



Natural Resources Commission

Final report

# Review of the Water Sharing Plan for the Coffs Harbour Area Unregulated and Alluvial Water Sources 2009

April 2020



## Acknowledgement of Country

The Natural Resources Commission acknowledges and pays respect to all the traditional owners and Aboriginal peoples. The Commission recognises and acknowledges that traditional owners have a deep cultural, social, environmental, spiritual and economic connection to their lands and waters. We value and respect their knowledge in natural resource management and the contributions of many generations, including Elders, to this understanding and connection.

In relation to the Coffs Harbour area, the Commission pays its respects to Gumbaynggirr traditional owners past, present and future, as well as other Aboriginal peoples for whom these waterways are significant. The Commission hopes that the involvement of Aboriginal peoples and Local Aboriginal Land Councils throughout the review process will help to shape collaborative water planning and sharing that is beneficial to Aboriginal peoples and their Country.

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## Acronyms and units of measurement

Act	<i>Water Management Act 2000</i> (NSW)
AHIMS	Aboriginal Heritage Information Management System
AWD	Available Water Determinations
Commission	the Natural Resources Commission
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DPI-Fisheries	Department of Primary Industries – Fisheries
DPI-Water	The (former) NSW Department of Planning and Industry – Water
DPIE-EES	Department of Planning, Industry and Environment – Environment, Energy and Science (the former Office of Environment and Heritage)
DPIE-Water	Department of Planning, Industry and Environment – Water
ICOLL	Intermittently Closed and Open Lakes and Lagoons
LGA	Local Government Area
LTAAEL	Long-term annual average extraction limit
MER	Monitoring, evaluation and reporting
ML	Megalitre (unit of volume equivalent to one million (1×10 <sup>6</sup> ) litres)
NSW	New South Wales
OEH	Former NSW Office of Environment and Heritage
Plan	the <i>Water Sharing Plan for the Coffs Harbour Area Unregulated and Alluvial Water Sources 2009</i>
SMART	Specific, measurable, achievable, relevant and time-bound

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## Executive summary

In line with its statutory responsibility under the *Water Management Act 2000* (the Act), the Natural Resources Commission (the Commission) has reviewed the *Water Sharing Plan for the Coffs Harbour Area Unregulated and Alluvial Water Sources 2009* (the Plan).

Water in the Plan area is largely used for licenced stock and domestic use and irrigated horticultural agriculture. There has been a significant shift in agricultural land use over the Plan period from predominantly dryland agriculture to intensive irrigated horticulture. This has significantly altered the use of water in the region. The Plan does not currently cater for town water utility supply and this is not expected to change. Town water in the Plan area is drawn from the Orara and Nymboida rivers under the *Water Sharing Plan for the Clarence River Unregulated and Alluvial Water Sources 2016*.

A lack of clear outcomes, hydrological modelling, and limited monitoring, evaluation and reporting (MER) activities makes difficult to determine the Plan's performance. The limited evidence puts achievement of the Plan's outcomes at high risk considering the high demand for water extraction and high value downstream environments, including the coastal lagoons and estuaries of the Solitary Islands Marine Park.

## Advice on Plan extension and replacement

The Commission's review has identified a range of areas for improvement that justify a replacement Plan. The Commission suggests a two-year extension to allow enough time and resources to make the required Plan improvements.

The Commission therefore recommends that the Plan is:

- **extended for a further two years until June 2022** to allow enough time and resources to make required Plan improvements
- **replaced by June 2022** to address the recommendations of this report.

The Department of Planning, Industry and Environment – Water (DPIE-Water) should address the following priorities when developing the replacement Plan:

- improving metering, gauging and reporting of extraction and flow
- defining environmental assets and ecosystem functions and their flow requirements including the need to maintain connectivity as a key function
- reviewing key provisions to protect the environment to ensure they are evidence based, transparently reported and their implementation monitored
- addressing risks from rainfall runoff harvesting and climate change
- improving Aboriginal access to water entitlements and participation in decision-making
- defining non-extractive social and economic values (including downstream) and considering their flow requirements
- supporting more effective water account management and trade
- improving the Plan's objectives, strategies and performance indicators
- developing a Plan-specific monitoring, evaluation and reporting framework.

## Summary of findings

### Major issues related to environmental outcomes

The Plan rules currently do not reflect the risk to the instream environmental values or the downstream estuaries from the extraction of water. The Commission identified several major environmental risks that are not adequately managed in the Plan:

- There is currently limited evidence to determine the Plan's impact on environmental outcomes. There are no flow gauges, limited metering and minimal ecological studies in the Plan area, but findings from available ecological studies indicate that environmental outcomes are unlikely to be achieved. There is also significant stakeholder concern regarding water quality and impacts on estuaries and coastal environments downstream of the Plan.
- The Plan and the external regulatory framework do not consider risks associated with increased use of farm dams, which capture significant volumes of flow and will impact low flows in the Plan area. Rainfall runoff capture into farm dams is not measured under the current metering framework beyond logbook accounting, and harvestable rights are also excluded from metering requirements. Without accurate measurement, this extraction cannot be accurately accounted for and managed. The Commission considers that farm dams and extraction outside Plan regulations pose a high risk to environmental, social and economic outcomes.
- The increased use of farm dams has been driven by a shift towards intensive horticulture. Stakeholders raised concerns regarding potential environmental impacts resulting from this shift, which has significantly altered the extraction profile of the Plan area. The impact of this shift on environmental outcomes is currently unknown due to a lack of monitoring, but the risks associated with changes in extraction profile are not addressed in the Plan.

Given that the Plan does not adequately manage risks to the environment, the Commission recommends replacing the Plan to strengthen rules protecting environmental water and achieve environmental outcomes in accordance with the priority they are afforded under the Act.

### Specific changes that should be made to address risks to the environment include:

- defining the environmental water requirements of the Plan area
- strengthening rules such as cease to pump thresholds and flow regime requirements to protect environmental values and functions
- addressing risks of significant extraction outside the Plan regulation, particularly from rainfall runoff harvesting
- incorporating climate change modelling.

### Social and cultural outcomes

The Commission reviewed the Plan's performance against the current social and cultural outcomes, objectives and performance indicators and found that:

- the social objectives and outcomes of the Plan should reflect current community values, including Aboriginal values
- the revised Plan should better support Aboriginal water interests through access and use provisions and by anticipating future native title determinations and land use agreements

- Aboriginal engagement must be on a nation-by-nation basis to ensure appropriate engagement and involvement in water planning and management.

### **Economic outcomes**

The Commission reviewed the Plan's performance against the current economic outcomes, objectives and performance indicators and found that:

- Plan performance has not been monitored and data are not available to definitively link economic benefits or impacts in the region to the Plan – however, the Plan has allowed for economic benefits to be realised through the expansion of horticulture
- given changes to extraction over time and stakeholder concern, the Commission recommends that the replacement Plan reassess the economic dependence of water sources and include the full range of economic benefits and impacts (including downstream)
- trading under the Plan can also be better supported by improving administration systems and price reporting, implementing comprehensive metering and improving compliance.

### **Monitoring, evaluation and reporting**

The Commission reviewed the Plan's MER arrangements and found that:

- as with many water sharing plans, the Plan does not have a robust MER framework, which limits available data, the evaluation of outcomes and adaptive management – this should be developed for the replacement Plan
- the Plan does not clearly specify environmental, social and economic outcomes that are prioritised in line with the Act – the replacement Plan should include objectives, strategies and performance indicators that are logically linked, are specific, measurable, achievable, relevant and time-bound (SMART) and reflect the water management principles listed in the Act
- The current monitoring of water extraction and use is inadequate, and almost all licences in the Plan area are unmetered. Most pumps in the Plan area will not require a meter under the NSW non-urban water metering reforms, entrenching the existing knowledge gap in Plan development, implementation and improvement. Measures to improve understanding of extraction should therefore be investigated and include rainfall runoff harvesting.
- suitable locations for flow gauging should be identified and monitored to improve data on environmental, social and economic outcomes and risks
- the replacement Plan should better support adaptive management in response to new information being generated.

### **Plan development and implementation**

The Commission reviewed the Plan's development and implementation more broadly and found that:

- a broad lack of compliance with water take laws is a significant issue in the area – although compliance is outside of the scope of the Plan, efforts to strengthen compliance through the Natural Resources Access Regulator is supported and they should be consulted as part of the development of the replacement Plan

- issues with the clarity of the current Plan for both licensees and the general community may be contributing to compliance issues – the replacement Plan should be accessible and easily understood, and supported by active, ongoing communication and education
- there is limited value in merging the current Plan with the *Water Sharing Plan for the Bellinger River Area Unregulated and Alluvial Water Sources 2008*, as previously considered.

## Recommendations

Key recommendations from the Commission’s review are provided in **Table 1**. Suggestions for complementary actions to improve the Plan development and implementation are provided in **Table 2**. Recommendations and actions marked with an asterisk (\*) are strategic initiatives which the Commission considers DPIE-Water should implement across NSW to support all water sharing plans outcomes, noting that several state-wide initiatives are already being progressed by DPIE-Water.

The Commission recognises the significant amount of work required to address these recommendations. Due to the risks to the unique environmental, social and economic values of the Plan area, the Commission encourages the NSW Government to support DPIE-Water to appropriately fund and resource the work required to address the issues in the Plan area.

**Table 1: Key recommendations for DPIE-Water to strengthen Plan outcomes**

Overall	
1	The Plan should be: <ul style="list-style-type: none"><li>a) <b>extended for two years until June 2022</b> to complete studies, monitoring and assessment</li><li>b) <b>replaced by June 2022</b> considering the recommendations and suggested actions in this review and the findings from (a), ensuring that the Plan firstly protects the water source and its dependent ecosystems and secondly provides for basic landholder rights above other uses.</li></ul>
Environmental outcomes	
2	In the next two years during Plan development, collect evidence (as required) and transparently report to: <ul style="list-style-type: none"><li>a) describe the natural flow regime incorporating data from <b>recommendation 12</b></li><li>b) map and ground-truth the presence and extent of water and groundwater dependent environmental assets including estuarine and coastal ecosystems</li><li>c) identify key assets and ecosystem functions, their conditions and the factors driving their condition. Classify high priority ecosystems and high ecological value waterways including those assets identified in (b)</li><li>d) define the flow (and groundwater) requirements of key assets and functions</li><li>e) determine the impact of the Plan (including seasonal variations) on the flow regime in (a) and key assets and functions flow requirements in (d).</li></ul>
3	Improve consideration of groundwater by building on groundwater assessment processes used for recent inland water sharing plans specifically to:

- a) identify high, medium and low priority groundwater dependent ecosystems in the Plan and refer to them explicitly as relevant in any groundwater dependent ecosystem protection provisions
  - b) clearly define groundwater terms and their relevance to the Plan, including connectivity, ecological value, potential and type – connectivity should include both discharge of groundwater to surface water and surface water recharge to groundwater systems
  - c) establish a coastal floodplain alluvial groundwater source and appropriate rules to bring governance of these licences and their extraction under the *Water Management Act 2000*
  - d) review setback distances for work near identified groundwater dependent ecosystems and standardise these based on the *NSW Aquifer Interference Policy 2012*.
- 
- 4 Understand and better protect planned environmental water:
- a) during Plan development, define and assess the impacts of extraction by:
    - i. gathering data on farm dam location and capacity alongside other extraction mechanisms and model cumulative impacts on each waterway's flow regime
    - ii. determining the spatial and temporal variation in extraction for each waterway and water source
    - iii. assessing impacts of extraction on each waterway's flow regime and each water source's environmental, social and economic outcomes, including estuarine and coastal function.
  - b) audit changes in entitlements under the Plan, defining entitlement on issue in each water source and where this has increased during the Plan
  - c) if an increase in entitlement overlaps with water sources of high instream value, determine any risks that may occur as a result of this increase
  - d) using (a) through (c), define a numeric LTAAEL in the remade Plan and include a provision to adjust it if required in Year 5 based on **recommendation 2**
  - e) if required, implement the provision in (c) and associated measures in Year 5 to bring LTAAEL to the level required to protect the volume of planned environmental water identified in **recommendation 2**
  - f) monitor and provide an annual publicly available report summarising the estimated extraction volume and methods of licenced extraction in each water source.
- 
- 5 Protect key environmental assets' flow requirements and maintain natural flow variability and connectivity:
- a) if extraction shifts significantly towards in-river extraction, or at Year 2 of the Plan (whichever occurs earlier), reassess the cease to pump thresholds and raise them as required to protect the low flow requirements of environmental assets and functions
  - b) design and implement provisions at Plan commencement to protect the flow requirements of key environmental assets
  - c) implement additional mechanisms, such as protection of freshes and small floods, as necessary outside the Plan to maintain natural flow variability and ecosystem function, including estuarine, coastal and coastal lagoon berm function.
- 
- 6\* Incorporate climate change impacts:
- a) ensure the Plan functions appropriately under a range of climate change scenarios
-

- b) review and revise Plan provisions based on the best available climate information and allow for Plan amendments to address longer-term water availability based on evidence of changing climatic conditions.

### Social and cultural outcomes

- 7\* Continue work to improve Aboriginal engagement and outcomes, including work to:
  - a) strengthen and expand the nation-by-nation engagement developed as part of the inland water resource plan process to coastal areas and to other representative Aboriginal groups
  - b) use the strengthened engagement process to identify Aboriginal values and uses, objectives and outcomes, and flow allocations in the Plan area, then link these to strategies, performance indicators and measuring and reporting requirements
  - c) simplify licence categories or co-design other water access mechanisms in consultation with Aboriginal peoples that can support identified Aboriginal water values, rights and uses
  - d) include a timeframe of three months to initially amend the Plan to acknowledge any native title determinations and Indigenous Land Use Agreements and allocate enough time to undertake detailed engagement with stakeholders on the final Plan amendment and allocation process.

### Economic outcomes

- 8 Assess the economic dependence of each water source, with the assessment broken down into the full range of economic benefits and impacts including:
  - a) extractive industries (for example intensive horticulture, forestry)
  - b) non-extractive industry (for example tourism, aquaculture, recreational and commercial fishing)
  - c) community and ecological services (for example amenity, suitable water quality, recreation, flood mitigation through natural coastal lagoon function).
- 9 Confirm trading boundaries and rules are ecologically appropriate using baseline data including updated high instream value mapping, and data on hydrologic connectivity and downstream impacts.

### Monitoring, evaluation and reporting

- 10\* Finalise the MER framework for coastal water sharing plans by the end of 2020, adequately fund its implementation and include the following as part of the replacement Plan:
  - a) provisions for Plan-specific MER requirements following the established framework and including both freshwater and estuarine ecosystems at a minimum
  - b) clear governance arrangements for MER, including roles and responsibilities
  - c) timely and regular public reporting of the results of monitoring and evaluation activities to support transparency, public awareness and active compliance
  - d) appropriate governance arrangements and timeframes for adaptation and improvement, particularly in response to new information such as climate change.
- 11\* Set strong foundations to improve implementation and measurement of Plan outcomes by:

- 
- a) developing objectives, strategies and performance indicators that are strongly linked to the Act's environmental, social and economic outcomes, and in line with the Act's priorities
  - b) developing SMART objectives, strategies and performance indicators.
- 
- 12 Monitor streamflow, water extraction and use:
- a) identify suitable gauging locations and implement river flow monitoring arrangements to collect local data and provide a transparent evidence base for hydraulic modelling and management and planning decisions
  - b) implement additional measures such as metering beyond the new NSW non-urban water metering framework to understand extraction and support decision making, adaptive management and improve public confidence
  - c) implement mechanisms to quantify and account for rainfall runoff harvesting
  - d) release a report by year two of the Plan outlining findings from (a) through (c) and either implement steps to measure total extraction (including basic landholder rights) or justify no action, providing a roadmap for ongoing steps.
- 

**Table 2: Suggested actions for DPIE-Water to support the replacement Plan**

Environmental outcomes	
A	Complete specific, local scale studies incorporating detailed assessments of existing take along with hydrological, ecological and socio-economic studies for any water source under consideration for increased harvestable rights extraction. The potential impacts should be assessed in detail, consulted with the broader affected communities and transparently reported.
B	Outline a transparent process that can be initiated to review water sharing arrangements if climate change results in significant changes in the water available in the system.
C*	Fund and implement integrated catchment actions to improve riverine and estuarine health objectives drawing on relevant agencies across the cluster of Planning, Industry and Environment.
Social and cultural outcomes	
D*	Integrate the NSW river flow and water quality objectives into the Plan. Revisit the objectives during community consultation to agree on currency of objectives and develop community understanding to improve participation in Plan development and implementation.

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- E\* Develop the NSW Aboriginal Water Framework by end-2020 to provide consistent and transparent guidelines and resourcing for Aboriginal water access and involvement in water planning and management. At a minimum, the framework should consider:
- a) relevant guidelines and legislation, including any need for legislative reforms
  - b) Aboriginal water values and its uses
  - c) processes for allocating water for Aboriginal interests including cultural, environmental, social and economic purposes
  - d) processes for improving Aboriginal water access and use, through simplified licencing or other identified mechanisms
  - e) clear requirements for including native title determinations and proactive processes for undertaking other land/water use agreements
  - f) strengthened Aboriginal engagement processes across the state to expand on the basin engagement process, broaden the stakeholder base (to include Traditional Owners, Nations, Local Aboriginal Land Councils and other relevant groups), and increase Aboriginal staff with capacity to lead and maintain engagement.
  - g) appropriate Aboriginal-led governance and decision-making arrangements, such as an Aboriginal Water Holder
  - h) adequate resources including dedicated Aboriginal staff with capability in water planning and management, and funding, such as an Aboriginal Water Trust.

### Economic outcomes

- F\* DPIE-Water should continue to implement their program to improve all trade information, including coordination with relevant agencies to:
- a) publish a transparent overarching process for assessing trades for approval
  - b) support improvements to price reporting by licence holders
  - c) increase education and awareness of trading arrangements, including the use of metering to increase trade opportunities
  - d) investigate trade drivers and barriers through stakeholder engagement processes, including with Aboriginal stakeholders.

### Plan development and implementation

- G\* Adopt processes that support clear and transparent implementation of the Plan:
- a) finalise and implement the *Reasonable Use Guidelines* by the end of 2020 and include the agreed standards as part of the replacement Plan to adequately estimate and enforce basic landholder rights
  - b) develop simple and concise Plan documents, minimising cross referencing and improving clarity
  - c) strengthen existing processes for stakeholder engagement developed as part of the water reform action plan, and include an area-specific stakeholder engagement plan – this needs to specify appropriate forums for engagement, such as a stakeholder advisory panel, including formal engagement with a range of stakeholders with diverse interests and localised knowledge of water.
- H\* Continue to work with the Natural Resources Access Regulator to understand compliance and enforcement risks in the Plan area and incorporate findings into Plan development and ongoing improvement in implementation.

# 1 Review background

## 1.1 Water sharing plans and the Commission's role

Water sharing plans are statutory instruments under the *NSW Water Management Act 2000*. They prescribe how water is managed to support sustainable environmental, social, cultural and economic outcomes. They are intended to provide certainty for water users over the life of the water sharing plan, which is typically 10 years unless it is extended.

The *Water Sharing Plan for the Coffs Harbour Area Unregulated and Alluvial Water Sources 2009* commenced on 1 August 2009 and is due to expire on 1 July 2020. The Commission has a role under Section 43A of the Act to review water sharing plans within five years of expiry and report to the Minister on:

- the extent that the Plan's water sharing provisions have materially contributed to the achievement of, or the failure to achieve, environmental, social and economic outcomes
- if changes to Plan provisions are warranted.

The Commission can recommend extending or replacing the Plan depending on its review findings.

In its review the Commission must consider the water management principles,<sup>1</sup> including the water sharing principles. The Act is clear that water sharing is not about balancing uses and values; it is about firstly providing for the environment and secondly recognising basic landholder rights above other uses. It specifies that:

- a) sharing of water from a water source must protect the water source and its dependent ecosystems, and
- b) sharing of water from a water source must protect basic landholder rights, and
- c) sharing or extraction of water under any other right must not prejudice the principles set out in paragraphs (a) and (b).<sup>2</sup>

Further, Section 9(1)(b) of the Act emphasises that the water management principles should be prioritised in the order that they are set out in Section 5(3) of the Act. Water sharing plans must be based on evidence to achieve these outcomes.

## 1.2 The Commission's review

This review was informed by a range of evidence, including:

- **targeted stakeholder consultation** – with government agencies, community and industry organisations
- **consultation with Aboriginal stakeholders** – the Commission provided the opportunity for input from relevant Local Aboriginal Land Councils and government agencies
- **Document review** – the Commission reviewed the Plan and its background document and obtained both publicly available information and unpublished reports from water

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<sup>1</sup> *Water Management Act 2000*, Section 5.

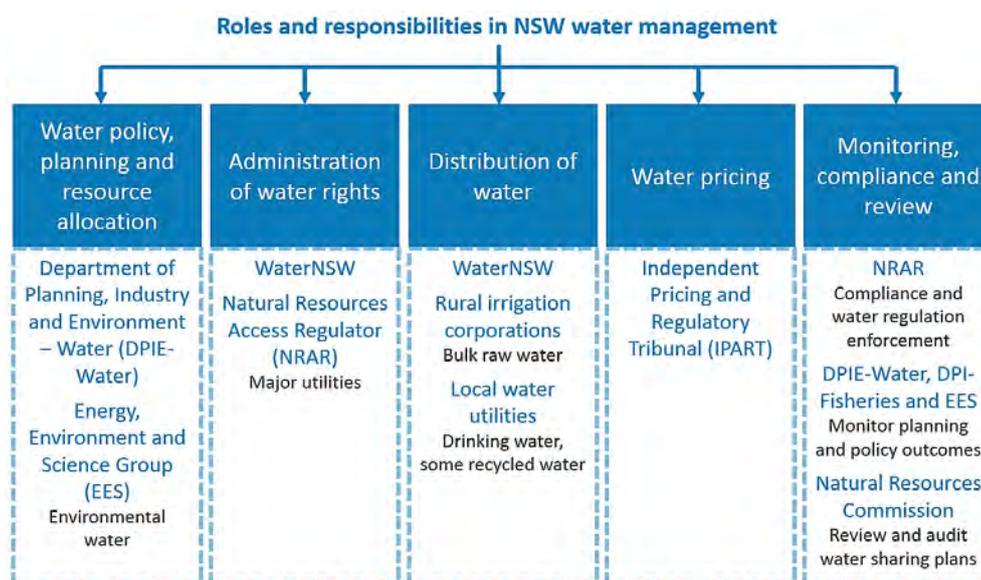
<sup>2</sup> *Water Management Act 2000*, Section 5(3).

management agencies including the Department of Planning, Infrastructure and Environment – Water (DPIE-Water). In line with requirements, the Commission considered other relevant state-wide and regional government policies or agreements for the Plan area.

- **technical advice** – consultants provided expert analysis on Plan provisions and opportunities for improvement
- **Submissions** – the Commission called for public submissions on the Plan via letters and emails to key stakeholders,<sup>3</sup> advertising in local newspapers (The Land, Bellingen Courier Sun and Coffs Harbour Advocate), Local Land Services communication channels and on the Commission’s website. Stakeholders were asked to respond to the following questions to assess the Plan’s contribution to environmental, social, cultural and economic outcomes:
  - To what extent do you feel the plan has contributed to environmental outcomes?
  - To what extent do you feel the plan has contributed to social outcomes?
  - To what extent do you feel the plan has contributed to economic outcomes?
  - To what extent do you feel the plan has contributed to meeting its objectives?
  - What changes do you feel are needed to the water sharing plan to improve outcomes?

Ten submissions were received with non-confidential submissions published on the Commission’s website.

The Commission would like to thank DPIE-Water and other water management agencies for their assistance and cooperation in providing evidence and input to this report. For reference, the roles of the various NSW water management agencies are summarised in **Figure 1**.



**Figure 1: Roles and responsibilities in rural and regional water management<sup>4</sup>**

<sup>3</sup> Including DPIE-Water and WaterNSW.

<sup>4</sup> Revised from DoI-Water (2019) *NSW Regional Water Statement*. Available at: [https://www.industry.nsw.gov.au/\\_\\_data/assets/pdf\\_file/0019/218404/NSW-Regional-Water-Statement.pdf](https://www.industry.nsw.gov.au/__data/assets/pdf_file/0019/218404/NSW-Regional-Water-Statement.pdf).

The Commission evaluated the Plan’s performance against its stated objectives and performance indicators, which were linked to each of the broader outcome categories required under the review (environmental, social, cultural and economic outcomes). The Plan was based on limited evidence, there is no flow gauging and no historic requirement for metering in the area. Limited monitoring has been undertaken to measure the outcomes achieved against each stated objective, making it difficult to determine plan performance. This report presents the Commission’s findings using the best available evidence.

**Table 3** summarises the Plan objectives, indicators and their relevant outcome category. To allow for robust assessment, a MER framework should be developed. This is discussed in **Chapter 7**.

**Table 3: Plan objectives and indicators, and the primary outcome as assessed by the Commission**

Plan objective	Plan performance indicator	Primary outcome
<i>Plan vision: To provide healthy and enhanced water dependant ecosystems and equitable water sharing among users in these water sources</i>		
10(a) protect, preserve, maintain or enhance the important river flow dependent ecosystems of these water sources	12(a) change in low flow regime 12(b) change in moderate to high flow regime 12(e) change in, or maintenance of, ecological value of key water sources and their dependent ecosystems	Environment
10(b) protect, preserve, maintain or enhance the Aboriginal, cultural and heritage values of these water sources	12(j) extent of recognition of spiritual, social and customary values of water to Aboriginal people	Social
10(c) protect basic landholder rights	12(f) extent to which basic landholder rights requirements have been met 12(h) change in the extent to which native title rights requirements have been met	Social
10(d) manage these water sources to ensure equitable sharing between users	12(d) change in local water utilities access 12(g) extent to which local water utility requirements have been met	All
10(e) provide opportunities for market based trading of access licences and water allocations within sustainability and system constraints	12(i) change in economic benefits derived from water extraction and use	Economic
10(f) provide sufficient flexibility in water account management to encourage responsible use of available water		Economic
10(g) contribute to the maintenance of water quality		All
10(h) provide recognition of the connectivity between surface water and groundwater	12(c) change in groundwater extraction relative to the long-term average annual extraction limit	Environment
10(i) adaptively manage these water sources		All

## 2 Plan context

This chapter provides an overview of the relevant environmental, social and economic background in relation to the Plan area. Key points are:

- The Plan area includes 13 small coastal water sources, including over 20 discrete, individual coastal catchments.
- The Commission has calculated the known allowable extraction volume as about 3,990 megalitres (ML) per year. The allowable extraction in individual water sources is estimated to range from less than one percent to 11 percent of average annual flow, based on estimates used in Plan development and provided by DPIE-Water.
- Water in the Plan area is largely used for irrigated horticulture and basic landholder rights. There has been a significant shift in agricultural production over the Plan period, from largely dryland banana production to intensive irrigated horticulture. This has seen a corresponding change in water use which has increased extraction pressure and risks to the Plan outcomes.
- The Plan's water sources are not used for town water supply and the Commission understands that this is unlikely to change. Town water in the Plan area is drawn from the Orara and Nymboida rivers under the *Water Sharing Plan for the Clarence River Unregulated and Alluvial Water Sources 2016*.
- The Plan area has a subtropical climate with high average annual rainfall with seasonal variation including drier winters and lower stream flows. It is currently in drought and has had a serious rainfall deficiency since December 2017. Climate change projections indicate there will be seasonal changes in rainfall and the number of very hot days is likely to increase. Since the Commission began this review, the broader region has experienced the most severe bushfires on record over the 2019-20 spring and summer period, followed by heavy rainfall and flash flooding along the coast in early February.
- Much of the Plan area is dominated by national park, nature reserves and state forests, and includes high environmental value areas and threatened species. The estuarine portion of the water sources is part of the and downstream environment intersect with the southern half of the Solitary Islands Marine Park and is classified as its sanctuary or and habitat protection zones.
- The Plan area's major town is Coffs Harbour, with other significant suburbs including Woolgoolga, Urunga and Sawtell. The population is estimated to be around 75,500 and increased by about 20 percent since 2009. Current projections indicate further growth.
- The Plan area includes the traditional lands of the Gumbaynggirr people, to whom the water resources of the area are very important. Several significant cultural sites are in and around the Plan area, including in identified waterways.
- Health, real estate and construction are the key industries in the Plan area. The area's amenity, land and water assets underpin significant tourism, agriculture and fisheries industries. Tourism visitation has remained relatively flat since 2011, while emerging agricultural industries are seen by some stakeholders to be increasingly important to the local economy.

## 2.1 The Plan and its water sources

**Figure 2** (on following page) shows the Plan area, which is located on the mid-north coast and extends from north of Red Rock to above Repton in the south. The Plan area includes 13 small coastal water sources, which are managed under ten extraction management units (**Table 4**). While the water sources are described by their major waterway, each includes multiple disconnected creeks and rivers. The Coffs Harbour coastal plain has no major rivers but numerous small creek systems that end in estuaries and lagoons along the region's beaches. Flow in the creek systems is poorly gauged, with gauges for estuarine water level only.<sup>5</sup> DPIE-Water has estimated average annual flow from all Plan river systems to be about 155,000 ML based on standardised flow duration curves and data from discontinued stream gauges in Woolgoolga Creek and Upper Corindi.

The Plan covers all surface waters in the water source boundaries, as well as alluvial groundwater upstream of the tidal limit. It does not include groundwater in coastal sands or any fractured or porous rocks.<sup>6</sup> The Plan does not extend below the mangrove limit,<sup>7</sup> except for the Arrawarra Creek, Double Crossing Creek, Korora Basin, Station Creek and Woolgoolga Creek water sources where the extent is to the mouth of the river.<sup>8</sup>

**Table 4: Water extraction management units, sources, estimated annual flow and their extents**

Extraction management unit	Water source	Area (ha)	Extent
Station Creek	Station Creek	2,220	Rivers and alluvial groundwater areas downstream to the river mouth, excluding all alluvial groundwater downstream of the tidal limits and water in fractured or porous rock aquifers
Arrawarra Creek	Arrawarra Creek	2,030	
Woolgoolga Creek	Woolgoolga Creek	3,110	
Double Crossing Creek	Double Crossing Creek	1,220	
Korora Basin	Korora Basin	1,480	
Corindi River	Corindi River	9,190	
	Dirty Creek	2,070	
	Red Bank River	4,090	
Moonee Creek	Moonee Creek	4,500	
Coffs Creek	Coffs Creek	2,660	
Boambee Creek	Boambee Creek <sup>9</sup>	5,120	
Bonville Creek	Bonville Creek	5,380	
	Pine-Bundagaree Creek	7,710	

<sup>5</sup> Coffs Harbour City Council, Office of Environment and Heritage (OEH) and University of New England Aquatic Ecology and Restoration Research Group (2016) *EcoHealth: Coffs Coastal Catchments Report Card 2016*. Part 1, Section 4, Clause 3 (a-c) of the Plan.

<sup>6</sup> Part 1, Section 4, Clause 3 (a-c) of the Plan.

<sup>7</sup> Mangrove limit is defined as the mangrove that was growing furthest upstream in each river and creek, as in Department of Natural Resources (2006) *Survey of tidal limits and mangrove limits in NSW estuaries 1996 to 2005*. Part 1, Section 4, Clause 4 (a-d) of the Plan.

<sup>8</sup> Part 1, Section 4, Clause 4 (a-d) of the Plan.

<sup>9</sup> Boambee Creek Water Source is subdivided into Cordwells Creek and Boambee Creek management zones.



Figure 2: Coffs Harbour area showing the Plan area, water source boundaries and main waterways

## 2.2 Land and water use

Land use in seven of the ten extraction management units is dominated by national park, nature reserves and state forests.<sup>10</sup> Horticulture is the primary land use in Double Crossing Creek and Korora Basin extraction management units. Urban areas are located on the coastal plain, with Coffs Creek the only extraction management unit dominated by urban land-use. The Plan does not include water sources used for town water supply and the Commission understands that this is unlikely to change. Town water in the Plan area is drawn from the Orara and Nymboida rivers under the *Water Sharing Plan for the Clarence River Unregulated and Alluvial Water Sources 2016*.<sup>11</sup>

Water in the Plan area is largely used for irrigated horticultural agriculture and basic landholder rights. **Table 5** shows the total annual entitlement volume as listed in the Plan. The volume of harvestable rights was not specified in the Plan but is anticipated to have increased, as discussed in **Section 4.2**. The known allowable extraction volume is about 3,990 ML per year, which represents an average of three percent of flows across the Plan area, but this is highly variable between water sources.<sup>12</sup>

**Table 5: Total annual entitlement volume as per the Plan<sup>13</sup>**

Category	Entitlement volume <sup>14</sup>
<b>Basic landholder rights</b>	
Native title rights	0 ML per year
Domestic and stock rights	1,299 ML per year
Harvestable rights	No estimate provided <sup>15</sup>
<b>Licensed entitlement</b>	
Domestic and stock access licences	59 ML per year
Local water utility access licences	10 ML per year
Unregulated river access licences	2,473 unit shares
Unregulated river (high flow) access licences	0 unit shares

<sup>10</sup> Station Creek, Dirty Creek, Arrawarra Creek, Moonee Creek, Pine-Bundagaree Creek, Woolgoolga Creek, Bonville Creek and Boambee Creek.

<sup>11</sup> This is except for a 10 ML per year water utility access licence in the Woolgoolga Creek Water Source.

<sup>12</sup> From information in Part 7 of the Plan and Department of Water and Energy (2009) *Water Sharing Plan – Coffs Harbour unregulated and alluvial Water Sources – Background document*. Available at: [https://www.industry.nsw.gov.au/\\_\\_data/assets/pdf\\_file/0010/166843/coffs-harbour-background.pdf](https://www.industry.nsw.gov.au/__data/assets/pdf_file/0010/166843/coffs-harbour-background.pdf).

<sup>13</sup> As listed in Part 5, Sections 21–24 and Part 7, Sections 26–31 of the Plan.

<sup>14</sup> Extraction limits per unit share vary according to the Available Water Determination. The Commission calculated the share entitlement based on Plan history of a 100 percent allocation per unit share.

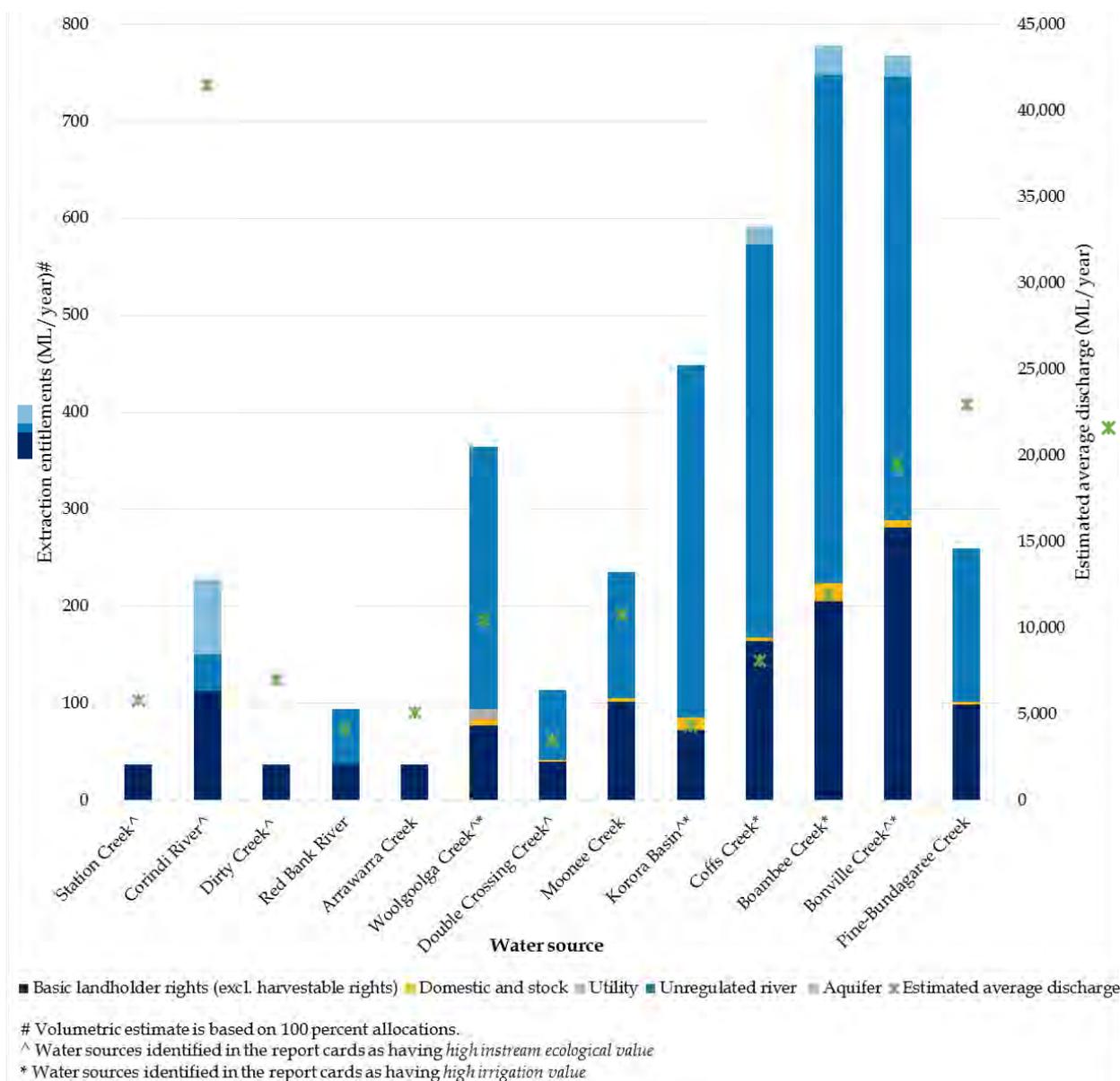
<sup>15</sup> Harvestable rights refer to landholders' capture 10 percent of average regional rainwater runoff on their land, with certain limitations (NSW Government (2006) *NSW Government Gazette 40 – 31 March 2006*, pp. 1,628–1,631. Available at: [https://gazette.legislation.nsw.gov.au/so/download.w3p?id=Gaz\\_Gazette%20Split%202006\\_2006-40.pdf](https://gazette.legislation.nsw.gov.au/so/download.w3p?id=Gaz_Gazette%20Split%202006_2006-40.pdf)).

Category	Entitlement volume <sup>14</sup>
Aquifer access licences	149 unit shares
<b>Total Plan extraction</b>	<b>3,990 ML per year</b>

**Figure 3** shows the extraction entitlement for each water source (excluding harvestable rights). Consistent with the Act and Plan objectives, the Plan gives priority of access (after the environment) for basic landholder rights.<sup>16</sup> Basic landholder rights use is not monitored and may have increased due to subdivisions.<sup>17</sup> As such, the total volume of water both allowed for, and used, under basic landholder rights is unknown. Additional take from farm dams, including under harvestable rights, is discussed in detail in **Section 4.2**.

<sup>16</sup> Basic landholder rights do not require a licence: *domestic and stock rights* - owners or occupiers of land over an aquifer or with river, estuary or lake frontage can take water without a licence for household use or to water stock; *native title rights* - anyone holding native title with respect to water can take and use water for a range of personal, domestic and non-commercial purpose; and *harvestable rights* - allows landholders to collect 10 percent of the average regional rainfall runoff on their property and store it in one or more farm dams up to a certain size.

<sup>17</sup> Department of Primary Industries – Water (2009) *Water Sharing Plan for the Coffs Harbour Area Unregulated and Alluvial Water Sources 2009 – Background document*. Available at: [https://www.industry.nsw.gov.au/\\_\\_data/assets/pdf\\_file/0010/166843/coffs-harbour-background.pdf](https://www.industry.nsw.gov.au/__data/assets/pdf_file/0010/166843/coffs-harbour-background.pdf).



**Figure 3: Water sources and the estimated share components of access licences as defined by the Plan, with estimated average annual discharge for each water source<sup>18</sup>**

Agricultural production has changed significantly over the Plan period, with a corresponding change in water use.<sup>19</sup> When the Plan was developed, agriculture in the area was largely dryland production of Cavendish bananas, with intensively irrigated horticulture a developing

<sup>18</sup> Basic landholder rights (excluding harvestable rights) and access licence shares as per Part 7 of the Plan, estimated average annual recharge as provided by DPIE-Water.

<sup>19</sup> Coffs Harbour City Council (2019) *Assessment of Drinking Water Tanks in Close Proximity to Intensive Plant Agriculture in the Coffs Harbour Local Government Area 2017-2019*. Available at: <https://www.coffsharbour.nsw.gov.au/environment/Compliance-and-Reporting/Documents/Final%20report%20Private%20Drinking%20Water%20Study%202019.pdf>; and Department of Primary Industries – Water (2009) *Water Sharing Plan for the Coffs Harbour Area Unregulated and Alluvial Water Source 2009 – Background document*. Available at: [https://www.industry.nsw.gov.au/\\_\\_data/assets/pdf\\_file/0010/166843/coffs-harbour-background.pdf](https://www.industry.nsw.gov.au/__data/assets/pdf_file/0010/166843/coffs-harbour-background.pdf).

industry. Since 2011 there has been a sharp shift from banana production to intensive irrigated horticulture, largely blueberries but also cucumbers and raspberries.<sup>20</sup>

The number of blueberry farms in the broader Coffs Harbour local government area has increased from 29 farms in 2006 to about 130 in 2016, with Coffs Harbour producing about 80 percent of Australia's blueberries.<sup>21</sup> The industry in the Coffs Harbour local government area is estimated to employ about 6,000 to 7,000 casual and 2,000 permanent employees.<sup>22</sup> Cucumbers are generally grown as a secondary, minor crop to generate an alternate income source alongside blueberries or bananas.<sup>23</sup> Avocados and custard apples are also grown as secondary crops and are produced with both dryland and irrigated methods.<sup>24</sup>

Blueberries are grown in drip or sub-surface irrigated raised beds. Most irrigation water is sourced from spring fed or rain fed dams, pumped from creeks and bores or a combination thereof.<sup>25</sup> The fruit set stage of production (July to December) is the peak water use period for blueberries, corresponding to the relatively low average rainfall months of July to October (which receive below 100 mm per month on average). Farm dam supplies have been almost exhausted in particularly dry seasons.<sup>26</sup> River extraction is also likely to be under pressure, as when land use was predominantly banana production, peak extraction already exceeded available flows in November in nine water sources.<sup>27</sup> For the wider North Coast, the availability of water licenses and the physical availability of water has been identified as a limiting factor for expanding industries such as blueberries.<sup>28</sup>

## 2.3 Climate

Coffs Harbour has a humid, subtropical climate with warm to hot summers and mild winters. The region has a high average annual rainfall (1,576 millimetres), although July through to September have much lower rainfall and dry periods are not uncommon, particularly over winter.<sup>29</sup>

The Plan's western boundary is the Great Dividing Range. The coastal escarpment strongly influences rainfall, with high intensity storms over the coastal plain flooding creeks and the

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<sup>20</sup> Arup (2019) *Coffs Harbour Bypass Environmental Impact Statement: Appendix K Socio-economic and agriculture assessment*. Available at: <https://www.planningportal.nsw.gov.au/major-projects/project/10461>; and White, S.A., Santos, I. R., Conrad, S.R. and Sanders C.J. (2018) *Investigating water quality in Coffs coastal estuaries and the relationship to adjacent land use. Part 2: Water Quality*, National Marine Science Centre, Southern Cross University, Coffs Harbour, NSW.

<sup>21</sup> Coffs Harbour City Council (2017) *Local growth management strategy – Rural lands issues and options*.

<sup>22</sup> *Ibid.*

<sup>23</sup> Arup (2019) *Coffs Harbour Bypass Environmental Impact Statement: Appendix K Socio-economic and agriculture assessment*. Available at: <https://www.planningportal.nsw.gov.au/major-projects/project/10461>.

<sup>24</sup> *Ibid.*

<sup>25</sup> *Ibid.*

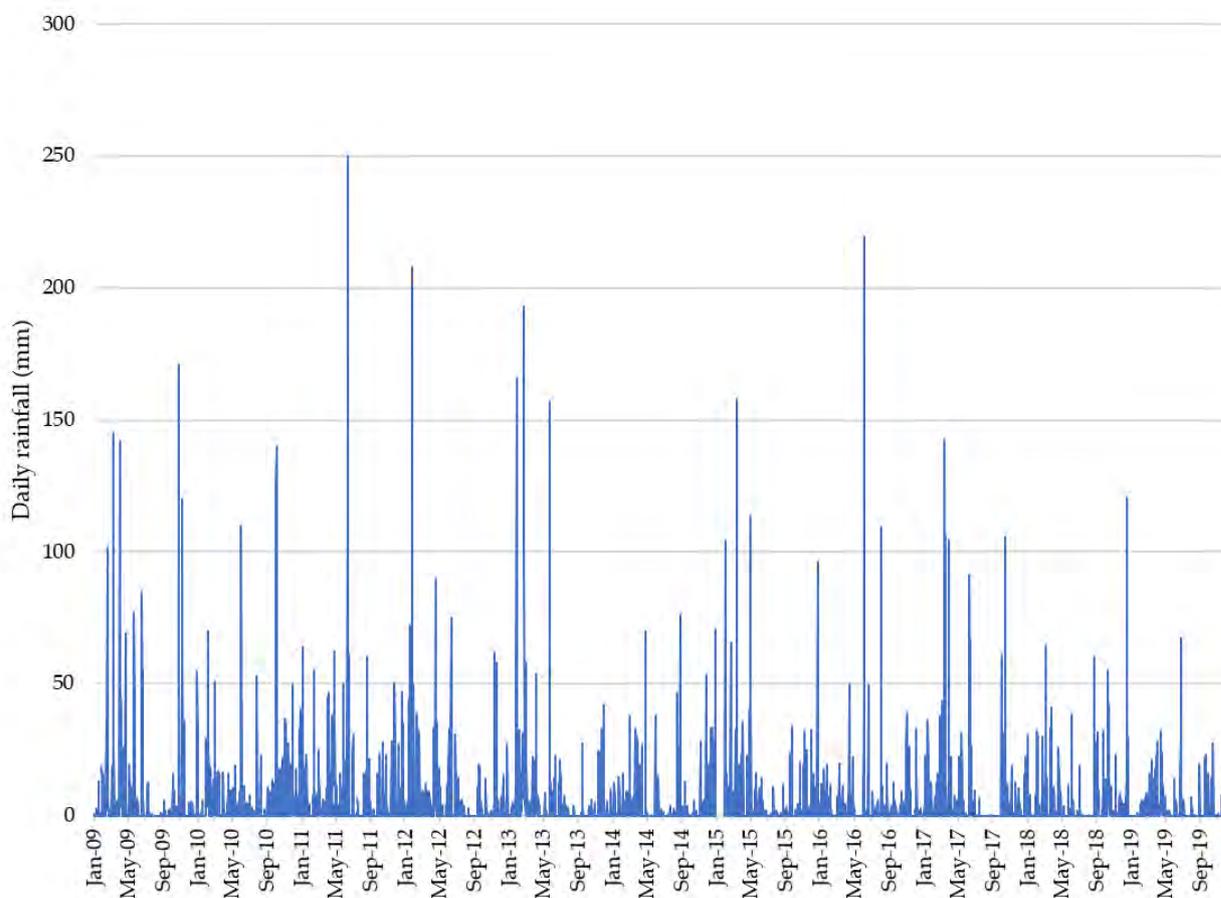
<sup>26</sup> Kaime, G. and Giddings, J. (2016) *Erosion control, irrigation and fertiliser management and blueberry production: Expert interviews*, Prepared for Department of Primary Industries.

<sup>27</sup> Department of Water and Energy (2009) *Commenced Water Sharing Plan for the Coffs Harbour Area unregulated and alluvial water sources – report cards*. Available at: <https://www.industry.nsw.gov.au/water>.

<sup>28</sup> EcoLogical Australia (2015) *Characterisation of the Socio-Economic Landscape of the North Coast Region of NSW*, prepared for North Coast Local Land Services. Available at: [https://northcoast.lls.nsw.gov.au/\\_\\_data/assets/pdf\\_file/0012/564789/characterisation-of-the-socio-economic-landscape-of-the-north-coast-region-of-nsw.pdf](https://northcoast.lls.nsw.gov.au/__data/assets/pdf_file/0012/564789/characterisation-of-the-socio-economic-landscape-of-the-north-coast-region-of-nsw.pdf).

<sup>29</sup> Combining rainfall data from Woolgoolga (Clear Place) from 1 January 2009 to 31 December 2016 and Coffs Harbour Airport from 1 January 2017 to 8 December 2019. Bureau of Meteorology (2019) *Monthly rainfall: Woolgoolga (Clear Place)*; and *Monthly rainfall Coffs Harbour Airport 59151*. Available at: <http://www.bom.gov.au/climate/data/index.shtml>.

coastal plain (see **Figure 4**). The short, relatively steep catchments and rivers have led water users to rely primarily on rainfall harvesting dams and groundwater rather than extraction directly from rivers (see **Section 4.2**).



**Figure 4: Daily rainfall for the Plan area showing the intense rainfall events as peaks in the graph<sup>30</sup>**

The Plan area, like most of NSW, is in drought. While the Plan area is not experiencing drought conditions as extreme as other areas of NSW, it has experienced a serious deficiency (rainfall in the lowest 5-10 percent of historic totals) in the two years from December 2017 to December 2019 (**Figure 5**).<sup>31</sup> NSW - including the region surrounding the Plan area - has experienced the most severe bushfires on record over the 2019-20 spring and summer period, followed by the coast - including Coffs Harbour - experiencing heavy rainfall and flash flooding in February 2020.

<sup>30</sup> Bureau of Meteorology (2019) *Daily rainfall – Woolgoolga (Clear Place) number 59039*. Available at: [http://www.bom.gov.au/jsp/ncc/cdio/weatherData/av?p\\_nccObsCode=136&p\\_display\\_type=dailyDataFile&p\\_startYear=2017&p\\_c=-697320204&p\\_stn\\_num=059039](http://www.bom.gov.au/jsp/ncc/cdio/weatherData/av?p_nccObsCode=136&p_display_type=dailyDataFile&p_startYear=2017&p_c=-697320204&p_stn_num=059039).

<sup>31</sup> Bureau of Meteorology (2019) *Thirty-six monthly rainfall deficiency for New South Wales/ACT*. Available at: <http://www.bom.gov.au/jsp/awap/rain/index.jsp?colour=colour&time=latest&step=0&map=drought&period=36month&area=ns>; and *Twenty-four monthly rainfall deficiency for New South Wales/ACT*. Available at: <http://www.bom.gov.au/jsp/awap/rain/index.jsp?colour=colour&time=latest&step=0&map=drought&period=24month&area=ns>.

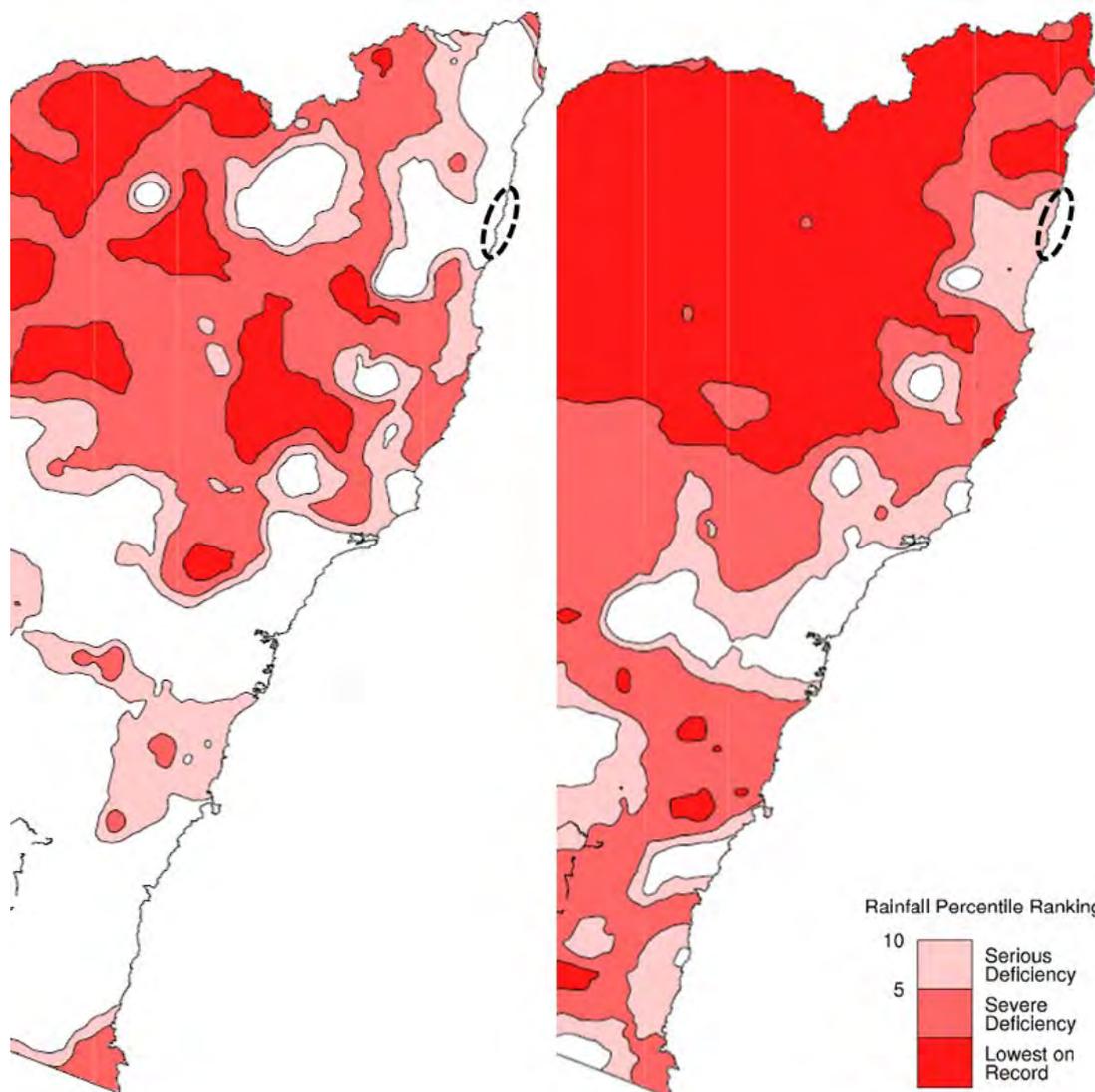


Figure 5: Rainfall deficiency maps for 1 December 2015 to 30 November 2019 (left) and 1 December 2017 to 30 November 2019 (right), with the approximate Plan area circled<sup>32</sup>

Climate change creates uncertainty for the region. NSW projections for the north coast region indicate little change in annual rainfall in 2030, with natural variability continuing to be the main driver.<sup>33</sup> However, seasonal changes are predicted. The greatest rainfall decreases are predicted in the Plan area in winter (from five up to 20 percent decrease in the south around Bonville Creek extraction management unit) with a slight decrease (0-5 percent) predicted in summer in 2020-39 compared to 1990-2009.<sup>34</sup> Autumn and spring are predicted to have slight increases in mean precipitation in 2020-39 compared to 1990-2009 (5-10 percent increase in autumn and spring).<sup>35</sup>

<sup>32</sup> *Ibid.*

<sup>33</sup> NSW Government (2014) *NSW Climate projections map for 2020-2039*. Available at: <https://climatechange.environment.nsw.gov.au/>.

<sup>34</sup> *Ibid* and OEH (n.d.) *North Coast: change in mean precipitation for summer (%) to 2020-2039*. Available at: <https://climatechange.environment.nsw.gov.au/Climate-projections-for-NSW/Climate-projections-for-your-region/North-Coast-Climate-Change-Downloads>.

<sup>35</sup> OEH (n.d.) *North Coast: change in mean precipitation for spring (%) to 2020-2039*; and OEH (n.d.), *North Coast: change in mean precipitation for autumn (%) to 2020-2039*. Available at

Summer and winter surface water runoff in the North Coast region is projected to decrease slightly by 2039 (0-20 millimetres), while spring runoff may increase slightly (0-20 millimetres).<sup>36</sup> A decrease in rainfall results in a greater percentage reduction in runoff, this may significantly impact stream flows in winter and summer months. Further, the lower rainfall and drier periods in winter may have a proportionally greater impact on flows.

The North Coast projections also indicate that mean temperatures will increase by 0.7 degrees Celsius by 2030, with temperatures increasing across all seasons. Temperature increase projections are large compared to the natural temperature variability.<sup>37</sup> There are projected to be an average of three additional hot days over 30 degrees Celsius a year by 2030.<sup>38</sup> Evapotranspiration rates are also projected to increase, with the associated potential for increased plant stress and higher irrigation requirements.<sup>39</sup>

## 2.4 Environmental context

The Coffs Harbour region is recognised for its high biodiversity and natural beauty. The Plan area includes steep hillsides that are generally forested and floodplains and coastal areas that have largely been cleared for urban, horticultural and other uses. Vegetation cover includes rainforests, moist eucalypt forests, coastal heaths, estuarine wetlands and headland rock platforms.<sup>40</sup>

The Plan's background document identified high instream ecological values in seven of the 13 water sources. All water sources with high instream ecological values contain threatened species. Other factors included in the instream ecological value assessment include recreation value, significant area in national parks, stream condition and diversity.<sup>41</sup>

The high biodiversity in the Plan area is reflected in its large area of conservation and other forested areas, including national parks, private conservation areas and state forest (**Figure 6**). The Plan area intersects eight national parks and nature reserves. The largest is Bongil Bongil National Park, which protects over 42 square kilometres, including coastal wetlands, creeks and estuaries and native plant and animal species. The park has 47 threatened or otherwise significant animal species and provides habitat for 14 migratory birds listed under the *Environment Protection and Biodiversity Conservation Act 1999*. It also includes threatened

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<https://climatechange.environment.nsw.gov.au/Climate-projections-for-NSW/Climate-projections-for-your-region/North-Coast-Climate-Change-Downloads>.

<sup>36</sup> OEH (2015) *Hydrology: Climate change impact snapshot*. Available at:

<https://climatechange.environment.nsw.gov.au/-/media/NARCLim/Files/Climate-Change-Impact-Reports/Hydrology-Climate-Change-Impact-Snapshot.pdf>.

<sup>37</sup> OEH (2014) *North Coast climate change snapshot*. Available at: <https://climatechange.environment.nsw.gov.au/Climate-projections-for-NSW/Climate-projections-for-your-region/North-Coast-Climate-Change-Downloads>.

<sup>38</sup> NSW Government (n.d.) *NSW Climate projections map for 2020-2039*. Available at: <https://climatechange.environment.nsw.gov.au/Climate%20projections%20for%20NSW/Interactive%20map?climate=temperature&region=mylocalarea&selectedRegion=1&stateLocation=Coffs+Harbour&time-period=202039&fromHomepage=true>.

<sup>39</sup> CSIRO (2016) *Australian changing climate*. Available at: [https://www.climatechangeinaustralia.gov.au/media/ccia/2.1.6/cms\\_page\\_media/176/AUSTRALIAS\\_CHANGING\\_CLIMATE\\_1.pdf](https://www.climatechangeinaustralia.gov.au/media/ccia/2.1.6/cms_page_media/176/AUSTRALIAS_CHANGING_CLIMATE_1.pdf).

<sup>40</sup> Department of Water and Energy (2009) *Water Sharing Plan – Coffs Harbour Area Unregulated and Alluvial Water Sources – Background document*. Available at:

[https://www.industry.nsw.gov.au/\\_\\_data/assets/pdf\\_file/0010/166843/coffs-harbour-background.pdf](https://www.industry.nsw.gov.au/__data/assets/pdf_file/0010/166843/coffs-harbour-background.pdf).

<sup>41</sup> *Ibid.*

ecological communities such as littoral rainforest and swamp sclerophyll forest on coastal floodplains.<sup>42</sup>

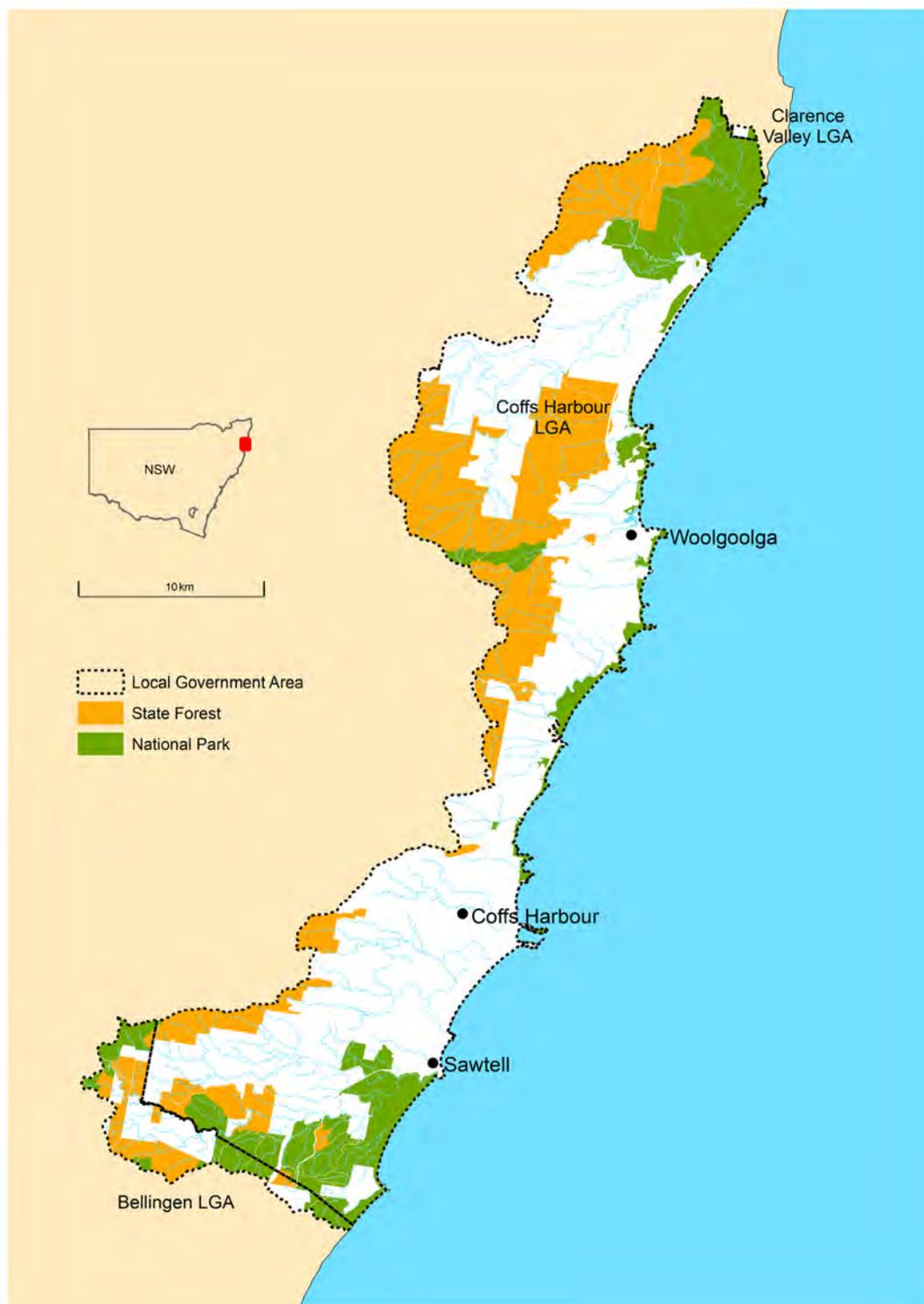


Figure 6: National parks and state forests in the Plan area

<sup>42</sup> National Parks and Wildlife Service (2017) *Bongil Bongil National Park Draft Plan of Management*. Available at: <https://www.environment.nsw.gov.au/research-and-publications/publications-search/bongil-bongil-national-park-draft-plan-of-management>.

Most of the Plan's water sources provide habitat for threatened fish species, including the Oxleyan Pygmy Perch,<sup>43</sup> and the Purple Spotted Gudgeon.<sup>44</sup> Other threatened water-dependent flora and fauna in the Plan area include birds,<sup>45</sup> numerous frog species,<sup>46</sup> coastal wetland and littoral rainforest area protected under the *Coastal Management Act 2016*, and plants such as the square-stemmed spike rush, and swamp and ravine orchids.<sup>47</sup> The area includes migratory birds covered by bilateral migratory bird agreements with Japan (JAMBA) and China (CAMBA) and the Double Crossing Creek Water Source that drains into Hearn Lake, which hosts one of NSW's significant breeding sites for the threatened south-eastern Australian population of the Little Tern.<sup>48</sup>

A rivers' flow regime shapes its ecology and is the key variable for sustaining biodiversity and ecological integrity.<sup>49</sup> Altered flow regimes also impact downstream environments by impacting river ecology and geomorphology.

The extent of downstream areas covered by the Plan varies according to the water source (see **Table 4** in **Section 2.1**). The Plan area discharges to at least 19 estuaries, including nine intermittently closed and open lakes and lagoons (ICOLLS).<sup>50</sup> While some ICOLLS are outside the Plan boundary, whether they are open or closed impacted by river discharge along with the coastal environment (including sediment, wave energy and tides).<sup>51</sup> This review therefore considers the effect of the Plan on all downstream ICOLLS.

The Plan includes all waterways that flow to the southern half of the Solitary Islands Marine Park. The Plan extends to the river mouth for the waterways in Arrawarra Creek, Double Crossing Creek, Korora Basin, Station Creek and Woolgoolga Creek water sources.<sup>52</sup> These water sources include are within habitat protection or sanctuary zones<sup>53</sup> within the Solitary Islands Marine Park.<sup>54</sup> The southern region of the Solitary Islands Marine Park along the Plan

<sup>43</sup> Known or expected to be found in the Corindi River, Red Bank River and Station Creek, as advised by Department of Primary Industries – Fisheries, December 2018.

<sup>44</sup> Known or expected to be found in Coffs Harbour Creek, Corindi River, Dirty Creek, Moonee Creek, Red Bank River, Station Creek, Woolgoolga Creek, Bonville Creek and Pine Bundagaree Creek, as advised by Department of Primary Industries – Fisheries, December 2018.

<sup>45</sup> Australasian Bittern, Beach Stone-curlew, Black Bittern, Black-necked Stork, Blue-billed Duck, Brolga, Collared Kingfisher, Comb-crested Jacana, Freckled Duck, Great Knot, Great Sand Plover, Lesser Sand Plover, Osprey, Painted Snipe, Sanderling and Terek Sandpiper.

<sup>46</sup> Booroolong Frog, Giant Barred Frog, Green and Golden Bell Frog, Green-thighed Frog, Olongburra Frog, Pouched Frog, Stuttering Frog and Wallum Froglet.

<sup>47</sup> Department of Water and Energy (2009) *Water Sharing Plan – Coffs Harbour unregulated and alluvial Water Sources – Background document*. Available at:

[https://www.industry.nsw.gov.au/\\_\\_data/assets/pdf\\_file/0010/166843/coffs-harbour-background.pdf](https://www.industry.nsw.gov.au/__data/assets/pdf_file/0010/166843/coffs-harbour-background.pdf).

<sup>48</sup> GeoLink (2011) *Estuary Management Study – Willis Creek*. Available at: [www.coffsharbour.nsw.gov.au/environment/our-coast/Documents/1616049%20Willis%20Creek%20EMS%20-%20Final%20Report.pdf](http://www.coffsharbour.nsw.gov.au/environment/our-coast/Documents/1616049%20Willis%20Creek%20EMS%20-%20Final%20Report.pdf).

<sup>49</sup> Poff, N.L and Zimmerman J.K.H (2010), *Ecological responses to altered flow regimes: a literature review to inform the science and management of environmental flows*, *Freshwater Biology*, 55:194-205.

<sup>50</sup> Department of Primary Industries (2006) *Primary Industries in the North Coast Region of NSW - Strategic Review*. Available at: [http://www.dpi.nsw.gov.au/\\_\\_data/assets/pdf\\_file/0003/72984/pi-north-coast.pdf](http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0003/72984/pi-north-coast.pdf).

<sup>51</sup> Haines, P.E., Tomlinson, R.B. and Thom, B.G. (2006) 'Morphometric assessment of intermittently open/closed coastal lagoons in New South Wales, Australia', *Estuarine, Coastal and Shelf Science*, 67, no. 1-2, pp. 321-332.

<sup>52</sup> Part 1, Section 4, Clause 4 (a-d) of the Plan.

<sup>53</sup> Habitat protection zones limit waterway activities including fishing methods, while sanctuary zones further restrict activities (such as not allowing any recreational or commercial fishing) to protect plants, animals and habitats (Parks Australia and Australian Marine Parks (2018) *Solitary Islands Marine Park Guide*. Available at: [https://www.dpi.nsw.gov.au/\\_\\_data/assets/pdf\\_file/0006/656304/simp-user-guide.pdf](https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0006/656304/simp-user-guide.pdf)).

<sup>54</sup> Including Arrawarra Creek, Double Crossing Creek (including Hearn Lake), Korora Basin (including Pine Brush Creek and Jordans Creek), Station Creek and Woolgoolga Creek (including Willis Creek and Darkum Creek) water sources (Clause 4 of the Plan).

area is recognised for its large pelagic fish, turtles and shelled animals, including marine snails and slugs.<sup>55</sup> Species found in the marine park rely on connectivity with the Plan area, such as the threatened Black Rockcod (*Epinephelus daemeli*). The Solitary Islands Marine Park is an important breeding ground for this species, and its larger juveniles live in rocky shores in estuaries.<sup>56</sup> Seventy percent of coastal fish species in south-eastern Australia need to move through estuaries to complete their life cycle.<sup>57</sup> As such, the Commission has assessed potential Plan impacts on estuaries and through to the Solitary Islands Marine Park.

The Solitary Islands Marine Park is the oldest marine park in NSW and one of five marine parks on the NSW mainland.<sup>58</sup> It is an area of tropical and temperate mixing, supporting a unique mix of tropical, sub-tropical and temperate marine communities. The Gumbaynggirr Nation have strong cultural links with the marine park and are involved in its conservation planning.

## 2.5 Social and cultural context

The Coffs Harbour City local government area had an estimated residential population of about 75,500 in 2017.<sup>59</sup> Coffs Harbour is the major town in the Plan area, with several other significant suburbs including Woolgoolga, Urunga and Sawtell. Population in the Coffs Harbour local government area increased by about 20 percent over the life of the Plan and current projections point to further growth.<sup>60</sup> Population increases significantly in holiday seasons, with tourism an important part of the regional economy.

The Plan area is Gumbaynggirr Country. Aboriginal stakeholders advised the Commission that the Gumbaynggirr are a water people to whom the water resources of the area are very important.<sup>61</sup> The areas around Boambee and Bonville Creeks were especially rich sources of food from the forest, streams and beach.<sup>62</sup> Several significant cultural sites are in and around the Plan area, including in identified waterways.<sup>63</sup> The Arrawarra Headland includes stone fish traps that are afforded special protection within the Solitary Islands Marine Park, and associated rock platforms that are still used for special occasions, and fishing remains an

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<sup>55</sup> Department of Primary Industries (DPI)-Fisheries (n.d.) *Solitary Islands Marine Park*. Available at: <https://www.dpi.nsw.gov.au/fishing/marine-protected-areas/marine-parks/solitary-islands-marine-park>.

<sup>56</sup> Department of Primary Industries (2015) *Prime Fact - Black Rockcod - Epinephelus daemeli*. Available at: [https://www.dpi.nsw.gov.au/\\_\\_data/assets/pdf\\_file/0008/635696/black-rockcod.pdf](https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0008/635696/black-rockcod.pdf) and The Coffs Coast Advocate (2010) *SIMP important to black cod*. Available at: <https://www.coffscostadvocate.com.au/news/a-solitary-hide-out/553618/>.

<sup>57</sup> Advice from Department of Primary Industries - Fisheries, received 13 March 2020.

<sup>58</sup> Australian Government - Parks Australia, Australian Marine Parks and NSW Department of Primary Industries - Fisheries (2018) *Solitary Islands Marine Park Guide*. Available at: [https://www.dpi.nsw.gov.au/\\_\\_data/assets/pdf\\_file/0006/656304/simp-user-guide.pdf](https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0006/656304/simp-user-guide.pdf)

<sup>59</sup> .id Demographic Resource Centre (2019), *Coffs Harbour City - About the area*. Available at: <https://economy.id.com.au/coffs-harbour/about>.

<sup>60</sup> Department of Primary Industries - Water (2009) *Water Sharing Plan for the Coffs Harbour Area Unregulated and Alluvial Water Source 2009 - Background document*. Available at:

[https://www.industry.nsw.gov.au/\\_\\_data/assets/pdf\\_file/0010/166843/coffs-harbour-background.pdf](https://www.industry.nsw.gov.au/__data/assets/pdf_file/0010/166843/coffs-harbour-background.pdf); .id Demographic Resource Centre (2019) *Coffs Harbour City - About the area*. Available at:

<https://economy.id.com.au/coffs-harbour/about>; and NSW Planning and Environment (2016) *NSW State and Local Government Area population projections*.

<sup>61</sup> Personal communication, NTSCorp, 2019.

<sup>62</sup> Yeates, N. (1990) *Coffs Harbour, Vol 1: Pre-1880 to 1945*, Bananacoast Printers for Coffs Harbour City Council, Coffs Harbour.

<sup>63</sup> Submission: NTSCorp, received 17 January 2019.

integral part of the Gumbaynggirr way of life.<sup>64</sup> Estuaries and adjoining creeks form travelling routes, with songs attached to the Corindi River.<sup>65</sup> The Coffs Harbour Local Aboriginal Land Council advised that the waterways include women's sites and community camps around the estuary banks. They noted that along with the songlines attached to a river, species and their interactions are important and individual assets cannot be separated; the system must be maintained as a whole.<sup>66</sup>

The local community value the amenity and recreation provided by the water sources, as well as their associated services. Examples of amenity and recreation uses include the use of riverside picnic areas, weekly kayak competitions run by Bonville Creek Kayak Club on Bonville and Pine creeks, birdwatching and a substantial recreational freshwater and estuarine fishing industry. Downstream, the Solitary Islands Marine Park caters for a broad range of recreational and commercial activities including commercial and recreational fishing, swimming, surfing, diving, whale and dolphin watching, education, research, boating and beach activities.<sup>67</sup>

## 2.6 Economic context

The region's largest employer is health care and social assistance (about 6,600 jobs in 2017-18). The industry with the greatest output is rental, hiring and real estate services, followed by construction (\$947 million and \$903 million in 2017-18, respectively).<sup>68</sup> Other important industries in the region are tourism, agriculture and fisheries industries.

The Coffs Harbour City local government areas receives an estimated 1.6 million visitors each year – mostly domestic – who contribute about \$490 million to the region each year.<sup>69</sup> Over half of tourism in the region is nature-based and relies on assets impacted by the Plan, including ICOLLs and the Solitary Islands Marine Park.<sup>70</sup> Destination North Coast and Coffs Harbour City Council have identified nature-based tourism as a priority. Agencies and businesses are working together to increase the value of nature-based tourism and support the values it relies on, including fish habitat, water quality and other natural amenities.<sup>71</sup> DPI-Fisheries advised the Commission that many tourism businesses and events rely directly on estuarine and marine values, including recreational fishing charters and competitions, surf and paddle schools and tours, Aboriginal cultural tours, snorkelling and scuba diving charters, whale and dolphin watching charters, surf lifesaving and fitness racing.<sup>72</sup>

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<sup>64</sup> NSW Marine Parks Authority and Yarrowarra Aboriginal Corporation (2006) *Arrawarra Headland Conservation Plan: Arrawarra Headland and stone fish traps*. Available at: [http://www.arrawarraculture.com.au/images/arrawarra\\_conservation\\_plan.pdf](http://www.arrawarraculture.com.au/images/arrawarra_conservation_plan.pdf).

<sup>65</sup> Personal communication, Coffs Harbour Local Aboriginal Land Council, 2019.

<sup>66</sup> Personal communication, Coffs Harbour Local Aboriginal Land Council, 2019.

<sup>67</sup> Department of Primary Industries (2006) *Primary Industries in the North Coast Region of NSW - Strategic Review - 2006*. Available at: [http://www.dpi.nsw.gov.au/\\_\\_data/assets/pdf\\_file/0003/72984/pi-north-coast.pdf](http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0003/72984/pi-north-coast.pdf).

<sup>68</sup> .id Demographic Resource Centre (2018) *Coffs Harbour City - Employment by industry (total)*, available at <https://economy.id.com.au/coffs-harbour/employment-by-industry>; and .id (2018) *Coffs Harbour City - Output*. Available at: <https://economy.id.com.au/coffs-harbour/output-by-industry>.

<sup>69</sup> Wray, M., Lebski, S., and Fox, B. (2016) *Coffs Coast Tourism Strategic Plan 2020*, prepared for Coffs Harbour City Council. Available at: <http://www.bellingen.nsw.gov.au/sites/bellingen/files/public/images/documents/bellingen/Council/On%202520Exhibition/Draft%20Coffs%20Coast%20Strategic%20Tourism%20Plan%20-%209%20February%202016.pdf>.

<sup>70</sup> Destination North Coast (2018) *North Coast Destination Management Plan 2018 to 2021*. Available at: <https://dncnsw.com/wp-content/uploads/2018/07/DNC-Destination-Management-Plan.pdf>.

<sup>71</sup> *Ibid.*

<sup>72</sup> Advice from Department of Primary Industries - Fisheries, received 13 March 2020.

Tourism visitation has remained relatively flat since 2011 and Coffs Harbour City Council have been working under the *Coffs Coast Tourism Strategic Plan* since 2016 to stimulate the tourism economy.<sup>73</sup> While developing the economic contribution of tourism is a council priority, some community stakeholders are concerned that not enough is being done to support emerging agricultural industries that are becoming increasingly important for local economies, such as intensive horticulture.<sup>74</sup>

Agriculture, forestry and fishing had \$157 million value add<sup>75</sup> (\$352 million in output) in 2017-18<sup>76</sup> and employed about 1,500 equivalent full-time employees.<sup>77</sup> **Table 6** summarises the outputs of the main agricultural commodities and other key natural resource industries in the local government area. In 2015-16, blueberries were the major contributor to output value at almost \$90 million. Coffs Harbour City Council advised there has been recent diversification from blueberries to other intensive horticulture such as cucumbers and raspberries.<sup>78</sup> Other key industries are 'agriculture, forestry and fishing support services', forestry and logging, and fishing. Output values for these industries in 2015-16 were \$66 million, \$18 million and \$11 million, respectively.

There are multiple quarries in the Plan area. While there is a history of gold mining in the region, there are no active mines in the Plan area. There is one mineral access licence held by Fortius Mines' Karangi Project who are in the exploration and development phase.<sup>79</sup>

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<sup>73</sup> Wray, M., Lebski, S., and Fox, B. (2016) *Coffs Coast Tourism Strategic Plan 2020*, prepared for Coffs Harbour City Council. Available at: <http://www.bellingen.nsw.gov.au/sites/bellingen/files/public/images/documents/bellingen/Council/On%2520Exhibition/Draft%20Coffs%20Coast%20Stratgeic%20Tourism%20Plan%20-%209%20February%202016.pdf>.

<sup>74</sup> Coffs Harbour City Council (2017) *Local growth management strategy – Rural lands issues and options*.

<sup>75</sup> Value add by industry is an indicator of business productivity, showing how each industry sector increases the value of its inputs.

<sup>76</sup> .id Demographic Resource Centre (2018) *Coffs Harbour City - Value of agricultural production*. Available at: <https://economy.id.com.au/coffs-harbour/value-of-agriculture>.

<sup>77</sup> .id Demographic Resource Centre (2018) *Coffs Harbour City – Employment by industry (FTE)*. Available at: <https://economy.id.com.au/coffs-harbour/employment-by-industry-fte>.

<sup>78</sup> Personal communication, Coffs Harbour Council, December 2018.

<sup>79</sup> William Buck (2016) *Australia United Mining Ltd: Independent Expert's Report and Financial Services Guide*. Available at: <https://www.asx.com.au/asxpdf/20161101/pdf/43ckk55y2x2qkq.pdf>.

**Table 6: Main agricultural commodities (and other key natural resources industries) in the Coffs Harbour City local government area in 2015-16<sup>80</sup>**

Main commodities and industries	Output value (\$ million)
Blueberries	\$89.8
Agriculture, forestry and fishing support services	\$66.0
Forestry and logging	\$17.8
Fishing, hunting and trapping	\$11.1
Nurseries and cut flowers	\$5.6
Livestock slaughtering	\$4.1
Milk	\$3.4
Bananas	\$2.7
Nuts	\$1.3
Aquaculture	\$1.2
Cucumbers	\$1.0

<sup>80</sup> Note: The Coffs Harbour local government area does not align with the Plan area. The local government area extends further inland than the Plan. Table data from .id Demographic Resource Centre (2018) *Coffs Harbour City - Value of agricultural production*. Available at: <https://economy.id.com.au/coffs-harbour/value-of-agriculture>.

### 3 A replacement Plan is required to address key issues

The Commission's review has identified a range of areas for improvement that justify a replacement Plan. Importantly, there are several environmental risks:

- There is currently limited evidence to assess the Plan's impact on environmental outcomes, but findings from available ecological studies indicate that water sources and their dependent ecosystems are not being maintained. There is also significant stakeholder concern regarding reduced flows, water quality and impacts on estuaries and coastal environments downstream of the Plan (noting that the Plan includes some estuaries).
- Intensive horticulture has changed the water extraction profile of the Plan area. The Plan does not consider risks associated with increased use of farm dams, which capture significant volumes of flow. While there is currently no evidence to indicate that this shift has impacted environmental outcomes (or basic landholder rights), the risks associated with the change in extraction profile are not accounted for in the Plan. Moreover, there appears to be no mechanism to collect data that would reveal whether such impacts occur.
- Rainfall runoff capture into farm dams is unaccounted for in the current metering framework and harvestable rights are excluded from metering requirements. The Commission considers that farm dams and extraction outside Plan regulations are likely to impact the flow regime and pose a high risk to environmental, social and economic outcomes.

Given that the Plan does not adequately manage environmental risks, the Commission recommends replacing the Plan to strengthen rules protecting environmental water and achieve environmental outcomes in accordance with the priority they are afforded under the Act. Replacing the Plan will not resolve all the water management issues in the Plan area, without comprehensively monitoring and regulating all forms of extraction.

The Commission notes DPIE-Water's recent efforts to address issues in NSW water planning and management more broadly, and the significant resource and timing challenges of delivering water sharing plan remakes. The Commission suggests that DPIE-Water request a two-year extension for Coffs Harbour. This will enable dedication of time and resources to develop a satisfactory, evidence-based Plan and achieve desired outcomes.

We further recommend that the Plan is replaced by June 2022, considering the recommendations and suggested actions in this review, and the findings from the previous two years' work.

Table 7: Overall recommendation for DPIE-Water

#### Recommendation

- 1 The Plan should be:
  - a) **extended for two years until June 2022** to complete studies, monitoring and assessment
  - b) **replaced by June 2022** considering the recommendations and suggested actions in this review and the findings from (a), ensuring that the Plan firstly protects the water source and its dependent ecosystems and secondly provides for basic landholder rights above other uses.

## 4 Managing key environmental risks and improving outcomes

Under the Act's water management principles, water sharing must prioritise the protection of water sources, floodplains and their dependent ecosystems and contribute to the general principal of restoring these ecosystems.<sup>81</sup> To protect the water sources and their dependent ecosystems, the Plan:

- establishes a Long-term Average Annual Extraction Limit (LTAAEL) to limit overall extraction volumes<sup>82</sup> and protect planned environmental water<sup>83</sup>
- sets flow rules to protect minimum environmental requirements (preventing extraction if there is no visible flow at the extraction point or if the water is to be extracted from a pool, there is no flow into or out of that pool)<sup>84</sup>
- restricts trade to maintain or reduce entitlement in high instream value water sources.

The Plan does not adequately manage environmental risks. This chapter outlines the current environmental risks and proposed improvements to manage them, including:

- reassessing the environmental water requirements of the Plan area
- strengthening rules to protect environmental values and functions
- incorporating climate change modelling
- investing in complementary measures beyond the Plan to increase resilience.

### 4.1 Limited evidence suggests environmental outcomes are at risk

There has been no targeted monitoring to assess if Plan provisions are achieving environmental outcomes, and studies recommended in the Plan's background documents have not been undertaken to date (see **Chapter 7**). There are also few independent studies available in the Plan area to evaluate environmental outcomes. **Chapter 7** provides more detail on the issues and recommendations related to evidence and MER.

In the absence of adequate data, it is difficult to assess the extent that water extraction has impacted environmental outcomes in the Plan area. However, the limited studies that are available, as well as anecdotal evidence from stakeholder engagement, indicate that environmental outcomes may not be achieved.

A key Plan objective is to 'contribute to the maintenance of water quality'.<sup>85</sup> Ecological studies that are available in the Plan area indicate several issues. NSW Government State of the

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<sup>81</sup> As per the water management principles, Section 5(3a) of the *NSW Water Management Act 2000*.

<sup>82</sup> Granting of additional water access licences will general only be considered for local water utility or town water supply, domestic or Aboriginal cultural purposes.

<sup>83</sup> Section 8(1) of the *Water Management Act 2000* defines planned environmental water as water committed for 'fundamental ecosystem health or other specified environmental purposes, either generally or at specified times or in specified circumstances, and that cannot to the extent committed be taken or used for any other purpose'.

<sup>84</sup> Except for specific circumstances when under 20 kilolitres per day is extracted for fruit washing, cleaning of dairy plant and equipment for hygiene purposes, poultry watering and misting, or cleaning of enclosures used for intensive animal production for hygiene purposes.

<sup>85</sup> Part 2, Section 10(g) of the Plan.

Catchments reporting found that sediment and nutrient input is placing a high to very high pressure on all estuaries in the Plan except for Station Creek.<sup>86</sup> The EcoHealth program<sup>87</sup> found that no monitored water sources in the Plan area were in 'good' or 'excellent' condition in 2011-12 or 2014-15. Coffs Creek and Boambee Creek were assessed as 'poor' overall condition, with few of the environmental values met.<sup>88</sup> Corindi River, Arrawarra Creek, Woolgoolga Creek, Moonee Creek, Bonville Creek and Boambee Creek were assessed as having a 'fair' overall condition.<sup>89</sup> Higher algal levels reported in estuaries were considered to indicate poor hydrological flushing and internal nutrient recycling, likely due to very low stream discharge to flush tidal environments.<sup>90</sup>

In addition to these studies, stakeholders identified issues associated with water quality as part of this review and during in the Coffs Harbour City Council's *Local Growth Management Strategy*.<sup>91</sup>

The Commission understands that DPIE-Water are developing a risk assessment for coastal water sharing plans to prioritise and to monitor, mitigate or respond to the factors that pose the highest overall risks. The risk assessment process is likely to be challenging due to limited available data, reducing the evidence needed to identify key risks.

Over the next two years, DPIE-Water should invest in data collection, including seeking stakeholder input, to inform the risk assessment process and ultimately the replacement Plan, and implement a MER framework (see **Chapter 7**).

## 4.2 The risks from increased farm dam use have not been considered

The shift towards intensive horticultural production that was noted when the Plan was developed has increased dramatically since 2009, resulting in a significantly altered water extraction and use profile. The Commission understands that most irrigation water for intensive horticulture is not sourced directly from creeks but from mixed use farm dams fed by rainfall runoff harvesting and topped up by springs, groundwater and pumped streamflow, or a combination thereof (**Figure 7**).<sup>92</sup> For example, of eleven irrigated farms surveyed in the Plan area for a recent environmental impact assessment:

- seven had spring fed dams (some combined with rain fed)

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<sup>86</sup> Department of Environment, Climate Change and Water (2010) *State of the Catchments report: Estuaries and Lakes – Northern Rivers region*. Available at:

<https://www.environment.nsw.gov.au/resources/soc/northernrivers/10426NRIVERsestuarine.pdf>.

<sup>87</sup> The EcoHealth program has 31 monitoring sites in the Plan area, including 11 freshwater sites and 20 estuarine sites capturing all estuaries except Station Creek. Areas not covered are Dirty Creek, Double Crossing Creek, Korora Basin, Red Bank River and Station Creek.

<sup>88</sup> Ryder, D., Mika, S., Vincent, B., Burns, A. and Schmidt, J. (2016) *Coffs Harbour Region Ecohealth Project 2014-2015: Assessment of River and Estuarine Condition. Final Technical Report*. Available at: [https://www.coffsharbour.nsw.gov.au/environment/Documents/SoE%202016/Coffs%20Ecohealth%20Report%20\[Web%20version\]%20May%202016.pdf](https://www.coffsharbour.nsw.gov.au/environment/Documents/SoE%202016/Coffs%20Ecohealth%20Report%20[Web%20version]%20May%202016.pdf).

<sup>89</sup> 'Fair' condition demonstrated that some of the environmental values were met or the indicators met some of the benchmark values for some of the year.

<sup>90</sup> Ryder, D., Mika, S., Vincent, B., Burns, A. and Schmidt, J. (2016) *Coffs Harbour Region Ecohealth Project 2014-2015: Assessment of River and Estuarine Condition. Final Technical Report*. Available at: [https://www.coffsharbour.nsw.gov.au/environment/Documents/SoE%202016/Coffs%20Ecohealth%20Report%20\[Web%20version\]%20May%202016.pdf](https://www.coffsharbour.nsw.gov.au/environment/Documents/SoE%202016/Coffs%20Ecohealth%20Report%20[Web%20version]%20May%202016.pdf).

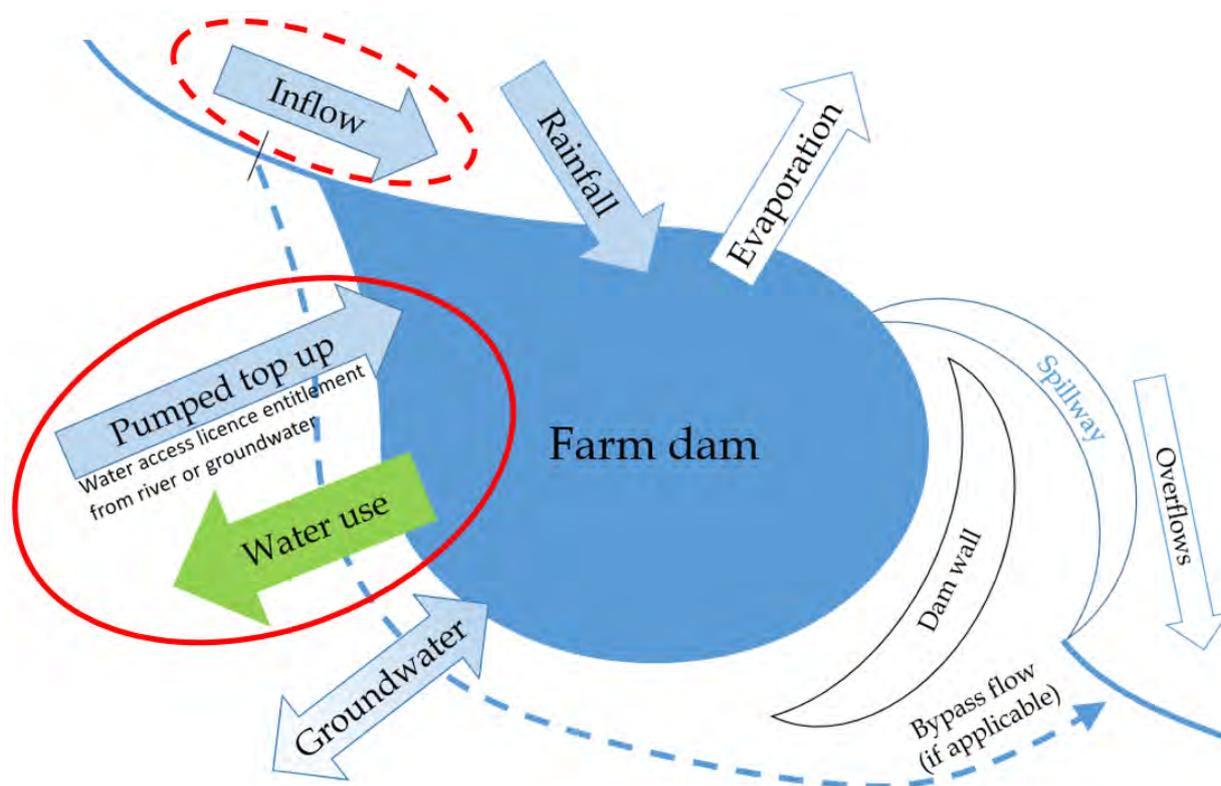
<sup>91</sup> Coffs Harbour City Council (2017) *Local Growth Management Strategy – Rural Lands Issues and Options*.

<sup>92</sup> Arup (2019) *Coffs Harbour Bypass Environmental Impact Statement: Appendix K Socio-economic and agriculture assessment*. Available at: <https://www.planningportal.nsw.gov.au/major-projects/project/10461>.

- two had rain fed dams (some combined with spring fed)
- four had an unregulated river access licence
- one used a bore.<sup>93</sup>

Aerial imagery shows a visible increase in the number of farm dams in catchments in the Plan area, such as the Woolgoolga and Korora Basin water sources.<sup>94</sup> Korora Basin includes six discrete catchments of small watercourses with impacts potentially uneven across the system.

Farm dams have an increasing role in agricultural development. Farm dams have a significant effect on the water yield and flow regime of rivers, reducing annual water availability or total flow.<sup>95</sup> The impact of farm dams varies seasonally and depends on factors such as the number of farm dams and their location in a catchment, mean annual rainfall, flow regime, irrigation practice and soil properties. A Victorian study found the largest volumetric reduction was on summer freshes, where for every megalitre of farm dam development, modelled summer streamflow reduced by over two megalitres.<sup>96</sup> While the greatest volume of capture is at higher flows, the greatest proportion of flow is captured in low flows.



**Figure 7: Schematic of water use via mixed use farm dams, with the aspects regulated by the Plan circled in red and partly regulated (for capture above basic landholder rights) in dashed red<sup>97</sup>**

<sup>93</sup> Arup (2019) *Coffs Harbour Bypass Environmental Impact Statement: Appendix K Socio-economic and agriculture assessment*. Available at: <https://www.planningportal.nsw.gov.au/major-projects/project/10461>.

<sup>94</sup> Personal communication, Department of Primary Industries – Fisheries, February 2019.

<sup>95</sup> Nathan R. and Lowe, L. (2012) *The hydrologic impact of farm dams*. Australian Journal of Water Resources, 16(1): 75-83.

<sup>96</sup> *Ibid.*

<sup>97</sup> Simplified from SKM (2011) *STEDI: Estimating the impact of farm dams on streamflow, user manual*. Version 1.1.

The shift in land-use from largely dryland banana production to intensive irrigated horticulture has raised tensions among stakeholders, with some raising concerns of broad environmental impacts.<sup>98</sup> Stakeholders also raised concerns about the impact of increased extraction and reduced freshwater flow on downstream ecosystems. The change in land-use and growth in farm dams will have increased the capture of the initial flows after rainfall, reducing the magnitude and duration of the initial pulse of water (see **Section 4.4.2**). The relative impact of capture and extraction is higher in dry years.

ICOLLS are particularly sensitive to change<sup>99</sup> and there is particular concern around their condition and impacts on estuarine and marine ecosystems including the Solitary Islands Marine Park.<sup>100</sup> There are also concerns regarding reduced water quality and associated social and economic outcomes.<sup>101</sup>

The Commission understands that the impact of an increase in farm dams was not addressed in Plan development because while their potential impact was recognised, their construction to extract higher flows<sup>102</sup> for commercial use was considered unlikely.<sup>103</sup> Further, all water sources except for Bonville Creek and Corindi River were considered incapable of supporting commercial-scale extraction from high flows.<sup>104</sup> This suggests there may have been evidence in 2009 of potential impact on environmental outcomes from farms dams. This is concerning given the increased construction and use of farm dams over the Plan period.

Water held in farm dams is only partially regulated by the Plan.<sup>105</sup> Water access licences are required for extraction from surface or groundwater beyond harvestable rights. Harvestable rights are regulated by the NSW Government Gazette, not the Plan, and refer to landholders' right to capture 10 percent of average regional rainwater runoff on their land, with certain limitations.<sup>106</sup> Farm dams also require a licence if they are on a third order or greater river, a permanent spring fed first or second order stream or if they exceed the harvestable rights for

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<sup>98</sup> For example, concerns were raised around pesticide spray drift from intensive horticulture affecting residences in Woolgoolga, Sandy Beach, Bonville and Pine Creeks, and Upper Corindi (Coffs Harbour City Council (2019) *Assessment of Drinking Water Tanks in Close Proximity to Intensive Plant Agriculture in the Coffs Harbour Local Government Area 2017-2019*. Available at: <https://www.coffsharbour.nsw.gov.au/environment/Compliance-and-Reporting/Documents/Final%20report%20Private%20Drinking%20Water%20Study%202019.pdf/>).

<sup>99</sup> Coastal lagoons, specifically ICOLLS, are the most sensitive estuarine type to human impacts, as in Boyd, R., Dalrymple, R. and Zaitlin, B.A. (1992) 'Classification of clastic coastal depositional environments', *Sedimentary Geology*, 80:139-150.

<sup>100</sup> Personal communication, Department of Primary Industries – Fisheries, February 2019.

<sup>101</sup> Personal communication, Department of Primary Industries – Fisheries, February 2019.

<sup>102</sup> The flows occurring about 50 percent of the time, as defined by Department of Water and Energy (2009) *Water Sharing Plan – Coffs Harbour Area Unregulated and Alluvial Water Sources – Background document*. Available at: [https://www.industry.nsw.gov.au/\\_\\_data/assets/pdf\\_file/0010/166843/coffs-harbour-background.pdf](https://www.industry.nsw.gov.au/__data/assets/pdf_file/0010/166843/coffs-harbour-background.pdf).

<sup>103</sup> Department of Water and Energy (2009) *Water Sharing Plan – Coffs Harbour Area Unregulated and Alluvial Water Sources – Background document*. Available at: [https://www.industry.nsw.gov.au/\\_\\_data/assets/pdf\\_file/0010/166843/coffs-harbour-background.pdf](https://www.industry.nsw.gov.au/__data/assets/pdf_file/0010/166843/coffs-harbour-background.pdf).

<sup>104</sup> Department of Water and Energy (2009) *Water Sharing Plan – Coffs Harbour Area Unregulated and Alluvial Water Sources – Background document*. Available at: [https://www.industry.nsw.gov.au/\\_\\_data/assets/pdf\\_file/0010/166843/coffs-harbour-background.pdf](https://www.industry.nsw.gov.au/__data/assets/pdf_file/0010/166843/coffs-harbour-background.pdf).

<sup>105</sup> Extraction from a runoff harvesting dam requires an access licence and a water supply works approval, above the landholder's harvestable right entitlement under Section 53 of the Act. See also Clause 35 of the Plan, if the share components of access licences nominating a runoff harvesting or in-river dam is reduced through a trade, surrender, amendment or cancellation then the Minister may require the dam to be modified to ensure its capacity is reduced (such as through requiring by-pass flows) in line with the reduced share components.

<sup>106</sup> NSW Government (2006) *NSW Government Gazette 40 – 31 March 2006*, pp. 1,628-1,631. Available at: [https://gazette.legislation.nsw.gov.au/so/download.w3p?id=Gaz\\_Gazette%20Split%202006\\_2006-40.pdf](https://gazette.legislation.nsw.gov.au/so/download.w3p?id=Gaz_Gazette%20Split%202006_2006-40.pdf).

the property.<sup>107</sup> It is important that DPIE-Water comprehensively assess and manage the environmental risk associated with farm dams and their extraction potential under the replacement Plan.

The shift in agriculture and associated increase in farm dams over the Plan period is a reminder that rules should be based on protecting environmental requirements from all potential extraction mechanisms, as existing land use is not necessarily a good indicator of future extractive demand.

Managing downstream impacts of extraction in the Plan will require greater emphasis on monitoring and compliance to allow for the division and management of water in farm dams from harvestable rights versus licenced river and alluvial entitlements (for example, metering of various dam inputs). The need for additional metering and compliance are discussed in detail in **Sections 7.4** and **8.1**, respectively.

### **4.3 The Plan should better recognise environmental water requirements**

DPIE-Water should use best-available evidence to assess environmental water requirements and achieve intended outcomes. The Commission identified several key processes required to improve the replacement Plan, including:

- incorporating estuarine and coastal water requirements
- defining key environmental assets and their water and flow requirements
- ground-truthing the presence of groundwater dependent ecosystems and clarifying terminology
- assessing and reducing hydrological stress
- revising and transparently reporting the LTAAEL to protect environmental water.

#### **4.3.1 The Plan should incorporate estuarine and coastal requirements**

While DPIE-Water completed a high level assessment of inflow sensitivity in estuarine environments to limit extraction in highly sensitive estuaries, the Plan does not consider the full range of requirements for estuarine and dependent coastal environments and associated social and economic values.<sup>108</sup> In Plan development, DPIE-Water must identify assets, their flow requirements and potential Plan impacts.

The regulation of freshwater flows under the Plan will impact estuary health. Altered freshwater flow regimes have a significant impact on the physical and biological aspects of downstream estuarine and coastal environments, including sediment loads, pH, temperature, salinity, clarity, oceanography and nutrients.<sup>109</sup> Estuaries are also important nursery habitats for

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<sup>107</sup> Department of Water and Energy (2009) *Water Sharing Plan – Coffs Harbour Area Unregulated and Alluvial Water Sources – Background document*. Available at:  
[https://www.industry.nsw.gov.au/\\_\\_data/assets/pdf\\_file/0010/166843/coffs-harbour-background.pdf](https://www.industry.nsw.gov.au/__data/assets/pdf_file/0010/166843/coffs-harbour-background.pdf).

<sup>108</sup> *Ibid.*

<sup>109</sup> Gillanders, B.M. and Kingsford, M. (2002) 'Impact of Changes in Flow of Freshwater on Estuarine and Open Coastal Habitats and the Associated Organisms', *Oceanography and Marine Biology*, 40, pp. 233-309.

inshore fisheries communities. In 2010 (before the increase in intensive horticulture) altered freshwater flow was identified as placing a moderate pressure on the estuaries of:

- Pine Brush Creek (Korora Basin Water Source)
- Coffs Creek (Coffs Creek Water Source)
- Pipe Clay Creek (Red Bank River Water Source)
- Darkum Creek and Flat Top Point Creek (Woolgoolga Creek Water Source).<sup>110</sup>

The modification of estuary entrances and modified freshwater flows in estuaries have been identified as priority threats for the NSW Marine Estate.<sup>111</sup> Anecdotal evidence has indicated that ICOLLs are staying closed longer, possibly contributing to nutrient build-up, localised flooding and vegetation die back.<sup>112</sup>

Riverine flow targets do not protect downstream processes, including estuaries. Estuarine flow requirements should be developed to enable the Plan to maintain the environmental assets and functions of these ecosystem. DPIE-Water should assess estuarine and dependent coastal ecosystem requirements when considering Plan risks and impacts. The NSW Government has previously identified the following key principles which should be considered in the replacement Plan:

- 'Coastal catchments must be considered and managed as whole systems that extend from the upper catchment down to the offshore waters.'<sup>113</sup>
- 'Water management decisions should recognise that freshwater inflows are an essential requirement for the maintenance of estuarine and coastal ecosystems. This is particularly so in areas with identified conservation values – for example, marine protected areas, which have a dependency on a share of natural freshwater inflows.'<sup>114</sup>
- 'River flows should be managed so that a sufficient share of the total freshwater in a catchment is protected as inflows to estuaries to maintain and protect the biophysical processes and biodiversity of estuarine and coastal ecosystems'.<sup>115</sup>

Consideration of impacts to estuarine and coastal environments should not be limited to environmental impacts. Commercial and recreational fisheries and tourism are among the many industries relying upon Plan effectiveness and healthy ICOLLs.<sup>116</sup> The Plan's downstream impacts on estuaries and coastal ecosystems including on threatened fish species should be considered under the three umbrellas of environmental, social and economic outcomes. These significant environmental assets should be monitored and appropriately protected by Plan rules.

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<sup>110</sup> NSW Department of Environment, Climate Change and Water (2010) *State of the Catchments report: Estuaries and Lakes – Northern Rivers region*. Available at

<https://www.environment.nsw.gov.au/resources/soc/northernrivers/10426NRIVERSestuarine.pdf>.

<sup>111</sup> Marine Estate Management Authority (2017) *NSW Marine Estate – Threat and Risk Assessment Report – Final Report*. Available at: [https://www.marine.nsw.gov.au/\\_\\_data/assets/pdf\\_file/0010/736921/NSW-Marine-Estate-Threat-and-Risk-Assessment-Final-Report.pdf](https://www.marine.nsw.gov.au/__data/assets/pdf_file/0010/736921/NSW-Marine-Estate-Threat-and-Risk-Assessment-Final-Report.pdf).

<sup>112</sup> Personal communication, Department of Primary Industries – Fisheries, February 2019.

<sup>113</sup> Principle 1 in NSW Government (n.d.) *No. 10 Freshwater flows to estuaries and coastal waters: Advice to Water Management Committees*. Available at:

[http://www.water.nsw.gov.au/\\_\\_data/assets/pdf\\_file/0005/548024/policy\\_advice\\_10-flows.pdf](http://www.water.nsw.gov.au/__data/assets/pdf_file/0005/548024/policy_advice_10-flows.pdf).

<sup>114</sup> Principle 2 in *ibid.*

<sup>115</sup> Principle 4 in *ibid.*

<sup>116</sup> Personal communication, Department of Primary Industries – Fisheries, February 2019.

### 4.3.2 Key environmental assets and their water and flow requirements should be defined

The Plan should protect key environmental assets (or values) and functions such as threatened species, system connectivity, wetlands, adequate water quality, in-stream habitats, and ICOLLs. These assets have individual requirements within the local flow regime. The flow regime describes flow bands (for example, very low flows, low flows, baseflows and overbank flows), and their magnitude, frequency, duration, timing or seasonality, rate of change and return period.

Key environmental assets' flow requirements vary spatially and temporally and should be used to inform Plan flow sharing and extraction limit provisions. However, there are limited data on water availability, environmental assets or their water needs, and the various flow regimes or the Plan's impact upon them. The Commission considers that the Plan is unlikely to deliver environmental outcomes without this data and analysis. The Commission refers to 'key' environmental assets as these are the underlying attribute which will contribute to a waterway or estuary being high value (that is, the presence of multiple key assets will make a waterway high value).

In NSW, the understanding of environmental assets and their flow requirements has been focused on Murray-Darling Basin catchments as part of the development of long term water plans. In the Plan area, the reporting of assets has been limited to waterways with high instream values and provisions to protect groundwater dependent ecosystems.

In 2009, DPIE-Water classified Station Creek, Dirty Creek, Corindi River, Double Crossing Creek, Korora Basin, Woolgoolga Creek and Bonville Creek as having high instream values.<sup>117</sup> In 2015, DPIE-Water used the Australian Government's High Ecological Value Aquatic Ecosystems framework to assess the Plan area and identify environmental assets, replacing the instream value assessment used at Plan development.<sup>118</sup>

DPIE-EES have further revised the high ecological value framework with input layers and support for the map provided by the DPI-Fisheries and DPIE-Water. The map overlays 27 indicators to show high ecological value waterways and water dependent ecosystems based on definitions, guidelines and policies under the *Environment Protection and Biodiversity Conservation Act 1999*, *Biodiversity Conservation Act 2016*, *Fisheries Management Act 1994* and *Water Management Act 2000*. Aquatic habitats should be linked to ecological communities and a complete inventory of water dependent communities in each river network developed.

The water dependent ecosystems consist of wetlands and vegetation and fauna that rely on water sources (including groundwater) but have not been ground-truthed. The Commission has been provided with a draft version of the Coffs Harbour high ecological value waterways and water dependent ecosystems map and understands it will be completed in 2020. The Commission recommends that DPIE-Water collaborate with DPIE-EES and DPI-Fisheries to ground-truth this map and incorporate it into Plan development.

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<sup>117</sup> NSW Department of Water and Energy (2009) *Report card for [various] water source*. Available at: [www.water.nsw.gov.au](http://www.water.nsw.gov.au).

<sup>118</sup> The NSW approach consists of four key criteria that can be used at a range of scales: diversity, distinctiveness, naturalness and vital habitat (Department of Primary Industries – Water (2016) *Coffs Harbour Interagency Regional Panel Paper*, provided by DPIE-Water; and Department of Industry-Water (2018) *Applying the High Ecological Value Aquatic Ecosystem Framework for Riverine Ecosystems*. Available at: [https://www.industry.nsw.gov.au/\\_\\_data/assets/pdf\\_file/0019/207055/applying-the-HEVAE-framework-for-riverine-ecosystems.pdf](https://www.industry.nsw.gov.au/__data/assets/pdf_file/0019/207055/applying-the-HEVAE-framework-for-riverine-ecosystems.pdf)).

DPIE-Water identified fewer water sources as having high instream value in 2015 compared to 2009 (**Table 8**). The Commission has not reviewed the technical detail to understand if the reduction in water sources identified as high value is due to a decrease in ecosystem health in the intervening time or if there are differences in the datasets, collection methods or methods of determining value. DPIE-Water should provide evidence on how they are considering the classification and changes over time.

As Plan rules focus on protecting high-value water sources, these changes could impact the level of entitlement and the extraction regimes for each water source (such as cease to pump thresholds, which are discussed in **Section 4.4.1**). If environmental assets are repeatedly re-categorised over time as pressures on the waterways are increasing, unless the cause of reclassification is addressed, protections may be eroded as higher controls are only focused on those water sources with high conservation or ecological value.

**Table 8: Methods used by DPIE-Water to identify water sources with high instream value**

Extraction management unit	Water source	High instream value 2009 <sup>119</sup>	High or very high instream value 2015 <sup>120</sup>
Station Creek	Station Creek	✓	✓
Ararwarra Creek	Ararwarra Creek	✗	✓
Woolgoolga Creek	Woolgoolga Creek	✓	✗
Double Crossing Creek	Double Crossing Creek	✓	✗
Korora Basin	Korora Basin	✓	✗
Corindi River	Corindi River	✓	✓
	Dirty Creek	✓	✓
	Red Bank River	✗	✗
Moonee Creek	Moonee Creek	✗	✓ (part)
Coffs Creek	Coffs Creek	✗	✗
Boambee Creek	Boambee Creek	✗	✗
Bonville Creek	Bonville Creek	✓	✗
	Pine-Bundagaree Creek	✗	✓

Given the Plan area's environmental significance and increased extraction, this Plan warrants additional attention and DPIE should assign the resources required to improve on the first Plan. To minimise the impact of extraction on environmental outcomes, the following steps should be completed during Plan development:

- Identify environmental assets, their location and status and associated ecosystem functions. The high ecological value aquatic ecosystems framework should be used to establish assets in the first instance, compared to those assets identified in the parallel

<sup>119</sup> NSW Department of Water and Energy (2009) *Report card for [various] water source*. Available at: [www.water.nsw.gov.au](http://www.water.nsw.gov.au).

<sup>120</sup> Department of Primary Industries – Water (2016) *Coffs Harbour Interagency Regional Panel Paper*, provided by DPIE-Water.

process undertaken by DPIE-EES, and ground-truthed before Plan commencement. This assessment should include groundwater dependent ecosystems, described in detail in **Section 4.3.2**.

- Determine flow requirements for each asset to maintain key habitats and perform other key ecological processes, including maintaining connectivity in key periods, fish passage, sediment initiation or flushing flows.
- Incorporate the findings from the above steps into Plan development to manage impacts on flow regimes and key assets' requirements. This may require developing fit-for-purpose hydrological models that can accommodate flow variability at a range of scales to assess the impact of current and proposed water management measures.

### 4.3.3 Groundwater dependent ecosystems should be recognised

Water sharing plans are required to reserve water for the overall health of groundwater dependent ecosystems. While the Plan includes provisions specifically to protect high priority groundwater dependent ecosystems, they are not in use as no high priority groundwater dependent ecosystems are identified in the relevant schedule.

The Plan currently only applies to high priority groundwater dependent ecosystems (if identified), whereas low and medium priority ecosystems are considered in other legislation such as the *Environmental Planning and Assessment Act 1979*. The Plan should clarify terminology and the extent of protection of low and medium priority groundwater dependent ecosystems. This is important given the classification of high priority or high ecological value ecosystems is inconsistent across jurisdictions and policies.

High ecological value groundwater dependent wetlands and vegetation have been mapped in the Plan area, including Dry Grassy Blackbutt-Tallowwood and Lowland Red Gum (high potential).<sup>121</sup> The *Bureau of Meteorology Groundwater Dependent Ecosystem Atlas* is generally regarded as the best available reference point for ecosystem identification and is intended to be updated regularly with state-based data, requiring ongoing collaboration and maintenance.<sup>122</sup> DPIE-Water have advised that they will soon publish a state-wide groundwater dependent ecosystem assessment which will update the Atlas. DPIE-Water has advised that they are working to update the mapping of potentially high priority groundwater dependent ecosystems in the Plan area.<sup>123</sup> During Plan development, available data should be ground-truthed and additional ecosystems included as necessary. This would give effect to the provisions included in the Plan to protect groundwater dependent ecosystems.

Groundwater dependent ecosystems are classified according to the ecosystems they support (**Table 9**). All ecosystem types can be impacted by reduced groundwater quantity (in terms of flow or level) or changes in groundwater quality but each have different risk profiles based on their level of water dependence. Type 2 groundwater dependent ecosystems are widespread throughout NSW coastal regions as wetlands, occurring wherever there is discharge, while Type 3 ecosystems are common in coastal sands. The Plan should specify which types of

<sup>121</sup> Kuginis L., Byrne G., Serov P. and Williams J.P. (2012) *Risk assessment guidelines for groundwater dependent ecosystems, Volume 3 – Identification of high probability groundwater dependent ecosystems on the coastal plains of NSW and their ecological value*, pp. 232-267, Department of Primary Industries – Office of Water, Sydney. Available at: [http://archive.water.nsw.gov.au/\\_\\_data/assets/pdf\\_file/0010/547939/gde\\_risk\\_assessment\\_guidelines\\_volume\\_3\\_final\\_accessible\\_smallest.pdf](http://archive.water.nsw.gov.au/__data/assets/pdf_file/0010/547939/gde_risk_assessment_guidelines_volume_3_final_accessible_smallest.pdf).

<sup>122</sup> Bureau of Meteorology (2019) *Groundwater Dependent Ecosystems Atlas*. Available at: <http://www.bom.gov.au/water/groundwater/gde/>.

<sup>123</sup> Personal communication, DPIE-Water, 17 March 2019.

groundwater dependent ecosystem are to be considered as it currently appears to be limited to Type 2 ecosystems. During Plan development, all ecosystems should be identified (see recommendation 2 in **Section 4.3.2**) and their groundwater and surface flow requirements should be defined as appropriate.

**Table 9: Classification of groundwater dependent ecosystems<sup>124</sup>**

<b>Type 1</b>	<b>Ecosystems living in an aquifer</b> – for example, stygofauna, which are fauna found in groundwater systems such as caves <sup>125</sup>
<b>Type 2</b>	<b>Ecosystems supported by discharging groundwater to the surface</b> – for example, wetlands, seeps, springs and river baseflow
<b>Type 3</b>	<b>Ecosystems supported by the subsurface presence of groundwater</b> – for example, deep-rooted terrestrial vegetation

The *NSW Aquifer Interference Policy* holistically protects groundwater dependent ecosystems, considering both potential water level and quality impacts.<sup>126</sup> It outlines a comprehensive approach to groundwater dependent ecosystem protection and includes a method to assess set back distances and a reporting framework. The *NSW Aquifer Interference Policy* requires impact assessments for all proposed extraction works if an entire aquifer is a high priority groundwater dependent ecosystem, including the extent of impact on the water source as a whole.

The Plan includes a range of setback distances for work near groundwater dependent ecosystems. Setback distances aim to minimise the potential impacts of groundwater extraction on environmental features, including groundwater dependent ecosystems. The Commission recommends that these distances are aligned to the *NSW Aquifer Interference Policy* for consistency between water sharing plans and NSW Government policies.<sup>127</sup> Caveats should be retained that give the Minister discretion to vary these distances, provided adequate studies are undertaken.

DPIE-Water has also undertaken considerable work to standardise setback distances in inland areas as part of the implementation of the *Murray Darling Basin Plan 2012*. DPIE-Water's intention is to use the distances set for inland for coastal systems, although local modifications may still occur based on consultation feedback.<sup>128</sup>

The Coffs Harbour Coastal Sands Groundwater Source is within the Plan surface water boundary area but is part of the *Water Sharing Plan for the North Coast Coastal Sands Groundwater Sources 2016*. Almost half of the groundwater source area is of high environmental value<sup>129</sup> and includes types 2 and 3 groundwater dependent ecosystems. Agricultural chemicals and

<sup>124</sup> These types are used by the Bureau of Meteorology and the Independent Expert Scientific Committee in its guidelines to assess groundwater dependent ecosystems.

<sup>125</sup> The Commission notes that DPIE-Water are progressing research into the science behind stygofauna watering requirements. These requirements are currently largely unknown, making rule development difficult.

<sup>126</sup> Department of Primary Industries – Water (2012) *NSW Aquifer Interference Policy: NSW policy for the licensing and assessment of aquifer interference activities*. Available at: [https://www.water.nsw.gov.au/\\_data/assets/pdf\\_file/0004/549175/nsw\\_aquifer\\_interference\\_policy.pdf](https://www.water.nsw.gov.au/_data/assets/pdf_file/0004/549175/nsw_aquifer_interference_policy.pdf).

<sup>127</sup> *Ibid.*

<sup>128</sup> Information provided by DPIE-Water, 17 March 2019.

<sup>129</sup> Note that while they are identified as high environmental value, they are not identified as high priority groundwater dependent ecosystems. These definitions should be clarified and streamlined.

fertiliser from the Plan area have been identified as potentially impacting the Coffs Harbour Coastal Sands Groundwater Source.<sup>130</sup>

For the highly-connected alluvial systems in the Plan area, increasing surface water extraction and use of groundwater beyond licenced entitlement (see **Section 8.1**) could result in increased risks to groundwater and surface water resources, as well as their associated outcomes. The recognition of surface and groundwater connectivity should be retained in the Plan. However, this can be strengthened to explicitly acknowledge the varying spatial and temporal scales, as well as the two-way relationship between surface and groundwater recharge and loss.

The coastal alluvium has been classified as having low to moderate connectivity with the surface water.<sup>131</sup> Entitlements for extraction from alluvial sediments under the Plan floodplains are still under the legislation of the *Water Act 1912* and not the Plan.<sup>132</sup> To comprehensively manage all water sources, the Plan should establish a coastal floodplain alluvial groundwater source and appropriate rules to bring governance of these licences and their extraction under the *Water Management Act 2000*.

#### 4.3.4 Hydrological stress should be assessed and reduced if necessary

When the Plan was developed, all water sources were rated as having high hydrological stress except for three that are largely state forest or national park.<sup>133</sup> These three water sources had no licenced extraction listed in the Plan, with only estimated extractions for stock and domestic components of basic landholder rights. For all other water sources, there is evidence that hydrological stress is likely to have increased over the Plan period. In addition, original calculations of stress may not have included the impact of extraction for harvestable rights. Furthermore, the method used to determine hydrological stress only considers annual flow and does not account for shorter variation such as seasonal variability.

Hydrological stress should take into consideration all extraction mechanisms, including all basic landholder rights. Hydrological stress in each waterway should be revisited given the significant change in agriculture and growth in farm dams (noting that it was rated as high in 2009 and is likely to have increased). The risks to environmental, social and economic outcomes posed by extraction must also be reassessed and steps taken to ensure extraction levels are appropriate for protecting environmental assets in each waterway in each water source.

When water sharing plans were originally developed the default planning rule was to prevent trades into water sources with high hydrological stress to avoid increases in extraction.<sup>134</sup> However, extraction could still increase if new licences were granted (see **Section 4.3.5**) or basic landholder rights increase. The Commission is aware that agricultural stakeholders have

<sup>130</sup> NSW Department of Environment, Climate Change and Water (2010) *State of the Catchments Report: Groundwater – Northern Rivers region*. Available at:

<https://www.environment.nsw.gov.au/resources/soc/northernrivers/10423NRIVERSgwater.pdf>.

<sup>131</sup> Department of Water and Energy (2009) *Water Sharing Plan – Coffs Harbour Area Unregulated and Alluvial Water Sources – Background document*. Available at:

[https://www.industry.nsw.gov.au/\\_\\_data/assets/pdf\\_file/0010/166843/coffs-harbour-background.pdf](https://www.industry.nsw.gov.au/__data/assets/pdf_file/0010/166843/coffs-harbour-background.pdf).

<sup>132</sup> Personal communication, DPIE-Water, November 2019.

<sup>133</sup> Station Creek, Arrawarra Creek and Dirty Creek water sources (Department of Water and Energy report cards for water sources are available at: [www.water.nsw.gov.au](http://www.water.nsw.gov.au)).

<sup>134</sup> NSW Office of Water (2013) *An overview of water sharing plans for unregulated and alluvial water sources in coastal NSW*. Available at:

[http://www.water.nsw.gov.au/\\_\\_data/assets/pdf\\_file/0006/549411/wsp\\_overview\\_coastal\\_unreg\\_and-alluvial\\_water\\_sharing\\_plans.pdf](http://www.water.nsw.gov.au/__data/assets/pdf_file/0006/549411/wsp_overview_coastal_unreg_and-alluvial_water_sharing_plans.pdf).

requested that DPIE-Water review the harvestable rights provision for coastal water users under basic landholder rights. Some stakeholders are seeking an increase from the current allowance of 10 percent of average annual regional rainfall runoff. If additional water is captured under harvestable rights, this water would be lost from downstream environments, licensees and communities and would impact the Plan LTAAEL unless another form of entitlement was reduced accordingly.

The proportion of estimated river flow available for extraction under the Plan appears to have increased. Based on the evidence available to the Commission, the proportion of overall flow permitted to be extracted is estimated to be about 2.8 percent.<sup>135</sup> This proportion excludes harvestable rights, which has been studied in detail in catchments in the Plan area and is known to be significant.

**Table 10** shows the entitlement from access licences as a proportion of estimated annual average flow across water sources. This does not include harvestable right take. Korora Basin Water Source has 11 percent of estimated annual flows licenced for extraction, while the Coffs Creek and Boambee Creek water sources each have about 7 percent of estimated annual flows licenced for extraction. While these values do not equate to that percentage of flow being extracted, without metering data it indicates extraction potential and highlights those water sources at higher relative risk of over-extraction. While the overall entitlement appears low, the accuracy of the flow estimates is uncertain due to a lack of gauging or detailed modelling and it does not consider spatial and temporal variability and the impacts on the flow regime.

It is important to note that the flows of NSW coastal rivers north of the Georges River are influenced by multidecadal shifts in rainfall, moving between flood dominated and drought dominated regimes over 20-50 year periods.<sup>136</sup> A shift to a drought dominated regime can reduce flows to a fraction of the long-term average flows.<sup>137</sup> The Commission recommends that these shifts in regime are incorporated into Plan development and implementation. When assessing cease to pump thresholds (see **Section 4.4.1**), adding a buffer to account for uncertainty in flow estimates and secular climate variability would reduce risks associated with maintaining environmental assets and functions such as migration of native fish.

DPIE-Water used the macro sharing approach to develop the Plan, considering a combination of instream values and hydrological stress. However, the process didn't allow for changing instream values along various reaches of a water source.<sup>138</sup> The River Condition Index method updates the macro sharing approach and spatially represents value and risk at the reach scale.<sup>139</sup> The Commission understands that DPIE-Water intends to replace the macro sharing approach with the River Condition Index and high instream ecological value mapping. The Commission supports this approach.

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<sup>135</sup> Estimated discharge for water sources based on DPIE-Water data provided in 2019. Estimated extraction based on basic landholder rights excluding harvestable rights outlined in the Plan, and data on share allocations in 2018-19 from the WaterNSW Water Register (based on 100 percent Available Water Determination for licences expressed in unit shares).

<sup>136</sup> Erskine, W.D. and Warner, R.F. (1988) 'Geomorphic effects of alternating flood- and drought-dominated regimes on NSW coastal rivers.' *Fluvial Geomorphology of Australia*, pp. 223-244; and Warner, R.F. (2009) 'Secular Regime Shifts, Global Warming and Sydney's Water Supply'. *Geographical Research* 47(3), pp. 227-241.

<sup>137</sup> Warner, R.F. (2009) 'Secular Regime Shifts, Global Warming and Sydney's Water Supply'. *Geographical Research*, 47(3), pp. 227-241.

<sup>138</sup> Office of Water (2012) *River Condition Index in New South Wales: method development and application*. p. 4. Available at: [https://www.industry.nsw.gov.au/\\_\\_data/assets/pdf\\_file/0018/151173/River-Condition-Index-in-NSW.pdf](https://www.industry.nsw.gov.au/__data/assets/pdf_file/0018/151173/River-Condition-Index-in-NSW.pdf).

<sup>139</sup> *Ibid*

The spatial variation in extraction between waterways and across water sources should be assessed during Plan development and mechanisms to reduce hydrologic stress on catchments implemented if required (discussed further in the following section). Changes to the flow regime (such as the frequency or scale of cease to flows, baseflows and overbank flows) also impact on water dependent ecosystems both within and downstream of the water sources and will be discussed further in **Section 4.4**.

**Table 10: Estimates of extraction as a proportion of estimated average annual flow, showing an increase in entitlement in eight water sources and the Plan area overall<sup>140</sup>**

Extraction management unit	Water source	Estimated flow (ML per year) <sup>141</sup>	Estimated % flow able to be extracted excluding harvestable rights		
			Plan (2009)	2018-19	Change <sup>142</sup>
Station Creek	Station Creek	5,800	0.64	0.64	-
Corindi River	Corindi River	41,500	0.55	0.54	↓
	Dirty Creek	7,000	0.53	0.53	-
	Red Bank River	4,100	2.3	2.3	-
Arararra Creek	Arararra Creek	5,100	0.73	1.7	↑
Woolgoolga Creek	Woolgoolga Creek	10,500	3.5	4.4	↑
Double Crossing Creek	Double Crossing Creek	3,500	3.3	4.6	↑
Moonee Creek	Moonee Creek	10,800	2.2	2.1	↓
Korora Basin	Korora Basin	4,300	10.4	11.0	↑
Coffs Creek	Coffs Creek	8,100	7.3	7.4	↑
Boambee Creek	Boambee Creek	11,900	6.5	7.0	↑
Bonville Creek	Bonville Creek	19,500	3.9	4.4	↑
	Pine-Bundagaree Creek	23,000	1.1	1.3	↑
<b>Total % estimated discharge able to be extracted</b>			<b>2.6</b>	<b>2.8</b>	<b>↑</b>

The impacts of a potential increase in entitlement on environmental outcomes is particularly important when overlaid with those water sources that have a high instream ecological value. In 2009, seven water sources were identified as having high instream ecological value.<sup>143</sup> Of these, Korora Basin, Woolgoolga Creek, Bonville Creek and Double Crossing Creek have potentially increased in entitlement and Korora Basin and Woolgoolga Creek are also identified

<sup>140</sup> Estimated discharge for water sources based on DPIE-Water data provided in 2019 and used in the current Plan development. Estimated extraction is based on basic landholder rights excluding harvestable rights outlined in the Plan and data on share allocations for 2018-19 from the WaterNSW Water Register (based on 100 percent Available Water Determination for licences expressed in unit shares).

<sup>141</sup> Based on data provided by DPIE-Water, 2019.

<sup>142</sup> Direction of change is based on actual values rather than percentage extraction to more accurately reflect changes in licences (that is, Corindi River shows a slight decrease as there were 37 unit shares of unregulated river access licences in the Plan and 33.5 in the 2018-19 Water Register).

<sup>143</sup> Department of Water and Energy (2009) *Water Sharing Plan – Coffs Harbour Area Unregulated and Alluvial Water Sources – Background document*. Available at: [https://www.industry.nsw.gov.au/\\_\\_data/assets/pdf\\_file/0010/166843/coffs-harbour-background.pdf](https://www.industry.nsw.gov.au/__data/assets/pdf_file/0010/166843/coffs-harbour-background.pdf).

as having had an increase in farm dams (**Table 10**).<sup>144</sup> Plan trading rules for water sources with high instream ecological value were restricted to avoid any increase in entitlement (discussed further in **Section 6.3**).<sup>145</sup>

Before increasing any form of entitlement, DPIE-Water should assess specific, local-scale data on existing take, along with hydrological, ecological and socio-economic studies. DPIE-Water should require monitoring to determine potential risks to ecological values from any increase in unit share entitlement. In the Plan area, impacts are likely to extend to estuarine function, with stakeholders already identifying potential impacts. Any ongoing change in flow regime will likely further impact water dependent ecosystems, potentially significantly. For example, the Commission understands that the harvestable rights dam storage volume in a catchment within the Plan is over 10 percent of licenced extraction for that catchment and could double under current harvestable rights rules. DPIE-Water should assess and transparently report potential impacts of harvestable rights in detail.

The Commission also notes that the Plan includes a provision that enables available water determinations (AWDs) to be increased after year four of the Plan if the annual extractions in an extraction management unit are less than 95 percent of the LTAAEL by five percent or more.<sup>146</sup> While the implementation of this clause is theoretical, given the lack of metering in the Plan area (discussed in **Section 7.3**), the Commission considers it creates a risk of additional extraction after drought, which may impact on environmental and social recovery. This clause is also not across all coastal plans. The Commission therefore considers it should be excluded from the replacement Plan.

#### 4.3.5 LTAAELs should be revised and transparently reported

Under the Plan, a defined share of water must be set for riverine ecosystems to protect environmental outcomes.<sup>147</sup> The Plan establishes LTAAELs for each extraction management unit to limit overall extraction volumes<sup>148</sup> and protect planned environmental water. This is committed for fundamental ecosystem health or other specified environmental purposes and cannot be extracted for any other purpose.<sup>149</sup>

Planned environmental water should not be permitted to decrease.<sup>150</sup> That is, the total volume of water entitled to be extracted should not increase unless evidence demonstrates environmental outcomes will be maintained. However, planned environmental water appears to have reduced over the Plan period in line with the potential increase in licence entitlement described in this section.

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<sup>144</sup> Based on a comparison of entitlement at Plan commencement and data extracted from the NSW Water Register for 2018-19.

<sup>145</sup> Department of Water and Energy (2009) *Water Sharing Plan – Coffs Harbour Area Unregulated and Alluvial Water Sources – Background document*. Available at: [https://www.industry.nsw.gov.au/\\_\\_data/assets/pdf\\_file/0010/166843/coffs-harbour-background.pdf](https://www.industry.nsw.gov.au/__data/assets/pdf_file/0010/166843/coffs-harbour-background.pdf).

<sup>146</sup> Clause 46(2) of the Plan.

<sup>147</sup> Department of Water and Energy (2009) *Water Sharing Plan – Coffs Harbour Area Unregulated and Alluvial Water Sources – Background document*. Available at: [https://www.industry.nsw.gov.au/\\_\\_data/assets/pdf\\_file/0010/166843/coffs-harbour-background.pdf](https://www.industry.nsw.gov.au/__data/assets/pdf_file/0010/166843/coffs-harbour-background.pdf)

<sup>148</sup> Granting of additional water access licences will general only be considered for local water utility or town water supply, domestic or Aboriginal cultural purposes.

<sup>149</sup> *Water Management Act 2000*, Section 8(1).

<sup>150</sup> Water sharing plans must include provisions to identify, establish and maintain planned environmental water, *Water Management Act 2000*, Section 8(2).

The Plan's current LTAAEL is equal to the total of:

- the volume of water in entitlements under Part 2 of the *Water Act 1912* immediately before the Plan came into effect on 1 August 2009
- estimated annual extraction of water under domestic and stock rights and native title rights at the start of this Plan (3.56 ML per day, this excludes harvestable rights) and
- the sum of access licence share components in each extraction management unit.<sup>151</sup>

The Commission has not been provided with the values for these components from DPIE-Water and they are not consistently publicly reported. In 2014, the draft Plan audit identified the need for a clear numerical statement of the Plan's LTAAEL, but this has not been published.<sup>152</sup>

A clear numeric value for the LTAAEL is required to:

- provide transparency to stakeholders
- inform water source management
- determine compliance with the protection of planned environmental water volumes
- allow DPIE-Water to adjust available water determinations if the LTAAEL is exceeded.

The Commission is not aware of any investigations into the specific water requirements of water-dependent or groundwater dependent ecosystems in the Plan area before or during Plan implementation. Given this, there is insufficient knowledge to assess if an LTAAEL, when defined, represents an environmentally sustainable level of extraction for dependent ecosystems, including estuaries.

Once defined, extraction under the LTAAELs will not be adequately assessed due to the prevalence of farm dams and use of harvestable rights in the Plan area unless new measures are introduced. DPIE-Water should invest in understanding basic landholder rights take in more detail in the coastal systems, where the population density allows greater relative extraction under domestic and stock allowances than in the Murray Darling Basin. The LTAAEL should include all forms of extraction under basic landholder rights and should be metered or otherwise accurately assessed to enable compliance and assessment. See **Sections 7.4** and **8.1** for more detail.

In lieu of being provided with the LTAAEL for each extraction management unit, the Commission estimated the LTAAELs, as at 2009. This was calculated to be about 3,990 ML per year across the Plan excluding harvestable rights.<sup>153</sup>

Based on current entitlement data, there appears to have been an increase in the unregulated river access licence entitlement component of the LTAAELs since 2009 (see **Figure 5** below and **Table 10** in **Section 4.3.4**). The value of the change in entitlement is uncertain due to the

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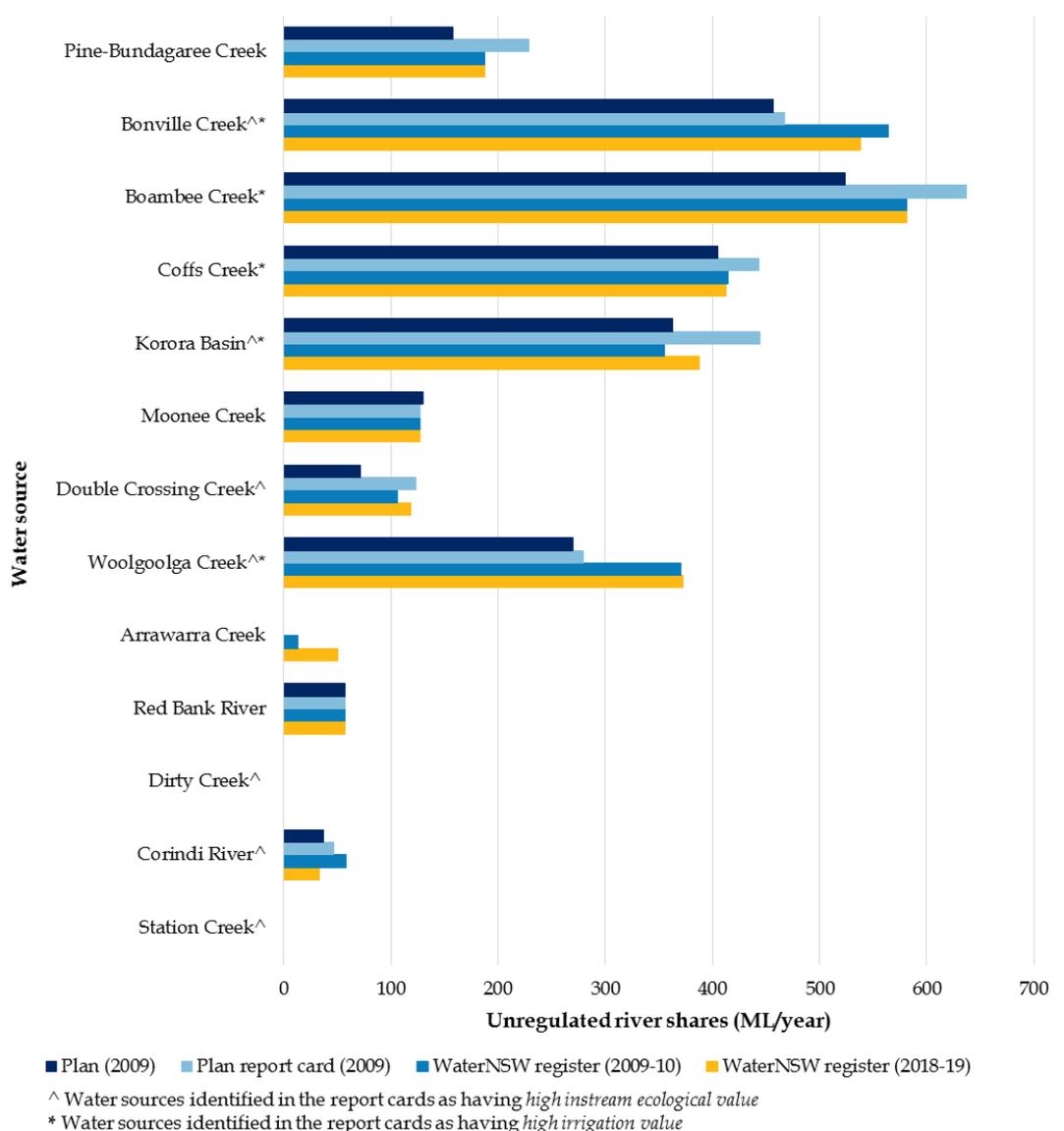
<sup>151</sup> Summarised from Clause 43 of the Plan.

<sup>152</sup> Office of Water (2014) *Draft Audit of implementation – Coffs Harbour Area unregulated river water sharing plan audit report card*, NSW Government.

<sup>153</sup> Consisting of the following extraction management units: Station Creek (37 ML per year), Corindi River (359 ML per year), Arrawarra Creek (37 ML per year), Woolgoolga Creek (364 ML per year), Double Crossing Creek (114 ML per year), Moonee Creek (235 ML per year), Korora Basin (449 ML per year), Coffs Creek (592 ML per year), Boambee Creek (778 ML per year) and Bonville Creek (1,028 ML per year).

inconsistent data available to the Commission.<sup>154</sup> Almost all water sources (except Corindi River and Mooney Creek) have a greater volume of potential extraction under unregulated river access licence entitlement listed in 2018-19 compared to in the Plan, with the largest differences in:

- Woolgoolga Creek, with 103 more unit shares
- Bonville Creek, with 81 more unit shares
- Boambee Creek, with 57 more unit shares.



**Figure 8: Comparison of the published numbers of unregulated river shares for each water source, showing differences between documented values in 2009, and changes between 2009 and 2019**

<sup>154</sup> For example, if the WaterNSW Water Register is taken as the current (2019) source of truth, depending on the source used to define the entitlements at Plan commencement, Double Crossing Creek has had an:

- increase in entitlements of 47 unit shares (based on Clause 29 of Plan)
- decrease in entitlements of 4.5 unit shares (based on the Plan Report Card in 2009)
- increase in entitlements of 12 unit shares (based on the Water Register in 2009-10).

The Commission understands that the only permitted methods of increasing entitlements under the Plan are for:

- volumetric conversion of *Water Act 1912* entitlements that were non-volumetric (the Plan notes 21 *Water Act 1912* entitlements)<sup>155</sup>
- granting of specific purpose access licence as defined in the *Water Management (General) Regulation 2010*<sup>156</sup>
- conversion of an unregulated river access licence to 2.5 shares of unregulated river (high flow) access licence in the Bonville Creek Water Source or the Corindi River Water Source (the Commission understands there have been no conversions under the Plan).<sup>157</sup>

The observed growth should not have occurred under the latter two scenarios and, while the Commission has not been able to determine the extent of conversion of non-volumetric *Water Act 1912* entitlements, it understands that most licences were converted and this could be a cause of the apparent changes in entitlement. DPIE-Water advised that due to dealings (trades) in the Plan's water sources, licences were cancelled, transferred or sub-divided.<sup>158</sup> This may have changed entitlement in water sources but should not increase the overall volume of extraction.<sup>159</sup>

DPIE-Water's Plan replacement process should not amend entitlement volumes without an audit of entitlements to understand the cause and scale of these increases and if there has been an actual increase in entitlement or just conversion of *Water Act 1912* entitlements. The data demonstrate two issues:

- the need for clear, transparent record keeping for effective Plan implementation
- that Plan implementation may not have regulated extraction limits in high value water sources.

If the average annual extraction has increased as a result of unit shares or basic landholder rights increases, AWDs should be reduced below 100 percent to maintain overall volumes of planned environmental water. AWDs have been 100 percent for each year under the Plan (except for the first year when they were 200 percent).

The Commission considers that the Plan has not been effectively implemented and there is a reasonable likelihood that planned environmental water has not been maintained due to:

- increasing demand for water extraction, construction of irrigation infrastructure and an apparent increase in entitlements
- no metering and no systemic collection and collation of logbook data (see **Section 7.3** for further discussion) leading to unknown annual extraction
- compliance issues (**Section 8.1**)
- no assessment of the LTAAEL
- full annual available water determinations.

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<sup>155</sup> Clause 32 and Schedule 2 of the Plan.

<sup>156</sup> Part 8 of the Plan and *Water Management (General) Regulation 2010*, Clause 10.

<sup>157</sup> Clauses 44 and 67 of the Plan.

<sup>158</sup> As advised by DPIE-Water, 17 March 2020.

<sup>159</sup> As advised by DPIE-Water, 17 March 2020.

## 4.4 Plan rules can be strengthened

The Plan includes waterways with high instream value due to their high biodiversity and threatened species. Many Plan waterways are also included in the Solitary Islands Marine Park. The Plan rules do not reflect the risk to the instream values or the downstream estuaries from the extraction of water. For example, under the NSW macro water sharing plan approach, indicative low flow water access rule options for gaining streams were outlined as follows for areas where there is a high risk to instream values and medium dependence on extraction:

- cease to pump rules maintain a specified depth of flow at the end of the water sources
- specific flow rules for instream values (such as protection of fish passage for spawning)
- cease to pump to allow flows at or below the 90<sup>th</sup> percentile to pass end of water sources
- environment to receive high proportion (70 percent) of daily flow.<sup>160</sup>

The Plan rules only protect pools and do not have end of water source flow targets or rules for specific requirements. Further the risk to instream values would have been underestimated for the current Plan as it did not consider take of water under harvestable rights.

The environmental flow requirements in the Plan waterways are under hydrological stress as outlined in **Section 4.3.4**, and must have greater protections. Hydrological stress calculations should consider the long-term as well as short-term impacts of extraction. Typical extraction impacts on flow regimes and dependent ecosystems in coastal systems include:

- increased frequency of low flow and cease to flow periods can impact aquatic habitats, fish communities and the viability of water-dependent vegetation, particularly if periods of demand correspond with fish migration
- reduced frequency and volume of estuarine flushing events leading to accumulated pollutants, nutrients, and sediments and changes to ICOLL opening regimes.

Increases in harvestable rights and the number or size of farm dams increases the capture of rainfall before it reaches waterways, impacting freshes and small floods, natural flow variability and the number of flow days.

The Commission therefore recommends strengthening the following rules to manage environmental risk:

- cease to pump thresholds protecting critical environmental flows and development of licence classes to protect flows within lower flow ranges<sup>161</sup>
- mechanisms to protect freshes and smaller flood events.

### 4.4.1 Cease to pump rules should be monitored and reassessed

Currently, cease to pump thresholds are the main mechanism to manage short- to long-term extraction impacts on downstream environmental, social and economic outcomes. They are implemented for both surface water and the Plan's highly connected alluvial groundwater to

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<sup>160</sup> NSW Office of Water (2011) *Macro water sharing plans – the approach for unregulated rivers. A report to assist community consultation*. Available at:

[http://www.water.nsw.gov.au/\\_\\_data/assets/pdf\\_file/0008/548153/macro\\_unreg\\_manual\\_web.pdf](http://www.water.nsw.gov.au/__data/assets/pdf_file/0008/548153/macro_unreg_manual_web.pdf).

<sup>161</sup> Part 3, Section 17 and Part 4, Section 19, Clause 3 of the Plan.

protect pools as refugia in cease to flow periods.<sup>162</sup> Cease to pump thresholds are currently inadequate in the Plan area as:

- cease to pump thresholds will not comprehensively address key risks in the Plan area due to rainfall runoff harvesting
- current cease to pump thresholds of no visible flow are too low to protect flow requirements and ensure connectivity along the length of the waterways, which may affect upstream native fish migration
- without metering or flow gauging current cease to pump rules are challenging to monitor, which creates a risk of over-extraction and enforcement issues.

The Commission understands that the Plan rules were established based on two principles, including:

- a general ecological principle to maintain pools to protect aquatic species in dry times
- that demand typically occurs at times of low flow.

Relying on these principles provides some environmental protection from extraction but does not maintain connectivity and, as previously mentioned, rainfall runoff harvesting to farm dams generally occurs at times of higher flow.<sup>163</sup> Cease to pump rules based on no visible flow are unlikely to protect all flow requirements. Additional measures, including protections of freshes and smaller flood events (discussed in the following **Section 4.4.2**), are also needed.

Current cease to pump thresholds are low. Unregulated river licensees in all water sources must cease pumping when there is no visible flow immediately downstream of the pump site or into and out of the pumping pool.<sup>164</sup> Boambee Creek, Bonville Creek, Coffs Creek, Corindi River, Dirty Creek, Korora Basin and Woolgoolga Creek have an additional provision to cease pumping if there is no visible flow at an identified reference point. Since July 2014, cease to pump conditions were extended to the few aquifer access licences that extract from alluvial aquifers within 40 metres of a waterway to reflect their highly connected nature.<sup>165</sup>

The Plan's water sources comprise short, relatively high-energy streams, characterised by pool and riffle sequences. The cease to pump threshold of no visible flow is likely to allow extraction below shallow habitats such as riffles and drying out of the habitat they provide for

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<sup>162</sup> Note that users accessing their basic landholder rights, extracting from a runoff harvesting dam or listed in Schedule 2 of the Plan are not required to cease pumping under the Plan's requirements.

<sup>163</sup> Rainfall runoff is a fundamental component in determining total water availability in all river systems. Not all rainfall becomes runoff. The rate of runoff varies over time depending on how wet and dry the conditions have been, while the percentage of rain becoming runoff depends on several factors, dominated by rainfall depth and affected by irrigation and other in-farm factors. The higher the average rainfall, the higher the average percentage of rainfall becoming runoff. While runoff from individual rainfall events may be very high, the long-term average will be much lower (DPIE-Water (2019) *Floodplain harvesting fact sheet – estimating rainfall run-off and harvesting in the NSW Murray-Darling Basin*. Available at: [https://www.industry.nsw.gov.au/\\_\\_data/assets/pdf\\_file/0008/272726/Estimating-rainfall-run-off-and-harvesting-in-the-NSW-Murray-Darling-Basin-Fact-Sheet.pdf](https://www.industry.nsw.gov.au/__data/assets/pdf_file/0008/272726/Estimating-rainfall-run-off-and-harvesting-in-the-NSW-Murray-Darling-Basin-Fact-Sheet.pdf)).

<sup>164</sup> 'No visible flow' is defined as the continuous downstream movement of water that is perceptible to the human eye (Office of Water (2010) *Guidelines for surface water sharing plan report cards*. Available at: [http://www.water.nsw.gov.au/\\_\\_data/assets/pdf\\_file/0008/547802/wsp\\_surface\\_water\\_guide\\_to\\_report\\_cards.pdf](http://www.water.nsw.gov.au/__data/assets/pdf_file/0008/547802/wsp_surface_water_guide_to_report_cards.pdf)).

<sup>165</sup> As advised by DPIE-Water, 17 March 2020. Cease to pump thresholds do not apply for existing domestic and stock access licences and local water utilities access licences. Department of Water and Energy (2009) *Water Sharing Plan for the Coffs Harbour Area unregulated and alluvial water sources - Water source rules summaries*.

macroinvertebrates.<sup>166</sup> Loss of these environments is proportionally larger than the loss of pools in drought scenarios.<sup>167</sup> Riffles are significant in river systems to provide macroinvertebrate habitat, re-oxygenate water and promote biogeochemical filtration and nutrient cycling.

DPIE-Water should maintain the existing cease to pump rules and include provisions to incorporate evidence gathered during Plan development and in the first two years of implementation. In the interim they should focus on:

- monitoring and reporting on the methods of licenced extraction in each water source
- improving the evidence base for the Plan.

If extraction shifts significantly towards in-river extraction or at year two of the Plan (whichever occurs earlier), DPIE-Water should reassess cease to pump thresholds and, if required, raise them to protect critical low flows (including through riffle habitats) and maintain environmental assets in and downstream of the Plan area.

The Commission notes that provisions to incorporate evidence have not been implemented in other water sharing plans where they exist and encourages DPIE-Water to undertake the necessary studies and implement findings. This is particularly important in the Plan area due to the existence of flow-sensitive downstream estuaries, the Solitary Islands Marine Park and the potential for reduced flows to cause environmental, social and economic impacts.

#### **4.4.2 Protections of freshes and small floods should be investigated**

As discussed in **Section 4.3.2**, DPIE-Water should define the key environmental assets and their flow regime requirements. The Commission identified several river flow objectives<sup>168</sup> that are at risk due to the change in extraction profile (discussed in **Section 4.2**) and are not managed under the Plan. These objectives are to:

- protect important rises in water levels (described in this review as freshes and small floods)
- maintain or mimic natural flow variability in all streams
- maintain or rehabilitate estuarine processes and habitat.<sup>169</sup>

These objectives are critical to protect or restore river health, ecology and biodiversity, for example, the number and abundance of estuarine species.<sup>170</sup> In particular, protecting freshes and small floods is important to maintain or mimic natural flow variability and maintain estuarine processes.

When the Plan commenced DPIE-Water intended to introduce commence to flow rules to protect what they termed the 'first flush' to estuaries and the Commission is describing as

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<sup>166</sup> University of New England Aquatic Ecology and Restoration Research Group (2019) *Natural Resources Commission Report on Coffs Harbour and Central Coast Water Sharing Plans*, report prepared for the Commission.

<sup>167</sup> Hakala, J.P. and Hartman, K.J. (2004) 'Drought effect on stream morphology and brook trout (*Salvelinus fontinalis*) populations in forested headwater streams', *Hydrobiologia*, 515(1-2), pp. 203-213.

<sup>168</sup> River flow objectives were developed alongside the water quality objectives. Both the river flow and water quality objectives were endorsed by the NSW Government in 1999 after significant, catchment-specific public consultation (Office of Water (2006) *Bellinger River and Coffs Harbour – River Flow Objectives explained*. Available at: <https://www.environment.nsw.gov.au/ieo/Bellinger/report-04.htm>).

<sup>169</sup> Office of Water (2006) *Bellinger River and Coffs Harbour – River Flow Objectives explained*. Available at: <https://www.environment.nsw.gov.au/ieo/Bellinger/report-04.htm>.

<sup>170</sup> *Ibid.*

freshes and small floods.<sup>171</sup> The Plan's background document states that this was to contribute to 'improvement in the condition of estuaries and coastal lake ecosystems'. DPIE-Water advised the Commission that the rules were not progressed due to limited resourcing and the significant work required to meet the *Murray-Darling Basin Plan* requirements in inland water sharing plans.<sup>172</sup> While a commence to flow rule would provide some benefit, it only targets extraction from the river and would be limited due to the prevalence of farm dams, which capture the first portion of rainfall events and reduce the occurrence of freshes and smaller flood events after dry periods and high flows, particularly if dams are on third order streams.

The impact of increasing farm dam storage on streamflow is variable over time and depending on location. Site-specific studies are required to understand local impacts and solutions. Stakeholders advised that reduced downstream flows is contributing to the accumulation of sediment in ICOLLs, reduced water quality and impacting on associated social and economic outcomes.<sup>173</sup> There is limited evidence to attribute these impacts to farm dams or assess the relative contribution of the ongoing drought (see **Section 2.3**).

At this stage, there is insufficient evidence for the Commission to suggest appropriate mechanisms to protect or restore freshes, small floods or other necessary flow requirements. DPIE-Water in conjunction with DPIE-EES should investigate extraction and water requirements as outlined in **Section 4.3** and design and implement a management framework to protect important rises in water levels, maintain natural flow variability and maintain or rehabilitate estuarine processes. Mechanisms may be required outside the Plan to achieve these outcomes such as:

- reducing or capping the extraction potential of farm dams
- managing rainfall runoff and floodplain harvesting (see **Section 7.4** for details)
- implementing alternative mechanisms to maintain flow variability.

## 4.5 Climate change impacts should be addressed

Given the Plan's 10-year period, the replacement Plan should address risks to the flow regime and dependent ecosystems by incorporating likely medium-term impacts of climate change and natural secular variation on water demand and stream flow.

As outlined in **Section 2.3**, climate change is predicted to decrease summer and winter rainfall and runoff. Mean temperatures, the number of hot days over 30 degrees Celsius and evapotranspiration rates are predicted to increase. This will all have an impact on plant stress, water demand and water availability, and may alter the flow regime, connectivity and ecosystem function.

Recent work regarding climate variability indicates that there are risks associated with relying on the relatively brief observed climate record (about 100 years) for water planning, which may

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<sup>171</sup> Department of Water and Energy (2009) *Water Sharing Plan – Coffs Harbour Area Unregulated and Alluvial Water Sources – Background document*, pp. 9. Available at: [https://www.industry.nsw.gov.au/\\_\\_data/assets/pdf\\_file/0010/166843/coffs-harbour-background.pdf](https://www.industry.nsw.gov.au/__data/assets/pdf_file/0010/166843/coffs-harbour-background.pdf).

<sup>172</sup> As advised by DPIE-Water, 17 March 2020.

<sup>173</sup> Personal communication, Department of Primary Industries – Fisheries, February 2019.

not represent the full range of past or longer-term variability.<sup>174</sup> The Commission understands that DPIE-Water is developing methods to better understand and address climatic risk to water management outcomes across NSW.<sup>175</sup> This includes developing methods to incorporate climate change information based on DPIE-EES' NARClIM climate modelling project, which includes a more comprehensive representation of natural variability and integrates climate change projections, especially of increased evaporative demand.<sup>176</sup> The project also extends climate information to 10,000 years of data using statistical techniques.

It is important to note that the readily available NARClIM maps referred to in this report present the multi-model mean, which may understate the change and misrepresent the direction of change. It is possible to further interrogate the NARClIM datasets, including to further understand extreme scenarios but this has not been explored for this review.

The Plan relies on existing water allocation mechanisms, such as trading and AWDs, to adapt to climate change. As currently implemented, the Commission believes that this is inadequate to address either extreme climate variation or climate change. The replacement Plan should better consider climate change given projected temperature increases and decreases in water availability. Revisions to the Plan should:

- ensure the Plan can function under a range of climate change scenarios
- consider how water will be shared to first protect the water source and its dependent ecosystems, second, protect basic landholder rights and thirdly be shared equitably among all other users, if scarcity and demand on the resource increases.

#### 4.6 Risks outside the Plan regulation should be considered

While the bushfires of spring and summer 2019-20 were largely outside the Plan area, it has highlighted a need to plan for catastrophic events. The Commission highlights the NSW Government's recognition of the need to take immediate action to ease the impact of the bushfires on coastal waterways.

Bushfires degrade waterways by impacting water quality and coastal ecosystems, which subsequently impacts estuary environments and local industries such as tourism and aquaculture.<sup>177</sup> The *Bushfire Affected Coastal Waterways Program* provides \$5 million to minimise the effects of the bushfires through activities such as sediment and erosion control, water quality monitoring, wetland restoration or riparian corridor management. This program recognises the need for integrated catchment management to achieve outcomes. Integrated catchment management and improved monitoring should be expanded beyond extreme events and extended to business as usual.

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<sup>174</sup> Zhang, L., Kuczera, G., Kiem, A.S., and Willgoose, G. (2018) 'Using paleoclimate reconstructions to analyse hydrological epochs associated with Pacific decadal variability', *Hydrology and Earth System Sciences*, 22(12), pp. 6399-6414. Available at: <https://www.hydrol-earth-syst-sci.net/22/6399/2018/>.

<sup>175</sup> Personal communication, DPIE-Water, 28 August 2019.

<sup>176</sup> The NARClIM (NSW/ACT Regional Climate Modelling) project is developing regional climate projections for south-east Australia to span the range of likely future changes in climate. It is a collaboration between NSW and ACT governments and the University of NSW Climate Change Research Centre. It will be independently expert reviewed (NSW Government (n.d.) *About NARClIM*. Available at: <http://www.climatechange.environment.nsw.gov.au/Climate-projections-for-NSW/About-NARClIM>); and Personal communication, DPIE-Water, 28 August 2019.

<sup>177</sup> DPIE-EES (2019) *\$5 million for bushfire affected coastal waterways*. Available at: [https://www.environment.nsw.gov.au/news/5-million-for-bushfire-affected-coastal-waterways?utm\\_source=miragenews&utm\\_medium=miragenews&utm\\_campaign=news](https://www.environment.nsw.gov.au/news/5-million-for-bushfire-affected-coastal-waterways?utm_source=miragenews&utm_medium=miragenews&utm_campaign=news).

While some environmental risks can be addressed through the Plan, studies indicate that the ecological condition of Plan water sources is also impacted by issues outside of the Plan regulation. For example, there is evidence that the nitrogen in Hearnese Lake (draining from Double Crossing Creek) is from agricultural production, with nitrogen loads greatest in wet periods.<sup>178</sup> Sediment and nutrient loads into the lake have increased since 2004.<sup>179</sup> These issues may impact threatened species known to occur at Hearnese Lake<sup>180</sup> and will ultimately also be exported into the marine waters of the Solitary Islands Marine Park.

Riparian condition has also been shown to be highly variable. While Station Creek has largely intact vegetation, about 74 percent of riparian vegetation in Pine Brush Creek is disturbed, closely followed by Woolgoolga Lake and Coffs Creek.<sup>181</sup>

Using the principles of integrated catchment management, DPIE-Water should consider risks and measures outside of Plan regulation during Plan development and implementation and identify areas for collaboration or additional funding. This will increase overall resilience at the landscape scale, which is particularly important as climate change places additional pressures on environmental, social and economic outcomes.

Specific issues that should be considered for action in the Plan area include:

- concerns around ‘fertilisation’, nutrient runoff and overwatering of intensive horticulture crops, particularly on steep slopes<sup>182</sup>
- improve aquatic habitat via refuge restoration, riparian restoration, removal of barriers to fish passage and reinstatement of instream woody habitats<sup>183</sup>
- over-clearing and poor management practices along riparian zones and gullies, with an associated need for buffer zones, riparian fencing and native revegetation<sup>184</sup>
- challenges with increasing education and awareness in intensive horticultural industries with high turn-over of smaller operators<sup>185</sup>

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<sup>178</sup> Conrad, S.R., Sanders C.J., Santos, I. R. and White S.A. (2018) *Investigating water quality in Coffs coastal estuaries and the relationship to adjacent land use - Part 1: Sediments*. Report prepared for Coffs Harbour City Council. Available at: [https://www.coffsharbour.nsw.gov.au/environment/Compliance-and-Reporting/Documents/Part1\\_Sediments%20Hearnese%20Lake\\_EL%20report.pdf](https://www.coffsharbour.nsw.gov.au/environment/Compliance-and-Reporting/Documents/Part1_Sediments%20Hearnese%20Lake_EL%20report.pdf).

<sup>179</sup> *Ibid.*

<sup>180</sup> Hearnese Lake provides known habitat for *Sternula albifrons*, vulnerable *Crinia tinnula* and threatened flora *Marsdenia longiloba*, *Niemeyera whitei*, *Senna acclinis* and *Thesium austral* (*Ibid.*).

<sup>181</sup> North Coast Region State of the Environment Report Working Group (2016) *Regional State of the Environment – for the North Coast region of New South Wales*. Available at: <https://www.coffsharbour.nsw.gov.au/environment/Documents/SoE%202016/SoE%20REPORT%202016%20%20designed%20v1.3.pdf>.

<sup>182</sup> For example, North Coast Local Land Service is running a program funded by Catchment Action NSW to implement soil and erosion management plans on horticulture farms in the Sandy Beach area to mitigate soil and nutrient loss in the Hearnese Lake Catchment.

<sup>183</sup> Department of Primary Industries – Fisheries (2019) *Improving fish habitats*. Available at: <https://www.dpi.nsw.gov.au/fishing/habitat/rehabilitating/habitats>.

<sup>184</sup> Ryder, D., Mika, S., Vincent, B., Burns, A. and Schmidt, J. (2016) *Coffs Harbour Region Ecohealth Project 2014-2015: Assessment of River and Estuarine Condition. Final Technical Report*. Available at: [https://www.coffsharbour.nsw.gov.au/environment/Documents/SoE%202016/Coffs%20Ecohealth%20Report%20\[Web%20version\]%20May%202016.pdf](https://www.coffsharbour.nsw.gov.au/environment/Documents/SoE%202016/Coffs%20Ecohealth%20Report%20[Web%20version]%20May%202016.pdf).

<sup>185</sup> Note: the Australian Blueberry Growers Association has a Code of Conduct that addresses environmental impacts and water availability and supports the recent activities of the Natural Resource Access Regulator (Australian Blueberry Growers Association (2018) *Code of Conduct*. Available at: <https://abga.com.au/wp-content/uploads/2018/07/BlueberryCodeOfConduct-Final.pdf>; and Berries Australia (2019) *Berries Australia welcomes increased compliance activities on Coffs Coast*. Available at: <https://abga.com.au/ba-welcomes-increased-compliance-activities-on-coffs-coast/>).

- causes of seagrass decline in the Pine-Bonville Creek, Corindi River and Boambee Creek estuaries.<sup>186</sup>

## 4.7 Recommendations

The Commission presents the following recommendations (**Table 11**) and suggested actions (**Table 12**) to strengthen environmental outcomes.

**Table 11: Recommendations for DPIE-Water to improve environmental outcomes**

Recommendations	
2	<p>In the next two years during Plan development, collect evidence (as required) and transparently report to:</p> <ul style="list-style-type: none"><li>a) describe the natural flow regime incorporating data from <b>recommendation 12</b> (see <b>Chapter 7</b>)</li><li>b) map and ground-truth the presence and extent of water and groundwater dependent environmental assets including estuarine and coastal ecosystems</li><li>c) identify key assets and ecosystem functions, their conditions and the factors driving their condition. Classify high priority ecosystems and high ecological value waterways including those assets identified in (b)</li><li>d) define the flow (and groundwater) requirements of key assets and functions</li><li>e) determine the impact of the Plan (including seasonal variations) on the flow regime in (a) and key assets and functions flow requirements in (d).</li></ul>
3	<p>Improve consideration of groundwater by building on groundwater assessment processes used for recent inland water sharing plans specifically to:</p> <ul style="list-style-type: none"><li>a) identify high, medium and low priority groundwater dependent ecosystems in the Plan and refer to them explicitly as relevant in any groundwater dependent ecosystem protection provisions</li><li>b) clearly define groundwater terms and their relevance to the Plan, including connectivity, ecological value, potential and type – connectivity should include both discharge of groundwater to surface water and surface water recharge to groundwater systems</li><li>c) establish a coastal floodplain alluvial groundwater source and appropriate rules to bring governance of these licences and their extraction under the <i>Water Management Act 2000</i></li><li>d) review setback distances for work near identified groundwater dependent ecosystems and standardise these based on the <i>NSW Aquifer Interference Policy 2012</i>.</li></ul>
4	<p>Understand and better protect planned environmental water:</p> <ul style="list-style-type: none"><li>a) during Plan development, define and assess the impacts of extraction by:<ul style="list-style-type: none"><li>i. gathering data on farm dam location and capacity alongside other extraction mechanisms and model cumulative impacts on each waterway's flow regime</li></ul></li></ul>

<sup>186</sup> Ryder, D., Mika, S., Vincent, B., Burns, A. and Schmidt, J. (2016) *Coffs Harbour Region Ecohealth Project 2014-2015: Assessment of River and Estuarine Condition. Final Technical Report*. Available at: [https://www.coffsharbour.nsw.gov.au/environment/Documents/SoE%202016/Coffs%20Ecohealth%20Report%20\[Web%20version\]%20May%202016.pdf](https://www.coffsharbour.nsw.gov.au/environment/Documents/SoE%202016/Coffs%20Ecohealth%20Report%20[Web%20version]%20May%202016.pdf).

## Recommendations

- ii. determining the spatial and temporal variation in extraction for each waterway and water source
  - iii. assessing impacts of extraction on each waterway's flow regime and each water source's environmental, social and economic outcomes, including estuarine and coastal function.
- b) audit changes in entitlements under the Plan, defining entitlement on issue in each water source and where this has increased during the Plan
  - c) if an increase in entitlement overlaps with water sources of high instream value, determine any risks that may occur as a result of this increase.
  - d) using (a) through (c), define a numeric LTAAEL in the remade Plan and include a provision to adjust it if required in Year 5 based on **recommendation 2**
  - e) if required, implement the provision in (c) and associated measures in Year 5 to bring LTAAEL to the level required to protect the volume of planned environmental water identified in **recommendation 2**
  - f) monitor and provide an annual publicly available report summarising the estimated extraction volume and methods of licenced extraction in each water source.
- 
- 5 Protect key environmental assets' flow requirements and maintain natural flow variability and connectivity:
- a) if extraction shifts significantly towards in-river extraction, or at Year 2 of the Plan (whichever occurs earlier), reassess the cease to pump thresholds and raise them as required to protect the low flow requirements of environmental assets and functions
  - b) design and implement provisions at Plan commencement to protect the flow requirements of key environmental assets
  - c) implement additional mechanisms, such as protection of freshes and small floods, as necessary outside the Plan to maintain natural flow variability and ecosystem function, including estuarine, coastal and coastal lagoon berm function.
- 
- 6\* Incorporate climate change impacts:
- a) ensure the Plan functions appropriately under a range of climate change scenarios
  - b) review and revise Plan provisions based on the best available climate information and allow for Plan amendments to address longer-term water availability based on evidence of changing climatic conditions.
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**Table 12: Suggested actions for DPIE-Water to improve environmental outcomes**

## Suggested actions

- A Complete specific, local scale studies incorporating detailed assessments of existing take along with hydrological, ecological and socio-economic studies for any water source under consideration for increased harvestable rights extraction. The potential impacts should be assessed in detail, consulted with the broader affected communities and transparently reported.
  - B Outline a transparent process that can be initiated to review water sharing arrangements if climate change results in significant changes in the water available in the system.
-

## Suggested actions

- C\* Fund and implement integrated catchment actions to improve riverine and estuarine health objectives drawing on relevant agencies across the cluster of Planning, Industry and Environment.
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## 5 Opportunities to improve social and cultural outcomes

Social objectives and outcomes should be revised in the replacement Plan to comprehensively reflect community values, including Aboriginal values. The replacement Plan should better support Aboriginal water interests through access and use provisions and by anticipating future native title determinations and land use agreements.

The Commission recommends more active and consistent engagement with stakeholders across the community. For Aboriginal stakeholders, this must be negotiated and agreed on a nation-by-nation basis to ensure appropriate engagement and involvement in water planning and management.

### 5.1 The Plan does not adequately reflect community values

The benefits of a healthy river system are valued by the whole community. The Plan does not explicitly outline how it supports community values and does not incorporate them into its objectives. DPIE-Water has recently updated water sharing plan templates to make social, economic and environmental objectives more explicit, including how Aboriginal cultural and heritage values, uses and objectives are protected, preserved, maintained or enhanced. In lieu of existing, specific objectives, the Commission has considered the NSW river flow and water quality objectives, which were developed based on broad community consultation for river catchments across NSW.<sup>187</sup> The Commission understands that DPIE-EES are piloting revisions of these objectives in Sydney catchments and supports the expansion of this work across NSW.

The Commission considers that the Plan intends to support community values related to aquatic ecosystems, drinking water, agriculture and irrigation. Objectives that were identified by the Coffs Harbour community that are not reflected in the Plan and its supporting documents include:

- recreation and tourism
- feelings of attachment and wellbeing associated with knowing the catchment was healthy
- the production of fish, shellfish and crustaceans in the lower estuarine areas.<sup>188</sup>

Submissions highlighted the importance of being able to fish and swim in Plan waterways. They also highlighted that reduced water flows are impacting on community activities downstream and that there has been a significant increase in the frequency of reduced flows under the Plan. While the Plan boundary ends either at the mangrove limit or the river mouth (depending on the water source), Plan rules and compliance are the main governable factor<sup>189</sup> impacting on inflows to the estuaries and therefore the interactions with the estuarine and offshore coastal systems of the Solitary Islands Marine Park.

Interest groups also have specific concerns relating to water management. Recreational fishers place a high value on Boambee Creek, Bonville Creek, Coffs Creek and the Corindi River, which

<sup>187</sup> OEH (2006) *Catchment at a glance – Bellinger and Coffs Harbour Catchments*. Available at: <https://www.environment.nsw.gov.au/ieo/Bellinger/caag.htm>.

<sup>188</sup> OEH (2006) *Bellinger and Coffs Harbour – Community comment on the objectives*. Available at: <https://www.environment.nsw.gov.au/ieo/Bellinger/report-01.htm>.

<sup>189</sup> The Plan is the main factor able to be directly managed, noting that hydrological drought and climate variability will also impact on inflows. The Plan should be designed to account for climate variability and not exacerbate hydrological drought.

are highly fished.<sup>190</sup> One stakeholder commented that recreational fishers are interested in the Plan outcomes but have not been engaged in the process or Plan to date and find it difficult to provide input. This is likely to be the case for most community groups who do not directly interact with water access licences and the Plan.

In developing a replacement Plan, DPIE-Water should engage early with the local community to revisit water quality and river flow objectives and ensure all identified values are considered. Monitoring and reporting can then occur against agreed community values. Specific interest groups and the broader community should also be engaged to develop an understanding of, and shared language for, participation in developing and implementing the new Plan.

Although there is currently no intention to supply town utilities from the Plan water sources, projected population growth and the likelihood and impacts of utility supplies being drawn from the Plan area in the future may also be considered as part of the assessment of community values.

## 5.2 Aboriginal outcomes can be improved

Aboriginal community wellbeing is entwined with the ability to access land, water and associated natural resources, as well as the health of the environment.<sup>191</sup> Limited access and its associated impacts on cultural practice have created a history of socio-economic disadvantage and health and wellbeing impacts.

It is important that the Plan supports Aboriginal water values through provisions that recognise land and water rights and interests, processes that identify Aboriginal objectives, water values and uses, and ongoing engagement and involvement in water management.

### 5.2.1 Aboriginal values, outcomes and uses need to be identified

One of the Plan's objectives is to 'protect, preserve, maintain or enhance the Aboriginal, cultural and heritage values of these water sources' and the relevant performance indicator is the 'extent of recognition of spiritual, social and customary values of water to Aboriginal people'.<sup>192</sup>

The Commission has not received any information or data on this objective or indicator, and it is not evident that there are strategies to achieve the objective. Specific water-dependent Aboriginal cultural values were not identified during Plan development, beyond the desire for naturally flowing rivers with healthy aquatic ecosystems, which aligns with the Plan's vision for healthy and enhanced water dependant ecosystems.<sup>193</sup>

The Plan needs to better support Aboriginal cultural and heritage values, uses, objectives and outcomes in line with relevant legislation. Both state and national water legislation and policy integrate broader recognition of Aboriginal, cultural and heritage values and uses of water. In

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<sup>190</sup> Personal communication, Department of Primary Industries – Fisheries, 2019.

<sup>191</sup> NSW Department of Environment, Climate Change and Water (2010) *State of the Catchments 2010: Economic sustainability and social well-being – Northern Rivers region*. Available at: <https://www.environment.nsw.gov.au/resources/soc/northernrivers/10429NRIVERSecosus.pdf>.

<sup>192</sup> Clause 12(j) of the Plan.

<sup>193</sup> Department of Water and Energy (2009) *Water Sharing Plan – Coffs Harbour Area Unregulated and Alluvial Water Sources – Background document*. Available at: [https://www.industry.nsw.gov.au/\\_\\_data/assets/pdf\\_file/0010/166843/coffs-harbour-background.pdf](https://www.industry.nsw.gov.au/__data/assets/pdf_file/0010/166843/coffs-harbour-background.pdf).

NSW, the Act includes a broad objective to ‘recognise and foster the significant social and economic benefits to the Aboriginal people in relation to their spiritual, social, customary and economic use of land and water’ and associated provisions.<sup>194</sup>

The broad legislative and policy objectives need to be implemented in a way that recognises the diverse water values of Aboriginal peoples, both material and intangible, including:

- cultural heritage and evidence of historic occupation and use
- connection to key water dependent plant and animal species
- customary food, fibre and tool production
- land and water management activities and expertise
- creation stories and customary lore
- movement and presence of spiritual and metaphysical beings
- well-being and recreation
- economic development and opportunities.<sup>195</sup>

Further, it should be acknowledged that these values are interconnected as part of a broad cultural landscape and are not confined only to individual, tangible cultural sites.<sup>196</sup>

The National Water Initiative acknowledges that ‘native title should not be solely relied upon to deliver Indigenous peoples the access and rights to their traditional waters. Water planners should consider other mechanisms for giving access and rights to water to Indigenous peoples’. There have been significant efforts to provide guidance on how to undertake values assessments and consult effectively with Aboriginal people specifically in water planning and management.<sup>197</sup> However, these guidelines are not mandatory, so a proactive approach is required when identifying and protecting cultural values and uses and involving Aboriginal people in water planning and ongoing management.

The Commission considers that a better understanding and articulation of Aboriginal water interests is needed for the Plan to protect, maintain and enhance these values and uses. The Commission notes the efforts of DPIE-Water in Aboriginal engagement and values identification as part of the water resource planning process. This nation-based engagement model needs to be built on to identify relevant values and uses in the Plan area with a broader range of Aboriginal stakeholders including Traditional Owners, Nations, Local Aboriginal Land Councils, relevant local Aboriginal organisations and stakeholders.

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<sup>194</sup> *Water Management Act 2000*, Division 3, Part 2, Section 13 (1(e)) and Division 3, Section 55.

<sup>195</sup> Murray Lower Darling Rivers Indigenous Nations, Northern Basin Aboriginal Nations and North Australian Indigenous Land and Sea Management Alliance (2017) *Dhungala Baaka: Rethinking the Future of water management in Australia*. Available at: <http://www.mldrin.org.au/wp-content/uploads/2018/06/Dhungala-Baaka.pdf>.

<sup>196</sup> Interviews: Indigenous Land and Sea Corporation, 30 September 2019; Illawarra Local Aboriginal Land Council, 24 October 2019; and Forster Local Aboriginal Land Council, 31 October 2019.

<sup>197</sup> Including additional modules for the National Water Initiative and the Basin Plan, and as part of the National Cultural Flows project.

## 5.2.2 Aboriginal water access needs to be simplified

Meaningful access to water for Aboriginal peoples has been precluded by narrow definitions of water for 'traditional purposes';<sup>198</sup> either under cultural water access licences, community development or native title.<sup>199</sup> Aboriginal cultural and community development licenses are only permitted in Plan water sources with low to medium instream value, and subject to certain ecological conditions, restrictions and limitations for use.

Aboriginal community development licences allow water to be pumped from rivers in higher flows and stored to be used as needed.<sup>200</sup> Aboriginal community development access licences were not recommended in the Plan area, as high flows were not considered capable of supporting additional commercial-scale extraction.<sup>201</sup>

Aboriginal cultural licences in the Plan area must be less than 10 ML per year and can only be used by Aboriginal persons or communities for personal, domestic or communal purpose, including recreational, cultural and ceremonial purposes. However, no licences have been granted. Stakeholders advised that there would be definite interest in these licences but there is a lack of consultation and awareness of these licenses and how to apply for and use them.<sup>202</sup>

Aboriginal licence categories and the processes for applying for them should be simple and clear to improve access to water. Policy should address a range of Aboriginal water interests, including economic opportunities, and recognise other issues that can impact water access, including:

- limits to volumetric entitlement
- restrictions on uses of water to narrow cultural definitions
- exclusion of economic and commercial uses of water
- complexity of water licence governance and application processes
- limited awareness and capability around water policy and governance
- reliance on lengthy and complex land rights processes for accessing water
- restricted physical access to land and water, for example private lands, fencing, poorly maintained land and banks
- lack of infrastructure to use water, for example pumps and dams.

DPIE-Water should help to address the significant barriers to Aboriginal people accessing and using water. Actions to simplify Aboriginal water licences need to be considered – this may

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<sup>198</sup> The Plan's background document states that 'the plans allow Aboriginal communities to apply for water access licences for cultural purposes such as manufacturing traditional artefacts, hunting, fishing, gathering, recreation and for cultural and ceremonial purposes. Aboriginal cultural licences can also be used for drinking, food preparation, washing and watering domestic gardens.' (Department of Water and Energy (2009) *Water Sharing Plan – Coffs Harbour Area Unregulated and Alluvial Water Sources – Background document*. Available at: [https://www.industry.nsw.gov.au/\\_\\_data/assets/pdf\\_file/0010/166843/coffs-harbour-background.pdf](https://www.industry.nsw.gov.au/__data/assets/pdf_file/0010/166843/coffs-harbour-background.pdf)).

<sup>199</sup> The Act includes three categories of Aboriginal water access licences; cultural, Aboriginal community development and Aboriginal environment licences.

<sup>200</sup> Department of Water and Energy (2009) *Water Sharing Plan – Coffs Harbour Area Unregulated and Alluvial Water Sources – Background document*. Available at: [https://www.industry.nsw.gov.au/\\_\\_data/assets/pdf\\_file/0010/166843/coffs-harbour-background.pdf](https://www.industry.nsw.gov.au/__data/assets/pdf_file/0010/166843/coffs-harbour-background.pdf).

<sup>201</sup> *Ibid.*

<sup>202</sup> Personal communication, Coffs Harbour Local Aboriginal Land Council, December 2019.

include the simplification of licence categories and removal of unnecessary restrictions on the purpose of water use.<sup>203</sup> Any attempts to address Aboriginal water access through these means needs to be part of the co-designed, state-wide Aboriginal Water Framework (discussed in **Section 5.2.4**).

### 5.2.3 Native title and other land use agreements need to be anticipated

A native title holder is entitled to take and use water for a range of needs (including personal, domestic and non-commercial communal purposes such as manufacturing traditional artefacts, hunting, fishing, recreation, cultural and ceremonial purposes) without an access licence, water supply work approval or water use approval.<sup>204</sup> Native title rights are a basic landholder right alongside domestic and stock rights and harvestable rights.

While one of the Plan's performance indicators is the 'extent to which native title requirements have been met', there are currently no native title determinations or claims within the Plan area.<sup>205</sup> The Plan area is directly north of a determination (NSD6104/1998), which includes Bellinger River south to Oyster Creek. In addition, the Gumbaynggirr People are preparing a Gumbaynggirr Nation Claim, which is proposed to include the whole Plan area.<sup>206</sup>

Inadequate recognition of native title is common across most water sharing plans, undermining stated priorities for Aboriginal outcomes in water planning and management.<sup>207</sup> DPIE-Water should undertake proactive engagement as part of Indigenous Land Use Agreements or other agreements, where possible, and in line with:

- specific water-related provisions of the *Native Title Act 1993*, including government and third parties impacts on native title rights to water
- provisions under the *Water Management Act 2000* where native title rights must not be detrimentally affected by lesser priorities of water extraction.

The Plan should include set timeframes for amendment following future native title determinations, Indigenous Land Use Agreements or other agreements to prevent issues related to the long timeframes of native title claims and extended periods of inaction that often follow final determinations. The Commission recommends that a timeframe of three months is adopted to undertake initial amendments of the Plan, and adequate time is allocated to

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<sup>203</sup> The restrictions on the purposes and dealings of licences held by Aboriginal peoples are unnecessary and should be removed. No other category or sub-category of licence is subject to the specification of the purpose of take.

<sup>204</sup> *Water Management Act 2000*, Section 55(1).

<sup>205</sup> Clause 12(h) of the Plan.

<sup>206</sup> Submission: NTSCorp, received 17 January 2019.

<sup>207</sup> National Water Commission (2009) *Australian Water Reform 2009: Second Biennial Assessment of Progress in Implementation of the National Water Initiative*. Available at <https://www.agriculture.gov.au/sites/default/files/sitecollectiondocuments/water/nwi-assessment-2009.pdf>; National Water Commission (2011) *The National Water Initiative – Securing Australia's Water Future: 2011 Assessment*. Available at: <https://apo.org.au/sites/default/files/resource-files/2011/09/apo-nid26368-1233946.pdf>; National Water Commission (2014) *A Review of Indigenous Involvement in Water Planning*. Available at: [https://www.mdbrc.sa.gov.au/sites/default/files/mdbrc-exhibit-556-national-water-commission-a-review-of-indigenous-involvement-in-water-planning.pdf?acsf\\_files\\_redirect](https://www.mdbrc.sa.gov.au/sites/default/files/mdbrc-exhibit-556-national-water-commission-a-review-of-indigenous-involvement-in-water-planning.pdf?acsf_files_redirect); and Productivity Commission (2017) *National Water Reform Inquiry, Draft Report*. Available at: <https://www.pc.gov.au/inquiries/completed/water-reform/report>.

undertake detailed engagement, determine water allocations, and make final Plan amendments.<sup>208</sup>

#### 5.2.4 Active and ongoing Aboriginal engagement is needed

Consistent and ongoing engagement is important to achieve the Act's outcomes and Plan objectives for Aboriginal stakeholders. While Aboriginal communities were engaged during the Plan's development, stakeholders advised that there was minimal to no ongoing engagement through Plan implementation. Consultation to date has occurred in an ad hoc manner and has not been with representative stakeholder groups.

Licence or trade approvals should require consultation with Aboriginal community representatives to determine and minimise potential impact on cultural sites. Consultation is only instigated if an Aboriginal Heritage Information Management System (AHIMS) search shows results within a 300-metre buffer of the proposed licence. However, AHIMS does not include a comprehensive list of cultural and important sites in the area.

The Plan does not provide measures to address cultural values. NTSCorp's submission noted that all major Aboriginal cultural assets should be considered in decision-making that may affect their integrity. Plan implementation should require effective and ongoing consultation with a representative Aboriginal stakeholder group, including for licence or deal approvals, to identify and minimise potential impacts on cultural sites.

There have been significant efforts to provide guidance on how to effectively engage with Aboriginal stakeholders to identify cultural water values,<sup>209</sup> including Aboriginal waterways assessments<sup>210</sup> and cultural flows assessments.<sup>211</sup> DPIE-Water should draw on these established guidelines and processes to begin to better understand, value and support the values of Aboriginal people in the Plan area. The Commission recognises DPIE-Water's recent efforts to address these issues for Murray-Darling Basin plans by engaging on a nation-by-nation basis as part of water resource plan development.

DPIE-Water should expand these efforts and use the process to identify values, develop objectives and outcomes, and determine required cultural flows to support Aboriginal water values in consultation with Aboriginal stakeholders across the remainder of NSW.

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<sup>208</sup> The Commission's recommends a volumetric or proportional allocation as it helps to clarify what is achievable within the native title entitlement. However, this does vary, with some native title rights providing an entitlement without a specific allocation. Some stakeholders have advised the Commission that the focus on an allocation may detract from the process of recognising cultural entitlements due to the lengthy and complex processes involved in determining an allocation.

<sup>209</sup> Including additional modules for the *National Water Initiative* and the *Basin Plan*, and as part of the *National Cultural Flows* project.

<sup>210</sup> The purpose of the Aboriginal Waterways Assessment Program was to develop a tool that consistently measures and prioritises river and wetland health so that Traditional Owners can more effectively participate in water planning and management in the Basin. (Murray-Darling Basin Authority (2017) *Aboriginal Waterways Assessment Program*. Available at: <https://www.mdba.gov.au/publications/mdba-reports/aboriginal-waterways-assessment-program>).

<sup>211</sup> The National Cultural Flows Research Project is a project driven by and for Aboriginal people, sought to establish a national framework for cultural flows. The framework, released in 2018, provides the first guide and method for future planning, delivery, and assessment of cultural flows (Murray-Darling Basin Authority (2019) *Cultural Flows*. Available at: <https://www.mdba.gov.au/discover-basin/water/cultural-flows>).

Due to the long timeframes to undertake meaningful engagement and build trust, it is important to follow clear and transparent guidelines. The Commission recommends agreeing on an appropriate engagement process and timeframe with Aboriginal stakeholders, noting this will vary between areas.

Across all water sharing plan reviews, there is consistent evidence and feedback that significant efforts are needed to redress Aboriginal values and uses, objectives and outcomes across NSW in partnership with Aboriginal stakeholders. This needs to be undertaken using a state-wide approach that is consistent and transparent, with supporting governance, staff and resources. In previous reviews, the Commission has identified valuable examples of such approaches.<sup>212</sup>

The Commission have been made aware that DPIE-Water are making significant progress on this state-wide framework in consultation with the NSW Peak Aboriginal Bodies Group.<sup>213</sup> The Commission strongly supports these efforts and recommends that DPIE-Water continue to drive the state-wide changes required to adequately address Aboriginal water issues comprehensively across legislation, policy, programs and processes by the end of 2020. Any efforts need a consistent policy framework and associated funding to support ongoing Aboriginal involvement and leadership in water management in NSW, beyond the water sharing plan processes.

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<sup>212</sup> Examples include:

- Recent reforms in Victoria as part of the Water and Catchment Legislation Amendment Bill 2019 which formalised obligations for Victorian water and catchment management agencies to engage with and support opportunities for Aboriginal involvement as part of the 'Water for Victoria Plan'. This sets out the process for documenting water-dependent values, collaborating with water management agencies and pursuing economic development opportunities through access to water.
- The *Yarra River Protection (Wilip-gin Birrarung murron) Act 2017*, which combines Traditional Owner knowledge with modern river management expertise and treats the Yarra as one integrated living natural entity to be protected. It also gives an independent voice to the river through the Birrarung Council, a statutory advisory body which must have at least two Traditional Owner representatives on it.
- Whole-of-Country planning and management such Gunaikurnai Land and Waters Aboriginal Corporation and Native Title Services Victoria (2015) *Gunaikurnai Whole-of-Country Plan*. Available at: [www.glawac.com.au](http://www.glawac.com.au); Dja Wurrung Clans Aboriginal Corporation (2014) *Dja Wurrung Country Plan 2014-34*. Available at: [www.djadjawurrung.com.au](http://www.djadjawurrung.com.au); and Barengi Gadjin Land Council (2017) *Country Plan: Growing What Is Good*. Available at: [www.bglc.com.au](http://www.bglc.com.au).
- Dedicated Aboriginal roles in water management (for example, Aboriginal rangers and water officers for monitoring and compliance).
- Aboriginal Water and Land Holder and an associated Trust Account.
- Cultural Flows Projects and officers.
- Economic development opportunities through Aboriginal-led programs and business ownership such as aquaculture businesses (University of Technology Sydney (2016) *Social and Economic Evaluation of NSW Coastal Aquaculture*. Available at: [www.uts.edu.au/sites/default/files/fass-report-social-economic-evaluation-nsw-coastal-aquaculture.pdf](http://www.uts.edu.au/sites/default/files/fass-report-social-economic-evaluation-nsw-coastal-aquaculture.pdf)).

<sup>213</sup> Interview: Principal Aboriginal Policy and Legislation Officer - Water Policy & Legislation, DPIE-Water, 28 February 2020.

## 5.3 Recommendations

The Commission presents the following recommendations (**Table 13**) and suggested actions (**Table 14**) to strengthen social and cultural outcomes.

**Table 13: Recommendation for DPIE-Water to improve social and cultural outcomes**

### Recommendation

- 7\* Continue work to improve Aboriginal engagement and outcomes, including work to:
- a) strengthen and expand the nation-by-nation engagement developed as part of the inland water resource plan process to coastal areas and to other representative Aboriginal groups
  - b) use the strengthened engagement process to identify Aboriginal values and uses, objectives and outcomes, and flow allocations in the Plan area, then link these to strategies, performance indicators and measuring and reporting requirements
  - c) simplify licence categories or co-design other water access mechanisms in consultation with Aboriginal peoples that can support identified Aboriginal water values, rights and uses
  - d) include a timeframe of three months to initially amend the Plan to acknowledge any native title determinations and Indigenous Land Use Agreements and allocate enough time to undertake detailed engagement with stakeholders on the final Plan amendment and allocation process.

**Table 14: Suggested actions for DPIE-Water to improve social and cultural outcomes**

### Suggested actions

- D\* Integrate the NSW river flow and water quality objectives into the Plan. Revisit the objectives during community consultation to agree on currency of objectives and develop community understanding to improve participation in Plan development and implementation.

## Suggested actions

- E\* Develop the NSW Aboriginal Water Framework by end-2020 to provide consistent and transparent guidelines and resourcing for Aboriginal water access and involvement in water planning and management. At a minimum, the framework should consider:
- a) relevant guidelines and legislation, including any need for legislative reforms
  - b) Aboriginal water values and its uses
  - c) processes for allocating water for Aboriginal interests including cultural, environmental, social and economic purposes
  - d) processes for improving Aboriginal water access and use, through simplified licencing or other identified mechanisms
  - e) clear requirements for including native title determinations and proactive processes for undertaking other land/water use agreements
  - f) strengthened Aboriginal engagement processes across the state to expand on the basin engagement process, broaden the stakeholder base (to include Traditional Owners, Nations, Local Aboriginal Land Councils and other relevant groups), and increase Aboriginal staff with capacity to lead and maintain engagement.
  - g) appropriate Aboriginal-led governance and decision-making arrangements, such as an Aboriginal Water Holder
  - h) adequate resources including dedicated Aboriginal staff with capability in water planning and management, and funding, such as an Aboriginal Water Trust.

## 6 Opportunities to improve economic outcomes

Plan performance has not been monitored and data is not available to definitively link economic benefits or impacts to the Plan. However, the Plan has allowed for economic benefits to be realised through the expansion of horticulture.

Given changes to regional extraction over time and stakeholder concern, DPIE-Water should reassess the economic dependence of water sources and assess the full range of economic benefits and impacts.

Trading under the replacement Plan can also be better supported by improving administration systems and price reporting, implementing comprehensive metering and ensuring compliance monitoring.

### 6.1 The Plan has enabled the transition to irrigated horticulture

The Commission cannot assess the economic benefits from any changes in water use patterns or compliance with extraction limits and cease to pump thresholds due to a lack of metering and water use information. However, by providing licenced entitlement – or the ability to extract water – the Plan has allowed for horticultural expansion in the Plan area, which has delivered economic value to the region.

Over the Plan period, all license categories had full annual allocations (100 percent or 1 ML per share), including 200 percent allocation in the first year. As discussed in **Section 4.3.5**, there appears to have been an increase in licence entitlements, further supporting the growth of irrigated horticulture. In areas of the Plan where blueberry and banana production occur, the proportion of people working in agriculture is higher than the Coffs Harbour local government area average.<sup>214</sup>

### 6.2 The full range of economic benefits and impacts should be considered

The Plan was developed recognising the economic benefits of commercial extraction to irrigators and the region.<sup>215</sup> When the Plan commenced in 2009, five of its water sources were classified as having a high economic dependence on commercial extraction due to the high value of production from horticultural irrigation:

- Boambee Creek
- Bonville Creek
- Coffs Creek
- Korora Basin

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<sup>214</sup> Coffs Harbour City Council (2017) *Local Growth Management Strategy – Rural Lands Issues and Options*. Available at: <https://www.coffsharbour.nsw.gov.au/Building-and-Planning/Growth-Strategies/Documents/Rural%20Lands%20Strategy/Rural%20Lands%20Issues%20and%20Options%20Paper.pdf>.

<sup>215</sup> Department of Water and Energy (2009) *Water Sharing Plan – Coffs Harbour unregulated and alluvial Water Sources – Background document*. Available at: [https://www.industry.nsw.gov.au/\\_\\_data/assets/pdf\\_file/0010/166843/coffs-harbour-background.pdf](https://www.industry.nsw.gov.au/__data/assets/pdf_file/0010/166843/coffs-harbour-background.pdf).

- Woolgoolga Creek.<sup>216</sup>

Given the substantial land use change that has occurred since 2009, the identification of water sources with high economic dependence should be revisited when developing the replacement Plan to ensure currency. Plan rules must subsequently be based on the prioritisation required by the Act.

When the economic dependence of water sources is reviewed, the full range of economic benefits and impacts should be assessed and included to avoid perverse outcomes and ensure that all potential impacts are considered and addressed. Factors that are not currently considered and should be assessed when developing the replacement Plan include:

- benefits and impacts of flow and water quality on industries and water uses such as tourism, recreational and commercial fisheries, ecosystem services and community activities
- benefits and impacts from the growth in horticulture (despite short term flow-on economic benefits to the community, stakeholder submissions highlighted concerns regarding its growth and longer-term sustainability, including compliance issues causing water shortages for the environment and other users including horticultural users, and water quality impacts).

### 6.3 Support mechanisms for trade can be improved

The Plan should maximise the social and economic benefits of water use while protecting environmental and social outcomes.<sup>217</sup> To do this, the Plan sets dealing rules (referred to as trade rules in this review). Trade rules are intended to encourage movement of water access licences to the highest value use, while protecting the environmental health of the water source and preventing over-extraction. Trade rules should be based on environmental requirements<sup>218</sup> and should prevent adverse impacts on basic landholder rights and features of major cultural, heritage or spiritual significance.<sup>219</sup> Entitlements should not increase through trading into high conservation value water sources and Plan rules sheets restrict trade into high instream value water sources. The Commission has taken high instream value water sources as outlined in Plan documents to be high conservation water sources.<sup>220</sup>

**Table 15** summarises trades across water sources under the Plan (a total of 53). The highest frequency of trades occurred in Bonville Creek (12 trades) followed by Woolgoolga Creek (11 trades). The most shares traded occurred in Bonville Creek (172 units) and Korora Basin (151 units).

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<sup>216</sup> *Ibid.*

<sup>217</sup> The objective of trading is to help maximise social and economic benefits of access licences for the community as required under the objects of the Act - see *Access Licence Dealing Principles Order 2004*, Clause 10.

<sup>218</sup> As summarised from *Access Licence Dealing Principles Order 2004*, Clause 7, trades should:

- not adversely affect environmental water and water dependent ecosystems identified in the Plan
- be consistent with any strategies to maintain or enhance water quality
- not increase commitments to extract from water sources identified in the Plan as high conservation value
- not increase commitments to extract above sustainable levels identified in the Plan.

<sup>219</sup> *Access Licence Dealing Principles Order 2004*, Clauses 7-9.

<sup>220</sup> NSW Department of Water and Energy (2009) *Report card for [various] water source*. Available at: [http://archive.water.nsw.gov.au/?root=822712&queries\\_content\\_query=Coffs+Harbour&search\\_page\\_79634\\_2\\_submit\\_button=Search&current\\_result\\_page=1&results\\_per\\_page=0&submitted\\_search\\_category=&mode=results](http://archive.water.nsw.gov.au/?root=822712&queries_content_query=Coffs+Harbour&search_page_79634_2_submit_button=Search&current_result_page=1&results_per_page=0&submitted_search_category=&mode=results).

While an increasing water market was expected to develop over time, this has not occurred. The Act allows for several types of trade but all trades under the Plan have been access licence transfers, which are simple changes in ownership of water access licences.<sup>221</sup>

**Table 15: Summary of water access licence dealings by water source<sup>222</sup>**

Water source	Category	Number of dealings	Units dealt
Boambee Creek*	Domestic and stock	1	1
	Unregulated river	5	76
Bonville Creek*	Unregulated river	12	172
Coffs Creek*	Unregulated river	5	44
Corindi River	Aquifer	1	80
	Unregulated river	1	4
Double Crossing Creek	Unregulated river	6	40.5
Korora Basin*	Domestic and stock	2	2
	Unregulated river	6	151
Pine-Bundagaree Creek	Unregulated river	1	40
Woolgoolga Creek*	Domestic and stock	2	2
	Unregulated river	11	112
Total		53	724.5

\*Water source classified as having a high level of economic dependence (from horticultural irrigation)

Inherent limitations to trade in the Plan area include:

- relatively high rainfall
- small, hydraulically disconnected catchments
- the unregulated nature of the catchments, which prevents capture and release of water on demand.

There are also several limitations that can and should be addressed in the replacement Plan:

- **Administrative systems limit dealings** – stakeholders raised that the lack of a transparent, easy to use licence database makes trading difficult, as does the lack of data on available allocations. The lack of market transparency means that:

<sup>221</sup> Section 71M of the Plan.

<sup>222</sup> WaterNSW (2018) *Water Register*. Available at: <https://waterregister.watnsw.com.au/water-register-frame>.

- dealings rely on word-of-mouth and individual licence holders connecting personally to trade or transfer licences or allocations
- remaining sleeper licences<sup>223</sup> may be difficult to identify and obtain, causing frustration for those seeking licences
- those holding remaining sleeper licences may not be aware of the value of their asset.

This system is inefficient and inequitable. In addition, DPIE-Water and WaterNSW assess trades before approval for varying elements. There should be a transparent overarching process for assessing trades for approval, acknowledging that specific concerns will vary between locations.

- **Price reporting is inaccurate** – water trading is intended to move water to the highest value use, with the cost of water therefore tracking scarcity and potential intended uses. It is not possible to reasonably assess the costs of the deals that have occurred under the Plan for two key reasons:
  - Most of the trades had no costs assigned. While this is not uncommon, it limits the information available to the market to support growth.<sup>224</sup> There are legitimate reasons for a trade appearing with zero-dollar costs, such as transfers between related entities or family businesses. However, there is stakeholder concern that a lack of data may reflect water holders’ reluctance for price disclosure.
  - Where costs were assigned to transfers, it is likely that many of the prices are not a true reflection of the value of water entitlements in the region, with prices often recorded incorrectly due to data entry errors, confusion about the form requirements, reluctance to reveal actual price paid or because the price included other assets such as land. Anecdotal information provided by stakeholders indicated that horticulturalists have paid \$8,000 to \$10,000 per ML for transfers in the Plan area, with the average price around \$4,000 to \$5,000 per ML. If accurate, this suggests water is moving to the highest value use as intended under the Plan.
  - The Commission understands that WaterNSW has recently updated their trade application form to require price be included.<sup>225</sup>
- **A lack of metering prevents temporary trades** – restrictions on temporary trade were imposed due to the lack of metering and information on account water balances,<sup>226</sup> as temporary trades are generally only possible if a water user has installed a meter.<sup>227</sup> Issues and recommendations regarding metering are discussed further in **Section 7.3**.
- **A historic lack of compliance monitoring may have reduced incentives to trade** – compliance issues are outside the scope of the Plan but can significantly impact outcomes. Compliance issues in the Plan area may have limited market opportunities. These issues and recommendations are discussed further in **Section 8.1**.

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<sup>223</sup> Stakeholders advised that the Plan had a significant number of sleeper licences under dryland banana plantations, current numbers are unknown.

<sup>224</sup> In the 2016-17 Australian Water Markets Report, ABARES reports that 74 percent of entitlement trade transactions in unregulated surface water systems outside the Murray-Darling Basin record a \$0 transaction, while 100 percent of allocation trade transactions in unregulated surface water systems outside the Murray-Darling Basin record a \$0 transaction.

<sup>225</sup> Personal communication, DPIE-Water, received 27 February 2020.

<sup>226</sup> NSW Office of Water (2014) *Draft Audit of implementation – Coffs Harbour Area unregulated river water sharing plan audit report card* (unpublished).

<sup>227</sup> *Ibid.*

Any actions to strengthen trade must protect environmental outcomes in line with the Act's water management principles. Horticultural stakeholders indicated that they would like increased trading between water sources, which is currently only permitted between Pine-Bundagaree Creek and Bonville Creek.

The coastal catchments have trade restrictions between water sources to reflect the small, disconnected catchments. Generally, trading is in a downstream direction and not permitted into fully allocated water sources.<sup>228</sup> There are also limits on the maximum volume of water that can be traded into some management zones or water sources.<sup>229</sup> Trading between water sources will decrease river flows in the source the licence is transferred to (where extraction takes place), which increases the risk of impairment to its instream values.<sup>230</sup> This is particularly relevant for the Plan's multiple short streams with ICOLLs. Water sources facing high hydrological stress cannot have trades into that water source.<sup>231</sup> Only Station Creek, Arrawarra Creek and Dirty Creek do not have a high hydrologic stress rating, with their catchments largely national park or state forest.<sup>232</sup>

As discussed in **Section 4.3.4**, DPIE-Water is revising the high instream value mapping. This should be incorporated into trade rules. DPIE-Water should design trade rules considering the potential for reducing flow in the Plan areas' numerous hydraulically disconnected waterways and to avoid impacts on downstream environments. Care should be taken when considering any revisions to trade rules to identify potential perverse or unintended outcomes.

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<sup>228</sup> Department of Water and Energy (2009) *Water Sharing Plan for the Coffs Harbour Area unregulated and alluvial water sources – Guide*. Available at:

[https://www.water.nsw.gov.au/\\_\\_data/assets/pdf\\_file/0008/548693/wsp\\_coffs\\_harbour\\_guide.pdf](https://www.water.nsw.gov.au/__data/assets/pdf_file/0008/548693/wsp_coffs_harbour_guide.pdf).

<sup>229</sup> Department of Water and Energy (2009) *Water Sharing Plan for the Coffs Harbour Area unregulated and alluvial water sources – Guide*. Available at:

[https://www.water.nsw.gov.au/\\_\\_data/assets/pdf\\_file/0008/548693/wsp\\_coffs\\_harbour\\_guide.pdf](https://www.water.nsw.gov.au/__data/assets/pdf_file/0008/548693/wsp_coffs_harbour_guide.pdf).

<sup>230</sup> University of New England Aquatic Ecology and Restoration Research Group (2019) *Natural Resources Commission Report on Coffs Harbour and Central Coast Water Sharing Plans*, report prepared for the Natural Resources Commission, University of New England.

<sup>231</sup> NSW Office of Water (2013) *An overview of water sharing plans for unregulated and alluvial water sources in coastal NSW*, NSW Government.

<sup>232</sup> NSW Department of Water and Energy (2009) *Report card for [various] water source*. Available at: [www.water.nsw.gov.au](http://www.water.nsw.gov.au).

## 6.4 Recommendations

The Commission presents the following recommendations (**Table 16**) and suggested actions (**Table 17**) to strengthen economic outcomes.

**Table 16: Recommendations for DPIE-Water to improve economic outcomes**

Recommendations	
8	Assess the economic dependence of each water source, with the assessment broken down into the full range of economic benefits and impacts including: <ul style="list-style-type: none"><li>a) extractive industries (for example intensive horticulture, forestry)</li><li>b) non-extractive industry (for example tourism, aquaculture, recreational and commercial fishing)</li><li>c) community and ecological services (for example amenity, suitable water quality, recreation, flood mitigation through natural coastal lagoon function).</li></ul>
9	Confirm trading boundaries and rules are ecologically appropriate using baseline data including updated high instream value mapping, and data on hydrologic connectivity and downstream impacts.

**Table 17: Suggested action for DPIE-Water to improve economic outcomes**

Suggested action	
F*	DPIE-Water should continue to implement their program to improve all trade information, including coordination with relevant agencies to: <ul style="list-style-type: none"><li>a) publish a transparent overarching process for assessing trades for approval</li><li>b) support improvements to price reporting by licence holders</li><li>c) increase education and awareness of trading arrangements, including the use of metering to increase trade opportunities</li><li>d) investigate trade drivers and barriers through stakeholder engagement processes, including with Aboriginal stakeholders.</li></ul>

## 7 Opportunities to improve monitoring, evaluation and reporting

The Plan does not clearly identify its intended objectives and there have been limited MER activities on its listed objectives since the Plan commenced. In addition, there is little information available – particularly to the public – to indicate whether the Plan objectives are being met and what, if any, adaptive management may be required.

The lack of MER – particularly around extraction – is undermining the outcomes of the Plan, notably the determination and enforcement of environmental water requirements, the function of the LTAAEL, and the performance of water account management and trade. The NSW non-urban water metering reforms are scaled based on pump-size and most extraction in the Plan area will not be required to be metered.

DPIE-Water should implement a Plan-specific MER framework that:

- clearly defines outcomes and assesses them against clear and linked objectives, strategies and performance indicators
- increases the measurement of extraction and flow
- addresses identified knowledge gaps in flow gauging and metering
- incorporates ecosystem-based monitoring
- supports adaptation and improvement.

### 7.1 A Plan-specific framework is needed

An appropriate MER framework is important to:

- measure the contribution of the Plan to achieving environmental, social and economic outcomes against clearly defined objectives
- provide clarity of roles and responsibilities where multiple parties are involved
- inform timely decision making, for example around environmental water provisions
- support ongoing adaptive management
- provide transparency for stakeholders.

Consistent with requirements of the Act and the National Water Initiative, the need for robust MER frameworks was recognised when water sharing plans were developed.<sup>233</sup> The Commission understands that DPIE-Water planned to monitor the performance of the Plan to determine:

- the ecological condition of water sources and dependent ecosystems

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<sup>233</sup> NSW Office of Water (2011) *Macro water sharing plans – the approach for unregulated rivers. A report to assist community consultation*. Available at: [http://www.water.nsw.gov.au/\\_\\_data/assets/pdf\\_file/0008/548153/macro\\_unreg\\_manual\\_web.pdf](http://www.water.nsw.gov.au/__data/assets/pdf_file/0008/548153/macro_unreg_manual_web.pdf).

- the economic benefits derived from water extraction and use (noting that this only included extraction of water (generally by irrigators) and not the full range of economic benefits and uses of water that should be measured, which are outlined in **Section 6.2**).<sup>234</sup>

DPIE-Water also planned to establish an implementation program in line with the Act that incorporated a monitoring, evaluation and reporting framework<sup>235</sup> and the Plan's background document recommended several studies and actions to improve the evidence underpinning the Plan, including:

- high priority ecological monitoring and evaluation in most of the Plan water sources<sup>236</sup>
- the assessment of Aboriginal cultural values
- an investigation of the Coffs Harbour River estuary, including economic valuation and hydraulic behaviour in response to freshwater inflows
- the development of rules for tidal pool areas and commence to flow rules based on estuarine environmental requirements
- the development of integrated hydrological/ecological studies and socio-economic models to assess related impacts.<sup>237</sup>

Despite this intent, the Plan's supporting documents do not clearly set out a monitoring, evaluation and reporting framework and limited data have been collected during Plan implementation. The need for monitoring within the Plan, particularly of high priority water sources, has been noted repeatedly.<sup>238</sup>

DPIE-Water advised the Commission that there has not been funding to support consistent monitoring, evaluation or reporting in any of the coastal water sharing plans and none of the studies recommended in the background document were implemented.<sup>239</sup> DPIE-Water advised the Commission that work is underway to develop a consistent monitoring, evaluation and reporting framework for the coastal water sharing plans.<sup>240</sup> Such a framework requires adequate long-term committed funding to ensure its effective implementation.

As previously highlighted by the NSW Government, research to improve understanding of the impact of freshwater extraction on estuarine and coastal ecosystems and adaptive management systems are essential.<sup>241</sup> To be effective, strategic adaptive management must be active and

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<sup>234</sup> Office of Water (2011) *Environmental flow response and socio-economic monitoring. North Coast – progress report 2009*. Available at [http://www.water.nsw.gov.au/\\_\\_data/assets/pdf\\_file/0019/549010/monitor\\_2009\\_northcoastvalley\\_report.pdf](http://www.water.nsw.gov.au/__data/assets/pdf_file/0019/549010/monitor_2009_northcoastvalley_report.pdf).

<sup>235</sup> Department of Water and Energy (2009) *Water Sharing Plan – Coffs Harbour Area Unregulated and Alluvial Water Sources – Background document*. Available at: [https://www.industry.nsw.gov.au/\\_\\_data/assets/pdf\\_file/0010/166843/coffs-harbour-background.pdf](https://www.industry.nsw.gov.au/__data/assets/pdf_file/0010/166843/coffs-harbour-background.pdf).

<sup>236</sup> Office of Water (2011) *Environmental flow response and socio-economic monitoring. North Coast – progress report 2009*. Available at [http://www.water.nsw.gov.au/\\_\\_data/assets/pdf\\_file/0019/549010/monitor\\_2009\\_northcoastvalley\\_report.pdf](http://www.water.nsw.gov.au/__data/assets/pdf_file/0019/549010/monitor_2009_northcoastvalley_report.pdf).

<sup>237</sup> Department of Water and Energy (2009) *Water Sharing Plan – Coffs Harbour Area Unregulated and Alluvial Water Sources – Background document*. Available at: [https://www.industry.nsw.gov.au/\\_\\_data/assets/pdf\\_file/0010/166843/coffs-harbour-background.pdf](https://www.industry.nsw.gov.au/__data/assets/pdf_file/0010/166843/coffs-harbour-background.pdf).

<sup>238</sup> National Water Commission (2014) *The National Water Planning Report Card 2013*, available at <https://apo.org.au/sites/default/files/resource-files/2014/07/apo-nid40397-1236086.pdf>.

<sup>239</sup> Advised by DPIE-Water, 17 March 2020.

<sup>240</sup> Advised by DPIE-Water, 17 March 2020.

<sup>241</sup> NSW Government (n.d.) *No. 10 Freshwater flows to estuaries and coastal waters: Advice to Water Management Committees*. Available at: [http://www.water.nsw.gov.au/\\_\\_data/assets/pdf\\_file/0005/548024/policy\\_advice\\_10-flows.pdf](http://www.water.nsw.gov.au/__data/assets/pdf_file/0005/548024/policy_advice_10-flows.pdf).

requires long funding time-frames, a high risk tolerance, and institutional and management flexibility.

The Commission acknowledges that the relevant monitoring is undertaken by multiple agencies (including DPIE-Water, DPIE-EES, WaterNSW, DPI-Fisheries and councils) and this has created confusion and been a barrier to knowledge sharing.

The Commission understands DPIE-Water's lack of data collection was partly due to the system being considered relatively low risk in terms of extraction volumes and the need to focus limited resourcing on inland catchments. However, downstream environments include sensitive estuaries and marine environments in, the Solitary Islands Marine Park and threatened species and communities and the Plan must be designed to maintain these environments and their associated social and economic values.

The lack of quality MER is a significant and recurring issue across NSW that has been repeatedly highlighted in previous Commission reviews, as well as by the National Water Commission.<sup>242</sup> The Plan should include provisions for an MER plan, in line with the Act and the MER framework for coastal water sharing plans. The MER plan should include ownership of actionable items, timelines and progress, and there should be adaptive management mechanisms in the Plan. This should be supported by community and stakeholder engagement and adequate resources, noting the need to ensure the cost is proportionate to the risk of over extraction.

The Commission recommends that the MER plan is completed by the end of 2020 and draws upon any relevant studies currently underway, including:

- DPI-Agriculture's Clean Coastal Catchments projects under the *Marine Estate Management Strategy*, the first of which assists the blueberry industry to reduce fertiliser waste and nutrient runoff into coastal waterways through a Blueberry Research Facility<sup>243</sup>
- Southern Cross University's investigations into changes in flows to small coastal lakes and lagoons and interventions in lake and lagoon entrance conditions.<sup>244</sup>

## 7.2 Outcomes should be clearly defined and align with the Act

Clearly defined outcomes linked to objectives, strategies and indicators are the foundation of effective implementation and robust MER frameworks. The Plan's stated high-level objectives reflect most of the Act's water management principles, except for cumulative impacts.<sup>245</sup> However, it does not clearly specify environmental, social and economic outcomes prioritised in line with the Act. The Plan also does not provide suitable, well-defined objectives, strategies and performance indicators in line with best-practice approaches, or present a clear logical flow between objectives, strategies and performance indicators.

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<sup>242</sup> Department of Water and Energy (2009) *Water Sharing Plan – Coffs Harbour Area Unregulated and Alluvial Water Sources – Background document*. Available at: [https://www.industry.nsw.gov.au/\\_\\_data/assets/pdf\\_file/0010/166843/coffs-harbour-background.pdf](https://www.industry.nsw.gov.au/__data/assets/pdf_file/0010/166843/coffs-harbour-background.pdf); EcoHealth reporting as previously discussed; and the National Water Commission (2014) *The National Water Planning Report Card 2013*. Available at: [www.agriculture.gov.au/SiteCollectionDocuments/water/2013-national-water-planning-report-card.pdf](http://www.agriculture.gov.au/SiteCollectionDocuments/water/2013-national-water-planning-report-card.pdf).

<sup>243</sup> Personal communication, Department of Primary Industries – Fisheries, February 2019.

<sup>244</sup> Personal communication, Department of Primary Industries – Fisheries, February 2019.

<sup>245</sup> *Water Management Act 2000*, Section 5(2)(d).

The Plan should include SMART objectives, strategies and performance indicators to support the delivery of environmental, social and economic outcomes. These should reflect and appropriately prioritise the full range of water management principles in the Act (outlined in **Section 1.1**).

There should be clear, logical relationships between objectives, strategies, performance indicators and the Plan rules. Currently, the Plan objectives do not logically link to strategies and performance indicators (see **Table 3** in **Section 1.2**). For example, the objective 'contribute to the maintenance of water quality' does not directly link to a strategy or performance indicator. There is therefore no ability to demonstrate if this objective has been achieved.<sup>246</sup>

DPIE-Water is currently improving objectives in Murray-Darling Basin water sharing plans as part of the water resource planning process. The Commission understands that a similar approach will be taken to improve the coastal water sharing plans in future. Arrangements would need to be tailored to reflect the unique hydrology and ecology, and scale of the Coffs Harbour region but the processes are a suitable reference for the development of the replacement Plan.

The Plan should also align with relevant planning reviews and processes such as the:

- *North Coast Regional Plan 2036*<sup>247</sup>
- *Marine Estate Management Strategy*, including the Clean Coastal Catchments Project<sup>248</sup>
- revised Coffs Harbour City Council *Local Growth Management Strategy*, currently under review and due to be released in 2020.<sup>249</sup>

### 7.3 Flow gauging is required to assess Plan effectiveness

Flow gauging is required to understand the volume, duration and timing of water in the system and the impact of extraction from the system. Local flow gauging data are important to determine environmental, social and economic changes and inform evidence-based management. Hydrological models, as discussed in **Section 4.3.2**, can then be calibrated with local data and Plan impacts can be better assessed over time.

As with metering, the cost of implementing flow gauging must be balanced with the risk to the resource of over extraction. In many coastal catchments, the risk to the resource is considered low due to the relatively low level of access licences issued compared to average annual flows. However, the Plan area has significant extraction in some water sources and high-value ecosystems and downstream social and economic values.

WaterNSW staff familiar with the area advised that there are staff gauges on Bonville Creek and Coffs Creek in the Plan area but there are few locations suitable for monitoring gauges (noting there have been gauges historically, including on Woolgoolga Creek between 1975 and 1983). The sand and gravel creek beds vary regularly and can be unsuitable for permanent monitoring

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<sup>246</sup> See note, Clause 10 of the Plan.

<sup>247</sup> Department of Planning and Environment (2017) *North Coast Regional Plan 2036*. Available at: [www.planning.nsw.gov.au/-/media/Files/DPE/Plans-and-policies/north-coast-2036-regional-plan-2017.pdf](http://www.planning.nsw.gov.au/-/media/Files/DPE/Plans-and-policies/north-coast-2036-regional-plan-2017.pdf).

<sup>248</sup> Department of Primary Industries (2019) *Clean Coastal Catchments*. Available at: <https://www.dpi.nsw.gov.au/agriculture/irrigation/clean-coastal-catchments>.

<sup>249</sup> Coffs Harbour City Council (2019) *Coffs Harbour Local Growth Management Strategy*. Available at: [www.coffsharbour.nsw.gov.au/Building-and-Planning/Growth-Strategies/Pages/growth-strategies.aspx](http://www.coffsharbour.nsw.gov.au/Building-and-Planning/Growth-Strategies/Pages/growth-strategies.aspx).

gauges. Short creeks in the Plan area also make placement more difficult as gauges cannot be in the tidal pool. Despite these difficulties, suitable gauging locations should be identified and river flow monitoring arrangements put in place.

## 7.4 Water extraction and use should be comprehensively monitored

The current monitoring of water extraction and use is inadequate. Almost all licences in the Plan area are unmetered. The Commission was advised that, historically, extraction has been recorded manually in logbooks that have not been regularly reviewed and water use has not been monitored.<sup>250</sup> DPIE-Water's draft audit recommended that in the absence of metering, feasible methods to assess extraction should be developed to enable water accounting.<sup>251</sup> This has not occurred. Most water pumps will not meet the metering threshold in the new metering policy.

The lack of monitoring of extraction and use means it is not possible to:

- define extraction levels or the volume of water available for the environment
- confirm compliance with water access licences or the LTAAEL, which is a Plan requirement and discussed in **Section 4.3.5**<sup>252</sup>
- link potential environmental, social or economic impacts or benefits to extraction.

The volume of water used by intensive horticulture is also unquantified. This is a concern given reports from some councils in the greater North Coast area that some fully allocated sub-catchments appear to be under stress from the expansion of intensive horticulture.<sup>253</sup>

### 7.4.1 Current metering reforms will have minimal benefits in coastal catchments

Since 2017, the NSW Government has made considerable progress in addressing shortfalls in its metering and compliance regime in response to Ken Matthews' independent investigation into NSW water management and compliance. Current reforms will improve the standard and coverage of non-urban water meters but are not expected to provide enough extraction data from metering in time for the development of the replacement Plan.

The reforms focus on larger pumps, which are more prevalent in inland waterways compared with the Coffs Harbour area. WaterNSW licensing details for the Plan area list only one pump (over 500 millimetres) requiring a meter by December 2020 under the new metering policy.<sup>254</sup> Most of the pumps in the Plan area are below 100 millimetres and will not meet the threshold to

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<sup>250</sup> From stakeholder engagement and North Coast Region State of the Environment Report Working Group (2016) *Regional State of the Environment Report 2016 - for the north coast region of NSW*. Available at: <https://www.coffsharbour.nsw.gov.au/environment/education-and-resources/Pages/state-of-the-environment.aspx>.

<sup>251</sup> NSW Office of Water (2014) *Draft Audit of implementation – Coffs Harbour Area unregulated river water sharing plan audit report card* (unpublished).

<sup>252</sup> Part 10, Section 45-46 of the Plan.

<sup>253</sup> North Coast Region State of the Environment Report Working Group (2016) *Regional State of the Environment Report 2016 - for the north coast region of NSW*. Available at: <https://www.coffsharbour.nsw.gov.au/environment/education-and-resources/Pages/state-of-the-environment.aspx>.

<sup>254</sup> DPIE-Water (2019) *Overview of the non-urban water metering framework*. Available at: <https://www.industry.nsw.gov.au/water-reform/metering-framework/overview-of-the-non-urban-water-metering-framework>.

require metering if only one pump is in use, with extraction continuing to be monitored in logbooks.<sup>255</sup>

The Commission acknowledges the significant work that has gone into the metering policy and the balance that must be struck between risk and the cost of metering smaller pumps. However, effective monitoring of Plan performance cannot occur unless WaterNSW and DPIE-Water regularly collect and digitally maintain extraction data. In other catchments, DPIE-Water has required metering to be expanded, such as requiring additional groundwater metering where there is over-allocation in at-risk water sources.<sup>256</sup> For coastal system licensees with smaller pump sizes, additional measures may be required by DPIE-Water, WaterNSW and the Natural Resources Access Regulator to achieve the Plan outcomes, such as:

- adoption of the metering policy below the size requirements
- regular digitisation of logbook data
- additional resources to actively monitor account data and verify manual extraction records (logbooks)
- other mechanisms such as compliance or additional monitoring.

This would provide additional data to improve decision making and public confidence and support adaptive management. During consultation for this review, stakeholders advised that metering is generally supported and seen to increase transparency and legitimacy, although licensees are concerned about associated costs and responsibilities of ongoing maintenance.

#### 7.4.2 All forms of extraction should be quantified

In addition, farm dams are inadequately monitored, with rainfall runoff capture unaccounted for in the current metering framework. As discussed in **Chapter 4**, extraction in the Plan area is understood to be largely from farm dams fed by a combination of rainfall runoff, spring flow and pumped creek and groundwater. Farm dams can capture significant volumes of flow, and the NSW Government has previously acknowledged that they must be managed relative to their risk to water access entitlement integrity and the achievement of environmental outcomes.<sup>257</sup> The Commission considers that farm dams and extraction outside Plan regulations pose a high risk to environmental, social and economic outcomes.

A broad range of Plan stakeholders raised concerns regarding the impacts of farm dams, including:

- inappropriate use of water under basic landholder rights (domestic and stock, and harvestable rights)
- oversized dams including:
  - dam infrastructure constructed or altered beyond licenced capacity

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<sup>255</sup> DoI-Water (2018) *NSW Non-Urban Water Metering Policy*. Available at: [www.industry.nsw.gov.au/\\_\\_data/assets/pdf\\_file/0017/205442/NSW-non-urban-water-metering-policy.pdf](http://www.industry.nsw.gov.au/__data/assets/pdf_file/0017/205442/NSW-non-urban-water-metering-policy.pdf).

<sup>256</sup> Department of Primary Industries – Water (2018) *NSW Non-Urban Water Metering Policy*. Available at: [https://www.industry.nsw.gov.au/\\_\\_data/assets/pdf\\_file/0017/205442/NSW-non-urban-water-metering-policy.pdf](https://www.industry.nsw.gov.au/__data/assets/pdf_file/0017/205442/NSW-non-urban-water-metering-policy.pdf).

<sup>257</sup> Commonwealth of Australia, Governments of New South Wales, Victoria, Queensland, South Australia, Australian Capital Territory and Northern Territory (2004) *National Water Initiative*. Available at: <https://www.agriculture.gov.au/sites/default/files/sitecollectiondocuments/water/Intergovernmental-Agreement-on-a-national-water-initiative.pdf>.

- allocations being sold but infrastructure not adjusted accordingly.

The draft audit of the Plan noted that an unspecified number of dams exceeded harvestable rights volumes and compliance action would be undertaken where identified.<sup>258</sup> An ongoing action was flagged to ensure compliance with harvestable rights provisions, now being undertaken by the Natural Resource Access Regulator.<sup>259</sup> To address the risk of over-extraction, DPIE-Water should investigate implementing mechanisms to monitor farm dam capture beyond harvestable rights. The Commission acknowledges the resources that would be required by such work but believes that due to the community concern, high demand for water extraction and high value downstream environments, additional measures are warranted in the Plan area.

Accounting mechanisms to quantify water capture and take could be informed by the inland floodplain harvesting program.<sup>260</sup> While there are significant differences in the program, three of the key inland program benefits are relevant for the Plan area to:

- provide clarity and certainty about management
- better protect downstream users and the environment from the effects of extraction
- improve the social licence for legitimate activities to continue.<sup>261</sup>

While the scale of farm dam infrastructure in the Plan area is very small compared to highly developed inland basins, the impacts of capture are significant on a local scale and have cumulative downstream effects. Increasing farm dam storage reduces annual streamflow and captures the initial flows in rainfall events. The volume of extraction included in DPIE-Water calculations as part of the LTAAEL is not transparent, and the Commission does not consider that the value used at Plan development will be current given the visible increase in the number and scale of farm dams in aerial imagery.<sup>262</sup>

In the Plan area, DPIE-Water should transparently assess the specific risks of all forms of extraction to high-value ecosystems, threatened species, and social and economic values when considering the need for additional metering measures.

## 7.5 The Plan should better support strategic adaptive management

The Plan includes provisions for adaptive management to allow the Plan to be improved over time and incorporate new information. The provisions have not been implemented to date, including:

- amending water sources and administrative boundaries or flow classes
- establishing individual and total daily volumetric limits
- listing groundwater dependent ecosystems
- providing for floodplain harvesting

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<sup>258</sup> NSW Office of Water (2014) *Draft Audit of implementation – Coffs Harbour Area unregulated river water sharing plan audit report card* (unpublished).

<sup>259</sup> *Ibid.*

<sup>260</sup> DPIE-Water (n.d.) *Floodplain harvesting program*. Available at: <https://www.industry.nsw.gov.au/water/plans-programs/healthy-floodplains-project/harvesting>.

<sup>261</sup> *Ibid.*

<sup>262</sup> Personal communication, Department of Primary Industries – Fisheries, February 2019.

- adding alluvial aquifers downstream of the tidal limit
- allowing for stormwater harvesting.

Given that current evidence underpinning the Plan is limited, it should better support strategic adaptive management in response to new information being generated. Adaptive management provisions should also allow for amendments if impacts to downstream environments are identified due to extraction under the Plan. The types of information that could be used in replacement plan design and incorporated into an adaptive monitoring, evaluation and reporting framework could include current and updated:

- environmental and flow studies
- ecological datasets and modelling (such as the SEED Portal,<sup>263</sup> *Directory of Important Wetlands*,<sup>264</sup> listed threatened species, monitoring of vulnerable habitats, fish sampling, Saving our Species data<sup>265</sup>)
- high ecological value and groundwater dependent ecosystem mapping
- riverine and estuarine condition studies
- current hydrological datasets
- drought data and management plans
- climate change and climate variability modelling
- land-use data including current infrastructure to inform modelling
- updated policies for example *Reasonable Use Guidelines*
- emerging compliance risks
- targeted research projects to fill knowledge gaps and inform ongoing decision making
- socio-economic modelling and impact assessments.

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<sup>263</sup> NSW Government (n.d.) *SEED Sharing and Enabling Environmental Data*. Available at: <https://www.seed.nsw.gov.au/edphome/home.aspx>.

<sup>264</sup> Department of the Environment and Energy (n.d.) *Directory of Important Wetlands*. Available at: <http://www.environment.gov.au/water/wetlands/australian-wetlands-database/directory-important-wetlands>.

<sup>265</sup> DPIE-EES (n.d.) *Saving our Species program*. Available at: <https://www.environment.nsw.gov.au/topics/animals-and-plants/threatened-species/saving-our-species-program>.

## 7.6 Recommendations

The Commission presents the following recommendations (**Table 18**) to strengthen monitoring, evaluation and reporting and improve all Plan outcomes.

**Table 18: Recommendations for DPIE-Water to improve monitoring, evaluation and reporting and Plan outcomes**

Recommendations	
10*	<p>Finalise the MER framework for coastal water sharing plans by the end of 2020, adequately fund its implementation and include the following as part of the replacement Plan:</p> <ul style="list-style-type: none"><li>a) provisions for Plan-specific MER requirements following the established framework and including both freshwater and estuarine ecosystems at a minimum</li><li>b) clear governance arrangements for MER, including roles and responsibilities</li><li>c) timely and regular public reporting of the results of monitoring and evaluation activities to support transparency, public awareness and active compliance</li><li>d) appropriate governance arrangements and timeframes for adaptation and improvement, particularly in response to new information such as climate change.</li></ul>
11*	<p>Set strong foundations to improve implementation and measurement of Plan outcomes by:</p> <ul style="list-style-type: none"><li>a) developing objectives, strategies and performance indicators that are strongly linked to the Act's environmental, social and economic outcomes, and in line with the Act's priorities</li><li>b) developing SMART objectives, strategies and performance indicators.</li></ul>
12	<p>Monitor streamflow, water extraction and use:</p> <ul style="list-style-type: none"><li>a) identify suitable gauging locations and implement river flow monitoring arrangements to collect local data and provide a transparent evidence base for hydraulic modelling and management and planning decisions</li><li>b) implement additional measures such as metering beyond the new NSW non-urban water metering framework to understand extraction and support decision making, adaptive management and improve public confidence</li><li>c) implement mechanisms to quantify and account for rainfall runoff harvesting</li><li>d) release a report by year two of the Plan outlining findings from (a) through (c) and either implement steps to measure total extraction (including basic landholder rights) or justify no action, providing a roadmap for ongoing steps.</li></ul>

## 8 Opportunities to improve Plan development and implementation

Outside of Plan provisions, the Commission considered issues and risks around the implementation of the Plan. Several improvements were identified to ensure replacement Plan provisions are implemented appropriately. These relate to ensuring:

- the Plan rules are clear and enforceable to manage compliance risks
- the Plan is accessible and easily understood and supported by ongoing community engagement and education.

The Commission also assessed the value of merging the current Plan with the *Water Sharing Plan for the Bellinger River Area Unregulated and Alluvial Water Sources 2008* and does not consider it would be beneficial at this stage.

### 8.1 Efforts to strengthen compliance are supported

Stakeholders and submissions consistently highlighted the historic lack of compliance activity as a significant issue facing the area. Concerns around compliance focused on reduced flows over the life of the Plan, community tensions, and eroded confidence and certainty. There was a consensus that visible, on-ground compliance monitoring and feedback is required to improve confidence in the Plan and equality among all water users and the general community.

The Natural Resources Access Regulator have found evidence of non-compliance with water take laws on ten properties (including seven in the Plan area<sup>266</sup>) investigated as part of the recent proactive Coffs Harbour Horticulture Water Compliance Project. All ten properties had evidence of non-compliance, including:

- six had dams significantly larger than harvestable rights (with one almost six times the allowable size), totalling 46 ML of unlawful dam storage capacity
- five had groundwater bore issues – two did not have a licence, three were used for irrigation without approval and one was connected to a dam used for irrigation without approval
- three licensees did not comply with approval and water access licence conditions including failing to keep pumping logbooks.<sup>267</sup>

The Natural Resources Access Regulator can enforce a range of responses to non-compliance and undertook enforcement action at these properties, including issuing directions to reduce the size of dams, stop work orders to cease the unauthorised use of bores and a direction to install metering equipment.<sup>268</sup> The Commission supports the Natural Resources Access Regulator's ongoing compliance and enforcement in the Plan area and recommends that DPIE-Water incorporates their findings regarding compliance risks into Plan development and ongoing improvement over time.

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<sup>266</sup> The other three were in the area covered by the *Water Sharing Plan for the Clarence River Unregulated and Alluvial Water Sources 2016*.

<sup>267</sup> Personal communication, Natural Resources Access Regulator, 26 September 2019; and as reported in Coffs Harbour Advocate, 2 October 2019, *Revealed: how farmers are failing the waterways*. Available at: <https://www.coffscostadvocate.com.au/news/results-in-farmers-are-failing-the-water-laws/3844503/?cspt=1570060701|14bc4500e2b04b981e38ca6f7f498ba>.

<sup>268</sup> Personal communication, the Natural Resources Access Regulator, 26 September 2019.

As discussed in **Section 7.3**, a historic lack of monitoring has made it difficult to assess compliance with water access licences or the LTAAEL. Implementing comprehensive monitoring of water extraction and use would better support compliance efforts.

Stakeholders also indicated that confusion around use of basic landholder rights allowances may be a driver of non-compliance. Discussions around basic landholder rights and farm dams demonstrated that there was a clear lack of understanding across licensees and the broader community about the rules surrounding these rights. Anecdotal evidence indicated that cease to pump thresholds were misunderstood by some water users. A range of stakeholders commented that the complexity and need for extensive cross-referencing in the Plan makes it difficult to understand requirements.

Basic landholder rights are regulated outside of water sharing plans but should be considered as part of the development and implementation of the replacement Plan as they impact the LTAAEL and extraction profiles. While DPIE-Water assumes a reasonable volume is taken under basic landholder rights and estimate this based on the needs of a household and a small number of stock, there is no publicly available transparent guideline around how much water can be extracted for domestic and stock use.

The Commission understands that the NSW Water Renewal Taskforce and DPIE-Water intend to introduce *Reasonable Use Guidelines* for stock and domestic consumption as part of the NSW Government's *Water Reform Action Plan*.<sup>269</sup> It is important that the guidelines are developed and implemented across NSW by the end of 2020. In making the replacement Plan, DPIE-Water should update estimates and modelling to reflect extractions under the *Reasonable Use Guidelines*.

## **8.2 The Plan should be accessible and supported by active engagement**

The overarching issues of monitoring, compliance and Plan clarity must be addressed to provide stakeholders with confidence in the ability of the Plan to manage water resources to achieve its environmental, social and economic outcomes.

Concerns about equity, transparency and unfair take were consistent across many of the submissions received and the Commission understands this is leading to stakeholder conflict. While some stakeholders attribute environmental impacts to changing intensive horticultural production, industry stakeholders feel unfairly targeted and assigned blame for those environmental impacts.<sup>270</sup>

DPIE-Water have significantly improved stakeholder engagement and the provision of factsheets and roadshows in recent years. The Commission supports these efforts.

The replacement Plan should be accessible and easily understood. Background and guidance documents and Plan rules should be simple, concise and written with a broad range of stakeholders in mind. This will ensure transparency and may contribute to increased compliance.

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<sup>269</sup> Department of Industry (2018) *NSW Non-Urban Water Metering Policy*, p. 5. Available at: [https://www.industry.nsw.gov.au/\\_\\_data/assets/pdf\\_file/0017/205442/NSW-non-urban-water-metering-policy.pdf](https://www.industry.nsw.gov.au/__data/assets/pdf_file/0017/205442/NSW-non-urban-water-metering-policy.pdf).

<sup>270</sup> Coffs Harbour City Council (2017) *Local growth management strategy – rural lands issues and options*. Available at: <https://haveyoursay.coffsharbour.nsw.gov.au/coffs-harbour-rural-lands-chapter>.

Not all Plan users are technologically capable, and some rely on direct engagement and their personal networks to inform them of requirements and updates. The NSW Irrigator's Council raised the need for active communication with water user groups, particularly in coastal valleys where they have historically self-regulated by monitoring flow rates and implementing pumping restrictions.

Government agencies responsible for Plan implementation should provide a range of communication and education channels to encourage ongoing and active engagement with water users and the general community. Engagement should be undertaken during the Plan replacement process and throughout implementation to ensure the community remain informed and emerging issues are identified.

DPIE-Water should strengthen the overarching stakeholder engagement strategy developed as part of the water reform action plan<sup>271</sup> to target efforts to effectively use resources and maximise the benefits of stakeholder engagement. Further, DPIE-Water should publish Plan-specific stakeholder engagement requirements specifying appropriate forums for engagement, for example, a stakeholder advisory panel. These activities should take place during Plan development and on an ongoing basis to refresh and capture new users and community members.

### **8.3 The Plan should not be merged with the Bellinger River plan**

There have been ongoing proposals to merge the Plan with the neighbouring *Water Sharing Plan for the Bellinger River Area Unregulated and Alluvial Water Sources 2008* as part of plan replacement. The Commission's review of the Bellinger River Area water sharing plan recommended that the 'Department of Industry-Water should conduct an assessment, including public consultation, to determine whether to merge the Water Sharing Plans for the Bellinger River Area and Coffs Harbour Area'. If this were to occur, the plan would cover 24 water sources (11 in Bellinger and 13 in Coffs Harbour).

The Commission has found no evidence to support a merger of these two plan areas. Merging the plans would reduce the number of plans in NSW and potentially create administrative efficiencies. However, the Commission understands that DPIE-Water would not alter the rules within each plan as part of the merger. For example, trade would not be allowed between the water sources currently in separate plans. While the Commission does not consider that there would be likely impacts on environmental, social or economic outcomes as a result of merging the plans, there could be unintended consequences. Further, there are existing issues with readability and clarity of both plans and their background documents, guides and rules and merging the two may cause additional confusion for users.

The Commission is therefore not recommending a merger of the Bellinger River and Coffs Harbour water sharing plans as part of this review.

Should DPIE-Water decide to pursue a merger, any final decision should consider potential impacts and incorporate rigorous public consultation to ensure that:

- the new plan can be navigated and understood by water users through appropriate communication measures and supporting documentation

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<sup>271</sup> DoI-Water (2018) *Water Stakeholder and Community Engagement Policy*. Available at: [https://www.industry.nsw.gov.au/\\_\\_data/assets/pdf\\_file/0011/148529/IND-I-245-Water-Stakeholder-and-Engagement-Policy.pdf](https://www.industry.nsw.gov.au/__data/assets/pdf_file/0011/148529/IND-I-245-Water-Stakeholder-and-Engagement-Policy.pdf).

- supporting documents are well-constructed and written in plain English
- a revised version of the simple 'rules summary sheets' prepared for each individual water source are retained for ease of reference by licensees
- issues raised during public consultation are addressed
- any perverse or unintended outcomes from merging the two plans are identified and resolved.

## 8.4 Recommendations

The Commission presents the following suggested actions (**Table 19**) to assist Plan development and improve implementation and Plan outcomes.

**Table 19: Suggested actions for DPIE-Water to improve Plan development, implementation and outcomes**

Suggested actions	
G*	Adopt processes that support clear and transparent implementation of the Plan: <ul style="list-style-type: none"><li>a) finalise and implement the <i>Reasonable Use Guidelines</i> by the end of 2020 and include the agreed standards as part of the replacement Plan to adequately estimate and enforce basic landholder rights</li><li>b) develop simple and concise Plan documents, minimising cross referencing and improving clarity</li><li>c) strengthen existing processes for stakeholder engagement developed as part of the water reform action plan, and include an area-specific stakeholder engagement plan – this needs to specify appropriate forums for engagement, such as a stakeholder advisory panel, including formal engagement with a range of stakeholders with diverse interests and localised knowledge of water.</li></ul>
H*	Continue to work with the Natural Resources Access Regulator to understand compliance and enforcement risks in the Plan area and incorporate findings into Plan development and ongoing improvement in implementation.