

Understanding and managing Queensland's coastal fish habitats through the Urban Fish Habitat Management Research Program

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ABSTRACT

Sustainable fisheries require healthy, diverse, extensive and connected fish habitats, including those in and around urban coastal communities. Targeted research informs and shapes the management direction for coastal fish habitats under pressure from increasing urban development and rising populations. As part of its role in managing Queensland's fish habitats and dependent fisheries, Queensland Primary Industries and Fisheries, of the Department of Employment, Economic Development and Innovation (DEEDI) (formerly known as Department of Primary Industries and Fisheries (DPI&F)) has developed and established the Urban Fish Habitat Management (UFHM) Research Program. This program identifies, prioritises, coordinates, encourages and financially supports fish habitat research in Queensland's urban coastal waters. Its objectives and research streams provide an integrated framework for commitment of funding to offset the impacts of development on fish habitats. The UFHM Research Program is updated annually online with summaries of completed projects. Reports are provided directly to external funding sources. Research outcomes are incorporated into DEEDI's fish habitat management activities and in advice to other resource and planning managers (e.g. local government). The UFHM Research Program is closely linked to DEEDI's (formerly DPI&F's) Marine Fish Habitat (MFH) Scholarships Program, awarded to Honours projects that are aligned with UFHM Research Program objectives. Now into its fourth year with the University of Queensland, the MFH Scholarships Program has recently been expanded to include James Cook and Central Queensland Universities. This paper and its associated poster will present examples of urban fish habitat research projects and how these have benefited management of Queensland's coastal resources.

INTRODUCTION

The key legislation applying to the management of Queensland's fisheries resources is the *Queensland Fisheries Act 1994* (Fisheries Act). The main purpose of the Fisheries Act, as stated under Section 3 (1), is to provide for the use, conservation and enhancement of the community's fisheries resources and fish habitats in a way that seeks to: (a) apply and balance the principles of ecologically sustainable development; and (b) promote ecologically sustainable development.

Administration of the Fisheries Act rests with Queensland Primary Industries and Fisheries (of DEEDI) and particular functions and powers are assigned to the Department's Chief Executive or delegate. Under Section 20 (1)(a) of the Fisheries Act, the chief executive, on behalf of the State, has responsibilities for the management, use, development and protection of aquaculture, marine plants, fish habitats and, coral limestone and fisheries resources. The other functions of the chief executive include: conducting or supporting fisheries research and development (under Section 20 (2)(e) of the Fisheries Act); and to examine, and advise the Minister on, issues affecting fisheries resources and fish habitats (under Section 20 (2)(g) of the Fisheries Act). The chief executive may, for performing the chief executive's functions perform, or arrange for the performance of, research, education and environmental programs (Section 20A (1)(j) of the Fisheries Act).

In keeping with these statutory responsibilities and in managing Queensland's fish habitats and their dependent fisheries, Queensland Primary Industries and Fisheries (of DEEDI) has developed

and runs the UFHM Research Program. A key aspect of the UFHM Research Program is to provide a platform to communicate research findings. The UFHM Research Program consolidates relevant information as a reference tool for fisheries management and represents a major advancement for fisheries managers seeking access to innovative fish habitat research and information gathered by government and researchers

Since its inception in 2003, the UFHM Research Program, has coordinated multiple marine fish habitat research projects, provided direction and priorities for research and communicated those findings to improve fish habitat management outcomes. The UFHM Research Program initially focused on projects within the Brisbane River and now recognises a wide range of projects undertaken in other coastal centres. Costs of program administration are absorbed within the budget allocation from the Queensland Government's consolidated revenue allocated annually for the purpose of fisheries management. Some projects identified within the UFHM Research Program have been solely funded by other agencies or jointly with in-kind collaboration of DEEDI. Other projects have been funded through offset outcomes of fisheries development approval decisions as part of the current Fisheries Research Fund (under the Fisheries Act).

Queensland Primary Industries and Fisheries (DEEDI) managers decide on fisheries development approval applications made under the Fisheries Act and *Integrated Planning Act 1997* (the Planning Act). Those decisions are supported by marine fish habitat operational policies administered by DEEDI. The many and varied decisions made by DEEDI rely on incorporating best available management techniques to improve outcomes for fish habitats, especially in situations where such decisions may cause negative or adverse impacts on fish habitats. Access to innovative solutions, particularly sharing of new techniques or methods to counter loss or replacement of fish habitats, is paramount as Queensland's population expands and coastal development pressure increases. Documenting research and allied investigative information is therefore vital for continued improvement to management of Queensland fish habitats.

The UFHM Research Program recognises innovations and research by agencies and researchers, building scientific knowledge to support fisheries management decisions. It promotes information sharing, cross-agency liaison and management benefits under the Program's Objectives.

The key objectives of the UFHM Research Program (DEEDI 2009) are to:

1. promote development and improvement of best practice 'habitat-sensitive' technologies that will minimise the effects of urban development on fish habitats and support protecting and managing fish habitats.
2. improve understanding of the impacts of urban activities on fish habitats and fishery species.
3. improve understanding of the relationships between fish species and fish habitats.
4. foster post-graduate fish habitat research project opportunities with Queensland Universities.
5. articulate research priorities for the development of research projects for Honours research by Queensland Universities participating in the DEEDI Marine Fish Habitat Scholarships Program, and specifically for those research projects to:
 - address marine plants (including mangroves, seagrasses, saltmarsh vegetation) and/or declared Fish Habitat Areas (Fisheries Act);
 - enhance knowledge of marine fish habitat functions and contributions to fisheries productivity in Queensland;
 - promote the importance of marine fish habitats to Queensland's fisheries through publicly available documented research; and
 - provide research information to assist DEEDI and/or other stakeholders to manage and maintain healthy marine fish habitats which sustain fisheries productivity in Queensland.

The UFHM Research Program is a statewide program referenced by DEEDI managers and departmental clients for strategic and integrated management outcomes. The UFHM Research Program falls within the government priority of 'valuing the environment' and in part will satisfy the DEEDI preferred outcome of ecologically sustainable use of natural resources. It promotes ecosystem-based management of fisheries systems (DEEDI 2009).

Five (5) fish habitat management objectives are covered by the UFHM Research Program:

- relative importance of fish habitats;
- impacts of human activities or natural events on fish habitats;
- sympathetic structures within fish habitats;
- nature and extent of fish habitats to be protected; and
- effective rehabilitation measures.

Integration of the UFHM Research Program with DEEDI management decisions assists in two (2) ways. Firstly, by providing a framework for preliminary project development using DEEDI's fish habitat priorities (based on fisheries management issues in urban communities) under the UFHM Research Program. Secondly, the UFHM Research Program provides technical information on project outcomes for use leading to improved management decisions.

Over forty (40) fish habitat management research, rehabilitation, maintenance and monitoring projects are listed in the UFHM Research Program (DEEDI 2009), recognising lead agencies and listing management benefits. The majority of projects listed are delivered by other lead agencies and researchers, not DEEDI. This reflects the key research broker role of DEEDI for fish habitat research. This role includes administration of offset funding which has been negotiated by DEEDI in support of fish habitat research. Twenty (20) projects under the current UFHM Research Program, including scholarships and DEEDI lead projects, are linked with offset funding.

In allocating financial support under the UFHM Research Program, DEEDI can provide part funding to selected projects under an agreement with offset fund providers. Funding is also being provided to Honours projects aligned with UFHM Research Program objectives through the DEEDI Marine Fish Habitat (MFH) Honours Scholarships Program. The MFH Scholarships Program was first established in 2005 with the University of Queensland, and extended to James Cook and Central Queensland Universities in 2008. Offset funding as financial support to UFHM Research Program projects is discussed below.

Offset funding for research and the UFHM Research Program

Queensland Primary industries and Fisheries (DEEDI) managers will refer to the UFHM Research Program when assessing fisheries development approvals for protected marine plant disturbance or works in declared Fish Habitat Areas (under the Fisheries Act). A negotiated outcome during assessments may include a requirement for suitable fish habitat offsets to be undertaken to address residual (unmitigated) development impacts.

Offset funding may be negotiated and secured as part of an approved offset program for major development projects (private or public). This approach has been in effect since the late 1980's and is in accordance with DEEDI's (formerly DPI&F's) long standing fish habitat management policy approach to balance the impact of new developments on coastal fish habitats. Details are outlined in policy document FHM OP005 (Dixon and Beumer 2002), a specific-issue offset policy under the Queensland Government Environmental Offsets Policy (EPA 2008). Offset funded fish habitat research that is linked to proposed fish habitat disturbance aligns with those policies.

In regard to development proposals, mitigation measures (e.g. onsite habitat restoration, best management practices) are to address impacts of development proposals and can be conditioned on a fisheries development approval issued by DEEDI. Where mitigation measures are not possible, or can not be fully implemented, a proponent may offset any residual development impacts with agreed offset measures.

Offset measures involving a financial contribution as funding toward fish habitat research under the UFHM Research Program may be agreed between DEEDI and the proponent as an offset requirement. A third party (agency or institute) would then be enlisted to deliver the research project under a separate agreement with DEEDI for research funding.

Offset funding may be allocated to Honours year scholarships awarded under the DEEDI MFH Scholarships Program under a written agreement with a University. To date, four scholarships have been awarded. Reports of the research outcomes are provided directly to offset fund providers and summaries are placed on the DEEDI website. Research outcomes are incorporated within DEEDI fish habitat management assessments and decisions and communicated with other resource managers.

Most UFHM Research Program projects are management-focused projects of approximately twelve (12) months duration. There is also scope for multiple agency collaboration in the development or implementation of longer research proposals (e.g. three (3) years), especially within university post-graduate programs. DEEDI's support and recognition of projects as part of the UFHM Research Program are given to those projects aligning with one (1) or more management priorities under the program's Research Streams.

Research Streams of the UFHM Research Program

Priorities for research relevant to fish habitat management needs have been assigned by DEEDI under five (5) *Research Streams* of the UFHM Research Program. The Research Streams correspond to the principal processes affecting fish habitats and fisheries productivity in coastal Queensland (DEEDI 2009) representing key management and research topics of interest to DEEDI and other agencies working in coastal fish habitats.

The Research Streams are:

1. Fish habitat utilisation (e.g. fish habitat mosaics and fisheries productivity)
2. Land use activity impacts on fish habitats (e.g. such as marina development)
3. Management of marine plants (e.g. local government urban mangrove management strategies)
4. Intertidal and subtidal structures as fish habitats (e.g. erosion protection measures)
5. Rehabilitation of fish habitats (e.g. restoration techniques and fish use of restored habitats)

RESULTS

Outcomes of UFHM Research Program projects, including DEEDI's MFH Scholarships Program, are reported online. The main project benefits include enhanced knowledge and understanding for management of fish habitats. Selected research project examples, by Research Stream, include:

Stream 1 (Fish habitat utilisation)

Benefit = *Knowledge and understanding*:

- subtropical saltmarsh systems and mangrove-algal assemblages
- the role of fish habitat mosaics

Stream 2 (Land use activity impacts on fish habitats)

Benefit = *Knowledge and understanding*:

- specific bio-control agents and their impacts on marine plants
- coastal catchment development and declared FHAs

Stream 3 (Management of marine plants)

Benefit = *Best practice management information*:

- urban mangrove management and mangrove pruning studies
- mangrove dieback research

Stream 4 (Intertidal and subtidal structures as fish habitats)

Benefit = *Best practice management information*

- optimum arrangement of bank stabilisation materials
- fish friendly flood gates

Stream 5 (Rehabilitation of fish habitats)

Benefit = *Best practice management information*

- fish use of restored fish habitats
- saltmarsh restoration

The UFHM Research Program is revised and updated annually to build on and report research and management techniques to advance better fisheries management outcomes as DEEDI continues to manage fish habitats in existing urban and new urban growth areas. An example of this is the adoption of new techniques within DEEDI's self-assessable development code criteria. Self-assessable development codes (under the Planning Act) allow low risk development activities to occur where development compliance can be satisfied using DEEDI's criteria. These criteria are based on current best practice management information to achieve minimal impact to fish habitats. The code criteria are revised by DEEDI as new information arises, therefore allowing future application of new techniques investigated under the UFHM Research Program. Investigation of gabions for erosion control is an example of applied, investigative research (UFHM Research Program Stream 4). That example demonstrates dual management benefits can be achieved through protection of local infrastructure and retention of mangrove communities in high use urban areas.

The full list of UFHM Research Program projects is available online at www.dpi.qld.gov.au. Selected projects are highlighted in the associated Queensland Coastal Conference 2009 poster.

CONCLUSIONS

Information about the program can be found on the UFHM Research Program home page (available by accessing the departmental website). Scholarships information and fish habitat offsets information can be accessed on the departmental website.

TAKE HOME MESSAGE

- Fish habitat research is integral to the management of fish habitats by DEEDI.
- DEEDI applies fish habitat research findings to achieve a balanced fisheries development approach addressing community needs and fisheries resources in urban areas.
- The UFHM Research Program provides a strategic framework of priorities for Queensland projects and opportunities exist to encourage, fund and direct fish habitat research.

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