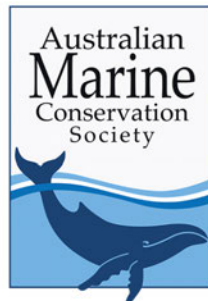


Joint submission on impact of land clearing on water quality — statutory review of NSW native vegetation clearing rules



Dolphin Research Australia
Knowledge, Awareness, Action – Conserving Our Seas

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1. Introduction — Native Vegetation Codes and water quality

The Australian Marine Conservation Society, National Parks Association of NSW, Surfrider Foundation, Nature Coast Marine Group, Clarence Environment Centre, Dive Industry Association of Australia, Ocean Youth, and Dolphin Research Australia welcome the opportunity to comment on the statutory review of NSW native vegetation clearing rules, as described in Part 5A of the *Local Land Services Act 2013*.

Our organisations have come together to share a joint submission, consisting of numerous case studies, to highlight our concern that the proposed scope of the review is too narrow, missing an opportunity to explore the serious issue of poor water quality and the impact on our freshwater and marine ecosystems.

Our waterways are vital to the health of our coastal and marine ecosystems. Not only do our waterways provide for agricultural security but they have intrinsic ecological and cultural values. They provide a vast range of ecosystem services and functions and are important breeding sites for many aquatic animals that need to move between marine, coastal, and freshwater environments during different life-cycle stages.

Our waterways carry nutrients, sediment, and contaminants from the land out into our oceans and marine parks. So, it is important native vegetation regulations work towards delivering clean, natural, healthy flowing waterways. This is also important for tourism, water security (including the water we drink), fisheries security, and recreation. Surfers, divers, swimmers, and recreational fishers make up the bulk of hundreds of thousands of members who belong to the organisations writing this submission. We share the belief that the impact of land clearing on water quality deserves special attention in the statutory review of the codes.

Our organisations are deeply concerned the NSW Government's reliance on self-assessment codes (where government has given the landholders the power to decide whether they are following the rules) has led to a 13-fold increase in land clearing across NSW since 2016,¹ putting our freshwater and marine ecosystems at risk, vital systems which support both the health of humans and vulnerable native wildlife. There is an urgent need to end clearing of riparian and coastal vegetation and significantly decrease the clearing of other vegetation through regulation and enforcement, rather than continuing to rely on weak and unreliable voluntary codes and market mechanisms.²

¹ Morton, M, NSW land clearing approvals increased 13-fold since laws relaxed in 2016, May 2020, The Guardian, <https://www.theguardian.com/environment/2020/mar/27/nsw-land-clearing-approvals-increased-13-fold-since-laws-relaxed-in-2016>

² See NPA Coffs Harbour's in-depth submission into the failure of Native Vegetation Codes' ability to meet the principles of Ecological Sustainable Development (ESD) as required by law.

2. The Native Vegetation Codes and the NSW Marine Estate Management Strategy 2018-2028

The Native Vegetation Codes are out of step with the Marine Estate Management Strategy (MEMS) 2018-2028, strongly contradicting the NSW Government's priority action to protect the marine estate's water quality. The MEMS lists:

- 'Agriculture diffuse-source runoff' and 'clearing riparian and adjacent habitat including wetland drainage' as 'High Risk' to estuarine and ocean waters, and;
- 'Stock grazing of riparian vegetation and marine vegetation in estuaries' as 'High Risk' to saltmarshes, mangroves and seagrass, species and communities protected under the Fisheries Management Authority (FMA).³

These concerns are not isolated to the state of NSW. Queensland commissioned a 2017 scientific review of the impacts of land clearing on threatened species, which cites widespread concern over the impacts of vegetation clearing on marine and freshwater habitats via increased erosion and run-off carrying sediment and nutrient pollution from agriculture and grazing lands.⁴ Since the QLD Government assessment, the recent East Coast flooding events have further shown marine life is struggling to cope with extreme runoff events. For example, back-to-back flooding events in Queensland led to serious impacts on two iconic species listed as Vulnerable in Queensland, the green turtles and dugongs. The loss of their primary food source, seagrass, which is highly susceptible to polluted run-off, led to higher than average strandings with 240 turtles and 22 dugong strandings between July 2021 to May 2022.⁵ The impact of runoff on turtles has been extensively studied in Queensland with researchers concerned chemical run-off from agriculture and industry results in inflammation and liver dysfunction in sea turtles.^{6 7 8}

More research is needed to identify whether sea turtles are experiencing the same fate in NSW. Considering water quality is a priority concern for the NSW Marine Estate, it is essential the review committee takes a whole-of-catchment approach, seeking to identify the links between land clearing and connected ecosystems. This includes investigating the link between land clearing or historically cleared land, rainfall events, and extreme flooding events on NSW's vulnerable marine and aquatic habitats and wildlife. Research shows sediment and nutrient pollution present huge risks for the environment, partially

³ NSW Government, NSW Marine Estate Management Strategy 2018-2028, 2021, p1, 18, & 20, https://www.marine.nsw.gov.au/__data/assets/pdf_file/0005/1352831/Marine-Estate-Management-Strategy-2018-2028.pdf

⁴ Neldner, V J et al (2017). Scientific review of the impacts of land clearing on threatened species in Queensland. Queensland Government, Brisbane, p6.

⁵ Australian Marine Conservation Society, Media Release: Increase protection zones to help flood hit dugongs and turtles in the Great Sandy Marine Park, May 2022, <https://www.marineconservation.org.au/increase-protection-zones-to-help-flood-hit-dugongs-and-turtles-in-the-great-sandy-marine-park/>

⁶ Heathcote, A, Turtles of the Great Barrier Reef are ingesting dangerous chemicals, Australian Geographic, June 2017, <https://www.australiangeographic.com.au/news/2017/06/turtles-of-the-great-barrier-reef-ingesting-dangerous-chemicals/>

⁷ Van Houtan K S, et al, Land use, macroalgae, and a tumor-forming disease in marine turtles, PLoS One, Sep 29;5(9):e12900, 2010, doi: 10.1371/journal.pone.0012900.

⁸ Van Houtan, K S, et al, Eutrophication and the dietary promotion of sea turtle tumors. PeerJ. 30;2:e602, 2014, doi: 10.7717/peerj.602.

responsible for destroying much of NSW's seagrass beds, with only 2.9km² of seagrass beds remaining in sheltered coastal waters and estuaries from the Hunter River to the NSW-QLD border at the turn of the century.⁹ Significantly, Posidonia Australis Seagrass Meadows of the Manning-Hawkesbury ecoregion are listed as an Endangered Ecological Community under the EPBC ACT.¹⁰ In addition, wetlands — which are important biological filters for water quality and are home to unique species — have been cleared, drained and converted into agricultural lands, including for storage for irrigation by permanent flood.¹¹

3. The Richmond River case study

“Since the 2022 mass flooding events, we are finding there is less availability of critters that provide food for fish in rivers where intensive agriculture occurs compared to healthy natural rivers,”

Prof. Kirsten Benkendorff, Marine Scientist, Southern Cross University

The NSW Government's Marine Estate Strategy showcases the Richmond River as an example of poor water quality due to excessive turbidity and nutrient concentrations. A paper in 2002, identified the dominant land user groups of the Richmond River catchment as cattle grazing (53%), timber cutting (42%), and cropping (3.4%).¹² (Today, horticulture has been an additional key user group).

In 2016, in partnership with the University of New England, Utility company Rous Water released an examination of the health of the Richmond River catchment, giving it an overall poor health rating of D+ (with a possible rating between A-F). They assessed indicators, such as water quality, riparian vegetation, and macroinvertebrates in 48 sites over a 12-month period. They pointed to land clearing, grazing in riparian zones, and the dominance of noxious weeds as the cause of poor river conditions.¹³ Another paper lists clearing as one of the major issues impacting on the health of the Richmond River, saying 'land clearing occurs everywhere in the catchment'. Wetland coverage once accounted for 20% of the catchment but has been reduced to just 6%; clearing on steep slopes has led to bare areas with pasture grasses that cannot hold soil in place; and riverbanks have been cleared of vegetation.¹⁴

The cost to fish life

The NSW Marine Estate Strategy highlights concern over the occurrence of mass fish kills that have been a result of three main factors; low dissolved oxygen, pollutants, and exposed acid sulphate soils washing into the river from even moderate flooding events. For example,

⁹ Katryna, D, Fish fill events and habitat losses of the Richmond River, NSW Australia: An overview, Journal of Coastal Research, 36(sp1), p217.

¹⁰ Posidonia Australis Seagrass Meadows of the Manning-Hawkesbury Ecoregion, Species Profile and Threats Database, Department of Climate Change, Energy and Water, <https://www.environment.gov.au/cgi-bin/sprat/public/publicshowcommunity.pl?id=127>

¹¹ Katryna, D, p217.

¹² Hossain, S & Eyre B, Suspended sediment exchange through the subtropical Richmond river estuary, Australia: a balance approach, Estuarine, Coastal and Shelf Science, 55, 579-586, 2002, p580.

¹³ Wilson River in very poor health: report, The Echo, May 2016, <https://www.echo.net.au/2016/05/wilsons-river-in-very-poor-health-report/>

¹⁴ Katryna, D, p217.

in 2001 and 2008, a widespread fish kill affected 30kms of the river, crashing levels of aquatic life.¹⁵ Our coastline is sensitive to the polluted runoff from acid sulphate soils, which is well-documented as causing fish kills and disease.¹⁶ A contributor to this process is the pasture grasses planted on floodplains that decompose within 24 hours of inundation, causing eutrophication and stripping surrounding water of dissolved oxygen. This process, alongside the floodwaters carrying large loads of sediment and nutrients (including acid sulphate soils) from cleared lands, further reduces the dissolved oxygen levels.¹⁷ Polluted runoff is a historical issue for the Richmond, leaching from agricultural crops where synthetic fertiliser is applied has resulted in an increase of nutrient pollution up to 2.5 and 3.0 times higher phosphate and nitrate concentrations respectively than 50 years prior in 1997 (with concentrations decreasing quickly after runoff events).¹⁸

The unknown cost to the marine environment, including to the Cape Byron Marine Park and associated recreational and business activities

The multiple impacts of runoff (i.e. from agriculture and other issues, such as a broken sewage treatment plant in 2022),¹⁹ is not just a concern to river health but to the adjoining marine environment, including the southern end of the Cape Byron Marine Park (CBMP) around Lennox Head, which is exposed to increased turbidity and associated pollutant exposure. This area is home to a marine sanctuary, offering the highest level of protection for marine life and habitats. It is also a popular tourism destination and surfing location. In a 2015-16 study, it was estimated that 40,000 people visited CBMP to swim, surf, sail, whale watch, dive, and fish with a total recreational marine user value of \$2.5 million.²⁰ Dolphin watching is also one of the largest commercial tourism industries in the CBMP.

One anonymous former CBMP committee member has alerted AMCS/NPA NSW that agricultural runoff has been a big concern for advisory committee representatives in the diving, conservation, and fisheries (recreational and commercial fishing) community. The representative reports 'DPI noted impacts on water quality from rivers outside the park boundary was a unique concern for CBMP compared to other marine parks. Storm water is discharged directly onto Lennox Head beach and that may locally mask the broader impact of runoff from the river near the town itself'.

Recent research demonstrates the dependency of higher-order marine species on functioning, healthy estuaries and waterways. Coastal communities of the globally Near Threatened Indo-Pacific bottlenose dolphin (*Tursiops aduncus*), utilise estuaries for critical

¹⁵ NSW Government, NSW Marine Estate Management Strategy 2018-2028, 2021, p30, https://www.marine.nsw.gov.au/__data/assets/pdf_file/0005/1352831/Marine-Estate-Management-Strategy-2018-2028.pdf

¹⁶ Katryna, D, p218.

¹⁷ Katryna, D, p217.

¹⁸ Eyre, B, Water quality changes in an episodically flushed sub-tropical Australian estuary: A 50 year perspective, Centre for Coastal Management, Southern Cross University, 1997.

¹⁹ Armitage, M, 'Several weeks' before Ballina waters safe for swimming, says council,' The Echo, April 2021, <https://www.echo.net.au/2022/04/several-weeks-before-ballina-beach-and-waterway-pollution-expected-to-subside-says-council/>

²⁰ Managing our big blue backyard - the role of marine parks in Australia, Australian Marine Conservation Society & Save Our Marine Life Alliance, March 2022, p10

activities, including feeding, resting, and socialising.²¹ These habitats are particularly important for females with dependent offspring, with some individuals showing residency and site fidelity over multiple decades to local NSW estuaries (including Port Stephens, Hastings River, Clarence River, Richmond River, Nambucca River and Tweed River).^{22 23} Estuarine communities of bottlenose dolphins are particularly vulnerable to decline due to elevated exposures to anthropogenic activities and habitat degradation that are concentrated along coastal fringes and more precisely around estuarine areas. Habitat degradation and poor water quality can result in e.g. loss of prey, increased exposure to pollutants and loss of habitat, which can in turn, lead to disease, illness and declines in reproductive success.^{24 25} As higher order predators, dolphins are bioindicators and essential to maintaining functioning marine ecosystems. Furthermore, local dolphin communities that frequent NSW estuaries are the focus of tourism ventures, providing major economic benefits to regional towns. By ending large-scale land clearing, the NSW Government has an opportunity to help reduce pressure on these ecologically, culturally, and economically important species, and ensure functioning, healthy marine ecosystems, and habitats.

The cost to aquaculture

Historically, the Richmond River had extensive oyster beds, which have practically disappeared as a result of declining water quality and high sedimentation causing stress and disease. In Australia, 95% of oyster reefs are now considered functionally extinct.²⁶ In particular, the QX disease is triggered by poor water quality.^{27 28} As a result of this disease, the number of viable oyster leases in the Richmond River has reduced from 27 in the 1970s to just three.²⁹ A recent study (yet to be published) by Benkendorff's team at SCU found 21 different pesticides in a single oyster.³⁰ Molluscs are vulnerable to intensive agricultural pesticide run-off which is why further study is needed into the impacts on estuarine environments³¹ and the cost to the aquaculture industry.

The cost to government

The NSW Government has invested \$4.23 million from the Marine Estate Management Strategy Project into reducing 2,800 tonnes of sediment and nutrient run-off by 34 farmers (mostly macadamia and cattle farms) in the Alstonville plateau to improve the health of the

²¹ Hawkins, E. R, Healthy Waterways-Healthy Dolphins Project Report 2019, Dolphin Research Australia Inc, 2019, p11, <https://www.dolphinresearchaustralia.org/wp-content/uploads/2020/01/HW-HD-2019-Project-Report-final.pdf>

²² Fury, C A, et al, Abundance, site fidelity and range patterns of Indo-Pacific bottlenose dolphins (*Tursiops aduncus*) in two Australian subtropical estuaries, *Marine and Freshwater Research* 59(11), 2008, DOI:10.1071/MF08109

²³ Hawkins, E. R, p7.

²⁴ Fury, C A, et al, p11-12.

²⁵ Hawkins, E. R, p4.

²⁶ Gillies, C. et al, Australian shellfish ecosystems: Past distribution, current status and future direction. *PLoS One*, 13(2), 2018, e0190914.

²⁷ Nell, J, Diseases of Sydney rock oysters. NSW Fisheries, Port Stephens Fisheries Centre, 2001.

²⁸ O'connor, W. A., & Dove, M. C, The changing face of oyster culture in New South Wales, Australia. *Journal of Shellfish Research*, 28(4), 803-811, 2009.

²⁹ OzFish, Richmond Rock Oysters, October 2021,

<https://ozfish.org.au/projects/richmond-rock-oysters/#:~:text=Various%20hydrological%20changes%20to%20the,crop%20losses%20and%20industry%20downturn>

³⁰ Personal correspondence with Professor Kirsten Benkendorff, marine Science, Southern Cross University, January 2023

³¹ Southern Cross University, New study finds agricultural pesticides can affect prawns and oysters, August 2020

Richmond River.³² The strategy's solution to poor agricultural land management includes managing private drainage systems and creating opportunities for private land conservation via riparian fencing, riparian replanting, and wetland restoration. It also identifies education and compliance activities as an important initiative to improve landholder's understanding of land use and their responsibility to providing better water quality for the Richmond River estuary.³³ While we congratulate government efforts to invest in agricultural restoration projects on the Richmond, this is wasted public money if land clearing rates continue to soar creating an overall net loss of vegetated lands in NSW with existing deep-rooted structures. Protecting existing native trees and native vegetated land is critical — they are our greatest allies against disturbed soils and run off. The root networks of trees bind and consolidate soil, they stabilise riverbanks, and prevent waterways becoming muddied and choked with silt.³⁴

4. The Coffs Harbour-Clarence blueberry farms case study

From 2001-2016, NSW saw a rapid expansion of intensive blueberry farming, increasing >400%, with 90% of that growth attributed to the Coffs Harbour region. The expansion of large blueberry farms has raised concerns in the local community, worried about the industry's impact on water quality downstream. Southern Cross University reports management agencies, including the Environmental Protection Authority, the Office of Environment and Heritage, and Coffs Harbour City Council, have fielded numerous complaints against the expansion of intensive blueberry farms.³⁵

The minutes from a 2017 Blueberry Interagency Working Group Meeting Growers details a list of alarming concerns in relation to clearing vegetation to expand the industry, including:

- The Department of Primary Industries (DPI) reported complaints about new farm developments conducting vegetation clearing around creeks in Coffs Harbour and the Clarence, as well as in regard to run off from mainly higher order streams;
- DPI found sediment controls appeared to be non-existent and raised concerns sediment can cause issues for the Eastern Freshwater Cod, an endangered species (considered extinct in many other river systems);
- Blueberry farmers are reportedly 'prepared to pay fines as a business cost';
- There was an increase in native vegetation clearing incidences by blueberry farmers from the Coffs and Clarence region. The minutes list 22 new incidents, including many by repeat offenders, and;

³² Honan, K, Habitat restoration reduces farm run-off into Richmond River catchment, ABC North Coast, September 2021, <https://www.abc.net.au/news/rural/2021-09-18/plan-to-improve-water-quality-richmond-river/100466282>

³³ NSW Government, NSW Marine Estate Management Strategy 2018-2028, 2021, p20, https://www.marine.nsw.gov.au/__data/assets/pdf_file/0005/1352831/Marine-Estate-Management-Strategy-2018-2028.pdf

³⁴ Moore, G, Trees: why they're our greatest allies against floods — but also tragic victims, The Conversation, March 2022, <https://theconversation.com/trees-why-theyre-our-greatest-allies-against-floods-but-also-tragic-victims-178981>

³⁵ Blueberries and water quality, Southern Cross University, <https://www.scu.edu.au/research/research-impact/impact-case-studies/blueberries-and-water-quality/>

- Some cleared land was on property where conservation funding had been allocated to previous owners.³⁶

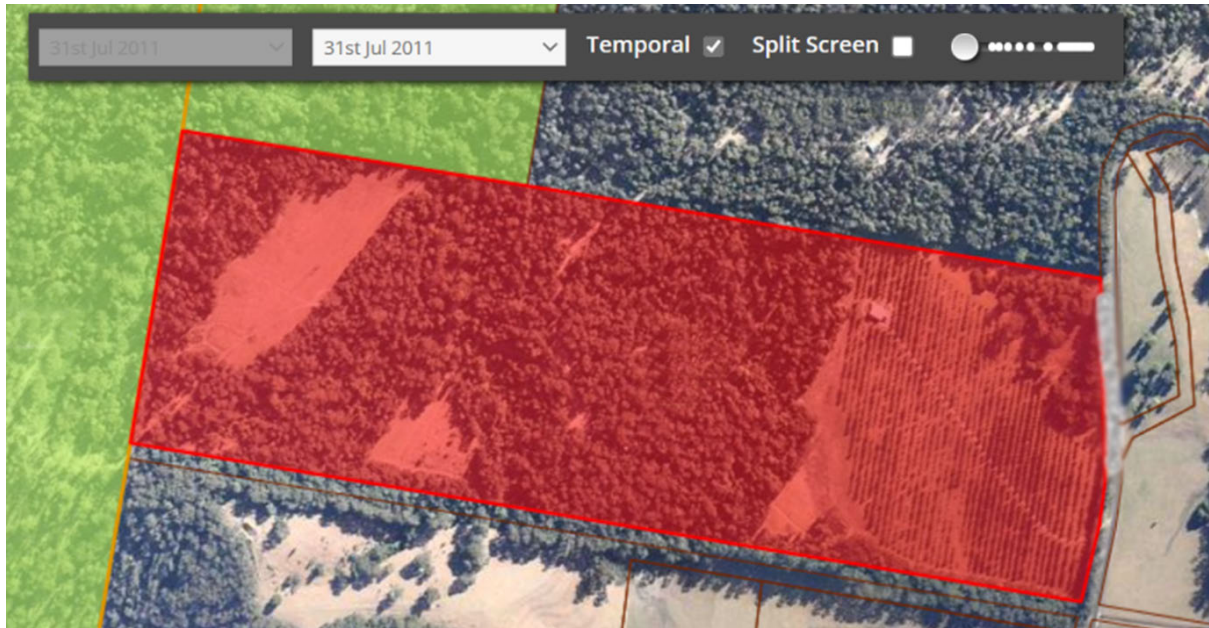


Figure 1: Satellite picture of a blueberry farm pre-clearing in the Coffs Harbour area, (where more than a half of 47 ha of land is classified as secondary and tertiary habitat for koalas on the Coffs Harbour Council mapping system), July 2011. The alleged clearing activities include clearing crown land. This blueberry farm has been reported to the relevant authorities and is awaiting court action.

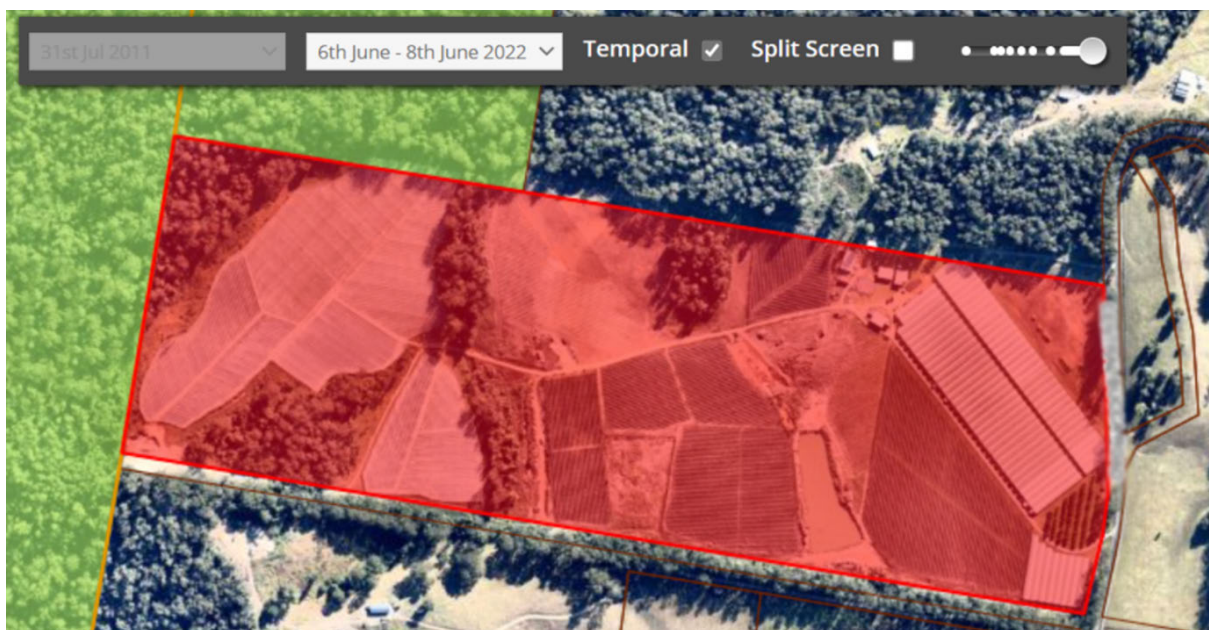


Figure 2: Satellite picture of the blueberry farm post-clearing June 2022

The Nature Resources Access Regulator (NRAR) found 28 of 31 blueberry farms it inspected around the Coffs Harbour region were non-compliant with water laws and it received more than 130 reports of alleged breaches.³⁷ Regardless of whether the alleged NRAR breaches

³⁶ Minutes from Blueberry Interagency Working Group Meeting, 15 February 2017, Grafton, <https://cec.org.au/wp-content/uploads/2022/03/BLUEBERRY-IAWG-minutes-Feb-2017-Final-ammend.pdf>

³⁷ Hannam, P, 'Rampant' expansion of blueberry farms trigger compliance crackdown, SMH, 2020

were in direct relation to land clearing, the high number of complaints shows an unwillingness or an inability for landholders to comply with the law. A recent example of illegal clearing includes a blueberry farmer in the Clarence Valley, who cleared more than 11 hectares of vegetation and as a result was required to enter into an Enforceable Undertaking with the NSW Department of Planning and Environment. We strongly support the regulator's decision to ensure the landholder commits to a conservation agreement for their property, which will protect more than 22 hectares of remnant vegetation for at least 25 years.³⁸

Although horticulture (e.g. blueberry farms) is a small proportion of the Clarence Catchment (mainly in the upper catchment around Tabulam and Orara, only about 0.1% of the catchment), elevated nitrogen was found in waters in the upper catchment and in nearby catchments.³⁹ In addition, SCU found where more than 15% of land use in a water catchment was under pressure by intensive horticulture (i.e. blueberry farms), water quality significantly decreased.⁴⁰

5. The Solitary Islands Marine Park case study

The Coffs Harbour region, known for its poor water quality in relation to blueberry farming, is home to the Solitary Islands Marine Park (SIMP) and many popular surf breaks. Ian Shaw, Community Member, Coastal Estuary Management Advisory Committee, Coffs Harbour City Council says 'as a community member I am concerned about the rapid growth of an intensive horticultural industry on land adjacent to the waters of the Marine Park, and about the effect of nutrient runoff into creeks and waterways entering this environment'.⁴¹

The Marine Park has been shown to be incredibly sensitive to runoff from poor land management. For example, Southern Cross University was asked to prepare water quality investigations into Double Crossing Creek, a tributary of Hearnes Lake (Habitat Protection Zone), which drains into the SIMP in 2018. When the lake was open and drained in wet conditions, they found increased loads of nitrogen drained out to the coastal marine communities in the park.⁴² Hearnes Lake is a part of the Hearnes Lake sub-catchment, where 38% of the sub-catchment was reported to be used by intensive horticulture in 2016.⁴³ Nitrite and nitrate levels feeding into the Hearnes Lake catchment have been recorded up to

³⁸ NSW Department of Planning and Environment, Unlawful native vegetation clearing results in Enforceable Undertaking for blueberry farmer, April 2022, <https://www.environment.nsw.gov.au/news/unlawful-native-vegetation-clearing-results-in-enforceable-undertaking-for-blueberry-farmer>

³⁹Hydrosphere Consulting, Clarence River Estuary, Coastal Management Program Stage 1: Scoping Study, Clarence Valley Council, September 2022, p2, 65 & 58, <https://www.clarenceconversations.com.au/clarence-river-estuary-cmp-scoping-study>

⁴⁰ Blueberries and water quality, Southern Cross University, <https://www.scu.edu.au/research/research-impact/impact-case-studies/blueberries-and-water-quality/>

⁴¹ Blueberries and water quality, Southern Cross University.

⁴² White, S A et al, Investigating water quality in Coffs coastal estuaries and the relationship to adjacent land use, Part 2: water quality, Coffs Harbour City Council Environmental Levy Program & Southern Cross University, July 2018, p29.

⁴³ Coffs Harbour Region Ecohealth Report, Coffs Harbour City Council, 2016, p97, [https://www.coffsharbour.nsw.gov.au/files/sharedassets/public/environment/projects-and-strategies/state-of-the-environment-2016/coffs-ecohealth-report-\[web-version\]-may-2016.pdf](https://www.coffsharbour.nsw.gov.au/files/sharedassets/public/environment/projects-and-strategies/state-of-the-environment-2016/coffs-ecohealth-report-[web-version]-may-2016.pdf)

695 times higher during high rainfall events.⁴⁴ Researchers determined fertiliser loss from agriculture to waterways to be ~20% of the recommended use and estimated dissolved nitrogen load six-fold higher than the modelled Australian East Coast Average — similar to rivers in China, India and Europe with strong urban and agriculture influences.⁴⁵

Recent research also found one elevated reading of a pesticide and the use of one banned chemical entering Hearnes Lake during rain events.⁴⁶ SCU has further detected nine pesticides, including five insecticides, two algicides and two fungicides. Of greatest concern was the very high concentrations of imidacloprid — a neonicotinoid pesticide that has been banned from use in the EU and Canada.⁴⁷ In laboratory experiments, research has shown imidacloprid can be uptaken into the flesh of prawns and oyster at levels that exceed acceptable residue limits and this pesticide causes significant mortality in prawns and sublethal effects on oysters.^{48 49 50} Another Woolgoolga lake study, with samples on multiple days, found that turbidity, ammonia, phosphate, E. coli and faecal coliforms exceeded acceptable ANZECC guidelines for estuarine waters.⁵¹

This is concerning as the SIMP is an important habitat for threatened species, including sea birds, and also a nursery ground for fish. When the lake is opened, the lake discharges into Flat Top Point, a marine sanctuary, home to one of the most highly diverse rocky shores in the SIMP. The transfer of toxic chemicals into the food web adds to the cumulative impacts of species that are already under pressure from habitat loss, extractive activities, and climate change. Threatened species affected by contamination include coastal birds which depend on fish, such as the Osprey, Little Tern, and the Black-necked stork, and amphibians such as the Wallum Frog. Hearnes Lake is also home to a coastal saltmarsh, which is listed as an Endangered Ecological Community.⁵²

It is worth considering the wider economic impacts on tourism, as it has been estimated the total tourism value of SIMP to be \$1.4 million, in terms of people visiting the region to swim, surf, sail, whale watch, dive and fish.⁵³ There are also economic implications for fisheries, considering scientists are concerned about the impact on major industries, including prawn trawling and fishing.⁵⁴

⁴⁴ Davies, A, Blueberry blues: how a cash crop is causing a contamination crisis in Coffs Harbour, Guardian, September 2022, <https://www.theguardian.com/australia-news/2022/sep/28/blueberry-blues-how-the-cash-crop-is-causing-a-contamination-crisis-in-coffs-harbour>

⁴⁵ White, S A et al, p29.

⁴⁶ Rowley, M, Identifying pesticides in Hearnes Lake catchment waterways, Coffs Harbour City Council, 2022

⁴⁷ Laicher, D, et al, Pesticide occurrence in an agriculturally intensive and ecologically important coastal aquatic system in Australia. Marine Pollution Bulletin 180, 2022, 113675, <https://doi.org/10.1016/j.marpolbul.2022.113675>

⁴⁸ Butcherine, P, et al, 2021. Acute toxicity, accumulation and sublethal effects of four neonicotinoids on juvenile Black Tiger Shrimp (*Penaeus monodon*). Chemosphere 275: 129918, 2021, <https://doi.org/10.1016/j.chemosphere.2021.129918>

⁴⁹ Ewere, E E, et al, The neonicotinoid insecticide imidacloprid, but not salinity, impacts the immune system of Sydney rock oyster, *Saccostrea glomerata*. Science of The Total Environment, 140538.

⁵⁰ Butcherine, P, et al, Impact of imidacloprid on the nutritional quality of adult black tiger shrimp (*Penaeus monodon*) Ecotoxicology and Environmental Safety 198, 110682, 2020.

⁵¹ Benkendorff, K. et al, Valuation of water quality regulation services by shellfish in Woolgoolga Lake, Report to Coffs Harbour City Council, 2022,

<https://www.coffsharbour.nsw.gov.au/Environment/Compliance-and-reporting/Monitoring-our-waterways/202122-Valuation-of-water-quality-regulation-by-shellfish-in-Woolgoolga-Lake>.

⁵² Rowley, M, Identifying pesticides in Hearnes Lake catchment waterways, Coffs Harbour City Council, 2022

⁵³ Australian Marine Conservation Society & Save Our Marine Life Alliance, 2022, p10

⁵⁴ Davies, A, 2022.

6. Impacts on drinking water supplies in the Coffs-Clarence region

The Clarence Catchment is NSW's largest catchment and is divided into five subcatchments, with drinking water storages at Shannon Creek Dam, Karangi Dam and Nymboida Weir supplying both the Coffs and Clarence region.

The Clarence Environment Centre (CEC) reports large-scale clearing, including from cattle grazing, urban development, and state forestry, as a high risk concern to drinking water supply to the Clarence-Coffs region. The CEC has produced several reports on soil disturbance and poor water quality in the Nymboida sub-catchment, noting the Clarence Council has cited huge amounts of 'dirty water' as a cause for concern, negatively impacting on its water treatment process, with the council uncertain about its safety (March 2022).⁵⁵

In total, 99% of the volume of the Mid Nymboida is allocated for town water.⁵⁶ The issue of 'dirty water' has implications for sustainable drinking supplies of the Coffs-Clarence region as the Karangi Dam (15 km west of Coffs Harbour CBD) receives water from the Orara River, Nymboida River, or Shannon Creek dam (west of Coutts Crossing village) via an underground pipeline, while the Shannon Creek dam receives water from the Nymboida River and the Karangi Dam to supply water to Coffs and the Clarence.^{57 58}

The Clarence Valley Council has been forced to shut down its treatment process every time the Nymboida and Shannon Creek catchments are overwhelmed by water pollution. The Clarence Environment Council says 'For over 100 years, the Nymboida River has provided water to the Clarence Valley communities, of a quality that was the envy of all. Now, the installation of the very expensive water purification plant, costly in terms of both construction and operation, is seen as a necessity. So, what has gone wrong?'⁵⁹ A solution to the Clarence water quality crisis is yet to be found as the cost of building a purification plant is expensive and council does not have the money to pay for one. CEC says the most cost-effective solution would be to put an end to large-scale land clearing in the catchment.

In support of CEC's observations, a 2022 independent study for the Clarence Valley Council found the most significant threats to the Clarence River catchment include native vegetation clearing and increased sediment and nutrient loads. It found sediment and nutrient runoff, including from agriculture, contributed to poor water quality.⁶⁰

⁵⁵ Edwards, J, Water Quality Matters Review, Clarence Environment Centre , 5 December 2021

⁵⁶ Hydrosphere Consulting, Clarence River Estuary, Coastal Management Program Stage 1: Scoping Study, Clarence Valley Council, September 2022, p27, <https://www.clarenceconversations.com.au/clarence-river-estuary-cmp-scoping-study>

⁵⁷ Hydrosphere Consulting, p27.

⁵⁸ Coffs Harbour Region Ecohealth Report, Coffs Harbour City Council, 2016, P10, [https://www.coffsharbour.nsw.gov.au/files/sharedassets/public/environment/projects-and-strategies/state-of-the-environment-2016/coffs-ecohealth-report-\[web-version\]-may-2016.pdf](https://www.coffsharbour.nsw.gov.au/files/sharedassets/public/environment/projects-and-strategies/state-of-the-environment-2016/coffs-ecohealth-report-[web-version]-may-2016.pdf).

⁵⁹ Clarence Environment Centre , December 2021.

⁶⁰Hydrosphere Consulting, 2022, p11.



Figure 3: Bank erosion on the Clarence River due to cattle farming, 2021, © Clarence Environment Centre

7. Clearing of native forests

Our alliance is concerned that with the unclear legislative arrangements, in the wake of the repeal of the NSW Native Vegetation Act 2003, that native vegetation (including rainforest and old growth) inside plantation areas is still being removed under the provisions of the current arrangement. The Native Vegetation Act 2003, (n) Division 4 Excluded clearing 25 Legislative exclusions, makes it clear that plantations are excluded from the act,⁶¹ whereas the Land Management (Native Vegetation) Code Act 2013 excludes any mention of plantations. The current NSW Plantation Reforestation Act and Code must be reformed to ensure that it is not used as a legislative hole for native forest logging inside NSW plantations. This is significant because mature forests have deeper roots than younger forests and are more efficient at extracting soil moisture, helping to reduce runoff.⁶²

This submission would like to draw attention to the intensification of forestry operations, following the loosening of rules in the Integrated Forests Operation Approval (IFOA), which has contributed to an overall reduction width in buffer zones (no go zones for logging) to protect creek, river, and drainage lines. In CEC's report, it has documented the negative impact of mass clearfelling at a plantation in Clouds Creek State Forest in the Clarence Catchment, particularly the Nymboida River, as an example of this. CEC is deeply concerned about the impact of large-scale clearfelling by forestry in the upper catchment of the Clarence on the Coffs-Clarence drinking water supply.⁶³ Similarly, clearfell plantation operations at Wild Cattle Creek State Forest pose similar threats to the Coffs-Clarence water supply. Whilst closer to the coast, water entering the Solitary Island Marine Park is threatened by logging operations at Wedding Bells State Forest, Conglomerate State Forest and Orara East State Forest.

⁶¹ The Native Vegetation Act 2003, (n) Division 4 Excluded clearing 25 Legislative exclusions, <https://legislation.nsw.gov.au/view/html/inforce/current/act-2003-103>

⁶² Neary, D G et al, Linkages between forest soils and water quality and quantity, Forest Ecology and Management, Volume 258, Issue 10, 30 October 2009, Pages 2269-2281 <https://doi.org/10.1016/j.foreco.2009.05.027>

⁶³ Edwards, J, 2021.



Figure 4: Plantation clear-felling at Clouds Creek State Forest, including removing trees on drainage lines almost to the river itself, 2021 © Clarence Environment Centre

Supporting these concerns, Senior Research Fellow, Earth Systems Government Project, Griffith University's Dr Tim Cadman told the local Coffs Harbour paper, News of the Area, under the Plantation Act (1990) regrowth can be classified as plantation. For example, Wild Cattle Creek has areas which are classified as 'native forest' in the state Defined Forest Area Classification system, but Forestry Corporation contractors have logged them as 'plantation.'⁶⁴ While breaches have been found in forest management in plantations that apply to native forest management, there is no requirement for plantation management to meet the Forestry Act 2012 or management guidelines.

8. Raising awareness about poor water quality in the Clarence

To raise awareness about poor water quality in the Clarence Catchment, Surfrider has launched an Endangered Wave campaign to protect Yamba and the surrounding waterways and coastlines including Iluka and Angourie (a national surfing reserve). Local Surfer Dan Ross says 'as surfers we are strongly connected to the areas where our rivers meet the sea. The Clarence River is under threat, as is the playground of world class waves at the end of it.' Previously, Surfrider has focused its efforts on the threat of a proposed dam and mining activities to poor water quality in the Clarence River catchment. However, Surfrider Foundation recognises the issue of land clearing and associated runoff during rainfall events is also a major concern and would like to draw attention to this. The independent study by the Clarence Valley Council has rated the estuary health risk (in terms of sediment and nutrient run off) as 'High Risk' to 58% of the catchment. This encompasses the majority of the southern arm of the Clarence River main stem, and upper and lower catchment areas.⁶⁵

⁶⁴ News of the Area, Differing definitions of plantations muddy timber classifications, August 2022, <https://www.newsofthearea.com.au/differing-definitions-of-plantations-muddy-timber-classifications-98834>

⁶⁵ Hydrosphere Consulting, 2022, 62 & 67.

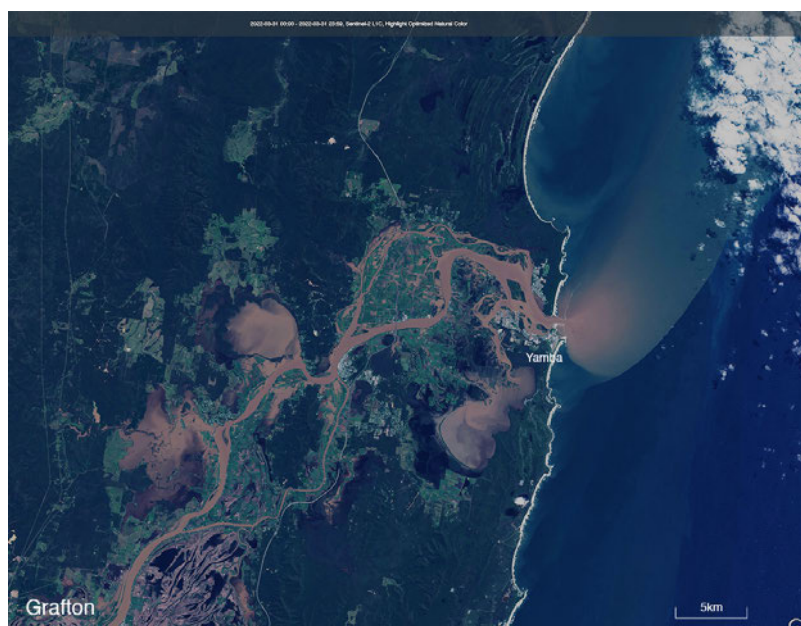


Figure 5: The extent of the Clarence River flood plume following the March 2022 floods.

9. The Batemans Marine Park case study

Why the Batemans Marine Park region is vulnerable to native vegetation clearing

The far south coast of NSW is called the ‘Nature Coast’ because of its outstanding natural coastal environment. The tourism value of the Batemans Marine Park is estimated to be \$1.6 million, attracting swimmers, surfers, sailors, people taking whale watching tours, diving and fishing.⁶⁶ The local tourism industry depends on the estuarine and coastal environment being clean and healthy for recreation, while fisheries and aquaculture industry also depend on a healthy marine park environment. Oyster farming is worth over \$58 million a year in NSW, and over \$15m a year in the far south coast (Clyde, Moruya, Tuross Rivers, Wagonga and other inlets south to Merimbula).⁶⁷

The water quality of the southern estuaries is generally very good since there is a lot of forested area, very little horticulture, and urban development is relatively sparse in the region.⁶⁸

However, vegetation clearing, even in the far distant upstream areas of coastal catchments, is a serious concern for maintaining the health of the Batemans Marine Park coastal environment. Soil, nutrients and agricultural toxins that runoff in the upper regions of any catchment eventually make their way down the rivers, into their estuaries and eventually all end up in the ocean. Unvegetated riparian and estuarine foreshores are particularly susceptible to erosion and this can be exacerbated if vehicles or stock have access to the riverbanks.

⁶⁶ Australian Marine Conservation Society & Save Our Marine Life Alliance, 2022, p10.

⁶⁷ Aquaculture Production Report, Department of Primary Industries, 2020-21, https://www.dpi.nsw.gov.au/_data/assets/pdf_file/0004/1389640/Aquaculture-Production-Report-2020-2021.pdf

⁶⁸ The health of our estuaries, NSW Department of Planning and Environment, <https://www.environment.nsw.gov.au/topics/water/estuaries/estuaries-of-nsw>

Post-bushfires - why riparian vegetation is more important than previously understood

Until recently, it was thought uncontrolled coastal developments, forestry, and grazing provided the biggest threats to the riparian and estuarine vegetation, particularly if the stock has free access to the foreshores. However, in the summer of 2019-20, a new threat arrived. The mega-Black Summer bushfire burnt about 80 per cent of the Eurobodalla Shire, both farms and forests right down to the waterline, and was followed soon after by torrential rain that washed the ash bed and exposed topsoil into the rivers. Serendipitously, the Nature Coast Marine Group is aware of a group of Sydney scientists who commenced a study on six of NSW estuaries before the fires, including the Clyde Estuary, were able to remeasure water quality after the fires. For those estuaries without a buffer of vegetation, the researchers found an increase in metals, pyrogenic carbon (carbon formed by fires), and nutrients, such as phosphorus and nitrogen. A rapid increase in concentrations of these chemicals could affect the behaviour, survival, and reproduction of estuarine species. Filter-feeding animals, such as mussels and oysters, are especially sensitive to the levels of silt, which increased after the fires. The study has found those estuaries with an intact riparian vegetation zone were significantly protected from the fire-induced pollution. The researchers say their findings prompt a call for riverside vegetation to be prioritised for protection and that bushfires be considered in catchment management plans.⁶⁹

Many mangrove trees lining the estuaries, some very old, died from the heat of the fire. Mangroves are very important for the health of the estuary. Their roots hold together mud and sediment, reducing coastal erosion and maintaining the quality of the water. Since they are not fire-adapted, they do not resprout like eucalyptus, so a mangrove forest takes a long time to recover. To speed up the process, local oyster farmers have been taking matters into their own hands. With the help of community volunteers, they have been collecting mangrove seeds, rearing them in a nursery and replanting them.⁷⁰

Therefore, it is important that both foresters and farmers (and urban developers) do not carry out large scale clearing and ensure they leave adequate vegetation buffers along water courses to ensure topsoil is not washed the rivers, reducing the fertility of the land and lowering water quality. Healthy mangroves and saltmarshes are critical for maintaining water quality of estuaries and should never be cleared.

The Native Vegetation Codes contradicts government efforts to restore fire-affected riparian zones

NSW Department of Planning and Environment (DPE) recognises the importance of vegetation for preserving water quality and has set up a Bushfire-Affected Coastal Waterways Project to help fire-affected Shires to restore riparian zones. The Eurobodalla

⁶⁹ The influence of megafires on estuaries, one of earth's most valuable biomes, University of New South Wales Newsroom, September 2022,

<https://newsroom.unsw.edu.au/news/science-tech/influence-megafires-estuaries-one-earths-most-valuable-biomes>

⁷⁰ Tregneza, H, Mangroves killed during Black Summer bushfires near Batemans Bay are not growing back, ABC South East NSW, May 2022,

<https://www.abc.net.au/news/2022-05-02/mangroves-killed-black-summer-bushfire-batemans-bay/101023676>

Shire is providing land holders with grants for erosion control, revegetating, and fencing stock out of riparian zones to allow for recovery.⁷¹

So, while one NSW government department is providing land owners grants to restore riparian zones to reduce erosion into our waterways and improve water quality, another department is providing land owners with permits for clearing vegetation which, if not carefully regulated and monitored, could increase erosion into our waterways, washing in silt, ash, nutrients, and agricultural toxins, thereby reducing the water quality of our rivers, estuaries, and the ocean. This could have a significant deleterious effect on the far south coast region, causing economic impact on the multi-million dollar aquaculture industry as well as tourism.

10. Summary

The case studies cited above demonstrate the inextricable relationships between the land clearing practices and the quality of water throughout downstream catchments and adjoining ocean. The reduction of water quality has massive impacts on those waters and the communities, habitats, and biodiversity that depend on high quality water. It is clear the current land clearing laws have seen significant impacts on catchments and marine habitats. These adverse impacts are being felt in the most ecologically, economically, socially, and demographically important portion of our State, the NSW coast.

This Alliance is concerned the current scope of the proposed review is too narrow to stabilise, let alone reverse, the environmental, economic and social declines associated with poor water quality. The recommendations below are designed to broaden the terms of the review and ensure revised clearing laws guarantee sustained improvements in the quality of waters flowing into our coastal regions.

11. Recommendations

- It critical the review committee pay particular attention to the Native Vegetation Codes' impact on:
 - Aquatic and marine ecosystems and the resident and migratory species that depend on utilise these systems;
 - Human health and wellbeing — when it comes to drinking water and to recreational activities, including swimming and surfing, in waterways and in the ocean, and;
 - Water security in the face of climate change, as one of the driest continents on Earth e.g. investigation should be conducted into the cost of clearing to local councils in terms of filtering their water supply. It should also take into

⁷¹ Bushfire-affected waterways, Eurobodalla Shire Council, <https://www.esc.nsw.gov.au/council/major-projects/current-projects/roads-bridges-water/bushfire-affected-waterways>

account future agricultural demand/pressure on catchments' scarce drinking water supplies and water needed for healthy productive rivers.

- The economic cost on commercial fisheries, aquaculture and tourism businesses (i.e. diving and recreational fishing).
 - Consider Indigenous knowledge and management practices in managing vegetation from a whole of landscape perspective, including consulting with Indigenous groups.
 - A specific scientific study report should be also conducted investigating the impact of land clearing on the aquatic and marine ecosystems and the migratory and resident species that live there, human health and wellbeing, and water security.
- The review committee should identify indicators, including sediment and chemical markers, to determine how they are distributed from the Richmond River mouth, potentially impacting on the CBMP.
 - The current review should be suspended in favour of a more comprehensive review of native vegetation regulations, one that acknowledges the disastrous impacts of the current regulations on biodiversity and establishes adherence to the Ecological Sustainable Development (ESD) principles and ensures that no further species or ecosystem are lost as basic objectives.
 - An immediate moratorium should be placed on large-scale land clearing and clearing of known threatened ecosystems, particularly in riparian and estuarine strips and habitat for wildlife, pending the outcomes of the review. Considering the government recognises water quality as a priority threat to the NSW Marine Estate, this should include an immediate ban on large-scale clearing in catchments negatively influencing state marine parks to prevent poor water quality, since marine parks are the state's refuges for unique wildlife and habitats and are essential buffers against the effects of climate change.
 - Native vegetation reform should be tied directly into the 30x30 target at a bioregional scale to highly protect a third of the land and sea, while designing whole of landscape policies to ensure the remaining 70% is sustainably managed, recognising the importance of connected ecosystems and catchment areas.
 - The NSW Government must stop removing protections for marine sanctuary zones, as evidence shows they provide ecosystem resilience against extreme flooding events⁷² and so could play a key role in creating resilience against agricultural pollution. This is why the government must reinstate lost sanctuary areas and invest in new marine parks, particularly in bioregions where there is no protection.
 - Provide technical support and education to help restore landscapes at a whole of catchment scale. This includes educating landholders on the scientific principles that underpin healthy land and seascapes, as well as the 30x30 target.
 - Funding should be allocated to better understand the impacts on vulnerable species and habitat, including sea turtles and the Indo-Pacific bottlenose dolphin.
 - We support government efforts to force offenders to enter into conservation agreements to prevent future clearing and recommend an expansion of this initiative.

⁷² Olds, A et al, Marine reserves help coastal ecosystems cope with extreme weather, *Global Change Biology*, May 2014, <https://doi.org/10.1111/gcb.12606>

- Repeat illegal land-clearing offenders should be banned from conducting agricultural activities, considering the immense costs to NSW's water security.
- If a landholder receives taxpayer funded conservation benefits, then there should be stronger criteria to ensure that any restored areas are not cleared in the future by new landholders.
- To ensure the effectiveness of this solution, the government should ensure there are a sufficient number of enforcement officers to provide a rapid response with immediate enforcement deployed to community calls on illegal land clearing to halt further damage to native vegetation.
- Separately investigate options for providing greater support for regenerative agricultural practices that enhance vegetation, biodiversity, nutrition, water cycling, soils, forests, perennial pastures and catchments.
- Conduct an 'end to end' overhaul of current biodiversity offset schemes.
- Expand stewardship programs to provide greater incentives for landholders to protect forests.
- Establish minimum competency and knowledge standards for all parties involved in assessment and land clearing operations, including clearing contractors.
- Improve mapping and provide greater transparency over land clearing data.
- Set IBRA subregion specific limits on habitat modification clearing.
- Mandate assessments for clearing proposals.
- Improve monitoring of post clearing environmental impacts, including increases in salinity, soil instability and decrease in water quality.
- Increase penalties for non-compliance.
- Increase funding for assessment and enforcement.
- Immediately restore Forestry and Agriculture riparian buffer zones to their original extent prior to the recent and damaging diminutions and that all classes of riparian buffer be immediately restored to no less than 10, 20, and 50 meters with no encroachment by machinery or removals. These buffers must remain undisturbed.
- Call for the restoration of the original size limits on large trees to 140 centimeters for coastal blackbutt and 120 centimeters to all over species and an end to logging of all non-planted native tree species in plantations, including rainforest, old growth and secondary native forest.
- Reform the current regulations, including the NSW Plantation Reforestation Act and Code, to ensure that they are not used as a legislative hole for native forest logging inside NSW plantations.