NSW DEPARTMENT OF PRIMARY INDUSTRIES

JOHN HOLLIDAY STUDENT CONSERVATION AWARD

– 2004 –

2004 WINNER

Craig Boys

OTHER ENTRIES RECEIVED FOR 2004

Brianna Clynick
Tom Bridge
Scott Gifford
Danielle Annese
Jennifer Warner
Ben Fitzpatrick
Jon Nottage

****** 2004 WINNING ENTRY ******

Fish habitat assessment in a large dryland river of south eastern Australia

By Craig Boys

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Summary

Craig's study investigated the fish habitat requirements of Australia's largest dryland river, the Barwon-Darling, and associations between freshwater fish and their habitat. His aims included: filling knowledge gaps of the largely unstudied dryland rivers; determining the most appropriate spatial scales at which conservation management strategies can be implemented; and gathering information to assist the listing of the Barwon-Darling River as an endangered ecological community under the Fisheries Management Act, 1994.

A number of additional objectives were noted and are investigated in Boys, C.A., Esslemont, G. and Thoms, M.C. (in press) Fish Habitat Assessment and Protection in the Barwon-Darling and Paroo Rivers. New South Wales Fisheries Final Report, Nelson Bay, 105 pp.

The Barwon-Darling is one of Australia's largest dryland river systems, so for the purposes of this study is was divided into zones. Within the zones habitat and fish surveys were conducted. Craig recorded a total of 5526 fish of which 86% were native and 14% were alien species. A number of management approaches were discussed to provide increased native fish habitat and to reduce the number of pest species and it was recommended that a whole of basin approach to river restoration be adopted with more emphasis given to the rivers in semi-arid regions in western NSW.

Craig's research presents scale-specific information on fish assemblage differences and fish habitat associations in the Barwon-Darling River. Many of the results from this study are currently being incorporated into a scoping report for implementation of a Darling River restoration reach (Boys et.al. in press).

The value of marinas and associated structures as habitats for fish

By Brianna Clynick

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Summary

Brianna's study examined the value of artificial structures as habitats for fish and investigated the importance of artificial structures for producing new biomass as opposed to just attracting the existing fish population. Brianna's study had three aims: to determine the distribution and abundance of fish associated with marinas; whether fish distributions were related to physical and biological features of these urban habitats; and if the species composition and abundance of fish using the artificial structures are similar to those using natural rocky reefs. To do this Brianna visited a number of structures and recorded the types and numbers of fish present fish, as well as photographing the habitat for analysis.

Brianna found over 70 species of fish which displayed predictable spatial patterns around marinas. There were differences in fish assemblages between structures and the open water surrounding structures. Assemblages at marinas appeared to be no different from those at natural reefs, indicating that artificial structures supported a fish assemblage similar to those at natural rocky reefs. Implications for fisheries were also discussed.

Effects of oceanographic variability on abundance, distribution and recruitment of juvenile black marlin within the eastern Australian fishing zone

By Tom Bridge

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Summary

Tom's study investigated the effects of oceanographic variability on juvenile black marlin within the eastern Australian fishing zone. He examined this by researching the Department of Primary Industries Gamefish Tagging Program database to map the spatial and temporal distribution of juvenile black marlin, as well as satellite sea surface temperature data to correlate these with oceanographic conditions. The implications of using this data was discussed. The study also explored the relationship between catch and environmental variables.

The results of Tom's study indicated that there is considerable variation in the recruitment, abundance and distribution of juvenile black marlin within the eastern Australian fishing zone. It also found that the abundance and distribution of juvenile black marlin are affected by sea surface temperature and that they occur in high numbers when a certain temperature threshold is obtained. It was concluded that this may have significant implications for the management of the black marlin population.

An examination of the environmental interactions of pearl oyster culture at Port Stephens, Australia

By Scott Gifford

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Summary

Scott described his research as the first to examine the potential for environmental disturbance arising from pearl cultivation and to quantify benefits of pearl cultivation on water quality. Scott's study utilised an existing pearl aquaculture farm off Port Stephens and the surrounding waters and aimed to: conduct a monitoring program to determine if pearl cultivation had a deleterious impact on the surrounding benthos; estimate levels of nutrients and metals removed by the oysters; and to evaluate the potential for pearl aquaculture to remediate nitrogen inputs from a sewage treatment plant.

Scott's study found no difference between the sediment underneath the existing pearl farm compared to other sites over time. Factors that would reduce the potential for impact include the farms relatively low stocking density and its position in a deep water location that experiences high current flows. The study also found that the pearl oysters acted as biofilters consuming various amounts of metals and nutrients and it was suggested that pearling operations could be used to remediate nitrogen inputs from sewage treatment plants.

The impact of the introduced green alga *Caulerpa taxifolia* on fish communities in a southern NSW coastal lake

By Danielle Annese

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Summary

Danielle's study on *Caulerpa taxifolia* aimed to examine changes in fish abundance, diversity, and assemblage at three control lakes and the heavily infested Lake Conjola on the NSW south coast. Danielle notes the spread of the invasive seaweed is cause for concern because of its potential to out-compete native seagrasses and potentially influence associated ecological communities. Fish were sampled in the four coastal lakes between spring 2003 and winter 2004 using a small seine net. All fish captured were identified and counted before being released. Separate nets were used to sample seagrass beds to ensure against the spread of *Caulerpa* among locations.

Danielle notes the data presented in this study is the first that examines changes in fish assemblages over time periods preceding and following the colonisation by *Caulerpa* at control and impact locations. The results suggest that the alteration of habitat caused by the displacement of native seagrasses by *Caulerpa* has affected both fish abundance and species diversity in Lake Conjola.

Habitat attributes influencing the abundance and distribution of syngnathid fishes in NSW estuaries, Australia

By Jennifer Warner

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Summary

Jennifer's study examined both habitat and syngnathid (seahorse) variables in estuaries as well as in aquariums in the lab. The first set of aims investigated habitat features for the distribution and abundance of seahorses in seagrass beds in the wild. The second set of aims assessed the effects of changes in seagrass density on the behaviour of seahorses in the lab. Three estuaries on the NSW Central Coast were selected after a number of attributes were located. Seahorses were collected using a small seine net with a 1 mm mesh. The net was hauled through the seagrass beds to the shore, where the seahorses were counted and identified, and all other species released. The seahorses were placed into a container of water and a number of quick measurements taken before they were released. A total of 542 seahorses from five species were found. The aquarium study utilised artificial seagrass of various density and two seahorses in each tank. The movements of the seahorses were observed and recorded over time.

The study found no differences occurring between habitats for both seahorses and for habitat attributes, however differences were found between sites for seahorses and habitat attributes. The aquarium experiments found no difference in seahorse behaviour between control and reduced density artificial seagrass.

Habitat heterogeneity of NSW marine protected areas

By Ben Fitzpatrick

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Summary

Ben's study presents a rapid habitat assessment technique to define habitat heterogeneity of subtidal benthic communities within and adjacent to marine protected areas (MPAs). Ben investigated three NSW Marine Protected Areas (MPAs) at Jervis Bay, Solitary Islands and Byron Bay. To assess underwater habitats, Ben towed underwater video and sonar equipment to view changes in offshore benthic communities. A number of parameters were also recorded including depth, temperature, tide and speed. The underwater video footage was recorded and analysed in the lab.

Ben found varying results in each of the MPAs and identified that Jervis Bay Marine Park is underrepresented by sand and sponge habitat, and offshore reef habitat is underrepresented within the Solitary Islands Marine Park. It was found that the protection of habitat heterogeneity in the northern section of the Cape Byron Marine Park would have the most fish habitat protection value.

Squid, cuttlefish and octopus of New South Wales commercial fisheries landings

By Jonathan Nottage

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Summary

Jonathon's study investigated the species composition of cephalopods (squid, cuttlefish and octopus) in NSW commercial fisheries catches. He aimed to identify the species as well as collect information on size and weight. Additional objectives were also examined but not fully discussed due to size limitations of the summary.

To investigate cephalopods in commercial catches Jonathon visited the Sydney Fish Market and a number of Commercial Fishers Co-operatives. He randomly examined 111 fish boxes and the number of individuals of each species of cephalopod was recorded and either measured, weighed, or both. Jonathon recorded 21 cephalopod taxa including seven species of cuttlefish, nine species of octopus, and five taxa of squid. A number of species were unable to be identified and Jonathon noted additional studies are required to identify these to assist in the conservation and sustainable management of the cephalopod fisheries.