

Abstract

The Coastal Floodplain Prioritisation Study is a product of the NSW Marine Estate Management Strategy (MEMS) developed by the University of NSW Water Research Laboratory (WRL).

As part of that Study, a finite element numerical hydrodynamic model (RMA-2) (King, 2015) was developed to simulate present day and future sea level rise hydrodynamics in each of the Tweed, Richmond, Clarence, Hastings, Macleay, Manning and Shoalhaven River estuaries.

Hydrodynamics is the study of water movement. In an estuary, three main elements control the movement of water (tidal hydrodynamics). This includes, estuary geometry, upstream catchment inflows and downstream ocean tides. The geometry of an estuary is defined by its width, length, depth or the shape and storage of sidearms. Upstream catchment inflows are based on rainfall and runoff and downstream tidal inflows are based on the water levels in the ocean.

The completed hydrodynamic tidal models adequately represent day-to-day variations to estuarine water levels using detailed bathymetry in the intertidal range, and calibrated over a long time period to capture different tidal conditions. The hydrodynamic models were calibrated to both water levels and flow (where possible). Calibration and verification periods varied between the seven (7) estuaries based on data availability. Information on the period of calibration and data used for calibration can be found in the appendix of each individual floodplain report.

The RMA-2 hydrodynamic model solves the shallow water wave equations and is suitable for the simulation of flow in vertically, well-mixed water bodies such as, estuaries. RMA-2 uses the principles of conservation of mass and momentum, and represents typical processes of bed and bank friction, turbulence and wind stress.

The hydrodynamic model for each estuary comprised of three (3) main inputs:

1. Channel bathymetry;
2. Downstream tidal water levels; and
3. Upstream river flow.

The channel bathymetry was defined from existing hydro-survey datasets which had been collected for each estuary. 1-D elements were used to represent well defined channels in which the water levels remain 'in bank' and two dimensional 2-D elements were used to represent areas in which flow can occur in both the X and Y planes.

Ocean tidal water levels were based on MHL observations at the entrance of each estuary. Major upstream river flows were applied as inflow boundaries and were based on real-time streamflow observations maintained by WaterNSW. Lower catchment floodplains inflows were not included in the modelling and were likely to have a proportionally minor influence on water level statistics near the areas of interest near the lower parts of the estuary.

Further information on the tidal hydrodynamic models are outlined in the Coastal Floodplain Prioritisation Study – Background and Methodology (Rayner et al., 2023) (i.e. the 'Methods report'). Details of the specific inputs used for each estuaries' model is included Appendix I of the relevant Study Appendices document (see references below).

The Estuarine Tidal Hydrodynamic Models for the following regions can be accessed as resources below:

- Tweed River
- Richmond River
- Clarence River
- Hastings River
- Macleay River
- Manning River
- Shoalhaven River

Legal Constraints

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Resource locator

[WRL
Hydrodynamic
Models
README.txt](#)

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Protocol: WWW:DOWNLOAD-1.0-http--download
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Name: Coastal Floodplain Prioritisation Study - Estuarine Tidal Hydrodynamic Models Data Quality Statement
Protocol: WWW:DOWNLOAD-1.0-http--download

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[Estuarine Tidal](#)

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[Models Data](#)

[Quality](#)

[Statement](#)

Description:

Data Quality Statement for Coastal Floodplain Prioritisation Study - Estuarine Tidal Hydrodynamic Models

Function: download

Unique resource identifier

Code b53170a9-b20e-4cf3-b46a-0d22483cfc32

Presentation form

Dataset language English

Metadata standard

Name ISO 19115

Edition 2016

Dataset URI <https://datasets.seed.nsw.gov.au/dataset/b53170a9-b20e-4cf3-b46a-0d22483cfc32>

Purpose These models were developed specifically for determining regular daily water levels throughout the tidal limit of each subject estuary. Any other use of the models would require informed variations to the model input files and or source code, and create a different model and purpose (refer to licensing details below). The objective of the Coastal Floodplain Prioritisation Study was to develop an evidence base for the strategic management of NSW coastal floodplains. Sea level rise scenarios were run in the Coastal Floodplain Prioritisation Reports using the models to indicate expected water level changes, with the results used to estimate or rank the vulnerability of fixed infrastructure (such as floodgates) and adjoining floodplains to reduced functionality or drainage constraint. The sea level rise vulnerability information can be used in land use and infrastructure management decision making related to both water quality and drainage vulnerability risks.

Status Completed

Spatial representation

Type vector

Spatial reference system

Code identifying the spatial reference system 4283

Topic category

Keyword set

keyword value

- ECOLOGY-Landscape
- INDUSTRY-Primary
- WATER
- WATER-Hydrology
- WATER-Rivers
- WATER-Surface

MARINE-Estuaries

MARINE-Geology-and-Geophysics

MARINE-Human-Impacts

BIOPHYSICAL

CLIMATE-AND-WEATHER

CLIMATE-AND-WEATHER-Climate-change

HAZARDS

HAZARDS-Flood

GEOSCIENCES

GEOSCIENCES-Geomorphology

GEOSCIENCES-Hydrogeology

OCEANOGRAPHY-Physical

LAND-Topography

HUMAN-ENVIRONMENT-Planning

HUMAN-ENVIRONMENT-Structures-and-Facilities

Originating controlled vocabulary

Title	ANZLIC Search Words
Reference date	2008-05-16

Geographic location

West bounding longitude	150.61492
East bounding longitude	153.59633
North bounding latitude	-34.94724
South bounding latitude	-28.16887

Vertical extent information

Minimum value	-100
Maximum value	2228

Coordinate reference system

Authority code	urn:ogc:def:cs:EPSG::
Code identifying the coordinate reference system	5711

Temporal extent

Begin position

End position	N/A
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Dataset reference date

Resource maintenance

Maintenance and update frequency	Not planned
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Contact info

Contact position	Data Broker
Organisation name	Department of Primary Industries and Regional Development (DPIRD)
Responsible party role	pointOfContact
Lineage	<p>Tucker, T. A., Rayner, D. S., Harrison, A. J., Lumiatti, G., Rahman, P. F., Gilbert, D. & Glamore, W. 2023. Tweed River Floodplain Prioritisation Study WRL TR2020/04. Water Research Laboratory, University of New South Wales. Harrison, A. J., Rayner, D. S., Tucker, T. A., Lumiatti, G., Rahman, P. F., Gilbert, D. & Glamore, W. 2023. Richmond River Floodplain Prioritisation Study WRL TR2020/05. Water Research Laboratory, University of New South Wales. Harrison, A. J., Rayner, D. S., Tucker, T. A., Lumiatti, G., Rahman, P. F., Gilbert, D. & Glamore, W. 2023. Clarence River Floodplain Prioritisation Study WRL TR2020/06. Water Research Laboratory, University of New South Wales. Tucker, T. A., Rayner, D. S., Harrison, A. J., Lumiatti, G., Rahman, P. F., Gilbert, D. & Glamore, W. 2023. Macleay River Floodplain Prioritisation Study WRL TR2020/07. Water Research Laboratory, University of New South Wales. Harrison, A. J., Rayner, D. S., Tucker, T. A., Lumiatti, G., Rahman, P. F., Gilbert, D. & Glamore, W. 2023. Hastings River Floodplain Prioritisation Study WRL TR2020/08. Water Research Laboratory, University of New South Wales. Rayner, D. S., Ruprecht, J. E., Harrison, A. J., Tucker, T. A., Lumiatti, G., Rahman, P. F., Gilbert, D. & Glamore, W. 2023. Manning River Floodplain Prioritisation Study WRL TR2020/09. Water Research Laboratory, University of New South Wales. Rayner, D. S., Harrison, A. J., Tucker, T. A., Lumiatti, G., Rahman, P. F. & Glamore, W. 2023. Shoalhaven River Floodplain Prioritisation Study WRL TR2020/10. Water Research Laboratory, University of New South Wales. Rayner, D. S., Harrison, A. J., Tucker, T. A., Lumiatti, G., Rahman, P. F., Waddington, K., Juma, D. & Glamore, W. 2023. Coastal Floodplain Prioritisation Study - Background and Methodology WRL TR2020/32. Water Research Laboratory, University of New South Wales.</p>
Limitations on public access	
Responsible party	
Contact position	Data Broker
Organisation name	Department of Primary Industries and Regional Development (DPIRD)
Responsible party role	pointOfContact
Metadata point of contact	
Contact position	Data Broker
Organisation name	Department of Primary Industries and Regional Development (DPIRD)
Responsible party role	pointOfContact
Metadata date	2023-10-11T19:52:08.911670
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