



Hunter and Central Coast Sustainable Aquaculture Strategy

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Hunter and Central Coast Sustainable Aquaculture Strategy

Land Based Aquaculture

JUNE 2005

A NSW Government Initiative

Hunter and Central Coast Sustainable Aquaculture Strategy

A NSW Government initiative of Department of Primary Industries, Department of State and Regional Development, Department of Environment and Conservation, Department of Lands, Department of Infrastructure, Planning and Natural Resources and NSW Premiers Department to encourage sustainable aquaculture in New South Wales.

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Department of Infrastructure, Planning and Natural Resources, Sydney, NSW

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Foreword

Aquaculture is one of the fastest-growing industries in the world. More than 30 per cent of worldwide seafood consumption is produced through aquaculture. NSW is capable of capturing a significant proportion of this dynamic growth industry.

The State Government recognises the great potential of aquaculture, as a way of generating jobs, supporting regional businesses and rural and regional communities. We remain focused on implementing measures to stimulate further investment in aquaculture opportunities throughout the State.

The Hunter and Central Coast Sustainable Aquaculture Strategy is a major part of this commitment.

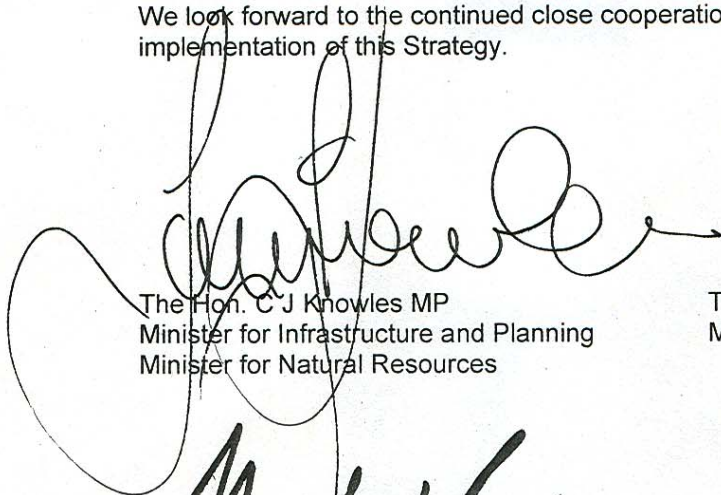
The strategy is the result of a 'whole-of-Government' approach, including the collaboration of industry and the community who contributed to its development.

This important regional planning document is a milestone for profitable, sustainable coastal land-based aquaculture in the Hunter and Central Coast Regions. It will assist investors and developers, consultants and planners prepare and submit development applications leading to profitable and sustainable aquaculture practices.

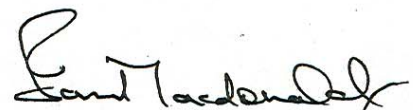
The strategy will also help local councils and other Government regulatory agencies in assessing aquaculture development proposals. This ability to streamline the aquaculture approvals process in the Hunter and Central Coast Region is part of a State-wide program of developing regional aquaculture strategies.

This strategy strives to facilitate aquaculture investment opportunities in the Hunter and Central Coast and will provide real incentives for economic development and benefits to the Hunter and Central Coast community.


We look forward to the continued close cooperation of all interested parties in the implementation of this Strategy.



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Executive Summary

Aquaculture is one of the fastest-growing industries in the world. Already 30% of seafood consumed worldwide is produced through aquaculture. According to the United Nations' Food and Agriculture Organisation, this is projected to rise to 40% by the year 2010, as a result of increasing demand for seafood which wild capture fisheries can no longer meet.

While many types of aquaculture are still in their infancy in Australia, the same global trends that are driving aquaculture internationally are evident here. As the total value of Australian fisheries production has tended to stabilise over the last five years, the contribution of aquaculture has almost trebled between 1991-92 and 2001-02. Australian aquaculture in 2003-04 was valued at \$732 million and represented 30 percent of the total value of Australian fisheries production and the industry is expected to increase in size four-fold to \$2.5 billion over the next decade.

New South Wales is poised to capture a significant proportion of this projected growth. A growing number of viable aquaculture investment opportunities are being generated by the drive to satisfy increasing domestic and export demand, and by the competitive advantages (both natural and man-made) which this State offers. Located largely in a temperate zone, New South Wales is not subject to the climatic extremes of many tropical and sub-tropical regions. Its coastal waters are not normally subject to cyclonic conditions.

Compared with many overseas locations, New South Wales offers a clean growing environment for most forms of aquaculture. It does not suffer from a number of diseases that have caused losses among aquaculture industries overseas. Strict national and State-level controls have been established to maintain our freedom from some of the worst exotic diseases.

New South Wales also offers reliable supplies of good quality water. It does not have problems with heavy industrial pollution, and controls are in place to protect estuaries, coastal areas and groundwater systems from contamination by sewage, agricultural pesticides and fertilisers and urban runoff.

Both industry participants and the NSW Government's regulatory agencies are very conscious of the need to ensure that the development of the aquaculture industry in New South Wales proceeds in a manner that does not jeopardise its ecological sustainability. Industry and government continue to invest heavily in research, technology and management practices to provide for the sustainable growth of this sensitive industry. Both recognise the environmental benefits arising from aquaculture, as well as the environmental qualities aquaculture needs for it to operate successfully to ensure the continuing high quality of its products. Other countries have shown a high regard for and interest in New South Wales' performance in this area.

The Hunter and Central Coast Sustainable Aquaculture Strategy applies to three types of intensive land based aquaculture, namely:

- Estuarine and marine pond and raceway aquaculture for endemic species;
- Freshwater pond and raceway aquaculture;
- Tank based high intensity recirculation aquaculture (saline or fresh water).

The Strategy is made up of two interlinked components – a best management component and an integrated approvals component so that projects can be established and operated in an efficient sustainable manner. The best management component provides the basis for the Aquaculture Industry Development Plans (AIDP) for Land-based Aquaculture on the Hunter and Central Coast under the provisions of the Fisheries Management Act 1994. The AIDP identifies best management for business planning, species selection, site selection and design, planning and operation of the facility and includes the performance requirements for relevant environmental regulations.

Based on best practice in the AIDP a “Project Profile Analysis” has been established to provide an up-front preliminary assessment of the likely level of risk to the environment from the proposal. This profile analysis provides the basis for streamlining approvals. Lower level risk proposals will only require a Statement of Environmental Effect to demonstrate that they comply with the best practice. Only those developments that have been identified as high risk in the profile analysis will require an environmental impact statement (EIS). This project profile analysis will be established through the State Environmental Planning Policy No 62 – Sustainable Aquaculture.

To streamline approvals required by a number of Acts or Regulations, the Strategy provides for integrated approvals. The approvals process will be managed so that approvals are obtained in a timely manner and the conditions are consistent with the provisions in the AIDP.

The Strategy recognises the importance of the role of Department of Primary Industries in extension and compliance. In addition to Department of Primary Industries Officers being available to provide up-to-date information as a result of research programs and advice on best practice in aquaculture management, they will be in the front line in ensuring best practice is followed and approvals are complied with.

The Strategy is designed to assist investors in simplifying the development approval process and by providing appropriate support to ensure that the aquaculture enterprises are established and operated in a sustainable manner.

Hunter and Central Coast Sustainable Aquaculture Strategy for Land-based Aquaculture

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ACRONYMS

AHD	Australian Height Datum
AIDP	Aquaculture Industry Development Plan
ANZECC	Australian and New Zealand Environment and Conservation Council
ASS	Acid Sulfate Soils
BCA	Building Code of Australia
BEV	Barramundi Encephalitis Virus
BOD	Biological Oxygen Demand
CIP	Clean in Place
CRC	Cooperative Research Centre
CSIRO	Commonwealth Scientific Industrial Research Organisation
DA	Development Application
DEC	Department of Environment and Conservation (incorporates Environmental Protection Agency and National Park and Wildlife Service)
DLWC	Former Department of Land and Water Conservation
DL	Department of Lands
DIPNR	Department of Infrastructure, Planning and Natural Resources
DO	Dissolved Oxygen
DPI	Department of Primary Industries (incorporates Agriculture, Fisheries, Forestry and Mineral resources)
DSRD	Department of State and Regional Development
EC	Electrical Conductivity
EHN Virus	Epizootic Haematopoietic Necrosis Virus
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
EP&A Act	Environmental Planning and Assessment Act
FAO	Food and Agricultural Organisation of the United Nations
GHP	Good Handling Practices
GIS	Geographical Information System
ha	Hectare
HACCP	Hazard Analysis Critical Control Point
IDA	Integrated Development Assessment
IPART	Independent Pricing and Regulatory Tribunal of NSW
IHHNV	Infectious Hypodermal-Haematopoietic Necrosis Virus
ISO	International Standards Organisation
LEP	Local Environment Plan
MHWN	Mean High Water Neap
MLWN	Mean Low Water Neap
N	Nitrogen
Na	Sodium
NFR	Non-Filterable Residues
NOFARIC	NSW OLMA Aquaculture Fishing and Related Industries Committee Inc.
NPWS	National Park and Wildlife Service
P	Phosphorous
pH	Acidity or basicity of water; Amount of Hydrogen-ion concentration
PMF	Probable Maximum Flood
POEO Act	Protection of the Environment Operations Act 1997
QA	Quality Assurance
R & D	Research and Development
Ramsar	Convention on Wetlands of International Importance (Ramsar Convention)
REP	Regional Environmental Plan
RTA	Road Transport Authority
SAR	Sodium Adsorption Ratio
SEE	State Environmental Effects
SEPP	State Environmental Planning Policy
SIS	Species Impact Statement
VENM	Virgin Excavated Natural Material
WMC	Water Management Committee

DEFINITIONS

Following definitions apply as used in this Strategy:

TERM	DEFINITION
Acid Sulfate Soils (ASS)	Acidic soil material resulting from the oxidation of iron sulphides. The soil material has a pH <4 (1:5 soil:water) when measured in dry season conditions and may be identified by one of the following: <ul style="list-style-type: none"> - yellow mottles and coatings of jarosite (straw yellow with a hue of 2.5Y or more yellow and chrome of 6 or more); - underlying potential acid sulfate soils; - 0.05% or more water-soluble sulfate.
AHD or Australian Height Datum	A common national place of level corresponding approximately to mean sea level.
Aquaculture	The commercial cultivation of aquatic animals or marine vegetation for the purpose of harvesting the animals or marine vegetation, or their progeny for sale, or the keeping of animals or marine vegetation in a confined area for commercial purposes.
Aquaculture Site	Identified sites for estuarine and marine pond aquaculture for endemic species, for freshwater pond and raceway aquaculture, and for tank based high intensity recirculation aquaculture (saline or freshwater) based on established locational and performance risk analysis criteria.
Aquatic Species	Live fish, molluscs, crustaceans, echinoderms, beachworms and other aquatic polychaetes including their reproductive products, fertilised eggs, embryos and juvenile stages, whether from aquaculture sites or from the wild. Also includes marine vegetation.
Aquifer	A layer of rock or soil which holds water in sufficient quantity to provide a source of water that can be tapped by a bore.
Benthic Shear Stress	An underlying stress that governs sediment condition of the ponds. It regulates the convection of volatile substances such as oxygen across the sediment-water interface. It is the primary determinant of where particulate matter scours, rolls, saltates, settles, and consolidates.
BOD Biochemical Oxygen Demand	The quantity of Oxygen used in the biochemical breakdown of organic matter in the effluent expressed in milligrams per litre or ppm.
Broodstock	A parent fish or shellfish.
Catchment Area	A drainage area, for example for a reservoir or river.
Discharge Water	Treated water discharged from ponds, hatcheries etc that may be reused in the ponds or for irrigation or may be discharged to waterways.
Dissolved Oxygen or DO	The amount of Oxygen dissolved in water expressed in milligrams per litre or ppm. In ponds it is a measure of the stability of the water environment. The colder the water, the greater the amount of oxygen that can dissolve in it. In freshwater, oxygen is soluble up to 14.6 mg/L at 0°C, and up to 8.4 mg/L at 25°C. Fish and other aquatic organisms generally require more than 2 mg/L of DO to survive.
Ecologically Sustainable Development	"Using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased" (National Strategy for ecologically sustainable development, Council of Australia Governments, 1992).
Effluent	Untreated water discharge from ponds, hatcheries or plants.
Endangered Species	The species is likely to become extinct in nature if threats continue, or its numbers are reduced to a critical level, or its habitat is reduced.
Endemic Species	A species confined in occurrence to a local region.
Environmental Impact	The potential biophysical, social and/or economic effects of a proposed aquaculture project on the community or the natural environment
Environmental Impact Statement (EIS)	A detailed assessment on the potential effects of the project if undertaken. It should be prepared by an appropriately qualified person and must stand up to rigorous community and agency review. The EIS must contain: <ul style="list-style-type: none"> • a summary; • a statement of objectives of the activity; • an analysis of feasible alternatives; • description of the development; • prediction and analysis of the likely impacts of the development; • reasons justifying the carrying out of the development; and • a list of approvals to be obtained.

Environmentally Sustainable Aquaculture	Applications of the best practice in aquaculture so that ecological process, on which life depends, are maintained, and the total quality of life now and in the future can be preserved and enhanced. It does not pollute natural watercourses or ground water, does not degrade soils on the land-use area, and ensures land-use options for future generations.
Estuarine	Of, pertaining to or formed in an estuary (brackish water). Relates to those soil materials, which have been under the influence of brackish water during their deposition.
Fish	Any marine, estuarine or freshwater fish (including aquatic molluscs, crustaceans, echinoderms and beachworms and other aquatic animals) at any stage of their life cycle.
Flood Plain	Levels nominated in an LEP or those areas inundated as a result of a 1/100 year flood event.
Groundwater	Underground waters (aquifers) both suitable and unsuitable for domestic and aquaculture purposes.
Growout	Stage and/or unit where the cultivation of aquatic animals is undertaken from initial seeding of young fry or juveniles up to harvesting of marketable sizes. Other stages in the production cycle include broodstock (breeders), hatchery (production of seed) and nursery (transition before growout).
Health Certificate	A certificate issued by a competent authority attesting to the health status of a shipment of aquatic animals and/or their production facility.
Intensive Aquaculture	Aquaculture undertaken by providing supplementary food for the fish or marine vegetation that are being cultivated (whether or not naturally occurring food is consumed or available for consumption by the fish or marine vegetation).
Indigenous Species	A species native to a particular region or country.
Intensive Growout	A production scheme in aquaculture where stocking density is optimised requiring a high degree of life support system, supplementary feeding, sufficient water supply, adequate aeration system, etc. to attain its high production target.
Introduced Species	A species introduced into an area where it does not naturally occur.
Landform Element	Part of the landform characterised by a distinctive slope, shape, size, form and type of geomorphologic processes (eg. alluvial) active on it.
Levee	Very long, low ridge that is immediately adjacent to a stream or river channel, built up by overbank flow.
Nutrient	A food essential for cells, organisms or plants. Provided artificially as fertilisers for plant growth, its basic elements are Nitrogen (N), Phosphorous (P) and Potassium (K). N is much more mobile, and it's primarily mediated by microorganisms. P is considered the major element responsible for potential algal bloom, while K is sometimes replaced with Silicate (Si) as in the case of the brown algae, the Diatoms that are essential in hatchery and pond aquaculture.
Oxidation	Process in which Oxygen combines with another molecule resulting in the removal of one or more electrons from an atom or ion. Oxidation is important in the formation of acid sulfate soils by converting pyrite to jarosite and sulfuric acid.
Pathogen	An infectious agent capable of causing disease.
Permeability	The ease with which water can penetrate or force its way through rocks, gravel and soils. Coarse sand and gravel permit rapid flow and are rated as highly permeable materials. Microscopic pores in clay impede flows; such soils are considered impermeable or of low permeability for dike and dam constructions.
pH	A measure of acidity or alkalinity of a substance. A pH of 7.0 denotes neutrality, higher values indicate increasing alkalinity, and lower values indicate increasing acidity.
PMF or Probable Maximum Flood	It is used to cover the situation when worst predictable meteorological condition could combine with the worst ground condition at which time maximum runoff would be achieved. It can vary over time relative to catchment changes: e.g., removal of vegetation, man-made disturbances.

Potential Acid Sulfate Soil (PASS)	Soil material which is waterlogged and contains oxidisable sulfur compounds, usually ferrous iron disulfide (pyrite, FeS ₂), that has a field pH of 4 (1:5 soil:water) but will become severely acid when oxidised. May also be referred to as sulfidic materials.
Project Profile Analysis	A matrix of environmental and operational factors for ranking the level of environmental design and operational factors and the level of environmental risk in relation to the siting, establishment and operation of an aquaculture development in relation to those factors.
Pond Aquaculture	Type of aquaculture predominantly in ponds, raceways or dams but may include some culture in tanks particularly during the hatchery or depuration phases but does not include any culture in natural waterbodies, e.g. pond culture of prawns, yabbies or silver perch.
Quarantine	<ul style="list-style-type: none"> a) The holding of aquatic animals or plants in a facility which ensures retention and destruction of said animals as well as any organisms associated with them. b) Disease management procedures including quarantine (sense 1) and certification (Australia).
Reconditioned Water	Water from culture units that has been treated by physical, biological and chemical processes to remove waste products.
Recycled Water	Wastewater from ponds, tanks or hatcheries that has been treated and re-used for culture.
Regional Sustainable Aquaculture Strategy	<p>A framework for encouraging the sustainable siting, establishment and operation of aquaculture development within a region. It provides a whole-of-government best practice for types of aquaculture in the region. The Strategy includes:</p> <ul style="list-style-type: none"> (i) an Aquaculture Industry Development Plan (AIDP) approved under the <i>Fisheries Management Act of 1994</i>; (ii) the assessment regime under this State Environmental Planning Policy (SEPP) which relates to the AIDP; and (iii) integrated approval arrangement agreed to by the relevant approval authorities responsible for regulating aquaculture in that region.
Salinity	The measure of salt concentration of water in ponds, tanks or hatchery expressed in part per thousand or ppt.
Sedimentation System	Pond system of sufficient size (at least 10% of total watered area) designed to minimise benthic shear and retain all discharged water for at least 24 hours for some or all settleable particles to settle.
SEPP	State Environmental Planning Policy as an instrument pertaining to issues of State Environmental Planning significance made by the Governor of NSW on the advice of the Minister for Infrastructure, Planning and Natural Resources under section 39 of the Environmental Planning and Assessment Act 1979.
Statement of Environmental Effects (SEE)	<p>For Class 1 category, the SEE is a straightforward statement, which sets out the details of the development to demonstrate compliance with all Class 1 criteria and with best practice in the AIDP.</p> <p>For Class 2 category, the SEE is a more substantial assessment on the impacts of the development project, with particular reference to higher level assessment criteria and their potential impact to the environment with a minimum 30 day exhibition period for public participation.</p>
Stocking Densities	Number of animals per square metre of effective pond area.
Suspended Solids	In water, the amount of available particulate matter (organic and inorganic) that can be trapped by mechanical filters.
Tank Aquaculture	Type of intensive aquaculture that utilises recirculating water technology in tanks or raceways (e.g. hatcheries and tank aquaculture of barramundi, and abalone).
Vulnerable Species	A species that will become endangered unless mitigating action is taken against its threats.
Waterway	Generally refers to creek, river, wetland, waterbody or groundwater.

Acknowledgment

The Hunter and Central Coast Regional Steering Group developed the Strategy as an extension of the NSW State Government's Aquaculture Initiative. The Regional Steering Group would like to thank all those who contributed to the development of the Strategy by making submissions. A special thanks to Nick Arena of Taylor Made Fish Farms and also to Bryan and Sacha Royce of Royce's Crayfish for photos used in this strategy. The Regional Steering Group will continue to liaise with all stakeholders in implementing the Strategy and reviewing it from time to time.

The following have contributed through the Hunter and Central Coast Regional Aquaculture Steering Group to the development of the Strategy.

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Copies of the document can be accessed from www.dpi.nsw.gov.au or can be purchased from DPI, Port Stephens Fisheries Research Centre, or:

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