Wet Tropics Aquatic Biosecurity Workshop

Outcomes Report

May 8, 2025

Wet Tropics Biosecurity Futures

We acknowledge the traditional custodians of where we live and work throughout Far North Queensland.

We pay respects to Elder's past, present and emerging, and to First Nations enduring connections to land, sea, sky, Country and culture.

Disclaimer

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Wet Tropics Aquatic Biosecurity Workshop
Executive Summary

The Wet Tropics Aquatic Biosecurity Workshop highlighted the urgent need for a coordinated, prevention-first approach to aquatic invasive species management. The workshop reinforced the grim reality of aquatic biosecurity incursions that once organisms are released into an aquatic environment; it is next to impossible to effectively contain or eliminate them. Given its tropical environment the Wet Tropics region already has many established aquatic weeds and pest fish which are legacy of a failure to prevent new species naturalising from the ornamental and aquarium trade. Based on its geographical context the region is also a likely pathway for biosecurity risk incursions from other tropical regions, either by naturalisations from the north or by accidental introductions through ports, harbours, collectors and commerce. With high-risk pest fish present in Papua New Guinea and detected in the Torres Strait, and numerous potentially invasive aquarium plants already in trade or cultivation, participants emphasised that legislative tools like the Biosecurity Act must be supported by on-ground enforcement, local capacity building, and behaviour change initiatives. They also reinforced that both pre and post border approaches remain essential to reducing the exposure of the region to aquatic biosecurity risks.

Community surveillance and citizen science tools such as iNaturalist, Weed Spotters and Feral Fish Scan were recognised as critical tools for bridging the gap between awareness and action. The fact that historical campaigns like *Don't Be a Tank Tipper* are still relevant 20 years on demonstrated the need for more targeted education and stronger compliance action aimed at shifting behaviour. Despite efforts to address gaps in surveillance capability, concerns remain over the limited capacity in rural and remote regions underscoring the need to strengthen indigenous ranger programs and invest in training across the Far North to engage with other land managers.

Environmental disturbance, whether driven by land use, development or natural disasters, was identified as a key enabler of invasive aquatic species. The most tangible strategies to remedy this are habitat protection and restoration aimed at reducing degradation, maintaining resilience and improving water quality and waterway function. It is anticipated that the increasing impacts of climate change on natural systems will further exacerbate these trends.

In parallel, emerging technologies are reshaping the management landscape. Drones, AI, and eDNA surveillance are significantly enhancing detection and response capabilities, especially in hard-to-access areas. New tools in the herbicide toolkit and improved application methods are showing encouraging outcomes, such as more selective control, reduced off-target damage, improved water quality and native species recovery.

Yet, without addressing systemic drivers like ongoing land-use impacts and fragmented governance, these technological gains may be short-lived. The workshop closed with a collective call for greater cross-sectoral coordination, integration of traditional ecological knowledge, and sustained investment in innovation, education, and regional partnerships.

Background

Biosecurity is all about protecting ecosystems, agriculture, and human health from harmful pests, diseases, and invasive species. The Wet Tropics is exposed to biosecurity risks from invasive aquatic plants and animals in addition to pathogens and disease. Biosecurity risks and impacts can be classified as current, emerging, or future concerns. While the draft framework does consider invasive species from adjoining ecosystems, its primary focus remains on instream and aquatic ecosystem issues.

Proposed aquatic biosecurity strategy framework

Throughout the workshop a proposed aquatic biosecurity framework was tested. In practical terms, it was acknowledged that areas of aquatic biosecurity (e.g. pest fish, pathogens) fall outside of the remit of local governments and regional stakeholders. However, it was established that all aquatic biosecurity issues are usually interrelated with cross-cutting management responses were therefore all elements should be considered concurrently where possible.

	Biosecurity impact and risk		
	Current	**Emerging**	**Future**
Invasive aquatic plant • Culinary plants • Aquarium/ ornamental plants • Agricultural plants	Naturalised or widely established	Early stages of naturalisation or establishment	In captivity or trade but not naturalised in the region
Invasive aquatic animals • Pest fish • Molluscs • Crustaceans • Reptiles/ amphibians	Occur in multiple locations and catchments	Occur in discrete locations or sub-catchments	Pathways for introduction from outside region exist
Invasive species of adjoining ecosystems • Invasive animals • Riparian weeds and invasive plants • Pathogens and disease	Impacts are observable and widespread	Impacts are localised or contained	Impacts are assumed or not yet known
Invasive aquatic diseases of: • Amphibians • Crustaceans • Molluscs • Terrestrial mammals	Management objectives focused on asset protection or containment	Management objectives focused on prevention and eradication	Management objectives focused on prevention and pre-border preparedness

Context and definitions

Invasive aquatic plants pose a significant risk to Queensland and comprise around 25% of the priority species identified in Local Government Biosecurity Plans in the Wet Tropics region. According to the Nursery and Garden Industry Association around 75% of aquatic weeds have entered Australia through the ornamental plant trade. Others have their origins as culinary plants.

Aquatic weeds have a significant environmental and economic impact and are often exceptionally expensive and complex to manage once established.

Invasive aquatic animals include vertebrate and invertebrate pests such as pest fish, molluscs, crustaceans and reptiles in addition to exotic pathogens and disease. In Australia there are over 1,000 species[1] of aquarium animals in trade some of which (e.g. tilapia, carp, gambusia, platys, swordtails) have become widely established and naturalised in Queensland[2].

Invasive aquatic animals include translocated native aquatic animals which have been introduced into catchments where they did not previously exist. Sooty grunter, barramundi and redclaw are examples of species commonly stocked in impoundments which may have impacts on local aquatic ecosystems[3].

Invasive aquatic animals have a significant environmental and economic impact and are often next to impossible to manage once naturalised or established in waterways.

Invasive species of adjoining ecosystems Riparian and other ecosystems which adjoin wetlands and waterways are particularly vulnerable to invasive species, which can alter water flow, degrade habitat quality, and outcompete native vegetation. Feral pigs and exotic vines are examples of invasive species which can alter or transform aquatic ecosystems.

Invasive aquatic diseases In Queensland, invasive aquatic diseases pose significant risks to ecosystems and industries. Several diseases, like White spot disease in crustaceans and Yellowhead disease in prawns, are highly contagious and can cause substantial mortality. Additionally, diseases like Enteric septicaemia of catfish have been reported in ornamental fish.

[1] Ebner et al. 2020
[2] Biosecurity Queensland
[3] Biosecurity Queensland

Workshop format

The workshop acknowledged the broader context of aquatic biosecurity within the proposed framework but focused on invasive aquatic plants and invasive aquatic animals.

The workshop was comprised of four sessions, each with opportunities for discussion, feedback or exploring regional implications and considerations. Presenters and context for each session are provided below.

Speakers and themes

Session one – state of play

Session one set the scene by providing participants with a high-level understanding of key trends in aquatic biosecurity risks, historical context, and current strategies and programs in place to respond.

- Invasive aquatic plants in Queensland- Steve Csurhes, Biosecurity Queensland.
- Invasive aquatic animals -Hayden Ferguson, Biosecurity Queensland.

Session two: Management tools and technology

Session two provided an update and practical examples of the advancement of tools and technology to assist with on ground management of aquatic biosecurity issues.

- Aquatic weed management with the new herbicides flumioxazin and florpyrauxifen-benzyl'- Dr Tobias Bickel, Biosecurity Queensland.
- Aerial platforms (detection, monitoring and management) - Micheal Graham, Biosecurity Queensland.
- Environmental DNA for detection of weeds: potential application in surveillance and eradication programs - Dr Karen Bell, NSW DPI.

Session three: Decision making – understanding wetland and waterway condition and management outcomes

Session three explored some examples of decision making, monitoring and reporting tools which can assist in the delivery of aquatic biosecurity management programs from understanding risk to monitoring and reporting on impacts on the ground.

- Wet Tropics Waterways – invasive aquatic weeds indicator review – Travis Sydes, FNQROC.
- Invasive species planning framework- Cameron Durnsford, Senior Project Officer, Invasive Plants and Animals.

Session four: synthesis and next steps - workshop session

The final session for the day explored a conceptual framework for a regional aquatic biosecurity strategy. Participants identified key needs and directions to guide the further development of a strategic approach and undertook an exercise profiling key invasive aquatic plants in the region.

- Introducing a regional aquatic biosecurity strategy approach - Travis Sydes, FNQROC

Summary outcomes

Key take homes and big-ticket items identified in the workshop

Session one: Aquatic biosecurity risks in the Wet Tropics

The Wet Tropics region is facing growing aquatic biosecurity challenges on top of existing established aquatic pests and weeds, and the first session reinforced that prevention is our strongest defence. It was useful to understand the interaction between pre and post border initiatives and policies to help frame and understand our exposure to risk. At the local scale participants agreed that while the Biosecurity Act and Local Laws provide a regulatory foundation, declaration alone is not a "magic wand." Legislative tools must be backed by consistent enforcement, well communicated expectations and clear operational responsibilities, particularly in remote and high-risk areas. This is in addition to the effective use of compliance and penalties for breaches of the law when required.

It was alarming to all that pest fish, such as snakehead, climbing perch and more virulent varieties of Tilapia, are making their way to the Torres Strait from Papua New Guinea. While the Straits and Cape York are regions with higher-than-normal biosecurity awareness due to the presence of NAQS (Northern Australia Quarantine Strategy), the population is sparse and resources limit detection capacity. The discussion focused on the need for expanded investment in early detection and on ground capacity. Platforms like *iNaturalist* and Feral Fish Scan as well as community networks like Weed Spotters were strongly endorsed as vital contributors to biosecurity surveillance. These tools connect real-time sightings to alerts, enabling rapid response and increased public engagement. Campaigns like *Don't Be a Tank Tipper* are still highly relevant and address key behaviours, helping individuals understand their role in prevention as well as their legal obligations under the Act.

A key discussion point centred on the role of environmental disturbance, particularly from large-scale resource development in creating ecological niches for invasive species. This led to serious reflection on accountability, with suggestions that industries should be required to post environmental bonds to offset the public biosecurity risks triggered by their operations.

Crucially, it was acknowledged that once pest fish establish in a system, effective removal tools are limited. The session closed on a shared message: community awareness, education, and a strong frontline prevention network are indispensable, especially when invasive threats are already at the doorstep.

Session 2: Management tools and emerging technologies

The second session showcased promising innovations shaping aquatic biosecurity management. Technologies such as drones, eDNA testing, AI, sonar, and new herbicides are advancing quickly, offering new hope for detection and control. These are particularly useful in remote or logistically difficult areas. Participants were struck by how quickly research is transforming the field, especially with tools like frogbit-specific eDNA assays now developed and in trial phases.

Drones have emerged as a significant operational breakthrough with their potential to assist on-ground management now becoming fully realised. In field settings they are making it quicker and easier for local teams to monitor vast or inaccessible environments. Their effectiveness is increasing over time as operators gain skill and technology becomes more precise. New herbicide registrations and ongoing research are demonstrating positive ecological results, including reduced weed loads, increased oxygen levels, and native species recovery. New herbicides are now enabling management options for some aquatic weeds where there were none prior illustrating the capacity for targeted treatment when used judiciously. This does have the flow-on effect of providing reasonable and practical options for control when used in a compliance environment.

However, the group cautioned that these gains risk being undermined by unresolved systemic issues including some beyond the influence of regional stakeholders. Unless ongoing disturbance driven by land use change, climate change and insufficient coordination and resources is addressed, even the most sophisticated technology may only offer temporary relief. Stronger legislative tools and enforcement of pre and post border compliance in response to online trading platforms and ecommerce were highlighted as a significant need. It was also acknowledged that many high-risk species are likely to already be in cultivation and aquaria of which many may be difficult to identify. Participants emphasised that technology cannot replace sound policy, proactive planning, or long-term investment in ecosystem integrity.

There was also a focus on the barriers that remain: high upfront costs, complex herbicide registrations and protracted regulatory processes, and a discernible knowledge gap around new tools available as they rapidly evolve. Many attendees were unaware that eDNA testing was even available for use in aquatic weed detection underscoring the importance of communication between researchers, land managers, and frontline practitioners.

Overall, the tone was one of cautious optimism. The capacity to detect and respond is growing rapidly, but success hinges on collaboration, capacity-building, and prevention-first thinking. Equipping communities, fostering inter-agency partnerships, and embedding biosecurity in broader land-use and waterway health frameworks are critical next steps.

Workshop observations and recommendations

Participants identified current and future opportunities and obstacles to deliver improved aquatic biosecurity outcomes in the Wet Tropics through a SWOT analysis. These observations and reflections captured during the workshop were then used to develop a series of recommendations to inform a regional aquatic biosecurity strategy.

SWOT Summary

Strengths	Weaknesses
Passionate landholders & motivated community groups Citizen science tools (Weedspotter, iNaturalist, WeedScan, Feral Fish Scan) Use of drones, eDNA, herbicides showing real results Regional taskforces (e.g. FNQROC, NAMAC) improving collaboration Strong local and historical knowledge bases	Fragmented responsibilities across tenures Lack of "one-stop-shop" for data/tools Skills gaps & training needs for field crews Limited enforcement & reactive governance Cross-boundary land access disputes

Opportunities	Threats
Standardised pest fish white-list (permitted list) and mapping Training revival (e.g. TAFE) including aquatic biosecurity Regional MOU frameworks & cross-sector governance Emerging technologies (AI, sonar, eDNA, new herbicides) Integrated dashboard for live tracking & collaborative reporting	Continued environmental disturbance creates pest niches Knowledge erosion due to limited data capture & sharing Inconsistent funding & short-term project horizons Public apathy or disengagement if awareness not maintained Siloed decision-making undermining coordinated response

SWOT discussion

Strengths

The Wet Tropics region benefits from a passionate and engaged community, with active landholder groups and motivated individuals leading the charge on aquatic biosecurity. Platforms like Weed Spotters, iNaturalist, and WeedScan have empowered local surveillance, while events such as fishing competitions, eco festivals, and school programs help connect biosecurity priorities with broader community interests. Regional taskforces (like FNQROC and NAMAC) and inter-agency collaborations offer a solid foundation for knowledge sharing and rapid mobilization.

Operationally, emerging technologies like drones, eDNA, and advanced herbicides are already showing real-world results in weed and pest fish control. Enthusiastic council staff, dedicated rangers, and community volunteers have demonstrated resilience, innovation, and adaptability under challenging conditions. There's also a wealth of historical knowledge, both scientific and cultural, that can guide ongoing efforts especially when integrated with new digital tools and regional mapping initiatives.

Weaknesses

Despite these strengths, there are critical structural and operational weaknesses that limit effectiveness. Ownership and responsibility over waterways remain unclear, especially across private property boundaries. Cross-tenure collaboration is hampered by inconsistent policies, variable land access, and low trust in some areas. Reactive governance, inconsistent funding, and a lack of field-ready training further constrain momentum.

Data silos and mapping gaps undermine decision-making, while limited visibility of pest fish pathways and inadequate surveillance in remote areas expose vulnerabilities. Tools and information are scattered across platforms, and no "one-stop-shop" exists for managers seeking clear guidance on pest identification, control methods, or chemical regulations. The looming threat of crocodiles creates logistical and safety challenges, especially for smaller field crews operating with limited gear.

Opportunities

Looking ahead, capacity can be improved by consolidating what's already working and scaling up best practice models. Technology is evolving rapidly. AI weed detection, real-time mapping, eDNA diagnostics, and drone-based treatment offer smarter, safer, and more efficient pathways forward. National standardisation (e.g. pest fish white-lists), expanded training pathways, and place-based governance models could unlock region-wide consistency and capacity.

Reinvigorating vocational training and accreditation programs could bridge skill gaps, while integrating cultural knowledge into aquatic management frameworks could deepen impact and legitimacy. Platforms that facilitate transparent data sharing and trend reporting like a regional dashboard would build shared accountability. Better MOU frameworks, clearer funding pipelines, and community-led monitoring would further decentralize capability, making the system more resilient and responsive.

Threats

The most pressing threats are systemic and cumulative. Continued environmental disturbance is creating new ecological niches for aquatic invasives. Short-term funding cycles and reactive enforcement keep frontline staff in a holding pattern, chasing rather than preventing incursions.

Loss of local and historical knowledge, poor inter-agency coordination, and fragmented responsibilities between councils, state agencies, and communities all weaken the integrity of the overall biosecurity framework. Apathy and competing priorities can erode public support, particularly without consistent awareness-building. Even with high-tech tools, if cultural adoption doesn't follow, innovation remains underutilised and potential gains are lost.

Strategic recommendations by theme

Drawing on the outcomes from the workshop sessions and participants feedback a series of strategic recommendations which align with the themes of the proposed aquatic biosecurity strategy framework were collated (in no particular order) for future prioritisation and action.

1. Field-based tools

1. Expand accessibility to drones (or other aerial platforms) and accreditation, eDNA kits, and AI-based surveillance tools for regional teams.
2. Further refine or develop field-based solutions and procedures for operating in crocodile-prone or hard-to-reach zones.
3. Advocate for development of biocontrol options for aquatic weeds and pest fish (e.g. frogbit, Tilapia).

2. Participatory tools

1. Strengthen citizen science programs (e.g. Weed Spotters and Feral Fish Scan) with feedback loops and incentives.
2. Develop regional awareness campaigns focusing on social media, events, and culturally relevant engagement.
3. Partner with angling clubs, community groups and eco events to promote aquatic biosecurity and improve awareness and engagement.
4. Partner with industry and special interest groups (e.g. - ANGFA, OzFish, nurseries) to promote substitution of suitable local species for ornamental and exotic species in trade.
5. Develop or support habitat restoration and resilience programs for native species in waterways and wetlands.

3. Regulatory tools

1. Advocate for and support the introduction of a pest fish whitelist to reduce confusion and enforcement barriers.
2. Undertake a regional risk assessment of aquarium plants in cultivation and develop a multi-tiered response to the biosecurity risks identified.
3. Utilise available tools in Local Laws and Biosecurity Act to restrict the sale and distribution of unregulated aquatic biosecurity matters in the Wet Tropics region – e.g. – locally and regionally significant biosecurity priorities.

4. Knowledge

1. Investigate the establishment of a regional knowledge hub (one stop shop) approach for aquatic biosecurity management information and guidance (pests, control tools, mapping, and success metrics).
2. Identify opportunities for shared learning and incorporation of traditional ecological knowledge and perspectives into aquatic biosecurity planning and policy.

3. Collate and share management data to inform operational plans, ecosystem condition and trend analysis.

5. Observation and learning

1. Utilise observational platforms (e.g. - iNaturalist, Feral Fish Scan) and dashboards for recording sightings and distribution data.
2. Support Indigenous ranger-led training and monitoring programs across the Wet Tropics (and neighbouring regions).
3. Seek opportunities for skill development and accredited training for land managers working in aquatic biosecurity management.

6. Decision-making tools

1. Develop rapid risk assessment and response templates for new local and regional incursions.
2. Collate and visualise biosecurity distribution and management datasets alongside mapped values to inform cross-agency priority setting.
3. Use modelling to project long-term outcomes of management decisions under different scenarios.

7. Governance

1. Broker more MOUs between councils, Ranger Groups, NRM's, and state departments with shared goals and programs.
2. Establish a Wet Tropics Aquatic Biosecurity Strategy to identify mechanisms to monitor delivery, map progress and challenges, identify lead roles and build shared responsibility.
3. Identify management needs and advocate for long-term, fit-for-purpose funding with built-in evaluation cycles.

Next steps

It is recommended that the Wet Tropics Region develop a Regional Aquatic Biosecurity Strategy to consolidate existing partnerships and map out future investments as a matter of priority.

Conclusion

The Wet Tropics region sits at a pivotal point in time for aquatic biosecurity. Invasive aquatic species are increasing in number and distribution, with long-lasting impacts if left unchecked. At the same time rapid advancement of new tools and technologies have the capacity to dramatically influence management of invasive species.

This workshop highlighted that the tools exist, the partnerships are growing, and the energy is there - but systems must evolve to match the scale of the challenge. Investment in capability, connectivity, and long-term planning will define whether the Wet Tropics region can successfully address its unique aquatic biosecurity risks.

Workshop participants

Speakers

Steve Csurhes	Biosecurity Queensland
Hayden Ferguson	QLD DPI
Dr Tobias Bickel	Biosecurity Queensland
Michael Graham	Biosecurity Queensland
Dr Karen Bell	NSW DPI
Travis Sydes	FNQROC
Cameron Durnsford	Invasive Plants and Animals
Dr Xiaocheng Zhu	NSW DPI

Attendees

Doon McCall	Barron River Catchment Care
Evizel Seymour	Terrain NRM
Russell Jack	DNR
Lewis Defranciscis	Cairns Regional Council
Kinga Albrecht	Cairns Regional Council
Tom Crumpton	Cairns Regional Council
Damon Sydes	Cassowary Coast Regional Council
Tim Wong	Wet Tropics Management Authority
Jess Conroy	Douglas Shire Council
Matt Buckman	Hinchinbrook Shire Council
Ken Goleby	Tablelands Regional Council
Alison King	Tablelands Regional Council
Richard Heazlewood	Yungaburra Landcare
Dennis AhKee	Jaragun Ecoservices
John Brisbin	Mitchell Watershed Management Group
Robert Ambrum-Mow	Jaragun Ecoservices
Caesar Hunter	Djabaguy
Chloe Richards	Djabaguy
Michael Nash	Hinchinbrook Shire Council
Kelly Dean	FNQROC (tech support)
Travis Sydes	FNQROC (convenor)