Australian Museum

Identification workshop of marine invasive worm species

Such worms impact on the oyster industry, and other aquaculture activities as well as changing benthic habitats which can impact on wild stocks

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nature culture discover



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In submitting this report, the researcher has agreed to FRDC publishing this material in its edited form.

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Executive Summary

Every year large numbers of exotic marine species are accidently introduced into Australian waters as a result of vessel fouling, ballast water release, aquarium trade, or through aquaculture associated stock movement. Although the majority of exotics do not establish viable populations, over 250 aquatic invasives have become notorious pests (www.marinepests.gov.au) that have significant direct economic impact on aquaculture and fisheries industries. Indirect impact include blocking industrial water intake and outlet pipes, fouling of commercial and recreational vessels as well as modifying natural ecosystems by competing for food and space with indigenous species. Correct identification is essential.

A two day workshop was held at the Australian Museum on the 1st and 2nd August 2013, on invasive marine worms. Recognised polychaete experts provided guidance as to how to identify particular families and the important characters which are used for both live and preserved material. They could then compare them with the images on the digital guide. Participants to the workshop were given access to the beta version of the digital guide to invasive worms which has been developed by the Australian Museum and their feedback was used in developing the final version which is now available. Lines of communication were established between these experts and the participants and this will facilitate the identification of new introductions as well as ensuring the correct identification of known invasives.

Background

There is an urgent need to accurately identify introduced marine worms and distinguish them from native Australian species. The National Marine Pest Sectoral Committee (MPSC) including representatives from all states and New Zealand identified correct recognition of marine pests as a high priority together with workforce training and developing user-friendly means of identification, as well as establishing a viable network of end users and specialists. This will lead (flow on effects) to improved control measures being designed and implemented. Once established, invasive pests are nearly impossible to eradicate. Therefore, the correct timely identification of new introductions is the key to successful cost-effective eradication. Such actions will prevent the establishment of problematic pest populations.

The concept of the proposed identification workshop was conceived as a result of both relevant discussions held at the inaugural meeting of MPSC and the opportunistic timing allowed us to take advantage of worm specialists (including those studying invasive species) coming to the 11th International Polychaete Conference being held in August 2013 at the Australian Museum, Sydney. These international meetings are held every three years and this is the first time in 30 years that it was held in Australia. Bringing all these specialists to Australia without the conference would have been prohibitively costly. However, because of the conference, we had the unique opportunity to pay only a fraction of the cost to ensure participation of internationally recognised experts in the workshop, thus adding considerable value to the workshop. We developed a database of all agencies (both governmental and private consulting companies) and personnel involved in the management of invasive species in Australia, all of whom were contacted and invited to the workshop.

Participants came from a variety of backgrounds, consultants, universities and fisheries from a variety of Australian states and overseas.

Aims of the study

To host an identification workshop of marine invasive worms for those who need to be able to accurately identify such species.

Results / key findings

The digital guide to identify invasive marine worms is a very useful guide and fills a major gap as there is currently no such guide is available. This guide was developed by the Australian Museum with input from all the international experts participating in the workshop. The completed digital guide incorporated comments received as feedback during the workshop. A questionnaire was also circulated during the workshop and again provided useful points to incorporate into the guide. The final version of the guide has been circulated to all workshop participants. We also hope that this guide will be updated on a regular basis as more information becomes available. The main finding is that such a digital guide is useful and that non specialists using it can accurately identify their material and closely related native species. In addition, important contacts were made by participants with the relevant Australian and international experts, which should result in earlier detection of new invasive species and potentially lead to eradication before they become established.

The outcomes are an improved road-tested digital guide to invasive marine worms and an increased awareness of the importance of the correct identification of these worms. This guide will be available for sale and we will advertise its availability by emailing the entire database we have developed. Participants at the workshop have been given log-in details to access the guide.

Implications for relevant stakeholders

We hope that this workshop will improve the quality of identification of invasive species and that native species are not confused with invasives. Also we believe that these people will be more likely to contact the relevant experts following the workshop. We stressed that this is an ongoing project with new introductions occurring regularly.

Recommendations

We would encourage the development of similar guides for other groups of marine invertebrate invasive species, as the problems of correct identification are universal, and are compounded by the gaps in our knowledge of native Australian biodiversity.

Keywords

Polychaetes; marine invasive worms; marine pests; Spionidae; Sabellidae; Serpulidae

Introduction

Every year large numbers of exotic marine species are accidently introduced into Australian waters as a result of vessel fouling, ballast water release, aquarium trade, or through aquaculture associated stock movement. Although the majority of exotics do not establish viable populations, over 250 aquatic invasives have become notorious pests (www.marinepests.gov.au) that have significant direct economic impact on aquaculture and fisheries industries. Indirect impacts include blocking industrial water intake and outlet pipes, fouling of commercial and recreational vessels as well as modifying natural ecosystems by competing for food and space with indigenous species. The costs to industry, government, and the environment are significant and ongoing. The best prevention of pest spread is their early recognition and eradication by field workers, as once established, eradication is almost impossible. This, however, entails the correct initial identification of the species. Because many exotic species closely resemble native species, it is critical to distinguish between native and introduced species that already occur here as well as to recognise new introductions.

Training of stakeholders to recognise introductions and develop working relationships with the relevant taxonomic experts is critical so that this can be ongoing, which will facilitate early detection and development of emergency management strategies.

Objectives

- 1. To host an identification workshop for oyster farmers, consultants, port authorities, quarantine and fisheries managers to teach them how to accurately recognise marine pests.
- 2. To increase the awareness of new potential introductions.
- 3. To highlight the problem of diversity and impacts of invasive marine worm species which could become pests.
- 4. To establish collaborative working relationships between participants and relevant Australian and international experts.
- 5. To test and update the guide to native and invasive potential pest worms currently being developed.

Methodology

A two-day workshop was held in August 2013 at the Australian Museum prior to the 11th International Polychaete Conference (www.ipc2013.com.au) where the relevant polychaete (worm) experts taught participants how to collect and preserve material and then how to prepare it for taxonomic identification as well as given a general introduction to seaworms. The worms were projected up onto a large screen and the relevant structures crucial to identify these animals and to recognise them as invasive marine pests were demonstrated. Each group of invasive polychaete species was dealt with by an internationally recognised expert; Dr Harry A. ten Hove, the Netherlands (Serpulids, fouling calcareous tubeworms), Dr Maria Capa, Norway (fan worms that can modify habitats and are unpalatable to many fish species), Dr Vasily Radashevsky, Russia, Dr Carol Simon, South Africa and Dr Waka Sato-Okoshi, Japan (Spionids – mud worms) plus three Australian experts (Dr Robin Wilson from Museum Victoria, Melbourne, Dr Pat

Hutchings and Dr Elena Kupriyanova, Australian Museum, Sydney). Each participant received access to a beta version of a fully illustrated digital guide providing identification details for both invasive and native species. The beta version was updated and log-in details have been sent to all participants.

All these experts contributed to the digital guide which was tested during the workshop.

The Australian Museum developed a database of all agencies (both governmental and private consulting companies) and personnel involved in the management of invasive species in Australia and all were invited to the workshop as well as asking them if they would be willing to be contacted by the Australian Museum web team to help improve the usability of the guide by participating in beta-testing of the initial version.

Results

The workshop was held on the 1st and 2nd August 2013 at the Australian Museum and 24 attended the workshop from all over Australia and also from overseas. The participants were shown how to preserve material and the diagnostic characters used for identifying species in each of the families (Spionidae, Sabellidae and Serpulidae). They were led through the digital guide and given opportunities to comment and these are now being incorporated into the final version. Participants were given opportunities to ask questions of the experts, were able to look at fresh material and to actually remove the worms from their tubes.

In addition to the presentations on each family there was a general introduction to seaworms.

An interesting talk was given by Leslie Harris of the Los Angeles County Museum who was involved in studying large concrete blocks which had become displaced during the tsunami in Japan in 2011 from port facilities. These were then carried across the Pacific Ocean during the following year or so, and have been washed up on the Pacific Coast of America in early 2013, creating the potential for Japanese species to become established on the west coast of North America.

We emphasised to the participants at the workshop (who came from a variety of institutions from around Australia overseas) the diversity of polychaetes and the large number of species which have been introduced into Australian waters, and how some of these may become pests in addition to those already recognised as being pests.

Discussion

A very successful workshop was held with delegates from a variety of Australian and overseas institutions including consultants, port authorities and fisheries managers.

Throughout the workshop all experts discussed the mechanisms by which invasive species are introduced into Australia. We also discussed the need to accurately recognise new introductions into Australia as well as recognising that much of the native Australian fauna still remains to be identified.

The workshop established contacts between the experts, both Australian and international, and those people who are responsible for recognising introductions. This will greatly facilitate the early recognition of new introductions and with it the potential for early eradication. The experts may gain access to valuable sources of material which may help in understanding the origins of the introduced species and help in either eradication or minimisation of invasions. It is critical to correctly identify the species, as

often there are closely related native species which are not pest species, present in the same region. Once correctly identified, then life histories and habitat requirements of the species can be determined, relevant literature consulted and as a result, appropriate control and management protocols developed.

The use of this guide will allow the timely recognition of potential new introductions from overseas which arrive regularly through shipping carrying unwanted hitchhikers on ship hulls and in ballast water. Road testing the guide during the workshop improved its usability and user-friendliness. This product is available for purchase and it is intended to be regularly updated as new invasions are recognised. All participants have received details as to how to access the guide.

This workshop established Australia as a leading player in the field of biosecurity protocols and control measures and will minimise the risk of introduced exotics becoming costly pests.

In addition this workshop improved the flow of information from specialists to people involved in the day-to-day management and will lead to improved management practices addressing translocation issues both in adult and juvenile aquaculture stock. This may then lead to a reduction in shellfish infestations by mudworms and fouling species, increasing their retail value, and hence the viability of aquaculture facilities.

Conclusion

The workshop was highly successful, improved the usability of the digital guide, increased the awareness of the need for accurate identification of invasive species and how to distinguish from closely related native species. This will facilitate the recognition of new introductions and should lead to early eradication before they become well established.

It established good relationships between those at the coal face and the relevant systematists both national and international which will greatly assist in the recognition of new species being introduced into Australian waters.

Implications

The problem of invasive species is a worldwide problem and international co-operation is required.

Recommendations

We would encourage the development of similar guides to other groups of marine invertebrate invasive species, as the problems of correct identification are universal, and compounded by the gaps in our knowledge of native Australian biodiversity.

Further Development

We finalised the digital guide for invasive marine worms and hope to be able to update it on a regular basis subject to the availability of funds.

Extension and Adoption

The workshop improved the flow of information from specialists to people involved in the day-to-day management of marine invasive worms. This product is available for purchase and regularly updated as new invasions are recognised. All participants have received details as to how to access the final version of the guide.

Project Coverage

Australia-wide.

Project Materials Developed

A digital guide to invasive marine worms has been developed.