

Schedule of Documents

Other documents provided

No.	Description of record	Agency's view on release
1.	Cronulla research projects 2011	Release
2.	Fisheries Heritage Report	Release
3.	Guiding principles for relocations from Cronulla	Release
4.	Letter to Audit Office re meeting December 2011, 13/8/11	Release
5.	PFA media release support Cronulla decision, 24/8/12	Release
6.	Site development plan for PSFI 2007	Release
7.	Snapshot CFRC 2011	Release
8.	Transfer of positions at Cronulla, 30/8/12	Release

RESEARCH PROJECTS IN 2010-11

Title	PI/Sponsor	IRM Project Number
Development of methods to determine the effectiveness of fishery management strategies on the Hawkesbury River estuary	Astles	R-Con2008/159
Vulnerability assessment of the effects of climate change on estuarine habitats in the lower Hawkesbury estuary	Astles	R-Con2010/203
Qualitative ecological risk assessment (QERA) of human disturbances on marine biodiversity in NSW	Astles	R-Con2011/227
Monitoring of Gamefish and Australian bass fisheries in NSW via competition-based angling	Ghosn (formerly Scandol)	R-FSR2007/185
Integrated Fisheries Resource Management (Philippines)	Gibbs	R-Con2005/107
Risk assessment of impacts of climate change for key species in south eastern Australia	Gibbs	R-Con2010/204
Refinement and application of Cage Aquaculture Decision Support Tool (CADS Tool) for freshwater systems in the Philippines	Gibbs	R-Con2010/205
Sustainable regional development and strategic options for management of marine uses and industries in NSW – ecologically healthy and economically productive regional ecosystems	Gibbs	R-FSC2004/147
Comparative assessment of reproduction and growth of coastal finfish and invertebrates	Gray	R-FSC2005/165
Observer-based survey of retained and discarded catches from commercial line fishing in coastal waters of NSW	Gray	R-FSC2006/179
Evaluating the estuarine fisheries resources of NSW	Gray	R-FSC2008/197
Feeding and breeding: Rainfall effects on connectivity and fidelity of iconic coastal fishes	Gray	R-FSC2009/223
Primer development and assessment of population structure of dusky flathead and sand whiting	Gray	R-FSC2010/240
Evaluating the recreational fisheries of Recreational Fishing Havens and other key recreationally-fished estuaries in NSW	Gray	R-FSR2008/199
Movements and ecological interactions of key fish species in estuaries and coastal waters of NSW	Gray	R-FSR2008/219
Profiling the biology and fishery of rock blackfish (<i>Girella elevata</i>) in the Sydney region	Gray	R-FSR2009/231
Study of ghost fishing in the NSW Rock Lobster fishery	Liggins / Montgomery	R-FSC2006/173
A biological basis for fishery management strategies for Carcharhinid sharks commercially exploited in NSW waters	Macbeth	R-FSC2009/233
Observer surveys in the commercial large-shark fishery and ocean prawn-trawl fishery of NSW	Macbeth / Gray	R-FSC2009/224
Stock assessment and related research for the eastern rock lobster, <i>Jasus verreauxi</i>	Montgomery	R-FSC2000/018
Reducing uncertainty in the assessment of the Australian spanner crab fishery	Montgomery	R-FSC2003/139
Development of a DNA based aging technique for use in fisheries assessments	Montgomery	R-FSC2008/193
Study of the faunal assemblage on collectors for lobster larvae	Montgomery	R-FSC2008/210
Determining the age of cephalopod species from waters off NSW	Montgomery	R-FSC2008/220
Wobbegong shark movement in a NSW MPA	Peddemors	R-FSC2008/208
Shovelnose ray (<i>Rhinobatidae</i>) commercial fishery catch and biology	Peddemors	R-FSC2008/217
CritterCam deployment on sharks	Peddemors	R-FSC2010/258

Mechanics of shark bite	Peddemors	R-FSC2010/264
Development of methodology suitable for aerial shark surveys	Peddemors	R-FSC2010/265
Biology and fishery of angel sharks and sawsharks in NSW	Peddemors	R-FSC2011/268
Data capture and analysis for the Protective Beach Meshing Program	Peddemors	R-FSR2000/013
Integrating fishery-dependent and -independent data for improved sustainability of fisheries resources and other aspects of biodiversity	Rotherham	R-FSC2008/211
Solving bycatch and discard problems in NSW's recreational mud crab fishery	Rotherham	R-FSC2009/249
Resource assessment and monitoring of commercially harvested species	Rowling (formerly Scandol)	R-FSC2003/123
Application of the CSIRO Ecosystem Model Atlantis to NSW and comparison of Atlantis with the UBC Model EcoSpace	Scandol	R-FSC2004/141
Movements and biology of coastal sharks in NSW	Smoothey / Peddemors / Gray	R-FSC2007/186
Development of cost-effective methods for monitoring and assessing spatial management options for recreational fisheries in NSW	Steffe	R-FSR2008/200
Australian salmon (<i>Arripis trutta</i>): Population structure, reproduction, diet and composition of commercial and recreational catches in NSW	Stewart	R-FSC2005/157
Assessment and monitoring of pilchard landings from the vessel Delamere	Stewart	R-FSC2006/169
Movement patterns and stock structure of Australian sardine (<i>Sardinops sagax</i>) off South Australia and east coast: Implications for future stock assessment & management	Stewart	R-FSC2009/225
Assessment of barotrauma and its mitigation measures on the behaviour and survival of offshore species in NSW	Stewart	R-FSC2009/226
Diagnostic radioichthyology: Using computerised tomography scans (CT scan) to explore the effects of barotrauma on fish	Stewart / Ferrell	R-FSC2007/190
The life history characteristics and fishery of teraglin, <i>Atractoscion aequidens</i> , (Family Sciaenidae) off the coast of NSW	Stewart / Hegarty	R-FSC2010/263
Refinement of selective gears for estuarine prawn and squid fisheries	Broadhurst	R-Ctu2005/016
Estimating and maximising the survival of key species released by recreational fishers in NSW (PHASE 3 - SALTWATER)	Broadhurst	R-Ctu2008/021
Maximising the post-release survival of angler-caught native freshwater fish in NSW (PHASE 2)	Broadhurst	R-Ctu2008/022
Utility of beam and multi-rig trawl configurations for reducing environmental impacts in the Clarence River prawn-trawl fishery	Broadhurst	R-FSC2007/191

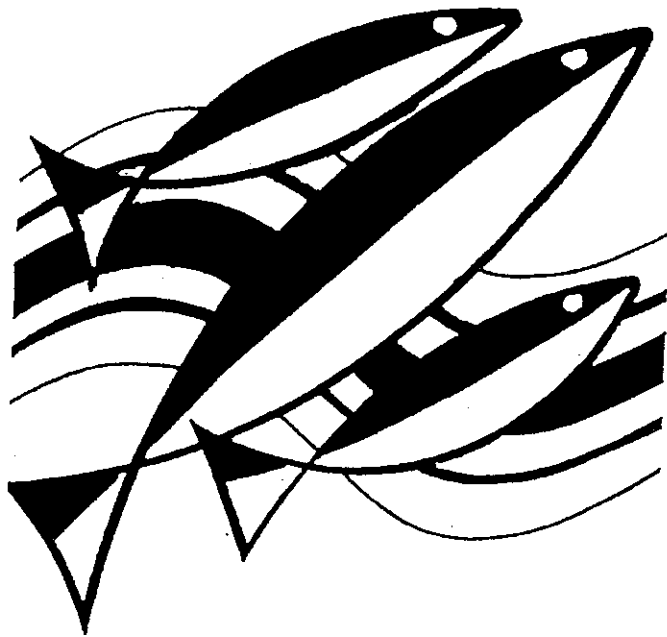


1997

NSW FISHERIES
HERITAGE AND
CONSERVATION REGISTER

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INTRODUCTION

In 1987 Section 170 was added to the NSW Heritage Act, requiring all Government instrumentalities to prepare a Heritage and Conservation Register of assets it controls or owns.

A primary reason for these registers is to help each government agency to understand the significance of any heritage assets it owns or controls and to manage them accordingly.

This register has been prepared in accordance with S170 of The Heritage Act and with the assistance of the Guidelines for the Preparation and use of Heritage and Conservation Registers supplied by the Heritage Council of New South Wales.

ACKNOWLEDGEMENTS

This register has been prepared with the assistance of the following NSW Fisheries staff; Wayne Jones, Co-ordinator, Dave Pollard, Principal Scientist-Marine Protected Areas and Kathy Bown and Carolyn Bland-Librarians.

Acknowledgement is given to Geoff Ashley-Built Heritage Specialist, Joan Kent-Historian, Fred Yarad-Historian and Jill Sheppard, Associate Director, of Godden Mackay Pty Ltd, Heritage Consultants.

Acknowledgement is also made for the assistance of Helen McDonald, Librarian, Sutherland Shire Council, staff from the Archives Office of New South Wales and to oral informants R Spinks and C Brown who worked at the site now known as the Fisheries Research Centre from the 1940s.

THEMATIC HISTORY

NSW FISHERIES

1.0 Introduction

1.1 Background

This Historical Context Report has been prepared for NSW Fisheries by Godden Mackay Pty Ltd in compliance with the preparation of heritage and conservation registers requirements of s170 of the NSW Heritage Act. A Historical Context Report is required to not only provide such historical information as is available regarding specific items included in a register but also to place the items within an historical, administrative and environmental context.¹ This report augments a study undertaken in July 1996 by Godden Mackay Pty Ltd on several buildings at the Fisheries Research Institute Cronulla.

1.2 Site Location

The Department of Fisheries has its head office at the NSW Fish Markets in Pymont. The NSW Fisheries Research Institute is located at Hungry Point, Port Hacking, in the southern Sydney suburb of Cronulla. The study focuses on the group of older buildings and equipment constructed during the first decade of the century but also records subsequent development and usage. As a number of buildings at the site, built during the Stage 2, CSIR period, are now approaching the fifty year heritage assessment point, consideration should be given to collecting information regarding their construction and usage.

The other current NSW Fisheries Research Stations at Narrandera, Salamander Bay and Grafton have not been included in this study as although they are an important part of Fisheries' research network, they do not yet qualify on the basis of age (50 years). The sites should however be investigated for exceptional technological and industrial archaeological significance, during both NSW Fisheries management and during prior occupations.

The Aquatic Reserves included on the NSW Fisheries Heritage Register for their natural heritage significance have not formed part of this study. They should be the subject of a separate study, preferably carried out by NSW Fisheries staff.

1.4 Constraints

An administrative history of the agencies (State and Federal) which have managed the Gunnamatta Hatchery site has been compiled. It must however be emphasised that because of resource constraints of both time and funding, this is by no means a full and complete history of any agency; because the Gunnamatta Hatchery is the only heritage site currently listed on the NSW Fisheries Register, the study focuses on that site and the types of activities carried on there.

Accordingly it has not been possible to include the full range of activities which NSW Fisheries in all its guises has carried on: the involvement with early fish marketing and liaison with municipal and industry authorities; the considerable research into inland fisheries at various locations throughout the state; the network of coastal inspectors and sub-inspectors at strategic locations along the coastline; the state trawling industry experiment; the system of 'closed waters' whereby netting was prohibited in bay estuaries and rivers at certain seasons, for periods of time or permanently.

Apart from resource constraints, the inaccessibility of much of the various NSW Fisheries agencies' archival records has inhibited the breadth of research possible. No use of CSIRO archival documents and photographs has been possible, apart from published records and Annual Reports. This has meant that it has not been possible at this time to link particular activities and events with specific buildings.

1.5 Comment

This study should be read in conjunction with the Heritage Assessment prepared by Godden Mackay in July 1996. The fact that historical research for the Heritage Study has followed rather than preceded the Heritage Assessment has meant that a considerable amount of information which would otherwise have formed part of the Assessment has necessarily been included in the Heritage Study's text.

A comprehensive history of the Australian fishing industry is yet to be produced necessitating considerable primary research in order to establish a context for the Study. More detailed information regarding the CSIRO's fisheries activities can be found in Vivienne Mawson et al, (eds) *CSIRO at Sea 50 Years of Marine Science* (CSIRO Australia, Marine Laboratories, Tasmania, 1988) ISBN 0 643 04835 9

1.6 Nomenclature

Throughout its European occupation the Hatchery site has been known variously as the Port Hacking Hatchery, the Gunnamatta Bay Hatchery, the Cronulla Hatchery, the Government Fish Hatchery, the Headquarters of the Fisheries Investigation Branch of the CSIR (later the Division of Fisheries and Oceanography of CSIRO) and the Fisheries Research Institute. The area is referred to variously as Port Hacking, Cronulla, Hungry Point and Gunnamatta Bay.

1.7 Endnotes

¹ NSW Heritage Guideline for the Preparation and Use of Heritage and Conservation Registers in Accordance with S17 of The Heritage Act for State government agencies

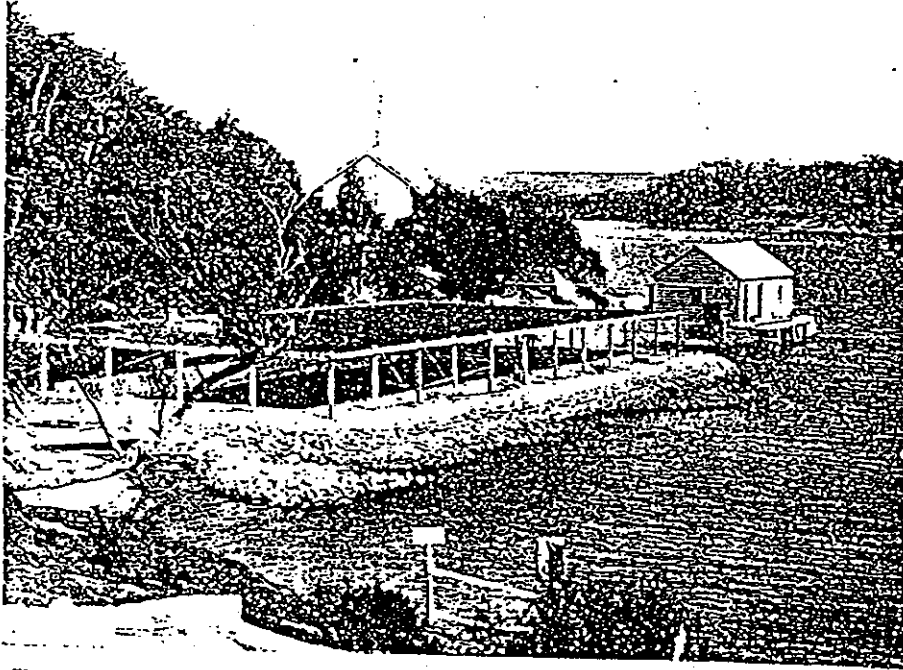


Figure 1.2 Fish Hatchery c1911.



Figure 1.3 Photo showing the Hatchery c1930-1940s. Note the small building next to the Fish Pool. This was later replaced in the late 1940s by the elongated building which now occupies that site. (From CSIRO at Sea, 1988).

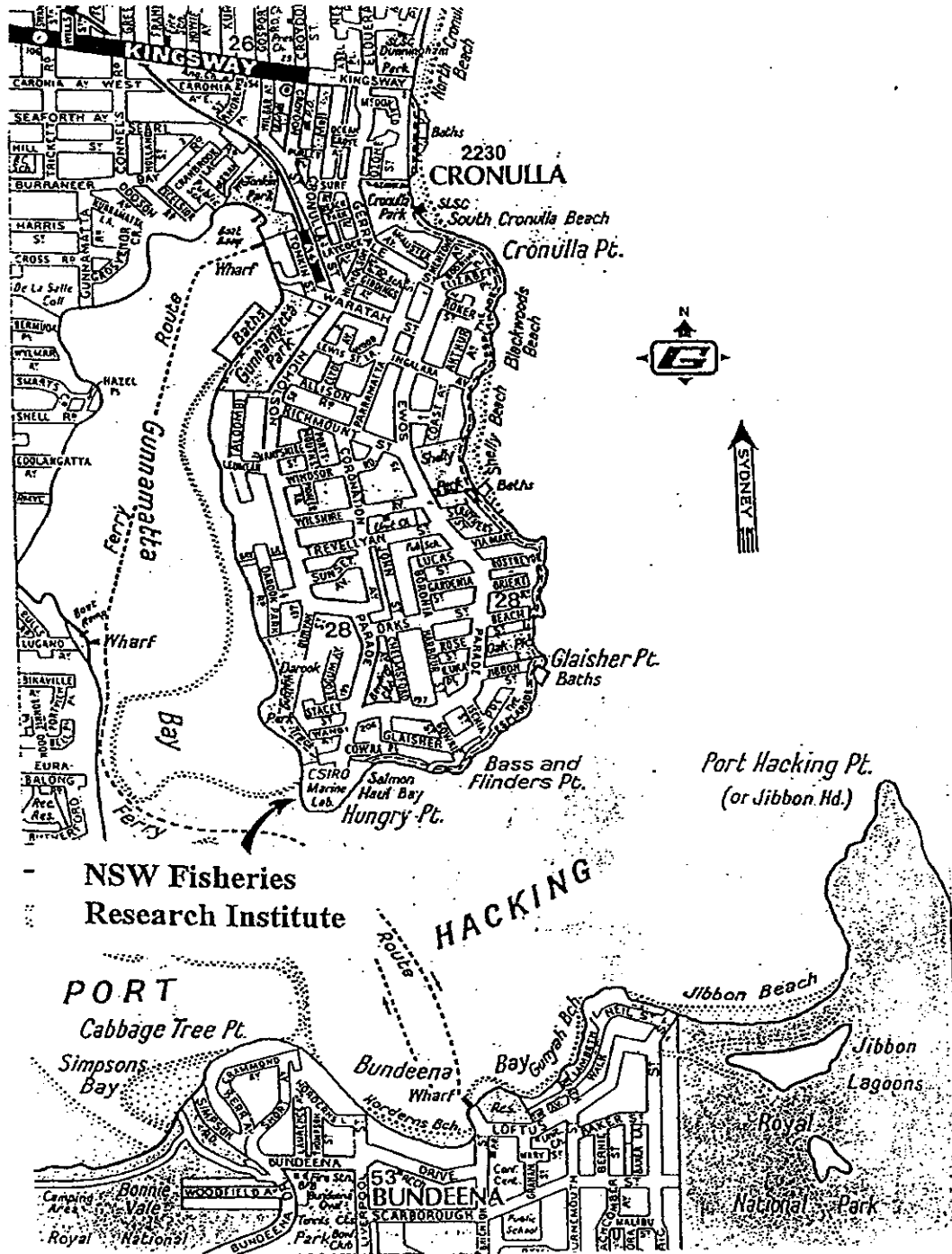


Figure 1.1 Location of NSW Fisheries Research Institute.

2.0 Aboriginal Use of and Association With the Gunnamatta

When the First Fleet straggled into Botany Bay in January 1788 the 'Eora' people occupied Sydney Cove, while the northern shore of Port Jackson from the Lane Cove River to Middle Harbour belonged to the Camaraigal. North of Many was the homeland of the Gayimai and to the west the Walumeda. South from Botany Bay was Cadigal country while the Gwiyalgal hunted and fished in the swamps between Botany Bay and Port Hacking. Radiocarbon dating indicates that Aborigines were using areas of the Royal National Park at least 7500 years ago.¹

The Gwiyalgal were of distinctive appearance - they stuck resin in their hair to give it a mop-like appearance - and spoke the Dharawal language. They almost certainly witnessed Cook's landing at Kurnell in 1770 as well as the First Fleet's arrival in 1788. Being a coastal group, the main food gathering occupation was fishing, although vegetables and land animals were also important.²

Coastal Sydney appears to be an exception to the generally accepted rule that the collection of vegetable foods was the task of Aboriginal women; accounts of coastal Sydney portray the male as the principal vegetable gatherer and women the major fish providers. While both men and women fished, they nevertheless had their own distinct fishing methods. Women fished from canoes with hook and line; a fire was kept burning in the middle of the canoe to heat and cook the catch, portions of which were chewed and spat into the water as berley. A fishing spear was used to bring in larger fish which they had hooked. Early observers believed the *mal-gun* operation (removal of the top joint of the little finger on the right hand) was to avoid the fishing line tangling with the little finger as it was wound around the hand.³

Aboriginal men tended to fish from the shore with the four-pronged *mooting*, but as they needed a calm surface to see the fish, a place out of the wind was necessary. They too used chewed fish or cockle as berley. Men also speared from canoes, lying across their canoes with their faces in the water and their spears immersed. For smaller surface species, the *mooting* was thrown. Strips of stringybark were used as torches for night fishing. The fishing catch was either cooked and eaten on the canoe or brought to the shore, cooked on a fire on the beach or nearby and consumed on site, resulting in huge mounds of shells and fishbones, known as middens, at popular locations on high points or secluded caves and overhangs.

Analysis of fish bones found in coastal middens indicates that snapper, bream, groper and wrasse were eaten as well as morwong, leatherjacket, flathead, tailor and blackfish. Estuarine middens produced evidence of snapper, bream, groper, mulloway, leatherjacket and wrasse. The Sydney people reportedly did not eat sharks or stingrays, although no reason for this rejection of a seemingly valuable food source was recorded. It is more surprising as whales were a prized catch. Estuarine and coastal molluscs were eaten when other foods were scarce. Men would jump off rocks and dive for shellfish which were then cooked on a fire - oysters, rather remarkably, were reputedly opened with the



Figure 2.1 Aborigines spearing and cooking fish on the seashore. The two men in the left foreground are using woomeras but the man on the right is not.



Figure 2.2 A man and his wife fishing from a canoe. A woomera is not being used. (R Browne, watercolour, 1819, Dixson Galleries.)

thumbnail in the Sydney region. In middens in the Gymea Bay and Connells Point areas the larger species commonly found in the area are well represented - Sydney rock oyster, Sydney cockle, hairy mussel, southern chama and mud oyster. In ocean-front middens limpets, rock welks, abalone, periwinkles, nerites and mussels are found, while on the southern edge of the Kurnell peninsula pipi shells were gathered on local beaches in large numbers.⁴

The three Aboriginal middens on the Gunnamatta Hatchery site [Heritage Register No F0009], registered with the National Parks & Wildlife Service in January 1996, should be analysed by appropriate personnel to ascertain the species contained therein. Adjacent Darook Park (named for a group of local Aborigines) reportedly contains carvings and spear sharpening grooves. Frank Cridland identified the locations as Darook Park and Wahgunyah cliffs. Writing in 1924 Cridland described an Aboriginal water-hole extant in Darook Park with an immense 'kitchen-midden' nearby. He wrote also of rock carvings (figures and art) in caves and overhangs along the beachfront backing onto the present Nicholson Parade.⁵

Cridland identified a number of sites around Gunnamatta Bay on Burraneer Point as well as the Darook shoreline where life-size carvings of two whales, 35' and 38' long, a shark and a bream could be found, as well as figures and other fish and native animals. One, a kangaroo carved into the vertical face of the cliff on Burraneer Bay was described as a splendid piece of work. Handmarkings were located in various local cave shelters. W D Campbell, a surveyor, reputedly surveyed, measured and described rock and cave drawings between 1886 and 1893 and examples of his drawings are reproduced by Cridland.⁶

While the Aboriginal population of the Sydney region appeared to the newcomers to be well provided for with fish, land animals and vegetables, the Europeans had little concept of how precarious was the balance between starvation and sufficiency. The sudden influx of over 1,000 extra mouths to feed placed unbearable strains upon the available supply of fresh food. Kangaroos, birds, herbs and fish all ended up in the pots of the newcomers, in quantities never before witnessed by the Aborigines. During the winter of 1788, when the fish supply naturally declined, Aborigines died of starvation in the bush, their spears and handlines being no match for the introduced guns and seine-nets in an environment already drastically depleted of its food resources.

The Aborigines, desperate and resentful, began taking a share of the netted catch by force. Governor Phillip had already issued a General Order to fishing parties to give part of their catch to the Aborigines if they approached, but this no longer appeared to satisfy them. As Willey comments, 'hunger and pestilence are seldom far apart in the more melancholy passages of history' - and the advent of smallpox or some other pestilence was to decimate the local population, killing perhaps half of all the Aborigines in the vicinity of Port Jackson.⁷ Argument has raged ever since as to the nature of the disease. This is outside the ambit of this work and does not alter the fact that many hundreds died, relieving the pressure on the food chain in a truly tragic manner.



Figure 2.3 The 'Noble Savage' had become the 'Comic Savage' by the time R Browne painted this picture of an Aborigine returning with his catch of fish in 1819. (Rex Kivell Collection, National Library).



Figure 2.4 Aboriginal remains in Port Hacking, 1918.

A series of photographs in the Government Printing Office collection, taken in 1918, graphically record a large number of Aboriginal bones and artefacts, uncovered at the site of a rock or cave collapse at Port Hacking. The occupants were clearly trapped and died, remaining buried until the date of photography.⁸ But the evidence of the Dreamtime occupants of the Gunnamatta Bay region is sparse.

By the time the Europeans began passing legislation to protect the fisheries they so ruthlessly appropriated and subsequently squandered, the last remnants of the Sydney tribes were decimated and dispossessed, leaving only their art and artefacts along the coastline and in isolated caves and rock overhangs. The wise husbanding of the extensive food resources which their tribal lands provided was overwhelmed by an alien economic and social system, the only evidence now it seems being middens, three ironically protected because they were located on the site of the Gunnamatta Hatchery.

2.1 Endnotes

¹ Keith Willey, *When the Sky Fell Down* (Sydney, 1979) p 15; Peter Turbet, *The Aborigines of the Sydney District Before 1788* (Kangaroo Press, 1989) p. 10

² Turbet, *op cit*, pp 16, 23

³ *ibid*, pp 53, 70

⁴ *ibid*, pp 55/58

⁵ Megan Pitt, *A Walk Around Cronulla* (Sutherland Shire Council, 1990) np

⁶ Frank Cridland, *The Story of Port Hacking* (Sydney, 1924) pp 34, 44/46, 141/148

⁷ Willey, *op cit*, pp70/78

⁸ GPO Series I, Stills # 17919, 17920, 17928, 18233, 18234, 18235

3.0 Moves Towards the Protection and Regulation of Fisheries

3.1 The Settlement of New South Wales Before 1850

As outlined in 2.0 above, fishing, with all its social and cultural associations, was a traditional use of the Port Hacking area of New South Wales (NSW), as was most of the eastern seaboard of the Australian continent. With the intrusion of Europeans into the Sydney area, the white invaders took the fisheries of the inland and seaboard as their own, in time replacing subsistence farming of the resource with private enterprise in the form of fish barrows, stalls and house to house sale of fish. The earliest documentary reference to a local fishing 'industry' appears in the *Sydney Gazette* of December 14, 1806 which reported:

*'On Friday, a boatload of salted fish, amounting to 13 cwt. was brought in at the Hospital Wharf' (the site of the Museum of Contemporary Art in the former Maritime Services Board building)*¹

Crews of whalers had ranged up and down the coast for some years before the newspaper report but the whalers of many nations were transient and not much interested in establishing trading links with the marginal penal colony - not at least until the 1840s when the flamboyant Ben Boyd began harvesting the ocean just as enthusiastically as he reaped the profits of inland squatting.

From a late twentieth century perspective it is difficult to calculate the importance to the fledgling penal colony of the great variety of fish available in the surrounding waters - a population largely dependent upon the salted meats transported over many months from their home ports and upon the fish and game they were able to hunt. For such as these, fish of whatever kind was a welcome addition of fresh food. The British in particular were a nation who traditionally looked to seafood as a staple food and they brought with them the trade of fishmongering, a system of mass harvesting of available fish stocks for resale to a consuming public - a far cry from the traditional Aboriginal concept of hunting and fishing for the family's immediate consumption.

Despite the vital place which fresh fish played in the diet of Sydney's traditional and early European population, the indigenous varieties were not highly esteemed during the nineteenth century, no doubt another instance of the belief that all things British were *ipso facto* superior to the local. This view was clearly enhanced in the case of fisheries by the smaller stocks of a greater variety of fish in Australian waters, compared to the huge European fishing grounds of herring, cod and salmon. Fish auctions were first held in Sydney about 1827 when a certain Boyle, agent for Mr J Lord held sales on the race-course, latterly Hyde Park. Daily supplies from Botany Bay in the 1820s and 30s exceeded that offered for sale in the 1890s.²

The remnants of the Eora people had long been aware the impact of the greatly enlarged population and methods of mass harvesting had upon their traditional fishing grounds; awareness of the effects of the destruction of fish fry upon the future potential of the industry became apparent but it was not until the 1860s that the dire

condition of the Colony's fisheries prompted any attempt to control the industry by legislation.

3.2 Establishment of fisheries legislation, post 1860

Throughout the first half of the nineteenth century seine-hauling for fish had been widespread and totally unrestricted with regard to net length and size of mesh, although only Port Jackson, George's River and Botany and Broken Bays could be fished with nets. The resultant depopulation of fish stocks was finally recognised by the public and the more astute fishermen who enlisted the assistance of Richard Driver Jnr MLA in bringing the matter before a Select Committee of the House. The Committee heard that the general custom was to work with nets of $\frac{3}{4}$ " (20 mm) which caught and destroyed enormous quantities of fry, a major cause of the depletion of the fishing grounds. Another major cause of spoliation was the system of 'stalling' which consisted of:

*'shooting at high tide a net of some 250 or 300 or more of fathoms across a shallow bay or around flats and leaving it until the receding tide had left the enclosure dry. By this means tons upon tons of fish were destroyed and as from these quantities only those of a saleable size and of the more choice species were selected, the large remainder of the stranded fish was left unused and to rot on the beaches...'*³

The Fisheries Act, 1865 (28 Vic No 10)

As a result of the evidence placed before the Committee the Fisheries Act of 1865 (Dick Driver's Act) was passed, specifying the size of mesh permitted for use in particular seasons and locations, and restricting the practice of 'stalling', making it a penal offence to fix or stake any net within a mile of the shore or at the mouth of any river. Unfortunately administration of the Act was entrusted to the Police and Customs Departments which were totally unequal to the task.

Royal Commission to enquire into and report on the actual state and prospects of Fisheries of the Colony of New South Wales, 1880

After some fifteen years of inactivity and procrastination, William Macleay MLC presided over a Royal Commission enquiring into the current situation in the Colony's fisheries and tendering advice to Government for developing and preserving them. The Commissioners heard that the present quantity of the catch did not of itself affect appreciably the available supply, the rapid decline of which was a result of the 'wanton destruction by fishermen of the spawn and young'. However they also learnt of the wide-spread practice overseas of annually liberating a much larger number of artificially-reared fish than the annual catch.⁴ They also collected information on acclimatisation and pisciculture in Australia and overseas and recommended

'that assistance should be given by the Government to any competent association engaged in Pisciculture, by a grant of money, and the use, if required, of the "National Park" at Port Hacking.'

The Report⁵ recommended a more detailed survey of the sea bottom for a distance of twenty miles from the land; and special fisheries for mullets, herrings etc. which periodically visited the coast in large shoals, together with a closed season for the protection of young fish. Immediate legislation was urged for the protection of the oyster fishery and crayfish canning was suggested as a profitable industry. The Commissioners anticipated increased fish supplies as a result of the use of a superior class of fishing boats, improved methods of capture and preservation in ice. A closed season prohibiting net fishing in rivers and bays from 1st April to 1 October was recommended and the minimum net size to be set at 1½ inches (38 mm). Stalling was to continue to be tightly controlled and the minimum mesh size suggested was 4 inches (102 cm). Administration, control and direction of the fisheries should be vested in a central board, with competent local inspectors.⁶

The Fisheries Act, 1881 (44 Vic No 10)

As a result The Fisheries Act, 1881 (44 Vic No 10) repealed the former legislation and allowed for the appointment of five Commissioners to supervise the implementation and operation of the Act, divided the Colony into three 'Grounds' for effective administration under the supervision of Inspectors and sub-Inspectors, some of whom it was envisaged for reasons of economy would be local members of the police force. The recommendations of the Commissioners were incorporated into the new legislation, with penalties for the destruction of undersized fish and the prohibition of explosives and poisonous substances for the purpose of destroying fish.⁷

The five Commissioners, all of whom had acted as Fisheries Royal commissioners, immediately began implementing the new Act and in keeping with their obligations to develop the fish supply induced the Government to import a variety of innovative fishing-gear currently being used in England, America and Norway to assess their suitability for Colonial waters and in order that 'our fishermen might be instructed in the modes of fishing practised in those countries'.⁸

Calamity struck on the morning of 22 September 1882 when the imposing Garden Palace, erected in the Sydney Botanic Gardens for the Great International Exhibition of 1879/80, was totally destroyed by fire, obliterating amongst many irreplaceable Government records, the collection of fishing implements and all the books and records of the Fisheries Department. Soon afterwards, the entire original Fisheries Board retired, to be replaced by five new Commissioners, all but two of whom had also served on the 1880 Fisheries Royal Commission. Stability proved to be a problem for the Fisheries Board, with fifteen different appointments being made between 1881 and 1893.⁹

Nevertheless the reconstituted Board enthusiastically prepared for the Colony's contribution to the Great International Fisheries Exhibition to be held in London in 1883. The Commission also recommended a survey of the seabed outside Port Jackson, at an estimated cost of £1000, and the purchase of a seaworthy steam launch to lay down oysters on exhausted beds.¹⁰ Claims that the 1881 Act was deficient and needed redrafting soon emerged, initiated and supported by disgruntled fishermen and interested parties who believed the Act placed undue restrictions upon them. A Select Committee of

the Legislative Assembly was established resulting in the Fisheries Act Amendment Act, 1883 which reduced the stringency of the regulation of the industry, not however sufficiently for the protesters who continued to agitate until their cause was taken up by Frank Farnell MLA.

Farnell criticised the Fisheries Commission 'for want of practical knowledge, and the officers under them for their administration of the Act'. The Select Committee subsequently appointed, including Farnell, reported in August 1889 in a negative assessment of the Act repeating Farnell's parliamentary criticisms: that it operated harshly upon those engaged in the industry, that it offered insufficient encouragement of oyster-culture and that its' regulations were unnecessarily restrictive; it recommended encouragement of trawler fishing and abolition of the Fisheries Commission, with the re-establishment of the department under direct Ministerial control, or the addition of two representatives of the fishermen to the Board. It also appended two draft Bills amending the Act, but despite a further Royal Commission in 1894 which repeated calls first articulated in 1880 for deep sea surveys and the establishment of a marine fish hatchery¹¹, pressure of parliamentary business and changes in the Ministry¹² resulted in these and subsequent draft Bills (1883, 1890, 1895, 1898) remaining on the table of the House. Indeed the Fisheries Commission's staff numbers and activities declined in 1893 when the Government introduced stringent economies and retrenchments as a result of the 1890's depression.

No legislative amendments took place until the turn of the century, despite representations in each Annual Report to Parliament and the appointment to the Board of its most vocal parliamentary critic, Frank Farnell, in 1895.¹³ Finally responding to recommendations in previous Royal Commission Reports since 1880, Farnell supervised a trawling expedition on behalf of the Government in 1898 to test the ocean bottom off the coast to ascertain whether trawling operations were likely to be successful. The Government steamer *Thetis* was fitted out for the purpose and equipped with an otter trawl but despite a 'very interesting and instructive report' submitted to Parliament by Farnell no immediate action was taken.¹⁴

The perennial problems of fishery closures and catch regulation occupied much of the Board's attention:

It is very difficult to adopt necessary measures for a proper protection of the fish and fishing-grounds without causing a certain amount of dissatisfaction amongst the fishermen, but, while the Commissioners are anxious to assist the licensed men as far as practicable, they find it absolutely necessary for the preservation of fish, and to maintain the supply, that breeding-grounds should be nursed and protected.¹⁵

Amid the plethora of Royal Commissions and Select Committees, draft Bills and parliamentary criticism, the regulation of the fishing industry ground slowly into the twentieth century. The Department of Fisheries Report for 1899, presented to Parliament on 26 May 1899, again pleaded for stronger legislative support:

We consider that it is our duty, in the interests of the fishing industry to again urge upon the Government the necessity of introducing more stringent laws than those at present in force for the protection of fish and fishing-grounds, and for the better administration of the fisheries.¹⁶

3.3 Endnotes

- ¹ Quoted M Hutton Neve, *Sutherland Shire Society Bulletin*, May 1978, p.145
- ² Lindsay G. Thompson, *History of the Fisheries of New South Wales...*, Sydney, 1893, p 44 ML981/65A1
- ³ Thompson, *ibid*, , pp 26/7
- ⁴ Thompson, *ibid*, pp 30/31
- ⁵ *NSW Commissioners of Fisheries Report 1880, passim* ML 639N
- ⁶ Borchardt, *Checklist of Royal Commissions, etc.: Part IV, NSW, 1855-1960*, pp 107/8
- ⁷ Thompson, *op cit*, pp 26/35
- ⁸ Thompson, *ibid*, pp36/38 These implements included a purse-seine net from Maine, USA; a French trammel net; a collection of glass hooks and floats as used by Norwegian fishermen; a herring-net and otter trawl and beam trawl-net of English east coast origin.
- ⁹ Thompson, *op cit*, pp 37/38
- ¹⁰ NSWLA, *Annual Report - Fisheries of the Colony, 1883*, pp 2/3
- ¹¹ *Report of the Royal Commission into Fisheries, 20 November 1894, passim*, ML Q639.2/1A1-2. The Report recommended the immediate passage of a new Bill; systematic exploration of the sea coast by a properly equipped trawling vessel to determine the capabilities of the deepsea fisheries; inquiries into the crayfish and inland water industries; establishment of fish hatcheries; improvement in Fish Market accommodation; reduction in market dues; abolition of middlemen allowing fishermen to vend their own fish; erection of a Central Fish Market near Darling Harbour Railway Terminus, with Urban and Suburban auxiliary markets.
- ¹² Thompson, *op cit*, pp38/43
- ¹³ NSWLA - *Annual Report - Fisheries of the Colony, 1895*, pp 1/2
- ¹⁴ NSWLA - *ibid*, 1898, p 7
- ¹⁵ NSWLA - *ibid*, p 3
- ¹⁶ NSWLA - *ibid*, p 12

4.0 European Development and Management

4.1 Stage I - New South Wales Fisheries Development of the Hatchery : 1902 - 1938

4.1.1 Development in the period leading to the Fisheries Act, 1902 (Act No.119, 1902)

Predictably it took an event as life-threatening as an outbreak of bubonic plague to achieve new legislation and stricter regulation of the industry. The impact was more dramatic as the plague coincided with the revelation that a large quantity of dead fish and prawns had been found floating on the surface of Johnson's Bay, causing much alarm to the public who believed the mortality was caused by the large amounts of chemicals and disinfectants used to control disease emptying into the rivers and bays surrounding Sydney.

The public's response was to immediately refuse to purchase fish of all types; the Board's response was to close the whole of the waters of Port Jackson to net-fishing and to adopt stringent measures to prevent fish from these waters reaching the markets. A feeling of *deja vu* prevails when one reads the comment of the Annual Report of the Fisheries Department for 1900:

'The prejudice of the public extended to the consumption of oysters, although they came from inlets north and south of Port Jackson, and were in a healthy and sound condition.'

The Bacteriologist of the Linnean Society examined the dead fish and prawns, reporting that there was nothing to account for the disease in either. Samples of water from the localities in which the dead fish were found were examined by the Government Analyst who found that 'although charged with sewage matter, no trace of disinfectants could be detected.' The Board was inclined to accept the findings of the Commissioner of Fisheries in Ottawa, Canada, on water pollution there, that the fatalities were caused by sluggish turbid waters, especially during the summer months.

4.1.2 Fish Hatcheries and Oyster Culture

The NSW Commissioners admitted in the 1900 Annual Report that a number of fish species had been found in diminishing quantities for some years and they believed NSW should follow overseas examples (notably the USA, Norway, Canada, New Foundland and Scotland) by stocking exhausted grounds with fry hatched in sea-fish hatcheries. However they had in fact already initiated the establishment of a marine hatchery for salt-water fish and crustacea, and for the cultivation of oysters, at Cabbage Tree Creek and Basin on the southern shore of Port Hacking (described as Maianbar but apparently

located on the sandy foreshore adjacent to Bonnie Vale Camping Ground between the villages of Maianbar and Bundeena); the completion of the works associated with 'an experimental farm and fish preserve' had been reported in the previous Annual Report, which concluded that 'the hatching and propagation of fish, as carried out in England, Canada and America, will now be only a question of funds'. The Report proposed the construction of fish breeding paddocks and the laying down of oysters on the shallow flats, 'with a view to studying their habits and life history.'²

This was however by no means the first attempts at acclimatisation and fish culture in Australia, although initially these attempts were aimed at acclimatising Northern hemisphere inland fish varieties; as early as 1864 brown trout and salmon eggs transported from Europe were hatched out at Plenty Salmon Ponds in the Derwent Valley, Tasmania, following three unsuccessful attempts at transportation between 1841 and 1864. In that year salmon and brown trout eggs at the 'eyed' stage were shipped to the Australian mainland, packed in moss and charcoal in a special container cooled by the water from melting ice blocks. This technique was later used to transport rainbow trout eggs from California to Australia via New Zealand - the original stock from which rainbow trout farmed in southern Australia is derived.³

Also in 1864 10,000 salmon and 1,000 brown trout eggs were transported from England to Tasmania. However the 3,000 salmon fry eventually released were lost and only 300 brown trout were hatched. The progeny of the latter, the brood stock at Plenty Hatchery, now stock the rivers and lakes of Tasmania, mainland Australia and New Zealand.⁴ In 1888 NSW Fisheries Commission, through the co-operation of the Victorian Government and the Geelong Acclimatisation Society, obtained over a thousand trout fry which were liberated in streams throughout the Colony. However attempts at oyster culture were most unsatisfactory, attributed to the very dry season.⁵

Following the erection in 1894 of hatching troughs specially erected in an old blacksmith's shop below Prospect Reservoir, three rearing ponds were constructed at Prospect and in the following year Prospect Hatchery was erected. This was the first fish hatchery in NSW and for more than 25 years the only trout hatchery in the State. It was a very low profile experiment with no mention of the prospective event in preceding Annual Reports until notice of expenditure in the appendices of the 1895 Annual Report of £250 for the erection of houses for trout hatching.⁶

Considerable success was reported in 1898 with the hatching at Prospect Hatchery of several thousand rainbow (*salmo irideus*), brown (*salmo fario*) and loch leven (*salmo levenensis*) trout from ova obtained from the Wellington Acclimatisation Society; several thousand fry were liberated in the knowledge that previous liberations were resulting in successful acclimatisation throughout the Colony.⁷ By 1899 the Commission was convinced that the rainbow trout (*salmo irideus*) was the most suitable fresh water fish for importation into NSW.⁸

It seems strange that the hatching of coastal fish took so long to be established but apart from the continuing enthusiasm for acclimatising Northern hemisphere varieties, a clue is

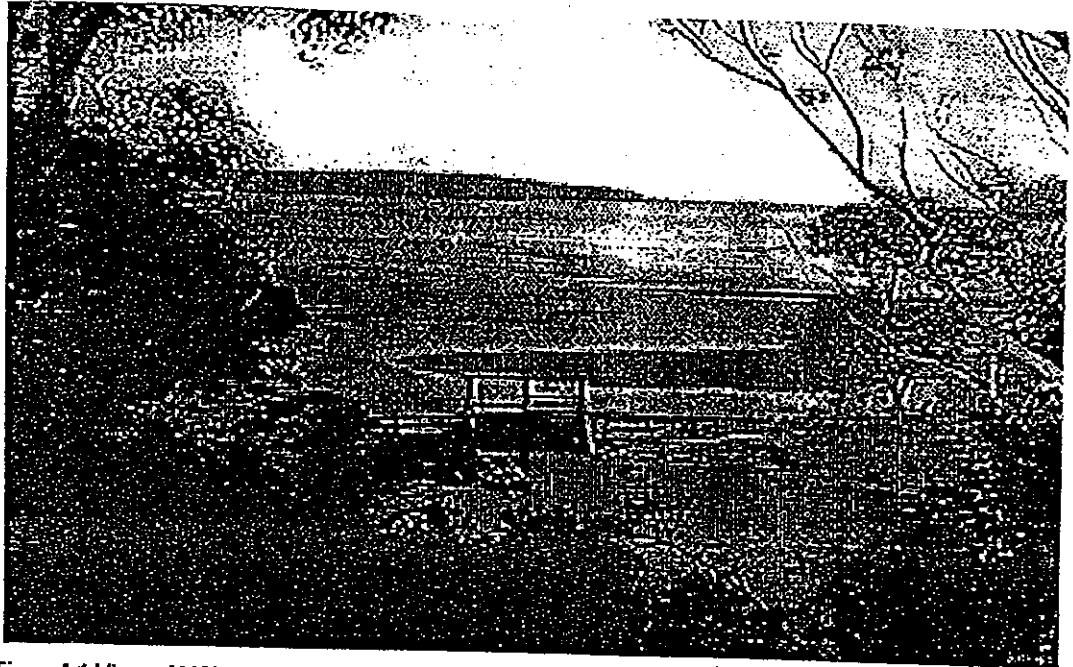


Figure 4.1 View of NSW's first fish hatchery at Maianbar, 1901. GPO Server 1.

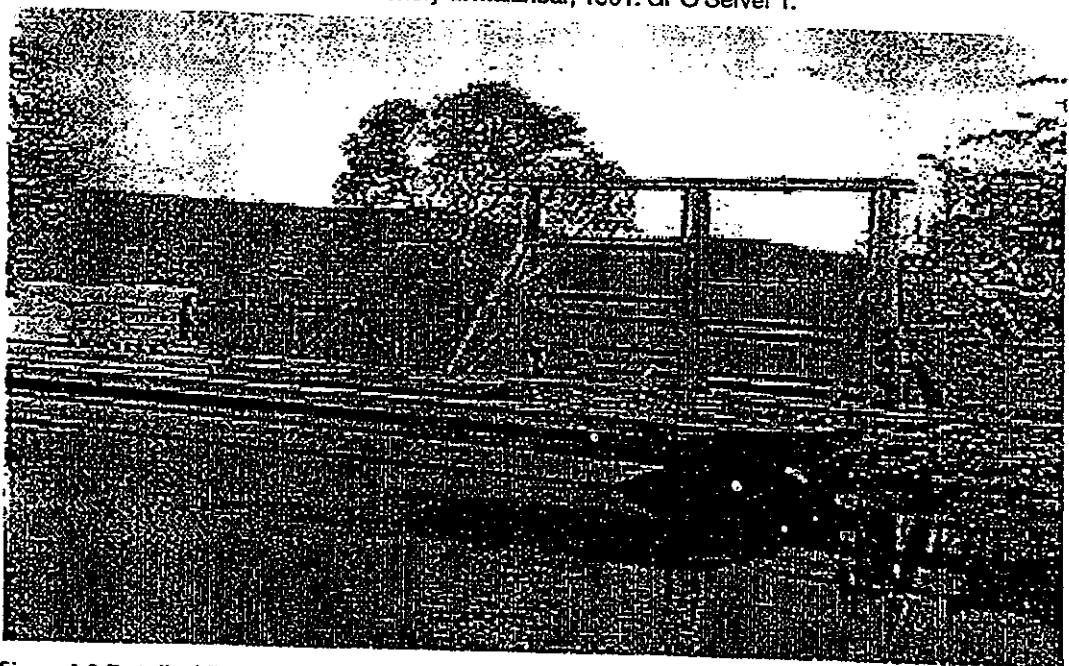


Figure 4.2 Detail of fish hatchery which preceded Gunnamatta hatchery and received fish stocks brought to NSW by Dannevig in 1902.

found in the Commissioners' comment in the above Report that 'many of the waters in which [rainbow trout] are being liberated are devoid of edible fish life. On the eastern slopes of our northern tablelands the only edible inhabitants of the streams are eels, and on the western slopes there are no fish except where cod have been introduced from the rivers of the plain country.'⁹ There may have been problems with the coastal fisheries but the situation had not yet reached the dire state of the inland rivers and lakes.

4.1.3 The Fish Hatcheries at Maianbar and Gunnamatta Bay, Port Hacking

The Maianbar Fish Nursery was modelled on that at Dunbar in Scotland, which had been established in 1893: a hatching house, spawning pond, egg collection chamber, pump and boiler house and tidal pond. A stone dyke was constructed with small-meshed wire-netting gates to admit the tidal waters, with close wire-netting wings 22 feet long and 3 feet 9 inches high which continued to the shore. Two small marine paddocks were erected in the water on the western shore for the placement of fish in order to observe the spawning. The Government provided £500 with which to make a start on the project, which initially was aimed at the study of indigenous varieties. A site for a trout hatchery in the Snowy Mountains was being actively sought, but the cost was found to be temporarily prohibitive.

The Commissioners were also interested in introducing plaice from Europe and Tasmanian crayfish and trumpeter. An experimental shipment of the latter was made but unsuccessfully. Despite the Government's best efforts over nearly forty years

'it is beyond doubt that some of the valuable food fishes indigenous to the waters of this State are - in close proximity to the coast about Sydney - becoming more scarce each year, we have determined to introduce some of the best food fishes from the United Kingdom when the hatchery is sufficiently equipped to successfully propagate them.'

The Board was further convinced, after correspondence with the Gatty Marine Laboratory at St Andrews, that 'a scientific superintendent' and a reliable Fisheries Adviser, obviously trained at that institution, were vital to the success of the acclimatisation programme. The decision to construct a more ambitious sea-fish hatchery at Port Hacking was also made by 1900 when enquiries were made to obtain the services of an overseas expert in fresh water and marine fishes and oysters. This would also allow the possibility of importing European varieties under trained supervision.¹⁰

To this end the President, Dr James Cox, on a six-month visit to England and Scotland in 1901, visited famous fishing centres in Scotland, and inquired into methods adopted at the Aberdeen Sea-fish Hatchery, with a view to introducing a similar Marine Hatchery at Port Hacking. It had been found to be impossible to secure an expert in both fish and oyster, the two studies being considered separate areas, and it was decided that a knowledge of oyster culture would not be regarded as absolutely necessary.

Parliamentary approval for the position having been obtained, the Agent-General for NSW secured the services of Harald C Dannevig (see Section 5.0) who had been

charge of the Aberdeen Marine Fish Hatchery for the previous nine years. David G. Stead (see Section 5.0) was secured as Scientific Assistant to the Department, 'as there is absolutely nothing known of the biological history of our fishes at the present time'. Stead was to investigate the habits and life history of the State's fish, crustacea and oysters, working from the Marine Fishery at Maianbar. Advice on the requirements of sea-fish hatcheries, together with plans and photographs, was furnished by T. Wemyss Fulton, Scientific Superintendent of the Aberdeen Marine Laboratory of the Fishery Board for Scotland, while selection of appropriate sites was left to H C Dannevig upon his arrival.¹¹

Dannevig's appointment also allowed the accomplishment of a scheme initiated in 1900 - the importation of Scottish fish under specialist care, ova having been rejected because of the unlikelihood of their survival on a long sea voyage. He was authorised to spend no more than £200 on their capture and transportation; subsequently 722 plaice of one, two and three years' growth and a number of soles, turbot, brill, lobsters and crabs accompanied him to Sydney, only the plaice and soles being considered 'successful' importations. Live fish had previously been transported from England to America and India, but this was the first successful voyage to Australia. Nevertheless 162 plaice and 8 soles were lost on the voyage.

A wire-netting enclosure measuring 90 x 50 x 10 feet deep had been erected to receive the live fish at Turriell Point, on the northern shore of Port Hacking (in the vicinity of Shiprock Aquatic Reserve [Heritage Register No F0006]); however Dannevig preferred the one-third of an acre wire-netting paddock in the more placid waters at the Maianbar Fishery site. A number perished during the transfer to the Fishery early in August 1902, but the staff were optimistic. However, small numbers continued to die over the following three months, despite the seemingly healthy appearance of the survivors. Five days of extreme heat in December took their toll and by the end of that month all the plaice had been destroyed by octopi and starfish or the high temperature. Several soles were seen but Dannevig was loathe to disturb any remaining stocks until it was necessary to remove them to the new concrete pond being constructed at Gunnamatta Bay. Unfortunately Dannevig's report on the condition of any surviving fish stocks, an Appendix to the 1902 Annual Report was omitted 'by the direction of the Printing Committee of the Legislative Assembly.'¹²

4.1.4 The Fisheries Act, 1902 (Act No. 119, 1902)

The above Act was assented to on 29th December 1902, bringing to fruition the planning and perseverance of the previous Board over some fifteen years. The Act prescribed a Board consisting of a Chairman (appointed by the Governor for three years) and nine other members, one required to be a licensed fisherman of five years' standing and an oyster lessee of equal experience, one a representative of the Inland Fisheries and six representatives of the Crown. The Board was given extensive powers and responsibilities under the new Chairman, Frank Farnell, to supervise the industry, to carry out investigations likely to be of service, and to ensure observance of regulations regarding dimension of nets, closure of inland and tidal waters, net-fishing, etc.¹³

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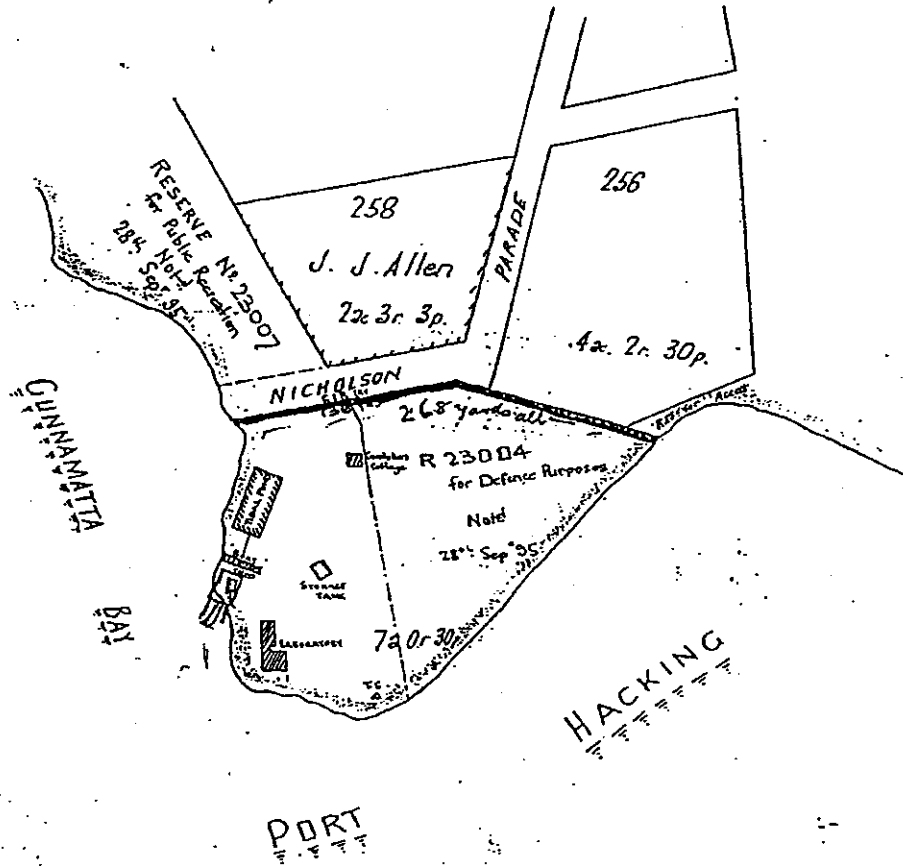
Shewing by Green band proposed lines for fencing to include Hatchery Site.....

at Port Hacking

Parish of Sutherland

County of Cumberland

Scale 4 Chains to an Inch



Note: Lines proposed to be fenced shown by Green bands

Figure 4.3 Subdivision of Defence Reserve to create Fish Hatchery on 3 acres, 1 rod and 20 perches.

Clearly, however, despite the Board's insistence that legislative changes were long overdue, many of the initiatives which were to direct the control of the industry and the scope of its activities over coming decades had already commenced before the passage of the new Act. Indeed no steps were taken by Government to constitute a Board under the 1902 Act until two months after it's assent.

4.1.5 The Construction of the Gunnamatta Fish Hatchery - Stage One

Engaged as Superintendent of Fisheries Investigations and Fish Hatcheries from 1st May, 1902, Harald Dannevig left Plymouth on 21st June in the *RMS Oroya*, arriving in Sydney with his live cargo on 2nd August. Three days after his arrival he was directed to investigate the waters between Broken Bay (initially Lake Macquarie) and Port Hacking for a suitable site for 'a marine fish hatchery and fish-pond'.¹⁴ Dannevig completed a thorough Report dated 18th August 1902,¹⁵ for submission to the Board of Commissioners, explained in the 1902 Report as follows:

*'After consideration of the suitability of different sites as regards the density, purity, and temperature of the salt water procurable for the development of marine fish eggs, and harbour and other required accommodation, it was decided to select a site on the eastern shore of Gunnamatta Bay, near the entrance to Port Hacking.'*¹⁶

Dannevig's Report recommended the acquisition of the whole of Hungry Point on Gunnamatta Bay, Port Hacking, which had been reserved as Reserve No 23004 for Defence Purposes on 28th September, 1895, simultaneously with the gazettal of the adjoining Reserve No 23007 for Public Recreation, now known as Darook Park (see Figure 4.3). This would allow for the construction of buildings and ensure sufficient privacy for marine activities. He also wanted the sandy beach to the north west of the proposed pond site, then part of the public grounds, to be included.

The Board accepted his recommendations and further agreed that 'he will reside at a suburb near Hurstville, that a conveyance will be provided for him to go out and in to the Hatchery at option and that a telephone be established between [his] residence and the Hatchery establishment'.¹⁷ It was not a simple matter however to arrange the transfer of land. Three State governments departments were involved - Fisheries, Lands, Chief Secretary's as well as two Commonwealth - Defence and External Affairs.

Furthermore the Defence Department was unwilling to revoke the whole of the Reserve and Fisheries could not accept the other option of permission only to erect buildings, as they required exclusive control of any site where the Hatchery and Ponds were to be erected. Finally an area of 3 acres 1 rood 20 perches - roughly half the area originally requested - was placed under the control of the Fisheries Commissioners for pisciculture, leaving the way open to at last begin construction.¹⁸ In the meantime an offer had been received to lease, with the option of purchase, the Bondi Aquarium and grounds for a site for a marine hatchery, 'but for various reasons the offer could not be accepted.'

There remained small complications such as the status of local residents' 'grace and favour' occupation of the site, resulting in the purchase for £7/10/- an iron roofed boat shed, a 240 gallon galvanised iron tank, and a 'trolley and ways', the shed to be used to store cement during the proposed construction.¹⁹

In 1902 in response to an estimate by the Harbours and Rivers Department of Public Works, £500 was advanced from the Colonial Treasurer's Advance Fund and construction of the fish pond 100' long 45' wide and 10' depth at centre was begun by Harbours and Rivers; however when the work was well advanced it was found that a further sum of £150 would be required to complete it. The funds not being available, work on the project stopped.²⁰

With the resolution of the problems associated with the acquisition of land at Hungry Point, plans and specifications were drawn up by April 1903 for the Hatchery complex: a hatchery building, laboratory, reservoir and pumping plant, and caretaker's residence, this construction estimated to cost £1,825. A further £150 was requested to complete the fish pond. The Chairman of the Fisheries Board, Frank Farnell convinced the Colonial Treasurer of the worth of the project - it was estimated that

'the hatchery would be capable of propagating 100,000,000 fish every season, which will be distributed along the Coastal Waters and inlets to stock the depleted waters with the more valuable forms of fish'

and the Treasurer provided £800 from the Advance Fund to begin the process. The balance was placed on the Estimates for 1903-4.²¹

A number of modifications were made to the plans - the box windows on the north and west side of the Hatchery were to be fitted with louvre shutters, a verandah to be erected on the south side of the laboratory building, timber was to be used instead of brick to construct the caretaker's cottage (thus reducing the cost to the sum of £200 or less) and a fireplace was to be provided in the laboratory.²²

Tenders were called and on February 3, 1904 the Chief Secretary's Office advised that Mr Charles McCarthy of Mosman had been successful with a tender of £1,371 which included the construction of a storage tank. Construction was to be completed in 26 weeks from January 28, 1904.²³ McCarthy also completed the tidal pond, at a cost of £167 (£17 more than budgeted for, a fact which was noted with some disapproval by the Under Secretary to the Chief Secretary), although it is not clear whether this was completed before or after the main complex construction.

A handwritten note to a memo, dated August 23, 1904, confirms that the hatchery buildings and fish pond were completed but it was essential that hatching operations should be commenced without delay and this could only be done by obtaining £500 from the Advance Fund to carry on till the Estimates were passed. This was approved late in October enabling 3" and 4" piping to be fitted to the pump, as well as filtering apparatus and material and hatching and automatic apparatus for the hatchery; covering and filtering material for the tidal pond; and construction of the engine and boatshed and landing.²⁴

As a result further work to a total of £318 was undertaken by McCarthy that same month

- the fish pond was covered with a roof 110' x 50' of galvanised wire and lattice on 6"x4" hardwood posts (£140)
- a combined engine shed, store room and boat house, boat slip and platform. Constructed in weather board with iron roof. Engine shed to have concrete floor, store and boat house wooden floors. Size of building 40' x 20' (£153)
- constructing 270 lineal yards of 6 wire anchor fence, including 9' gate (this was to enclose the entire Government area, including the Defence Department's Reserve) (£20)
- cutting a flight of steps in stone (£5)²⁵

Following the supply of hatching boxes by McCarthy, the construction of a water wheel and pit and with the completion of the cutting of existing stone ledges and the securing of filtering mats in February 1905, the Hatchery Complex was ready for commissioning. Frederick Aldrich, formerly Inspector of Fisheries at Port Hacking was appointed Keeper at the Gunnamatta Hatchery from 1st July that year at the increased salary of £150 per annum. Already however the Commissioners were reporting the undermining by the public of the stone walls surrounding the area.²⁶

The Commissioners were able to report that the Hatchery came into full operation at the beginning of 1906, the initial stock comprising whiting, red bream, flathead, trevally and crayfish. Later a few schnapper and other deep sea fish were introduced. These all flourished in their new surroundings but disappointingly refused to spawn. Dannevig travelled to Hobart to escort 1,200 flounder taken from the Derwent River to Gunnamatta. 1,050 survived the voyage and were liberated in the fish pond.

Eggs from the first collection of roe a few days later were transferred to the hatchery apparatus for development. When a second shipment of 1,100 flounder was received in July 1905, resulting in a total output for the season of over 20,000,000 liberated into Port Hacking, Botany Bay, Middle Harbour and Brisbane Water, expectations were buoyant.²⁷

4.1.6 Troubled Waters

Dannevig's reputation grew with the success of the hatchery; he was 'loaned' to the Commonwealth in 1907 to prepare plans for construction of the Fisheries Investigation vessel, to Victoria to advise the Government on a site for a fish culture station and advised local councils on matters of river health and suitability. He travelled the State investigating and advising on inland fish and fisheries. David Stead, the Department's Naturalist, published and lectured widely, enhancing the Department's reputation at home and abroad.²⁸

Dannevig's fame was such that in July 1908 he was appointed by the Commonwealth Government as Director of Fisheries for Australia, his main purpose to be the investigation of the deep-sea fisheries off the Australian coast. His departmental car was sold (for £35)

as there was no further use for it, his position as Superintendent of Fisheries Investigations and Fish Hatcheries being left vacant. The Fisheries Board was distracted by such issues as the Fish Markets Inquiry, a proposal to establish a Government aquarium at Manly and the 'unsuitable and inconvenient' accommodation in which they were compelled to hold their meetings.

But with the departure of Dannevig, gloom seems to have settled on the Hatchery. No flounder importations were made in 1908 and the only work carried out was some crayfish hatching. The varieties indigenous to the State's coastline would not spawn in the ponds, except for a few whiting. During the year only one and a half million fry were hatched, a small number of which were preserved as specimens and the remainder liberated in Port Hacking. Observation and recording of the species occupied the staff, with visitors to the site becoming increasingly important - over 600 visitors were recorded as visiting the site in 1908. While propagation activities were stagnant, the hatchery was by no means neglected - minor improvements and repairs took place - the roof of the spawning pond at the Hatchery was strengthened by the erection of concrete pillars along the centre of the pond, a new stone path was formed from the hatchery to the boatshed and new skids for the boats were laid down.²⁹

The 1909 season was more productive following a further importation of Tasmanian stock, with some 7,000,000 fish and 4,000,000 crayfish being liberated - but still a far cry from the initial projected figure of 100,000,000 (see above). More worrying was the fact that there was no evidence that the large quantities of flounder fry previously liberated were surviving, although the Board pointed out that no systematic search with suitable equipment had been made.

The Board was clearly concerned about the hatchery's viability and recommended to the Government that 'the Establishment be carried on as a Marine Biological Station...giv[ing] special attention to the investigation of the early history of our fishes and crustacea rather than to the hatching solely of sea fishes.' However the Government did 'not consider...[it] opportune to carry out the suggested alterations.'

Gunnamatta Keeper, Frederick Aldrich, increasingly spent his time involved with the development of inland fishery activities, particularly in the Jenolan Caves area. A wire-netting enclosure had been erected at the Maianbar Fishery which continued to operate using methods which allowed the flounder to 'deposit their spawn in a natural way' in Cabbage Tree Basin.³⁰ Over time Gunnamatta Hatchery began to release its' Tasmanian flounder fry into Cabbage Bay Basin as well as the open waters.

A new initiative was to make facilities at Gunnamatta available to the students of Sydney University to carry out biological work during September and the launch and gear were placed at their disposal. This continued for a number of years with useful research being supervised by Professor Anderson Stuart of the University and his assistant, Mr Kesteven but 'only a limited number [of students] availed themselves of the privilege.'³¹

The Gunnamatta Hatchery was not a happy working environment at this point. David Stead, who had carried out the duties of Naturalist since the Hatchery's inception had anticipated (it is not clear with what encouragement from Dannevig) to succeed the latter as Superintendent of Fisheries Investigations & Fish Hatcheries. He apparently carried out these duties for some time but when the Board were refused to formalise his position he began a deluge of at times acrimonious correspondence with the Board members and others to expedite a decision. He also appears to have felt threatened by Frederick Aldrich, the Keeper of the Hatchery, whom Stead believed undermined his authority at the Hatchery.³² To be fair the Board had its own preoccupations with new far-reaching legislation regarding fisheries administration being prepared and a cloud hanging over their own personal prospects.

With less than spectacular results being obtained in the fish nursery activities at Gunnamatta, new avenues were obviously indicated, and here Stead was forthcoming. He was clearly the instigator of the unsuccessful suggestion [4.1.37 above] that the site be converted to a Marine Biological Station where the only hatching operations would be simply a means of pursuing marine biology. To this end he submitted a report detailing how alterations could easily be carried out to the main hatchery building to convert it into an aquarium. Stead believed the hatchery operations were superfluous because of 'our great fish-fauna, so rich in both species and individuals.'³³

Advice from various sources was given to the Chief Secretary as to possible means of improving the viability of Gunnamatta, increasingly centred on attracting the public for educational and recreational visits; this involved extending the number of visiting days and additional assistance to the Keeper was suggested. It is not clear whether this advice was accepted.

Controversy enveloped the hatchery at this vulnerable period : in response to an earlier letter suggesting the Government find more funds for the hatchery, an anonymous letter to the editor of the *Sydney Morning Herald* on January 7, 1910. 'M' was highly critical of the methods used at the hatchery, pointing out that because there was no 'nursery' for the flounder fry, they were liberated at the three day old stage into local waters - a practice, it was claimed, 'on a par with putting three-day-old chickens into a ferret coop'. The practice was obviously unsuccessful, 'M' rightly claimed, as despite the millions of fry liberated no effect could be determined on local fish stocks. And as to the scientific study of local fish located in the unsuitable conditions 'in the dug-out pond', it was ludicrous to believe that a fish would 'exhibit...to the student as he was meant to his natural habits'.

The Chairman of the Fisheries Board, Frank Farnell, was of the opinion that the Board should not respond to anonymous criticism 'unless the gentleman came from behind the hedge' and ordered a report prepared detailing the activities of the hatchery for the Chief Secretary. The Board itself however appears not to have supported him and he prepared a note (it is not clear that this was published or circulated) which stated that he had not been involved with the foundation of the establishment, that he was opposed to its continuance purely as a sea-fish hatchery which he considered to be unnecessary and

that the Board had recommended to the Minister some time ago that the establishment should be converted into a marine station.³⁴

4.1.7 Fisheries (Amendment) Act, 1910

There was clearly Government and public dissatisfaction with the management of the Fisheries Board and this event could not have improved its reputation. New legislation amended the 1902 Act by establishing the principle of Ministerial administration and the former Board of Fisheries became the Fisheries Branch of the Chief Secretary's Department.

The amended Act 'contemplated' the appointment of a Chief Inspector of Fisheries and an Advisory Board consisting of no more than five persons to advise the Minister, who was charged with the control and regulation of the sale of fish and oysters, whether produced in the State or imported. The Amendment was not implemented until early in 1911, when it was 'not deemed necessary to...appoint...an Advisory Board as experience has shown that such a board is not so far necessary.' The staff moved from Richmond Terrace to the Chief Secretary's Department³⁵.

The legislation appears to have had little effect on the hatchery operations, which continued to stagnate especially after the Keeper, Frederick Aldrich, resigned to take up the Chief Inspectorship of Fisheries in Western Australia. The long overdue appointment of a permanent replacement for Dannevig (who had resigned in 1908) eventuated in a separation of his former duties; J B Grane was appointed to the practical aspects as Supervising Inspector of Fisheries and D G Stead to the scientific as Superintendent of Fishery Investigation.

Hatchery work continued to be beset by problems; disease began to affect fish held in the spawning pond due to partial stagnation and imperfect oxygenation. In addition the pond was leaking and required re-concreting, which necessitated removal of the fish, so it was decided to let the matter stand over. The work of the hatchery was being further impeded by the influx of visitors, who reportedly interfered with the fish requiring the spawning pond to be enclosed by a wire-netting structure.³⁶

During 1911 Stead was given permission to embark upon an experiment in curing and pickling fish caught at Port Hacking, adapting existing facilities at a small cost; the aim was to provide fishermen with expertise in these activities, using indigenous plants ('honeysuckle banksia' and eucalypts) as fuel for smoking. A small smoke-house already existed at the Inspector's house at Port Hacking and was removed to Gunnamatta. One side of the boat-shed was used as a drying room for suspended fish, which were arranged so as not to interfere with boat launching. Splitting was done in the net-room and a small empty area in the NE corner of the hatchery building was used for final arrangement and storage. Large quantities of product were not expected but a number of firms had expressed interest in purchasing them. J J Mair, who had experience in curing fish in Scotland was employed to take charge of this activity.³⁷

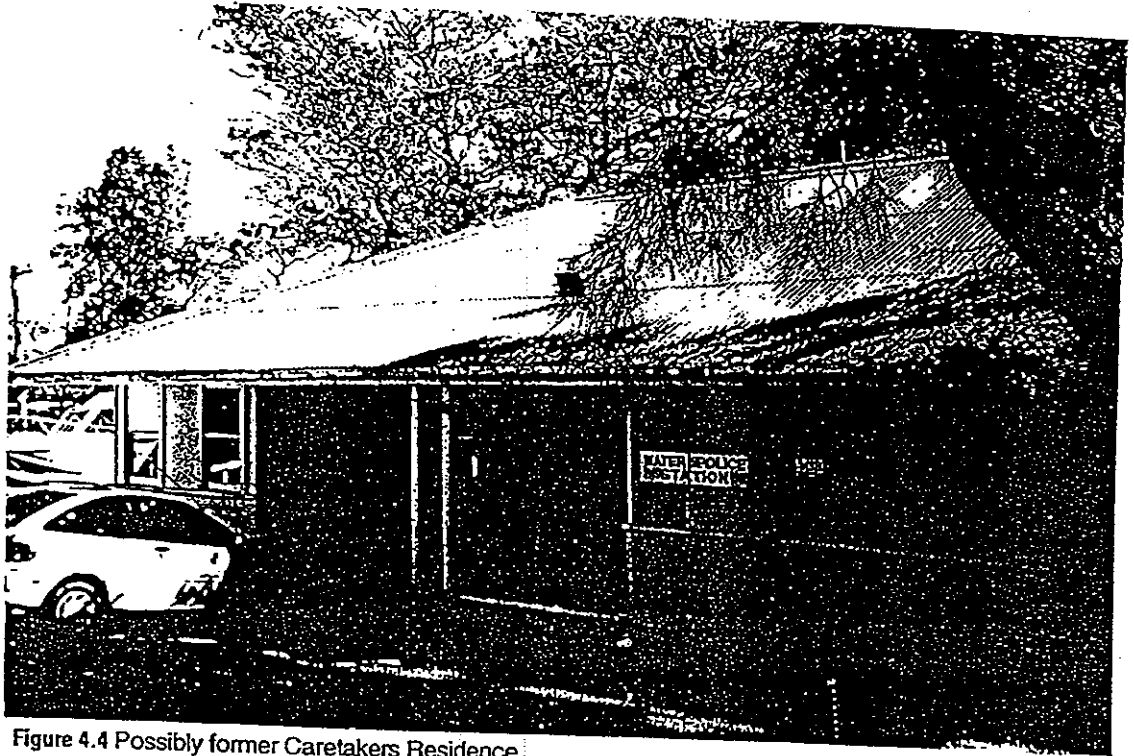


Figure 4.4 Possibly former Caretakers Residence

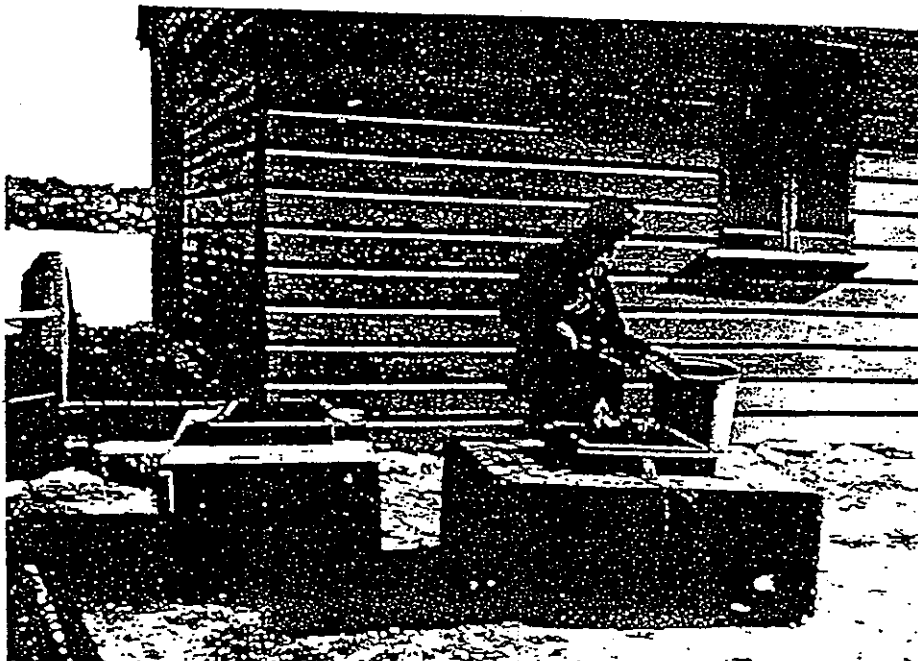


Figure 4.5 "Transferring fish from portable tanks" (undated photo in CSIRO at sea, p12). Note Boat Shed in background.

Within weeks, controversy had erupted in the press; local residents were incensed on a number of points: the downgrading of the scientific activities at the hatchery, the visual impact, not to mention the odour, of fish-curing on the site, the netting of fish in the closed waters of Port Hacking and the 'practical shutting off of the...one of the finest spots on the river...from the public.'³⁸

In a letter of explanation to the Under Secretary, Stead expressed the view held by both he and the local Inspector of Fisheries that the criticism was emanating from a very influential movement in Cronulla which sought the practical handing over of the hatchery area to the public for a pleasure resort. Stead had previously complained of the intrusion at all hours of holiday-makers and picnickers, when visitation was again restricted to two afternoons per week and only on the possession of an order from the Chief Secretary. As a result of the public outcry, the curing experiment was discontinued and the assistant Mair, was eventually dispensed with.³⁹

Calm descended on Gunnamatta Bay until February 1914 when during unusually muggy and thunderous weather a large number of fish at Gunnamatta died. Water samples revealed very low oxygen levels which, combined with the weather conditions, resulted in vast quantities of micro organisms which killed all the fish except the sea mullet and crayfish.

In response to this event former Chairman of the Board of Fisheries Frank Farnell wrote a long explanatory letter to the press, claiming that the original concept (which, he emphasised, had been worked by political influence and with which he had not been involved) of acclimatising English fish was mistaken. This situation was exacerbated by the Government's refusal to fund the construction of a nursery pond to allow reasonable growth of the fry before liberation. Farnell reiterated strongly that he did not want to see the hatchery closed but wished to see the continuation of hatching suitable fresh-water species and indigenous fish such as Murray cod.⁴⁰

4.1.8 Temporary' Closure

Farnell may not have intended to hasten the Gunnamatta Hatchery by the publication of his letter and the resultant public discussion but that is what was achieved. Finally in July 1914 the decision was taken to close the hatchery 'temporarily' and the remaining sea mullet and crayfish in the spawning pond were netted and liberated into the waters of Port Hacking. A month before, David Stead had travelled to Europe to make enquiries into the fishing industry and to arrange for the initiation of the trawling industry into NSW, which was to provide a new direction for both Stead and the Fisheries Department.⁴¹

Despite the stated 'temporary' nature of the Gunnamatta closure, it began to appear increasingly permanent. Henry Aldrich, Fisheries Inspector at Port Hacking, was moved, with his family, to the hatchery in 1914, combining the activities of inspector and caretaker. The hatchery still received occasional visitors although no hatching was carried out.

Aldrich and his family remained at Gunnamatta until 1920 when he took charge of the Sydney fish markets.⁴²

In the intervening period little mention of Gunnamatta Hatchery is found in official records: a good deal of termite damage to the buildings was reported in 1917, necessitating repairs and renewals and treatment by 'the white-ant expert'. The following year complaints were received from a local resident that fisherman had established a camp at Gunnamatta Point within the Hatchery grounds and spread their nets out to dry on the Departmental boat skids. However the offenders moved on request and those operating at Salmon Haul were given permission to spread their nets on the wall and wharf at the boatshed.⁴³ After nearly fifteen tempestuous years, the Hatchery 'went with a whimper rather than a bang'. A report on the Port Hacking district in the *Annual Report for Fisheries* for 1917 serves as an depressing obituary:

'Tests were made...in the early part of...[1917], with a specially constructed net, to endeavour to ascertain whether the Tasmanian Flounder had become acclimatised in the waters of Port Hacking.

'The operations were carried out in Cabbage Tree Basin, Gunnamatta Bay, and various parts of the river. Several species of ground fish were captured, but no Flounder.

'About 44,000,000 fry of the Tasmanian Flounder were liberated in Port Hacking and other coastal waters between the years 1906 and 1910, and no evidence has been obtained of their acclimatisation in the waters of this coast. It may be that the fish found the local conditions unfavourable, and returned to the southern waters from which their parents came.'⁴⁴

4.2. Stage 2 - CSIR and CSIRO, C 1936 - 1984

4.2.1 1936-1939

There is a direct link between the work of Harald Dannevig (as NSW Superintendent of Fisheries Investigations and for the Australian Government on the Fisheries Investigation vessel *Endeavour*) and the establishment of the Council for Scientific and Industrial Research (CSIR). Following Dannevig's work and death, an Advisory Council of Science and Industry was established in 1916 by Prime Minister Billy Hughes, modelled on the Great Britain example. The Advisory Council became the Institute of Science and Industry and in 1926, the Council for Scientific and Industrial Research. The Council's brief included the initiation and conduct of research in connection with or for the promotion of primary and secondary industries, the training of research workers, the making of grants for pure research and the supervision of the testing of scientific apparatus and standardisation.⁴⁵

In 1926 H F Heath's *Recommendations for the Reconstitution of the Commonwealth Institute of Science and Industry* had promoted the establishment of a fisheries section and in July 1927 the National Fisheries Conference had urged the Commonwealth to set up an organisation for fisheries investigations; nothing however had eventuated. By the

mid 1930s there was a growing realisation that the problems which faced the fishing industry and the scientific investigation of indigenous varieties could best be solved by cooperation between the States (especially where they shared waterway boundaries) and a national approach supervised and funded by the Federal Government. Recognition at Federal level was apparent with the Cabinet decision of July 29, 1935 which resulted in CSIR assuming responsibility for the recently initiated fisheries investigations section originally established under the auspices of the Development Branch of the Prime Minister's Department.

Simultaneously the NSW Government determined to reinstitute scientific research in tandem with the enactment of new comprehensive fisheries legislation. It was careful however to avoid duplication of the work of other bodies such as the CSIR, Universities and Museums. G. L. Kestevan was appointed Scientific Investigating Officer to the State Fisheries organisation in March 1937 and an Advisory Council of various organisations with an interest in fisheries was established to advise the Minister. On the interstate front, a conference to discuss the position of inland fisheries was held in Melbourne in October, with particular reference to alleged depletion of supplies.⁴⁶

The CSIR's initial program of fisheries research comprised:

- (i) Exploration of fishing grounds by a specially designed vessel
- (ii) Experiments in canning...and the manufacture of fish by-products
- (iii) Tests for methods of curing and preserving fish, especially the more common varieties
- (iv) Marine biological investigations, including research into the life histories, distribution &c. of economically important fish.

The biggest hurdle was seen to be the dearth of appropriately trained and experienced staff to implement the program. After extensive enquiries overseas Dr Harold Thompson was appointed OIC of the Fisheries Investigations Section but not before some administrative complications. Thompson, the British Government Fisheries expert in Newfoundland had accepted the post for five years at a salary of £1,000 per annum and was aghast when he found that the salary offered was in pounds Australian rather than pounds sterling. A compromise of an immediate rise of £250 was negotiated. A local candidate, Captain Flett, was appointed master of the Council's fisheries investigations vessel.⁴⁷

To combat the lack of local expertise two Australian graduates were sent overseas for two years' postgraduate training in scientific fish preservation and marine biology, financed by the Science and Industry Endowment Fund. Over the next three years a marine biologist (Professor W J Dakin), a hydrologist, a bacteriologist (E J Fergusson Wood) and a graduate technical assistant were appointed and aerial reconnaissance was begun by Stanley Fowler in a seagull amphibian off NSW, Victoria and Tasmania.

Plans for a research vessel, the *FVR Warreen* (Aboriginal for 'the sea') were begun at Cockatoo Island Shipyard, the building of which was carried out by the Melbourne Harbour

Trust in 1936/37. The first cruise left Melbourne in May 1938. The Council's mandate to carry out fish preservation investigations was set in motion by the planning of laboratories and experimental cold chambers in Sydney and a skilled fish curer was sought to determine the most suitable fish varieties.⁴⁸ An enormous vitality and enthusiasm is evident in official documentation of the period, and coupled with previously undreamt of levels of funding, enormous progress was made in the establishment of national fisheries investigations.

This led to the re-birth and devitalisation of Gunnamatta Bay Hatchery, apparently idle since 1920. Thompson, the newly appointed OIC of Fisheries Investigations, first chose a site for the new laboratory at Portsea in Victoria but soon realised its unsuitability. In August 1937 he recommended the old Port Hacking site, which the Minister subsequently approved; the Minister further suggested that Dannevig's old buildings could still be used, a decision which David Tranter believes resulted in 'the section [being] saddled with those derelicts for the next 40 years'.⁴⁹ The site was transferred to the Commonwealth the following year, with provisions made to also house the NSW Fish Biology Branch and occasional use by students of The University of Sydney. The Fisheries Section moved from Melbourne in April 1938 and planning began for additional buildings and renovations at the site; the newly-erected biological laboratory was occupied during the last week of June, 1939. Restoration works cost £167/10/- and the main building £15,000.⁵⁰

The CSIR Annual Report for 1938-39 gives a bird's-eye view of the site at the time of occupancy and an indication of the work being carried on:

The [biological laboratory] building contains offices and a strong room, one bacteriological and one chemical laboratory (with common preparation room), five biological laboratories, a dark room, a balance room, a library, a stock room, and a draughting room. Several storage rooms and a workshop are also included in the new works. The pre-existing (hatchery) works have been re-conditioned and adapted. They include a centrifugal pump with pipe-line to a 25,000-gallon concrete sea-water reservoir, from which there is a gravity feed to the former hatchery buildings, which have been converted to contain two biological laboratories, a projector room, and a large main experimental aquarium. The latter is supplied with ordinary sea-water under pressure, and conditioned (heated or chilled) sea-water is also available for experimental work. Extra working space is also available in this room, which is fitted in addition with three thermostatically controlled refrigerating chambers (two maintained at zero and one at 30° F.), and a small canning plant. A small commercial-type smokehouse and a net-storage and fish-processing shed have been built on the foreshore, while a small jetty has been constructed from the end of which certain experimental work can be carried out. The large concrete tidal pond (100 feet x 42 feet) will be re-conditioned during the coming year. For estuarial surveys, a 16-vet. 3½ h.p. skiff has been constructed, and, for field work, a 2-ton Bedford mobile unit has been acquired and fitted with the necessary apparatus.'

⁵¹

4.2.2. The War Years 1939-1945

The effects of the onset of World War II were slow to impact on the CSIR. Initially Harold Thompson argued against any change in the section's program, but as the reality of the war began to impact on Australia, the Fisheries Investigations Sections prepared to meet the challenge of substantially reduced if not total withdrawn of overseas food supplies. Appropriate changes were made in the direction in their research: food preservation -

canning and smoking - and fish liver oil production gained a higher profile, at the expense of bacteriological research, and the possibility of achieving the production of agar (a seaweed by-product used commercially and pathologically) was investigated. In an effort to solve problems of winter mortality of oysters and ensure a continuous food supply, the NSW Fisheries Department provided funds for the appointment of an additional officer to the CSIR Fisheries Investigations Section. The *Warreen* was commandeered by the Navy in July 1942; this action, together with the redirection of the section's activities led to a degree of dissatisfaction amongst the staff despite their commitment to the war effort. This was unfortunate as much research of longterm value was achieved, notably in improving standards of canning tuna and other fish (in conjunction with the CSIR's Division of Food Preservation) and experimenting with various net fishing techniques.⁵²

4.2.3 Post War Reconstruction and the CSIR

Immediately after peace was declared, the CSIR Executive split the fisheries division into scientific and exploration activities. No sooner was this implemented than the Government adopted an idea floated during the war that, a separate fisheries authority be set up within the Department of Commerce to control and develop fisheries. Over time this authority (later the Fisheries Department of Primary Industry) took over these elements of CSIR's activities leaving the CSIR to continue its scientific research on fisheries as had originally been intended. The *Warreen* returned to service after Naval secondment, joined by a second research vessel, the wooden ketch *Taipan*, allowing the resumption of exploratory cruises.⁵³

4.2.4 Post War Expansion

The immediate post war years were times of expansion and growth for the CSIR's Fisheries Section; improvements and additions were made to the laboratory at Cronulla in 1947; branch laboratories in Melbourne, Perth and Hobart came into operation followed by marine stations at Dunwich (completed 1949) and Thursday Island (1948), the latter for pearlshell research. In addition to the laboratory additions, two wooden hostel buildings were constructed (currently the Tuna Building and the Scientific Staff Offices) located north and northwest of the Administration Building. Their initial purpose was reputedly as hostel accommodation for post World War II migrants being trained in fishing techniques but they appear to have been first used for the first technical training school for the fishing industry under the Commonwealth Reconstruction Training Scheme in January 1947. These buildings were later used to house scientific offices and, with the addition of a large radio mast, the radio operations room which maintained contact with research vessels and buoys.⁵⁴

4.2.5 CSIR Becomes CSIRO

The Commonwealth Scientific and Industrial Research Organisation (CSIRO) was established on 19th May 1949 with the proclamation of the Science and Industry Research Act 1949, replacing the former Council for Scientific and Industrial Research

(CSIR). The powers and functions of the new organisation differed little from its predecessor, however there was a major change in administrative responsibility - CSIRO's governing body became an Executive of five persons rather than a large Council, although an Advisory Council remained. The Executive was headed by Dr I Clunies Ross as Chairman, following the retirement of the former CEO of 20 years' service, Dr David Rivett.⁵⁵

Over the next few years the main changes were the transfer of the work on fish preservation to the Division of Food Preservation and Transport in 1951 and the intensification of whaling investigations with a view to the development of an Australian industry in 1952. Experiments were begun at Maianbar, Moreton Island Lagoon (near Dunwich Research Station) and Lake Dobson (Tasmania) for the guidance of future large-scale experiments in estuarine fish farming. With regard to this experiment, a dyke at Maianbar was constructed, with gates to be placed in position after an ecological and hydrological survey of the area in its enclosed state had been completed.⁵⁶ It is not clear how long these experiments continued.

Without extensive research in the archives of CSIRO, information regarding Cronulla/Gunnamatta during the following twenty five years is not easily accessible. The Division was renamed Fisheries and Oceanography in January 1956 and remained so under the Division split into two separate divisions in March 1981. From 1945 a large number of state, national and international conferences were held at Cronulla in addition to training schools, meetings and workshops (see Chronology below). A Marine Biochemistry unit was established in April 1971 and an Estuarine Ecology program in Port Hacking began in April 1974. In 1976 the new Fisheries Biology building was completed.

4.2.6 CSIRO moves on

A watershed for the CSIRO, NSW Fisheries and the old Cronulla site occurred in October 1981 with the Parliamentary approval of the construction of new Marine Laboratories for the CSIRO in Hobart. Although the CSIRO Fisheries and Oceanography facilities at Cronulla were transferred back to the NSW Government in March 1984 and the new Hobart laboratories were completed in September of that year, it was not until January 1985 that the CSIRO Cronulla laboratories formally ceased operation. The site was by then already occupied by the Division of Fisheries of the Department of Agriculture for the establishment of a Fisheries Research Institute.⁵⁷

4.3 Stage 3 - NSW Fisheries Research Institute, Cronulla 1984 to Present

4.3.1. Retrospective

Following the closure of the hatchery the Dept of Fisheries became disinterested in research and preoccupied with more pragmatic matters. The hoary question of who

should oversee the city and suburban fish markets and to what standard was eventually resolved cooperatively. Dannevig's and Stead's persistence was rewarded in 1915 with the purchase by the NSW Government of three steam trawlers from England to establish an otter trawl fishery based in Sydney. The NSW State Trawling Industry was established under Stead's management; this state-owned enterprise was in tandem with others such as State Brickworks, and opened a fish shop in Sydney. Due to mismanagement, Stead was dismissed but by the time the fleet was sold to private enterprise it numbered seven. However, state owned enterprises were deemed unsuccessful and the Fisheries Dept. concentrated on regulating the industry and supervising fish marketing.

A number of administrative changes had taken place since the Cronulla site left the management of the Fisheries Department of the Chief Secretary's Department of NSW. In 1935 the Fisheries and Oyster Farms Act had set out the powers and functions of the State Minister in relation to fisheries generally. A related event was the establishment of the NSW Fish Authority in December 1963 (renamed Fish Marketing Authority in 1970) to coordinate fish marketing throughout NSW. The Fisheries Department became NSW State Fisheries in 1975, to be almost immediately re-established as a separate Department under the Minister for Conservation and Director of Fisheries in May 1976, following the election of the Wran Government. Just prior to the re-occupation of the Cronulla site, NSW State Fisheries was abolished as a separate Government Department and became the Division of Fisheries of the Department of Agriculture.

4.3.2 Return to Cronulla

The return of the Cronulla facilities considerably strengthened the Department's fisheries' research capability. The research staff were quickly installed at the newly renamed Fisheries Institute Research, Cronulla (FRI) and facilities were considerably upgraded.⁵⁸

During 1986-87 a review of fisheries research recommended that more senior scientific officers be appointed to the policy and management area to relieve research staff at the Institute of some administrative duties. However only one additional position was created. A review was also conducted of the Department's Aquatic Reserves activities as a result of which this function was transferred from the Institute to the policy section of the Division of Fisheries. Discussions were also held with the National Parks and Wildlife Service and the Department of Lands officers to develop a more coordinated approach to aquatic reserve management.⁵⁹

A major research project conducted by the Institute following the election of the Liberal-National Coalition Government in March 1988 was the assessment of the Water Board Deep Ocean Outfall. This was a new application of the Institute's research skills and facilities initiated because the NSW Water Board proposed discharging treated sewage from Sydney into the ocean through outfalls located three kilometres offshore. Sewage was proposed to be pumped through a series of pipes and tunnels to dissipaters placed ten metres off the ocean floor. The Board commissioned the Institute to carry out pilot studies on the methodology as assessing and monitoring the impact of the outfalls on the habitat and aquatic fauna near the sites. As a result a four-year contract was entered into

between the Division and the Board to carry out offshore research. In addition freshwater research and development projects were carried out cooperatively with officers at Narrandera and Cronulla.⁶⁰

In 1989 independent consultants Peat Marwick Hungerford reviewed the Division of Fisheries and recommended a restructure of the Division. Recommendations affecting the Fisheries Research Institute at Cronulla resulted in the creation of the position of Deputy Director and the deletion of three positions of Senior Biologist. Marine fisheries research, exploration and resource assessment continued to be centred at Cronulla with the support of the Fisheries Research Vessel *Kapala*. As a result of these activities it was possible for the Institute to provide accurate statistics enabling an allowable catch of 3000 tons per licence to be introduced in 1988 - a most practical application of the Institute's work.⁶¹

The success of the consultant research and assessment for the Water Board prompted the adoption of more entrepreneurial research activities by the Fisheries Research Institute. The Annual Report of NSW Agriculture & Fisheries for 1989-90 detailed commissions from four outside organisations (Fishing Industries Research and Development Council, Department of Defence, State Pollution Control Commission and Water Board) completed by the Institute for a revenue of \$2.5 million. This represented over one third of NSW Fisheries total research budget. On a more philosophical level, recognition of the Institute's international reputation in fisheries research was acknowledged with the visit to the Fisheries Research Institute in February 1990 of Captain Jacques Cousteau. Staff engaged Cousteau in discussion of local research programs and an exchange of ideas on global marine issues including man's increasing pressure on the aquatic environment.⁶²

These events occurred against a turbulent background of political controversy, administrative confusion and abysmally low staff morale. The Government determined in September 1989 that the Head Office of Fisheries would relocate to Orange, a decision which met determined and vocal opposition from the outset. Despite formidable outlay on the proposed move, the decision was rescinded in June 1991, Fisheries was transferred from Department of Agriculture to the new Ministry of Natural Resources and the Head Office of the new Division, to be known as NSW Fisheries, was eventually established at St Leonards in Sydney.

In the interim NSW Fisheries staff who had vacated the Head Office premises in the McKell Building in July 1991 were accommodated at the FRI at Cronulla, most accommodated in Building 13, with the Director located in Building 1 - until August when these staff moved to St Leonards. Refurbished premises at Cronulla were subsequently occupied by the new Finance and Personnel Branches and in March 1992 the Government announced that the Sydney Fish Markets would be retained and that the Head Office of NSW Fisheries would be located there.⁶³

The FRI remains an integral part of NSW Fisheries, structurally, philosophically and physically. Over more than a century of change and development, NSW Fisheries and its forebears, while shedding much of the responsibility for management and regulation of the

industry, retains in its Corporate Goals the ideals which first led to the establishment of a fisheries industry regulatory and investigatory organisation:

1. Maximum Benefits From Use Of The Fisheries Resource
2. Appropriate Sharing Of The Fisheries Resources
3. Enhance Aquaculture Production
4. Community Ownership Of, And Responsibility For, Fisheries Resources
5. The Development And Support Of Our People And Organisation⁶⁴

4.4 Endnotes

¹ NSWLA - *ibid*, 1900, pp 7/8. At the time of writing this Report, there is severe public resistance across Australia to the consumption of oysters and fish generally as a result of contamination of oysters from Wallis Lakes.

² NSWLA - *ibid*, 1899, p 6

³ Peter Pownall, *Fisheries of Australia*, Farnham Surrey, 1979, p 14/15

⁴ *ibid*. Pownall records that 'the Plenty Hatchery is no longer used extensively as a trout hatchery, but is being retained as a place of historical interest. Still in existence there is one of the wooden troughs in which were hatched the first brown trout eggs to reach Tasmania [and Australia generally] alive.'

⁵ NSWLA - *Annual Report - Fisheries of the Colony, 1888*, pp 1/2

⁶ NSWLA - *Annual Report, ibid.*, 1895, p 6; *Brief Review of Trout Acclimatisation in NSW* in *ibid*, 1938, p 6

⁷ NSWLA - *Annual Report, ibid.*, 1898, pp 7/8

⁸ NSWLA - *Annual Report, ibid*, 1899, p 9

⁹ *ibid*

¹⁰ *ibid*, 1900, pp 4/7, 13, 35/36

¹¹ *ibid*, 1901, pp 1, 3/4

¹² *ibid*, 1902, pp 2/4

¹³ *Guide to Colonial Secretary/Chief Secretary's Papers, State Fisheries Branch, Administrative Summary, AONSW*

¹⁴ *Dept of Fisheries NSW Memo 2226, 5th August 1902, AONSW, Col. Sec Papers, State Fisheries, Misc. Subject Bundles, Gunnamatta Fish Hatchery 1909-10 (4/6635.1)*

¹⁵ *ibid*, Department of Fisheries Memo 2387

¹⁶ NSWLA - *Annual Report, ibid*, 1903, p 9

¹⁷ *Dept of Fisheries No 2387, 2492, Col Sec/Chief Sec, State Fisheries Misc Subject Bundles, Gunnamatta Fish Hatchery 1909-10 (AONSW 4/6635.1)*

¹⁸ *ibid*, Minute 636, Memo 3084, 789, 3519, 3112

¹⁹ *ibid*, Fisheries Inletter 3028

²⁰ NSWLA, *Fisheries Annual Report, ibid*, 1902, p 5

²¹ *Dept of Fisheries, NSW Copy Memo to Principal Under Secretary of Chief Secretary's Dept., 1st April 1903 (AONSW 4/6635.1)*

²² *ibid*, Memo from Chairman of Fisheries Board to Secretary ditto, October 10, 1903

²³ *ibid*, Dept of Fisheries Incoming Letter No 489, February 3, 1904

²⁴ *ibid*, Memo 4/2574 from Dannevig, September 19, 1904; File note confirming same, October 24, 1904

²⁵ *ibid*, Letter of Tender from C McCarthy, October 19, 1904; Memo to Fisheries Board from H C Dannevig, Superintendent of Fisheries, October 19, 1904

²⁶ NSWLA - *Annual Report, ibid*, 1905, pp 12, 20

²⁷ *ibid*, 1906, pp 9/10

²⁸ *ibid*, 1907, pp 2, 8, 10

²⁹ *ibid*, 1908, pp 1, 5, 7, 9, 57

³⁰ *ibid*, 1909, pp 8/9, 46

³¹ *Report On Gunnamatta Fish Hatchery by the Secretary to the Board of Fisheries, February 11, 1910, pp 3/4, AONSW 4/6635.1*

- ³² Memo from Secretary of Fisheries Board to the Under Secretary of the Chief Secretary's Department, December 21, 1910, and other correspondence on the matter at AONSW 4/6635.1
- ³³ Suggestions as to the future use of the hatchery buildings at Gunnamatta Bay, by David G. Stead, May 18, 1909 and subsequent correspondence, AONSW 4/6635.1
- ³⁴ Sydney Morning Herald, January 7, 1910; file notes and memos 118/169, AONSW 4/6635.1
- ³⁵ NSWLA, Annual Report, Fisheries, 1910, p1/2, 7; 1911, p1
- ³⁶ *ibid*, 1912, pp 1,3
- ³⁷ *ibid* 1912, p3; Memo 1581/382, Stead to Under Secretary, May 15, 1911; Memo 3315/423, Scheme of Work....by Stead, August 2, 1912, AONSW 4/6635.1
- ³⁸ Sydney Morning Herald, Letters to the Editor, 'Gunnamatta Hatchery - Fish-Curing Experiments', October 21, 1912; 'Gunnamatta Fish Hatchery', October 22, 1912
- ³⁹ Memo No 3315/423 re Fish-curing experiments...J a Brodie, October 22, 1912, with attached report by Stead AONSW 4/6635.1
- ⁴⁰ Sydney Morning Herald, February 20, 1914, 'The Port Hacking Fish Hatchery'
- ⁴¹ NSWLA, Annual Report, Fisheries, 1914, pp 2, 4
- ⁴² Vivienne Mawson et al, (eds) CSIRO at Sea (Globe Press, Melbourne, 1988, 'A Boy at the Hatchery' by Frank Aldrich, pp 7/11
- ⁴³ NSWLA, Annual Report *ibid*, 1917, p 1; 1918, p 4
- ⁴⁴ *ibid*, 1917, p 2
- ⁴⁵ Commonwealth of Australia, Council for Scientific and Industrial Research, 19th Annual Report, 1944/5, p 1
- ⁴⁶ NSWLA, Annual Report, *ibid*, January 1936 to June 1937, pp 9/10
- ⁴⁷ Mawson, *op cit*, pp 19/20
- ⁴⁸ *ibid*; Commonwealth of Australia, Tenth Annual Report for the CSIR for 1936, pp 74/75; *ibid*, 1937, pp 62/64; NSWLA, Annual Report, Fisheries, January 1936-June 1937, pp 9/10; Mawson, *op cit*, Chronology, pp 211/212
- ⁴⁹ David Tranter, 'Origins of the CSIR Fisheries Division', in Mawson, *op cit*, p 21
- ⁵⁰ *ibid*, p 21; NSW Fisheries Biennial Report of Fisheries Research 1989-1991, p 4
- ⁵¹ Commonwealth of Australia, Annual Report CSIR, *ibid*, 1938-39, p 71
- ⁵² *ibid*, 1940-41, pp 60/61
- ⁵³ Tranter, *op cit*, pp 22/26
- ⁵⁴ Mawson, *op cit*, Chronology; CSIRO Research Report 1981-84, p 92
- ⁵⁵ Commonwealth of Australia, CSIRO First Annual Report, 1949, p 1
- ⁵⁶ *ibid*, 1951, p 68; 1952, pp 71/74
- ⁵⁷ Mawson, *op cit*, Chronology
- ⁵⁸ Report of the Department of Agriculture for...1985, pp 24/25
- ⁵⁹ *ibid*, 1986-87, pp 78-79
- ⁶⁰ *ibid*, 1988, pp 91, 97
- ⁶¹ *ibid*, 1989, pp 49, 52, 55
- ⁶² *ibid*, 1989-90, pp 67/69
- ⁶³ NSW Agriculture & Fisheries Staff Bulletins re Fisheries Restructure, June 17, June 26, 1991; NSW Fisheries Staff Memo re Office of Fisheries, July 24, September 11, 1991; NSW Fisheries Annual Report 1991-1992, np
- ⁶⁴ NSW Fisheries Biennial Report of Fisheries Research 1992-1994 p 6

5.0 Personnel Who Influenced the Early Hatchery

5.1 Harald Kristian Dannevig (1871-1914)

Born near Arendal, Norway in 1871, Dannevig was born into a seafaring family. His father was a master mariner who had developed fish hatcheries and was regarded as the leading fisheries expert in Europe. Dannevig spent his childhood helping his father with his fisheries work in the hatcheries, netting and trawling. He studied at the University of Christiania (Oslo) but did not formally qualify.

Selected by the Fishery Board of Scotland in 1894 to supervise the completion of the Dunbar marine fish hatcheries, he later transferred to the Aberdeen marine station where he designed new plant and a tidal spawning pond and spent considerable time at sea trawling. He was appointed Superintendent of Fisheries Investigations and Fish Hatcheries in NSW and arrived in Sydney in August 1902.

He supervised what was claimed to be the most elaborate attempt to transport live fish ever made (mostly plaice) which were placed in landing ponds at Maianbar in Port Hacking. He chose the site of the new hatchery to be constructed at Hungry Point in Gunnamatta Bay and was soon working with Naturalist, D. G. Stead [q v] on both landbased and sea investigations.

His acclimatisation attempts were not successful but his work established recognition of the potential for fisheries research and regulation. He, with his colleague Stead, began the development of more scientific trawling and laid the basis for the ill-fated purchase of state trawlers by the NSW government.

After the breakdown of his relations with the chairman of the Board of Fisheries, Frank Farnell, he left the NSW government to become Commonwealth director of fisheries at a salary of £600 pa (reduced to £520 in 1911 for absence without leave and over-indulgence in alcohol). His main activity was centred on the investigation ship *Endeavour*, in which over the following six years he identified 6000 square miles (16000 square km) of trawlable fishing ground between Port Stephens and the south of Tasmania as well as fishing grounds in the Great Australian Bight. He published widely, convinced that Australia had rich resources which should be developed.

Dannevig was died when the *Endeavour* was lost with all hands after leaving Macquarie Island in December 1914. A shell from the Great Australian Bight and an island in the Glennie Group, off Wilson's Promontory were named after him, as was a large trawler commissioned in 1946 by the CSIR Marine Station at Cronulla.

[Adapted from S Murray-Smith, DANNEVIG, HARALD KRISTIAN in *Australian Dictionary of Biography* Vol.8, pp204/5]

5.2 David George Stead (1877-1957)

David Stead was born in St Leonards, Sydney in 1877 and grew up with a natural love of the sea and bush. He studied zoology at Sydney Technical College and joined the Linnean Society of NSW in 1898. After working as a compositor for some years, Stead was appointed a scientific assistant under Harald Dannevig [q v], but felt his lack of academic qualifications acutely all his life. He published a number of books and scientific articles and lectured widely.

After an unhappy period following Dannevig's move to the Commonwealth, when he anticipated being appointed to Dannevig's position, he was sent overseas in 1914-15 to investigate European and American fisheries for the government. From July 1915 to 1920 he was general manager of the State Trawlers Industrial Undertaking, which he had fostered and which satisfied his socialist leanings but he was dismissed because of public outcry over his controversial and costly management.

He went to Malaya in 1921 as fisheries inquiry commissioner and acting director of supplies to the British government. In 1925-26 he investigated various methods of rabbit eradication. An outspoken man with ideas before his time, he was an executive member of the State branch of the League of Nations Union and the foundation chairman of the International Peace Campaign. He was an effective popular scientific educator and advocate for conservation, not enthusiastically received in the 1920s and 1930s. In 1909 he helped found the Wild Life Preservation Society of Australia and presided over the Aquarium, Naturalists' and Geographical societies of NSW. He was involved with a wide range of naturalist associations and the Town Planning Association.

He was harshly depicted in the autobiographical work *The man who loved children*, written by his daughter Christina Stead, one of Australia's foremost literary icons. His son, David Darwin Stead, a prominent conservationist, was co-proposer of the declaration of a portion of North Sydney Harbour as an aquatic reserve in 1982.

[Adapted from G P Walsh, STEAD, DAVID GEORGE in *Australian Dictionary of Biography*, Vol. 12, pp 57/58]

6.0 Conclusion

Over the 135 years of European occupation and management of the Port Hacking Gunnamatta Bay site covered by this Study, technologies and levels of expertise have advanced to unimagined levels - from wooden exploratory vessels to aerial surveillance, modern craft and high technology monitoring equipment, computerisation, electronics and sophisticated chemistry laboratories. Yet the first Hatchery failed essentially because of insufficient funding to construct a nursery pond to nurture fish from the fry to sustainable size.

Other aspects of Fisheries' activities have a unexpected consistency and longevity. As pointed out, there is an amazing correlation between the aims of the early investigatory bodies and their modern day equivalents. Throughout the period there has been a consistent seeking of better knowledge of indigenous species and the education of the wider fishing community; the attainment of maximum benefit from the resource whilst ensuring its viability; the balancing of the needs and concerns of various sectors in the community - industry, scientific enquiry, public use and public health, environmental issues, economic constraint, political pragmatism.

Clearly the experience at both state and national level has proved that the separation of responsibility for management and regulation of the fishing industry from scientific investigation and development has resulted in the better management of all bodies concerned with fisheries activities, removing much of the tension between them and resulting in higher levels of cooperation between agencies.

Changes in the delegation of state and federal responsibilities - demonstrated at Cronulla by the pendulum swings between state and federal control - have had a dramatic effect on the conduct of fisheries research, the recognition of the need for appropriate state and/or federal management and supervision of aspects of the industry, and on the prospects and development of the industry as a whole. In addition the growing awareness over this century of need to invest more heavily in industry research and development, while never adequate for departmental needs, has nevertheless had an appreciable influence on the range of disciplines and facilities available. With philosophical roots in the 1860s, it is obvious that the work continues to be perceived as not only an appropriate activity of Government, but one which can only be effectively pursued by Government agencies.

Although the environmental movement has had a generally 'green and leafy' public image, it has greatly impacted upon fisheries across a wide range of issues, from endangered species to water quality and sewage outfalls - an interesting development from the early 1900s when the Board of Fisheries was quite complacent about the effect the level of sewerage in Sydney's coastal waters may have had upon the quality of fish supplies.

All these issues and events have impacted upon the old hatchery site at Cronulla to greater and lesser degrees over the period. Despite the occasional response that the old buildings are no longer appropriate for a modern scientific establishment, they serve as a

physical link in our group consciousness between the first stumbling attempts at scientific enquiry and the rescue of an precious endangered resource and the present level of sophisticated research which now takes place within the grounds.

Much has been achieved and much of that achievement has taken place within the confines of the old Gunnamatta Hatchery, the first marine investigation site in Australia.

Chronology of the Development of Fisheries in Australia

- 1865 NSW Fisheries Act, 1865 passed as a result of a public enquiry held into the loss of fish populations in the Sydney vicinity
- 1865 Dec: First Melbourne Fish Market opened on site of present Flinders Street Railway Station
- 1872 Sydney's first Fish Market opened in Forbes Street, Woolloomooloo
- 1881 NSW Commissioners of Fisheries appointed under Fisheries Act 1881
- 1902 May: Harald Kristian Dannevig appointed superintendent of NSW Fisheries Investigations
- 1904 Tender for £1371 for construction of a fish hatchery at Hungry Point, Cronulla accepted; construction begins
- 1903 Under the Fisheries Act, 1902 the NSW Commissioners of Fisheries were replaced by the Board of Fisheries
- 1908 July: Dannevig resigns from NSW Fisheries and appointed first Commonwealth Director of Fisheries Investigations
- 1911 Under the Fisheries Act, 1910 the Board was dissolved and the fisheries of NSW placed under ministerial control as Chief Secretary's Department - Fisheries Branch
- 1914 July: Cronulla hatchery 'temporarily' closed - fish stocks released
- 1915 NSW Government bought three steam trawlers from England to establish an otter trawl fishery based in Sydney
- 1915 A shop owned and run by the NSW State Trawling Industry opened in Sydney to sell fish - first fish shop in Australia to have airconditioning for displaying perishable goods
- 1917 July: Prof. WA Haswell (Zoology Dept., U/Syd.) proposes establishment of a marine biological station in Sydney
- 1923 NSW Government sold fleet of trawlers (now 7) to private enterprise. By 1928 increased to 17; 6.6 million kg fish. Because of overfishing, operation moved to area between Cape Everard & Flinders Is. for tiger flathead
- 1925 Factory ships introduced (initially for whaling)
- 1926 Jan: H F Heath's Recommendations for the Reconstitution of the Commonwealth Institute of Science and Industry include establishment of a Fisheries Section
- 1926 CSIR established by Act of Parliament
- 1927 Conference on Australian fisheries led to establishment of marine biological institution as part of CSIR
- 1929 July: National fisheries conference urges the Commonwealth government to set up an organisation for fisheries investigations

- 1933 Oct: Commonwealth Government allocates funds for fisheries investigations by the Development Branch. Four aspects: (i) procure survey vessel; (ii) experiments on fish-canning; (iii) curing and preserving fish; (iv) marketing fish
- 1935 Aug: Commonwealth fisheries investigations transferred to CSIR; Stanley Fowler seconded to CSIR; Prof. W J Dakin appointed marine biology adviser
- 1935 Fisheries and Oyster Farms Act, 1935 sets out the powers and functions of the State Minister in relation to fisheries generally
- 1936 Oct: First CSIR aerial survey of fish stocks made by Stanley Fowler in a seagull amphibian off NSW, Victoria, Tasmania
- 1937 Mar: Dr Harold Thompson takes up duties as OIC of CSIR Fisheries Investigation Section
- 1937 Aug: Thompson recommends Port Hacking site for the fisheries laboratory
- 1938 Mar: PM seeks acquisition of Cronulla from NSW Premier
- 1938 Apr: CSIR Fisheries Section transferred from Melbourne to the hatchery site in Cronulla - shares site with NSW Fish Biology Branch and research students from University of Sydney
- 1939 June: New Cronulla biological laboratory occupied
- 1940 May: CSIR Fisheries Investigation Section renamed Division of Fisheries; Chief : Harold Thompson
- 1941 Oct: First issue of *Fisheries Newsletter* (now *Australian Fisheries*) published at Cronulla
- 1943 May: West Australian branch of division established
- 1943 Autumn School in Oceanography organised
- 1943 Aug: Thompson appointed Controller of Fisheries during war period
- 1945 Aug: Third Marine Biology School held at Cronulla laboratories Sydney Fish Market taken over by NSW Government
- 1946 Oct: Commonwealth Fisheries Office established in Department of Commerce & Agriculture to co-ordinate fishing industry
- 1947 Jan: First technical training school for the fishing industry under the Commonwealth Reconstruction Training Scheme held in Cronulla; Hostels built to accommodate migrants to be trained in fisheries work
- 1947 Agreed that Commonwealth should supervise matters re extra- territorial waters; whaling, pearling, research & co-ordination between states. States maintained control of inshore fishing & fish inspection
- 1947 Proposal for marine stations at Dunwich and Thursday Island
- 1948 Thursday Island pearl shell research station established
- 1948 Stanley Fowler retires due to ill health

- 1949 Mar: Dunwich laboratory occupied
- 1949 May: CSIR reconstituted as CSIRO
- 1949 Control of Sydney Fish Market passes to Central Co-operative Trading Co.
- 1950 Apr: *Australian Journal of Marine and Freshwater Research* begins publication
- 1950 Apr: Division hosts the Second Indo-Pacific Fisheries Council
- 1953 Advisory Committee Review of Division of Fisheries
- 1954 Dec: Harold Thompson retires; Maurice Blackburn appointed Acting Chief
- 1956 Jan: George Frederick Humphrey appointed Chief
- 1956 Jan: Division renamed Division of Fisheries and Oceanography
- 1958 Division hosts Conference on the Oceanography of the Coral and Tasman Seas
- 1960 Geoffrey L Kesteven appointed Assistant Chief
- 1960 Division participates in International Indian Ocean Expedition (until 1965)
- 1961 George Humphrey, Head of Australian Delegation to Intergovernmental Oceanographic Commission (for 12 years)
- 1961 Jul: Humphrey elected President of Special (later Scientific) Committee on Oceanic Research
- 1961 Oct: First Fisheries Field Officers' School held at Cronulla
- 1962 Feb: Camberwell Laboratory (Melbourne) established
- 1962 Nov: Population Dynamics School held at Cronulla
- 1963 Tasmanian laboratory closed; Camberwell laboratory opened Dec NSW Fish Authority (renamed Fish Marketing Authority 1970) established to co-ordinate fish marketing throughout NSW
- 1964 Feb: Division hosts Symposium on the Seasonal Biological Cruises of Australia and France in the Indian Ocean
- 1964 Nov: Division conducts training course for FAO on mackerel and tuna research at Cronulla
- 1966 Feb: International Symposium on Hydrodynamics of Plankton Samplers held at Cronulla
- 1966 May 20: Marine Science School conducted at Cronulla
- 1967 Oct: Division hosts Australian/New Zealand Meeting on Decapod Crustacea
- 1969 Camberwell laboratory closed
- 1970 Feb: Kesteven, overseas since 1967, resigns as Asst. Chief to work for FAO NSW Fish Authority renamed Fish Marketing Authority
- 1971 Apr: George Humphrey retires as Chief

- 1971 Aug: David J Rochford appointed Acting Chief
- 1971 Apr: Marine Biochemistry unit established; OIC George Humphrey
- 1971/72 Deception Bay laboratory completed
- 1972 Aug: Kenneth Radway Allen appointed Chief
- 1973 Cabinet approves, in principle, construction of 220 ft ocean-going vessel for fisheries and oceanographic research
- 1973 Estuarine Group established; First Australian National Prawn Seminar
- 1974 Apr: Estuarine Ecology program in Port Hacking begins
- 1975 Jan: The administration of the Fisheries and Oyster Farms Act, 1935 was transferred from the Chief Secretary to the Minister for Lands and Forests
- 1976 May: NSW State Fisheries established as a separate Department under the Minister for Conservation and Director of Fisheries
- 1976 Fisheries Biology building at Cronulla completed
- 1976 CSIRO acquires new laboratory site at Karumba
- 1976 Dec: Western Australian Laboratory (Marmion) completed
- 1977 Jan: Physical Oceanography meeting at Cronulla
- 1977 Aug: K Radway Allen retired; David Rochford appointed Chief
- 1977 Sep: Northeast Regional Laboratory officially opened
- 1978 Feb: Workshop on Dynamics of the East Australian Current
- 1978 Feb: Bioassay Workshop
- 1978 Oct: Chlorophyll Methodology Workshop
- 1979 Feb: Acoustics Workshop
- 1979 Feb: Marine Algae Biology Workshop
- 1979 Aug: Physical Oceanography meeting in Cronulla
- 1980 Aug: David Rochford retires as Chief; Brian Stacey appointed Acting Chief
- 1981 Mar: Division of Fisheries and Oceanography split into two separate divisions
- 1981 Mar: Angus McEwan appointed Chief, Division of Oceanography
- 1981 Mar: Physical Oceanography meeting in Cronulla
- 1981 Aug: Phytoplankton Workshop
- 1981 Oct: Shirley Jeffrey appointed Acting Chief, Division of Fisheries Research
- 1981 Oct: Parliamentary approval given for construction of Marine Laboratories in Hobart
- 1981 Dec: First Fisheries Divisional Seminar at Cronulla

- 1984 Mar: Second Fisheries Division Seminar at Cronulla
- 1983 Mar: NSW State Fisheries abolished as a separate Government Department and became the Division of Fisheries of the Department of Agriculture
- 1984 Mar: CSIRO Fisheries and Oceanography facilities at Cronulla transferred to NSW Government, the site subsequently occupied by the Division of Fisheries of the Department of Agriculture for the establishment of a Fisheries Research Institute
- 1984 Sept: New laboratories in Hobart completed
- 1985 Jan: Cronulla laboratories formally cease operation - occupied by Fisheries Research Institute
- 1986-7 Review of Department of Fisheries research carried out - more senior scientific staff recommended for Cronulla Review of Department's Aquatic Reserves activities leads to transfer from FRI to Policy Section
- 1989 Independent review of Division of Fisheries recommends restructure - little effect on Cronulla Sept Decision to relocate Head Office of Fisheries to Orange
- 1991 June: Decision to relocate rescinded Fisheries transferred from Department of Agriculture to new Ministry of Natural Resources, Head Office established at St Leonards, Sydney July Head Office staff temporarily accommodated at Cronulla
- 1992 Mar: Announced that Sydney Fish Markets would be retained and Head Office of NSW Fisheries located there

SOURCE: Much of the above information has been extracted from the Chronology contained in Vivienne Mawson et al, CSIRO at Sea

REGISTER

NSW FISHERIES HERITAGE AND CONSERVATION REGISTER

HERITAGE REGISTER NO - F0001

NAME OF ITEM: Bushrangers Bay Aquatic Reserve

PROPOSED BY: South Coast Conservation Society

LOCATION: Eastern end of Bass Point, south of Shellharbour near Wollongong.
34°36'S, 150°54'E
(approx. midpoint)

DECLARED:

Govt Gazette of 14 May 1982

SIZE: Approximately 3 hectares

SIGNIFICANT FEATURES:

Littoral zone, submarine cliffs, sublittoral reefs with kelp forest. Diverse fauna including invertebrates and fishes. Nursery for juvenile fishes including expatriate tropical fish. Protected area for novice divers.

GENERAL CONSERVATION PLAN:

The taking or disturbance of any fish or marine life is prohibited. Non destructive activities, such as diving and photography, are permitted.

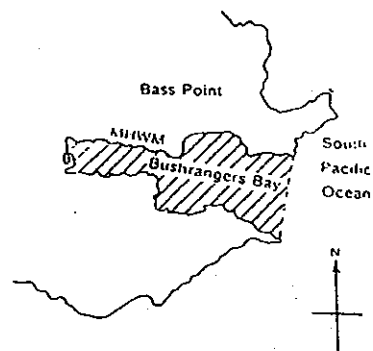
Known threatened species:

Eastern Blue Devil Fish
(*Paraplesiops bleekeri*)
Black Rock Cod
(*Epinephelus daemeli*)

Known threats to area:

Illegal line fishing and invertebrate collecting

BUSHRANGERS BAY



0 200 metres

 marine protected area

MHW=mean high water mark

NSW FISHERIES - LOCKED BAG 9 PYRMONT 2009. PH (02) 9566 7800

NSW FISHERIES HERITAGE AND CONSERVATION REGISTER

HERITAGE REGISTER NO - F0002

NAME OF ITEM: Fly Point - Halifax Park Aquatic Reserve

LOCATION: Towards the southern headland of Port Stephens, NSW
32°43'S, 152°09'E
(approx. midpoint)

DECLARED:

Govt Gazette of 28 Jan 1983

SIZE: Approximately 75 hectares

SIGNIFICANT FEATURES:

Natural features include rocky reefs, submarine cliffs and strong currents. Diverse species of invertebrates and fishes can be found, including juvenile expatriate tropical fishes. Popular spot for divers.

GENERAL CONSERVATION PLAN:

The taking or disturbance of any fish or marine life is prohibited, except as specified by Fisheries Regulations in a part of the area. Permitted activities include fishing by hook and line from the two jetties within the reserve and at Little Beach between them.

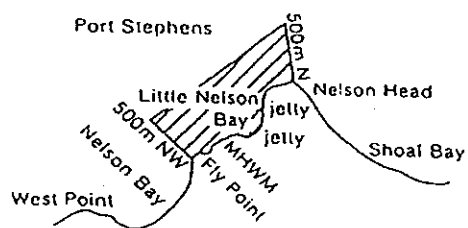
Known threatened species:

None identified, but reserve supports juveniles of various expatriate tropical fishes.

Known threats to area:

Illegal aquarium fish and invertebrate collecting; spearfishing of resident fish species

FLY POINT—HALIFAX PARK



0 1 kilometre

marine protected area

MHWM=mean high water mark

NSW FISHERIES - LOCKED BAG 9 PYRMONT 2009. PH (02) 9566 7800

NSW FISHERIES HERITAGE AND CONSERVATION REGISTER.

HERITAGE REGISTER NO - F0003

NAME OF ITEM: Julian Rocks Aquatic Reserve

PROPOSED BY: William Sylvester, Byron Bay

LOCATION: Offshore from the southern end of Byron Bay, NSW
28°36'S, 153°38'E
(approx. midpoint)

DECLARED:
Govt Gazette of 26 March 1982

SIZE: Approximately 80 hectares

SIGNIFICANT FEATURES:

The habitat consists of rocky reefs and sublittoral coral gardens and an underwater cave. Diverse fish fauna with both tropical and temperate species.

GENERAL CONSERVATION PLAN:

The taking or disturbance of any fish or marine life is prohibited except by methods specified in the Fisheries Regulations. Permitted activities include line fishing and non destructive pursuits.

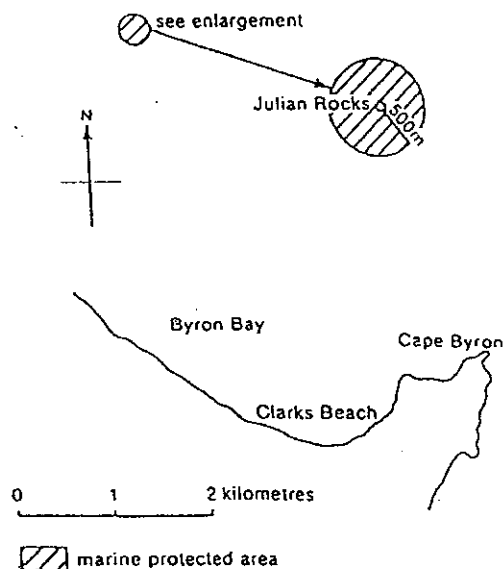
Known threatened species:

Black coral (*Antipatharia*),
Grey Nurse Shark
(*Carcharias taurus*),
Large gropers
(*Epinephelus* spp.)

Known threats to area:

Spearfishing; collection of coral and aquarium fish.

JULIAN ROCKS



NSW FISHERIES - LOCKED BAG 9 PYRMONT 2009. PH (02) 9566 7800

NSW FISHERIES HERITAGE AND CONSERVATION REGISTER

HERITAGE REGISTER NO - F0004

NAME OF ITEM: Long Reef Aquatic Reserve

PROPOSED BY: Isobel Bennett, University of Sydney

LOCATION: Adjacent to Long Reef Golf Course,
Dee Why, Sydney
33°45'S, 151°19'E
(approx. midpoint)

DECLARED:

Govt Gazette of 30 May 1980

SIZE: Approximately 60 hectares

SIGNIFICANT FEATURES:

Intertidal and subtidal rocky reefs with numerous tropical expatriate invertebrate species. Used extensively by school and university students as a marine ecology field study site. Severe depletion of invertebrate species by food gatherers.

GENERAL CONSERVATION PLAN:

The taking of any marine life is prohibited except by those methods specified in the Fisheries Regulations. Permitted activities include line and spearfishing, whilst collection of marine life for scientific and educational purposes is allowed under permit.

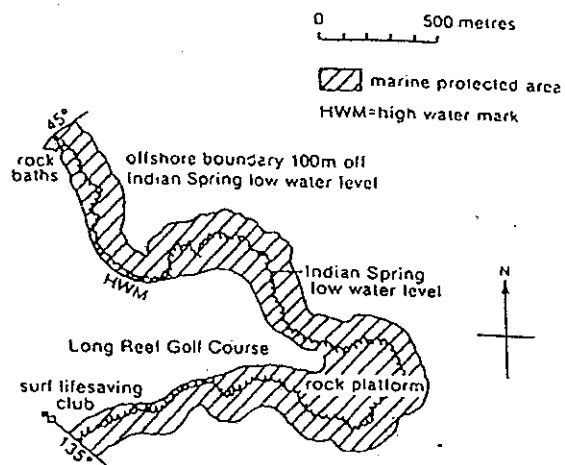
Known threatened species:

None specifically identified, although intertidal invertebrates have been greatly depleted in the past by over harvesting.

Known threats to area:

Collection of invertebrates for food and bait.

LONG REEF



NSW FISHERIES - LOCKED BAG 9 PYRMONT 2009. PH (02) 9566 7800

NSW FISHERIES HERITAGE AND CONSERVATION REGISTER

HERITAGE REGISTER NO - F0005

NAME OF ITEM: North Sydney Harbour Aquatic Reserve

PROPOSED BY: David Stead and Alan Stewart, State Member for Manly

LOCATION: Adjacent to northeastern suburbs of Sydney Harbour
33°49'S, 151°17'E
(approx. midpoint)

DECLARED:
Govt Gazette of 26 March 1982

SIZE: Approximately 250 hectares

SIGNIFICANT FEATURES:

Intertidal rocky shores and sublittoral rocky reefs adjacent to the natural foreshores of part of Sydney Harbour National Park

GENERAL CONSERVATION PLAN:

Some restrictions exist on fishing and the taking of marine life although most existing commercial and recreational fishing is still permitted.

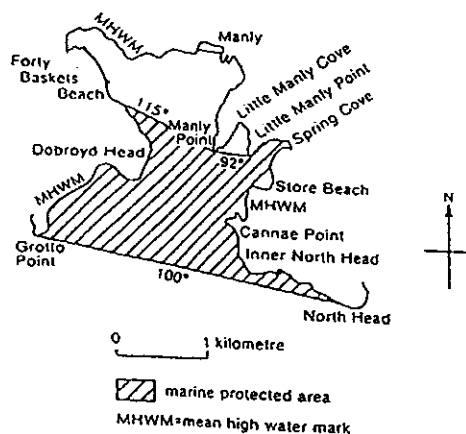
Known threatened species:

None specifically identified, although weedy sea dragons have been reported from this area.

Known threats to area:

Possible threats to water quality from surrounding urbanisation.

NORTH (SYDNEY) HARBOUR



NSW FISHERIES - LOCKED BAG 9, PYRMONT 2009. PH (02) 9566 7800

NSW FISHERIES HERITAGE AND CONSERVATION REGISTER

HERITAGE REGISTER NO - F0006

NAME OF ITEM: Shiprock Aquatic Reserve

LOCATION: Western side of Burraneer Bay off Little Turriel Pt, Pt Hacking, NSW
34°04'S, 151°08'E
(approx. midpoint)

DECLARED:

Govt Gazette of 26 March 1982

SIZE: Approximately 2 hectares

SIGNIFICANT FEATURES:

Submarine cliffs and pinnacles, strong currents. Diverse fish and invertebrate fauna including juvenile expatriate tropical fish.

GENERAL CONSERVATION PLAN:

The taking of all marine life is prohibited. Diving, underwater photography and other non destructive activities are permitted.

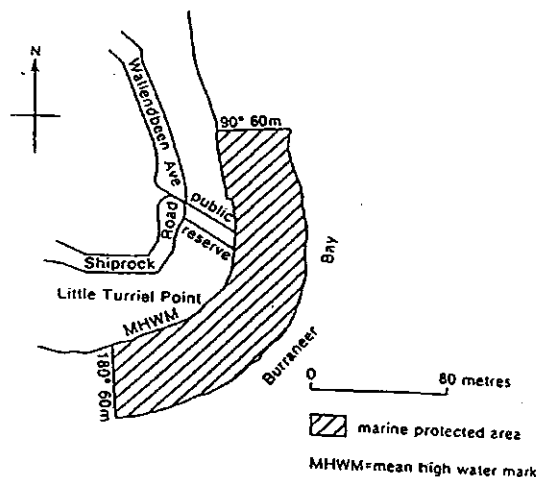
Known threatened Species:

Black rock cod
(*Epinephelus daemeli*)
Area also supports juveniles of various expatriate tropical fishes.

Known threats to area:

Surrounding residential development and illegal spearfishing and collecting.

SHIPROCK



NSW FISHERIES - LOCKED BAG 9, PYRMONT 2009. PH (02) 9566 7800

NSW FISHERIES HERITAGE AND CONSERVATION REGISTER

HERITAGE REGISTER NO - F0007

NAME OF ITEM: Towra Point Aquatic Reserve

PROPOSED BY: Allan Fox, NSW National Parks & Wildlife Service

LOCATION: Southern shores of Botany Bay covering areas known as Quibray Bay, Weeney Bay, Towra Point, Stinkpot Bay and Woollooware Bay

DECLARED:
Govt Gazette of 18 Sept 1992

SIZE: Approximately 333 hectares

SIGNIFICANT FEATURES:

Large areas of wetlands, seagrass meadows and mangrove forests provide fish nursery and feeding grounds, as well as an important feeding, roosting and nesting areas for water fowl and wading birds.

GENERAL CONSERVATION PLAN:

Split into two zones. The sanctuary zone prohibits the removal of or damage to all aquatic life. Sailing is permitted. The refuge zone allows recreational angling, commercial hauling, trapping, hoop nets and sailing, but prohibits commercial fish trawling.

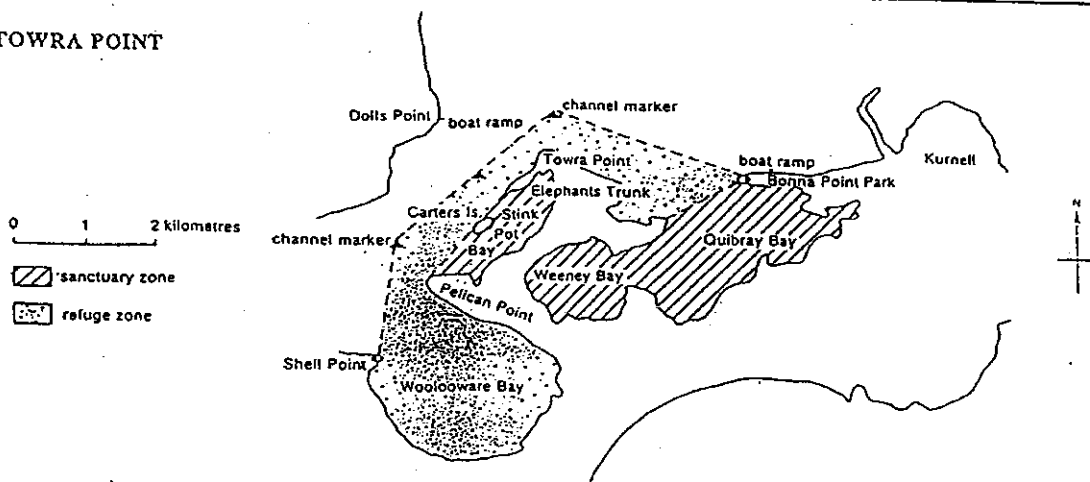
Known threatened species:

Little tern (bird)

Known threats to area:

Industrial, port and residential development in the surrounding area, and the concomitant risk of serious water pollution

TOWRA POINT



NSW FISHERIES - LOCKED BAG 9, PYRMONT 2009. PH (02) 9566 7800

NSW FISHERIES HERITAGE AND CONSERVATION REGISTER

HERITAGE REGISTER NO - F0008

NAME OF ITEM: Solitary Islands Marine Reserve

PROPOSED BY: Local diving interests including Harvey Lee and John Rotar (of the Solitary Islands Marine Conservation Association) and the University of New England Underwater Club.

LOCATION: Approximately 600km north of Sydney, between Coffs Harbour and the Sandon River and seawards to a depth of fifty metres.

DECLARED:
Govt Gazette of 11 May 1991

SIZE: Approximately 100,000 hectares

SIGNIFICANT FEATURES:

Productive estuaries, rock platforms, secluded beaches, spectacular headlands and offshore islands. Warm northern and cool southern currents create conditions for diverse marine life, including corals and dense aggregations of giant anemones and anemone fish.

GENERAL CONSERVATION PLAN:

Split into four zones. Sanctuary zones prohibit the removal of all natural resources. Refuge zones allow very limited taking of some marine life. Recreation zones allow primarily recreational use, and general use zones allow controlled commercial uses.

SOLITARY ISLANDS MARINE RESERVE ZONING SCHEME

ACTIVITY	GENERAL USE ZONE	RECREATION ZONE	REFUGE ZONE	SANCTUARY ZONE
RECREATIONAL				
- Line fishing	Yes	Yes	Yes	No
- Netting	Yes	Yes	No	No
- Trapping	Yes	Limited (C)	Limited (D)	No
- Spearfishing	Yes	Yes (*)	Limited (E)	No
- Collecting	Yes	Limited (B-C)	No	No
- Diving	Yes	Yes	Yes	Limited (A)
COMMERCIAL				
- Line fishing	Licensed	Licensed	Licensed	No
- Trawling	Licensed	No	No	No
- Trapping	Licensed	Limited (C)	Limited (D)	No
- Netting	Licensed	No	No	No
- Collecting	Limited (B-C)	Limited (B-C)	No	No
- Tourist Activity	Permit	Permit	Permit	Permit
COMPETITIONS				
- Line and spearfishing	Club Permit	Club Permit	Club Permit	No
COLLECTING FOR				
- Aquariums	Permit	Permit	No	No
- Group educational excursions	Permit	Permit	Permit	No
- Scientific Research	Permit	Permit	Permit	Permit

- A) No pre-certified diver training in Sanctuary Zones.
 B) For pipis, beach worms, rabbits, conjevoi, oysters, green sea lettuce, blackfish weed, crabs, sea urchins, prawns and dead objects only.
 C) Rock lobsters, crabs and abalone only.
 D) Rock lobsters in headland Refuge Zones only.
 E) Spanish mackerel, mullet, cubia, wahoo, rainbow runner, yellowtail kingfish, samson fish, amberjack, chinaman leatherjacket, sawtail surgeon, bream, tarwhine, tailor, diamond trevally, golden trevally, luderick, dusky flathead, red murwung, sweetlip.
 (*) No spear fishing in Corindi River Recreation Zone.

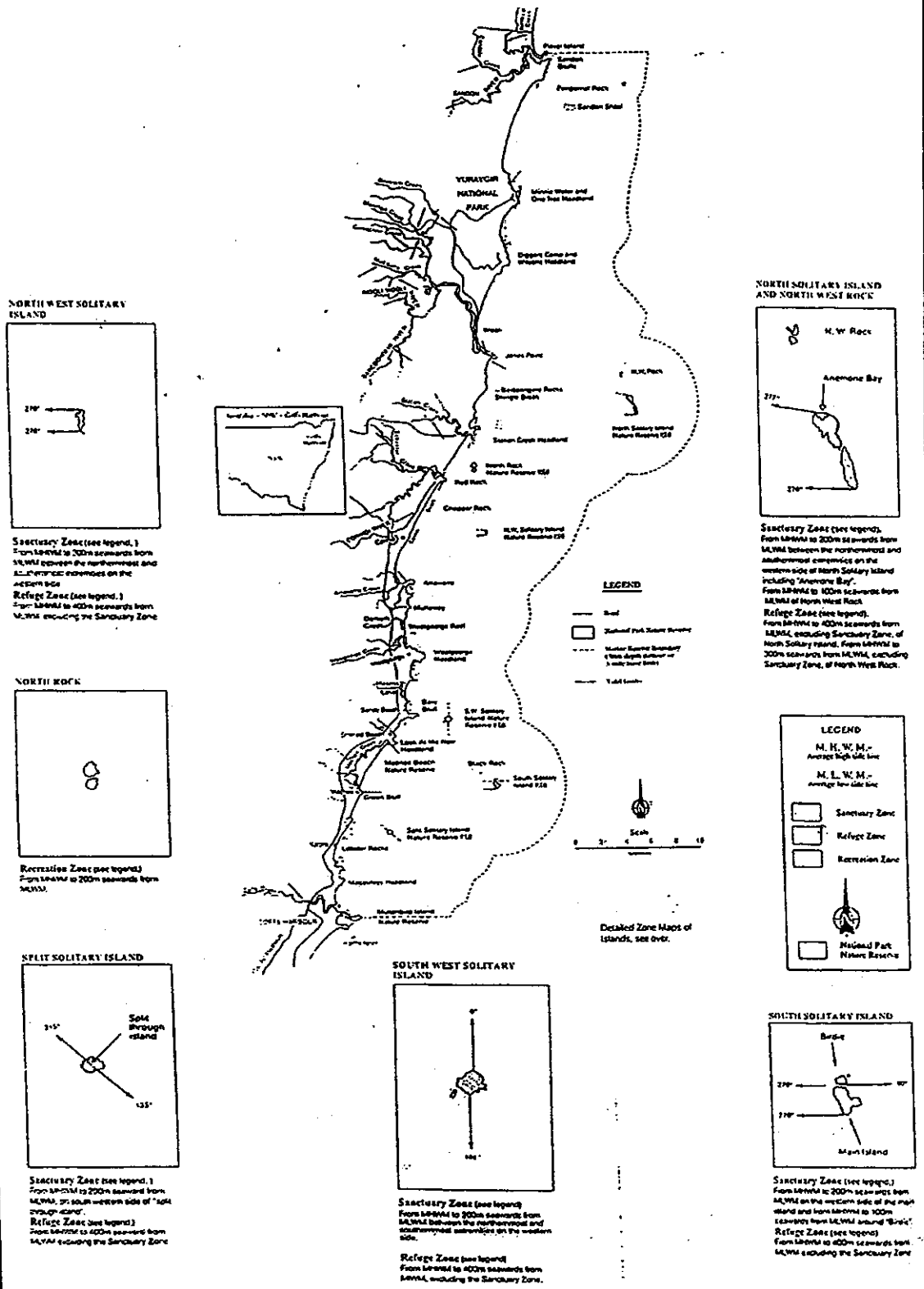
NOTE:

- (i) The use of anchors in Sanctuary zones is prohibited to protect fragile corals.
 (ii) These activities must comply with existing Fisheries regulations, e.g. restrictions on collecting and fishing at North Solitary Island; restrictions on trapping at North and South Solitary Islands; restrictions on spearfishing, netting and trapping in estuaries and bag and size limits applying to recreational fishers.
 (iii) All zones cover intertidal areas and most extend to 200m or 400m from the low tide line. A booklet detailing all zones of the Reserve is available from:-

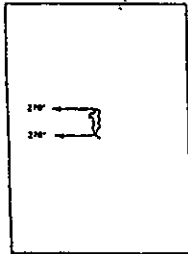
NSW FISHERIES - LOCKED BAG 9 PYRMONT 2009. PH (02) 9566 7800

NSW FISHERIES HERITAGE AND CONSERVATION REGISTER

SOLITARY ISLANDS MARINE RESERVE



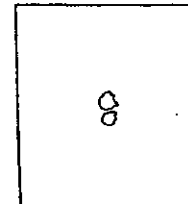
NORTH WEST SOLITARY ISLAND



Sanctuary Zone (see legend.)
From MLW to 200m seawards from MLW between the northward and southward peninsulas on the eastern side.

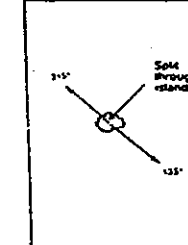
Refuge Zone (see legend.)
From MLW to 400m seawards from MLW enclosing the Sanctuary Zone.

NORTH ROCK



Recreation Zone (see legend.)
From MLW to 200m seawards from MLW.

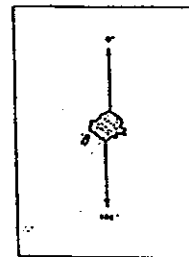
SPLIT SOLITARY ISLAND



Sanctuary Zone (see legend.)
From MLW to 200m seawards from MLW on the eastern side of the 'split through island'.

Refuge Zone (see legend.)
From MLW to 400m seawards from MLW enclosing the Sanctuary Zone.

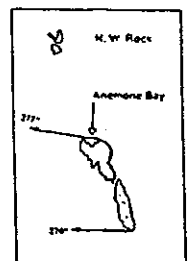
SOUTH WEST SOLITARY ISLAND



Sanctuary Zone (see legend.)
From MLW to 200m seawards from MLW between the northward and southward peninsulas on the western side.

Refuge Zone (see legend.)
From MLW to 400m seawards from MLW enclosing the Sanctuary Zone.

NORTH SOLITARY ISLAND AND NORTH WEST ROCK



Sanctuary Zone (see legend.)
From MLW to 200m seawards from MLW between the northward and southward peninsulas on the eastern side of North Solitary Island including 'Anemone Bay'.
From MLW to 100m seawards from MLW of North West Rock.

Refuge Zone (see legend.)
From MLW to 400m seawards from MLW, excluding Sanctuary Zone, of North Solitary Island. From MLW to 300m seawards from MLW, excluding Sanctuary Zone, of North West Rock.

LEGEND

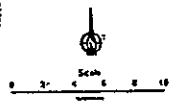
M, H, W, M - Average high tide line
M, L, W, M - Average low tide line

Sanctuary Zone
Refuge Zone
Recreation Zone

National Park Nature Reserve

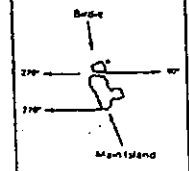
LEGEND

- Sand
- ▭ National Park Nature Reserve
- - - - National Reserve Boundary 400m depth contour or 3 mile limit line
- Tidal limits



Detailed Zone Maps of Islands, see over.

SOUTH SOLITARY ISLAND



Sanctuary Zone (see legend.)
From MLW to 200m seawards from MLW on the eastern side of the main island and from MLW to 100m seawards from MLW around 'Birds'.

Refuge Zone (see legend.)
From MLW to 400m seawards from MLW enclosing the Sanctuary Zone.

NSW FISHERIES HERITAGE AND CONSERVATION REGISTER

HERITAGE REGISTER NO - F0009

NAME OF ITEM: Aboriginal middens, three sites

LOCATION: Fisheries Research Centre complex,
Hungry Point, Port Hacking
202 Nicholson Parade, Cronulla
Sydney

REGISTERED:
Registered with the National
Parks & Wildlife Service,
January, 1996

DESCRIPTION OF MIDDEN DEPOSIT 1:

Australian Map Grid Coordinate... AMG 329080E 6228040N

Rockshelter with midden deposits which extend downslope for a distance of at least five metres below the shelter.

DESCRIPTION OF MIDDEN DEPOSIT 2:

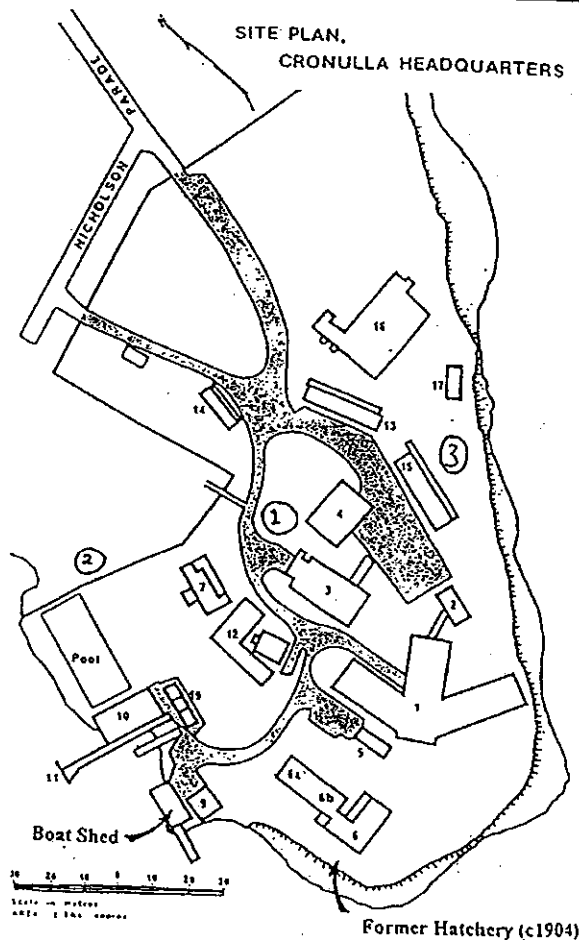
Australian Map Grid Coordinate
AMG 329010E 6228070N

Small area of midden down
near holding pens on western
side of complex.

DESCRIPTION OF MIDDEN DEPOSIT 3:

Australian Map Grid Coordinate
AMG 329100E 6227950N

Large area of midden along
the southeastern edge of the flat
area at the top of the complex
between building 15 and the
fuel store and beyond.



NSW FISHERIES - LOCKED BAG 9, PYRMONT 2009. PH (02) 9566 7800

NSW FISHERIES HERITAGE AND CONSERVATION REGISTER

HERITAGE REGISTER NO - F00010

NAME OF ITEM: Building no 6 - former hatchery building

LOCATION: Fisheries Research Centre complex,
Hungry Point, Port Hacking
202 Nicholson Parade, Cronulla
Sydney

SITE CONDITION

Minor alteration

Category: Research building

Boundary: 20 metre curtilage

DESCRIPTION:- (Setting/Size/Form/Roof/Walls/Features/Modifications)

An L-shaped face brick building with two wings, located on a flat (benched) area slightly above a boat shed and fish ponds at the western side of Hungry Point. Web-fired single skin brickwork walls with original single back piers and additional recent brick piers and buttresses to southern wing. New colourbond corrugated iron roof. Interior of northern wing adapted for office use; southern verandah of other wing infilled. Original features include door and window joinery.



Roll No:
96-101-1

Neg No:
7

Surveyor:
GA

Date of Survey:
May, 1996

see over

NSW FISHERIES HERITAGE AND CONSERVATION REGISTER

PRECINCT Former Hatchery Complex

SUBDIVISION

DATE OF CONSTRUCTION c1904

ARCHITECT/DESIGNER Not Known

STYLE Federation

BUILDER

PERIOD

HERITAGE LISTINGS

- | | |
|---|---|
| <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Register of the National Estate (AHC) - Register <input type="checkbox"/> Register of the National Estate (AHC) - Interim <input type="checkbox"/> Regional Environmental Plan Heritage Schedule <input checked="" type="checkbox"/> Local Environmental Plan Heritage Schedule <input type="checkbox"/> LEP Heritage Schedule - Conservation Area <input type="checkbox"/> Heritage Council Register - PCO <input type="checkbox"/> Heritage Council Register - ICO <input type="checkbox"/> Institute of Engineers (NSW) Heritage Register | <ul style="list-style-type: none"> <input type="checkbox"/> Heritage Council Register - s. 130 Orders <input type="checkbox"/> Government Department Heritage Register <input type="checkbox"/> Register of National Trust of Australia <input type="checkbox"/> Within National Trust Conservation Area <input type="checkbox"/> Register of Significant 20th Century Architecture (RAIA) <input type="checkbox"/> Art Deco Society <input type="checkbox"/> Other listings/ (please specify) |
|---|---|

- 1788 - 1840
- 1840 - 1890
- 1890 - 1915
- 1915 - 1940
- 1940 - 1960
- 1960 -

HISTORICAL NOTES

Fish hatchery established c1904. Building constructed prior to 1914, probably c1904-1907. Originally a laboratory wing (with open verandah on both sides) and a hatchery hall comprising a single open space containing fish tanks. Thought to be vacant c1920-1930. CSIR/CSIRO operations post-1938 in this building. Hall remained open until 1950.

OTHER INFORMATION SOURCES

Written: Report for NSW Fisheries by Godden Mackay, June 1996.

Oral: Former employees Clarrie Brown, R. Spinks, quoted *ibid*.

Graphic: Photo in F. Aldrich, "Boy at the Hatchery", in V. Mawson, et. al. (eds), CSIRO at Sea, CSIRO, 1988.

SIGNIFICANCE

Theme(s)	Statement															
<p>State Themes: Fishing, Science</p>	<p>The former Hatchery Building is part of the first marine fisheries investigation establishment in Australia and is associated with the work of the first Superintendent of NSW Fisheries, Harald Dannevig.</p>															
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 33%;"></th> <th style="width: 33%;">Representative</th> <th style="width: 33%;">Rare</th> </tr> </thead> <tbody> <tr> <td>Aesthetic</td> <td style="text-align: center;">L</td> <td></td> </tr> <tr> <td>Historic</td> <td></td> <td style="text-align: center;">S</td> </tr> <tr> <td>Scientific</td> <td></td> <td style="text-align: center;">S</td> </tr> <tr> <td>Social</td> <td></td> <td style="text-align: center;">L</td> </tr> </tbody> </table>		Representative	Rare	Aesthetic	L		Historic		S	Scientific		S	Social		L	
	Representative	Rare														
Aesthetic	L															
Historic		S														
Scientific		S														
Social		L														
<p>Level of Significance: S = State R = Regional L = Local</p>																

NSW FISHERIES - LOCKED BAG 9, PYRMONT 2009. PH (02) 9566 7800

NSW FISHERIES HERITAGE AND CONSERVATION REGISTER

HERITAGE REGISTER NO - F00011

NAME OF ITEM: Building no 9 - boat shed

<p>LOCATION: Fisheries Research Centre complex, Hungry Point, Port Hacking 202 Nicholson Parade, Cronulla Sydney</p>	<p>SITE CONDITION</p> <p>Minor alteration</p>
---	--

DESCRIPTION (Setting/Size/Form/Roof/Walls/Features/Modifications)

Weatherboard walls, corrugated asbestos gable roof. Located on eroded sea wall at edge of Port Hacking on western side of Hungry Point. Recent roller door on east side. Doors at west provide evidence of location of former wharf.



Roll No:
96-101-1

Neg No:
17

Surveyor:
GA

Date of Survey:
May, 1996

NSW FISHERIES HERITAGE AND CONSERVATION REGISTER

DATE OF CONSTRUCTION	ARCHITECT/DESIGNER	PERIOD
STYLE	BUILDER	1788 - 1840 <input type="checkbox"/>
HERITAGE LISTINGS <input type="checkbox"/> Register of the National Estate (AHC) - Register <input type="checkbox"/> Register of the National Estate (AHC) - Interim <input type="checkbox"/> Regional Environmental Plan Heritage Schedule <input checked="" type="checkbox"/> Local Environmental Plan Heritage Schedule <input type="checkbox"/> LEP Heritage Schedule - Conservation Area <input type="checkbox"/> Heritage Council Register - PCO <input type="checkbox"/> Heritage Council Register - ICO <input type="checkbox"/> Institute of Engineers (NSW) Heritage Register		1840 - 1890 <input type="checkbox"/>
<input type="checkbox"/> Heritage Council Register - s. 130 Orders <input type="checkbox"/> Government Department Heritage Register <input type="checkbox"/> Register of National Trust of Australia <input type="checkbox"/> Within National Trust Conservation Area <input type="checkbox"/> Register of Significant 20th Century Architecture (RAIA) <input type="checkbox"/> Art Deco Society <input type="checkbox"/> Other listings (please specify)		1890 - 1915 <input checked="" type="checkbox"/>
		1915 - 1940 <input type="checkbox"/>
		1940 - 1960 <input type="checkbox"/>
		1960 - <input type="checkbox"/>

HISTORICAL NOTES

Constructed between 1904 and 1914. Re-clad c1970s. Originally had wharf at western side. Engine room at east probably re-clad but original structure. Used to house boats used by fisheries inspectors in Hacking River.

OTHER INFORMATION SOURCES

Written: Report by Godden Mackay, June 1996; V. Mawson, et al. (eds), CSIRO at Sea, CSIRO, 1996.
 Oral: Mr R. Spinks, former employee.
 Graphic: Photo. in V. Mawson, et al. (eds), op. cit., p. 12.

SIGNIFICANCE		
Theme(s)	Statement	
State: Fishing, Science	The Boat Shed is evidence of the first marine fisheries investigation establishment in Australia and is associated with the work of the first Superintendent of NSW Fisheries, Harald Dannevig.	
	Representative	Rare
Aesthetic	L	
Historic		S
Scientific		S
Social		L
Level of Significance: S = State R = Regional L = Local		

NSW FISHERIES - LOCKED BAG 9, PYRMONT 2009. PH (02) 9566 7800

NSW FISHERIES HERITAGE AND CONSERVATION REGISTER

HERITAGE REGISTER NO - F00012

NAME OF ITEM: Fish Pond

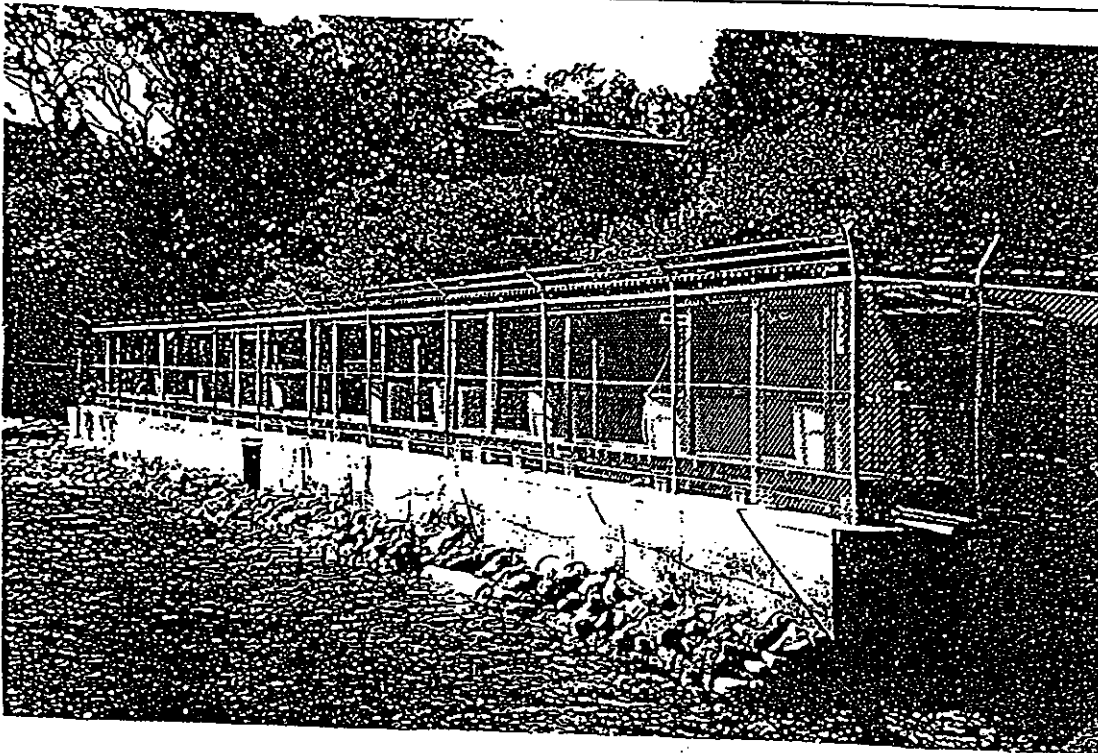
LOCATION: Fisheries Research Centre complex,
Hungry Point, Port Hacking
202 Nicholson Parade, Cronulla
Sydney

SITE CONDITION

Minor alteration

DESCRIPTION (Setting/Size/Form/Roof/Walls/Features/Modifications)

Concrete pool measuring 30 x 12 x 2 metres, featuring more recent concrete sea wall, mesh sunshades and filter units.



Roll No:
96-101-1

Neg No:
18

Surveyor:
GA

Date of Survey:
May, 1996

NSW FISHERIES HERITAGE AND CONSERVATION REGISTER

DATE OF CONSTRUCTION c1907

STYLE

ARCHITECT/DESIGNER

PERIOD

BUILDER

HERITAGE LISTINGS

- Register of the National Estate (AHC) - Register
- Register of the National Estate (AHC) - Interim
- Regional Environmental Plan Heritage Schedule
- Local Environmental Plan Heritage Schedule
- LEP Heritage Schedule - Conservation Area
- Heritage Council Register - PCO
- Heritage Council Register - ICO
- Institute of Engineers (NSW) Heritage Register

- Heritage Council Register - s. 130 Orders
- Government Department Heritage Register
- Register of National Trust of Australia
- Within National Trust Conservation Area
- Register of Significant 20th Century Architecture (RAIA)
- Art Deco Society
- Other listing/s (please specify)

- 1788 - 1840
- 1840 - 1890
- 1890 - 1915
- 1915 - 1940
- 1940 - 1960
- 1960 -

HISTORICAL NOTES

Constructed as part of the hatchery complex between 1904 and 1914. Complex established by Superintendent of Fisheries, Harald Dannevig.

OTHER INFORMATION SOURCES

Written: Report by Godden Mackay, June 1996; V. Mawson, et. al., (eds), CSIRO at Sea, CSIRO, 1988.

Oral: Other information held at Fisheries Library, Cronulla.

Graphic

SIGNIFICANCE

Theme(s)	Statement															
State: Fishing, Science	The Fish Pond is part of the first marine fisheries investigation establishment in Australia and is associated with the work of the first Superintendent of NSW Fisheries, Harald Dannevig.															
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th style="text-align: center;">Representative</th> <th style="text-align: center;">Rare</th> </tr> </thead> <tbody> <tr> <td>Aesthetic</td> <td></td> <td></td> </tr> <tr> <td>Historic</td> <td></td> <td></td> </tr> <tr> <td>Scientific</td> <td></td> <td></td> </tr> <tr> <td>Social</td> <td></td> <td></td> </tr> </tbody> </table>		Representative	Rare	Aesthetic			Historic			Scientific			Social			
	Representative	Rare														
Aesthetic																
Historic																
Scientific																
Social																
<p>Level of Significance: S = State R = Regional L = Local</p>																

NSW FISHERIES - LOCKED BAG 9, PYRMONT 2009. PH (02) 9566 7800

NSW FISHERIES HERITAGE AND CONSERVATION REGISTER

HERITAGE REGISTER NO - F0013

NAME OF ITEM: Fisheries Research Centre, Cronulla

LOCATION: Hungry Point, Port Hacking
202 Nicholson Parade, Cronulla
Sydney

DATE COMMENCED:
1904

AREA: Approximately 2.7 ha

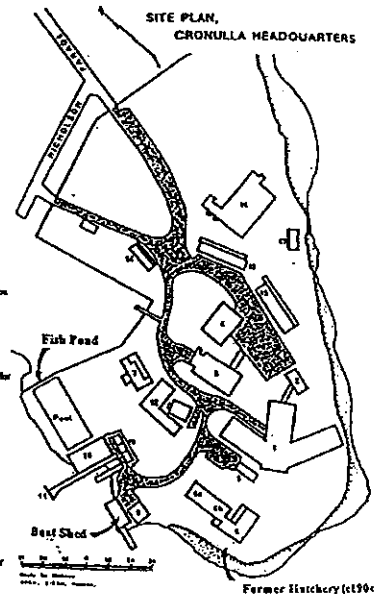
SIGNIFICANCE OF SITE:

The Fisheries Research Institute site as a whole is of national and state heritage significance because it is the first marine investigation establishment in Australia, commencing in 1904. It has had continual association with NSW and Commonwealth Government fisheries investigations since then.

The complex is associated with the work of the first Director of New South Wales and Commonwealth fisheries investigations, Harald Dannevig. Three original structures, the former hatchery, boat shed and concrete fish pond still exist on the site and are considered as a group to have State significance.



- SITE PLAN, CRONULLA HEADQUARTERS**
- 1 Administration (top floor);
CNS, same Scientific Staff
(lower floor)
 - 2 The "AR House" - chemistry lab -
named after Harry Jels
 - 3 Carpentry (top floor);
Receiving Dock/Storeroom;
Conference Room;
Offices (all lower floor)
 - 4 Workshop
 - 5 Carpenter's Workshop
 - 6 Aquaculture building - offices and labs
for Scientific Staff
 - 7 Drafting and Photography
 - 8a Engine Shed
 - 8b Boat Shed
 - 10 Waterfront Lab - offices and labs for
Scientific Staff - particularly
estuarine project
 - 12 Electronics Lab
 - 13 Tuna Building
 - 14 Division of Maths and Stats
Containing Statisticians
 - 15 Offices - Scientific Staff
 - 16 Fish Biology
Offices and Labs for
Scientific Staff
 - 17 Chemical Store (non-hazardous)
 - 18 Winch Room - winch for shipway



NSW FISHERIES - LOCKED BAG 9, PYRMONT 2009. PH (02) 9566 7800

MAINTENANCE OF HERITAGE ASSETS

Heritage Assets:

F0001 - F0009: Aquatic/Marine Reserves

Generally aquatic reserves are regulated/managed by the NSW Fisheries Act and Regulations. However, Julian Rocks Aquatic Reserve and Solitary Islands Marine Reserve have separate, complex management plans. Separate management plans for the other aquatic reserves may be implemented in the future.

F0009: Aboriginal Middens

These sites have been registered on the National Parks & Wildlife Service (NPWS) Aboriginal Sites Register and as such are protected under their Act. Accordingly NSW Fisheries will not damage or destroy these sites without prior permission from the Director General of the Service. All care will be taken not to disturb these sites should the department change the current use of the area. Any discovery of bone suspected of being of human origin will be reported to NPWS.

Additionally, any large scale ground disturbance on the Cronulla site will be preceded by a detailed assessment of potential impacts on aboriginal sites as part of a Review of Environmental Factors for the activity.

F0010, F0011 and F0012: Fisheries Research Centre Structures

Future management of these structures will aim to conserve all the original fabrics to maintain evidence and allow for the interpretation of their past uses.

Consideration will be given to removing detracting elements from the exterior of the former hatchery building if structural investigation is permitted and a maintenance schedule, including painting of timber joinery in period colours may be instigated for three original structures.

Proposed Maintenance for each structure:

Former Hatchery Building:

- Retain existing external building form without further addition
- Aim to improve recent external accretions, such as the slab and ancillary storage in the south west corner, to open up the verandah in this area
- Investigate building structure with the aim of eventually removing the lighter coloured brick piers, whilst retaining structural stability
- Investigate possible moisture problems in the walls, with the aim of eventually removing render from the lower part of the eastern wall of the former hatchery hall.

Boat Shed:

- Restore the sea wall below the boat shed
- Investigate the condition of the timber structure
- Paint exterior of building the light stone colour observed on weatherboards, and a darker chocolate brown on the framing/architraves.

Fish Pond:

- Maintain the existing open character of the fish pond and avoid enclosing the structure

F0013: Fisheries Research Centre Site

Retain association of the Cronulla site with fisheries research investigations, and where possible maintaining original structures within the complex with their historical usage.

POSSIBLE FUTURE INCLUSIONS

Public participation has already been invited for the establishment of another three aquatic reserves which could be included in the heritage and conservation register. These proposed aquatic reserves are located at Jervis Bay, Lord Howe Island and Cook Island.

Recommendations have been made for further examination of the Water Police building at the Fisheries Research Centre site, Cronulla to establish whether it is the original caretaker's cottage. If it is proven to be the original structure it will be included in the register.

The research centres at Narrandera, Salamander Bay and Grafton may be future inclusions in the register as important components of the fishery research network in New South Wales. They do not qualify as yet on the basis of age i.e. they are less than 50 years old.

Guiding Principles for relocations from Cronulla

1. Cronulla to close by Sept 12 (with 6 month tail)
2. Regionalise functions from Cronulla – (nil to CBD & face 2 face for Syd only)
3. At destinations sites work to achieve a mix of functions from Cronulla
4. Retain as much expertise as possible
5. Seek opportunities to enhance the business and service delivery incl partnerships with Unis
6. Acknowledge and accommodate special and compassionate needs
7. Cost effective – including facilities development and utilisation and transfer costs
8. Minimise impacts of projects and service delivery
9. Maintain industry support
10. Look long term not just short term post move.

3

3.

DEPARTMENT OF PRIMARY INDUSTRIES
Fisheries

Director General Letter

Letter from Audit Office re Closure of Cronulla Fisheries Centre

Issue:

Response to letter from the Audit Office of NSW dated 30 November 2011.

Background:

Mr Rob Mathie, Assistant Auditor-General, wrote a letter to the Director General Department of Primary Industries regarding the closure of Cronulla Fisheries Research Centre and the decentralisation of functions. Mr Mathie requests a meeting before the end of the year to discuss the scope of the planned closure.

4

Recommendation:

That the Director General signs the attached letter.

Author's name: Dr Geoff Allan 02 4916 3909

Position: A/Executive Director Fisheries NSW

Date: 15 December 2011

Reviewed and approved 15 December 2011

Dr Geoff Allan

A/Executive Director Fisheries NSW

Director General


16.1.4

 completed

4



Department of Primary Industries

Office of the Director General

DGPO11/697

Mr Rob Mathie
Assistant Auditor-General
Performance Audit
GPO Box 12
SYDNEY NSW 2011

16 JAN 2012

COPY

Dear Mr Mathie 

Closure of Cronulla Fisheries Research Centre

Thank you for your letter 30 November 2011 requesting a meeting to discuss the decision to close Cronulla Fisheries Centre. The decision is part of the Government's Decade of Decentralisation policy and is aimed at locating Fisheries NSW staff and functions in the regions, where much of their work is based.

A Change Management Plan is in the process of being finalised following extensive consultation with staff and the Public Service Association. I enclose the latest draft for your information.

A detailed business case has not yet been finalised. This will be completed once the new location for all functions and positions currently located at Cronulla have been decided and a better estimate of the costs possible.

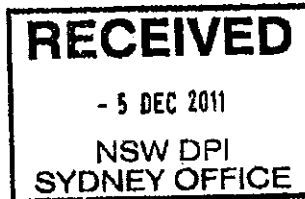
The Acting Executive Director of Fisheries NSW, Dr Geoff Allan, is responsible for the relocation. Can I suggest a meeting with him so he can brief you on the scope and policy context of the project and on the proposed timelines for completion. Due to Christmas leave, the meeting will need to be scheduled in January. Dr Allan will return to the office on 10 January 2012 and would be available to meet after that date.

If this is convenient, please contact Mrs Helena Heasman (Helena.Heasman@industry.nsw.gov.au or 02 4916 3909) to arrange a suitable date and time to meet.

Yours sincerely


RICHARD SHELDRAKE
DIRECTOR GENERAL

2FP11/1357
DG-PI 11/1357



Dr Richard Sheldrake
Director General
Department of Primary Industries
Level 6, 201 Elizabeth Street
SYDNEY NSW 2000

30 November 2011

Dear Dr Sheldrake

**Closure of Cronulla Fisheries Research Centre
and Decentralisation of Functions**

I note the concerns expressed by some members of the public about the costs and benefits of closing the Research Centre and relocating its functions (eg Sydney Morning Herald editorial of 8 November). I therefore intend to keep a watching brief on the planning and implementation of the project, including:

- The closure of the Research Centre and any sale/re-use of the assets there, including the heritage assets
- The relocation of functions and staff to other locations and the associated costs, including the costs of any redundancies
- The impact of the closure and relocation of any other state agencies.

I may undertake a more detailed audit of the project in due course if the Auditor-General and I feel it is warranted.

To help me keep watch, I would appreciate the Department keeping me informed of significant developments on the project as it proceeds, including providing us with copies of any of the following documents as they are completed:

- Financial analysis
- Cost/benefit/Impact analysis
- Implementation plan
- Actual costs associated with the project
- Benefits realisation plan

My colleague, Peter Barnes, will maintain the watching brief. He and I would appreciate a meeting with your staff responsible, at a convenient time before the end of 2011, to understand the broad scope and policy context for the project and to receive what planning and implementation information is currently available. I look forward to hearing from you. I can be contacted on 9275 7106.

Yours sincerely

Rob Mathie
Assistant Auditor-General
Performance Audit

8.12.11
D6 DTI byi
+ I will discuss E. Gau.



PROFESSIONAL
FISHERMEN'S ASSOCIATION

For immediate publication 24 September 2011

Media release

Support for Government decision on Cronulla

"The Professional Fishermen's Association (PFA) today confirmed their support for the government's decision to decentralise the Cronulla Fisheries Centre. At their scheduled meeting today the PFA Committee of Management confirmed unanimous support for the decision by the Coalition government.

"Our support is based on a number of reasons John Harrison, Executive Officer of the PFA said. These include the:

- the need for a cultural change within fisheries management; and
- taking commercial fishing management closer to the clients i.e. fishers.

This has been a long time coming and as far back as 1998 the IPART report said of Fisheries "*offices were scattered across the state and needed to be rationalised and relocated closer to customers and resources.*"

We know about 75% of the catch by volume of commercial fishing occurs north of Sydney and to have the management and researchers working at Coffs Harbour and Port Stephens near to that action makes sense to industry.

"We understand that the positions are not being abolished simply relocated and this gives us the confidence that there will not be lost capacity within the management or research arms of the Fisheries Agency." Mr Harrison concluded.

End

Media enquiries to John Harrison 04 2930 3371

PFA providing effective representation on NSW commercial wild harvest fishing to all levels of government and other key stakeholders

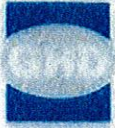
51 River Street
Maclean NSW 2463
ABN 93801719337

T 02 6645 0971
F 02 6645 0982

E jharrison@pfai.com.au
M 04 2930 3371

5

5



CLIENTS PEOPLE PERFORMANCE

NSW Department of
Primary Industries
Site Development Plan for the
Fort Stephens Fisheries Centre

6



6.

**NSW Department of
Primary Industries**

**Site Development Plan for the
Port Stephens Fisheries Centre**

Draft

June 2007



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Appendices

- A Existing Site Plan
- B Site Development Plan Options
- C Indicative Cost Estimates
- D Cost Benefit Analysis



Executive Summary

This study has been undertaken by GHD Pty Ltd for the NSW Department of Primary Industries (NSW DPI). The project scope was to conduct a strategic review of infrastructure requirements at the Port Stephens Fisheries Centre (PSFC) located at Taylors Beach, Port Stephens. Outcomes of the review include options for the redevelopment of the site and an economic appraisal to evaluate the feasibility of each option. This has resulted in the recommendation of a preferred option.

The Port Stephens Fisheries Centre was established in 1970 as an aquaculture research facility. Currently it is a leading agency in the conservation and management of living aquatic resources. Staff at the site are responsible for the administration of the Fisheries Management Act 1994, which provides a tool for the protection of living aquatic resources. Key areas of research and responsibility include:

- ▶ Aquaculture research including:
 - Oysters
 - Marine fish
 - Algal production
 - Nutrition and diet development
- ▶ Aquaculture policy and management including aquaculture administrative services
- ▶ Aquatic biosecurity
- ▶ Aquatic ecosystems research including:
 - Marine habitats and biodiversity
 - Freshwater habitats and biodiversity
 - Ecosystem linkages

A number of site development options have been considered in relation to infrastructure requirements at PSFC. These include:

- ▶ Option 1 – Base Case
- ▶ Option 2 – Refurbish Existing Facilities
- ▶ Option 3 – Provide New Facilities

The capital costs of these options are (May 2007 prices):

- ▶ Option 1 – \$975,000
- ▶ Option 2 – \$6,552,000
- ▶ Option 3 – \$13,579,000

Of the options analysed, from a purely NPV financial view, Option 1 is the most favourable at all the discount rates used. The Internal Rate of Return (IRR) for Option 2 is -69.44% and for Option 3 is -7.37%. Option 1 does not have a calculable Rate of Return. From an IRR perspective, Option 3 is the most favourable and is therefore the preferred option.



Option 3 allows for the development of the site in the context of a strategic plan. The benefits of the option are that it will achieve the objective of providing facilities which support enhancement of the long-term productivity, profitability and sustainability of aquaculture and aquatic ecosystems research within NSW. The option involves the refurbishment of many existing facilities and the provision of a new shark research facility and new chemical laboratory. Options to do nothing, rebuild elsewhere or to demolish all or the majority of existing facilities and rebuild them have not been considered, as they are not feasible or economically viable. The preferred option is supported by the economic appraisal outcomes summarised in the following tables.

Table 1 Discount Rates

Discount Rate	4.00%	7.00%	10.0%
	NPV \$	NPV \$	NPV \$
Option 1	-5,307,619	-4,392,015	-3,746,674
Option 2	-7,553,514	-6,877,439	-6,374,571
Option 3	-9,689,960	-9,956,897	-9,997,032

Table 2 Economic Appraisal Outcomes

	Options Incremental to Option 1	
	Option 2	Option 3
Capital Cost \$m (Present Value)	5.858	12.005
Benefits \$m (Present Value)	3.373	6.440
Net Present Value \$m	-2.485	-5.565
NPV/Capital Costs	-0.42	-0.46
Benefit Cost Ratio	0.58	0.54
Internal Rate of Return (IRR) %	-7.51	1.98



1. Introduction

The Port Stephens Fisheries Centre was established in 1970 as an aquaculture research facility. It is the leading agency in the conservation and management of living aquatic resources. Staff on site are responsible for the administration of the Fisheries Management Act 1994, which provides a tool for the protection of living aquatic resources. Key areas of research and responsibility include:

- ▶ Aquaculture research including:
 - Oysters
 - Marine fish
 - Algal production
 - Nutrition and diet development
- ▶ Aquaculture policy and management including aquaculture administrative services
- ▶ Aquatic biosecurity
- ▶ Aquatic ecosystems research including:
 - Marine habitats and biodiversity
 - Freshwater habitats and biodiversity
 - Ecosystem linkages

NSW DPI previously included Marine Parks responsibilities. This function has recently been transferred to the Department of Environment and Climate Change (DECC, formerly the NSW Department of Parks and Wildlife).

The site is located at Taylors Beach, Port Stephens. It was donated to the NSW Government by mining company VAM Limited and was originally called the Brackish Water Fish Culture Research Station.

The Centre is a working site and current precincts include:

- ▶ Workshop precinct
- ▶ Administration precinct
- ▶ Research precinct
- ▶ Wharf precinct

Facilities within these precincts include:

- ▶ Office accommodation (Visitors Centre, Administration Building, Conservation Research Building, NSW DPI/Marine Parks Building)
- ▶ Working accommodation including laboratories (Oyster Hatchery, Bass Hatchery, Nursery tanks, Marine Fish Hatchery, Fish Broodstock Building, Chemistry Laboratory, Conservation Research Building, Greenhouse, Covered and Open Ponds)
- ▶ Workshop facilities (sheds, workshops, refuelling area, boat storage facilities)



- ▶ Wharf facilities (boat ramp, jetty, pontoons and boatshed)
- ▶ Site infrastructure (site entry, parking facilities, engineering services, water reticulation systems and tanks)

The buildings and structures on site vary in terms of their age and condition from new to original condition. The use of seawater and location of the site means that corrosion and dry rot are prevalent. This gives rise to higher maintenance costs than might usually be expected. Pests and vermin such as rats can also be a problem.

Plans of the existing site are included at Appendix A. These outline the current site layout, precincts and opportunities and constraints.

1.1 Objective and Scope of the Study

The study objective was to analyse infrastructure requirements for PSFC in order to determine those necessary to support excellence in service delivery outcomes in the medium term. An analysis of all feasible asset and non-asset options was undertaken. Options considered were those that support service delivery and were consistent with NSW DPI's broader strategic and corporate objectives.

The project scope was to conduct a strategic review of infrastructure requirements at the site. Outcomes of the review include options for the redevelopment of the site and an economic appraisal to evaluate the feasibility of each option. This has resulted in the recommendation of a preferred option.



2. The Requirement

2.1 Background

NSW DPI has facilities strategically located throughout the State to meet the needs of regional communities and agricultural industries. Regionally located Centres of Excellence focus on specific industries and important agricultural issues. PSFC is the Centre of Excellence for aquaculture research. Services are delivered from the Agriculture and Fisheries Division of DPI.

There are approximately 111 staff on establishment. These staff are broadly divided into a number of functional groups, as outlined in the following diagram:

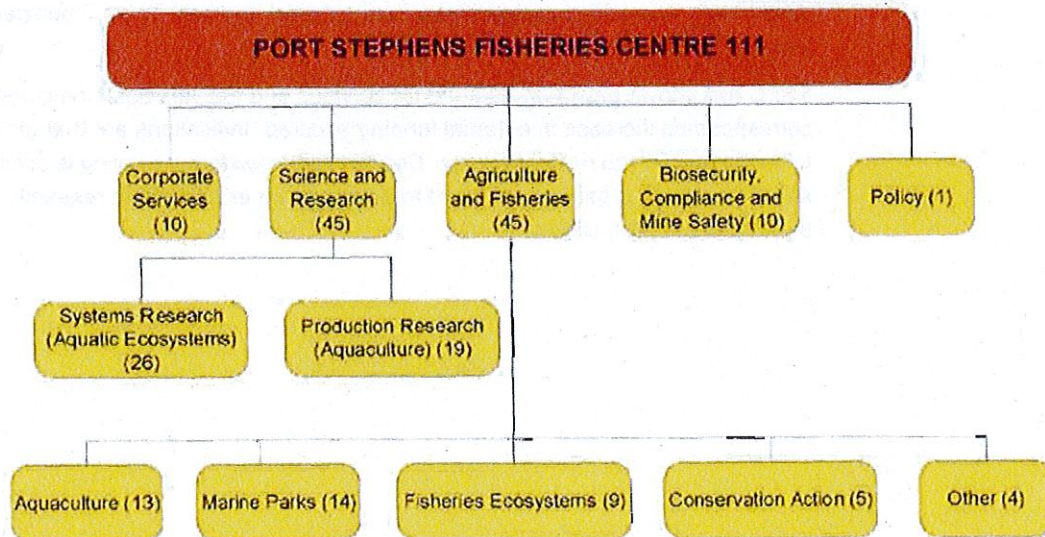


Figure 1: Organisation Chart



Key issues in relation to the existing site include:

- ▶ **The site has not previously been master planned**
- ▶ **The site is located on a peninsular which limits the land available for development**
- ▶ **The site is surrounded by environmentally sensitive areas which limit the land available for development**
- ▶ **The nature and type of research undertaken changes over time with some programs experiencing growth due to demand from industry bodies**
- ▶ **The use of technology for research changes with increasing trends towards diagnostic work which requires laboratory facilities**

As a research centre PSFC attracts external funding. The majority of PSFC's annual expenditure is obtained competitively from external sources. Table 3 outlines the external funding for the period 2006-2011.

PSFC has shown growth in demand for services and this has been indicated by a corresponding increase in external funding secured. Indications are that growth is likely to continue over the next five years. Competition for external funding is considerable and increasingly organisations need to demonstrate excellence in research supported by state of the art facilities.



Table 3 External Funding at PSFC (2006-11)

Funding Source	Project Title	Budget 06/07	Budget 07/08	Budget 08/09	Budget 09/10	Budget 10/11
FRDC	FRDC - Hatchery Snapper Farms	\$75,182	\$0	\$0	\$0	\$0
ACIAR	Aqua Degraded Areas	\$140,498	\$74,791	\$0	\$0	\$0
ACIAR	ACIAR FIS/2006/001 Fish Feed Man in PNG	\$48,664	\$48,664	\$0	\$0	\$0
FRDC	FRDC Syd Rock Oyster Breeding Program	\$215,451	\$113,265	\$118,106	\$111,705	\$0
CMA	HNIS0405 Threatened Species ID	\$45,000	\$0	\$0	\$0	\$0
NRCMA	SR6-7-120704 Stag Ass of Fish Movement	\$116,000	\$0	\$0	\$0	\$0
HNCMA	HN0507 RH8 River Health Aqu Hab Dragonfly/Perch Program	\$90,000	\$0	\$0	\$0	\$0
HNCMA	HN0507 B6d Threatened Spec Redfin threat abatement	\$37,950	\$37,950	\$0	\$0	\$0
MDBC	MD798 Monitoring effects of cold water pollution Namoi River	\$50,058	\$0	\$0	\$0	\$0
NRCMA	SR4-5-12004 Grey Nurse Shark Project - Research	\$70,500	\$0	\$0	\$0	\$0
NRCMA	SR4-5-12004 Grey Nurse Shark Project - Education	\$94,500	\$0	\$0	\$0	\$0
NRCMA	SR4-5-6-120-0601 Grey Nurse Shark Tagging Project	\$271,000	\$0	\$0	\$0	\$0
NRCMA	SR4-5-6-120-0602 Great White Shark Tagging Project	\$280,000	\$0	\$0	\$0	\$0
NRCMA	Fish Dist in Orara Nymboida & Clarence River	\$90,000	\$10,000	\$0	\$0	\$0
SRCMA	South Coast Marine Pest Surveys	\$25,000	\$46,600	\$0	\$0	\$0
MDBC	MD654 Fish Friendly Farms Program	\$40,000	\$0	\$0	\$0	\$0
DNR	Fish Friendly Farms Program	\$60,000	\$0	\$0	\$0	\$0
NAP/NHT	Decision Support Tools for NRM	\$295,832	\$414,166	\$0	\$0	\$0
DNR	Wetlands on Farms	\$276,000	\$272,000	\$0	\$0	\$0
MDBC	Est of demonstration reaches - Tarcutta Creek	\$70,000	\$0	\$0	\$0	\$0
NCMA	Namoi Aquatic Habitat Initiative	\$835,000	\$300,000	\$0	\$0	\$0
Fees	Hire of Dept Facilities PSFC	\$5,000	\$4,000	\$0	\$0	\$0
Non Comm	NAC - Inland Saline Aqua Coord	\$91,348	\$0	\$0	\$0	\$0



Funding Source	Project Title	Budget 06/07	Budget 07/08	Budget 08/09	Budget 09/10	Budget 10/11
ACIAR	ACIAR Provision of Services PSFC	\$70,363	\$73,178	\$76,105	\$0	\$0
FRDC	FRDC Temperate Fish Species	\$213,202	\$239,611	\$226,860	\$0	\$0
FT	FT Enhanced Fish Production Bass	\$124,340	\$120,000	\$120,000	\$120,000	\$120,000
FRDC	FRDC Enhance Popn Abalone Hatchery	\$45,000	\$12,544	\$35,000	\$0	\$0
FRDC	FRDC Syd Rock Oyster Grow Out	\$63,002	\$134,744	\$0	\$0	\$0
COM	Sydney Rock Oyster Grow Out	\$40,000	\$0	\$0	\$0	\$0
COLL	Mgt & Comm Syd Rock Oyster Breed	\$86,306	\$0	\$0	\$0	\$0
FRDC	Mollusc Programs and CRC	\$450,000	\$600,000	\$550,000	\$350,000	\$350,000
PD	Aquaculture Development Workshops	\$2,000	\$0	\$0	\$0	\$0
TF	Aquaculture Lease Bonds	\$110,000	\$110,000	\$110,000	\$110,000	\$110,000
CONSULT	PLDC P06012 Fish Monitor Penrith	\$11,750	\$11,750	\$11,750	\$11,750	\$0
DIPNR	WMF Rivers Project	\$58,420	\$0	\$0	\$0	\$0
DIPNR	MAQ Fish Survey	\$28,711	\$0	\$0	\$0	\$0
DIPNR	Sustainable Rivers - Port Stephens	\$158,840	\$0	\$0	\$0	\$0
ST/FT	Control Banded Grunter Project	\$57,962	\$0	\$0	\$0	\$0
CMA	Assessment & Monitoring Barwondaring River	\$30,000	\$30,000	\$30,000	\$0	\$0
CMA	Monitoring & Assessment Bringing Back the Fish	\$50,000	\$50,000	\$50,000	\$0	\$0
FT	Habitat Grant Program	\$199,594	\$0	\$0	\$0	\$0
MDBC	Coord Fish Strategy	\$60,000	\$0	\$0	\$0	\$0
FT	Habitat Restoration Grants	\$200,000	\$0	\$0	\$0	\$0
FT	Regional Fish Habitat	\$295,000	\$0	\$0	\$0	\$0
DON	Seagrass Mgt on Foreshore Structures	\$18,000	\$0	\$0	\$0	\$0
Total		\$5,245,473	\$2,103,263	\$777,821	\$353,455	\$230,000



2.2 Existing Facilities and Infrastructure

The existing PSFC site consists of office and working accommodation, wharf facilities and ponds. The facilities can be broadly grouped as follows:

- ▶ Office accommodation (Visitors Centre, Administration Building, Conservation Research Building, DPI/Marine Parks Building)
- ▶ Working accommodation including laboratories (Oyster Hatchery, Bass Hatchery, Nursery tanks, Marine Fish Hatchery, Fish Broodstock Building, Chemistry Laboratory, Conservation Research Building, Greenhouse, Covered and Open Ponds)
- ▶ Workshop facilities (sheds, workshops, refuelling area, boat storage facilities)
- ▶ Wharf facilities (boat ramp, jetty, pontoons and boatshed)
- ▶ Site infrastructure (site entry, parking facilities, engineering services, water tanks)

The current site has been developed over time and was not master planned. The site can be loosely grouped into the following precincts:

- ▶ Workshop precinct
- ▶ Administration precinct
- ▶ Research precinct
- ▶ Wharf precinct

These precincts are outlined on the site plan included at Appendix A. Key planning issues on the site include:

- ▶ Functions not situated in accordance with functional relationships
- ▶ Site presence and entry poor with insufficient signage
- ▶ A proliferation of parking areas on site
- ▶ Poor use of space available for development
- ▶ Like functions not consolidated
- ▶ Space not identified or reserved for future facilities

There are limitations that exist in relation to the current facilities and infrastructure. The buildings on site range in age with some dating from the 1970s. Some buildings are in poor condition for example the existing laboratory building. Significant dry rot and corrosion can be seen due to the aggressive environment and lack of maintenance. Flooding issues may exist in relation to the site and future buildings should be raised to account for this. The existing administration building is poorly laid out and has outdated furniture, which inhibits effective work practices and organisational communication. Across the site, storage facilities including secure storage are limited, leading to a proliferation of demountable buildings and shipping containers. Existing laboratories do not meet requirements for relevant codes. A detailed BCA audit was not undertaken but it is possible that some existing buildings do not meet current requirements.



Some facilities are obsolete in relation to their functional layout for example offices are long and narrow and are too large for one person but too small for two. Old laboratories are functionally obsolete and are unlikely to be granted certification, which will impact on the organisation's ability to attract and secure external funding over time. Laboratory and office accommodation facilities, essential for delivery of research services, require rationalisation. Staff are accommodated in facilities that are not conducive to organisational communication, efficiency and effectiveness. Some engineering services require upgrade in particular the water reticulation system.

Functional groups are spread throughout buildings based on space availability rather than functional relationships. There are some benefits from this integration for example better cross-functional communication. Existing accommodation is in many cases not suited to modern work and research practices and technology. Not all staff have modern workstations and this issue should be addressed. The layout of the administration building is poor and lacks flexibility.

2.3 Master Planning Principles

This study addresses the redevelopment needs of the PSFC site consistent with a master planning approach. The components of this include:

- ▶ Provision of appropriate office accommodation for staff
- ▶ Provision of modern, functional laboratory facilities which are flexible and meet certification and OH&S requirements
- ▶ Provision of consolidated working accommodation to maximise the available space for development
- ▶ Provision of consolidated storage facilities
- ▶ Improved entry and signage to assist way finding
- ▶ Upgrade of physical security, environmental controls and engineering services
- ▶ Removal of obsolete demountable buildings and structures
- ▶ Identification and reservation of space for future development

It is proposed to address these issues through the development of a site development plan and analysis of feasible options.



3. Project Options and Analysis

This section considers all feasible options, which will satisfy the functional requirement. Options to rebuild elsewhere or to demolish all or the majority of existing facilities and rebuild them have not been considered, as they are not feasible or economically viable.

3.1 Option 1 – Base Case

A "do nothing" option is not feasible for this project. At a minimum the base case option involves the remediation of urgent issues to ensure a safe working environment that complies with all relevant legislation. It is a minimal cost option as opposed to nil cost. This option involves the following scope of works:

Table 4 Option 1 - Scope of Works

Ser	Item	Scope Elements	Area (m ²)
1	Occupational health and safety upgrade	<ul style="list-style-type: none"> ▶ Upgrade 15 safety showers and eyewash facilities to comply with all relevant codes 	n/a
2	Upgrade dangerous goods storage	<ul style="list-style-type: none"> ▶ Review and consolidate dangerous goods storage on site to ensure compliance with all relevant codes ▶ Provide appropriate dangerous goods signage 	200 n/a
3	Fire services system upgrade	<ul style="list-style-type: none"> ▶ Upgrade site wide fire services including hydrants and pumps 	n/a
4	Signage upgrade	<ul style="list-style-type: none"> ▶ Upgrade site signage and way finding 	n/a
5	New pontoon	<ul style="list-style-type: none"> ▶ Provide new pontoon to wharf area 	n/a
6	Fish Broodstock Building office extension	<ul style="list-style-type: none"> ▶ Extend existing office space 	25

A plan detailing this option is included at Appendix B. The indicative capital cost of this option (May 2007 prices) is \$975,000. The breakdown of this cost estimate is included at Appendix C.

The advantages of this option are that it addresses the immediate concerns of the site including duty of care and statutory requirements. It is focused on rectifying current issues in existing facilities. It is the lowest capital cost. The disadvantages of this option are that it addresses only immediate issues and does not rectify other issues on site such as poor working accommodation and laboratory facilities. It addresses OH&S



issues but does not upgrade the level of amenity provided by existing facilities and buildings.

3.2 Option 2 – Refurbish Existing Facilities

This option involves the refurbishment of existing facilities on site and the provision of a new chemical laboratory. This option involves undertaking all items identified in Option 1 supplemented by the following scope of works:

Table 5 Option 2 - Scope of Works

Ser	Item	Scope Elements	Area (m ²)
1	All items included in Option 1	▶ As per Table 4	n/a
2	Refurbish the Conservation Research Building	<ul style="list-style-type: none"> ▶ Demolish and relocate internal walls ▶ Replace floor finishes ▶ Repaint ceiling and walls ▶ Upgrade lighting, fire and air conditioning systems ▶ Provide new workstations throughout (30) ▶ Upgrade ablutions and kitchen areas 	625
3	Refurbish the Administration Building	<ul style="list-style-type: none"> ▶ Demolish and relocate internal walls ▶ Replace floor finishes ▶ Repaint ceiling and walls ▶ Adjust lighting, fire and air conditioning systems to suit churn ▶ Provide new workstations throughout (45) 	1,000
4	Upgrade the Chemistry Laboratory	<ul style="list-style-type: none"> ▶ Upgrade building exterior including replacement of gutters, fascias and timber windows ▶ Undertake a major internal refurbishment including: <ul style="list-style-type: none"> - Address OH&S and BCA issues - Repaint internal and external surfaces - Upgrade cool room plant - Provide new whitegoods - Replace floor finishes - Replace benches, shelving and loose furniture - Upgrade lighting, fire, gas and air conditioning and hydraulic systems 	200



Ser	Item	Scope Elements	Area (m ²)
5	Provide a new Shark facility	<ul style="list-style-type: none"> ▶ Provide new facility including: <ul style="list-style-type: none"> - shark/fish autopsy area (stainless benches and sinks, air-conditioned) - clean room for operating on live animals plus holding tanks - sterile shark nursery area for up to 6 individual rearing units - aquarium room - large holding tanks - quarantine facility - storage - unisex toilet facility 	900
6	Upgrade the Oyster Hatchery	▶ Reconfigure lower floor laboratory space including demolition of existing tanks and concrete stands	150
7	Upgrade Greenhouse	▶ Replace shade cloth and corroded elements	650
8	Rationalise workshop precinct	<ul style="list-style-type: none"> ▶ Provide new secure storage are to front of garage/boat storage shed including new roller door and wire mesh cages ▶ Provide secure wire mess caged areas in existing shed 	50 300
9	Rationalise demountable buildings	▶ Remove 4 obsolete demountable buildings from site	250
10	Upgrade environmental controls	<ul style="list-style-type: none"> ▶ Provide concrete slab and bunding to existing fuel tank areas (including overhead cover) ▶ Pressure test underground concrete fuel storage tank 	100 n/a
11	Upgrade site security	<ul style="list-style-type: none"> ▶ Provide new security fence, 1.8m high with 3 strands of barbed wire over ▶ Provide 1 security camera to front gate and digital video recorder 	500 m n/a

A plan detailing this option is included at Appendix B. The indicative capital cost of this option (May 2007 prices) is \$6,552,000. The breakdown of this cost estimate is included at Appendix C.

The option includes refurbishment of key buildings on site to bring them back to functionality. It also includes the provision of a new shark facility. It provides for the upgrade of environmental controls and site security. It also provides for the rationalisation of some facilities on site. This is important given the physical constraints on site and the limited availability of land for current and future development.



The advantages of this option are that it addresses most of the current issues that impact on organisational communication, efficiency and effectiveness. This option also addresses immediate concerns of the site including duty of care and statutory requirements. It provides a level of refurbishment for many facilities. The disadvantages of this option are that it does not provide a new laboratory. It also does not adequately address the upgrade of engineering services.

3.3 Option 3 – Provide New Facilities

This option involves the construction of some new facilities on site and the refurbishment of others. This option involves undertaking all items identified in Option 1, selected items from Option 2 supplemented by the following scope of works:

Table 6 Option 3 - Scope of Works

Ser	Item	Scope Elements	Area (m ²)
1	All items included in Option 1	▶ As per Table 4	n/a
2	Selected items from Option 2	▶ Includes Serials 2, 3, 5, 6, 8, 9, 12	n/a
3	New Chemical Laboratory	▶ Construct a new chemical laboratory including <ul style="list-style-type: none"> - wet area for sorting biological samples - wet lab area for microscope identification of material (including sink and bench) - dry analytical lab room (including benches and shelving) - storage for preserved samples (reference collection plus preserved material awaiting sorting) - dry storage for electronic gear 	500
4	Upgrade wharf precinct	▶ Demolish boatshed ▶ Upgrade and realign boat ramp ▶ Infill old chem. lab site with bitumen ▶ Upgrade wash area	75 125
5	Upgrade research precinct	▶ Demolish existing Nursery Tanks and Bass Hatchery Buildings ▶ Provide a new Fin Fish Building similar to existing Fish Broodstock Building ▶ Demolish greenhouse ▶ Provide a new Fish Nutrition and Breeding Building similar to existing Fish	400 900 600



Ser	Item	Scope Elements	Area (m ²)
		Broodstock Building	600
6	Upgrade workshop precinct	<ul style="list-style-type: none"> ▸ Refurbish existing sheds and workshop buildings ▸ Provide new secure storage facilities 	1550 600
7	Replace fuel facility	<ul style="list-style-type: none"> ▸ Replace existing underground fuel tank with a new 50,000 lt tank ▸ Replace fuel bowser 	n/a
8	Upgrade water reticulation system	<ul style="list-style-type: none"> ▸ Undertake a site-wide review of water reticulation for rain water, sea water and bore water ▸ Upgrade pipework and water treatment system ▸ Disconnect from 1 existing bore ▸ Connect to town water 	n/a
9	Upgrade site security	<ul style="list-style-type: none"> ▸ Provide an electronic access control system to main buildings ▸ Provide an intruder detection system to main buildings ▸ Provide security cameras to main buildings and car parks 	n/a n/a n/a

A plan detailing this option is included at Appendix B. The indicative capital cost of this option (May 2007 prices) is \$13,679,000. The breakdown of this cost estimate is included at Appendix C.

The advantages of this option are that it addresses all significant issues on site in the medium term providing flexible facilities in support of excellence in service delivery outcomes. The new laboratory and shark facility would assist in securing and increasing levels of external funding. This option would address existing engineering services infrastructure issues. The main disadvantage is that it is the highest capital cost. The proposed investment represents a significant mid life upgrade for site.

3.4 Staging and Decanting

Existing facilities at PSFC would need to remain operational whilst any refurbishment works were undertaken. It is likely that this could be managed through development of a staging and decanting plan incorporating the proposed scope of works.



3.5 Comparative Analysis

Option 1 is the least expensive option whilst Option 3 is the most expensive. Option 3 best satisfies the user requirement whilst Option 1 addresses only urgent issues. Both Options 2 and 3 provide some improvements to the site.

Table 7 Comparative Analysis

Action	Benefits/Advantages
Provision of modern, functional laboratory facilities which meet OH&S requirements	Meeting all statutory and legislative requirements, safe work environment, consistent with modern best practice and uptake of new technology, improved research outcomes, better able to attract and retains high quality staff and external funding
Replacement of the obsolete facilities	Reduced maintenance and operating costs, safe work environment, consistent with modern best practice, improved research outcomes, better able to attract external funding
Rationalisation of buildings and structures on site	Improved opportunities for future development due to availability of land, reduced maintenance and operating costs, safe work environment
Improvement of site facilities including signage and security	Better way finding, public image and improved site security
Demolition of obsolete buildings and structures on site	Reduced maintenance and operating costs

3.6 Preferred Option

Of the options analysed, from a purely NPV financial view, Option 1 is the most favourable at all the discount rates used. The Internal Rate of Return (IRR) for Option 2 is -69.44% and for Option 3 is -7.37%. Option 1 does not have a calculable Rate of Return. From an IRR perspective, Option 3 is the most favourable and is therefore the preferred option. This is further outlined in the detailed Cost Benefit Analysis, which is included at Appendix D.

Option 3 allows for the development of the site in the context of a strategic plan. The benefits of the option are that it will achieve the objective of providing facilities which support enhancement of the long-term productivity, profitability and sustainability of aquaculture and aquatic ecosystems research within NSW. The option involves the refurbishment of many existing facilities and the provision of a new shark research facility and new chemical laboratory. Options to do nothing, rebuild elsewhere or to demolish all or the majority of existing facilities and rebuild them have not been considered, as they are not feasible or economically viable.



4. Financial Analysis

4.1 Cost Benefit Analysis Approach

The financial framework used for this analysis has been based upon the "New South Wales Treasury Economic Appraisal of Capital Works – Principles and Procedures Simplified, March 1999" as issued by the NSW Treasury and has been prepared from the perspective of New South Wales Government and community.

The model is essentially a series of interlinked spreadsheets allowing for the build-up of various cost components.

The analysis has been prepared on a differential basis and is not a full cost model. All costs centres are the net position (i.e. the net difference between the status quo and the options). Therefore items decreed to be cost neutral, which would not change for the proposed options, are not included within the model.

By use of a discount rate (i.e. Net Present Value – NPV) the model allows to account for the whole of life cost of the proposal over a time period.

The Net Present Value is calculated by subtracting the discounted total costs from the discounted total benefits.

The base discount rate used in the model is 7% as per the recommendations within "New South Wales Treasury Economic Appraisal of Capital Works – Principles and Procedures Simplified, March 1999" as issued by the NSW Treasury. A sensitivity analysis has also been undertaken at both 4% and 10%.

It should be noted an allowance has been included within the model for the residual value of new capital building works, as their life expectancy of 30 years is well beyond the study period of 20 years. Within the model all capital costs are assumed to be expended in Year 1– 5.

All costs included within the analysis are at June 2007 prices and escalation and GST have been specifically excluded from the study.

The "New South Wales Treasury Economic Appraisal of Capital Works – Principles and Procedures Simplified, March 1999" recommends that a 20 year analysis is used, therefore the study is based upon that time period.

The results of the cost benefit analysis are outlined in the following table.

Table 8 Discount Rates

Discount Rate	4.00%	7.00%	10.0%
	NPV \$	NPV \$	NPV \$
Option 1	-5,307,619	-4,392,015	-3,746,674
Option 2	-7,553,514	-6,877,439	-6,374,571
Option 3	-9,698,960	-9,956,897	-9,997,032



Of the options analysed, from a purely NPV financial view, Option 1 is the most favourable of all the discount rates used.

The Internal Rate of Return (IRR) for Option 2 is ~ 69.44% and for Option 3 is -7.37%. Option 1 does not have a calculable Rate of Return. From an IRR perspective, Option 3 is the most favourable.

An analysis of Options 2 & 3 incremental to Option 1 has also been undertaken. The results of this are outlined in the following table.

Table 9 Economic Appraisal Outcomes

	Options Incremental to Option 1	
	Option 2	Option 3
Capital Cost \$m (Present Value)	5.858	12.005
Benefits \$m (Present Value)	3.373	6.440
Net Present Value \$m	-2.485	-5.565
NPV/Capital Costs	-0.42	-0.46
Benefit Cost Ratio	0.58	0.54
Internal Rate of Return (IRR) %	-7.51	1.98

4.2 Sensitivity Analysis

The cost benefit analysis was subject to a range of sensitivity analysis for each of the cost centres on the following basis.

Benefits

Increased Revenue ±- 50%

Costs

Operating Costs ±- 20%

Repairs and Maintenance ±- 15%

Capital Costs ±- 10%

Consultancy & Management Fees ±- 10%

The results of the foregoing are detailed within Appendix D.



5. Summary

This study has been undertaken by GHD Pty Ltd for the NSW Department of Primary Industries (NSW DPI). The project scope was to conduct a strategic review of infrastructure requirements at the Port Stephens Fisheries Centre (PSFC) located at Taylors Beach, Port Stephens. Outcomes of the review include options for the redevelopment of the site and an economic appraisal to evaluate the feasibility of each option. This has resulted in the recommendation of a preferred option.

The Port Stephens Fisheries Centre was established in 1970 as an aquaculture research facility. It is the leading agency in the conservation and management of living aquatic resources. They are also responsible for the administration of the Fisheries Management Act 1994, which provides a tool for the protection of living aquatic resources.

A number of site development options have been considered in relation to infrastructure requirements at PSFC. These include:

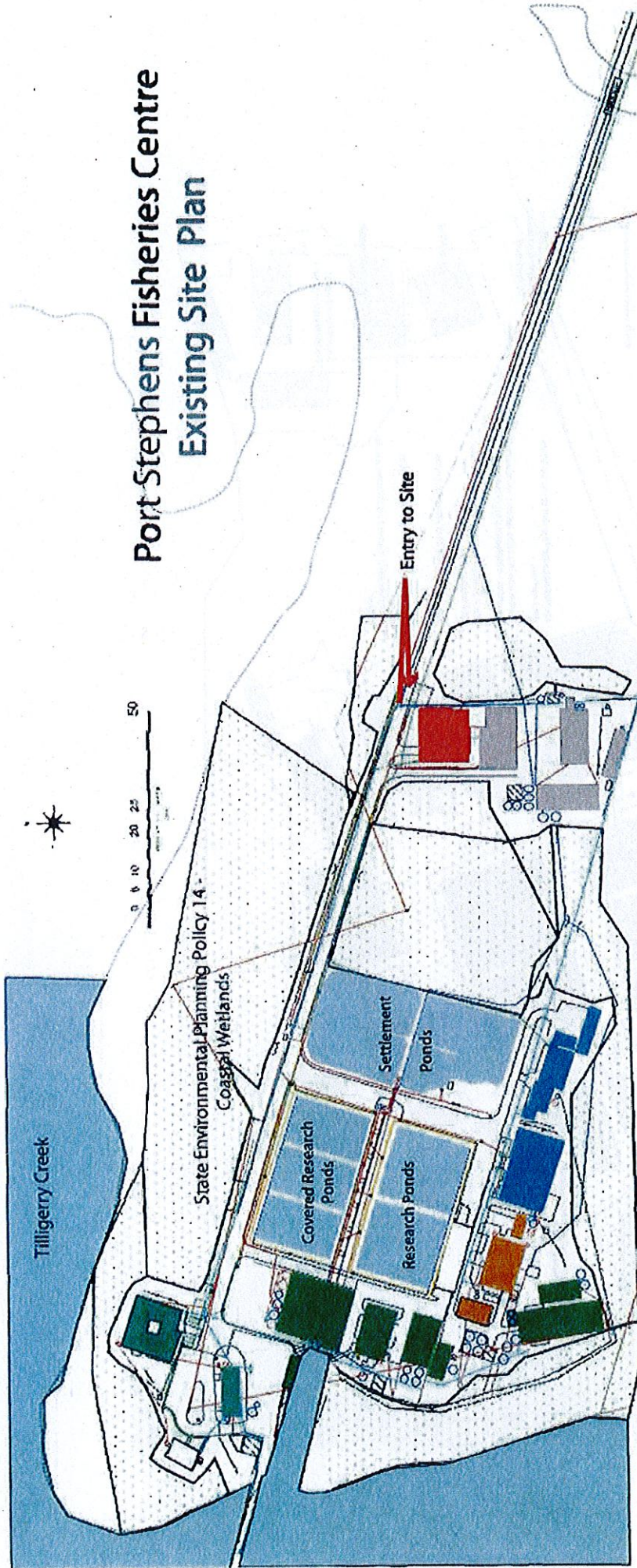
- ▶ Option 1 – Base Case (\$975,000)
- ▶ Option 2 – Refurbish Existing Facilities (\$6,552,000)
- ▶ Option 3 – Provide New Facilities (\$13,579,000)

The preferred option is Option 3. It should be noted that this conclusion is drawn from the economic analysis where Option 3 is the most favourable. This option allows for the development of the site in the context of a strategic plan. The benefits of the option are that it will achieve the objective of providing facilities which support enhancement of the long-term productivity, profitability and sustainability of aquaculture and aquatic ecosystems research in NSW.



Appendix A
Existing Site Plan

Port Stephens Fisheries Centre Existing Site Plan



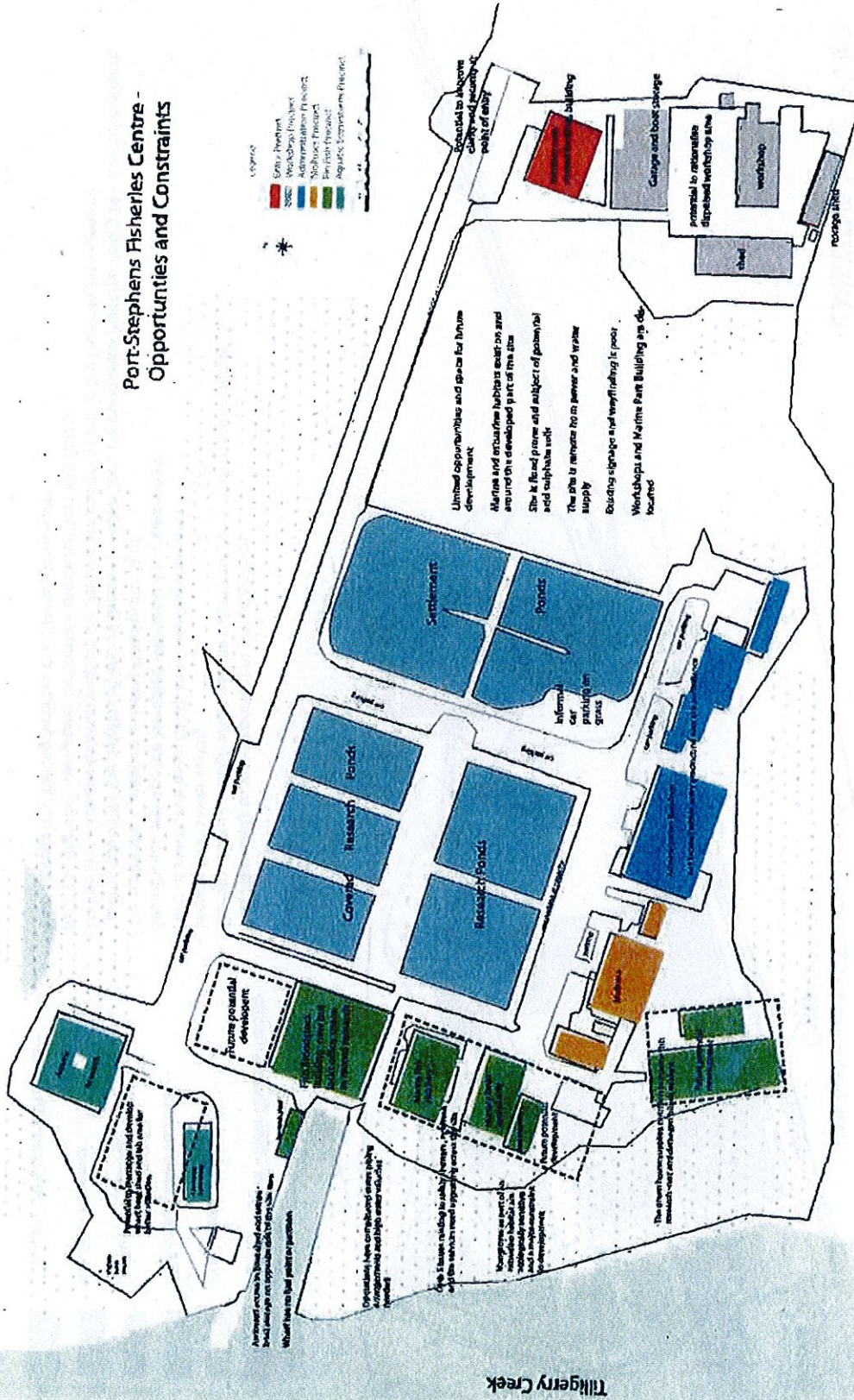
Legend

- Entry Precinct - New Shared Facility
- Workshop Precinct
- Administration Precinct
- Molluscs Precinct
- Fin Fish Precinct
- Aquatic Ecosystems Precinct

Current Site Issues

- Good proximity to sea - important to site operations
- Site operations use high water volumes; site is not connected to water supply
- Remote from sewer supply
- Parts of site do not meet OH&S and Code Requirements
- Security and signage are identified with areas for improvement
- The entire site is mapped as being 'flood prone land'
- Land surrounding the developed area of the site is within State Environmental Planning Policy 14 - Coastal Wetlands Act 1994 (includes mangroves and certain species of flora and fauna)
- Boat Storage and fuelling facilities at a distance from water

Port-Stephens Fisheries Centre - Opportunities and Constraints

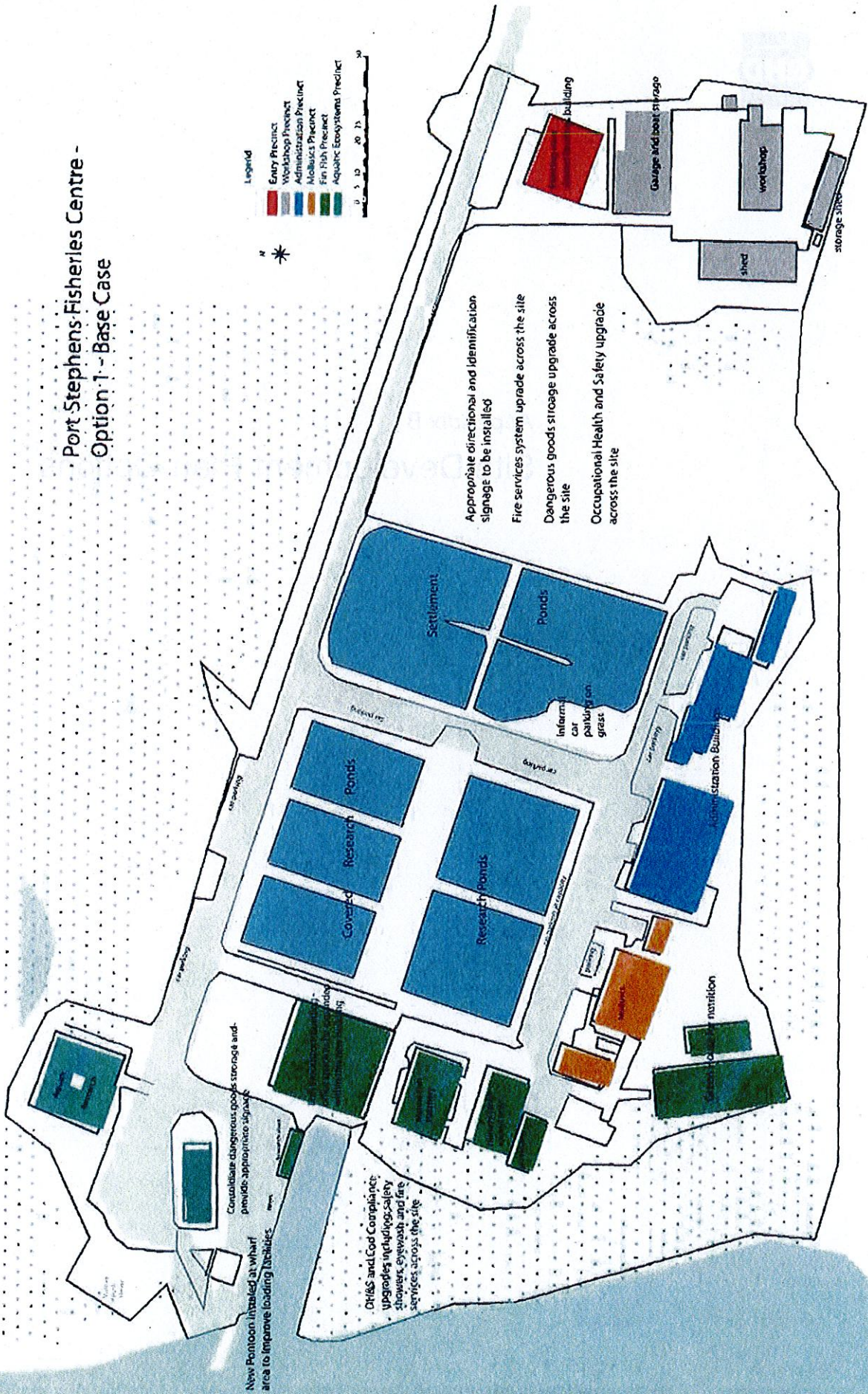


Tilligerry Creek



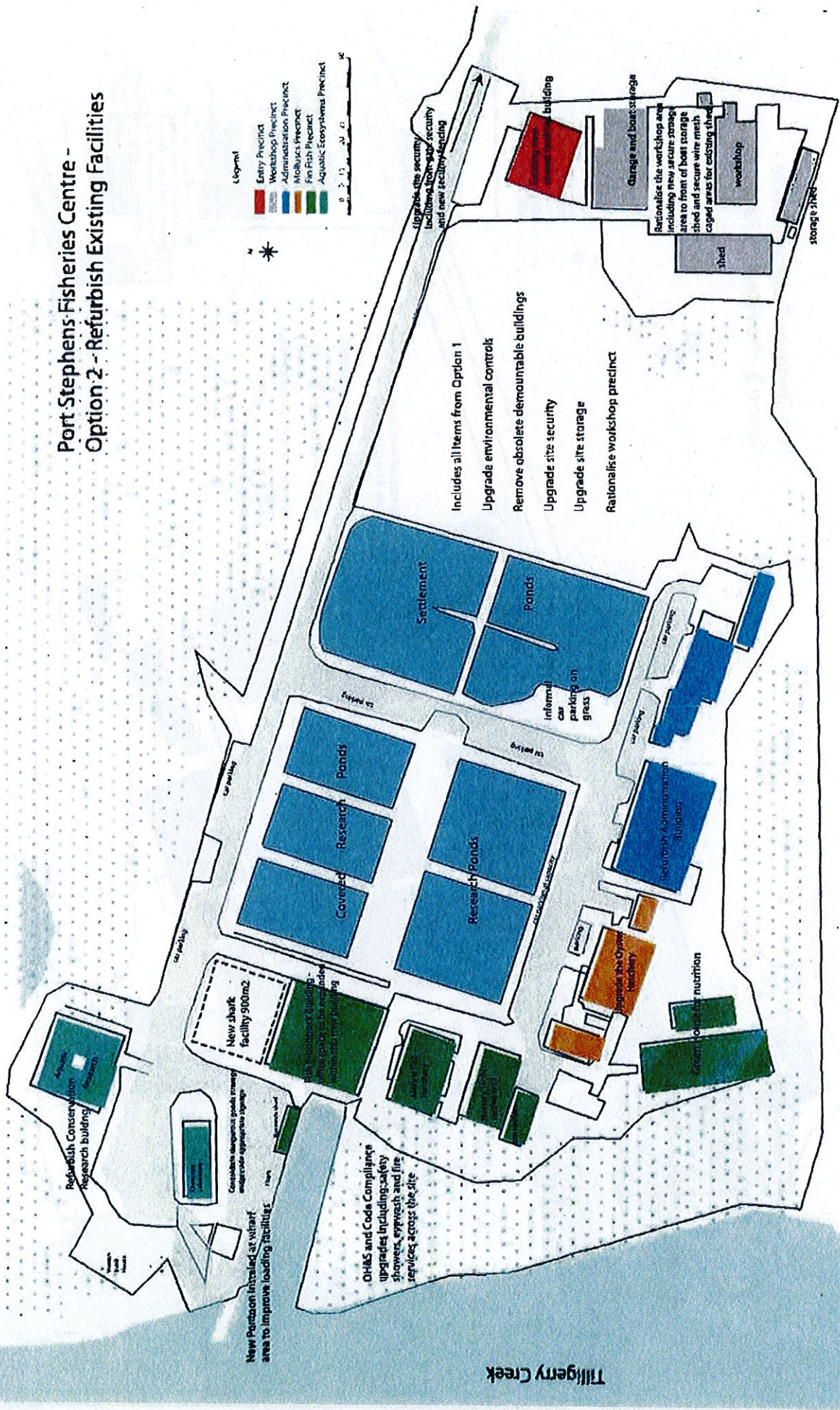
Appendix B
Site Development Plan Options

Port Stephens Fisheries Centre - Option 1 - Base Case



Tilligerry Creek

Port Stephens Fisheries Centre - Option 2 - Refurbish Existing Facilities



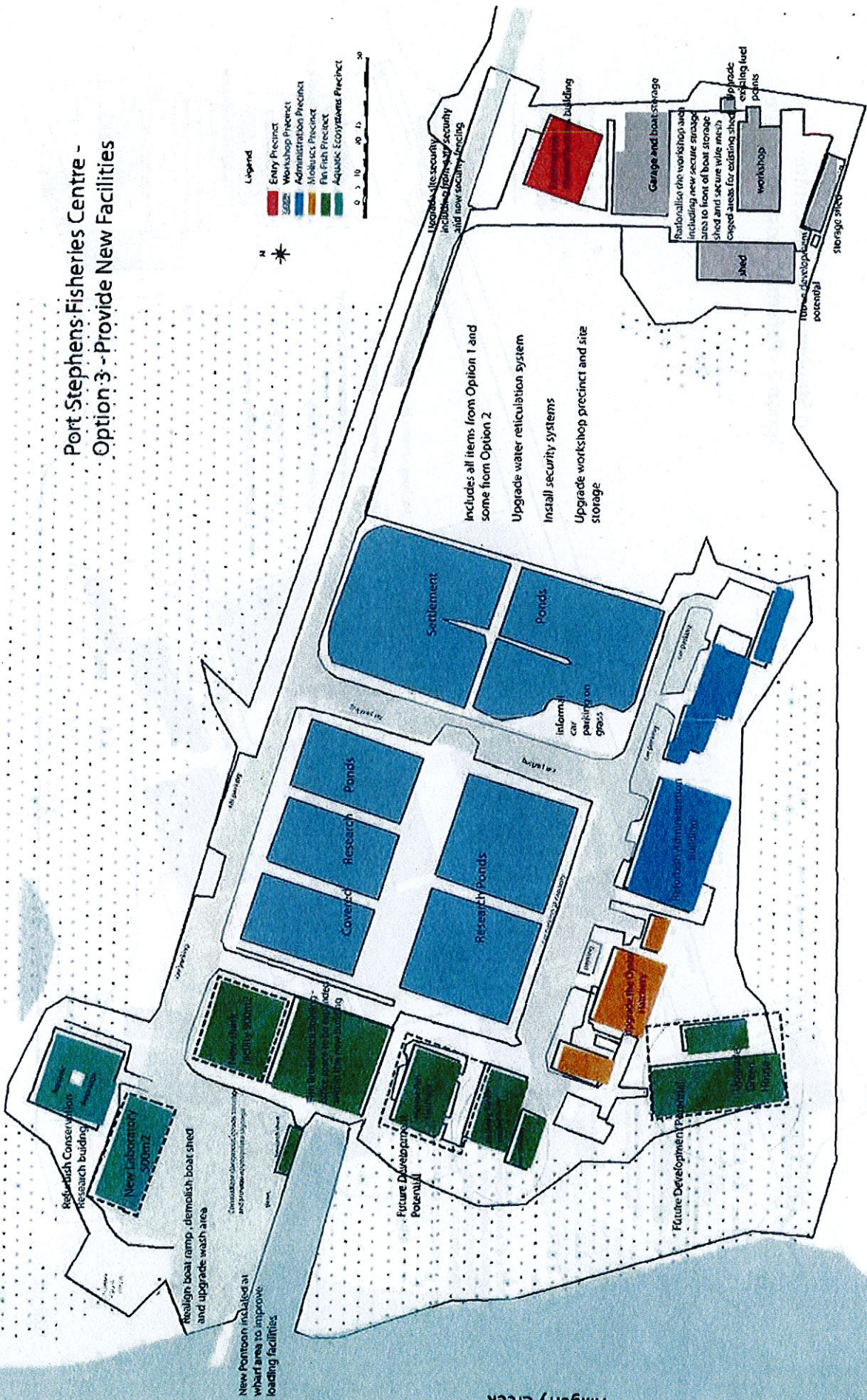
Legend

- Entry Precinct
- Workshop Precinct
- Administration Precinct
- Molluscs Precinct
- Fin Fish Precinct
- Aquatic Ecosystems Precinct

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Tilligerry Creek

Port Stephens Fisheries Centre - Option 3 - Provide New Facilities



Legend

- Entry Precinct
- Workshop Precinct
- Administration Precinct
- Modulus Precinct
- Fin Fish Precinct
- Aquatic Ecosystems Precinct

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Tilligerry Creek



Appendix C
Indicative Cost Estimates

Trade Breakup

Job Name : <u>3207DPI BUDGET1</u>	Job Description
Client's Name:	PORT STEPHENS, NSW UPGRADE FISHERIES CENTRE INITIAL BUDGET ESTIMATE 32/07 - 29 JUNE 2007

Item No.	Item Description	Quantity	Unit	Rate	Mark Up %	Amount
<i>Trade : 1 <u>OPTION 1 - DO NOTHING (BASE CASE)</u></i>						
<u>OPTION 1 - DO NOTHING (BASE CASE)</u>						
<u>Element 1 - Occupational Health and Safety Upgrade</u>						
1	New safety showers and eyewash to comply with relevant codes (Assume 15no.)	15.00	no	5,000.00		75,000.00
2	Sundries	1.00	item	15,000.00		15,000.00
3	Subtotal					<u>90,000.00</u>
<u>Element 2 - Upgrade Dangerous Goods Storage</u>						
4	Assume 4no. masonry facilities and 4no. open covered facilities		Note			
<u>Masonry Enclosed Facilities (4no)</u>						
5	Ground slab	64.00	m2	180.00		11,520.00
6	190 Block walls	180.00	m2	220.00		39,600.00
7	Doors	4.00	no	1,200.00		4,800.00
8	Roof complete	64.00	m2	220.00		14,080.00
9	Shelving	4.00	no	3,600.00		14,400.00
10	Lighting and incoming power	4.00	no	850.00		3,400.00
11	Mechanical ventilation	4.00	no	650.00		2,600.00
12	Signage	4.00	no	250.00		1,000.00
13	Drainage	4.00	no	650.00		2,600.00
<u>Open Covered Facilities (4no.)</u>						
14	Ground slab	136.00	m2	120.00		16,320.00
15	Columns	136.00	m2	40.00		5,440.00
16	Roof complete	136.00	m2	220.00		29,920.00
17	Chain wire mesh	251.00	m2	80.00		20,080.00
18	EO for gates	4.00	no	900.00		3,600.00
19	Racking for gas bottles etc.	4.00	no	2,200.00		8,800.00
20	Lighting and incoming power	4.00	no	4,160.00		16,640.00
21	Signage	4.00	no	250.00		1,000.00
22	Drainage	4.00	no	900.00		3,600.00
23	Sundries	1.00	item	5,600.00		5,600.00
24	Total					<u>205,000.00</u>

Trade Breakup

Job Name : <u>3207DPI BUDGET1</u> Client's Name:	Job Description PORT STEPHENS, NSW UPGRADE FISHERIES CENTRE INITIAL BUDGET ESTIMATE 32/07 - 29 JUNE 2007
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Item No.	Item Description	Quantity	Unit	Rate	Mark Up %	Amount
<i>Trade: 1 <u>OPTION 1 - DO NOTHING (BASE CASE)</u></i>						<i>(Continued)</i>
<u>Element 3 - Fire Service Systems Upgrade</u>						
25	Allow to upgrade pipework, provide additional hydrants etc. (PROVISIONAL ALLOWANCE ONLY)	1.00	item	200,000.00		200,000.00
26	Subtotal					<u>200,000.00</u>
<u>Element 4 - Signage Upgrade</u>						
27	Upgrade site signage and way finding	1.00	item	15,000.00		15,000.00
28	Subtotal					<u>15,000.00</u>
<u>Element 5 - Upgrade Jetty</u>						
<u>Floating pontoon</u>						
29	Gangway	1.00	item	10,000.00		10,000.00
30	Pontoon	19.00	m2	1,025.00		19,475.00
31	Piles	2.00	no	5,000.00		10,000.00
32	Allow for work at existing jetty	1.00	item	10,000.00		10,000.00
33	Sundries		item			525.00
34	Subtotal					<u>50,000.00</u>
<u>Element 6 - Fish Broodstock Building Office Extension</u>						
35	Extension to be built in existing space		Note			
36	Internal walls	18.00	m	400.00		7,200.00
37	Window	1.00	item	1,200.00		1,200.00
38	Door, frame and hardware	1.00	no	1,100.00		1,100.00
39	Floor finishes	25.00	m2	80.00		2,000.00
40	Ceiling finishes	25.00	m2	120.00		3,000.00
41	Workstations say	3.00	no	3,000.00		9,000.00
42	Fitments	1.00	item	2,000.00		2,000.00
43	Lighting and power	25.00	m2	120.00		3,000.00
44	Data and comms	1.00	item	1,200.00		1,200.00
45	Fire	1.00	item	625.00		625.00
46	Split A/C	1.00	item	3,800.00		3,800.00
47	Allow for interface between existing area and new	1.00	item	4,000.00		4,000.00
48	EO for toilet	1.00	item	15,000.00		15,000.00

Trade Breakup

Job Name : <u>3207DPI BUDGET1</u>	<u>Job Description</u>
Client's Name:	PORT STEPHENS, NSW UPGRADE FISHERIES CENTRE INITIAL BUDGET ESTIMATE 32/07 - 29 JUNE 2007

Item No.	Item Description	Quantity	Unit	Rate	Mark Up %	Amount
<i>Trade : 1 <u>OPTION 1 - DO NOTHING (BASE CASE)</u></i>						<i>(Continued)</i>
49	Allow for external services	1.00	item	8,000.00		8,000.00
50	Sundries	1.00	item	875.00		875.00
51	Subtotal					<u>62,000.00</u>
52	Total Nett Trade Cost					<u>622,000.00</u>
	<u>Location Allowance</u>					
53	Location Allowance - 5%	1.00	item	31,100.00		31,100.00
54	Total Nett Trade Works					<u>653,100.00</u>
	<u>Preliminaries and Profit</u>					
55	Preliminaries and Profit (16%)	1.00	item	104,496.00		104,496.00
56	Total Trade Works including Preliminaries					<u>653,100.00</u>
	<u>Other Costs</u>					
57	Allow for staging costs	1.00	item			NIL
58	Management and Design Fees (12%)	1.00	item	90,911.52		90,911.52
59	Contingency (15%)	1.00	item	127,276.13		127,276.13
60	Total Estimate at June 2007 prices (excluding escalation and GST)					<u>975,783.65</u>
61						-783.65
62						
63	Estimate Report:					
64	The initial budget estimate has been based upon the following:					
65	- Verbal briefing from GHD					
66						
67						
68	Exclusions:					
69	GST					
70	Escalation beyond the date of estimate					
71	Asbestos removal					
72	Public Works management fee					
<u>OPTION 1 - DO NOTHING (BASE CASE)</u>						Total : 975,000.00

Trade Breakup

Job Name : <u>3207DPI BUDGET1</u>	Job Description PORT STEPHENS, NSW UPGRADE FISHERIES CENTRE INITIAL BUDGET ESTIMATE 32/07 - 29 JUNE 2007
Client's Name:	

Item No.	Item Description	Quantity	Unit	Rate	Mark Up %	Amount
Trade : 2 <u>OPTION 2 - REFURBISH EXISTING FACILITIES</u>						
	<u>OPTION 2 - REFURBISH EXISTING FACILITIES</u>					
1	Element 1 - All items included in option 1	1.00	item	622,000.00		622,000.00
2	Subtotal					<u>622,000.00</u>
	<u>Element 2 - Refurbish the Conservation Research Building</u>					
3	Area	625.00	m2			
	<u>Externally</u>					
4	Allow for external work refurbishment including repainting fascia/soffit	1.00	item	10,108.00		10,108.00
	<u>Internally</u>					
5	General demolition works including making good where required	625.00	m2	25.00		15,625.00
6	Allow for sundry BCA/OH&S works internally	1.00	item	31,250.00		31,250.00
7	New internal walls	625.00	m2	90.00		56,250.00
8	Allow for new fitments in admin areas, storage, reception etc.	1.00	item	28,125.00		28,125.00
9	Workstations/office desks	30.00	no	3,000.00		90,000.00
10	Remove and replace floor finishes	625.00	m2	65.00		40,625.00
11	Repair and repaint ceiling	625.00	m2	12.00		7,500.00
12	Repair and repaint internal walls and doors throughout	625.00	m2	16.00		10,000.00
13	Replace venetian blinds	1.00	item	15,200.00		15,200.00
14	New kitchenette fitout	1.00	item	12,000.00		12,000.00
15	Whitegoods to kitchenette	1.00	item	3,500.00		3,500.00
16	EO for upgrading toilets	1.00	item	38,000.00		38,000.00
17	Upgrade airconditioning	625.00	m2	200.00		125,000.00
18	Modify/new light and power	625.00	m2	120.00		75,000.00
19	Upgrade/alter fire services	625.00	m2	25.00		15,625.00
20	Upgrade/alter data and comms	625.00	m2	65.00		40,625.00
21	BWIC to above including replacement of ceilings for access where required	1.00	item	31,250.00		31,250.00
22	New loose furniture and fitting in working accommodation	625.00	m2	60.00		37,500.00
23	Sundries	1.00	item	817.00		817.00
24	Subtotal					<u>684,000.00</u>

Trade Breakup

Job Name : <u>3207DPI BUDGET1</u>	Job Description PORT STEPHENS, NSW UPGRADE FISHERIES CENTRE INITIAL BUDGET ESTIMATE 32/07 - 29 JUNE 2007
Client's Name:	

Item No.	Item Description	Quantity	Unit	Rate	Mark	Amount
					Up %	
Trade : 2 <u>OPTION 2 - REFURBISH EXISTING FACILITIES</u>						<i>(Continued)</i>
	<u>Element 3 - Refurbish the Administration Building</u>					
25	Area	1,000.00	m2			
	<u>Externally</u>					
26	Allow for external refurbishment work including repainting fascia/soffit	1.00	item	10,108.00		10,108.00
	<u>Internally</u>					
27	General demolition works including making good where required	1,000.00	m2	25.00		25,000.00
28	Allow for minor BCA/OH&S works internally	1.00	item	12,500.00		12,500.00
29	New internal walls	1,000.00	m2	90.00		90,000.00
30	Allow for new fitments in admin areas, storage, reception etc.	1.00	item	28,125.00		28,125.00
31	Workstations/office desks	45.00	no	3,000.00		135,000.00
32	Remove and replace floor finishes	1,000.00	m2	65.00		65,000.00
33	Repair and repaint ceiling	1,000.00	m2	12.00		12,000.00
34	Repair and repaint internal walls and doors throughout	1,000.00	m2	16.00		16,000.00
35	Replace venetian blinds	1.00	item	15,800.00		15,800.00
36	New kitchenette fitout	1.00	item			EXCL
37	Whitegoods to kitchenette	1.00	item			EXCL
38	EO for upgrading toilets	1.00	item			EXCL
39	Modify airconditioning for chum	1,000.00	m2	60.00		60,000.00
40	Modify/new light and power for chum	1,000.00	m2	45.00		45,000.00
41	Modify/new fire services for chum	1,000.00	m2	12.00		12,000.00
42	Modify/new data and contms for chum	1,000.00	m2	35.00		35,000.00
43	BWIC to above including replacement of ceilings for access where required	1.00	item	15,625.00		15,625.00
44	New loose furniture and fitting in working accommodation	1,000.00	m2			EXCL
45	Sundries	1.00	item	842.00		842.00
46	Subtotal					<u>578,000.00</u>
	<u>Element 4 - Upgrade the Chemistry Laboratory</u>					
47	Area	200.00	m2			
	<u>Externally</u>					

Trade Breakup

Job Name : <u>3207DPI BUDGET1</u>	Job Description
Client's Name:	PORT STEPHENS, NSW UPGRADE FISHERIES CENTRE INITIAL BUDGET ESTIMATE 32/07 - 29 JUNE 2007

Item No.	Item Description	Quantity	Unit	Rate	Mark	Amount	Up %
<i>Trade : 2 <u>OPTION 2 - REFURBISH EXISTING FACILITIES</u></i>						<i>(Continued)</i>	
48	Allow for external refurbishment work including replacing gutters and fascias, windows <u>Internally</u>	1.00	item	35,000.00		35,000.00	
49	General demolition works including making good where required	200.00	m2	45.00		9,000.00	
50	Allow for sundry BCA/OH&S works internally	1.00	item	16,000.00		16,000.00	
51	New internal walls	200.00	m2	150.00		30,000.00	
52	New lab benches	200.00	m2	384.16		76,832.00	
53	Replace floor finishes	200.00	m2	120.00		24,000.00	
54	Repair and repaint throughout	200.00	m2	75.00		15,000.00	
55	New kitchenette fitout	1.00	item	12,000.00		12,000.00	
56	Whitegoods to kitchenette	1.00	item	3,500.00		3,500.00	
57	EO for upgrading toilets	1.00	item	17,000.00		17,000.00	
58	Safety shower and eyewash	3.00	item	5,000.00		15,000.00	
59	New air conditioning	200.00	m2	400.00		80,000.00	
60	Laboratory gases etc.	200.00	m2	100.00		20,000.00	
61	New fume cpbs		no			EXCL.	
62	New hydraulics	200.00	m2	500.00		100,000.00	
63	New light and power	200.00	m2	400.00		80,000.00	
64	New fire services	200.00	m2	250.00		50,000.00	
65	New data and comms	200.00	m2	55.00		11,000.00	
66	BWIC to above including saw cutting and breaking up ground slab for hydraulic access	1.00	item	20,000.00		20,000.00	
67	Loose furniture and fitting	200.00	m2	50.00		10,000.00	
68	Sundries	1.00	item	668.00		668.00	
69	Subtotal					<u>625,000.00</u>	
<u>Element 5 - Provide New Shark Facility</u>							
70	Area	900.00	m2				
71	Site preparation and bulk excavation	900.00	m2	10.00		9,000.00	
72	Ground slab including sub-base and thickenings	900.00	m2	106.00		95,400.00	
73	Drain and gratings at roller doors	16.00	m	180.00		2,880.00	

Trade Breakup

Job Name : <u>3207DPI BUDGET1</u>	Job Description PORT STEPHENS, NSW UPGRADE FISHERIES CENTRE INITIAL BUDGET ESTIMATE 32/07 - 29 JUNE 2007
Client's Name:	

Item No.	Item Description	Quantity	Unit	Rate	Mark Up %	Amount
<i>Trade : 2 OPTION 2 - REFURBISH EXISTING FACILITIES</i>						<i>(Continued)</i>
74	Colorbond industrial building comprising of external walls, roof, roller doors, entry doors and 150 ground slab	1.00	item	316,000.00		316,000.00
75	EO for pile footings and thickenings to suit tanks	900.00	m2	40.00		36,000.00
76	Eye wash and safety shower	1.00	item	5,000.00		5,000.00
77	Allow for special drainage	1.00	item	20,000.00		20,000.00
78	Light and power	900.00	m2	110.00		99,000.00
79	Switchboard	1.00	item	20,000.00		20,000.00
80	Fire protection	900.00	m2	30.00		27,000.00
81	External site power	1.00	item	5,000.00		5,000.00
82	External hydraulics	1.00	item	30,000.00		30,000.00
83	External drainage including water tank	1.00	item	18,000.00		18,000.00
84	EO for shark/fish autopsy area	150.00	m2	1,295.00		194,250.00
85	EO for gantry crane	1.00	item	55,000.00		55,000.00
86	EO for clean room	50.00	m2	1,680.00		84,000.00
87	EO for shark nursery	50.00	m2	905.00		45,250.00
88	EO for aquarium room	100.00	m2	745.00		74,500.00
89	EO for quarantine facility	200.00	m2	1,290.00		258,000.00
90	EO for storage	100.00	m2	250.00		25,000.00
91	EO for toilet	1.00	item	15,000.00		15,000.00
92	EO for office accommodation	50.00	m2	1,028.00		51,400.00
93	Sundries	1.00	item	20,320.00		20,320.00
94	Subtotal					<u>1,506,000.00</u>
	<u>Element 6 - Upgrade Oyster Hatchery</u>					
95	Reconfigure lower floor laboratory space	150.00	m2			
96	Demolish existing steel tanks	1.00	item	8,000.00		8,000.00
97	Break up and remove existing concrete plinths	1.00	item	5,000.00		5,000.00
98	Make good existing floor	150.00	m2	35.00		5,250.00
99	Sundries	1.00	item	750.00		750.00
100	Subtotal					<u>19,000.00</u>
	<u>Element 7 - Greenhouse</u>					

Trade Breakup

Job Name : <u>3207DPI BUDGET1</u>	<u>Job Description</u>
Client's Name:	PORT STEPHENS, NSW UPGRADE FISHERIES CENTRE INITIAL BUDGET ESTIMATE 32/07 - 29 JUNE 2007

Item No.	Item Description	Quantity	Unit	Rate	Mark	Amount	Up %
<i>Trade : 2 <u>OPTION 2 - REFURBISH EXISTING FACILITIES</u></i>							<i>(Continued)</i>
101	Replace blinds to greenhouse (measured on plan)	650.00	m2	37.50		24,375.00	
102	Allow for minor upgrading works	1.00	item	5,000.00		5,000.00	
103	Sundries	1.00	item	2,625.00		2,625.00	
104	Subtotal					<u>32,000.00</u>	
<u>Element 8 - Rationalise Workshop Precinct</u>							
105	Provide new secure storage to front of garage/boat storage including new roller door and wire cages	1.00	item	11,000.00		11,000.00	
106	New wire mesh caged areas in existing shed	1.00	item	14,000.00		14,000.00	
107	Subtotal					<u>25,000.00</u>	
<u>Element 9 - Rationalise Demountable Buildings</u>							
108	Disconnect and remove existing demountable buildings	250.00	m2	35.00		8,750.00	
109	Grub-up and remove footings	250.00	m2	20.00		5,000.00	
110	Sundries	1.00	item	250.00		250.00	
111	Subtotal					<u>14,000.00</u>	
<u>Element 10 - Upgrade Environmental Controls</u>							
112	Demolish existing	100.00	m2	20.00		2,000.00	
113	Provide bunding and slab	1.00	item	16,500.00		16,500.00	
114	EO for petrol and oil interceptor	1.00	item	20,000.00		20,000.00	
115	Allowance to pressure test underground concrete fuel storage tank	1.00	item	2,000.00		2,000.00	
116	Sundries	1.00	item	500.00		500.00	
117	Subtotal					<u>41,000.00</u>	
<u>Element 11 - Upgrade Site Security</u>							
118	Demolish existing fence	1.00	item	5,000.00		5,000.00	
119	New security fence	500.00	m	100.00		50,000.00	
120	Allow for one security camera to front gate and digital video recorder	1.00	item	15,000.00		15,000.00	
121	Subtotal					<u>55,000.00</u>	
<u>Element 12 - Upgrade Site Storage</u>							
122	Rationalise existing storage including providing secure chain wire mesh bays	1.00	item	20,000.00		20,000.00	
123	Subtotal					<u>20,000.00</u>	

Trade Breakup

Job Name : <u>3207DPI BUDGET1</u>	Job Description PORT STEPHENS, NSW UPGRADE FISHERIES CENTRE INITIAL BUDGET ESTIMATE 32/07 - 29 JUNE 2007
Client's Name:	

Item No.	Item Description	Quantity	Unit	Rate	Mark Up %	Amount
<i>Trade :</i> 2 <u>OPTION 2 - REFURBISH EXISTING FACILITIES</u>						<i>(Continued)</i>
124	Total Nett Trade Cost					<u>4,236,000.00</u>
	<u>Location Allowance</u>					
125	Location Allowance - 5%	1.00	item	211,800.00		211,800.00
126	Total Nett Trade Works					<u>4,447,800.00</u>
	<u>Preliminaries and Profit</u>					
127	Preliminaries and Profit (16%)	1.00	item	711,648.00		711,648.00
128	Total Trade Works including Preliminaries					<u>4,447,800.00</u>
	<u>Other Costs</u>					
129	Allow for staging costs	1.00	item			NIL
130	Management and Design Fees (12%)	1.00	item	619,133.76		619,133.76
131	Contingency (15%)	1.00	item	773,917.20		773,917.20
132	Total Estimate at June 2007 prices (excluding escalation and GST)					<u>6,552,498.96</u>
133						-498.96
134						
135	Estimate Report:					
136	The initial budget estimate has been based upon the following:					
137	- Verbal briefing from GHD					
138						
139						
140						
141						
142	Exclusions:					
143	GST					
144	Escalation beyond the date of estimate					
145	Asbestos removal					
146	Public Works management fee					
147	Tanks, pipework and associated heating and cooling					
<u>OPTION 2 - REFURBISH EXISTING FACILITIES</u>						Total : 6,552,000.00

Trade Breakup

Job Name : <u>3207DPI BUDGET1</u> Client's Name:	Job Description PORT STEPHENS, NSW UPGRADE FISHERIES CENTRE INITIAL BUDGET ESTIMATE 32/07 - 29 JUNE 2007
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Item No.	Item Description	Quantity	Unit	Rate	Mark Up %	Amount
Trade : 3 <u>OPTION 3 - PROVIDE NEW FACILITIES</u>						
<u>OPTION 3 - PROVIDE NEW FACILITIES</u>						
1	Element 1 - All items included in option 1	1.00	item	622,000.00		622,000.00
2	Selected items from option 2 - Items 2, 3, 5, 6, 8, 9, 11	1.00	item	2,881,000.00		2,881,000.00
3	Subtotal					<u>3,503,000.00</u>
<u>Element 3 - New Chemical Laboratory</u>						
4	Area	200.00	m2			
5	Demolition of existing laboratory	200.00	m2	130.00		26,000.00
6	Demolish existing septic tank	1.00	item	500.00		500.00
7	New multi-purpose shared laboratory facility	500.00	m2	4,100.00		2,050,000.00
8	EO for suspended ground slab and piers (ie above flood level)	500.00	m2	154.00		77,000.00
9	Main entry stairs	1.00	item	5,000.00		5,000.00
10	External escape stairs	1.00	item	2,500.00		2,500.00
11	External entry ramp	1.00	item	16,000.00		16,000.00
12	Allow for external services	1.00	item	65,000.00		65,000.00
13	Subtotal					<u>2,242,000.00</u>
<u>Element 4 - Upgrade Wharf Precinct</u>						
<u>Demolition and Make Good</u>						
14	Demolish existing boat shed	75.00	m2	20.00		1,500.00
15	Demolish existing ground slab and footings	75.00	m2	18.00		1,350.00
16	Demolish existing 'round about'	1.00	item	3,000.00		3,000.00
17	New hardstand	801.00	m2	90.00		72,090.00
18	Upgrade existing	2,199.00	m2	35.00		76,965.00
19	Allow for stormwater drainage modifications	1.00	item	10,000.00		10,000.00
<u>Ramp</u>						
20	Allow for demolition of existing boat ramp	1.00	item	5,000.00		5,000.00
21	Allow for new boat ramp approx. 25 metres long x 5 metres wide	1.00	item	80,000.00		80,000.00
<u>Boat Wash Point</u>						
22	Provide bunding and slab	1.00	item	11,900.00		11,900.00
23	EO for petrol and oil interceptor	1.00	item	25,000.00		25,000.00

Trade Breakup

Job Name : 3207DPI BUDGET1	Job Description
Client's Name:	PORT STEPHENS, NSW UPGRADE FISHERIES CENTRE INITIAL BUDGET ESTIMATE 32/07 - 29 JUNE 2007

Item No.	Item Description	Quantity	Unit	Rate	Mark Up %	Amount
Trade : 3 OPTION 3 - PROVIDE NEW FACILITIES						<i>(Continued)</i>
24	New shelter	1.00	item	18,400.00		18,400.00
25	Sundries	1.00	item	795.00		795.00
26	Subtotal					<u>306,000.00</u>
<u>Element 5 - Upgrade Research Precinct</u>						
<u>Demolition</u>						
27	Demolish existing greenhouse	650.00	m2	25.00		16,250.00
28	Demolish existing Bass hatchery	400.00	m2	35.00		14,000.00
29	Demolish existing ground slab and footings	1,100.00	m2	18.00		19,800.00
30	Demolish existing nursery tanks and shelter	1.00	item	15,413.00		15,413.00
<u>Fin Fish Building</u>						
31	Area	900.00	m2			
32	Site preparation and bulk excavation	900.00	m2	20.00		18,000.00
33	Drain and gratings at roller doors	16.00	m	180.00		2,880.00
34	Colorbond industrial building comprising of external walls, roof, roller doors, entry doors and 150 ground slab	1.00	item	316,000.00		316,000.00
35	EO for pile footings and thickenings to suit tanks	900.00	m2	40.00		36,000.00
36	Eye wash and safety shower	1.00	item	5,000.00		5,000.00
37	Allow for special drainage	1.00	item	20,000.00		20,000.00
38	Light and power	900.00	m2	110.00		99,000.00
39	Switchboard	1.00	item	20,000.00		20,000.00
40	Fire protection	900.00	m2	30.00		27,000.00
41	External site power	1.00	item	5,000.00		5,000.00
42	External drainage including water tank	1.00	item	18,000.00		18,000.00
43	EO for office space	25.00	m2	1,585.00		39,625.00
44	Retaining wall	70.00	m	600.00		42,000.00
<u>Fish Nutrition and Breeding</u>						
45	Area	600.00	m2			
46	Site preparation and bulk excavation	600.00	m2	10.00		6,000.00
47	Drain and gratings at roller doors	16.00	m	180.00		2,880.00

Trade Breakup

Job Name : <u>3207DPI BUDGET1</u>	Job Description PORT STEPHENS, NSW UPGRADE FISHERIES CENTRE INITIAL BUDGET ESTIMATE 32/07 - 29 JUNE 2007
Client's Name:	

Item No.	Item Description	Quantity	Unit	Rate	Mark	Amount	Up %
<i>Trade :</i> 3 <u>OPTION 3 - PROVIDE NEW FACILITIES</u>						<i>(Continued)</i>	
48	Colorbond industrial building comprising of external walls, roof, roller doors, entry doors and 150 ground slab	1.00	item	211,000.00		211,000.00	
49	EO for pile footings and thickenings to suit tanks	600.00	m2	40.00		24,000.00	
50	Eye wash and safety shower	1.00	item	5,000.00		5,000.00	
51	Allow for special drainage	1.00	item	20,000.00		20,000.00	
52	Light and power	600.00	m2	110.00		66,000.00	
53	Switchboard	1.00	item	20,000.00		20,000.00	
54	Fire protection	600.00	m2	30.00		18,000.00	
55	External site power	1.00	item	5,000.00		5,000.00	
56	External drainage including water tank	1.00	item	18,000.00		18,000.00	
57	EO for office space	25.00	m2	1,028.00		25,700.00	
58	EO for conditioned space to Bass hatchery	100.00	m2	700.00		70,000.00	
59	Sundries		item			452.00	
60	Subtotal					<u>1,206,000.00</u>	
<u>Element 6 - Upgrade Workshop Precinct</u>							
<u>Refurbish Existing</u>							
61	Refurbish existing sheds and workshop buildings	1,550.00	m2	80.00		124,000.00	
<u>New Workshops and Secure Storage</u>							
62	Area	600.00	m2				
63	Site preparation and bulk excavation	600.00	m2	15.00		9,000.00	
64	Colorbond shed comprising of 150 thick concrete slab, external walls, roof, roller doors and entry doors	1.00	item	180,600.00		180,600.00	
65	Sundry fitout	600.00	m2	100.00		60,000.00	
66	Light and power	600.00	m2	80.00		48,000.00	
67	Switchboard	1.00	item	10,000.00		10,000.00	
68	Fire protection	600.00	m2	30.00		18,000.00	
69	External site power	1.00	item	5,000.00		5,000.00	
70	External drainage including water tank	1.00	item	12,000.00		12,000.00	
71	Sundries	1.00	item	400.00		400.00	
72	Subtotal					<u>467,000.00</u>	

Trade Breakup

Job Name : <u>3207DPI BUDGET1</u>	Job Description PORT STEPHENS, NSW UPGRADE FISHERIES CENTRE INITIAL BUDGET ESTIMATE 32/07 - 29 JUNE 2007
Client's Name:	

Item No.	Item Description	Quantity	Unit	Rate	Mark	Amount
						Up %
Trade : 3 OPTION 3 - PROVIDE NEW FACILITIES						<i>(Continued)</i>
<u>Element 7 - Replace Fuel Facility</u>						
73	Demolish existing paving	100.00	m2	20.00		2,000.00
74	Provide bunding and slab	1.00	item	16,500.00		16,500.00
75	EO for petrol and oil interceptor	1.00	item	20,000.00		20,000.00
76	Demolish and make good existing fuel tank and bowser	1.00	item	30,000.00		30,000.00
77	New in ground fuel tank (2 x 25,000 lt tanks)	2.00	no	50,000.00		100,000.00
78	New bowser and associated pipe work	1.00	item	42,750.00		42,750.00
79	External power and hydraulics (including bowser lighting, lightning protection etc.)	1.00	item	38,875.00		38,875.00
80	Sundries	1.00	item	875.00		875.00
81	Subtotal					<u>251,000.00</u>
<u>Element 8 - Upgrade Water Reticulation System</u>						
82	Undertake site wide review	1.00	item	30,000.00		30,000.00
83	Upgrade pipework and water treatment (PROVISIONAL ALLOWANCE ONLY)	1.00	item	200,000.00		200,000.00
84	Disconnect from one existing bore	1.00	item	2,000.00		2,000.00
<u>Connect to Town Water</u>						
85	Hunter water fee	1.00	item	59,438.00		59,438.00
86	100 Water main including trenching and backfilling	846.00	m	200.00		169,200.00
87	50 Branch	100.00	m	80.00		8,000.00
88	Allow for valves/water meters etc.	1.00	item	10,000.00		10,000.00
89	Sundries	1.00	item	20,362.00		20,362.00
90	Subtotal					<u>499,000.00</u>
<u>Element 9 - Upgrade Site Security</u>						
<u>Upgrade access control and intruder detection to:</u>						
91	Main Administration Building	1.00	item	35,000.00		35,000.00
92	Conservation Research	1.00	item	25,000.00		25,000.00
93	Visitors Centre	1.00	item	24,000.00		24,000.00
94	Fish Broodstock Building	1.00	item	13,500.00		13,500.00
95	Oyster Hatchery	1.00	item	12,000.00		12,000.00
96	New Chemical Laboratory	1.00	item	20,000.00		20,000.00

Trade Breakup

Job Name : <u>3207DPI BUDGET1</u>	Job Description PORT STEPHENS, NSW UPGRADE FISHERIES CENTRE INITIAL BUDGET ESTIMATE 32/07 - 29 JUNE 2007
Client's Name:	

Item No.	Item Description	Quantity	Unit	Rate	Mark	Amount	Up %
Trade : 3 OPTION 3 - PROVIDE NEW FACILITIES							<i>(Continued)</i>
97	Fin Fish Building	1.00	item	13,500.00		13,500.00	
98	Fish Nutrition and Breeding	1.00	item	9,000.00		9,000.00	
99	New Fisheries Building	1.00	item			EXCL	
100	Provide security camera's to main buildings and carpark (as advised by GHD - 2no.)	1.00	item	30,000.00		30,000.00	
101	Subtotal					<u>182,000.00</u>	
102	Total Nett Trade Cost					<u>8,656,000.00</u>	
	<u>Location Allowance</u>						
103	Location Allowance - 5%	1.00	item	432,800.00		432,800.00	
104	Total Nett Trade Works					<u>9,088,800.00</u>	
	<u>Preliminaries and Profit</u>						
105	Preliminaries and Profit (16%)	1.00	item	1,454,208.00		1,454,208.00	
106	Total Trade Works including Preliminaries					<u>10,543,008.00</u>	
	<u>Other Costs</u>						
107	Allow for staging costs	1.00	item			NIL	
108	Management and Design Fees (12%)	1.00	item	1,265,160.96		1,265,160.96	
109	Contingency (15%)	1.00	item	1,771,225.34		1,771,225.34	
110	Total Estimate at June 2007 prices (excluding escalation and GST)					<u>13,579,394.30</u>	
111						-394.30	
112							
113	Estimate Report:						
114	The initial budget estimate has been based upon the following:						
115	- Verbal briefing from GHD						
116							
117							
118	Exclusions:						
119	GST						
120	Escalation beyond the date of estimate						
121	Asbestos removal						
122	Public Works management fee						

Trade Breakup

Job Name : <u>3207DPI BUDGET1</u>	Job Description PORT STEPHENS, NSW UPGRADE FISHERIES CENTRE INITIAL BUDGET ESTIMATE 32/07 - 29 JUNE 2007
Client's Name:	

Item No.	Item Description	Quantity	Unit	Rate	Mark	Amount
					Up %	
<i>Trade :</i> 3 <u>OPTION 3 - PROVIDE NEW FACILITIES</u>						<i>(Continued)</i>
123	Tanks, pipework and associated heating and cooling					
<u>OPTION 3 - PROVIDE NEW FACILITIES</u>						Total : 13,579,000.00



Appendix D
Cost Benefit Analysis

WILDE
AND
WOOLLARD

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ABN 81 058 229 404



**NSW DEPARTMENT OF PRIMARY INDUSTRIES
PORT STEPHENS FISHERIES CENTRE**

COST BENEFIT ANALYSIS

Prepared by:
Wilde and Woollard Consultants Pty Ltd

For:
GHD Pty Ltd

June 2007

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PORT STEPHENS FISHERIES CENTRE COST BENEFIT ANALYSIS

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Attachments

Non-Discounted Cash Flows
Discounted Cash Flows
Options Incremental to Option 1
Sensitivity Analyses
Base Information Schedule

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PORT STEPHENS FISHERIES CENTRE COST BENEFIT ANALYSIS

1.1 Executive Summary

1.1.1 Summary

The purpose of this Cost Benefit Analysis is to analyse on a financial basis, in respect of the NSW Government and community, the proposal to upgrade and/or extend the existing Port Stephens Fisheries Centre, for the NSW Department of Primary Industries. Three options with different scope of works are to be considered.

The existing Fisheries Centre site is located at Jesse Island, Taylor's Beach in central coast New South Wales.

The scope of the works is described in the Stakeholder Discussion Paper "Site Development Plan and Economic Appraisal" prepared by GHD.

The results of the Cost Benefit Analysis indicate that to "do nothing" i.e. Option 1 – Minimal Works could have negative consequences on the operation of the facility, involving the probable loss of some research funding. Options 2 & 3 are both more costly on an incremental basis compared with Option 1 on a purely financial basis. Options 2 & 3 both require a significant capital input, but of these Option 3 has the far more favourable Internal Rate of Return, although both are negative. The sensitivity analysis shows that the ranking of these two options is not heavily influenced by the discount rate used or by the uncertain nature of funding influences caused by the works.

The effect of funding on the project – prospective loss in the case of Option 1, likely continuing level of funding in the case of Option 2, and possibility of increased funding and therefore increased research in the case of Option 3, is important regarding the expected results from the financial expenditure on each option.

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PORT STEPHENS FISHERIES CENTRE COST BENEFIT ANALYSIS

1.1 Executive Summary cont'd

1.1.2 Options Analysed

Option 1

This option (labelled "Do Nothing – Base Case") is actually an option of doing the minimal of necessary works at the complex to maintain the status quo as far as possible. It involves the remediation of urgent issues to ensure a safe working environment to comply with current legislation. In essence the work involves:-

- o Upgrading Safety Showers and Eyewash Facilities
- o Upgrading Dangerous Goods Storage
- o Upgrading Fire Services System
- o Upgrading Site Signage
- o Providing New Pontoon to Wharf Area
- o Small Office Extension to Fish Broodstock Building

The minimal scope of works in this option is likely to result in overall degradation of the facility with consequent loss of funding, staffing and resources to elsewhere.

Option 2

This option (labelled "Refurbish Existing Facilities") is a considerable upgrade to the existing facilities, with some minor extensions and new buildings. It addresses many key issues on the current site, impacting on organisational communication, efficiency and effectiveness, as well as OH&S and statutory requirements. The work involves:-

- o Upgrading Safety Showers and Eyewash Facilities
- o Upgrading Dangerous Goods Storage
- o Upgrading Fire Services System
- o Upgrading Site Signage
- o Providing New Pontoon to Wharf Area
- o Small Office Extension to Fish Broodstock Building
- o Refurbishing the Conservation Research Building
- o Refurbishing the Administration Building
- o Upgrading the Chemistry Laboratory
- o Providing a New Shark Facility
- o Upgrading the Oyster Hatchery
- o Upgrading the Greenhouse
- o Rationalising the Workshop Precinct
- o Rationalising Demountable Buildings
- o Upgrading Environmental Controls

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PORT STEPHENS FISHERIES CENTRE COST BENEFIT ANALYSIS

1.1 Executive Summary cont'd

1.1.2 Options Analysed cont'd

- o Upgrading Site Security
- o Upgrading Site Storage

The scope of works in this option is likely to result in funding levels to the facility being maintained at approximately current levels.

Option 3

This option (labelled "Provide New Facilities") involves almost all the works involved in Options 1 & 2 plus the construction of a new chemical laboratory and various new buildings associated with the upgrading of the research precinct, as well as considerable upgrading of existing facilities. It fully satisfies the user requirement and would address all significant issues on the site in the medium term providing flexible facilities and opportunity for excellent service delivery outcomes.

The work involves:-

- o Upgrading Safety Showers and Eyewash Facilities
- o Upgrading Dangerous Goods Storage
- o Upgrading Fire Services System
- o Upgrading Site Signage
- o Providing New Pontoon to Wharf Area
- o Small Office Extension to Fish Broodstock Building
- o Refurbishing the Conservation Research Building
- o Refurbishing the Administration Building
- o Providing a New Shark Facility
- o Upgrading the Oyster Hatchery
- o Rationalising the Workshop Precinct
- o Rationalising Demountable Buildings
- o New Chemical Laboratory
- o Upgrading Wharf Precinct
- o Upgrading Research Precinct
- o Upgrading Workshop Precinct
- o Replacing Fuel Facility
- o Upgrading Water Reticulation System
- o Upgrading Site Security

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PORT STEPHENS FISHERIES CENTRE COST BENEFIT ANALYSIS

1.1 Executive Summary cont'd

1.1.2 Options Analysed cont'd

The scope of works in this option xxxx is likely to result in the laboratories being able to achieve accreditation to ISO 9000, expansion and increased efficiency of existing operations with funding levels likely to be increased above current levels.

1.1.3 Program

The programming of the works has yet to be finalised. The Financial Analysis has been prepared on the following time basis:-

Year 1

- All Option 1 Works
- New Chemical Laboratory

Year 2

- New Shark Facility
- Refurbishing Administration Building
- Upgrading Water Reticulation System

Year 3

- Refurbishing Conservation Research Building
- Upgrading Oyster Hatchery

Year 4

- Upgrading Site Security
- Upgrading Wharf Precinct

Year 5

- Upgrading Research Precinct
- Remainder of Works

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**PORT STEPHENS FISHERIES CENTRE
COST BENEFIT ANALYSIS**

1.1 Executive Summary cont'd

1.1.3 Program cont'd

Refurbishment of new capital works at mid-life of a predicted 30-year life cycle, that is, in Years 16 to Year 20 depending on the timing in the above program.

1.2 Capital Costs

1.2.1 Cost Estimates

The initial capital costs, prepared by Wilde and Woollard, for the options analysed are detailed separately and are summarised as follows:- (Note all costs incorporated within the CBA are current day costs at June 2007 prices and exclude GST).

Option 1

	\$
Construction Costs excluding Design & Management Fees	870,000
Design & Management Fees	104,000
Total at June 2007 Prices (ex GST)	975,000

Option 2

	\$
Construction Costs excluding Design & Management Fees	5,840,000
Design & Management Fees	712,000
Total at June 2007 Prices (ex GST)	6,552,000

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PORT STEPHENS FISHERIES CENTRE COST BENEFIT ANALYSIS

1.2 Capital Costs cont'd

Option 3

Construction Costs excluding Design & Management Fees	\$ 12,124,000
Design & Management Fees	1,455,000
Total at June 2007 Prices (ex GST)	13,579,000

1.2.2 Cost Estimate Report

The above estimates include demolition, new works, preliminaries and profit, location allowance, management and design fees and contingency.

Costs **not included** are GST and escalation to tender, Public Works management fee, asbestos removal, replacement of existing laboratory equipment, consumables, stationery and the like.

Future Capital Costs

We envisage any future capital upgrade works for the new works in the options analysed to be at the midpoint in an assumed 30-year life. Within the 20-year study period this would be in Years 16-20 according to the construction program for each facility. Any other works required will be nominal and will be covered by general repairs and maintenance. Any substantial capital upgrade and refurbishment to existing buildings are cost-neutral over the options and are excluded from this study.

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PORT STEPHENS FISHERIES CENTRE COST BENEFIT ANALYSIS

1.3 Financial Analysis

1.3.1 Generally

The financial framework used for this analysis has been based upon the "New South Wales Treasury Economic Appraisal of Capital Works – Principles and Procedures Simplified, March 1999" as issued by the NSW Treasury and has been prepared from the perspective of New South Wales government and community.

The model is essentially a series of interlinked spreadsheets allowing for the build-up of various cost components.

The analysis has been prepared on a "differential" basis and is not a full cost model. All costs centres are the net position (ie. the net difference between the "status quo" and the "options"). Therefore items decreed to be cost neutral which would not change for the proposed options, are not included within the model.

By use of a discount rate (ie. Net Present Value – NPV) the model allows to account for the "whole of life" cost of the proposal over a time period.

The Net Present Value is calculated by subtracting the discounted total costs from the discounted total benefits.

The base discount rate used in the model is 7% as per the recommendations within "New South Wales Treasury Economic Appraisal of Capital Works – Principles and Procedures Simplified, March 1999" as issued by the NSW Treasury. We have also undertaken a sensitivity analysis at both 4% and 10%.

It should be noted an allowance has been included within the model for the residual value of new capital building works, as their life expectancy of 30 years is well beyond the study period of 20 years. Within the model all capital costs are assumed to be expended in Years 1-5 – refer to 1.1.3 Program above.

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PORT STEPHENS FISHERIES CENTRE COST BENEFIT ANALYSIS

1.3 Financial Analysis cont'd

1.3.1 Generally cont'd

All costs included within the analysis are at June 2007 prices and escalation and GST have been specifically **excluded** from the study.

The "New South Wales Treasury Economic Appraisal of Capital Works – Principles and Procedures Simplified, March 1999" recommends that a 20 year analysis is used, therefore our study is based upon that time period.

1.3.2 Cost Benefit Analysis Results

We set out below the results of the cost benefit analysis below.

Discount Rate	4.00%	7.00%	10.0%
	NPV \$	NPV \$	NPV \$
Option 1	-5,307,619	-4,392,015	-3,746,674
Option 2	-7,553,514	-6,877,439	-6,374,571
Option 3	-9,689,960	-9,956,897	-9,997,032

Of the options analysed, from a purely NPV financial view, Option 1 is the most favourable at all the discount rates used.

The Internal Rate of Return (IRR) for Option 2 is -69.44% and for Option 3 is -7.37%. Option 1 does not have a calculable Rate of Return. From an IRR perspective, Option 3 is the most favourable.

We have also done an analysis of Options 2 & 3 incremental to Option 1. This gives the results shown in the table below:

	Options Incremental to Option 1	
	Option 2	Option 3
Present Value Capital Costs \$M	5.858	12.005
Present Value Benefits \$M	3.373	6.440
Net Present Value \$M	-2.485	-5.565
NPV/Capital Costs	-0.42	-0.46
Benefit-Cost Ratio	0.58	0.54
Internal Rate of Return (IRR) %	-7.51	1.98

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PORT STEPHENS FISHERIES CENTRE COST BENEFIT ANALYSIS

1.3 Financial Analysis cont'd

1.3.3 Sensitivity Analysis

The cost benefit analysis was subject to a range of sensitivity analysis for each of the cost centres on the following basis.

Benefits

Increased Revenue	±50%
-------------------	------

Costs

Operating Costs	±20%
-----------------	------

Repairs and Maintenance	±15%
-------------------------	------

Capital Costs	±10%
---------------	------

Consultancy & Management Fees	±10%
-------------------------------	------

The results of the foregoing are detailed within the attachments.

The purpose of the sensitivity analysis is to determine how the results of the analysis will be affected by changes in the figures used for elements of the benefits and costs. These changes may occur because of actual costs being different from those used by reason of assumptions made, accuracy of estimates, available information, changing circumstances and the like.

A high variable rate of 50% has been used for the Increased Revenue element, this element being used for the effect of funding changes to the facilities because of the scope of works of each option. Refer to 1.3.4 Base Information for comments on possible funding changes.

The cost centres most sensitive to cost movement are the Increased Revenue and Capital Costs which have the following NPV range.

Option 1

Increased Revenue	\$1,686,252	at ±50% sensitivity
Capital Costs	\$87,074	at ±10% sensitivity

Option 2

Increased Revenue	\$nil	at ±50% sensitivity
Capital Costs	\$567,472	at ±10% sensitivity

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PORT STEPHENS FISHERIES CENTRE COST BENEFIT ANALYSIS

1.3 Financial Analysis cont'd

1.3.3 Sensitivity Analysis cont'd

Option 3

Increased Revenue	\$1,533,776	at ±50% sensitivity
Capital Costs	\$1,074,157	at ±10% sensitivity

This means that if the actual Increased Revenue were to vary from the basis used for the analysis by 50% in either direction, the NPV would vary by \$1,686,252 in that direction for Option 1 and \$1,533,776 for Option 3. This would not affect the ranking of Options.

If the actual Capital Costs were to vary from the basis used for the analysis by 10% in either direction, the NPV would vary by \$87,074 in that direction for Option 1, \$567,472 for Option 2 and \$1,074,157 for Option 3. This also would not affect the ranking of Options.

The other cost centres indicate relatively insignificant cost movement for the defined variations in cost.

These results indicate that on a purely financial basis, changes to funding and capital cost of the project would be the major cost drivers within the analysis.

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PORT STEPHENS FISHERIES CENTRE COST BENEFIT ANALYSIS

1.3 Financial Analysis cont'd

1.3.4 Base Information

Generally

All cost analysed within the model are at June 2007 prices.

Capital costings are outturn and include for preliminaries, location allowances, management and design fees where appropriate and contingency, but exclude escalation and GST.

All "recurrent" expenditures analysed within the model are a "net" position i.e. they reflect the net change to the "status quo". Costs/savings have been combined to reflect a "holistic" position to the NSW Government and community.

Salary Savings/Associated On-Costs

Generally there will be no changes to staffing arrangements, therefore staffing/consultancy costs are cost neutral and are not addressed within the model.

Increased Revenue

Should Option 1 (Minimal Works) be adopted, there is the likelihood that the overall facility would continue to degrade, with funding levels likely to be reduced. A conservative calculation of disposable income lost to the NSW region is of the order of \$326K per annum.

Should Option 2 (Refurbish Existing Facilities) be adopted, the funding is likely to be maintained at approximately current levels and thus would have no effect on the Cost Benefit Analysis.

Should Option 3 (Provide New Facilities) be adopted, additional funding may be forthcoming, owing to the ability of the facility to carry out increased and efficient research. A conservative calculation of disposable income to be available in the NSW region is of the order of \$326K per annum.

W I L D E

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ABN 81 058 229 404

PORT STEPHENS FISHERIES CENTRE COST BENEFIT ANALYSIS

1.3 Financial Analysis cont'd

1.3.4 Base Information cont'd

The possible changes to funding are by no means definitive or precise and cannot be firmly established. For this reason, for the sensitivity allowance, a relatively high variable rate of 50% has been allowed to indicate the effect of wide actual changes to funding on the Cost Benefit Analysis results.

Costs Avoided

All three options incorporate costs of necessary work to ensure a safe working environment under Capital Works. There are therefore no other items to be included under this heading in the Cost Benefit Analysis.

Staffing Costs

Generally there will be no change to staffing arrangements and numbers. Any increase in funding which would allow additional research has been factored as a net disposable income increase to the NSW region as a whole under Increased Revenue, conversely in the case of a reduction in funding.

Operating Costs, Repairs & Maintenance

Changes to operating costs for the new capital works due to the new and extended buildings have been based on the current facility costs provided and historical data for the type of development and include such components as energy costs, cleaning, phone/data/Internet costs, waste management, pest control and security.

Increased cost of repairs and maintenance to buildings, pavements and services have been based on the current facility costs provided and historical data for the type of development.

W I L D E

A N D

W O O L L A R D

ABN 81 058 229 404

PORT STEPHENS FISHERIES CENTRE COST BENEFIT ANALYSIS

1.3 Financial Analysis cont'd

1.3.4 Base Information cont'd

Base Information – Capital Costs

Refer to Section 1.2 for details on all capital costs.

Refurbishment work to capital works done under Options 1, 2 & 3 have been included at Years 16-20, according to the proposed program for individual elements, being at the mid-point of a 30-year useful life.

The new capital works are expected to have a useful life of around 30 years; their residual value has been included at the end of the 20 year study period.

Attachments

COST BENEFIT ANALYSIS: NON-DISCOUNTED CASH FLOW



PROJECT: Port Stephens Fisheries Centre **Discount Rate** 0%
Job No. 32/07 **Period** 20 Years
Date: 29-Jun-07

Option 1 **Do Nothing - Minimal Work**

BENEFIT ITEM	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Salary Savings									
Associated On-Cost Savings									
Increased Revenue		-326,300	-326,300	-326,300	-326,300	-326,300	-326,300	-326,300	-326,300
Costs Avoided									
TOTAL		-326,300	-326,300	-326,300	-326,300	-326,300	-326,300	-326,300	-326,300
COST ITEM									
Staffing Costs									
Operating Costs		258	258	258	258	258	258	258	258
Repairs & Maintenance		1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Capital Costs	870,452								
Consultancy/Mngmnt Fees	134,548								
TOTAL	1,005,000	1,258	1,258	1,258	1,258	1,258	1,258	1,258	1,258
NET BENEFIT	-1,005,000	-327,558	-327,558	-327,558	-327,558	-327,558	-327,558	-327,558	-327,558

COST BENEFIT ANALYSIS - NON-DISCOUNTED CASH FLOW



PROJECT: Port Stephens Fisheries Centre Discount Rate 0%
Job No. 32/07 Period 20 Years
Date: 29-Jun-07

Option 1 Do Nothing - Minimal Work

Year10	Year11	Year12	Year13	Year14	Year15	Year16	Year17	Year18	Year19	Year20	Total
-326,300	-326,300	-326,300	-326,300	-326,300	-326,300	-326,300	-326,300	-326,300	-326,300	-326,300	-6,199,700
-326,300	-326,300	-326,300	-326,300	-326,300	-326,300	-326,300	-326,300	-326,300	-326,300	-326,300	-6,199,700
258	258	258	258	258	258	258	258	258	258	258	4,902
1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	19,000
						27,989					862,806
						3,359					137,907
1,258	1,258	1,258	1,258	1,258	1,258	32,606	1,258	1,258	1,258	-34,377	1,024,615
-327,558	-327,558	-327,558	-327,558	-327,558	-327,558	-358,906	-327,558	-327,558	-327,558	-291,923	-7,224,315

COST BENEFIT ANALYSIS: COST BENEFIT TABLE (DISCOUNTED CASH FLOW)



PROJECT: Port Stephens Fisheries Centre **Discount Rate** 7.00%
Job No. 32/07 **Period** 20 Years
Date: 29-Jun-07

Option 1 **Do Nothing - Minimal Work**

BENEFIT ITEM	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Salary Savings									
Associated On-Cost Savings									
Increased Revenue		-304,953	-285,003	-266,358	-248,933	-232,647	-217,427	-203,203	-189,910
Costs Avoided									
TOTAL		-304,953	-285,003	-266,358	-248,933	-232,647	-217,427	-203,203	-189,910
COST ITEM									
Staffing Costs									
Operating Costs		241	225	211	197	184	172	161	150
Repairs & Maintenance		935	873	816	763	713	666	623	582
Capital Costs	870,452								
Consultancy/Mngmnt Fees	134,548								
TOTAL	1,005,000	1,176	1,099	1,027	960	897	838	783	732
NET PRESENT VALUE	-1,005,000	-306,129	-286,102	-267,385	-249,892	-233,544	-218,266	-203,987	-190,642
INTERNAL RATE OF RETURN	N/A								

COST BENEFIT ANALYSIS - COST BENEFIT TABLE (DISCOUNTED CASH FLOW)



PROJECT: Port Stephens Fisheries Centre Discount Rate: 7.00%
 Job No. 32/07 Period: 20 Years
 Date: 29-Jun-07

Option 1 Do Nothing - Minimal Work

Year10	Year11	Year12	Year13	Year14	Year15	Year16	Year17	Year18	Year19	Year20	TOTAL
-177,486	-165,874	-155,023	-144,881	-135,403	-126,545	-118,266	-110,529	-103,298	-96,540	-90,225	-3,372,505
-177,486	-165,874	-155,023	-144,881	-135,403	-126,545	-118,266	-110,529	-103,298	-96,540	-90,225	-3,372,505
140	131	123	115	107	100	94	87	82	76	71	2,667
544	508	475	444	415	388	362	339	317	296	277	10,336
						10,145				-9,853	870,743
						1,217					135,765
684	640	598	559	522	488	11,818	426	398	372	-9,506	1,019,511
-178,170	-166,514	-155,620	-145,440	-135,925	-127,033	-130,084	-110,955	-103,696	-96,913	-80,719	-4,392,015

COST BENEFIT ANALYSIS: NON-DISCOUNTED CASH FLOW



PROJECT: Port Stephens Fisheries Centre **Discount Rate** 0%
Job No. 32/07 **Period** 20 Years
Date: 29-Jun-07

Option 2 Refurbish Existing Facilities

BENEFIT ITEM	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Salary Savings									
Associated On-Cost Savings									
Increased Revenue									
Costs Avoided									
TOTAL									
COST ITEM									
Staffing Costs									
Operating Costs		258	23,417	23,417	23,417	23,417	23,417	23,417	23,417
Repairs & Maintenance		1,000	24,290	24,290	24,290	24,290	24,290	24,290	24,290
Capital Costs	870,452	2,873,123	969,197	75,826	1,051,398				
Consultancy/Mngmnt Fees	134,548	351,110	118,454	9,112	128,780				
TOTAL	1,005,000	3,225,491	1,135,358	132,645	1,227,885	47,707	47,707	47,707	47,707
NET BENEFIT	-1,005,000	-3,225,491	-1,135,358	-132,645	-1,227,885	-47,707	-47,707	-47,707	-47,707

COST BENEFIT ANALYSIS - NON-DISCOUNTED CASH FLOW



PROJECT: Port Stephens Fisheries Centre Discount Rate 0%
 Job No. 32/07 20 Years
 Date: 29-Jun-07

Option 2 Refurbish Existing Facilities

Year10	Year11	Year12	Year13	Year14	Year15	Year16	Year17	Year18	Year19	Year20	Total
23,417	23,417	23,417	23,417	23,417	23,417	23,417	23,417	23,417	23,417	23,417	421,764
24,290	24,290	24,290	24,290	24,290	24,290	24,290	24,290	24,290	24,290	24,290	438,220
						27,989	721,060	707,252		-252,157	7,044,140
						3,359	86,527	84,870		86,155	1,002,915
47,707	47,707	47,707	47,707	47,707	47,707	79,055	855,294	839,829	47,707	-118,295	8,907,039
-47,707	-47,707	-47,707	-47,707	-47,707	-47,707	-79,055	-855,294	-839,829	-47,707	118,295	-8,907,039

COST BENEFIT ANALYSIS: COST BENEFIT TABLE (DISCOUNTED CASH FLOW)



PROJECT: Port Stephens Fisheries Centre **Discount Rate** 7.00%
Job No. 32/07 **Period** 20 Years
Date: 29-Jun-07

Option 2 Refurbish Existing Facilities

BENEFIT ITEM	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Salary Savings									
Associated On-Cost Savings									
Increased Revenue									
Costs Avoided									
TOTAL									
COST ITEM									
Staffing Costs									
Operating Costs		241	20,453	19,115	17,865	16,696	15,604	14,583	13,629
Repairs & Maintenance		935	21,216	19,828	18,531	17,318	16,185	15,127	14,137
Capital Costs	870,452	2,685,162	846,534	61,897	802,107				
Consultancy/Mngmnt Fees	134,548	328,140	103,462	7,438	98,246				
TOTAL	1,005,000	3,014,478	991,666	108,278	936,748	34,014	31,789	29,710	27,766
NET PRESENT VALUE	-1,005,000	-3,014,478	-991,666	-108,278	-936,748	-34,014	-31,789	-29,710	-27,766
INTERNAL RATE OF RETURN	-69.44%								

COST BENEFIT ANALYSIS: NON-DISCOUNTED CASH FLOW



PROJECT: Port Stephens Fisheries Centre **Discount Rate** 0%
Job No. 32/07 **Period** 20 Years
Date: 29-Jun-07

Option 3 Provide New Facilities

BENEFIT ITEM	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Salary Savings									
Associated On-Cost Savings									
Increased Revenue			326,300	326,300	326,300	326,300	326,300	326,300	326,300
Costs Avoided									
TOTAL			326,300	326,300	326,300	326,300	326,300	326,300	326,300
COST ITEM									
Staffing Costs									
Operating Costs		258	25,471	25,471	25,471	63,072	63,072	63,072	63,072
Repairs & Maintenance		1,000	24,290	24,290	24,290	47,520	47,520	47,520	47,520
Capital Costs	4,010,718	3,572,050	969,197	759,345	2,812,755				
Consultancy/Mngmnt Fees	134,548	594,170	160,696	126,936	468,585				
TOTAL	4,145,266	4,167,478	1,179,654	936,042	3,331,101	110,592	110,592	110,592	110,592
NET BENEFIT	-4,145,266	-4,167,478	-853,354	-609,742	-3,004,801	215,708	215,708	215,708	215,708



COST BENEFIT ANALYSIS - NON-DISCOUNTED CASH FLOW

PROJECT: Port Stephens Fisheries Centre **Discount Rate** 0%
Job No. 32/07 **Period** 20 Years
Date: 29-Jun-07

Option 3 Provide New Facilities

Year10	Year11	Year12	Year13	Year14	Year15	Year16	Year17	Year18	Year19	Year20	Total
326,300	326,300	326,300	326,300	326,300	326,300	326,300	326,300	326,300	326,300	326,300	5,873,400
326,300	326,300	326,300	326,300	326,300	326,300	326,300	326,300	326,300	326,300	326,300	5,873,400
63,072	63,072	63,072	63,072	63,072	63,072	63,072	63,072	63,072	63,072	63,072	1,022,751
47,520	47,520	47,520	47,520	47,520	47,520	47,520	47,520	47,520	47,520	47,520	786,670
						588,251	721,060	707,252		-3,258,828	10,881,800
						70,590	86,527	84,870		65,668	1,792,591
110,592	110,592	110,592	110,592	110,592	110,592	769,433	918,179	902,714	110,592	-3,082,568	14,483,812
215,708	215,708	215,708	215,708	215,708	215,708	-443,133	-591,879	-576,414	215,708	3,408,868	-8,610,412

COST BENEFIT ANALYSIS: COST BENEFIT TABLE (DISCOUNTED CASH FLOW)



PROJECT: Port Stephens Fisheries Centre **Discount Rate** 7.00%
Job No. 32/07 **Period** 20 Years
Date: 29-Jun-07

Option 3 **Provide New Facilities**

BENEFIT ITEM	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Salary Savings									
Associated On-Cost Savings									
Increased Revenue			285,003	266,358	248,933	232,647	217,427	203,203	189,910
Costs Avoided									
TOTAL			285,003	266,358	248,933	232,647	217,427	203,203	189,910
COST ITEM									
Staffing Costs									
Operating Costs		241	22,247	20,792	19,432	44,969	42,028	39,278	36,708
Repairs & Maintenance		935	21,216	19,828	18,531	33,881	31,665	29,593	27,657
Capital Costs	4,010,718	3,338,364	846,534	619,852	2,145,837				
Consultancy/Mngmnt Fees	134,548	555,299	140,358	103,618	357,481				
TOTAL	4,145,266	3,894,839	1,030,355	764,089	2,541,281	78,851	73,692	68,871	64,366
NET PRESENT VALUE	-4,145,266	-3,894,839	-745,352	-497,731	-2,292,348	153,797	143,755	134,332	125,544
INTERNAL RATE OF RETURN	-7.37%								

COST BENEFIT ANALYSIS - COST BENEFIT TABLE (DISCOUNTED CASH FLOW)



PROJECT: Port Stephens Fisheries Centre Discount Rate 7.00%
Job No. 32/07 Period 20 Years
Date: 29-Jun-07

Option 3 Provide New Facilities

Year10	Year11	Year12	Year13	Year14	Year15	Year16	Year17	Year18	Year19	Year20	TOTAL
177,486	165,874	155,023	144,881	135,403	126,545	118,266	110,529	103,298	96,540	90,225	3,067,551
177,486	165,874	155,023	144,881	135,403	126,545	118,266	110,529	103,298	96,540	90,225	3,067,551
34,307	32,063	29,965	28,005	26,173	24,460	22,860	21,363	19,967	18,661	17,440	500,961
25,848	24,157	22,576	21,099	19,719	18,429	17,223	16,097	15,044	14,059	13,140	390,696
						213,209	244,248	223,898		-901,093	10,741,568
						25,585	29,310	26,868		18,158	1,391,224
60,155	56,219	52,541	49,104	45,892	42,889	278,878	311,019	285,776	32,720	-852,356	13,024,449
117,331	109,655	102,481	95,777	89,511	83,655	-160,612	-200,490	-182,478	63,820	942,580	-9,956,897

COST BENEFIT ANALYSIS:
Options Incremental to Option 1 at 7% Discount Rate



Port Stephens Fisheries Centre
 32/07
 29-Jun-07

Period: 20 Years

	Options Incremental to Option 1	
	Option 2	Option 3
Present Value Capital Costs \$M	5.858	12.005
Present Value Benefits \$M	3.373	6.440
Net Present Value \$M	-2.485	-5.565
NPV/Capital Costs	-0.42	-0.46
Benefit-Cost Ratio	0.58	0.54
Internal Rate of Return (IRR)	-7.51%	1.98%

**COST BENEFIT ANALYSIS: SENSITIVITY ANALYSIS
VARYING DISCOUNT %**



Port Stephens Fisheries Centre
32/07
29-Jun-07

Period: 20 Years

	DISCOUNT RATE			IRR
	4.00%	7.00%	10.0%	
	NPV \$	NPV \$	NPV \$	
Option 1	-5,307,619	-4,392,015	-3,746,674	N/A
Option 2	-7,553,514	-6,877,439	-6,374,571	-69.44%
Option 3	-9,689,960	-9,956,897	-9,997,032	-7.37%

**COST BENEFIT ANALYSIS: SENSITIVITY ANALYSIS
VARYING COSTS & REVENUE**



Port Stephens Fisheries Centre

32/07

29-Jun-07

Period: 20 Years

Option 1	Variable %	Revised NPV \$	NPV \$ @ 7.00%	Difference \$
Salary Savings	+ 10	-4,392,015	-4,392,015	0
Salary Savings	- 10	-4,392,015	-4,392,015	0
Associated On-Cost Savings	+ 15	-4,392,015	-4,392,015	0
Associated On-Cost Savings	- 15	-4,392,015	-4,392,015	0
Increased Revenue	+ 50	-6,078,268	-4,392,015	-1,686,252
Increased Revenue	- 50	-2,705,763	-4,392,015	1,686,252
Costs Avoided	+ 10	-4,392,015	-4,392,015	0
Costs Avoided	- 10	-4,392,015	-4,392,015	0
Staffing Costs	+ 15	-4,392,015	-4,392,015	0
Staffing Costs	- 15	-4,392,015	-4,392,015	0
Operating Costs	+ 20	-4,392,549	-4,392,015	-533
Operating Costs	- 20	-4,391,482	-4,392,015	533
Repairs & Maintenance	+ 15	-4,393,566	-4,392,015	-1,550
Repairs & Maintenance	- 15	-4,390,465	-4,392,015	1,550
Capital Costs	+ 10	-4,479,090	-4,392,015	-87,074
Capital Costs	- 10	-4,304,941	-4,392,015	87,074
Consultancy/Mngmnt Fees	+ 10	-4,405,592	-4,392,015	-13,577
Consultancy/Mngmnt Fees	- 10	-4,378,439	-4,392,015	13,577



**COST BENEFIT ANALYSIS: SENSITIVITY ANALYSIS
VARYING COSTS & REVENUE**

Port Stephens Fisheries Centre

32/07

29-Jun-07

Period: 20 Years

Option 2	Variable %	Revised NPV \$	NPV \$ @ 7.00%	Difference \$
Salary Savings	+ 10	-6,877,439	-6,877,439	0
Salary Savings	- 10	-6,877,439	-6,877,439	0
Associated On-Cost Savings	+ 15	-6,877,439	-6,877,439	0
Associated On-Cost Savings	- 15	-6,877,439	-6,877,439	0
Increased Revenue	+ 50	-6,877,439	-6,877,439	0
Increased Revenue	- 50	-6,877,439	-6,877,439	0
Costs Avoided	+ 10	-6,877,439	-6,877,439	0
Costs Avoided	- 10	-6,877,439	-6,877,439	0
Staffing Costs	+ 15	-6,877,439	-6,877,439	0
Staffing Costs	- 15	-6,877,439	-6,877,439	0
Operating Costs	+ 20	-6,921,516	-6,877,439	-44,077
Operating Costs	- 20	-6,833,362	-6,877,439	44,077
Repairs & Maintenance	+ 15	-6,911,832	-6,877,439	-34,393
Repairs & Maintenance	- 15	-6,843,047	-6,877,439	34,393
Capital Costs	+ 10	-7,444,911	-6,877,439	-567,472
Capital Costs	- 10	-6,309,968	-6,877,439	567,472
Consultancy/Mngmnt Fees	+ 10	-6,952,745	-6,877,439	-75,305
Consultancy/Mngmnt Fees	- 10	-6,802,134	-6,877,439	75,305



**COST BENEFIT ANALYSIS: SENSITIVITY ANALYSIS
VARYING COSTS & REVENUE**

Port Stephens Fisheries Centre

32/07

29-Jun-07

Period: 20 Years

Option 3	Variable %	Revised NPV \$	NPV \$ @ 7.00%	Difference \$
Salary Savings	+ 10	-9,956,897	-9,956,897	0
Salary Savings	- 10	-9,956,897	-9,956,897	0
Associated On-Cost Savings	+ 15	-9,956,897	-9,956,897	0
Associated On-Cost Savings	- 15	-9,956,897	-9,956,897	0
Increased Revenue	+ 50	-8,423,122	-9,956,897	1,533,776
Increased Revenue	- 50	-11,490,673	-9,956,897	-1,533,776
Costs Avoided	+ 10	-9,956,897	-9,956,897	0
Costs Avoided	- 10	-9,956,897	-9,956,897	0
Staffing Costs	+ 15	-9,956,897	-9,956,897	0
Staffing Costs	- 15	-9,956,897	-9,956,897	0
Operating Costs	+ 20	-10,057,090	-9,956,897	-100,192
Operating Costs	- 20	-9,856,705	-9,956,897	100,192
Repairs & Maintenance	+ 15	-10,015,502	-9,956,897	-58,604
Repairs & Maintenance	- 15	-9,898,293	-9,956,897	58,604
Capital Costs	+ 10	-11,031,054	-9,956,897	-1,074,157
Capital Costs	- 10	-8,882,741	-9,956,897	1,074,157
Consultancy/Mngmnt Fees	+ 10	-10,096,020	-9,956,897	-139,122
Consultancy/Mngmnt Fees	- 10	-9,817,775	-9,956,897	139,122

PORT STEPHENS FISHERIES
CENTRE

Description	Source/ Action	Value	Comments
Status Quo			
Income:			
- Rates and Land Taxes	WW	NIL	Will not be included within the study ie cost neutral
Staffing Costings:			
- Staffing costs and overheads	WW	NIL	Will not be included within the study ie cost neutral
Operating Costs:			
- Operating costs including energy, cleaning, rubbish removal, security and phone/data costs	WW	NIL	Refer Options for net additional costs
Repairs and Maintenance:			
- Repairs and maintenance to buildings, services, surrounds, pest control and the like	WW	NIL	Refer Options for net additional costs
Costs Avoided:			
- Necessary work to ensure a safe working environment	WW/GHD	NIL	All work of this nature is included in the capital costs of each option
Options 1, 2 & 3			
Increased Revenue			
- Option 1 - loss of funding revenue	WW/DPI	-\$326,300.00	Funding currently averages \$3M - \$3.5M p.a. Should current buildings continue to deteriorate, it could be expected that funding might fall by about 20%. From 2008-09 (Y2) annual loss of funding could be expected as follows:- 20% of \$3.25M average = \$650,000 p.a. Assuming 20% of funding taken up by admin. costs and additional equipment, balance (\$520K) factored at 62.75% as loss to NSW community (Source: Saunders (2001) 77.75% average disposable income, reduced to 62.75% to account for higher than average salaries to research scientists)
- Option 2	WW/DPI	\$0.00	Should this option be chosen, it could be expected that current levels of funding would be maintained.
- Option 3 - possible additional funding	WW/DPI	\$326,300.00	From 2009-10 (Y3) annual funding may increase due to the scope for additional research and better facilities generally. Assuming 20% increase from Y3 and using similar rationale to Option 1, this figure adjusted to reflect additional gain in disposable income to NSW community
Staffing Costings:			

Description	Source/ Action	Value	Comments
- Staffing costs and overheads	WW/GHD	NIL	Generally there will be no changes to staffing numbers. Any changes in staffing due to funding changes are reflected in "Increased Revenue" as the effect on disposable income available to the NSW community as a whole
Operating Costs:			
- Energy	WW/DPI		p.a.
- Option 1		\$258	Minor increase due to Fish Broodstock office extension lighting and power costs at 450MJ/m2 (Y2 onwards) New shark facility lighting and power costs at 250MJ/m2 (Y3 onwards). New fin fish building and fish nutrition and breeding buildings at 250MJ/m2 lighting and power costs (Y6 onwards)
- Option 2		\$5,368	Minor increase due to Fish Broodstock office extension lighting and power costs at 450MJ/m2 (Y2 onwards) New shark facility lighting and power costs at 250MJ/m2 (Y3 onwards).
- Option 3		\$16,768	Minor increase due to Fish Broodstock office extension lighting and power costs at 450MJ/m2 (Y2 onwards) New shark facility lighting and power costs at 250MJ/m2 (Y3 onwards). New fin fish building and fish nutrition and breeding buildings at 250MJ/m2 lighting and power Y6 onwards, new workshops and secure storage at 200MJ/m2 (Y6 onwards)
- Option 3		\$2,054	Connection to town water, used for drinking and some cleaning down of facilities (Y3 onwards)
- Cleaning/Waste Disposal	WW/DPI		p.a.
- Option 1		NIL	No change likely
- Option 2		\$13,500	Increases for new shark facility (Y3 onwards)
- Option 3		\$32,500	Increases for new shark facility (Y3 onwards), fin fish building, fish nutrition and breeding building, new workshops and secure storage, saving on greenhouse (Y6 onwards)
- Phone/Data/Internet	WW/DPI		p.a.
- Option 1		NIL	No change likely
- Option 2		\$2,700	Increases for new shark facility (Y3 onwards)
- Option 3		\$7,050	Increases for new shark facility (Y3 onwards), fin fish building, fish nutrition and breeding building, new workshops and secure storage, saving on greenhouse (Y6 onwards)
- Security	WW/DPI		p.a.
- Option 1		NIL	No change likely
- Option 2		\$1,800	Increases for new shark facility (Y3 onwards)
- Option 3		\$4,700	Increases for new shark facility (Y3 onwards), fin fish building, fish nutrition and breeding building, new workshops and secure storage, saving on greenhouse (Y6 onwards)
Repairs & Maintenance:			

PORT STEPHENS FISHERIES
CENTRE

Description	Source/ Action	Value	Comments
- Repairs and maintenance to buildings, services, surrounds, pest control and the like	WW/DPI		p.a.
- Option 1		\$1,000	Maintenance on new/upgraded facilities - 1% of \$100K (Y2 onwards)
- Option 2		\$24,290	Maintenance on new/upgraded facilities - 1% of \$100K (Y2 onwards), new shark facility - 1% of \$2.329M (Y3 onwards)
- Option 3		\$47,520	Maintenance on new/upgraded facilities - 1% of \$100K (Y2 onwards), new shark facility - 1% of \$2.329M (Y3 onwards), new fin fish building, new fish nutrition and breeding building, new workshops and secure storage - 1% of \$2.323M (Y6 onwards)
Capital Costs:			
- Option 1	WW	\$975,000	Y1 Complete including fees and contingencies - at June 2007 prices excluding GST
- Option 2	WW	\$6,552,000	Y1-Y5 Complete including fees and contingencies - at June 2007 prices excluding GST
- Option 3	WW	\$13,579,000	Y1-Y5 Complete including fees and contingencies - at June 2007 prices excluding GST
Residual Value:			
- Option 1	WW	\$35,635	Residual value of new capital building works at end of 20-year study period, assumed 30-year life of building, straight-line depreciation
- Option 2	WW	\$970,115	Residual value of new capital building works at end of 20-year study period, assumed 30-year life of building, straight-line depreciation
- Option 3	WW	\$3,806,061	Residual value of new capital building works at end of 20-year study period, assumed 30-year life of building, straight-line depreciation
Future Capital Costs:			
- Refurbishment of new works at mid-life of 30 year useful life	WW		
- Option 1	WW	\$27,989.00	Refurbishment of fish broodstock extension, all other costs associated with new works included within the general repairs and maintenance allowances for the net additional works (ie calculated on a percentage basis); other works are cost neutral with status quo (Y16)
- Option 2	WW	\$3,430,906	Refurbishment of new works including fish broodstock extension and shark facility, conservation research building, administration building, chemistry laboratory, oyster hatchery and greenhouse; all other costs included within the general repairs and maintenance allowances for the net additional works (ie calculated on a percentage basis), or are cost neutral with status quo (Y16-Y18, Y20)

**PORT STEPHENS FISHERIES
CENTRE**

WILDE AND WOOLLARD

Description	Source/ Action	Value	Comments
- Option 3	WW	\$4,498,392	Refurbishment of new works including fish broodstock extension and shark facility, conservation research building, administration building, oyster hatchery, new chemical laboratory, fin fish building, fish nutrition and breeding building, new workshops and secure storage; all other costs included within the general repairs and maintenance allowances for the net additional works (ie calculated on a percentage basis), or are cost neutral with status quo (Y16-Y18, Y20)

Legend:

WW - Wilde and Woollard Consultants

DPI - NSW Department of Primary Industries, Port Stephens Fisheries Centre

GHD - GHD Pty Ltd

Notes:

1) All costings included within the Cost Benefit Analysis are at June 2007 prices and exclude GST and escalation to tender



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Document Status

Rev No.	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
A.	K. Drews	G. Osmond		G. Osmond		4 Jul 07

SNAPSHOT OF THE CRONULLA FISHERIES RESEARCH CENTRE of EXCELLENCE

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GENERAL

The Cronulla Fisheries Research Centre of Excellence is the first and oldest fisheries facility in the Southern Hemisphere, founded in 1902.

It is the headquarters for recreational and commercial fisheries research and management in NSW and also operates several core corporate services for DPI.

The entire site is Heritage-listed, with several buildings having separate listings.

The site also had an aboriginal presence for over 8000 years, with many significant aboriginal sites and middens on the property. It is the subject of an aboriginal lands claim from the La Perouse Lands Council.

It is the largest single employer in Cronulla with 152 employees (124 EFTs) in 2010-11. 49 EFTs are involved in fisheries management and licensing, 45 are fisheries scientific staff and 30 are in DPI corporate services such as finance, training, administration, IT, etc. There are also 22 post-graduate students working at the Centre. Its budget was \$17.5m in 2010-11 of which \$8.2m came from external grants to scientists and managers.

KEY SERVICES

WILD FISHERIES RESEARCH

The Wild Fisheries Research group is the main provider of scientific advice, research and development into the wild commercial and recreational fisheries of NSW and the many fish and invertebrates on which they depend. In 2010-11 this group ran 43 research projects and produced 48 scientific outputs (see attached lists).

Fisheries Biology and Assessment Unit

This unit investigates the life history characteristics of key recreational and commercial fish and invertebrate species. These include the ages, rates of growth, mortality, longevity and reproductive dynamics of key species. This information is used to set size and bag limits, advise on other management tools and feeds the resource assessment process.

This unit assesses and reports on the status of over one hundred key fish and invertebrates, their harvest levels from recreational and commercial fishing and advises on levels of total allowable catches. This unit also generates the bi-annual report "Status of the Fisheries Resources of NSW" – the main reporting mechanism on fish stocks to the NSW public (the owners of these resources).

Fisheries Technology Unit

The Fisheries Technology Unit develops and tests commercial and recreational fishing gears to improve their selectivity and reduce unwanted catches. It develops bycatch reduction devices, new nets and hooks, etc., identifies fishing practices that improve the survival of released fishes and provides recommendations on fishing gear regulations.

Fisheries Enhancement Unit

This unit investigates the effectiveness of structures such as artificial reefs and Fish Attraction Devices and fish stocking programs. The unit also examines the

connectivity and movements of key fish species among different habitats and water bodies.

Shark Assessment Unit

This unit investigates the biology and fisheries of sharks and rays which are known to be especially sensitive to over-fishing. The unit also investigates the biology and movements of dangerous sharks like bull sharks as part of the Government's bather protection program and provides the scientific monitoring of the beach-meshing program.

FISHERIES MANAGEMENT

Both the Commercial Fisheries Management and the Recreational and Indigenous Fishery Management Units are based at the Cronulla site. These two groups were formerly in a single directorate and continue very close links. Over the last three years, the funding for these program areas has become more reliant on industry funding, with a 35% reduction in consolidated revenue.

Commercial Fisheries

The Commercial Fisheries Management Unit provides day-to-day management and strategic planning for NSW's commercial fisheries. This group will manage the upcoming review of commercial fisheries management and will be primarily responsible for implementing any reforms adopted by the Government following the review.

Recreational and Indigenous Fisheries

NSW has the largest recreational fishery in Australia and one of the largest in the world with over 1 million anglers. The recreational fisheries program in NSW is supported by a licence which generates approx. \$13 million per annum. These funds are used to deliver a range of regulatory and non-regulatory programs such as artificial reefs, fish stocking, education, research and compliance.

Recent changes to legislation have provided for the increased and formal recognition of Aboriginal Peoples' connection with NSW's fisheries resources. Work is currently underway to develop a framework for the involvement of Aboriginal People in cultural and commercial fishing.

OFFICE OF DPI'S CHIEF SCIENTIST

Cronulla is also the headquarters of DPI's Chief Scientist. This position is charged with high-level strategic work on scientific matters, enhancing the overall quality of science done in the department, administering the Research Scientist Classification for the NSW Public Service and promoting the department's scientific-based activities.

SPECIAL FACILITIES

The H.C. Dannevig Fisheries Laboratory is a modern, state-of-the-art facility, but housed in a Heritage-listed building, which continually assists in ground-breaking fisheries research.

The heritage-listed aquarium at Cronulla is unique in Australia due to its size and seawater quality. It is used by staff and university students to study our commercially and recreationally important fish species, including work on age validation and tag retention.

The Centre's library is the only Fisheries-specific library on the Australia's eastern seaboard and services many universities and schools. It houses an extensive and historic range of international and domestic journals and books and has all the latest inter-library loan technologies and search engines.

RESEARCH PROJECTS IN 2010-11

Project Title	PI's Name	Project Number
Development of methods to determine the effectiveness of fishery management strategies on the Hawkesbury River estuary	Astles	R-Con2008/159
Vulnerability assessment of the effects of climate change on estuarine habitats in the lower Hawkesbury estuary	Astles	R-Con2010/203
Qualitative ecological risk assessment (QERA) of human disturbances on marine biodiversity in NSW	Astles	R-Con2011/227
Monitoring of Gamefish and Australian bass fisheries in NSW via competition-based angling	Ghosh (formerly Scandol)	R-FSR2007/185
Integrated Fisheries Resource Management (Philippines)	Gibbs	R-Con2005/107
Risk assessment of impacts of climate change for key species in south eastern Australia	Gibbs	R-Con2010/204
Refinement and application of Cage Aquaculture Decision Support Tool (CADS Tool) for freshwater systems in the Philippines	Gibbs	R-Con2010/205
Sustainable regional development and strategic options for management of marine uses and industries in NSW – ecologically healthy and economically productive regional ecosystems	Gibbs	R-FSC2004/147
Comparative assessment of reproduction and growth of coastal finfish and invertebrates	Gray	R-FSC2005/165
Observer-based survey of retained and discarded catches from commercial line fishing in coastal waters of NSW	Gray	R-FSC2006/179
Evaluating the estuarine fisheries resources of NSW	Gray	R-FSC2008/197
Feeding and breeding: Rainfall effects on connectivity and fidelity of iconic coastal fishes	Gray	R-FSC2009/223
Primer development and assessment of population structure of dusky flathead and sand whiting	Gray	R-FSC2010/240
Evaluating the recreational fisheries of Recreational Fishing Havens and other key recreationally-fished estuaries in NSW	Gray	R-FSR2008/199
Movements and ecological interactions of key fish species in estuaries and coastal waters of NSW	Gray	R-FSR2008/219
Profiling the biology and fishery of rock blackfish (<i>Girella elevata</i>) in the Sydney region	Gray	R-FSR2009/231
Study of ghost fishing in the NSW Rock Lobster fishery	Liggins / Montgomery	R-FSC2006/173
A biological basis for fishery management strategies for Carcharhinid sharks commercially exploited in NSW waters	Macbeth	R-FSC2009/233
Observer surveys in the commercial large-shark fishery and ocean prawn-trawl fishery of NSW	Macbeth / Gray	R-FSC2009/224
Stock assessment and related research for the eastern rock lobster, <i>Jasus verreauxi</i>	Montgomery	R-FSC2000/018
Reducing uncertainty in the assessment of the Australian spanner crab fishery	Montgomery	R-FSC2003/139
Development of a DNA based aging technique for use in fisheries assessments	Montgomery	R-FSC2008/193
Study of the faunal assemblage on collectors for lobster larvae	Montgomery	R-FSC2008/210
Determining the age of cephalopod species from waters off NSW	Montgomery	R-FSC2008/220
Wobbeong shark movement in a NSW MPA	Peddemors	R-FSC2008/208
Shovelnose ray (<i>Rhinobatidae</i>) commercial fishery catch and biology	Peddemors	R-FSC2008/217
CritterCam deployment on sharks	Peddemors	R-FSC2010/258

Mechanics of shark bite	Peddemors	R-FSC2010/264
Development of methodology suitable for aerial shark surveys	Peddemors	R-FSC2010/265
Biology and fishery of angel sharks and sawsharks in NSW	Peddemors	R-FSC2011/268
Data capture and analysis for the Protective Beach Meshing Program	Peddemors	R-FSR2000/013
Integrating fishery-dependent and -independent data for improved sustainability of fisheries resources and other aspects of biodiversity	Rotherham	R-FSC2008/211
Solving bycatch and discard problems in NSW's recreational mud crab fishery	Rotherham	R-FSC2009/249
Resource assessment and monitoring of commercially harvested species	Rowling (formerly Scandol)	R-FSC2003/123
Application of the CSIRO Ecosystem Model Atlantis to NSW and comparison of Atlantis with the UBC Model EcoSpace	Scandol	R-FSC2004/141
Movements and biology of coastal sharks in NSW	Smoothey / Peddemors / Gray	R-FSC2007/186
Development of cost-effective methods for monitoring and assessing spatial management options for recreational fisheries in NSW	Steffe	R-FSR2008/200
Australian salmon (<i>Arripis trutta</i>); Population structure, reproduction, diet and composition of commercial and recreational catches in NSW	Stewart	R-FSC2005/157
Assessment and monitoring of pilchard landings from the vessel Delamere	Stewart	R-FSC2006/169
Movement patterns and stock structure of Australian sardine (<i>Sardinops sagax</i>) off South Australia and east coast: Implications for future stock assessment & management	Stewart	R-FSC2009/225
Assessment of barotrauma and its mitigation measures on the behaviour and survival of offshore species in NSW	Stewart	R-FSC2009/226
Diagnostic radioicthyology: Using computerised tomography scans (CT scan) to explore the effects of barotrauma on fish	Stewart / Ferrell	R-FSC2007/190
The life history characteristics and fishery of teraglin, <i>Atractoscion aequidens</i> , (Family Sciaenidae) off the coast of NSW	Stewart / Hegarty	R-FSC2010/263
Refinement of selective gears for estuarine prawn and squid fisheries	Broadhurst	R-Ctu2005/016
Estimating and maximising the survival of key species released by recreational fishers in NSW (PHASE 3 - SALTWATER)	Broadhurst	R-Ctu2008/021
Maximising the post-release survival of angler-caught native freshwater fish in NSW (PHASE 2)	Broadhurst	R-Ctu2008/022
Utility of beam and multi-rig trawl configurations for reducing environmental impacts in the Clarence River prawn-trawl fishery	Broadhurst	R-FSC2007/191

RESEARCH OUTPUTS IN 2010/11

Barker, S.M., Peddemors, V.M. and Williamson, J.E., 2011. Recreational SCUBA diver interactions with the critically endangered grey nurse shark <i>Carcharias taurus</i> . <i>Pacific Conservation Biology</i> , 16: 261–269.
Barnes, L.M., Leclerc, M., Gray, C.A. and Williamson, J.E., 2011. Dietary niche differentiation of five sympatric species of <i>Platycephalidae</i> . <i>Environmental Biology of Fishes</i> , 90: 429–441.
Boomer, J.J., Peddemors, V. and Stow, A.J., 2010. Genetic data show that <i>Carcharhinus tilstoni</i> is not confined to the tropics, highlighting the importance of a multifaceted approach to species identification. <i>Journal of Fish Biology</i> , 77:1165–1172.
Broadhurst, M., 2011. Relative efficiency and selectivity of five recreational traps for freshwater crustaceans in Victoria. A paper prepared by the NSW Department of Primary Industries as a consultancy job for Fisheries Victoria. 10 pp.
Broadhurst, M., Butcher, P., Hall, K. and Brand, C., 2010. Barotrauma in snapper. <i>Go Fishing</i> , 31 (Dec'10): 75–78.
Broadhurst, M.K. and Millar, R.B., 2011. Square-mesh codend length and selectivity in southeastern Australian stow nets. <i>Fisheries Management & Ecology</i> , 18: 39–49.
Broadhurst, M.K., Butcher, P.B. and Cullis, B.R., 2011. Post-release mortality of angled sand mullet (<i>Myxus elongatus</i> : Mugilidae). <i>Fisheries Research</i> , 107: 272–275.
Butcher, P.A., Broadhurst, M.K., Hall, K.C. and Cooke, S.J. 2011. Post-release survival and physiology of angled luderick (<i>Girella tricuspidata</i>) after confinement in keeper nets in an Australian estuary. <i>ICES Journal of Marine Science</i> , 68: 572–579.
Butcher, P.A., Broadhurst, M.K., Orchard, B.A. and Ellis, M.T., 2010. Using biotelemetry to assess the fate of yellowfin bream (<i>Acanthopagrus australis</i>) released with ingested hooks. <i>ICES Journal of Marine Science</i> , 67:1175–1184.
Chick, R.C., 2010. Catch-tagging blacklip abalone (<i>Haliotis rubra</i>) for identification of hatchery-reared individuals on natural coastal reefs in New South Wales, Australia. <i>Journal of Shellfish Research</i> , 29(1): 209–215.
Ferrara, T.L., Clausen, P., Huber, D.R., McHenry, C.R., Peddemors, V. and Wroe, S., 2011. Mechanics of biting in great white and sandtiger sharks. <i>Journal of Biomechanics</i> , 44(3): 430–435.
Ford, J.R., Williams, R.J., Fowler, A.M., Cox, D.R., Suthers, I.M., 2010. Identifying critical estuarine seagrass habitat for settlement of coastally spawned fish. <i>Marine Ecology Progress Series</i> , 408: 181–193.
Gray, C.A., Taylor, M., Walsh, C., Reinfelds, I., Smoothey, A., Butler, G., Peddemors, V., van der Meulen, D., Gannon, R. and Payne, N., 2011. Utilising acoustic telemetry to examine the connectivity and fidelity of southeast Australian estuarine and coastal fishes and sharks. Presentation given at the 1 st International Conference on Fish Telemetry, 12 – 18 June, 2011, Sapporo, Hokkaido, Japan.
Gray, S.A., Ives, M.C., Scandol, J.P., Jordan, R.C., 2010. Categorising the risks in fisheries management. <i>Fisheries Management & Ecology</i> , 17(6): 501–512.
Hall K., Broadhurst M. and Brand C., 2011. Tight lines may save lives. <i>Freshwater Fishing Australia</i> , 108: 44–45.
Hall, K., Broadhurst, M., Butcher, P. and Brand, C., 2010. Caught a tagged bass? <i>NSW Fishing Monthly</i> , August 2010.
Ives, M.C., 2010. Are more complex fisheries models better? Comparing the results of size-based population models to simpler per recruit analyses. Presentation given at the 2010 Australian Society for Fish Biology Conference and Climate Change Symposium, 12 – 14 July 2010, Melbourne Museum, Victoria, Australia.
Izzo, C., Gillanders, B., Ward, T., Ivey, A., Stewart, J. and Suthers, I., 2010. Movement patterns and stock structure of the Australian Sardine (<i>Sardinops sagax</i>) throughout Australia. Presentation given at the 2010 Australian Society for Fish Biology Conference and Climate Change Symposium, 12 – 14 July 2010, Melbourne Museum, Victoria, Australia.
Kennelly, S.J., 2010. Improving food security in developing countries by the introduction of sustainable fishing practices. Invited presentation, International Seafood and Health Conference, 6 – 10 November 2010, Melbourne, Australia.
Kennelly, S.J., 2010. Monitoring and reporting on discards in the world's fisheries. Page 84 in <i>The State of World Fisheries and Aquaculture 2010</i> . FAO, Rome 2010, ISBN 978-92-5-106675-1.
Liggins, G.W. and Miller, M.E., 2011. Assessing and managing unaccounted fishing mortalities in the fishery for <i>Sagmaniasus verreauxi</i> in New South Wales, Australia. Presentation given at the 9 th International Conference and Workshop on Lobster Biology and Management, 16 – 28 June 2011, Bergen, Norway.
Mazumder, D., Sainilan, N., Williams, R.J., Szymczak, R., 2011. Trophic importance of a temperate intertidal wetland to resident and itinerant taxa: evidence from multiple stable isotope analysis. <i>Marine & Freshwater Research</i> , 62(1): 11–19.
Montgomery, S., 2011. Research for the sustainability of prawn resources. A brochure published by the NSW Department of Primary Industries. New South Wales, Australia.
Montgomery, S., 2011. Research for the sustainability of prawn resources. DVD production, duration: 4 min 16 sec.
Montgomery, S.S. and Liggins, G.W., 2011. The role of international conferences on lobster biology and management: The <i>Sagmaniasus verreauxi</i> experience. Presentation given at the 9 th International Conference and Workshop on Lobster Biology and Management, 16 – 28 June 2011, Bergen, Norway.
Montgomery, S.S., Walsh, C.T., Haddon, M., Kesby, C.L., Johnson, D.D., 2010. Using length data in the Schnute Model to describe growth in a metapenaeid from waters off Australia. <i>Marine & Freshwater Research</i> , 61(12): 1435–1445.
Robbins, W. and Peddemors, V., 2011. Investigating the behavioural response of grey nurse sharks to recreational lures and baited lines. [Available online at http://www.dpi.nsw.gov.au/research/areas/systems-research/wild-fisheries/outputs/2011/grey-nurse-update]
Robbins, W.D., Peddemors, V.M. and Kennelly, S.J., 2011. Assessment of permanent magnets and electropositive

- metals to reduce the line-based capture of Galapagos sharks, *Carcharhinus galapagensis*. *Fisheries Research*, 109(1): 100–106.
- Roberts, D.G., Gray, C.A., West, R.J. and Ayre, D.J., 2010. Gamete compatibility between marine and estuarine *Acanthopagrus* spp. (Sparidae) and their hybrids. *Journal of Fish Biology*, 77: 425–431.
- Roberts, D.G., Gray, C.A., West, R.J. and Ayre, D.J., 2010. Marine genetic swamping: hybrids replace an obligately estuarine fish. *Molecular Ecology*, 19: 508–520.
- Roberts, D.G., Gray, C.A., West, R.J. and Ayre, D.J., 2011. Temporal stability of a hybrid swarm between the migratory marine and estuarine fishes *Acanthopagrus australis* and *A. butcheri*. *Marine Ecology Progress Series*, 421: 199 – 204.
- Roberts, L.W., Butcher, P.A., Broadhurst, M.K. and Cullis, B.R., 2011. Using a multi-experimental approach to assess the fate of angled-and-released yellowtail kingfish (*Seriola lalandi*). *ICES Journal of Marine Science*, 68: 67–75.
- Rotherham, D., 2010. Surveys of estuarine fisheries resources in NSW: who, what, why, where, when and how? Oral presentation given at the National Estuaries Network Science Day, 1 December 2010, Australian Museum, Sydney, Australia.
- Rotherham, D., Gray, C.A., Johnson, D.D. and Kesby, C.L., 2010. Sampling estuarine fish and invertebrates with a beam trawl provides a different (not 'better') picture of populations and assemblages. Presentation given at the Fish Sampling with Active Methods Conference (FSAM 2010), 8–11 September 2010, Ceske Budejovice, Czech Republic.
- Rotherham, D., Macbeth, W.G., Kennelly, S.J. and Gray, C.A., 2010. Reducing uncertainty in the assessment and management of fisheries resources following an environmental impact. Presentation given at the Fisheries Dependent Information Conference (FDI 2010), "Making the Most of Fisheries Information Underpinning Policy, Management & Science", 23 – 26 August 2010, Galway, Ireland.
- Rowling, K. and Hegarty, A., 2011. Status of Fisheries Resources. Poster for general display. Industry and Investment NSW, Cronulla Fisheries Research Centre of Excellence, NSW, Australia.
- Rowling, K., Hegarty, A. and Ives, M., 2010. Status of fisheries resources in NSW 2008/09. NSW Industry & Investment, Cronulla, 392 pp. ISSN 1329-4253.
- Scandol, J. and Gillson, J., 2010. Spreading the risk: management strategies for multi-method inshore fisheries in a changing climate. Final report to the Fisheries Research & Development Corporation for project no. 2009/053. University of New South Wales. 53pp. ISBN 978-0-7334-2942-2.
- Silva, C.N.S., Broadhurst, M.K., Schwingel, A., Dias J.H., Cattani, A.P. and Spach, H.L. 2011. Refining a Nordmøre-grid for a Brazilian artisanal penaled-trawl fishery. *Fisheries Research*, 109: 168–178.
- Steffe, A.S. and Murphy, J.J., 2011. Recreational fishing surveys in the Greater Sydney Region. Fisheries Final Report Series No. 131. Cronulla, NSW, Australia. 122pp. ISSN 1837-2112.
- Stewart, J. and Hughes, J.M., 2010. Life-history traits of the Southern hemisphere eastern red scorpionfish, *Scorpaena cardinalis* (Scorpaenidae: Scorpaeninae). *Marine & Freshwater Research*, 61: 1290–1297.
- Stewart, J., 2010. Evidence of age-class truncation in some exploited marine fish populations in New South Wales, Australia. *Fisheries Research*, 108(1): 209–213.
- Stewart, J., Hughes, J., McAllister, J., Lyle, J. and MacDonald, M., 2011. Australian salmon (*Arripis trutta*): Population structure, reproduction, diet and composition of commercial and recreational catches. Final report to the Fisheries Research & Development Corporation for Project No. 2006/018 and 2008/056. Industry & Investment NSW – Fisheries Final Report Series No. 129. Cronulla, NSW, Australia. 257 pp.
- Stewart, J., Rowling, K., Hegarty, A-M. and Nuttall, A., 2010. Size and age at sexual maturity of snapper *Pagrus auratus* in New South Wales 2008/09. Industry & Investment NSW – Fisheries Research Report No. 27. ISSN 1837-2120. 38pp.
- Tully, P. and Genders, A. (editors), 2011. 2009-10 Annual Performance Report for the Shark Meshing (Bather Protection) Program. A report prepared in accordance with the requirements of the Joint Management Agreements and associated Management Plan. [Available online at http://www.dpi.nsw.gov.au/_data/assets/pdf_file/0011/377615/annual-performance-report-2009-10-nsw-shark-meshing-bather-protection-program.pdf]
- van der Meulen, D.E., Walsh, C.T., Gray, C.A. and Taylor, M.D., 2011. Investigating fine-scale spawning habitat and reproductive dynamics of estuarine-dependent fishes. Presentation given at the 1st International Conference on Fish Telemetry, 12 – 18 June, 2011, Sapporo, Hokkaido, Japan.
- Williams, R.J., Allen, C.B. and Kelleway, J., 2011. Saltmarsh of the Parramatta-Sydney Harbour: determination of cover and species composition including comparison of API and pedestrian survey. *Cunninghamia*, 12(1): 29–43.
- Zagaglia, C.R., Damilao, C., Hazin, F.H.V. and Broadhurst, M.K., 2011. Reproduction in *Mustelis canis* from an unexploited population off Northern Brazil. *Journal of Applied Ichthyology*, 27: 25–29.

Cronulla transfers numbers V4

Position activity	No. Total 138
1. Transfer accepted	36
a. Transfer pending	27
b. Transfer completed	9
2. Exit/Leave Fisheries	48
a. Exit pending	18
b. Exit complete	14
c. Retiree	1
d. Transfer to govt positions	15
3. Nil action for Transfer (no transfer entitlements)	18
a. Casual	5
b. Short term contract	8
c. Project ends before Feb 13	5
4. Action yet to be determined	36
a. Leave without pay LWOP	1
b. Formal transfer offer sent in last 2 weeks and return advice for staff pending	2
c. Advice pending – response from person is on hold as agreed with each person	9
d. Letter sent no reply	7
e. Formal transfer letter yet to be sent	13
f. Action to be advised – no transfer option currently on offer (Marine Pks)	4
5. Total number left Cronulla site (sum 1b, 2b, 2d)	38
6. Total number for whom action relating to transfer is known	102

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