

# WATERWAY AND CATCHMENT REPORT 2023

Reporting on data November 2022 to April 2023

MidCoast Council 2023 Waterway and Catchment Report Prepared by: MidCoast Council Natural Systems

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# INTRODUCTION

The MidCoast Council region depends heavily on the health of our catchments and waterways. The waterways form the basis of the region's economy (supporting tourism and primary production), contribute to our way of life and provide habitat for extraordinary biological systems. The region's catchments are under continued pressure from pollution and impacts associated with catchment land use, development and tourism. If unmanaged this has the potential to result in a decline in the health of our waterways.

All our local waterways are critically susceptible to environmental pressures; a Hepatitis A event in oysters in Wallis Lake in 1997, reoccurring blue-green algae in Myall Lakes, acid sulfate soil runoff in the Manning and Wallamba Rivers and episodic fish kills throughout our catchments are all examples of what can go wrong.

This report has been presented to accompany the 2023 Waterway and Catchment Report Card. It provides the technical information on how the Report Card scores were calculated as well as providing more detail on the results.

## WATER QUALITY - ECOLOGICAL HEALTH

Good management of our lakes, rivers and estuaries requires understanding of how they work, predictions about future conditions and informed choice about actions to get the outcome the community wants. MidCoast Council and the Department of Planning and Environment - Environment Science (DPE-ES) have worked together to put these principles into action.

International best practice suggests that research, modelling, management and monitoring should all use the measures of condition and success. DPE-ES research has allowed the development of a solid understanding of the impacts of catchment activities on estuary health and concluded that abundance of algae and water clarity would be good indicators for the future.

Council utilised this scientific understanding to form the Water Quality Improvement Plan in 2009, which was designed to achieve a number of specific outcomes, expressed in terms of water clarity and algal abundance. These same principals are currently being used in the development of Coastal Management Programs (CMP) which will produce management actions for the next 10 years.

The MidCoast Council community value the health of our waterways and the Waterway and Catchment Report Card is a tool that Council use to monitor how we are tracking. DPE-ES have undertaken an ecological health monitoring program in Wallis Lake and Khappinghat as part of the state-wide Monitoring, Evaluation and Reporting Strategy (MER). As part of the strategy, these estuaries were selected as two of seven across the state to be sampled each year to track interannual variability in two ecological health indicators; chlorophyll a (the amount of algae) and turbidity (the amount of sediment).

Since 2011 the monitoring program has been expanded to cover other key sites across the MidCoast Council area. DPE-ES have provided an independent scientific evaluation on the ecological health of Wallis Lake, Smiths Lake, Karuah River Estuary, Myall Lakes, Khappinghat Estuary and the Manning River Estuary.

Ecological health does not refer to environmental health issues such as drinking water quality, safety for swimming, heavy metal contamination, disease, bacteria, viruses or our ability to harvest shellfish or fish.

Figure 1: Wallamba Wetlands

Healthy waterways support our local towns and communities, they keep them thriving. They put food on our tables, support our outdoor lifestyle, local economy and provide homes for wildlife, trees and plants of every sort. With healthy waterways our communities have a healthy vibrant future

INTRODUCTION

# ECOLOGICAL HEALTH RESULTS PRESENTED IN EASY TO UNDERSTAND REPORT CARD

The results of ecological health monitoring have been presented in a Waterway and Catchment Report Card (see Appendix 1) which grades the health of the waterways in a similar way to school Report Cards, with a grade ranging from A (excellent) to F (very poor).

The information provided below includes the background details for the Report Card including the objectives, methods and a detailed description of the results.

# **REPORT CARD OBJECTIVES**

The objectives for the Report Card are:

- 1. To report on ecological health.
- 2. To track progress on management actions.

These objectives are specifically achieved by providing information to:

- Assist in the current and ongoing protection of "high conservation" areas that provide substantial water quality and biodiversity benefits to the rivers and estuaries.
- Guide and report on the remediation of areas that have high pollutant loads and highlight areas that may require further action.
- Help protect all waterways against further declines in water quality.

#### **ENVIRONMENTAL VALUES**

The environmental values that management actions in the catchment are aiming to achieve are:

- 1. Minimal algal growth.
- 2. Minimal sediment inputs and maximum clarity.
- 3. Intact aquatic habitats like seagrass, macrophyte and riparian vegetation.

Figure 2: Clear waters with minimal algal growth and maximum clarity support key habitats such as seagrass

# METHODS

#### DEVELOPMENT OF REPORT CARD GRADES

The monitoring program has assessed the Ecological health of Wallis, Smiths and Myall Lakes, Manning and Karuah River Estuaries and the Khappinghat Estuary. There are a number of steps taken to determine the score for each zone and subsequent Report Card grade:

- 1. Selecting the indicators.
- 2. Identifying the guideline values.
- 3. Collecting the data.
- 4. Calculating the zone score.
- 5. Allocating the Report Card grade.

#### **Selecting the indicators**

# WHY A REPORT CARD?

Report Cards are an effective way to check on the health of our waterways. They help us compare current conditions with the condition we would like them to be. Scientists use indicators to 'health check' our waterways. Just as your body temperature is used as an indicator that something may be wrong with your own health, indicators are used to show if something is out of balance or unhealthy in the system. The indicators are selected to assess the overall health or ecological condition. The results of the Report Card are used to guide future management actions and ensure long-term ecological health of our catchments.

In order to meet the objectives of the Report Card, indicators must report on ecological health but also be able to report on the outcomes of management actions. The management actions are linked to the environmental values set for the region (listed above), and the indicators selected have been shown to be responsive to catchment management actions.

There are many different estuary reporting programs world-wide, with indicators specifically chosen to suit local conditions or issues.

Chlorophyll and turbidity are commonly used as they are proven to be very informative and responsive indicators, see Table 1.

#### ACTIVITY

What we do on the land impacts on the quality of water that runs off. If the quality of the runoff is poor it puts stress on the environment.



## STRESSORS

Stressors are changes to the environment that result from the activity, these can lead to ecological harm. Stressors can include nutrients, acid leachate and sediment in the water (turbidity).



## **ECOLOGICAL IMPACTS**

Ecological condition grades are a combination of turbidity (water clarity) and algae (measured as chlorophyll) scores.



Algal growth can be measured by assessing chlorophyll a levels in the water and sediment inputs are assessed by measuring the turbidity (see feature box). These indicators are easy to measure and directly relate to the environmental values. The extent of seagrass beds is also an excellent ecological indicator of a healthy functioning ecosystem (see feature box).

Seagrass is the basis of the food web in healthy estuaries. Seagrass provides essential habitat and food for marine life. Where seagrass is abundant so is aquatic life and as such, it is an excellent indicator of ecological health. Seagrass growth is affected by a number of factors including nutrient levels, algal growth, physical removal and water clarity. Water clarity (turbidity) is directly linked to seagrass growth and can be used as a surrogate for ecological health. When water clarity is high, seagrass is abundant as there is plenty of light for it to thrive.

While macrophytes and riparian vegetation are not currently measured, low chlorophyll and turbidity levels are necessary to ensure healthy habitats. Expansion of the program in the future is likely to include assessment of these habitats.

Monitoring Program	Chlorophyll a	Turbidity	Dissolved Oxygen	Nutrients	Riparian vegetation	Seagrass	Other critical habitats (e.g coral)
South East Queensland Ecosystem Health Monitoring Program	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$
Chesapeake Bay EcoCheck program	$\checkmark$	$\checkmark$	$\checkmark$			$\checkmark$	$\checkmark$
Northern Rivers CMA Ecohealth	$\checkmark$	$\checkmark$	$\checkmark$		$\checkmark$		
New South Wales Monitoring, Evaluation and Reporting Program *	$\checkmark$	$\checkmark$	F		F	$\checkmark$	
MidCoast Council Report Card (this program)	$\checkmark$	$\checkmark$	F		F	$\checkmark$	

#### Table I: Indicators used in various estuarine monitoring programs

F - future

\* New South Wales Monitoring, Evaluation and Reporting Program also samples fish in a limited number of sites

The New South Wales Monitoring, Evaluation and Reporting Program, concluded that measurement of chlorophyll a and turbidity provides an effective measure of the short-term response of estuary health to management actions. Seagrass and other macrophytes provide a long-term integration of estuary health.

Dissolved oxygen has been widely used as an indicator of the amount of oxygen in the water column with many critical aquatic processes dependent on a healthy level and minimal variability. MidCoast Council and the New South Wales Monitoring, Evaluation and Reporting Program both acknowledge that dissolved oxygen is an important variable to measure but have not done so to date, due to logistical reasons. There are plans to include this indicator in future monitoring activities.

#### Identifying the guideline values

A healthy ecosystem refers to a system which has normal ranges of diversity and function. These 'normal' ranges have been established from extensive monitoring of estuaries across New South Wales. To establish these ranges, sites that represent a variety of ecological conditions from pristine (reference) sites to highly degraded have been sampled over a number of years. The data for pristine (reference) sites have been used to establish the guideline values which are fundamental for ranking the ecological health of a site.

A guideline value is the value which indicates that a variable is outside the 'normal range' and could trigger further investigation. In our context, we have used the guideline value to indicate conditions which are not desirable for continued waterway health.

A guideline value is specific to different types of estuary. In this study, Wallis Lake, Pipers Creek, Charlotte Bay, Bombah Broadwater and Myall Lake Estuary were all classified as 'Lakes', Mid Wallamba Estuary, Karuah Estuary, Wallamba Cove, Dawson River, Farquhar Inlet, The Branch Estuary, Lower Myall Estuary, Upper, Mid and Lower Manning Estuary River, Browns Creek, Landsowne and Ghinni Ghinni were classified as a 'River estuary' and Khappinghat was classified as a 'Creek estuary' (Roper et al. 2011).

#### Table 2: Guideline Values for NSW Estuaries (from Roper et al. 2011)

	Turbidity (NTU)	Chlorophyll (µg/L)	рН
Lake	6.7	2.5	
River estuary (mid)	1.9	2.2	

Figure 3: Algal growth in the Pipers Creek Catchment.

#### ALGAE

Algae or microscopic plants are always present in waterways but if conditions change and are suited to algal growth, blooms can occur. Blooms may occur if there is a lot of nutrients in the water which can come from urban stormwater, fertiliser runoff from farms and gardens and seepage from septic tanks. Algal blooms can reduce the amount of light reaching seagrass beds limiting their growth. When blooms of algae die and start to decay, the resulting bacterial activity can reduce oxygen concentrations in the water column, possibly leading to fish kills.

# **CHLOROPHYLL A**

Chlorophyll a is a pigment found in plants and is an essential molecule for the process of photosynthesis (the conversion of light energy to chemical energy resulting in the consumption of carbon dioxide and the production of oxygen and sugars). In estuarine and marine waterways, chlorophyll a is present in phytoplankton such as cyanobacteria, diatoms and dinoflagellates. Because chlorophyll a occurs in all phytoplankton it is commonly used as a measure of phytoplankton biomass (EHMP 2008).

#### **Collecting the data**

The MidCoast Council region has been divided up into reporting zones. A zone is actually a broad area within the estuary rather than a discrete point (see maps in Results Section) and may be represented by a single sample or by multiple samples. Six zones were sampled in Wallis Lake Estuary (Mid Wallamba Estuary, Coolongolook Estuary, Wallamba Cove, Pipers Creek, Wallis Lake and Charlotte Bay). There are eight zones in the Manning River Estuary (Middle, Upper, Lower, Dawson and Lansdowne River Estuaries, Browns and Ghinni Ghinni Creeks and Farquhar Inlet), three zones in the Myall Lakes (Myall Lake, Bombah Broadwater and Lower Myall Estuary), two zones in Karuah (Karuah Estuary and The Branch Estuary) and one zone in the Khappinghat Estuary and one zone in Smiths Lake.

Samples were collected on six occasions between summer and autumn from November 2022 to April 2023. This represents the part of the year when the highest chlorophyll concentrations are expected.



Figure 4: Department of Planning and Environment staff carry out monitoring of the waterways in the MidCoast Region

At each of the selected sites, samples were taken in accordance with the New South Wales Monitoring, Evaluation and Reporting protocols which are described in full in Roper et al. (2011). At each of the 'Lake' sites, turbidity was measured using a calibrated probe suspended at a depth of 0.5 metres for five minutes as the boat drifted or was motored (generally covering a distance of at least 300 metres), logging data every 15 seconds. The final value for the 'site' sampled was the average of all the logged data. During the drift, at least five samples of the top 1 metre of the water column were collected and combined in a bucket. At the end of the drift, a single 200 millilitre sample for chlorophyll a analysis was taken from the composite in the bucket.

For the river estuary sites, an 'underway sampler' is used to pass water past the probe whilst the boat travels at a regulated speed along a transect upstream from the middle to the upper part of the estuary. The turbidity is calculated as the mean of logged values for the transect. At two sites along the transect, composite water samples are collected for chlorophyll a analysis.

Figure 5: Department of Planning and Environment staff carry out monitoring of the waterways in the MidCoast Region Chlorophyll a samples are immediately filtered (within one hour) under mild vacuum and the filter frozen until analysis. Chlorophyll a is extracted into acetone and chlorophyll a concentration is determined by spectrometry. Seagrass depth range is calculated by measuring water depth at the shallow limit and deep limit of seagrass cover across three transects at a sampling site. One transect is a routine transect used in the survey each year. The remaining two transects are randomly located within 50 m each side of the routine transect. The mean shallow limit is subtracted from the mean deep limit to give the depth range for that site. All depths are standardised to a number of standard height markers in proximity to the sampling sites within the lake to remove potential errors from changing water levels.

A report card grade is calculated following the analysis method outlined in the New South Wales sampling and reporting protocols (OEH, 2016). Briefly, the seagrass depth range scores are based on not only the recorded depth range for a specific year, but also how that compares to the previous year, meaning how seagrass has progressed, recovered or regressed over time since the previous survey. The seagrass score is presented separately in the report card and does not affect the overall ecological health grade.





#### **SEDIMENT**

Sediment from the land can be washed into waterways when it rains. If land is poorly managed, large amounts of sediment can wash into our waterways. Sediment also comes from roads and pathways washing directly into the stormwater and then the estuaries.



Too much sediment in the water reduces the amount of light reaching the bottom and is detrimental to seagrass which require light for growth. Seagrass is critical for the health of estuaries as it provides essential habitat for fish and invertebrates which support bird life and the local tourism and aquaculture industries. Excess amounts of suspended particles can also smother benthic organisms like sponges, irritate the gills of fish and transport contaminants.

# TURBIDITY

Turbidity provides a measure of sediment in the water. It is the measure of light scattering by suspended particles in the water column, providing an indication of the amount of light penetration through the water column (EHMP 2008).

#### **METHODS**

#### Calculating the zone score

The measured values of all indicators are summarised into one value which can then be compared between different reporting zones.

Two basic calculations have been performed for each zone:

- Non-compliance score are the indicator values non-compliant with the guideline value?
- Distance from the benchmark score how far from the guideline value are the indicator values?

The distance measure is a recognition that the guideline values only allow for two possible states, compliant and non-compliant. The distance measure provides for more sensitivity for ecological condition along the gradient from good to poor.

#### Calculating the non-compliance score

The non-compliance score is simply calculated by taking the number of samples that are above the guideline value as a proportion of the total number of samples taken in the sampling period. The non-compliance score is then expressed as a value between 0 and 1, with 0 equal to none of the values being non-compliant (i.e. all compliant) and 1 equal to all values being non-compliant.

Non-compliance score equals the number of samples non-compliant with guideline value divided by the total number of samples.

#### Calculating the distance from benchmark score

The distance score has been expressed as a proportion between 0 and 1 to be standardised with the non-compliance score. To do that, the distance score is expressed as a proportion of the worst expected value (WEV) with a score of 0 equal to the benchmark value, and 1 equal to the worst expected value for each of the indicators.

The worst expected value has been determined by examination of a data set for all of New South Wales. The 98th percentile value was selected as the worst expected value Table 3. In the small number (2%) of circumstances where measured values were greater than worst expected value, the distance measure became 1 (which is the highest possible value).

Table 3:Worst expected	l value for	Condition	Calculations
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	Turbidity WEV (NTU)	Chlorophyll WEV (µg/L)
Lake	20	30
River (mid)	60	30
Lagoon	20	30

Distance of each non-compliant value equals: (measured value - guideline value) / (worst expected value - guideline value).

The distance score is calculated as the mean distance from the guideline of those values that are non-compliant for the reporting period.

Once the non-compliance and distance score have been calculated, the geometric mean of both scores is calculated to arrive at a single score that can be used to assess the condition of each indicator in that zone.

Final score for indicator =  $\int (\text{non-compliance x distance score})$ 

The final 'zone score' for each reporting zone is then the simple average of the indicator scores.

#### METHODS

#### **Allocating the Report Card Grade**

Defining the Report Card grade is an important step in the development of the Report Card. The grade definitions below are linked to the environmental values outlined above and are structured to allow easy comparison between each system and over time.

It is important that the cut-off values for each grade reflect the condition of each zone in comparison to a broader scale of condition across all New South Wales estuaries (i.e. an 'Excellent' grade represents an excellent condition for a New South Wales estuary). To assist with the derivation of cut-offs, scores were calculated for 130 zones across a wide range of New South Wales estuaries using the same guidelines and worst expected values as the MidCoast analyses. Cut-offs were then defined as representing a percentage of the scores for the state (Table 4). For example, a zone score less than 0.07 defined the 20% of best zone scores in the state and this became our 'Excellent' grade (see Table 4 for other cut-offs). We did not use a score of 0 as 'Excellent' because, as a consequence of how the guideline values are calculated, we expect that even pristine reference sites will exceed guideline values 20% of the time. The definition of the grades and description are shown in Table 4.

Table 4:	Report Car	d results,	definitions,	descriptions	and cut-off	

Grade	Result	Definition	Description
А	Excellent	All environmental values met (The indicators measured meet all of guideline values for almost all of the year)	The best 20% of scores in the State
В	Good	Most environmental values met (The indicators measured meet all of the guideline values for most of the year)	Next 30% of good scores
С	Fair	Some of the environmental values met (The indicators measured meet some of the guideline values for some of the year)	Middle 30% of scores
D	Poor	Few of the environmental values met (The indicators measured meet few of the guideline values for some of the year)	Next 15% of poorer scores
F	Very Poor	None of the environmental values met (The indicators measured meet none of the guideline values for almost all of the year)	The worst 5% of scores in the State

Figure 8: Relationships between grades, zone scores and state percentiles



#### Summary of the process for calculating the zone score

In summary, the process for calculating the zone involved:

- Calculating the proportion of time that the measured values of the indicator are above the adopted guideline limits or Guideline Values.
- Calculating the distance/departure from the guidelines for that indicator the extent the data extends past the guideline value and approaches the worst expected value (WEV) for that indicator.

- Calculating the geometric mean of the non- compliance and distance scores to get a final • score for that indicator for each zone.
- Averaging the scores for the two indicators at each site this gives the 'zone score'.
- Grade the zone based on the zone score as A, B, C, D, F.

#### **Rainfall results**

The amount of rainfall that occurs around the period of sampling for the Report Card (September - April each year) influences the Report Card results. If there is more rain, there is more runoff in the catchment resulting in greater quantities of sediment and nutrients entering our waterways.

The sampling period for 2022-23 was drier than average with a total of 552 mm falling at Whoota Station. Taree saw more rain, however the total fall was still slightly lower than the long term average.

The rainfall data is taken from the Forster Bureau of Meteorology rainfall station (Tuncurry Marine Rescue and Whoota Station) (www.bom.gov. au/climate/data). Similar trends were seen in data throughout the MidCoast Area.



Figure 9: Data presented includes total rainfall. \* data collected from Whoota Station.



Figure 10: Monthly observed and long term average rainfall during the 2020-21 monitoring program at Whoota (bom.gov.au)



Figure 11: Monthly observed and long term average rainfall during the 2020-21 monitoring program at Taree Airport (bom.gov.au)

METHODS

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# **MANNING RIVER ESTUARY**

## **CATCHMENT DESCRIPTION**

The Manning River has a catchment area of 8,420 square kilometers, which makes it the sixth largest on the coast of NSW. The Manning River is unique on the NSW coast because it is a double delta with two river entrances at Harrington and Old Bar. The main land uses within the catchment are urban development, beef cattle grazing, dairying, oyster growing and forestry. Significant areas of the catchment are also conserved within National Parks and Nature Reserves. The majority of the catchment's population live in the estuarine zone around the town centres of Taree, Wingham, Cundletown, Harrington and Old Bar.





The Upper, Mid and Lower sections of the Manning River Estuary all remained in good ecological condition this year. All monitoring sites in the main estuary channels received a good grade for water clarity. Turbidity dropped to half the levels of the previous year, probably due to less catchment runoff delivering sediment to the estuary. Algal abundance increased compared to last year, however, all sites in the mid and lower sections received a good grade for algal growth. Two sites in the upper estuary received a fair grade for algal growth probably due to longer residence times of waters in the upper estuary.

Farquhar Inlet improved all grades to excellent this year where the entrance was open throughout the sampling season. Dawson River remained in fair ecological condition with an improved grade of fair for water clarity. Browns Creek and Lansdowne River were graded as fair ecological condition this year with improved turbidity but high levels of algal growth in all of the tributaries.



#### **UPPER MANNING ESTUARY**

The Upper Manning River Estuary remained in good ecological condition this year. Algal abundance was elevated compared to last year resulting in a fair grade for algal growth. Almost all samples exceeded the chlorophyll guideline values, with higher levels of algal abundance usually occurring at the two sites located farthest upstream. Turbidity in the upper estuary was generally lower this year due to less rainfall and catchment runoff. There was only one exceedance of the turbidity guideline value but that was large enough to result in only a good grade for water clarity.

Average salinity in the upper estuary was 4.9psu this year compared to 1.7psu last year.

#### **Estuary description**

The Upper Manning Estuary includes the section of river from Tinonee to the western end of Dumaresq Island.



#### **DAWSON RIVER ESTUARY**

Dawson River Estuary was in fair ecological condition this year. Turbidity was typically below 8 NTU this year, compared to an average of 19 NTU last year, leading to an improved grade for water clarity to fair. One large exceedance of the guideline value on the first sampling trip prevented a further improvement in the grade.

Algal abundance was higher this year exceeding guideline values most of the time. There was no change to the fair grade for algal growth, however this grade is based on only four instead of the usual six samples as several samples were damaged.

Algal abundance was relatively high in the estuary on the two trips for which samples were lost, based on the chlorophyll reading from the water quality probe at the time. If all samples were analysed, it is possible that the grade for algal growth may have been worse than fair. The results of the last few years indicate that there is an ongoing need for nutrient and sediment management in this sub-catchment.

#### **Estuary description**

Dawson River is a tributary of the Manning River. It enters downstream of Taree and receives runoff from Taree's industrial areas as well as a sewage discharge.



#### **MID MANNING ESTUARY**

The Mid Manning River Estuary remained in good ecological health this year. Water clarity grade improved to good with only minor exceedance of the turbidity guideline value on two sampling trips. Algal growth was good with only minor exceedance of the chlorophyll guideline value in half of the samples.

Average salinity in the mid estuary was 18.5psu this year compared to 7.7psu last year.

#### **Estuary description**

The Mid Manning Estuary is the river from the western end of Dumaresq Island to the confluence with the Lansdowne River in the north channel, and to the confluence with Warwiba Creek in the south channel of the river. The Mid Manning Estuary also extends into Scotts Creek to the confluence with Bukkan Bukkan Creek.



## LOWER MANNING ESTUARY

The Lower Manning River Estuary remained in good ecological health this year. Water clarity grade improved to good with only minor exceedance of the turbidity guideline value on two sampling trips. Algal growth was good with only minor exceedance of the chlorophyll guideline value in one-third of the samples.

Average salinity in the lower estuary was 20.5psu this year compared to 8.0psu last year.

#### **Estuary description**

The Lower Manning Estuary is from the Lansdowne River confluence to the river mouth at Harrington, and from the Warwiba and Bukkan Bukkan Creek confluences to the river mouth at Farquhar Inlet.



# **FARQUHAR INLET**

Farquhar Inlet was in excellent ecological condition this year with improvements in water clarity and algal abundance. There was no exceedance of the turbidity guideline value and only one slight exceedance of the chlorophyll guideline value.

The entrance was open throughout the sampling season and average salinity was close to oceanic at 33psu, compared to 20psu last year.

#### **Estuary description**

Farquhar Inlet is a secondary entrance to the Manning River system that is intermittently open. It is a broad, shallow sand delta at the junction of the Manning River South Arm and Scotts Creek. It is surrounded by agricultural lands and receives runoff from the town of Old Bar.



#### **LANSDOWNE RIVER**

The Lansdowne River Estuary retained its fair grade this year with a great improvement in water clarity. Average turbidity dropped to 3.9NTU this year from 15NTU last year. There were only four minor exceedances of the turbidity guideline value and a step up in the water clarity grade to good.

Algal abundance was high, on average three times higher than last year, with all samples exceeding the chlorophyll guideline value. One sample had over ten times the guideline value, resulting in the very poor grade for algal growth. Nutrients in runoff from the agricultural catchment, coupled with longer residence times (due to less rainfall) and more available light in estuary waters, led to moderate-high algal abundance in the Lansdowne River this year.

#### **Estuary description**

Lansdowne River is a tributary of the Manning River draining to the estuary on the eastern side of Mamboo Island and via Ghinni Ghinni Creek. The catchment includes forested areas but is mainly agricultural land use, some high intensity farming (dairy, poultry and turf). Moto has extensive areas of acid sulfate soils which drain to the river.

### **GHINNI GHINNI CREEK**



Ghinni Ghinni Creek was downgraded to fair ecological condition this year. Water clarity improved to good with turbidity exceeding the guideline value by a small amount on most sampling trips. Average turbidity was 6 NTU this year compared to 10 NTU last year. Average algal abundance was more than three times higher than last year.

All samples exceeded the chlorophyll guideline value and two samples had four times that value, leading to a drop in that grade to poor. Less runoff from the agricultural catchment resulted in better water clarity and longer residence times in estuary waters for algae to grow in warm temperatures.

#### **Estuary description**

Ghinni Ghinni Creek connects the Lansdowne River to Manning River at the eastern side of Jones Island. The catchment is mainly agricultural - beef and dairy farming. Moto and Ghinni Ghinni have extensive areas of acid sulfate soils draining to the creek.



#### **BROWNS CREEK**

Browns Creek remained in fair ecological condition this year with a great improvement in water clarity. Average turbidity was 5 NTU this year compared to 19 NTU last year. Turbidity was three time higher than the turbidity guideline value on one sampling trip, with no other exceedances resulting in a good grade for water clarity. Algal abundance was on average twice as high as last year. Most samples exceeded the chlorophyll guideline value by two-three-fold, resulting in a poor grade for algal growth. The urban catchment delivers nutrients to Browns Creek fuelling algal growth.

#### **Estuary description**

Browns Creek is at Taree with urban and light industrial areas draining to the creek.

# **KHAPPINGHAT ESTUARY**



The Khappinghat Estuary improved to excellent ecological health this year due to improved water clarity and very low algal growth. There was only one minor exceedance of turbidity and chlorophyll guideline values this year, resulting in an excellent water clarity grade and a good for algal growth. It appears that water quality in the estuary has recovered from the extended drought 2017-2019 and the bushfires in 2019-20 during which time ecological health was only fair.

Average salinity in the estuary (33psu) was close to ocean water as the entrance was open for most of the year and scoured by high flows. Catchment runoff is flushed out of the estuary when the entrance is open, coupled with the inflow of ocean water, both of which would have contributed to excellent water quality in the Khappinghat Estuary this year.

# WALLIS LAKE

# **CATCHMENT DESCRIPTION**

The Wallis Lake catchment extends over 1400 square kilometers and this catchment includes the region's major urban centre of Forster-Tuncurry.

Wallis Lake is one of the most significant producers of Sydney Rock Oysters in Australia and is also central to the local tourism industry, valued at over \$315m per year. The lake is one of New South Wales' top three producing estuarine fisheries, it produces 80% of the states commercial crabs and is utilised extensively for recreation including boating, fishing and swimming.

The Wallis Lake catchment contains habitat for threatened and international migratory species and contains 35% of the seagrass beds of New South Wales, as well as the second largest representation of saltmarsh in the State.







## **MID WALLAMBA ESTUARY**

Mid Wallamba Estuary retained a good ecological health grade this year with improvements in grades for water clarity and algal growth. There was only one minor exceedance of turbidity guidelines resulting in an excellent grade for water clarity. Chlorophyll guideline values were exceeded in most samples, but exceedances were not large resulting in a good grade for algal growth.

Note that the algal growth grade is based on chlorophyll data from only four of the six sampling trips as samples were lost during analysis due to a bad batch of laboratory solvent. If all samples were analysed for chlorophyll, it is likely that Wallamba River would have received a lower grade of fair for algal growth because the missing samples were collected during low rainfall (8mm) or after moderate rainfall (36mm in week prior). The water quality probe showed chlorophyll levels were moderate to high in the estuary on those dates, and while data from the chlorophyll probe are not as accurate as analysing chlorophyll in grab samples, it is usually in the ballpark range of actual values.

Average salinity was in the brackish range (17psu) with frequent rainfall over the sampling season, including three large rain events on 23-24 February (75mm), 13-14 March (175mm) and 3-5 April (75mm). Sampling trips #5 and #6 occurred about 1 week after the February and March rain events. Moderate flows in the river estuary kept chlorophyll levels reasonably low on these trips, as residence times of estuary waters were not long enough for optimal algal growth.

Seagrass depth range improved to good this year at Lower Wallamba due to an increase in depth range. Improved seagrass depth range is likely to be the result of increased light availability in the water column due to excellent water clarity.

#### **Estuary description**

The Mid Wallamba Estuary sub catchment covers almost one third of the Wallis Lake catchment (550 km<sup>2</sup>). The catchment is one of the most modified sub catchments in Wallis Lake. Agriculture is the dominant land use with a small urban centre at Nabiac. The Mid Wallamba Estuary faces additional localised pressures from the erosion and collapse of stream banks due to its popularity for water sports over the summer period.

The water quality sampling occurs in the estuarine reaches of the river from Wallamba Island to Failford.



#### WALLAMBA COVE

Wallamba Cove was in good ecological condition again this year, retaining a fair grade for algal growth and a good grade for water clarity. Chlorophyll guideline values were exceeded in five out of six sampling trips with larger exceedances at the upstream site near Tuncurry town centre. Nutrients in urban runoff fuel algal growth and good water clarity in the estuary can lead to higher chlorophyll levels, as algal abundance increases due to more light availability. Turbidity marginally exceeded the guideline values on two trips.

The average salinity at Wallamba Cove was 31psu this year compared to 23psu last year reflecting less influence of catchment runoff and more influence of ocean water from Wallis Lake.



# **COOLONGOLOOK ESTUARY**

Coolongolook Estuary dropped a grade to fair ecological condition this year, driven by a poor grade for algal growth. Water clarity was good, possibly contributing to higher algal growth that was above desired levels all season. Very high algal growth occurred in the estuary following 175 mm rainfall on 13-14 March occasion leading to the poor grade. Turbidity marginally exceeded the guideline values on two trips.

Salinity ranged from 13-32psu and averaged 24psu. A pronounced salinity gradient from Wallis Lake to the upstream of the river was rarely observed. This reflects a longer residence time for river water which, coupled with good water clarity and warm temperatures, are optimal conditions for algal growth.

#### **Estuary description**

The Coolongolook Estuary receives water from the Coolongolook and Wang Wauk Catchments which contains modified landscapes predominantly used for agriculture. All lands within the Coolongolook catchment are on erodible soils. The catchment contains a small urban service centre with a population of around 417.

The water sampling occurs in the estuarine reaches of the river.





#### **PIPERS CREEK**

This year Pipers Creek remained in good ecological condition with excellent water clarity and a fair grade for algal growth. Water quality in Pipers Creek is good despite receiving runoff from a heavily urbanised catchment. There is an ongoing need to reduce nutrient inputs, as all samples exceeded chlorophyll guideline values by two to four fold. Turbidity was below the guideline value on all trips.

Seagrass depth range in the adjacent Pipers Bay improved to an excellent grade this year due to an increased depth range. Excellent water clarity provides ideal conditions for the expansion of seagrass beds as more light is available for growth.

#### **Estuary description**

The majority of the Forster township is located in Pipers Creek Catchment. The rainfall that once infiltrated into the ground through native vegetation now meets impervious surfaces (roofs, roads and footpaths) and runs directly into stormwater drains and Pipers Creek. This stormwater runoff carries with it pollutants such as sediments and nutrients from houses, lawns, roads and pathways. In the past, Pipers Creek and Pipers Bay have experienced large algal blooms and shown signs of poor ecological health. Following large rainfall events, the water from Pipers Creek and Pipers Bay can reach Wallis Lake and Charlotte Bay areas. Reducing the impacts of stormwater from the Pipers Bay Catchment therefore has benefits across the whole of Wallis Lake.

The samples for this Report Card are taken next to Big Island adjacent to Forster Keys.





#### WALLIS LAKE

Wallis Lake remained in good ecological condition this year with excellent water clarity and a fair grade for algal growth. Almost all algal samples exceeded guideline values by two fold. Water clarity was below the guideline value on all trips.

Seagrass depth range improved to excellent this year at Forster and East Pelican Island. However, there was a large decline in seagrass distributions at Coomba Bay resulting in a very poor grade for seagrass depth range. This outcome is of concern as Coomba Bay has received an excellent seagrass depth grade since seagrass monitoring began in 2016. Seagrass depth range decreased, and beds were sparse and intermittent across the bay.

The cause/s of this dramatic decline in seagrass distribution at Coomba Bay are not known. Coomba Bay seagrass sites are in shallow waters on the western side of Wallis Lake which is characterised by fines in sediments that are enriched in some areas. Possible causes of seagrass decline are; resuspension of fine sediments during strong winds, possibly smothering seagrass and limiting light to the fronds; declining sediment quality due to the accumulation of fine sediments and decaying organic matter and, increased microalgal growth on seagrass fronds (epiphytic growth) in the clear shallow waters, reducing the amount of light penetrating seagrass fronds for photosynthesis and growth.

The western side of coastal lakes can be relatively less flushed than eastern areas. Localised wind wave currents may be delivering fines and associated inorganic/organic matter from other areas of the lake to this embayment which may have led to a decline in sediment quality. Zostera seagrass beds can decline rapidly but are also known to recover quickly, and will be closely monitored in Coomba Bay throughout next season.

#### **Estuary description**

Wallis Lake is in the centre of the estuary and receives runoff from a narrow catchment immediately surrounding the lake. Adjoining areas directly influencing Wallis Lake include Coomba Park, Green Point and the rural residential land on the western side of Wallis Lake. During large rainfall events, water from the major rivers and the Pipers Creek catchment flow into this area carrying pollutants with it.

Sampling in Wallis Lake takes place in the centre of the estuary between Yahoo Island in the north and Earps Island in the south.





#### **CHARLOTTE BAY**

Charlotte Bay remained in good ecological condition this year with excellent water clarity and a good grade for algal growth. Almost all algal samples exceeded guideline values but only by a small amount. Turbidity was below the guideline value on all trips.

Water quality is least affected by catchment runoff at this site as there are no major tributaries, however, it has declined from excellent-to-good condition in the past 2 years. Macroalgae were noted in the bay which could indicate internal recycling of nutrients from the sediment to the water column, fuelling algal growth.

Seagrass depth range also dropped a grade this year from excellent-to-good, for the first time since monitoring began in 2016. Depth range used to be much greater here (2.7- - 3.3m) than at all other sites in the Wallis Lake system, however, this year it was below 2m for the first time. Seagrass beds still extend from all shores of Charlotte Bay across the lake floor.

#### **Estuary description**

Charlotte Bay covers the southern most part of the Wallis Lake estuary. There is limited mixing between the northern and southern parts of Wallis Lake, therefore the condition of this area is influenced mainly by the surrounding catchment. The catchment is largely vegetated with a small amount of residential, commercial and rural residential land.

Sample collection in Charlotte Bay occurs in the middle of the water body south of Earps Island.



# **SMITHS LAKE**



Smiths Lake retained its good ecological health grade this year. The lake remained open for most of the summer contributing to excellent water clarity and low algal growth. The three locations that make up the grade for Smiths Lake include Wamwarra Bay, central Smiths Lake and Symes Bay. Four out of six samples from Wamwarra Bay and the central lake exceeded the chlorophyll guideline value, in most cases by a small margin. Turbidity in Symes Bay exceeded the guideline value by a small margin on two trips. There were no exceedances of the turbidity guideline value at any other site this year.

Salinity was similar across the 3 zones, ranging from 30-35psu throughout the sampling season, indicating good mixing in the large estuary.

#### **Estuary description**

Smiths Lake has a catchment area of 35.89 square kilometers. It is an intermittently closed and open coastal lagoon and the lake entrance is artificially opened when levels approach 2.1 meters above sea level to prevent flooding of low-lying areas. The catchment of Smiths Lake has a good cover of native vegetation with a significant proportion of the catchment under conservation within the Wallingat and Myall Lakes National Parks. The Smiths Lake township and tourism facilities are situated near the lake's mouth, with impervious surfaces (roofs, roads and footpaths) increasing stormwater runoff into the lake. This stormwater runoff can carry with it pollutants such as sediments and nutrients from houses, lawns, unsealed roads and pets.

Samples for Smiths Lake were taken from three locations: Wamwarra Bay, Central Smiths Lake and Symes Bay. These data have been averaged to provide an overall score for Smiths Lake.



# **MYALL LAKES**

## **CATCHMENT DESCRIPTION**

The Myall Lakes catchment covers 440 square kilometres. Its major tributary is the Myall River, whose headwaters extend to Craven Nature Reserve and the Kyle Range. The catchment is largely occupied by agricultural land, with forestry and protected vegetation in the steeper areas and a small amount of urban land in the townships of Bulahdelah and the well-known tourist destinations of Tea Gardens-Hawks Nest.

The Myall Lakes and Myall River in particular are part of a large tourism and recreation industry which includes Myall Lakes National Park, one of New South Wales' most visited National Parks with estimated annual visitor numbers of 250,000.

Major issues for the Myall Lakes system include the impacts of rural runoff on water quality including nutrients, noxious weeds and other pathogens. Urban runoff and the impacts from tourism and recreation uses of the lakes and estuaries are more prevalent in the lower reaches of the catchment.





#### **BOMBAH BROADWATER**

Bombah Broadwater retained its fair ecological health grade this year. This was based on an improved grade for water clarity to good and a drop in grade for algal growth to poor, following a common pattern in grade changes this year where improved water clarity often led to higher algal growth. All algal samples exceeded the guideline value by two to six fold. Turbidity in the Broadwater only exceeded the guideline value on one sampling trip.

Average salinity in the Broadwater was 4psu which increased steadily from <1psu in late 2022 to 9psu by end of March 2023.

#### **Estuary description**

The Bombah Broadwater and Myall Lake are part of the Myall Lakes system which is comprised of four linearly connected brackish to freshwater basins: Myall Lake, Two Mile Lake, Boolambayte Lake and the Bombah Broadwater. The Myall Lakes National Park surrounds the lakes and is listed as a Ramsar wetland of international importance.

While the Bombah Broadwater itself is surrounded by National Park, it receives the majority of its inflow from the upper Myall River and Crawford River catchments which together drain an area of approximately 440 square kilometres. These catchments are largely occupied by agricultural land with forestry and protected vegetation in the steeper areas and a small amount of urban land in the township of Bulahdelah.

Samples were taken from three sites in the Bombah Broadwater and were combined to give an overall score for the health of the system.





#### **MYALL LAKE**

Myall Lake remained in excellent ecological condition this year, with no exceedances of turbidity guideline value and only minor exceedances of the chlorophyll guideline value. It remains one of the least impacted parts of the Myall system.

The average salinity in Myall Lake was 1.7psu this year compared to 2.9psu last year.

#### **Estuary description**

Myall Lake along with the Bombah Broadwater is part of the Myall Lakes system which is comprised of four linearly connected brackish to freshwater basins: Myall Lake, Two Mile Lake, Boolambayte Lake and the Bombah Broadwater.

The Myall Lakes National Park surrounds the lakes and is listed as a Ramsar wetland of international importance.

Myall Lake is directly influenced by a small fringing catchment which is contained within the Myall Lakes National Park. During times of high rainfall however, water from the Broadwater (and therefore the Upper Myall River and Crawford River catchments) influences Myall Lake by carrying with it nutrients and algae.

Samples were taken from two sites in Myall Lake and were combined to give an overall score for the health of the system.



**B-B-**C

Lower Myall Estuary

#### **Estuary description**

The Lower Myall Estuary near Tea Gardens is the mouth of the Lower Myall River and is situated in an area of highly mobile sand features. The river discharges into the moderately sheltered waters of Port Stephens but the river entrance is exposed to swell from the south-east coming through the entrance of the Port. The Lower Myall Estuary receives water from the urban area of Tea Gardens and Hawks Nest and is strongly influenced by the waters of the Bombah Broadwater following rainfall.

ALGAE

WATER CLARITY

# **KARUAH RIVER**

# **CATCHMENT DESCRIPTION**

The Karuah River Catchment is approximately 1460 square kilometres, largely comprised of grazing land, forest and woodland and is sparsely populated, the largest settlements being Karuah (pop.~1000), located at the mouth of the river, and Stroud (pop.~700), located in the centre of the catchment.

Land use in the Karuah River Catchment has undergone continuous change since European settlement beginning with land clearing for forestry and agriculture from the late 19th century. The landscape today is a mosaic of rural landuse, including forestry, grazing industries, poultry production, mining, aquaculture and rural residential areas.

Trends from past water quality monitoring shows periods of high sediment and nutrient loads within the Karuah River; whilst at the same time displaying a range of in-stream biological diversity. In 2011 the Karuah River estuary and Catchment was assessed as being in a moderate ecological condition, but with some significant threats to the system.



The Branch is a subcatchment of the wider Karuah River Catchment and is approximately 211 square kilometres. The Branch subcatchment is a mosaic of floodplain environments, with steep ridgelines traversing from the upper catchment through to the tidal zone of the river. The subcatchment is sparsely populated, without any settlements. Landuse is primarily grazing land with some forest and woodland in the upper catchment.

Figure 18: Karuah River Catchment.



# **KARUAH RIVER ESTUARY**

Karuah River remained in fair ecological condition this year. Water clarity retained a good grade and algal growth dropped a grade to poor. All but one sample exceeded chlorophyll guideline values, and on the third sampling trip there was very high algal growth at both sites. High algal abundance on January 16, 2023 was probably fuelled by nutrients in catchment runoff from a moderate rain event of 40mm, 7–10 days prior. There were two minor exceedances of the turbidity guideline value in at the upstream site and three exceedances at the downstream site.

#### **Estuary description**

The Karuah River Estuary is a priority oyster production area which has suffered periodic water quality issues associated with catchment runoff. The Karuah River Estuary discharges into the north western part of Port Stephens, and is the only significant source of sediment to this system.

There are substantial areas of mangrove and saltmarsh habitats in the Karuah River Estuary, which provide food sources and nursery areas to fish, but only very small areas of seagrass (seagrass extent has decreased by almost 80% between 1985 and 2009). Low light availability, due to high turbidity is the most likely reason for the lack of seagrass in the Karuah River Estuary.

The extent of saltmarsh over this time has also reduced, while mangrove has increased. Similar to many estuaries in New South Wales it is suggested that mangrove assemblages have increased at the expense of saltmarsh.



# **THE BRANCH ESTUARY**

The Karuah Branch was in fair ecological condition this year with similar water quality as the main branch of the Karuah River. The high algal abundance recorded in the main estuary on the third sampling trip was also observed in the Branch, leading to the poor grade for algal growth. There was only minor exceedance of the turbidity guideline value on half of the sampling trips, retaining a good grade for water clarity.

#### **Estuary description**

The tidal zone of The Branch River extends to slightly south of the Branch Lane, and discharges into the wider Karuah Estuary and ultimately into the north western corner of Port Stephens Estuary. The estuary is bounded by substantial areas of mangrove and saltmarsh habitats. The Branch is used as a nursery for juvenile oyster production, whilst landuse within The Branch Estuary is largely grazing lands for beef production and rural lifestyle living.



# MANAGEMENT ACTIONS OCCURRING ACROSS THE LOCAL GOVERNMENT AREA

#### SOUTHERN ESTUARIES COASTAL MANAGEMENT PROGRAM

The MidCoast contains many iconic and highly valued estuaries, including the largest coastal lake system in NSW. The southern estuaries include Wallis Lake, Smiths Lake, Myall Lakes, Khappinghat Creek, Black Head Lagoon and the northern foreshores of Port Stephens (including Karuah River, North Arm Cove and Kore Kore Creek), and their contributing catchments.

Estuaries are where the fresh water from our rivers meets salt water from the ocean. They are an important environmental zone, brimming with a diversity of life.

MidCoast Council is partnering with the community and agency stakeholders to develop a Coastal Management Program (CMP) to protect the health of these southern estuaries. The program will identify and manage the social, economic, cultural and environmental values of our waterways. It will identify, understand, prepare for, and respond to current and emerging pressures on these estuaries.

The development of a coastal management program takes place in five stages. During 2022, stage one was complete, this involved establishing the scope of the program, setting the direction for the rest of the program.

During stage one our community provided insight into what they love about and how they use our Southern Estuaries. As the program continues this information will play an important role in setting targets to protect our communities values. The main values and uses identified were:

- Environmental protection
- Nature observation
- Recreation on and in the water (kayaking, swimming, canoeing)
- Exercise (walking, running)
- Picnics and barbeques

Stage one of the project identified the current and emerging threats to our estuaries. Some of those identified include:

- Tidal inundation
- Bushfires and drought
- Sea level rise
- Invasive fauna
- Gaps in ecological knowledge
- Overcrowding of waterways

Stage two is currently in progress and involves undertaking detailed studies including coastal wetland mapping, tidal inundation studies and risk assessments for Khappinghat Creek and Black Head Lagoon that. These studies will help inform management actions to protect our estuaries.

For more information you can visit www.midcoast.nsw.gov.au/oursouthernestuaries Figure 20: Pindimar is part of the Southern Estuaries that will be protected through the preparation of the Coastal Management Program.

# **OLD BAR MANNING POINT COASTAL MANAGEMENT PROGRAM**

In addition to the Southern Estuaries CMP MidCoast Council is also developing programs for our coastal zone. The Old Bar Manning Point Coastal Management Program is advancing to stage three. In stage three Council, technical experts and community representatives consider the issues that exist in the area and identify future management options.

The Old Bar Manning Point CMP is a part of larger coastal management program which will cover the whole coast of MidCoast Council in the future. Council committed to advance the Old Bar Manning Point CMP ahead of the broader project because of concerns about rapid coastal erosion and shoreline recession and the need to provide the community with a clear direction about how Old Bar and Manning Point will be managed into the future.

In stage two, Council gathered additional information to help further understand key issues in the Old Bar Manning Point area. One of the priority issues is to improve understanding of coastal erosion and shoreline recession operating in the area, so that we can provide the best information to our community.

A probalistic hazard assessment that was supported by a ground penetrating radar survey has been finalised. The assessment considers the nature of land below the surface to determine those areas that will continue to erode and others that may be protected. Most of the area between Wallabi Point and Manning Point are underlain by sand which offers little resistance to these processes. Whereas there are areas below the Surf Club and Old Bar Public School that are hard bedrock which will not erode.

Probabilistic hazard assessment provides a more robust and thorough understanding of the risks from coastal erosion and shoreline recession and provides an understanding of the impact of these processes on these communities now and into the future.

Council will be engaging with a range of stakeholders in the Old Bar and Manning Point villages and more broadly with our MidCoast community as we work through the final stages of the CMP.

# MARINE ESTATE MANAGEMENT STRATEGY: REDUCING THE IMPACTS FROM SEDIMENT AND EROSION ON OUR WATERWAYS

The NSW Marine Estate Management Strategy (MEMS) is a 10-year program of works to coordinate and streamline the management of the 1750 kilometres of coastline, 826 beaches and 185 estuaries in New South Wales. In the MidCoast Council region, Hunter Local Land Services (HLLS) is implementing a large proportion of works on behalf of the NSW Government.

This is the third year that MidCoast Council has partnered with Hunter Local Land Services to undertake projects to reduce sediment from Council-maintained roads and tracks.

In 2022/23 Council undertook projects at Upper Lansdowne and the Manning River to reduce sediment flows where unsealed roads intersected with waterways. Both these sites had been previously identified for bridge replacement works, and these MEMS projects were proposed as additions to value add to the new infrastructure. In total, two-coat seal was applied to a total of 1,778m of previously sealed road, and 340m of drains were improved.

Several other sites, which had been delayed due to the consistent wet weather of the previous two years were also completed during this period. Sites in the North Arm Cove township, as well as key sites in the Manning River and Wallis Lake catchments were completed. Sealing and drain upgrades were undertaken on:

Manning Catchment	Careys Road (at 4 sites)
Wallis Lake Catchment	Mimi Creek Road Paffs Lane Wang Wauk Road Waterloo Road Monks Road
North Arm Cove	Merriwa Boulevard Casuarina Reserve Access track Water street Access track Other minor drain repairs

### MANAGEMENT OF WEEDS THROUGHOUT THE LOCAL GOVERNMENT AREA (LGA)

The weed biosecurity team manages weeds across the MidCoast LGA in line with state, regional and local management plans. These plans help dictate the importance of weed control dependent upon a weed's distribution and presence within a specified area. All priority aquatic weed species are currently being managed by Councils across the Hunter LLS Region, under the Hunter Aquatic Weed Eradication Strategy (HAWES) A comprehensive management plan for priority aquatic species has been developed and is being implemented following best practice guidelines and recommendations under this Strategy.

Priority aquatic weed species being managed in the MidCoast area under this Strategy include, Alligator weed at Girvan, Cabomba at various locations including Tea Gardens, Nabiac, Forster and Mayers Flat, Amazon Frogbit at Forster and Bulahdelah, Kidney-leaf mud plantain at Berrico and Waukivory, Senegal tea plant at Rainbow Flat and tributaries of the Manning River Catchment, and Water lettuce at various sites including Harrington, Crowdy Head, Coopernook, Old Bar, Wallabi Point, Wootton, Oxley Island and Cabbage tree Island.

Identification and management of new and emerging invasive species remains a priority for Council's weed biosecurity team. During 2023, several new and emerging alien species have been identified as impacting and threatening many of our high value ecosystems in the MidCoast area. These garden escape species include Ginger lily (*Hedichium gardnerianum*), Seeded banana (Musa species) and two members of the strelitzia family being Giant Bird of paradise and the "travellers" or East-West Palm.

> Backyard plant dealing, online plant trading and illegal dumping of green waste are identified activities that enhance the spread of invasive species across the MidCoast, Residents are advised that Council inspects and monitors social media sites for the sale of priority weed species. It is an offence to "deal with" (buy, sell, move, care for) certain species. Plants that fit into this category include Pampas grass, various prickly pear species, and aquatic weeds including Amazon frogbit, salvinia, water hyacinth.

> > Figure 21: Water lettuce is one of the species being targeted in the MidCoast area

## ENVIRONMENTAL DNA (EDNA) SAMPLING: A NEW TECHNOLOGY Revolutionising how we learn about our natural environment

Environmental DNA (eDNA) is a new technology revolutionising how we learn about our natural environment. Water samples collected from rivers and streams are analysed to identify strands of DNA shed by fauna in the water, which can then be identified using sophisticated analysis.

Sampling helps establish a base line of species distribution (native and introduced) at key sites that can be revisited over time to produce a long-term data set. Currently, eDNA techniques provide information about presence or absence of key species. And, importantly,

long-term eDNA data sets can tell us whether populations are stable, retracting or expanding, or able to successfully migrate through coastal valleys during different flow conditions.

From September 2022 - April 2023 Council, independent stakeholders and citizen scientists conducted trial snapshot surveys collecting water filter samples across 40 sites: 26 sites in the Manning River Catchment, and 14 sites in the Karuah River Catchment.

eDNA sampling across all sites indicated the presence of longfin eel, platypus, rainbow trout, brush-tailed possum, dwarf flathead gudgeon, Australian bush rat, smelt and wood duck, mallard, canine (dog/dingo), red-necked wallaby, satin bowerbird and exotic gambusia (Mosquito Fish).

eDNA sampling is set to continue. These efforts will help detect changes in the condition of our rivers and streams and inform future management and engagement activities to protect and enhance local biodiversity.

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Figure 22: Bobin Public School Students participating in eDNA monitoring in the Manning River Catchment

# **PROTECTING ENDANGERED SHOREBIRDS**

During the summer, beaches in our area, particularly at Winda Woppa, Harrington and Farquhar, are visited by shorebirds looking for suitable sites to nest and raise their chicks.

These include three endangered shorebirds, the red-capped plover, Australian pied oystercatcher and little tern.

They lay their eggs above the high tide line on open expanses of beach. A number of other shorebirds migrate from the northern hemisphere with the express purpose of putting on weight. An example is the critically endangered eastern curlew.

The Aleutian tern migrates from the subarctic region and was first recorded at Farquhar in<br/>2018. Since then, avid birdwatchers have travelled to see Aleutian terns in an area<br/>where they had never been seen before. This visitor spending helps to boost<br/>our local economy.23: Little terns

Figure 23: Little terns travel to the MidCoast area to nest and raise their chicks

Threats to beach nesting shorebirds include illegal fourwheel drive (4WD) activity, uncontrolled domestic dogs and people walking through nesting areas. Foxes are a major threat able to destroy multiple nests per evening.

Figure 24: Little terns lay their eggs on the open sand

#### MANAGEMENT ACTIONS OCCURRING ACROSS THE LOCAL GOVERNMENT AREA

Management activities consist of fox control, installing temporary fencing and signage around nesting sites, public education and restricting 4WDs and dogs within fenced nesting areas.

The 2022-23 nesting season saw 6 pied oyster catcher fledglings and approximately 10 little tern fledglings, which is an improvement on the previous season.

While threats such as 4WDs and interference by people are being addressed via education and enforcement, bait shy foxes and natural avian predation account for the high mortality rates.

Council is working with project partners including TIDE (Taree Indigenous Development and Employment), Hunter Local Lands Services, Crown Lands, volunteers, BirdLife, NPWS and Department of Planning and Environment as well as researchers at the University of Newcastle and the University of Sydney to develop innovative solutions to protect these endangered bird species. Other measures include improving coastal saltmarsh habitat by controlling weeds. Targeted weeding of affected sites within the Manning estuary includes Oyster Creek, Charlies Island, Harrington Wetlands, and Cabbage Tree Island. Forster sites include Goodwin and Cockatoo Islands.

#### **BIODIVERSITY FRAMEWORK IMPLEMENTATION**

Biodiversity is the variety of all living things, including the different plants, animals and microorganisms and the terrestrial, marine and freshwater ecosystems of which they are a part. The MidCoast Region contains important biodiversity and natural assets and values.

MidCoast Council's Biodiversity Framework is a roadmap for conserving natural heritage across the MidCoast region. It is a toolkit of Council actions and activities to maintain and enhance the condition and function of strategic assets and community priorities within the natural environment. By protecting and restoring biodiversity, we contribute to the quality of life of residents and visitors to our region and support the economy by enhancing nature-based tourism and primary production systems.

The MidCoast community values our natural environment. "Our environment" is one of five (5) core values in the MidCoast Community Strategic Plan. Biodiversity is also of cultural value to local Aboriginal people through their enduring connection to Country.

The MidCoast Council Biodiversity Framework 2021-2030 was adopted in 2021 and identifies seventyfour (74) actions across themes of: Engagement and Partnerships, Reserves and Conservation Agreements, Land Management, Science and Knowledge, Strategic Planning and Policies and Land Use Planning and Development.

It identifies a range of native plants and animals and threatened ecological communities that are a Council focus. This includes the koala, Manning River helmeted turtle, greycrowned babbler, endemic ground orchids and littoral rainforest. MidCoast Council has commenced the implementation of the Biodiversity Framework.

Figure 25: Biodiversity is the variety of all living things in the MidCoast area.

MANAGEMENT ACTIONS OCCURRING ARROSS THE LOCAL COVERNMENT A

Key projects that are being progressed include:

Council has, together with the NSW Biodiversity Conservation Trust and Mid Coast 2 Tops Landcare Inc, supported the engagement of a Private Lands Conservation Officer. The Officer has delivered a series of biodiversity-related workshops, supported existing private land conservation agreement holders and facilitated new Land for Wildlife and conservation agreements.

Council has continued to compile detailed vegetation community mapping for priority areas. Native vegetation maps are valuable for koala habitat and corridor mapping. At least 70,000-hectares of new vegetation mapping in priority areas during the reporting period.

A Local Area Conservation Action Plan is nearing completion for the Hallidays Point locality. The Plan will contribute to the development of a Place Strategy for this fast-growing but environmentally significant locality.

A program to map and describe regional priority wildlife corridors is being developed. The methodologies used in this mapping are being advised by expert researchers and government agency stakeholders.

Council has established a Regional Partnership with the NSW Government to assist deliver outcomes of the NSW Koala Strategy. The project involves the funding of a Koala Project Officer and substantial funding support for actions such as habitat protection, habitat restoration, vehicle strike avoidance, community education and habitat mapping.

#### **KOALA SAFE SPACES PROGRAM**

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Koalas face many threats and risks to their safety and wellbeing. Even in seemingly stable landscapes, they can be exposed to difficulties and pressures, which increase their stress. Stressed koalas are more prone to disease, have reduced breeding success and increased risks of car strike or dog attack. The focal point for safeguarding koala populations across the MidCoast region is to provide more safe spaces.

A koala safe space is an area of land that is established and managed in such a way that it contributes positively to the health, wellbeing, and long-term conservation of koalas. They are places for wild koalas to live, breed, shelter and move. Koala safe spaces can occur in rural and urban areas, on private and public lands. They can span anything from single trees in paddocks or yards, to corridors or steppingstones of habitat, to large blocks of remnant bushland. Koala safe spaces can be incorporated into working farms, forest management, residential developments, and other land uses.

Many local landholders are already planting trees and protecting special patches of trees and bush on their properties. This is valuable even in urban areas. A partnership of MidCoast Council, MidCoast 2 Tops Landcare and Hunter Local Land Services has secured funding from the NSW Koala Strategy and is looking to work with landholders to create new and improved koala safe spaces across the region.

Local landholders who already have or would like to establish a koala safe space on their property are asked to register their interest with Council. A variety of different funding is available to assist in activities associated with planting new koala habitat, conserving areas of koala habitat, controlling weeds that impact koala habitat, delivering koala friendly bushfire management or reducing threats to koalas. The largest survey of koalas ever undertaken is being completed in the MidCoast area. Community can help with the survey by reporting Koala sightings.

For more information, please visit the website (midcoast. nsw.gov.au/koalasafespaces) or email the team at koalasafespaces@midcoast.nsw.gov.au.

Figure 26: Our community can nominate their property as a koala safe space

MANAGEMENT ACTIONS OCCURRING ACROSS THE LOCAL GOVERNMENT AREA

# **WASTE EDUCATION IN SCHOOLS**

Over the last year the waste education team from Keep Australia Beautiful, "EnviroMentors", delivered fun and engaging workshops to students in primary schools across the MidCoast.

The program has two main aims, firstly to encourage students to "put the right thing in the right bin", and secondly, to "recycle right". For the primary schools, the "In the Bin" workshops allow the students to get creative through games while gaining knowledge of local waste issues. They learn the appropriate bin to place waste items in, how to deal with waste safely, and consequences of incorrect bin use. The disposal of tricky waste items such as e-waste and bulky items is also explored.

In the "recycling" workshops, interactive games and resources are used to help students discover what materials recycled items are made from, how they are created and the benefits of recycling. With a focus on local services, students explore why reducing waste going to landfill and saving natural resources are important. Transitioning to a circular economy is emphasised.



Figure 27: Local students participating in the Enviromentors program

EnviroMentors has been running mobile incursion-based environmental education programs in NSW since 1994. They encourage students to become environmental stewards in their households and communities. Ultimately, we want them to become leaders in their community and support our efforts to reduce waste to landfill by 2030.

## WATER SENSITIVE URBAN DESIGN

Healthy waterways protect the biodiversity of our aquatic ecosystems, and the health of our waterways also impacts on our community and our economy, for example, fishing, oyster growing and tourism.

Preventing pollutants such as sediments, nutrients, petrochemicals and heavy metals from being washed into our rivers and lakes is important. Managing the impacts of development is one of the ways we do this.

All new developments with the potential to impact the quality of stormwater are required to install water quality treatments such as raingardens, water tanks and swales to help filter nutrients and sediment out of stormwater. For large developments like subdivisions, there must be no new impacts on our waterways.

Since 2015, over 38 large subdivisions have achieved the 'no new impact' target. Last year, 24 large developments including subdivisions, commercial, industrial and multi dwellings were assessed. Small scale, infill developments, such as single dwellings located in the southern region, must include water sensitive design controls that protect our sensitive lake systems from nutrients and sediments.

Since 2015, over 987 new houses were required to include water sensitive design controls. As a result of managing the impacts of development, an estimated 304 kilograms of total nitrogen, 33 kilograms of total phosphorous and 15 tonnes of sediment is prevented from being washed into our waterways each year.

# **MANAGEMENT ACTIONS - MANNING CATCHMENT**

# IMPLEMENTING STAGE I OF THE MANNING ESTUARY CMP COMMUNITY ENGAGEMENT PROGRAM

The Manning River (Djarii Bila) is the lifeblood of our community. From the mountains to the sea, (Balgarr-abirang-Gurrwa-gu), freshwater to saltwater (Bathu-garibang-Girambit-gu) - the river connects our landscape and our community. The Manning River Estuary and Catchment Management Program (CMP) is a 10-year, whole-of catchment program to protect water quality and ecosystem health.

The plan was developed by Council's Natural Systems team with strong collaboration from a community reference group and a technical advisory group, as well as input from farmers, the Biripi community, special interest groups and delivery partners.

In 2023, community stewardship actions from the CMP commenced. The aim is to improve community understanding, commitment and stewardship of catchment values and function. This engagement program addresses 7 of the 36 management actions identified in the CMP.

Each year of the program will include a range of free workshops, webinars, tours, and citizen science activities that community, landholders and organisations are encouraged to attend within the Manning Estuary. Activities so far have

This program is supported by the NSW Government through its Coast and Estuary Program and Council's Environmental Rate.

Figure 28: Sunrise over the Manning River

**MANAGEMENT ACTIONS - MANNING CATCHMENT** 



## **CATTAI WETLANDS BIOBLITZ**

During September 2023, MidCoast Council joined with the local community and representatives from the Australian Museum, Manning Great Lakes Birdwatchers, TATE Environmental and more to celebrate Biodiversity Month at the Cattai Wetlands Bioblitz. Over 150 members of the community attended, participating in a variety of different surveys including spotlighting and frog tours, koala detection dogs, birdwatching walks, dip-netting for invertebrates, reptile searches, insect investigations and vegetation surveys.

Figure 30: Glossy ibis at the Cattai Wetlands Bioblitz

The bioblitz is a festival of biodiversity, designed to connect with our community about the importance of wetland habitats and biodiversity whilst collating an overall count of the plants, animals, fungi, and other organisms that live at Cattai Wetlands. With better knowledge of what is living in the wetlands Council can better plan management actions for the future, ensuring that we can continue to protect this beautiful site, the species that exist there and most importantly the Manning River, into which the waters from the wetland run.

The bioblitz was also an opportunity to work directly with the community, for residents to see and experience the work being undertaken at Cattai and also to connect them with the environment and the importance of protecting it.

A report of the findings will be prepared once all the results are finalised, preliminary data includes over 120 plant species, 5 mammal species, a variety of different reptile and insect species and over 100 bird species, including the endangered, black-necked stork found on the site.

The Bioblitz was identified as a project in consultation with the community during the development of the Manning River Coastal Management Program (CMP) to help grow our knowledge and plan future management actions and is just one of the many ways we are turning that Program into actions.

#### RIVER REVIVAL - ENHANCING RIPARIAN HABITAT AND REFUGE POOLS FOR MANNING RIVER WILDLIFE

Streams and their freshwater refuge pools play a key role in supporting biodiversity. In times of drought and low or no flow, aquatic species may be confined to refuge pools and depend on suitable riparian habitat and good water quality for survival. In the Manning catchment this includes freshwater aquatic species such as the Manning River helmeted turtle, spiny crayfish, and platypus.

To improve the trajectory of aquatic fauna MidCoast Council received grants from the NSW Environmental Trust and NSW Hunter Local Land Services to deliver a number of projects in partnership with landholders with the aim to protect and restore a network of refuge pools and associated riparian zones in the Barnard and Dingo River catchments. This River Revival project contains a number of different aspects including scientific monitoring and on ground works.



Figure 31: Water quality monitoring as part of the River Revival Project

Each year of the project community is invited to attend workshops and express their interest in the program. Activities that landholders can engage in include agricultural remediation management techniques such as stock exclusion fencing, riparian restoration and weed control helping to build ecosystem function in and around refuge pools so that species like the turtle have a better chance of long-term survival.

Through this collaboration, Council has partnered with landholders to implement these types of activities on 9 properties treating 21 ha of riparian land across more than 6.5km of river reach with planting of 2629 native riparian plants.

These collaborative achievements will enhance the resilience of aquatic fauna to climate change stressors.

MidCoast Council has also developed a River Revival webpage inviting community and landholders to participate in the program. There is a section for interested community to express interest in riparian restoration and another sign-up section for community to participate in citizen science programs such as quarterly RiverWatch water quality sampling in the Barnard and Dingo Catchments. These events are also promoted through council's website.

The success of the grant applications depended on strong collaboration and support from the Manning River Turtle Steering Group – a committee of agencies and community groups including the Manning River Turtle Group, Hunter Local Land Services and MidCoast 2 Tops Landcare that meet regularly to conserve this much-loved icon of the Manning River.

The project was identified during development of the Manning River Estuary and Catchment Management Program (CMP) in response to community concern about the impact of drought and fire on aquatic wildlife in the river.

# **POST FIRE REGENERATION AT CATTAI WETLANDS**

During the 2019/2020 bushfire season large areas of Cattai Wetlands were burnt. In the years following the fires MidCoast Council have been working to regenerate the area and ensure that the fire has limited lasting impacts.

Following the fire the canopy cover of trees was greatly reduced, which allowed for weed species to have flourished in the areas that were burnt. In particular vine weeds such as Coastal Morning Glory have popped up along the fringes of the lagoon as well as along the banks of Coopernook Creek.

In response to the weed explosion, contractors have been assisting council staff in removing the vine weeds from the canopy as well as those strangling native regeneration. Seedling regrowth of Camphour laurels and Groundsel bush has also been targeted by staff/ contractors during recent wet weather in which weed density has flourished.

> Figure 32: Planting of over 1200 trees have taken place at Cattai Wetlands

As part of protecting the site for the future over 1200 koala food trees were planted on the Harrington road side of Cattai wetlands, on what was previously leased pastoral land.

# PROTECTING MANNING RIVER COASTAL WETLANDS FOR PROTECTED SHOREBIRDS

The Manning River estuary shorebird area is located on the north coast plains of NSW, 34 kilometres northeast of the township of Taree. The Manning River divides in two creating two estuaries; one at the coastal town of Harrington and the second 8 kilometres south at the township of Old Bar. At Old Bar, the Manning River South Channel and Scotts Creek form an estuary around Cabbage Tree Island before entering the ocean. The environments in both estuaries are characterised by large sandbars intersected by channels and islands surrounded by mudflats covered with saltmarsh and mangroves. These two unique sites house nationally significant populations of eastern curlew, sanderling, Pacific golden plover and double-banded plover

Council in partnership with Local Land Services recently received grant funding to undertake remediation works in these regions in order to maintain and improve the coastal saltmarsh habitat. The project includes targeted weed control of priority species and implementation of best practice bush regeneration activities for the benefit of eastern curlews and other wildlife.

> The project also fulfils objectives of the Migratory Shorebird Site Action Plan for the Manning Estuary (Produced by Bird Life Australia): where the plan states that areas within Manning River Estuary are experiencing vegetation encroachment from the spread of weeds like Spiny rush in saltmarsh and Bitou Bush which limit the availability of roosting and feeding habitat for migratory shorebirds and other species.

> > Figure 33: Pied oystercatchers nest on the sand and are heavily impacted by human activities

## **PROTECTING DAWSON RIVER WETLANDS**

The Dawson Wetlands includes 45 hectares of natural vegetation and timber plantation north of Taree. While in the past the entire site has been used for timber harvesting, today areas of the site including the wetlands are being conserved for wildlife habitat.

The Dawson River Wetland supports two endangered ecological communities – swamp oak floodplain forest and coastal saltmarsh. These ecological communities are considered to be a high risk of extinction in NSW due to a number of pressures caused by urban development, weed invasion and rising sea levels as a result of climate change.

Works on the site includes weed management, bush regeneration and fauna surveys. This is a great example of how previously disturbed sites can be successfully regenerated and is part of a bigger project for the rehabilitation of 18 hectares of state protected coastal wetland, located between the Taree Recreation Centre and the Dawson River.



Figure 54: Dawson River Wetlands is one of many important wetland sites being protected

## **BUSH REGENERATION IN THE MANNING**

Council is responsible for the management of a large and diverse range of natural areas including public reserves along the Manning. These reserves provide an array of ecosystem services and contain large assemblages of flora and fauna, including threatened species and endangered ecological communities.

MidCoast Council is currently implementing a comprehensive program of works with the assistance of government funding value adding to the environmental rate, specialised bush regeneration contractors and Landcare volunteers to protect and restore the natural values and ecosystem functions of over 70 natural area reserves.

Works at over 440 hectares of reserves includes Primary, secondary and tertiary weeding, management of feral pest animals, flora and fauna surveys, threatened species management, planting of native species, litter and marine debris management and installation of nesting boxes

> These works help to improve the condition of native vegetation across sensitive landscapes, increase the habitat for native wildlife and aid in the recovery of these important ecosystems.

> > Reserves currently under active management include: Wingham Foreshore, Wingham Bight, Kolodong Reserve, Cowan Road/ Bays Hill, Skye Park, Manning Waters, Andrews Reserve, Bicentennial Park/ Browns Ck, Glenthorne Foreshore, Dawson River Reserve, Pretoria Reserve, Harrington Islands, Harrington Rainforest Lagoon and Manning Point Rainforest.

> > > Figure 34: Bush regeneration along the Manning River

#### THE TRANSFORMATION OF BUNGAY RESERVE IN WINGHAM

Restoration works are continuing in Bungay Reserve, Wingham, transforming what was a weed infested gully into a healthy bushland reserve. Tucked away at the end of Rosella Drive and frontage to Bungay Road and Finch Close, it is roughly 15 hectares in size and forms the north arm of Cemetery gully.

Two local bush regenerator contractors have joined forces to tackle the weed infestation that has festered on this site for many years. The crew's has treated the monocultures of lantana within the floor of the gully and previously open cleared sites in preparation for replanting suitable koala food trees. 230 trees were planted in these gaps to consolidate the edges and prevent weeds reinvading.

Monitoring of the site has shown a number of animals utilising the reserve, including koalas and wallabies.

### **RESTORING WINGHAM FORESHORE RESERVE**

Works are continuing on restoring riparian vegetation along the Wingham Foreshore. The project also aims to increase the overall carrying capacity of flying-foxes of the Wingham Brush camp by providing roosting habitat away from residential/school areas thereby reducing conflicts between humans and flying-foxes.

Wingham Foreshore Reserve will also provide a cooler area close to the river for flying-foxes to reduce heat stress. Regenerating lowland rainforest and increasing riverbank stability to protect planted vegetation.

Over 1200 indigenous plants have been planted during the 2022/23 season. Species planted included *Casuarina cunninhamiana*, *Syzygium floribunda* and *Tristaniopsis laurina*.

The site has also been severely impacted by weeds in particular exotic vines, have been and extensive works have been undertaken to remove these species.

In order to involve our community, a fun field day assisted by National Parks and Wildlife services and Landcare was held on the foreshore, over 100 plants were installed below the canopy followed by a walk and talk through the brush to learn more about the importance of low land rainforest and flyingfoxes.

This project is part of the Flyingfox Habitat Restoration Program assisted by the New South Wales Government through its Environmental Trust in association with Local Government NSW.

> Figure 35: Community members participating in a planting day at Wingham Foreshore

Figure 36: Flyingfoxes are an important pollinator

#### PROVIDING POLLINATION ON THE MANNING RIVER

Working with contractors, Taree TAFE students and volunteer organisations such as OZFish over 3880 trees and shrubs were planted over 3.5 hectares, on Flannagan's Spit in Taree. Tree and shrub species were selected specifically for their pollination properties with the aim to provide a welcoming food source for pollinating species such as birds and mammals such as flying-foxes and gliders during the winter months. Ten nest boxes were also installed to encourage tree dwelling mammals to settle into the site.

Revegetating foreshore and riparian habitat in these areas will also serve to slow flood waters, collect flood wrack and assist to stabilise the riverbank over the long-term.

This project is part of the Flying-fox Habitat Restoration Program assisted by the New South Wales Government through its Environmental Trust in association with Local Government NSW.

#### **MANAGING WEEDS IN THE MANNING**

Land holder education and priority weed management is ongoing and in the forefront for Biosecurity weed officers of the MidCoast.

Tropical soda apple (TSA) (Solanum viarum) continues to remain the number one priority for the protection of our thriving agriculture industry. TSA is currently managed under Tropical soda apple Control Order 2022, effective until 2027 where it will be revaluated and updated to reflect the weed's distribution and abundance across the State. This Control Order allows for eradication works to continue in our LGA. This year several new landowners and managers have entered into an agreement with Council to further the eradication efforts of TSA.

MidCoast Council's annual Senegal tea plant (*Gymnocoronis splianthoides*) control program has again been impacted by unfavourable weather conditions and availability of suitable contractors to implement and effectively report management to Council.

### **ERADICATING PLUME POPPY**

Effective responses to new and emerging species is the highest priority and the main objective to weed biosecurity management in the present day.

The newly identified species plume poppy continues to be a management focus for Council and two communities of the MidCoast region, Rainbow Flat and Upper Lansdowne.

Councils' rapid response to the management of this weed has been an outstanding success and has resulted a successful management education and capacity building project for the species across 680 hectares of the Kiwarrak estate at Rainbow flat. Since 2021 the number of infested sites have been reduced from 35 to 2, with 805 plants being detected and treated, more than 50kg of fruit harvested and destroyed combined with the plant being prevented from seeding for more than 2 years in this area.

#### **MANAGEMENT ACTIONS - MANNING CATCHMENT**

Council presented outcomes of the project at both the 22nd Australasian Weeds Conference in Adelaide and 22nd NSW weeds Conference in Dubbo. Further to this Council was successful in being announced winner for category C, and overall winner of the Invasive species management category at the 2022 Local Government Excellence in the Environment Awards in Sydney.

During September of 2023, one of Councils Biosecurity weeds officers was travelling to visit a friend at Upper Lansdowne where he identified a plume poppy plant growing on the side of the road. During subsequent



Figure 37: MidCoast Council staff are working hard to eradicate Plume Poppy in the Manning

weeks Council contacted members of the Upper Lansdowne community and commenced an inspection program, building the capacity of residents to identify and manage the species. Currently 373 mature and juvenile plants have been identified and managed and more than 109kg of fruiting bodies harvested and destroyed. Plume poppy management is ongoing at both these localities and will continue until the goal of eradication can be realised.

These infestations are the first recorded occurrence of the species naturalised in not only natural areas of NSW, but the whole of Australia. The species is also recorded as being a highly invasive weed of disturbed areas in tropical and subtropical regions throughout the world, most notably in Hawaii and Jamaica, and is the catalyst to the rapid response in the MidCoast area.

The project is strongly aligned to the Australian Weed Strategy, NSW invasive species plan 2023-2028, New South Wales Weed Action Program 2020-2025, Hunter Regional Weeds Committees' 'New Weed Incursion and Rapid Response Plan (2017-2022)', and the various plans and strategies of MidCoast Council including community strategic plan and DPOP.

### SHARE THE SHORE AND HELP PROTECT ENDANGERED SHOREBIRDS

Sharing the shore ensures we can continue to enjoy our beautiful beaches and the migratory shorebird populations will thrive.

The community shares a responsibility to find a balance between enjoying these places and protecting the unique species, natural habitat and cultural values of this coastline. Prime nesting areas for the endangered Beach Stone-curlews, Pied Oystercatchers and Little Terns include the beaches around Harrington, Farquhar/Manning Point and the Winda Woppa area.

Their numbers are in decline as they struggle to find undisturbed space on beaches to nest and raise their young. The 2022/2023 nesting season for little terns was devasted in Harrington due to intense hailstorm destroying the majority of nests. While the nesting site in Farquhar, which had well over 100 nests, were preyed upon by a fox over a two-night period. There was more fledgling success for the Pied Oyster Catcher with nests from Winda Woppa sand mound to Harrington being successful.

Large numbers and great diversity of migratory shorebirds arrived from the Northern hemisphere to feed during summer. As the 2023/2024 season begins we urge all our residents and visitors to take care and follow the rules when four-wheel driving, walking dogs and using the beach. As Shorebird eggs and chicks on sand nests are well-camouflaged and almost invisible. Beach drivers, foxes, dogs and walkers may crush the eggs or disturb parent birds, keeping them away from the nest. This leaves eggs and chicks vulnerable to predation from dogs and seagulls.

Figure 38: Little Terns come to Australia to nest on our beaches over summer

#### **MANAGEMENT ACTIONS - MANNING CATCHMENT**

Residents can help by following the tips below:

- Drive within the intertidal zone, keep out of fenced areas, and report any coastal fox sightings to Council.
- Keep control of your dog on dog permissible beaches at all times and away from any fenced or sign-marked nesting areas.
- Don't take firewood (from nesting beaches remove from nesting beaches as most people wont know which beaches are nesting), as driftwood provides useful shelter for young chicks.
- Please observe 'No Entry' areas including beach-nesting bird sites.

The Share the Shore message is supported by NSW Department of Primary Industries, Planning and Environment, Local Land Services, Crown Lands, Taree Indigenous Development and Enterprise (TIDE) and volunteer bird groups.

Funding for the program comes from Council's environmental rate, with our rangers playing a role in enforcement. The NSW Government's Saving our Species program funds a shorebird warden and provides the fencing and signage materials.

For more information on sharing the shore, visit www.midcoast.nsw.gov.au/ShareTheShore

## KIDS WILL CHANGE THE WORLD THROUGH PROJECT DJARRI BILA

MidCoast Council in partnership with Local Land Services, Take 3, National Parks and Taree Indigenous Development and Employment (TIDE) bought together students from across the Manning Catchment at Bobin Public School for a special education event. Bush to Beach: Project Djarri Bila highlighted the importance of the natural environment in the Manning Catchment, focusing on four hero species including the Manning River turtle, platypus, pied oystercatcher and little tern.

The focus of the program was to emotionally connect the kids with the Manning River so they understand why it's important and why they should care for it. As well, empowering them with ideas and opportunities they have to make and effect significant change for their world.



Figure 39: Attendees learning about how Catchments work at Bush to Beach - Project Djarri Bila

Stage 3 students from Harrington Public School, Coopernook Public School, Elands Public School, Bobin Public School, Hannam Vale Public School and St Josephs Primary School attended on the day.

Students were treated to a round robin of presentations on a variety of topics including:

- An interactive presentation about the importance of protecting catchments utilising the catchment model,
- Macroinvertebrate studies in Dingo Creek, to look at their importance to healthy waterways and the Manning River turtle and platypus
- Activities looking at shorebirds and the importance of their breeding grounds in the Manning Estuary for the little tern and pied oystercatcher
- Plastic pollution and its impact on the Manning River through interactive games and workshop.

In addition, a representative from TIDE spoke to the children about the importance of the River to the local Biripi people.

The afternoon session focused on leadership to allow students to recognise, develop and implement site specific solutions and to take ownership of plastic pollution and other issues within their own school grounds.

Students visiting Bobin from a vast number of areas also allowed them a great opportunity to see an area in the upper catchment they had never been and experience a vastly different environment to what they are used to.

The Manning CMP identified stewardship and creating a culture of custodianship is important for the health of the Manning River, and excursions like this can assist in this goal. Building knowledge and excitement in the children and allowing for ongoing class work for both students and teachers in the coming years.

Figure 40: Kids learning about litter with Take 3 at Bush to Beach - Project Djarri Bila

# MANAGEMENT ACTIONS -WALLIS LAKE CATCHMENT

#### **STORMWATER QUALITY IMPROVEMENT DEVICES**

MidCoast Council has been working hard to ensure our stormwater treatment systems are operating effectively to protect our waterways in what was a challenging year with diverse weather patterns.

Urban stormwater runoff is one of the greatest threats to waterway health. Changes in our landscape cause increased sediment, nutrients and litter finding their way into our lakes and rivers. This pollution can cause algal blooms and sedimentation and impact flora and fauna biodiversity in the water.

Stormwater treatment systems have previously been installed throughout the local government area and include Gross Pollutant Traps (GPTs) and biological systems such as wetlands and bioretention. These systems filter stormwater pollution before it has a chance to enter our waterways.

Council has been working to ensure that its stormwater quality improvement devices are being correctly maintained.

An independent audit of GPTs in the MidCoast region was previously undertaken to assess how well the GPTs were functioning and provided recommendations for repair and information sheets for undertaking comprehensive cleaning and maintenance. Following the audit, a rectification program has been underway ensuring that all devices are operating at their full capacity. In 2023, 2 devices were upgraded within the Wallis Lake catchment improving their capacity to remove pollutants before they enter the lake.

In 2023, an extensive audit of wetlands and bioretention located in Wallis Lake was completed. Environmental consultant E2 Design Lab inspected Councils biological devices to assess their current condition. Working in partnership with Council Operations teams the information from these audits identified what is required for best practice maintenance.

The audit has provided Council with a list of priority maintenance and rectification actions, a program for asset renewal and associated costs. Work is underway to undertake these works into the future

Figure 41: Auditors assessing Arlington Wetland.

#### LITTLE STREET GROSS POLLUTANT TRAP UPGRADE

Wallis Lake is a nationally significant estuary with high ecological values, a thriving tourism industry and productive fishery and oyster industries.

To protect Wallis Lake from litter and other pollutants a Gross Pollutant Trap (GPT) has been installed on the Foreshore in Little Street. An audit of Councils devices in 2019 showed that increased population and tourism pressures meant that the current GPT is no longer operating at the necessary capacity. Work is currently underway to upgrade the GPT to ensure that more gross pollutants and sediments are being effectively trapped within the device.

Following an Aboriginal Heritage Assessment to ensure that the heritage of the area is protected and the upgrade to the GPT will not have an impact, works have commenced on the installation of the new device which will improvement containment of pollutants by 90% and ensure the protection of the lake for years to come.



Figure 55: Installation of a new Gross Pollutant Trap in Forster will reduce the amount of pollution entering Wallis Lake.

#### **OYSTER REEF RESTORATION**

Over the last few years, the Natural Systems team have been working with Hunter Local Land Services and researchers from the University of Sunshine Coast to investigate oyster reefs, their importance to fish populations and potential locations for oyster reef restoration in the Wallis Lake estuary.

Shellfish or oyster reefs occur naturally in estuaries and they create important habitat for fish and other species, they can also help prevent erosion.

Declines in shellfish reef extent and condition have previously been documented in Wallis Lake. These declines in reef extent and condition have been implicated as contributing towards fisheries declines and oyster reef restoration has been identified as an important part of estuarine management not only in MidCoast systems but throughout NSW.

Researchers from the University of Sunshine Coast have spent several years studying our local systems, they began by undertaking mapping of remnant shellfish reefs in the region and identified a good abundance of sites in Wallis. Following the mapping exercise field surveys were undertaken and region wide and habitat specific analysis was completed.

Utilising the data from the surveys restoration models were created to look at areas where habitat restoration would be most beneficial as well as to prioritise works in the Wallis Lake system. This information will be utilised by MidCoast Council and Local Land Services to plan and implement management actions and create the best environmental outcomes for our local estuaries.



#### WALLIS LAKE SPONGES

The seagrass and algal meadows of Wallis and Smiths Lakes are identified as a hotspot for a diversity of marine sponges. Very little is known about the sponges in coastal lakes and lagoons but recent studies suggest there are at least 20 species of sponges associated with seagrass and algal meadows in NSW coastal lakes and lagoons. 10 of which have been recorded in Wallis Lake over the years, and the majority likely to be new to science.

In partnership with scientists from the Universities of Wollongong and Western Australia, MidCoast Council has been involved in regularly monitoring the sponges of Wallis and Smiths Lake since 2009.

This data adds to the previous research conducted by the Universities since 2002 and provides a valuable long-term data set to identify the diversity of sponges present in our waterways and possible impacts from development and environmental conditions such as drought, floods and fire.

A full report has been prepared following further monitoring during the summer of 2021/22. Since monitoring began in 2002 eleven species of sponges have been recorded in Wallis Lake.

In order to highlight the importance of this work and involve our community in the project a special Marine and Catchment Discovery event was held in Pacific Palms. As part of National Science Week Andy Davis, Professor of Marine Biology from the University of Wollongong provided some insights into research of the unique sponges that call Wallis and Smiths Lakes home.

Andy outlined findings of a twenty-year study (2002 to 2022) and demonstrated how some sponge populations in these MidCoast lakes are perhaps best characterised as boom or bust. Over 80 residents attended the evening and the feedback on the event and the project was overwhelmingly positive.

Long-term data sets like these are extremely rare and are valuable in understanding these sponges and how they respond to environmental change over time, will help us to protect these important habitats into the future.

#### **BANK STABILISATION**

Actions to improve water quality and fish habitat in the lower Wallamba River have continued in 2022 with additional oyster shell and hardwood timber restoration works progressing. Although works have been hampered significantly by the continual wet weather and access to sites.

In-water work has been focussed on Gereeba Island in the Wallamba River, Wallis Lake. Working together with the oyster industry to use discarded shell from the production process, LLS and Council are currently using a combination of logs, oysters and mangroves to stabilise eroding foreshore areas.



Figure 43: Timber being installed in the Wallamba River to protect the bank line and prevent erosion

## **BUSH REGENERATION AROUND WALLIS LAKE**

MidCoast Council is responsible for the management of a large and diverse array of natural areas within the Wallis Lake Catchment that provide important water quality functions and habitat for many native species, including numerous threatened species. These lands are all impacted to some extent through the invasion of weeds that compete with and degrade native vegetation.

Works around the Wallis Lake Catchment are aimed at maintaining and improving bushland condition through targeted weed control (for priority species) and bush regeneration activities. While much of the work is undertaken by trained bush regenerators, there is also opportunities in the program to provide Bushland Volunteers with mentoring, on-ground training, and education in the areas of best practice bush regeneration techniques and ecological restoration methodologies at some sites.

Currently work is being undertaken in areas included but not limited to:

- Pacific Palms
- Coomba Park
- Darawank
- Wallis Island
- Gareeba Island

Over 2000 hectares of land are currently undergoing bush regeneration in the Wallis Lake Catchment. Target weed species include Morning Glory, Lantana, Moth Vine, Senna, Madeira Vine, Camphor Laurel, Tobacco Bush, Ground Asparagus, Groundsel Bush, Brazilian



Figure 44: Lantana Control at Bungay Reserve in Wingham

Nightshade, Cape Ivy, Buffalo Grass and Cats Claw Creeper.

Work on removing these weeds has increased following the 2020 floods which saw large amounts of weed seeds washed down into areas in the lower catchment.

Removing weeds, planting native species and protecting native bushland provides habitat and wildlife corridors for native species, helps prevent erosion, runoff and sedimentation of Wallis Lake and provides a beautiful environment for locals and visitors to enjoy.

#### **MANAGEMENT ACTIONS - WALLIS LAKE CATCHMENT**

#### PROTECTING WALLIS LAKE FROM FERAL SPECIES

Feral species such as foxes compete with native species for food and resources and are a significant predator of small to medium sized ground dwelling native fauna. Controls in 2023 have taken place across council lands at Minimbah primarily targeting foxes that threaten a large number of native species including the long-nosed potoroo, eastern-chestnut mouse and the brush-tailed phascogale, all of which are listed threatened species.

Figure 45: - Foxes are an ongoing issue in the Wallis Catchment

Targeted controls have included trapping and ground shooting in conjunction with recent controls of feral deer in the area. This work has resulted in a number of foxes controlled across this important landscape. As part of the on-going management of feral pest species, MCC utilises motion activated cameras to detect foxes and other species in order to direct resources to on-going control efforts where required.

## **PROTECTING WILDLIFE HABITAT IN FORSTER**

Bush regeneration works continue across council reserves in urban Forster with intensive efforts still required following the impacts of the 2019 bushfires and the dense re-growth in the wet years post fire. Targeted works in 2022-23 were assisted by drier conditions that enabled areas that could not be worked previously due to site inundation as a result of the on-going wet weather.

The majority of the area was severely burned in 2019 with high intensity, removing all foliage and killing many Eucalypt, Melaleuca and Casuarina, which will affect the structure of the forest into the longer term.

Maintenance bush regeneration works at The Southern Parkway have targeted 3 emerging weeds in the locality namely groundsel bush, pampas grass and corky passionfruit. A multitude of other species were also treated. Most of the areas worked have been characterised by Swamp Sclerophyll woodland with a diverse weed invasion, often dense, within the ground and shrub layer. Works have continued to focus on hand removal of exotic species. The timely weed control has allowed native seedlings to develop with significantly less competition from fast growing weeds species. The regenerating canopy is now over 4 meters in height throughout the reserve.

> On-going maintenance bush regeneration works at this site and multiple other reserves in Forster will continue to improve the bushland condition for native fauna and flora.

> > The glider poles that were installed on The Southern Parkway in February 2022 have proved successful, with a good level of usage at various times during 2022-23, with squirrel gliders recorded regularly utilising the poles to cross the road between council reserves at The Grange and The Southern Parkway. The poles have enabled a safe crossing for the threatened gliders in the urban area.

Figure 46: Squirrel glider utilising the newly installed glider poles in Forster

## **IMPROVING EROSION AND SEDIMENT CONTROL PRACTICES**

Sediment and runoff can have a significant impact on the ecological health of our estuaries, reducing water clarity, destroying seagrasses and important habitat.

Large amounts of sediment runoff from development occurs during the construction phase and that sediment impacts on our waterways.

The construction boom in NSW has seen large numbers of subdivision releases, houses and road projects underway in MidCoast Council. There are also large road construction projects currently being undertaken which also increase the risk of sedimentation.

The 2020 waterway health report card showed 50% of the sites across Wallis and Smiths Lake Estuaries saw a decrease in water clarity. Reductions in water clarity were particularly evident in Wallis Lake, a 'lake' estuary with low residence time, the impacts of sedimentation in this large shallow estuary will be persistent and long lasting due to resuspension.

Following these results MidCoast Council applied for and received funding from the NSW Government's Coast and Estuary grants to undertake a comprehensive review of erosion and sediment control management systems across both public and private developments. The project will include a tenure blind independent audit of erosion and sediment control practices

In addition to the audit, erosion and sediment control training will be provided to designers, builders, Council staff and the construction industry to increase their knowledge of erosion and sediment control requirements and to help reduce sediment runoff from both public and private developments. In 2023 this project was kicked off with erosion and sediment control training for all Council staff involved in erosion and sediment control.

# **MANAGEMENT ACTIONS - SMITHS LAKE**

# **BACKYARDS FOR BIODIVERSITY**

Backyards for Biodiversity is a three-year project running in Smiths Lake, aimed at making sure that what happens in local backyards protects the natural environment that. The project focuses on encouraging whole-of-community action on protecting natural bushland from invasive plants and providing the right kind of habitat for local fauna. Protecting natural bushland is the key to protecting water quality. Native vegetation is excellent at binding soil reducing sediment runoff and filtering stormwater runoff.

Currently approximately 900 properties in Smiths Lake have been inspected for biosecurity threats. The community were notified of the inspection period, and we have continued to engage and communicate with the community as inspections have been undertaken. Communications with community have been mostly positive, and a variety of biosecurity threats have been identified including Amazon frogbit, African olive, coral creeper and pampas grass.

Several successful community events were held which included a project launch on the Smith's Lake foreshore where residents could find out more about local flora and fauna, the impacts of backyards on the local environment and the ways they could get involved in the project.

As part of the program an iNaturalist project was created in order to find out more about the flora and fauna in the region. Currently over 2000 observations have been uploaded into the program, covering 749 species. To support the project a curator from the iNaturalist program came along to a community event day to demonstrate just how important citizen science is, how residents in Smiths Lake are able to participate and how simple phone technology can help provide much needed data and support to help us better understand and protect the biodiversity in the area.

As the program continues species identified during the inspections will be targeted, and additional flora and fauna survey opportunities will be undertaken with the community. Figure 47: Community members arning more about the Backyards for Biodiversity program

# **ENHANCING YELLOW-BELLIED GLIDER HABITAT**

The yellow-bellied glider (*Petaurus australis*) is a large gliding possum with a membrane of skin that extends from the wrist to the ankle, allowing the animal to make glides of over 100 metres.

Sadly, in NSW the yellow-bellied glider is listed as vulnerable and threatened with extinction. Smiths Lake is home to a population of these special gliders and MidCoast Council is working hard to enhance and protect their habitat.

Primary bush regeneration works across 40-hectares of reserves has reduced the weed density across the project site with an array of environmental weeds targeted for control. Three successful community events were held which included a project launch on the Smith's Lake foreshore and a very well attended tree planting event that saw over 500 trees planted at the Macwood Road Council reserve.

In addition, a felting workshop with local kids during school holidays. The kids had fun felting yellow-bellied gliders with a felt art instructor and learning more about these special animals.

Nesting boxes for the target species were installed by an arborist along with various sized boxes for a variety of species installed by MCC staff. Monitoring of the boxes at this early stage has detected usage by possums and the vulnerable squirrel glider.

Three factsheets have been developed based on project themes to raise awareness and educate the local community about the project and the importance of the public bushland reserves to native wildlife and the need to protect them.

Figure 48: Yellow-bellied gliders are an important species in the Smiths Lake area

A surprise find in the first year was the discovery of the cryptic forest twiner (*Tylophora Woollsii*), a NSW and federally listed endangered woody climbing plant that was found at the Second Ridge Road Council reserve. This plant is very rare within its known range, so this was an exciting find and shows the importance of protecting habitat, not just for the target species but also for other species that rely on the same habitat.

# **IMPROVE EROSION AND SEDIMENT CONTROL PRACTICES**

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# **MANAGEMENT ACTIONS - MYALL LAKES**

#### **MANAGEMENT OF AQUATIC WEEDS**

Salvinia (*Salvinia molesta*) is a historic problem within the MidCoast LGA and is now widespread and abundant. Salvinia forms thick mats that can quickly cover water bodies and infestations reduce water flow, degrade water quality, and affect native animals, stock, and recreational users.

Control works were undertaken during 2023 that included the release of biological control in the main body of the waterway. The biological control has been introduced to assist with the long-term management and ongoing maintenance of the site to protect the downstream estuary.

Figure 49: Salvinia is one of the aquatic weeds being treated in Myall Lakes

The Myall Lakes area is currently also awaiting the commencement of control activities under the Hunter Aquatic Weeds Strategy. High Priority weed infestations including Cabomba are scheduled for management utilising a combination of integrated strategies utilising herbicides and biological controls at specific identified locations.

### **CONSERVATION PARTNERSHIPS**

The Myall River catchment occupies an area of about 819 square kilometres, of which the Myall Lakes estuary is about 115 square-kilometres. Myall Lakes National Park sits within the catchment and is one of the most visited national parks in NSW. It is an internationally recognised wetland and hotspot for biodiversity. Outside the National Park, there are a range of private land uses, including agriculture, conservation, and lifestyle, as well as towns and villages.

Because of the ecological significance of the Myall Lakes waterway and the experience with bluegreen algae outbreaks, MidCoast Council collaborate with NSW National Parks and Wildlife Service and other stakeholders to monitor the condition and health of the system. Preserving the functionality and condition of the terrestrial environment is important for the preservation of the Myall Lakes system.

Over the past year, the following programs have been implemented to support the protection of wetlands and important natural landscapes and the conservation of biodiversity in the Myall River catchment:

 Council continues to manage and protect the 366-hectare Bulahdelah Plain Council Reserve. This Reserve adjoins a private conservation area and is adjacent to Myall Lakes National Park. It contains important habitat known to support threatened species including the long-nosed potoroo, squirrel glider and New Holland mouse. Council conducts feral pest animal and weed controls and is actively regenerating formerly cleared parts of this reserve.

Figure 50: Long-nosed potoroo are one of the many species benefiting from conservation partnerships

- Several private landholders have entered into conservation agreements and biodiversity stewardship site agreements which permanently conserve several hundreds of hectares of native vegetation and wildlife habitats. These agreements are facilitated by the NSW Biodiversity Conservation Trust (www.bct.nsw.gov.au) and encouraged by MidCoast Council and Mid Coast 2 Tops Landcare Connections Inc.
- Council is planning on developing a Wildlife Corridor Implementation Plan for the catchment, to build on the work undertaken to identify the highest priority wildlife corridors and connections in the landscape. The Implementation Plan will identify the range of tools and engagement required to increase the protected status and restoration of important wildlife corridors in this catchment.

#### **MANAGEMENT ACTIONS - MYALL LAKES**

#### **FERAL ANIMAL CONTROL**

Council's Bulahdelah Plain Wetland is home to a diverse range of fauna, a number of which are listed as threatened under NSW and Commonwealth legislation. Many of the ground dwelling species, particularly the long-nosed potoroo and New Holland mouse are under threat due to predation by the European red fox. To reduce the pressure on threatened species, Council runs multiple fox control programs across the site and also on surrounding lands in collaboration with adjoining landholders.

In 2022-23 two control programs were implemented by an experienced contractor and MCC staff. The programs utilised trapping and baiting methods and predator activity,



Figure 51: Foxes are an ongoing problem at Bulahdelah Plain Wetland, with ongoing control works in place

particularly foxes was low, indicating that on-going control programs are starting to have an impact on the presence of feral animals at the wetland. The two programs which also included controls on neighbouring property resulted in the control of 4 foxes across this important landscape. Regular control of foxes when combined with habitat restoration and enhancement, is vital to protect local populations of native fauna in our natural bushland areas.

#### **BUSH REGENERATION**

MidCoast Council is responsible for the management of a large and diverse range of natural areas including significant areas of public reserves. These reserves provide an array of ecosystem services and contain large assemblages of flora and fauna, including threatened species and endangered ecological communities. Natural Systems is currently implementing a comprehensive program of works with the assistance of government funding value adding to the environmental rate, specialised bush regeneration contractors and Landcare volunteers to protect and restore the natural values and ecosystem functions of natural area reserves in the Myall Lakes area.

Works in the region include primary, secondary and tertiary weeding, Landcare/DuneCare assistance, management of feral pest animals, flora and fauna surveys, threatened species management, planting of native species, litter and marine debris management, installation of nesting boxes and hazard reduction burns.

Council been working with RFS in planning a mosaic of hazard reduction burns scheduled over a period of years for Kore Kore reserve, this year zones # 1 and 2 have been successful had a low intensity burn undertaken and contractors have been engaged to monitor these burnt sites for weed invasion.

These works help to improve the condition of native vegetation across sensitive landscapes, increase the habitat for native wildlife and aid in the recovery of these important ecosystems.

Active sites include Kore Kore Reserve, Viney Creek Road, Settlers Way Reserve, Jean Shaw Koala Reserve, Sanderling Avenue, Bennetts Beach, Jimmys Beach, Yaccaba Spit The Boulevarde, Winda Woppa Reserve and Esplanade Reserve North Arm Cove.

#### **MANAGEMENT ACTIONS - MYALL LAKES**

Figure 52. Bush regeneration works are taking place in reserves throughout the Myall Lakes region

# MANAGEMENT ACTIONS -KARUAH RIVER CATCHMENT

# **PROTECTION OF HABITATS**

The Karuah River catchment has been a focus for Council engagement and encouragement in private land conservation. This is to improve the connectedness of the landscape, to safeguard the protection of ecosystem services functions, such as water quality protection for the Karuah River domestic water supply, and to protect the habitat of focal species like the koala. Council is building on partnerships with Mid Coast 2 Tops Landcare Connection and the NSW Biodiversity Conservation Trust to improve the delivery and growth of Land for Wildlife and private land conservation schemes in the Karuah River catchment.

The Australian Wildlife Conservancy has established a new sanctuary within the Karuah River catchment. Covering 3,000-hectares of land, the Gorton Forest Sanctuary is a valuable contribution of privately conserved and managed land. It adjoins the existing Myall Lakes National Park and a large Biodiversity Stewardship Site. This Sanctuary can provide a possible cornerstone to a broader network of private and public reserves in the Wards River locality, which will have biodiversity, tourism and water quality benefits.

The Karuah River catchment is recognised for its productivity, natural assets and popularity for nature-based recreation. Council, with a range of key stakeholders, continues to assist protect an important nesting site of the little tern and pied oystercatcher in the Port Stephens estuary, including around the sandspits and islands associated with Corrie Island and Winda Woppa.

Koalas occur across the Karuah River catchment, but more information is needed to understand the densities, distribution and trends of these populations. Parts of the Karuah River catchment are a state-wide priority for

Figure 53: Koalas are an important species in the Karuah Catchment

addressing knowledge gaps. As such, Council is investing in koala surveys using thermal drones, detection dog teams and song-meters. By learning more about the status and significance of koala populations in this catchment, Council will be advocate for its protection and recovery and devise and implement management actions. Koala conservation in this catchment will rely on the voluntary supporting efforts of a range of landholders.



# WATERWAY AND CATCHMENT REPORT CARD 2023

Reporting on data November 2022 to April 2023

# **RESULTS 2023**

The 2023 Report Card saw similar results to 2022 with 15 sites remaining at the same grade, 2 sites improving grades and 3 sites grade decreasing.

Higher algal growth strongly influenced the grades this year. This is likely due to lower rainfall than the previous year, which results in less turn over of water within the waterbodies and thus more time for algae to grow.

## **MANNING RIVER ESTUARY**

The Upper, Mid and Lower sections of the Manning River Estuary remained in good ecological condition this year.

Farquar Inlet improved to excellent condition this year and was open to the ocean all summer. Water clarity and algal growth grades were both excellent.

The Dawson River Estuary remained in fair condition due to a fair grade for both water clarity and algal growth.

Browns Creek retained its fair grade with improved water clarity but a poor algal growth grade.

The Lansdowne River Estuary retained its fair grade this year. While there was an improvement in water clarity improved, algal growth increased.

Water clarity improved in Ghinni Ghinni Creek but algal growth was poor, leading to a drop in the overall water quality grade to fair.

# **KHAPPINGHAT ESTUARY**

The Khappinghat Estuary improved to excellent condition this year due to improved water clarity and very low algal growth. Water quality in the estuary has now completely recovered from the bushfires in 2019-20. The entrance was open for most of this year which may have also led to improved water quality.

# KARUAH RIVER AND THE BRANCH ESTUARY

The Karuah River Estuary retained its fair grade this year, receiving a good grade for water clarity but a poor grade for algal growth. Algal growth in the estuary exceeded desired levels for most of the season.

The Branch Estuary returned to fair condition this year due to a poor grade for algal growth which exceeded desired levels all season. Water clarity in The Branch Estuary remained good.





# WALLIS LAKE

Wallis Lake, Charlotte Bay and Pipers Creek retained their good grade this year due to excellent water clarity.

Mid Wallamba Estuary retained its good grade with an improved grade for both water clarity and algal growth. Wallamba Cove was in good condition again this year.

Coolongolook Estuary dropped a grade to fair condition this year, driven by a poor grade for algal growth.

#### **ESTUARY SCORE KEY**



#### **Overall grade**:

This represents ecological condition, it is a combination of algae and water clarity scores.

#### Seagrass depth range score:

The seagrass score indicates how deep the

**Historical grades** 

seagrass is growing and if the seagrass area is expanding or contracting. Where there are no seagrass results, no data was collected at these locations.

For more details on the scientific methods and results contained in this Report Card (Waterway and Catchment Technical Report) www.midcoast.nsw.gov.au/reportcard

# **SMITHS LAKE**

Smiths Lake retained its good grade during 2023. The lake remained open for most of the summer contributing to excellent water clarity and low algal growth.

## **MYALL LAKES**

Myall Lake remained in excellent condition this year despite an increase in algal growth. Bombah Broadwater retained its fair grade with improved water clarity but an increase in algal growth this year.

Myall River Estuary was in good condition with excellent water clarity and low levels of algal growth for most of this year.





# **PROTECTING OUR ESTUARIES** SETTING THE DIRECTION

Estuaries are where freshwater from our rivers meets salt water from the ocean. They are an important environmental zone, brimming with a diversity of life.

The Southern Estuaries of the MidCoast region, including Wallis, Myall and Smiths Lakes, Karuah River, North Arm Cove, Kore Kore and Khappinghat Creeks and Black Head Lagoon are some of its greatest assets. They strengthen the MidCoast economy, they are some of the reasons our community love where they live and others come to visit.

MidCoast Council is preparing a Coastal Management Program (CMP) for its Southern Estuaries. This program will set the direction for the future of our estuaries and help MidCoast Council to identify, understand, prepare for, and respond to current and emerging pressures on these estuaries.

# What you told us you love about MidCoast Estuaries

During Stage One our community provided insight into what they love about and how they use our Southern Estuaries. As the program continues this information will play an important role in deciding where to put the most effort in order to protect our environment and our community.

The main values and uses identified were:

- Environmental Protection
- Nature Observation
- Recreation on and in the water (kayaking, swimming, canoeing)
- Exercise (walking, running)
- Picnics and Barbeques

The Southern Estuaries Coastal Management Program will guide how we protect and enhance biodiversity and achieve water quality to support our community values.

#### **Pressures on our estuaries**

Stage One of the project also assessed the present and emerging threats to our estuaries. Some of those identified include:

- Tidal Inundation
- Bushfires and Drought
- Sea level rise
- Invasive fauna
- Gaps in ecological knowledge
- Overcrowding of waterways

# Building our knowledge to inform future management

Stage Two is currently in progress and involves undertaking detailed studies including coastal wetland mapping, tidal inundation studies and risk assessments for Khappinghat Creek and Black Head Lagoon that will help identify management actions across all of our beautiful estuaries.

#### Have your say

Over the next 12 months there will be opportunities for you to get involved with the program simply sign up on our website bit.ly/3ts76F5.



# WATER-WISE URBAN LIVING

Towns and cities alter the way that water flows into the natural environment. Hard surfaces such as roads, pathways and roofs create more runoff which carries pollutants such as nitrogen, phosphorus, sediments and litter, impacting on our sensitive waterways.

Science informs us that the best way to minimise the impacts of urban stormwater is with Water Sensitive Urban Design (WSUD). WSUD is about including water into urban planning, slowing down stormwater and introducing wetlands and raingardens to filter pollutants before they reach our waterways. These systems are designed to re introduce natural processes into our urban landscape.

#### Protecting our waterways at home

Raingardens are small scale, specialised garden beds that slow and clean stormwater before it drains into our waterways. They look similar to a normal garden, but below the surface they are working hard to filter out pollution.

Raingardens are effective in removing up to 90% of nutrients and chemicals and up to 80% of sediments from the rainwater runoff. Compared to a conventional lawn, rain gardens allow for 30% more water to infiltrate into the ground.

# The key principles of Water Sensitive Urban Design are:

- to protect and enhance the quality of waterways
- to reduce the demand for drinking water by using alternative sources of water such as rainwater
- to minimise the generation of stormwater
- to treat wastewater to a suitable standard for re-use and/or release into local waterways
- to use stormwater in the urban landscape to improve the visual and recreational amenity of developments.

They can treat water from a single home or runoff from large residential estates. In the MidCoast area you may be required to install a raingarden when building or renovating a home, but anyone can install a raingarden and ensure that every drop of water counts.

#### **Benefits of a raingarden**

- Improves water quality in our estuaries
- Looks great and adds to the aesthetic of your home
- Preserves native vegetation
- Helps prevent flooding
- Attracts beneficial birds, butterflies and insects
- Easy to maintain after establishment



This project is funded by MidCoast Council's Environmental Rate and supported by the New South Wales Government through its Coast and Estuary Program and Department of Planning and Environment.