NSW DEPARTMENT OF PRIMARY INDUSTRIES

JOHN HOLLIDAY STUDENT CONSERVATION AWARD

– 2006 –

2006 WINNER

Liz Heagney

Winner of the 2006 John Holliday Student Conservation Award
Picture from left to right: Mr Charles Holliday (John's father); The Hon Penelope Gail Sharpe, MLC; Ms Liz Heagney (winner); and NSWDPI's Chief Scientist, Dr Steve Kennelly.

OTHER ENTRIES RECEIVED FOR 2006

(in alphabetical order of surname)

Meredith Brainwood
Kathryn L. Newton
Stephen Summerhayes
Sven Sebastian Uhlmann
Mirella Verhoeven

****** 2006 WINNING ENTRY ******

Pelagic fish diversity, habitat and species interactions determined using a novel mid-water baited video technique: providing new opportunities for targeted management of pelagic fish stocks

By Liz Heagney

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Summary

I designed a novel mid-water baited video system to survey pelagic fish assemblages. Baited video surveys conducted at Lord Howe Island identified 10 pelagic species, including 4 important fisheries species (Galapagos whalers, yellowtail kingfish, highfin amberjack and white trevally). Comparing pelagic fish assemblages and densities across a range of environmental variables, I found that current speed was the most important determinant of pelagic fish habitat: areas of low-flow (current speed $\leq 0.15 ms^{-1}$) contained distinct pelagic fish assemblages and around 80% of the relative density of most pelagic species. Video surveys also provided new insights into the structure and function of open-water ecosystems: I observed close behavioural associations between Galapagos whalers and large carangid fish, which suggest that sharks may play an important role in the feeding and migration patterns of other large pelagic fish.

My surveys identified a number of opportunities for targeted protection of important fisheries species. We identified nursery areas for Galapagos whalers, which are currently classified as 'near threatened' by the IUCN. I also identified potential spawning aggregations of yellowtail kingfish and white trevally, both of which are considered growth overfished in NSW waters. The new mid-water baited video system is of particular value for these species as it allows non-destructive sampling of these valuable fish stocks.

Ecological and anthropogenic factors that impact on the distribution of mussels in the Hawkesbury-Nepean river

By Meredith Brainwood

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Summary

In this study, surveys were done at 100 sites in the Hawkesbury-Nepean River to record the distribution and densities of populations of 3 species of mussels, *Hydridella depressa*, *H. australis* and *Velesunio ambiguous*. In addition to mussel data, observations relating to the geology, vegetation type, flow rates, geomorphology, land use, level of disturbance to riparian vegetation structure were recorded and related to mussel population density. Annual water quality data were also obtained from Sydney Catchment Authority, Sydney Water and NSW EPA and related to mussel distribution at 28 sites; and to observe the relationship of water quality with mussel populations with a range of densities, water quality was analysed from an additional 18 sites. Sites were sampled above and below 32 small impoundments, 16 located above Warragamba Dam, and 16 below the dam.

This study demonstrated that higher density mussel populations were most common in catchment areas with little anthropogenic modification to the channel bed or adjacent vegetation communities. Levels of disturbance of riparian vegetation, and to a lesser degree, land use, were identified as strongly associated with the absence of mussels from some reaches. Catchment geomorphology was also shown to be relevant to the abundance, population structure and suite of mussel species present in different geomorphic reaches of the river.

Absence of a fish passage around Warragamba Dam is strongly implicated in the decline of mussel populations above this impoundment. Smaller weirs are linked with reduced recruitment in lower catchment reaches. Partitioning of species occurs at a reach scale, with partitioning at a microhabitat scale more commonly linked with mussel size. Absence of mussels was noted from areas where mussels had been recorded in previous studies (e.g., Byrne, 1998), indicating that mussel species are under threat in the catchment. This decline reinforces the need for a better understanding of the spatial scales at which impacts on physical habitat operate to limit or reduce local freshwater mussel populations in the Hawkesbury-Nepean River.

Ascidian assemblages of subtidal rocky reefs in the Port Stephens – Great Lakes Marine Park, NSW

By Kathryn L. Newton

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Summary

Patterns of variability in ascidian assemblages of subtidal rocky reefs were investigated in Port Stephens region of the Port Stephens – Great Lakes Marine Park (PSGLMP). This study specifically focused on the differences between exposed offshore island reefs and sheltered reefs within Port Stephens. It also examined differences between assemblages of two depth zones. Non-parametric multivariate techniques were coupled with Analysis of Variance (ANOVA) to quantify these differences. Twenty-one ascidian species were recorded, ten of which had not been noted previously in the area. Ascidian assemblages were highly spatially variable, especially between depth zones of individual sites. However, temporal variability was only noted for a few ascidian species here. This study has provided a fundamental data set of ascidian biodiversity and distribution patterns on subtidal reefs of Port Stephens. The data is essential for ongoing monitoring and detection of changes to marine communities in the area resulting from habitat protection zones, unforseen environmental events and the increasing anthropogenic pressures placed on marine habitats of Port Stephens.

Ecological impacts of QX disease in the Hawkesbury estuary, Australia

By Stephen Summerhayes

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Summary

Oysters play pivotal structural and functional roles within estuarine systems and are therefore crucial to maintaining their ecological health and integrity. In their functional role, they provide a wide array of ecosystem services ('ES'). Commercial cultivation of *Saccostrea glomerata* in the Hawkesbury Estuary has collapsed due to QX disease, *Martelia sydneyi*. In response, culturists are trialling triploid *Crassostrea gigas,* which do not express the disease. The impacts of QX upon wild *S. glomerata* and concomitant ES are relatively unknown. In this study, oyster and macroinfaunal assemblages were assessed within key habitats of the Hawkesbury to assess whether mortality in *C. glomerata* mariculture has been replicated in wild stocks and, if so, whether *C. gigas* have exploited resource expansion such as food and space. Comparisons between habitats revealed species-specific differences in abundance and size classes of oysters. Oyster cover differed between habitats and macrofaunal assemblages associated with oyster abundance varied among sites. Overall, mass mortality of cultured *S. glomerata* was not reflected in wild assemblages and *C. gigas* had not expanded its realised niche. These results assist in determining ecological interactions between QX and economically important ES and provide information necessary to underpin management strategies.

Maximizing the survival of bycatch released from commercial estuarine fishing gears in New South Wales (NSW)

By Sven Sebastian Uhlmann

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Summary

This project aims to develop methods and tools to reduce mortalities of unwanted, discarded bycatch from commercial, estuarine fishing gears in NSW. The specific objectives of the study are:

(i) To identify and quantify the effects of deleterious operational procedures and post-capture handling techniques on the short-term survival of unwanted, discarded bycatch throughout NSW's estuarine fishing gears.
(ii) Suggest and test alternative operations and/or handling techniques that improve the short-term post-capture survival of unwanted bycatch.
(iii) Assist with the design and implementation of appropriate strategies for commercial fisheries to adopt the new developments.

Does epiphyte grazing improve the sustainability of remnant patches of seagrass in NSW?

By Mirella Verhoeven

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Summary

Seagrass meadows provide critical ecosystem services for fisheries, however over the last century excessive overgrowth of epiphytic algae due to nutrient loading has resulted in large seagrass dieback. The top-down force of grazing epifauna may mitigate this effect by substantially reducing the standing stock of epiphytic algae, promoting the sustainability of seagrass beds. The hypothesis was tested that epiphyte grazing by the unstudied trochid gastropod *Calthalotia fragum* can counteract impacts of nutrient enrichment on the productivity of the seagrass *Posidonia australis*, a protected species within Botany Bay that supports a number of threatened and economically important species.

A field experiment simultaneously manipulated nutrient levels using Osmocote Native™ and grazer abundance using cages. *C. fragum* significantly suppressed epiphytic growth on the seagrass and had a strong positive effect *on P. australis* productivity (28%), as well as photosynthetic performance. Overall, this study demonstrated the key role *C. fragum* plays in the sustainability of *P. australis* in Botany Bay and provides important insights into the ecology of this protected species of seagrass.