempts took place in 1930, 1931, 1932, 1957 and 1992. They have involved the streams called Zerouka, Tioumliline, Tigrigra, Ras-el-Ma, Tizguit, Sidi Rached and Sidi Mimoun in Middle-Atlas.

The population introduced in Tizguit was well accustomed to the climatic conditions of the stream. So, from this ecosystem, we have witnessed some population transfers during 1970. The transfers were to the streams Aï nAghbal, Guigou, Bekrit, Sidi Mimoun and Sidi Rached.

Successful spawnings at the National Center of Hydrobiology and of Fish-culture in 1995 permitted the production of sufficient numbers of juveniles to preserve and rehabilitate this species. These spawning

also allowed the release of *Astacus astacus* in to other streams: Ras-el-Ma, Sidi Rached, Ben Smimand, and the lakes Ain Mersa and Ile d'Amour.

1.0 Introduction

Morocco is the only country outside Europe where populations of *Astacus astacus* exist. This crustacean, introduced for the first time in 1914, found favorable conditions in Ifrane province for its development. Nevertheless, some factors like flooding, predators, water quality and pollution have prevented the spread of this species to more ecosystems in Middle-Atlas.

Other attempts to stock this species in 1930, 1931, 1932, 1957 and 1992 resulted in colonies becoming established in the streams Tizguit, Zerouka and Sidi Mimoun. The population established in Zerouka stream has expanded downstream and colonized Tizguit stream. From this ecosystem, the transfer of populations was realised into the streams Bekrit, Aïn Aghbal, Guigou, and Sidi Rached.

In 1992, the Administration of Water and Forests imported 2500 juveniles from Germany. This population was introduced in Ras-el-Ma and Sidi Rached. The National Center of Hydrobiology and of Fish-culture started managed reproduction in 1995. This strategy has safeguarded the rehabilitation of this species.

In this paper, we review all the introductions of freshwater crayfish (*Astacus astacus*) in Morocco, the transfers of acclimated populations, and the releasing of juveniles resulting from managed reproduction at the National Center of Hydrobiology and Fish-culture. Then we present the actual geographical distribution of this species in our country.

2.0 Results

2.1 Rehabilitation of *Astacus astacus*

2.1.1 Introductions from Europe

The introduction of *Astacus astacus* from Europe occurred between 1930 and 1957. Some streams like Tioumliline, Tigrigra and Sidi Mimoun received a single transplantation during 1930. Sidi Mimoun is the only stream which shows favorable conditions for the development of this species. Releases into some other ecosystems, like Zerouka, Ras-el-Ma, Sidi Rached have occurred, but Zerouka is the only stream where we have noticed good population development (Table 1).

Finally, the streams Zerouka and Sidi Mimoun were recognized as ecosystems for developing *Astacus astacus*. Concerning Ras-el-Ma and Sidi Rached, the introduction was successful after the release made in 1992 from Germany.

2.1.2 Transfers of populations

Morocco has known, between the years 1930 and 1957, several attempts to rehabilitate *Astacus astacus*. Our samples show that this species is well established in Tizguit. Its presence in this ecosystem is due to natural propagation. In fact, this species has migrated from Zerouka, a river tributary of stream

Tizguit, which is downstream where the environmental conditions are favorable to its development.

In order to extend the geographical area of this species, the Water and Forest Administration tried transferring 142 specimens from Tizguit stream to other ecosystems. They have been used to reinforce the population already existing in Sidi Mimoun and to extend geographical area of the species to new ecosystems like Bekrit, Aïn Aghbal, Guigou and Sidi Rached. Sampling these streams has established the presence of *A. astacus* in Sidi Mimoun and Sidi Rached only.

2.2 'Cared' natural reproduction

The releasing of crayfish in Ras-el-Ma during 1992 has shown that the age has an important effect on the success of the introduction. This introduction confirms that young crayfish can be more acclimated in a new ecosystem than an older one. So, the National Center of Hydrobiology and Fish-culture has tried to produce juveniles destined for re-stocking.

The first test of 'cared' natural reproduction occurred in 1995. One hundred crayfish have

Table 1: Introduction of fresh water crayfish from Europe.

Dates	Streams	Number
1930 - 31 - 32 - 39	Zerouka	828
1930	Tioumliline	70
1930	Tigrigra	85
1930 - 31 - 48 - 57 - 92	Ras-el-Ma	2060
1957 - 92	Sidi Rached	72
1930	Sidi Mimoun	128

been used. Their lengths are between 80 and 140 mm for females and 100 and 130 mm for males. Their sex ratio is 1 male for 3 females.

By this first experience, the fecundity rate was 75% and the spawning rate was 65%. The mean production of larvae is 58 per female. The larvae have been reared in the hatchery; then they have been transferred to natural ecosystems in order to develop geographical distribution of this species. In the period 1995 to 1999, the total production was 5000 crayfish. They have been released into some aquatic ecosystems of Middle-Atlas.

2.3 Releasing into aquatic ecosystems

All releases into new ecosystems are preceded by a study of their characteristics. The first areas chosen were Ben Smim stream and the Ain Mersa and l'Île d'Amour lakes.

A part of this production has been used to reinforce the already existing populations like in Zerouka, Ras-el-Ma and Sidi Rached.

2.4 Actual geographical distribution of crayfish in Morocco

The transplantation of freshwater crayfish in Morocco (introduction, transfer and releasing

juveniles after managed reproduction) have permitted the rehabilitation of *Astacus astacus* especially in Ifrane province. Table 2 groups all the ecosystems where this species is actually existing

3.0 Conclusion

The presence of the freshwater crayfish in some ecosystems of the Middle-Atlas is not due to pure hazard, but it is the result of releases, initially from Europe (France and Germany) during the period 1930 to 1957. The transfer of specimens from Tizguit stream characterized the second step of rehabilitation. Lastly, the 'cared' natural reproduction realised by the National Center of Hydrobiology and Fish-culture has permitted us to show the feasibility of this technique in Morocco to produce juveniles in sufficient quantity and to release this species in Middle-Atlas.

These investigations permit the rehabilitation of this freshwater crayfish in some streams like Tizguit, Zerouka, Sidi Mimoun, SidiRached, Ras-el-Ma and Ben Smim and the lakes Zerouka 1, Zerouka 2, SidiMimoun, Ain Mersa and l'Île d'Amour.

Table 2: Ecosystems where *Astacus astacus* actually exist

Streams	Lakes
Tizguit	Zerouka 1
Zerouka	Zerouka 2
Sidi Mimoun	Sidi Mimoun
Sidi Rached	Ain Mersa
Ras-el-Ma	Île d'Amour
BenSmim	

RESEARCH SET TO EXPAND AUSTRALIAN MARRON INDUSTRY

A major research project aimed at increasing the value of Australian marron production by more than \$30 million is to get underway in Western Australia in the next financial year. Marron is a Western Australian native animal that is a high value, gourmet item in markets both in Australia and overseas. Over SAUD 3 million will be invested in the project over five years.

The research (to be carried out by Fisheries Western Australia and the University of Western Australia with financial assistance from the Fisheries Research and Development Corporation and the Aquaculture Development Fund) aims to develop a genetically improved marron strain which, when managed efficiently in ponds, would grow 50% faster than existing cultured marron.

Marron from various rivers can be quite genetically different. Project leader **Craig Lawrence** will investigate whether farmers are growing the best river strain and whether the strains can be improved by selective breeding and crossing between strains. Craig Lawrence also said there is great potential for improving pond management with better use of refuges, aerators and size grading.

The marron industry extends from north of Geraldton to Esperance and regional differences in performance will also be assessed. The Aquaculture Council of WA (ACWA) says the research project has huge implications for the profitability of the Western Australia marron industry.

"With more than three quarters of Australian marron production coming from purpose built farms here in WA, marron farmers will be the direct beneficiaries of this research project," said ACWA Executive Director Simon Bennison.

The outcomes of the project will translate into more farmers realising the economic viability of farming marron and this should dramatically increase the number of players in the industry."

Improved

In developing a genetically improved strain of marron, the project will also aim to reduce size variation. At present there is a large variation in the size of marron at harvest time and some animals need to be left for another 12 months to grow to the required size. Selective breeding and better husbandry should greatly improve the performance of the slower growers and improve profitability.

"The benefits of this project will be widespread for the industry. Breeding marron for faster growth will produce animals that are not only bigger but that are more efficient eaters so there will be less wastage of feed. This will result in financial and environmental benefits," Mr Bennison said.

Beneficiaries

"The direct beneficiaries from this project will be commercial marron farmers who will increase profitability by producing a greater volume at a uniform size with the additional benefit of reduced production costs due to a shorter grow-out period," Mr Bennison said.

A key strategy in the project is the use of commercial farming ponds to help ensure that the results are adopted by an industry that is contributing generously to the research.

"All round this project will be great for the marron industry and we await the results with interest. This project should take the industry to a significant level of production that justifies the industry's, State's and the FRDC's investment."

Source: ACWA News 30:6