Queensland Wetlands Program tools

The Queensland Wetlands Program (the Program) provides a suite of integrated tools across the wetland management spectrum from policy and assessment through on-ground management to monitoring and communication. All these tools are freely available through Wetland*Info*—the first-stop-shop for wetland management resources in Queensland.

Current knowledge: maps, classification and science synthesis

Cape York wetlands. Photo by DES

Wetland mapping and data for wetlands in Queensland enable managers to make confident, effective and accurate decisions about the management and care of wetlands. Anyone can use the maps to find out about wetlands generally or to find out about specific wetlands.

The Program has developed a consistent wetland map at a scale of 1:100,000, with finer detail in some parts of Queensland (mainly coastal regions). The mapping integrates satellite imagery, regional ecosystems (REs) and topographic data, based on an innovative mapping and classification methodology developed by the Program. The result is maps of Queensland's swamps (palustrine wetlands), lakes (lacustrine wetlands), rivers (riverine wetlands), estuarine and marine wetlands.

The wetland mapping has been updated several times and the present mapping shows the status of wetlands in 2017.

The wetland classification system applies a range of attributes to the maps, including the ecological system (lacustrine, palustrine, riverine, estuarine and marine), climate region, water type, water regime, substrate, topography and vegetation. The classification system has formed the basis for the Program's groundbreaking work on wetland typology. The attributes identify wetland habitat types which are linked to the mapping and form the basis for the conceptual models and management profiles (see below).

In partnership with other programs, the wetland mapping has been enhanced by the mapping of Groundwater Dependent Ecosystems (GDEs). GDEs are ecosystems which require access to groundwater on a permanent or intermittent basis to meet all or some of their water requirements and include aquifers, springs, caves, lakes, palustrine wetlands, rivers and terrestrial ecosystems. A GDE mapping and classification methodology has been developed and is being applied to generate mapping for Queensland. The mapping is supported by a suite of pictorial conceptual models of different GDE types, a set of mapping rule sets and Frequently Asked Questions and handbooks.

Shallowest watertable aquifer mapping identifies the extent and key characteristics of the shallowest watertable aquifers in a landscape.

The wetland, GDE and shallowest watertable aquifer mapping and classification are available through:

- Wetland*Summary*
- Wetland*Maps*
- PDFs, KMLs (via 100K map tiles)
- QSpatial data download.

The Queensland Intertidal and Subtidal Ecosystem Classification Scheme uses the biological, physical and chemical characteristics of the water column and sea floor to classify intertidal and subtidal ecosystems, which includes estuarine and marine environments. The scheme develops a common understanding and language of classification to improve communication and lead to better management outcomes. It provides a structured framework and understanding available for mapping.

The Queensland Waterhole Classification Scheme has been developed to provide a framework for classifying and typing Queensland waterholes.

Wetland*Maps* provides an interactive map server that aims to give users fast and easy access to wetland information via a Google interface. An online animation has been developed to assist users to get the most out of this useful tool.

Wetland*Summary* allows users to access wetland and other related information by natural resource management (NRM) region, local government area, catchment and many more pre-defined areas.

the search function of this tool. Find out more by viewing an online animation.

The Moreton Bay mangroves and associated communities interactive map viewer is an interactive swipe map that visualises changes in the extent of mangroves and associated communities in Moreton Bay, Queensland, between 1955, 1997 and 2012.

Supporting the mapping is the Wetlands hydro-climate tool (with full support documents). This is an interactive tool that shows historic hydrological conditions for wetlands in the Queensland wetland mapping. The tool provides historical context to evaluate the representativeness and variability of the hydro-climatic conditions that are relevant to wetland inundation and the extent of inundation.

The Queensland Wetland Definition and Delineation Guidelines Part A and Part B are guides to existing wetland definitions and how to apply the Queensland Wetlands Program's wetland definition. This tool helps decision makers and planners, such as government agencies, landowners, conservationists, or natural resource managers, identify whether a feature is a wetland and, if so, its extent at a site-scale.

Soil Indicators of Queensland Wetlands uses soil properties to help identify wetlands and wetland boundaries. The five products in the suite support planners, environmental managers and wetland rehabilitation managers to establish the precise location of wetlands. The tools include a literature review, field guide, assessment methodology, 39 case studies and the Indicator of Reduction in Soils (IRIS) method.

Pictorial conceptual models of lacustrine and palustrine wetlands showing natural processes and components are concise and visually stimulating illustrations that use symbols or drawings to depict important features and processes of wetland environments. These models use the most current knowledge or understanding of an environment, presented in a way that is easy to understand.

The conceptual models are based on the freshwater wetland types derived using the wetland typology mentioned above. They describe the ecological components and processes associated with each wetland type.

Pictorial conceptual models of pressures on lacustrine and palustrine wetlands demonstrate how human or other activities interact with the natural processes in a wetland and impact on the wetland. Wetland managers can use this tool to discover pressure and condition indicators that are specific to a particular pressure and wetland type.

Conceptual model case studies are vibrant, easy to understand, illustrated guides to selected individual wetlands in Queensland. They offer site-specific, synthesised science in the form of conceptual models and text to support and inform management. They cover a wide variety of wetland issues and types. The technique used for developing the conceptual models can be implemented by local wetland managers anywhere in Queensland.

The Program has developed a Guide to pictorial conceptual modelling to support wetland ecosystem science and management in Queensland. The guide draws on the experience developed through the Program on how to synthesise and communicate complex scientific ideas to diverse and often non-scientific audiences. The guide explores the use of pictorial conceptual modelling to inform wetland management and engage the broader wetland community, and provides a step-by-step process for developing these types of models.

The report Understanding Ecological and Biophysical Processes in Queensland's Wetlands is a literature review and gap analysis of information about relationships between wetlands and Great Barrier Reef water quality. It consists of research on how wetland ecosystems function, on the role wetlands play in landscape processes (in particular, the improvement of downstream water quality), on assessment of the health of wetlands in an ecological context, and the implications of research for the protection, management and restoration of degraded wetlands.

'Walking the landscape' is a whole-of-system framework for understanding and mapping environmental processes and values. Developed by the Program in collaboration with other partners it systematically and transparently synthesises science by integrating existing data with expert knowledge to develop robust conceptual models which are spatially linked to real world landscapes. This process has been used to develop interactive catchment stories which demonstrate how water flows in catchments.

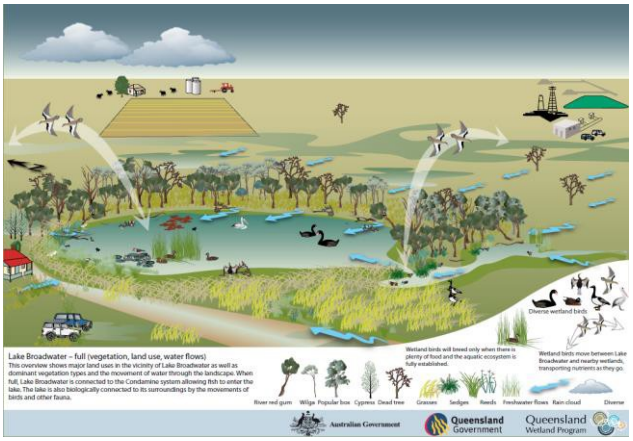
The Framework for evaluating aquatic ecosystem connectivity provides a way of understanding and applying connectivity at any level of spatial scale for any management outcome. It can also benefit research in providing a systematic method for the consideration of complex forms of ecological connectivity. A connectivity animation and narration provides a brief yet comprehensive explanation about aquatic

ecosystem connectivity across the landscape. It is supported by a connectivity poster.

The Waterbird and shorebird survey of the Bowling Green Bay Ramsar site provides a detailed assessment of the distribution and abundance of shorebirds and waterbirds in the Bowling Green Bay Ramsar Site. A suite of information on the management, inventory, monitoring and assessment, and identification of waterbirds of Queensland, and locations of shorebirds in Queensland, can be used for management.

Wetland management tools

Wetland management profiles of different wetland types help wetland managers identify the social,



Pictorial conceptual model of Lake Broadwater in its full phase. Photo by DES

economic and environmental values of wetlands, the hydrology and ecology of wetlands, threats and pressures on wetlands, and management actions that can be taken to conserve or enhance wetland biodiversity and productivity. These profiles link to the types identified in the mapping and classification project mentioned above.

The Treatment Systems pages synthesise best practice approaches to treatment systems for improving water quality and include conceptual models, diagrams and photos.

The Site Management and Rehabilitation pages provide a generic, best practice approach for site management and rehabilitation of wetland areas.

The Queensland Wetland Buffer Planning Guideline provides the steps for designing a wetland buffer and identifies the benefits and future management needs. The tool helps planners and managers design the most appropriate buffer for Queensland's wetlands, using a value-based approach that recognises potential stressors on wetland values. Decision makers can use the tool to help develop the best protection zone to stop impacts of development and other threatening activities around wetlands.

The wetland buffer case study for Lake Broadwater provides an example of how to apply the guideline. Lake Broadwater is located approximately 25 kilometres south-west of Dalby on the Darling Downs and lies within one of the most intensively cultivated agricultural districts in Queensland.

Rehabilitation Guidelines for the Great Barrier Reef (GBR) Catchment help wetland managers, including landholders, local councils and natural resource management bodies, undertake effective wetland rehabilitation. The guidelines draw on existing research and experience in Queensland. The guidelines include information such as wetland values, threats, practical rehabilitation techniques, legislative requirements and advice on maintenance, monitoring and evaluation.

The Farm Management Systems (FMS) wetland handbook helps producers and extension officers protect the functions of Queensland's wetlands in intensive agricultural production systems. The FMS economic assessment tools are step-by-step worksheets that help primary producers manage riparian areas on dairy farms and assess the costs and benefits of treating irrigation wastewater with reedbed wetlands.

The Grazing for Healthy Coastal Wetlands: Guidelines for managing coastal wetlands in grazing systems have been developed to provide graziers, landowners and extension officers with practical information on managing grazing in and around Queensland's coastal wetlands to maintain healthy coastal wetlands and productive grazing enterprises.

The Treatment systems in coastal catchment summary report provides a summary of the speakers' presentations, questions and answers from the Treatment Systems in Coastal Catchments Forum held on 8 July 2016. Several videos accompany the report.

A series of fact sheets about farm run-off treatment systems provides advice to extension officers and land managers on planning and designing farm run-off treatment trains, specific to coastal agriculture in the wet/dry tropics region between central and Far North Queensland. The fact sheets include the use of sediment basins, buffer strips, vegetated swales and drains and constructed (treatment) wetlands.

The guidelines for plant selection for water sensitive water design for Mackay contains practical design drawings and illustrates how they may be applied.

The Program has developed guidelines and a template for preparing a wetland management plan. It was initially developed for primary producers (grazing, dryland cropping) in Queensland's inland catchments but most of the material is applicable to Queensland generally.

The wetland related policy and legislation pages link to many different programs, policies and laws affecting wetlands.

The divese guidelines above are supported by more than 30 case studies and are available as separate fact sheets.

The wetland projects search tool lists on-ground wetland projects from a range of funding programs, stakeholder groups and land managers.

The Inventory of Instream Structures Impacting on Ramsar Wetlands report demonstrates the impacts of structures which threaten the health of local fish populations that support important recreational and commercial fisheries and associated wetland functions. The report's key feature is a Response Action Plan (RAP) that nominates specific actions to protect wetland values.

Wetland indicator species lists of wetland plants and animals are available to support identification and management of Queensland's wetlands. These lists are integrated with the State Government's species databases so that anyone can get detailed species information through Wetland*Summary* and Wetland*Maps*.

Wetland Plants of the Townsville–Burdekin Floodplain and Wetland Plants of the Wet Tropics are user-friendly illustrated field guides that offer comprehensive information on the wetland plants of these areas.

The Wetlands in the Great Barrier Reef Catchments Management Strategy 2016–21 supports the Reef 2050 Long term Sustainability Plan and the Reef Water Quality Protection Plan 2013, setting out a framework for the improved management of the wetlands of the Great Barrier Reef catchments.

Assessment and monitoring tools

The Aquatic Biodiversity Assessment and Mapping Method (AquaBAMM) is a comprehensive method that identifies relative wetland conservation values within a specified study area (usually a catchment). AquaBAMM is used to produce an aquatic conservation assessment (ACA) of wetlands within that area. The results provide a powerful decision support tool that can be comprehensively interrogated through a Geographic Information System (GIS) platform.

Updates to the wetlands mapping record changes in wetland extent and type over time which is useful for the State of the Environment reporting and similar reporting products. Wetland*Summary* provides wetland extent changes for areas of Queensland.

Sewage treatment facilities (STPs) and monitoring point locations in Queensland are available as part of the point-source monitoring program page.

The Assessment Toolbox provides users with current wetland assessment methods. Users enter a set of pre-determined criteria into a toolbox function that responds with a list of recommended methods, links to resources, a summary of the method and contacts.

Cattle at a recently installed watering trough that is shared between two new paddocks (from the box-mulga country case study). Photo by Roger Jaensch

A landscape hazard assessment for wetlands in the Great Barrier Reef report details the approach taken to assess hazards to lacustrine and palustrine wetlands in the Great Barrier Reef (GBR) catchments in Queensland. It provides a landscape scale assessment of hazard arising from land-use, and was conducted as a desktop GIS analysis.

Communication

Queensland's wonderful wetlands is a full colour brochure and poster package that sums up how valuable our wetlands are, what they are threatened by and how they can be sustainably managed. This valuable, easy-to-read information resource has been widely distributed to wetlands centres, community groups and industry bodies throughout Queensland.

The Great Barrier Reef—Our wetlands video highlights the wonderful values of wetlands in the catchments of the Great Barrier Reef.

Wetlands and the Great Barrier Reef catchments video builds on the video above and highlights the many

values of wetlands in the Townsville and Burdekin Shires and promotes the importance of wise management of these areas in helping to protect the outstanding universal value of the Great Barrier Reef.

A brochure on Wetlands of the Great Barrier Reef catchments concisely outlines the values of wetlands in the catchments of the Great Barrier Reef and is a handy resource to access important facts quickly.

The Wetlands Education Toolkit is a classroom teaching resource providing a collection of ideas, information and activites to support effective wetland education for Science and Geography curriculums. The Toolkit has a particular emphasis on the middle years of schooling (Years 6 to 9) and has been designed to be adaptable by teachers for flexible use across most Primary and Secondary year levels.

The Wetland*Info* website is the Queensland Wetlands Program's first-stop-shop for all your wetland management resources. The website links users to the widest range of wetland management resources in Queensland. Wetland*Info* is regularly updated with Program tools and new information. An online website tour is available to make finding your way around the Wetland*Info* site even easier.

The Moreton Bay, Bowling Green Bay and Currawinya Lakes Ramsar site fact sheets provide general information about these internationally important wetlands. The Moreton Bay—celebrating 20 years as a wetland of international importance fact sheet provides details of the wide range of activities that have occurred on the site, since its nomination.

A poster shows the location of Queensland's 5 Ramsar sites.

A series of on-line training packages has been prepared as a resource for people who want to learn more about wetlands. Users can download and use the contents of this training package to meet their learning and training needs. This information should be used in conjunction with information found on this website.

The User defined fact sheet tool allows users to create their own Queensland Wetland Program fact sheet based on their needs and the parts of site which are relevant to them.

The User defined treatment systems fact sheet tool allows users to create their own treatment systems fact sheet.

The Queensland Wetlands Program supports projects and activities that result in long-term benefits to the sustainable management, wise use and protection of wetlands in Queensland. The tools developed by the Program help wetland landholders, managers and decision makers in government and industry. The Queensland Wetlands Program is currently funded by the Queensland Government.

Contact wetlands@des.qld.gov.au or visit www.wetlandinfo.des.qld.gov.au

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