

The value of sharing knowledge

Queensland's experience with reservoir fisheries habitat management

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Sharing knowledge is important!

- Knowledge can be gained in multiple ways
 - observation
 - trial and error
 - experimentation
 - mimicry
- The most effective and efficient means is through shared learning
- Stored and shared knowledge has been a key factor in technological advancement
- Learning from others what works and what doesn't, saves time and resources
- Open discussion and sharing of ideas also encourages different approaches to common problems and leads to quicker and more broadly applicable solutions

Partnerships are valuable

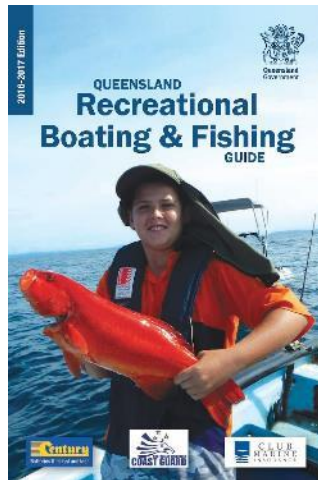
- Partnerships are critical in facilitating the exchange of ideas and knowledge
- Often challenges can be too great for an individual or organisation to overcome by themselves
- Over-arching organisations such as RFHP promote and enable knowledge exchange and collaboration amongst groups with similar interest or goals and fast-track uptake and development
- Australia would greatly benefit from a collaborative impoundment fisheries habitat group like the RFHP
- DAF are interested in partnering with other agencies to jointly explore common research avenues and potentially bring a different perspective

Reservoir fish habitat management in Australia

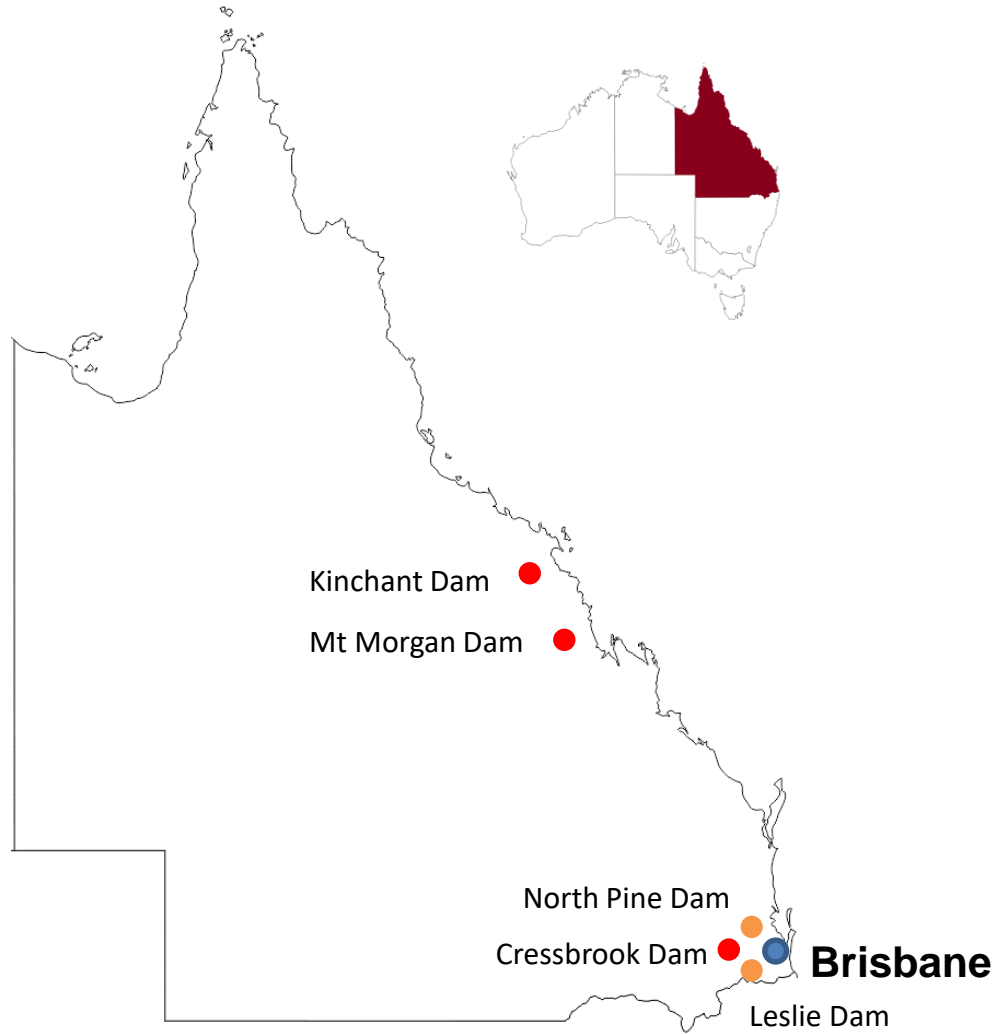
- Managing aquatic habitats in impoundments has historically been overlooked as a fisheries management tool in Australia
- Focus has been on stocking and catch restrictions in dams
- A visit to the USA in 2015 highlighted the potential value of managing aquatic habitats for recreational fisheries
- Organisations allowed access to data and knowledge which when collated, helped convince Australian fisheries and waterways managers that habitat enhancement was a management tool worth exploring further
- Learning from these organisations and their partners has led to the commencement of impoundment fisheries habitat research projects in Queensland, Australia
- The insights gained from the USA visit have saved significant time and investment, and enabled us to hit the ground running

Reservoir fish habitat management in Queensland

- Most native species targeted by anglers do not spawn in impoundments
- Dams instead rely on stocking to maintain the fishery
- Fish attraction and not wild recruitment is generally the focus
- Habitat enhancement is now being undertaken in 5 dams in Queensland
- Each dam focusses on slightly different project objectives



Habitat enhancement programs in Queensland



Reservoir fish habitat research in Queensland

- In the 3 DAF research trials, each dam addresses the response of a different suite of native fish to the introduction of structural fish habitat
- These dams rely on stocking so wild recruitment is not a focus
- Key goals for these trials include:
 - assess fish response to various structure types
 - assess angler attitudes and catch rates
 - determine the most cost effective and appropriate structure types for Australian conditions
 - demonstrate to waterway managers the introduction of fish attraction structures do not have detrimental impacts to waterway operation or safety
- The overall goal is improved angler satisfaction with the fisheries, hopefully leading to greater tourism and expenditure in regional areas

Reservoir fish habitat research in Queensland

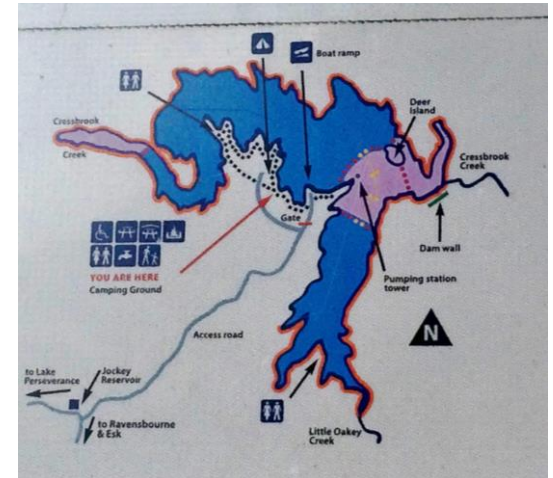
- The experimental design and monitoring intensity varies between the trial dams
- Programs are run by Department of Agriculture and Fisheries in conjunction with local volunteers groups and local government
- Many materials have been recycled or donated
- Each project has an initial duration of 3 years
- High interest from anglers and waterway managers around the state and across the country has led to applied fish habitat projects commencing in 2 other dams in Queensland

Queensland's approach to habitat enhancement

- The approach taken in Queensland has been based on the best-practices developed in the USA by members of the RFHP and other agencies
- The main steps in each project include:
 1. Baseline surveys
 - Fish distributions and abundance
 - Bathymetry
 - Existing structure
 2. Development of Fish Attraction Plans
 3. Construction and deployment of Fish Attracting Structures (FAS)
 4. Monitoring and evaluation of FAS effectiveness
 5. Plan revision and extension of results

Cressbrook Dam

- 515 ha (1,273 acres)
- Mixed-species stocked recreational fishery
- Homogenous habitat with limited structure
- Fishing can be difficult
- Closed zones for fishing
- Slow boat speeds (<8 kn)
- Managed by the local council
- Camping ground
- Dedicated local stocking group
- Great opportunity to test a range of habitat enhancement activities and improve recreational fishing experience
- Strong focus on research and science



Cressbrook project objectives

1. Evaluate the ability of several types of modular fish attracting structures (FAS) to attract a range of native fish species
2. Evaluate the impacts of FAS on angler catch rates and angler satisfaction
3. Evaluate the impact of FAS on angler visitation rates
4. Develop best practice guidelines for installation of FAS in Australian impoundments



Improve the recreational fishing experience in Cressbrook Dam

Construction and deployment of FAS

- FAS were built in conjunction with local stakeholders
- Modular units used to enable easy construction, transport and deployment
- Recycled materials were used where safe and available
- Most FAS were based on structures used in the USA
- 700 to be installed in Cressbrook Dam primarily around bays and points to assist in monitoring and remain out of the main flow path
- FAS located in >3-5 m of water to avoid navigational issues, to sit above the thermocline and counter water level fluctuations
- Several FAS clusters were located in deeper open water to assess site effectiveness of these locations

Cressbrook fish attractors

- 3 types of FAS are being compared during the project
 - Timber structures
 - Brush bundles
 - Porcupine cribs

Hardwood cribs and brush bundles



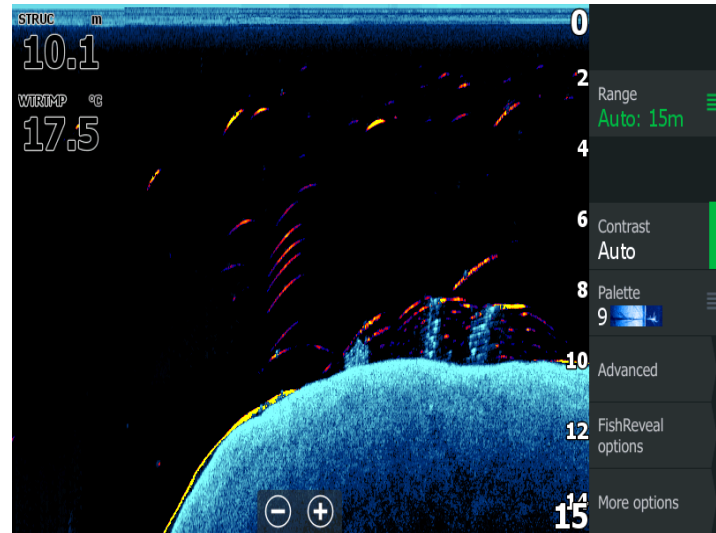
Cressbrook fish attractors

- 3 types of FAS are being compared during the project
 - Timber structures
 - Brush bundles
 - Porcupine cribs
 - Synthetic structures
 - Spiders
 - Georgia cubes
 - Synthetic trees

Spiders and cubes



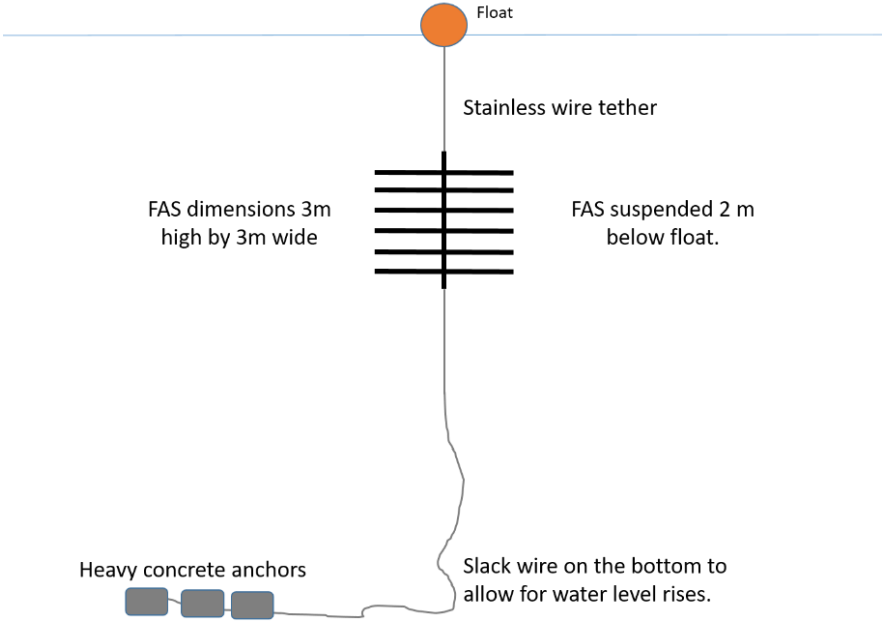
Synthetic trees



Cressbrook fish attractors

- 3 types of FAS are being compared during the project
 - Timber structures
 - Brush bundles
 - Porcupine cribs
 - Synthetic structures
 - Georgian cubes
 - Spiders
 - Synthetic trees
 - Suspended structures
 - Radial PVC structures suspended from floats

Suspended FAS



Evaluating fish use of FAS and habitat types

- Acoustic tracking
 - Established an acoustic array in the central section of the dam
 - Tagged 30 Australian bass and 30 golden perch
 - Track movements for 2 years
 - Compare movements to habitat availability
- Twice yearly surveys of fish distributions relative to the different FAS types
 - Electrofishing
 - Underwater drone with camera
 - Targeted angling
- Fish use of different FAS will be compared to each other, bare substrate and natural existing structural habitat

Evaluation of angler catch and satisfaction

- The ultimate objective of the project is to improve recreational angling in Cressbrook Dam
- Periodic creel surveys
 - Angler effort
 - Catch rate
 - Satisfaction with fishery
 - Knowledge of project
- Mapping spatial and temporal changes in angler effort across the dam
- Periodic targeted angling

Cressbrook Dam Angler Survey (post-habitat installation)

Time of day (hh:mm): _____

Date: Day _____ Month _____ Year _____

Weather conditions _____

Awareness of fish attracting habitat installation

1. Are you aware that fish attracting habitat has been installed into Cressbrook Dam?

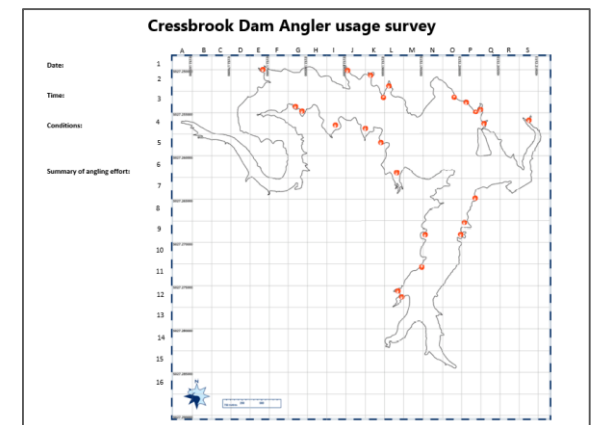
- 1) Not aware
- 2) Aware, but I don't know where it is
- 3) Aware, I know where it is but am not fishing it
- 4) Aware, I know where it is and I target it some of the time
- 5) Aware, I know where it is and target it most of the time

2. Did you come to fish at Cressbrook Dam because of the installed fish attracting habitat?

- 1) Strongly disagree
- 2) Disagree
- 3) Neutral
- 4) Agree
- 5) Strongly agree

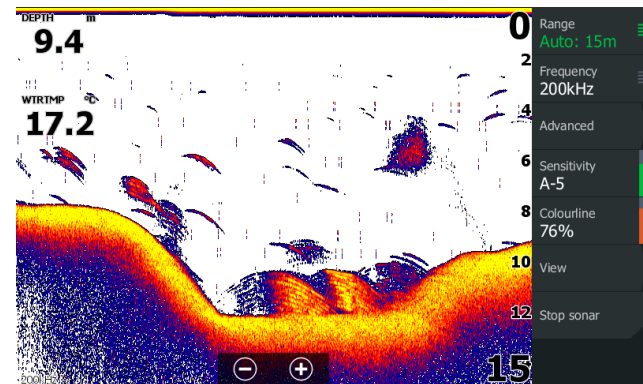
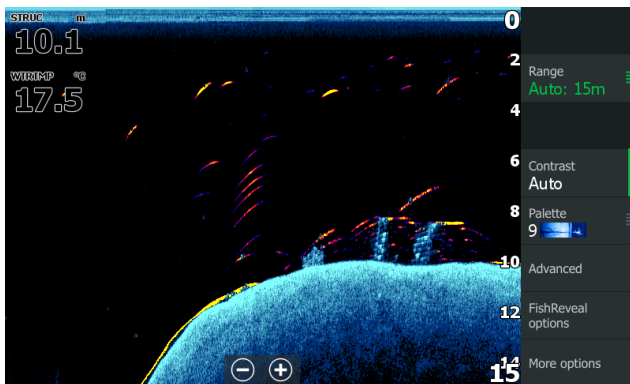
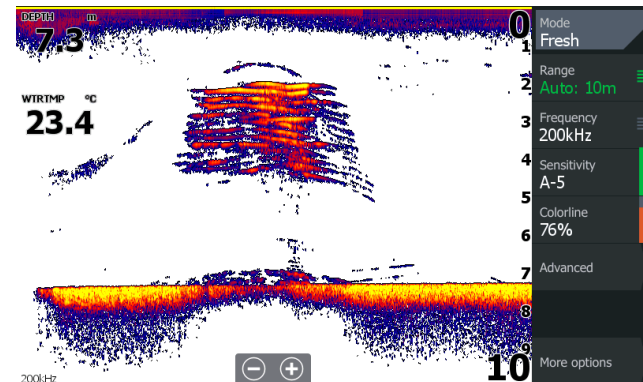
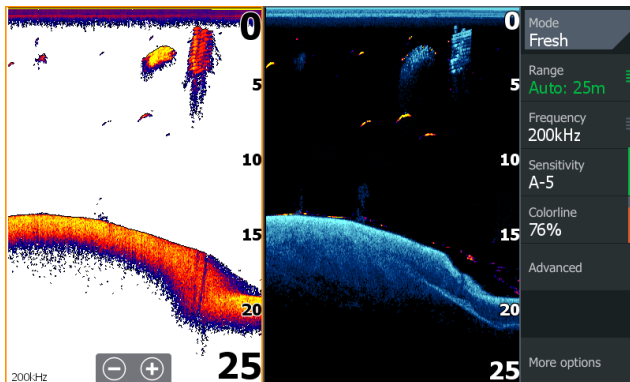
Today's fishing activity

- 1. Have you been a) boat fishing b) shore fishing c) both
- 2. Have you been a) lure fishing b) bait fishing or c) both
- 3. How many hours, to nearest 1/4 hour, have you been fishing? _____
- 4. How many people are fishing in your group today? _____
- 5. Have you finished fishing today? Yes No



Results so far...

- Too early to make conclusions
- Severe drought has hindered project
- Sonar images suggest that fish are utilising the installed FAS



Kinchant Dam

- 950 ha (2,300 acres)
- Has a tiny catchment, so water is pumped in from the nearby river
- Primarily used to irrigate sugar plantations but also is popular for recreational activities
- Known for its barramundi fishing, but the dam also holds sooty grunter, and sleepy cod
- Barramundi and Sooty Grunter are stocked into the dam annually, there is no natural recruitment



Many fish, but hard to catch.....

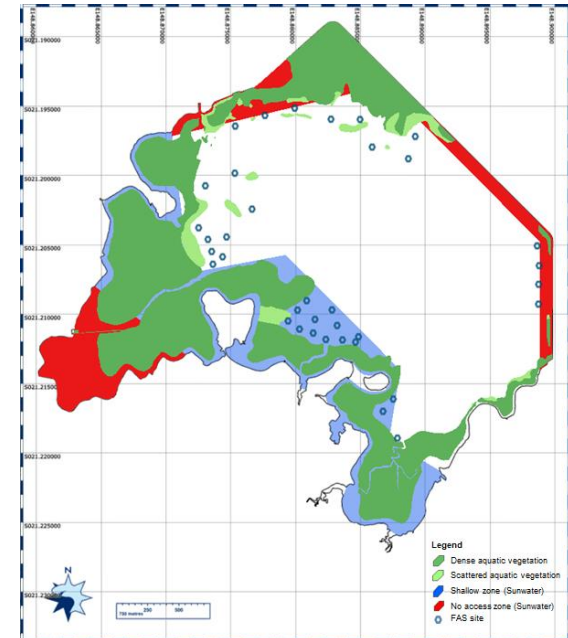
- Many large fish within the dam; however, fishing can be difficult, especially for tourists and more occasional anglers
- Apart from the vegetation around the edges and the inlet channel, there is little in the way of fishable structural habitat to aggregate the fish
 - => difficult for anglers to locate and target fish
- Some structural habitat occurs along the rocky dam walls, but these are no fishing zones to protect dam infrastructure
- Strategically improving the structural habitat complexity should lead to better fishing, improved tourism and ultimately a greater spend from visitors within the Mackay region

Kinchant project objectives

- Overall objective is fishery improvement, with less focus on evaluating individual techniques
- The three main goals of this project are to:
 1. Improve recreational angling in Kinchant Dam by strategically installing fish attracting structures (FAS)
 2. Encourage anglers to fish away from closed access areas near dam infrastructure and the water skiing zone
 3. Provide a platform for evaluating the response of native recreationally important fish species to different FAS types

Activities

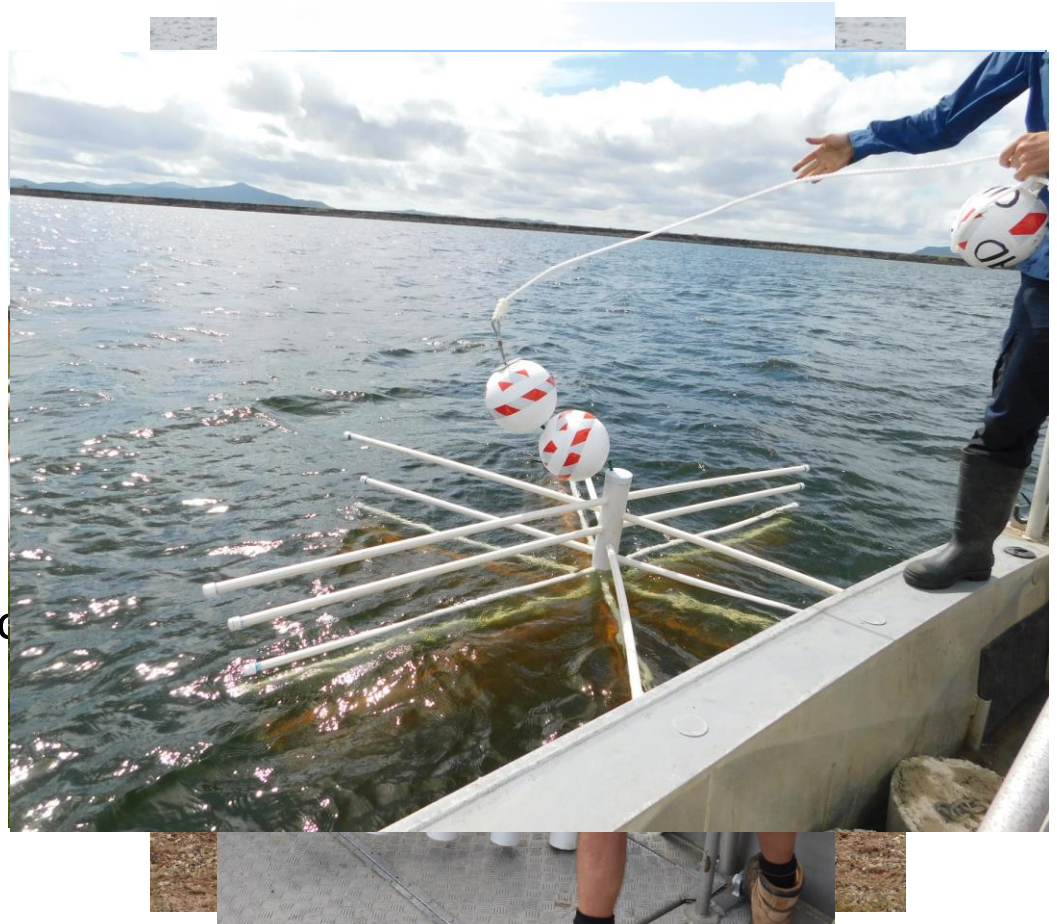
- Bathymetric survey
- Electrofishing survey
- Develop Habitat Enhancement Plan
- Develop, construct and deploy FAS
- Monitor
 - periodic electrofishing
 - competition angler catch data
- Communicate results



Kinchant fish attractors

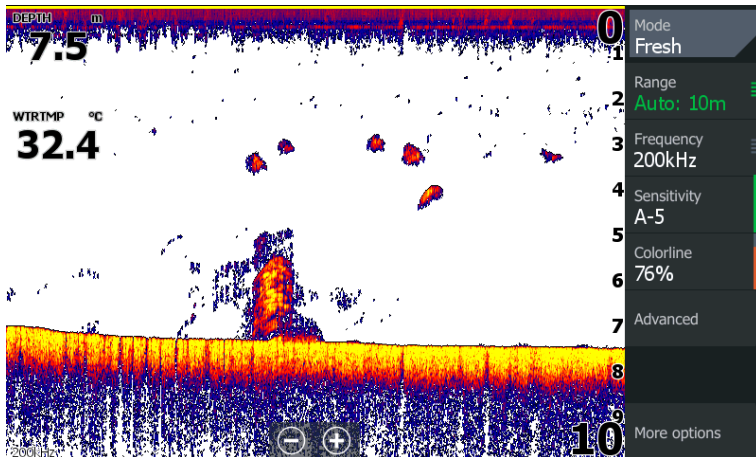
Provide a range of different habitat types to improve complexity

- Kinchant cribs
- Spiders
- Synthetic hedges
- Synthetic trees
- Pipe bundles
- Georgia cubes
- Suspended FAS
- Built by local community groups
 - Fish stocking group
 - Rotary
 - Schools
 - Volunteers



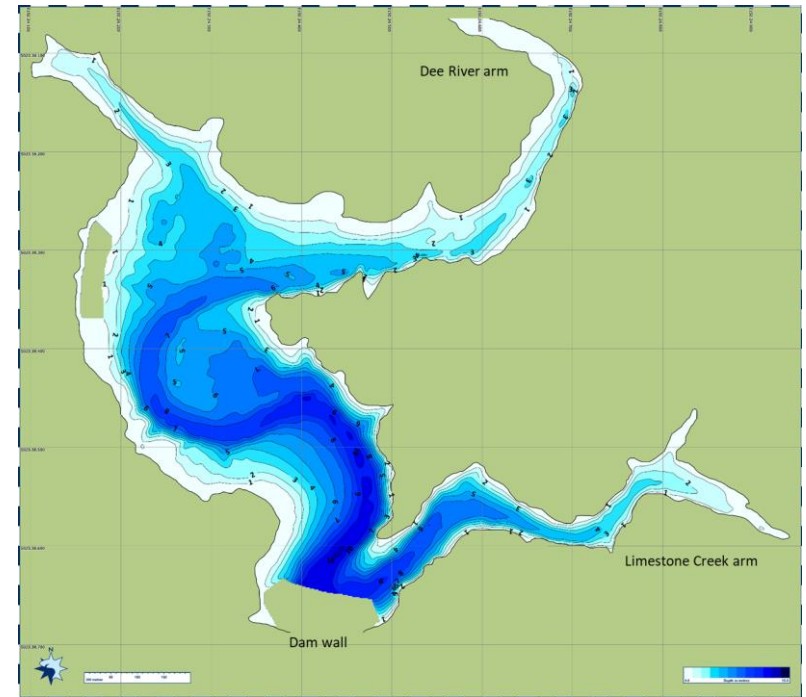
Early results

- Electrofishing catch rates of barramundi were similar between the dense vegetation and the fish attractors
- These catch rates were both higher than those at survey sites with bare habitat only
- Anglers are starting to target fish at the fish attractors
- Sounder images indicate bait fish and barramundi are utilising the FAS



Mount Morgan Dam 7

- Small dam 54 ha (134 acres)
- Town water supply
- Stocked and historically productive recreational fishery
- Recreational species currently very low abundance
 - Golden Perch
 - Sleepy cod
 - Saratoga
 - Eel-tail catfish
- Small prey are abundant
- Suspected high predation on stocked fingerlings and wild recruits by cormorants and barred grunter
- Habitat complexity is very low



Mt Morgan objectives

- The overall project goal is to re-establish a productive fishery
- Objectives include:
 1. Improve survival of stocked and wild fingerlings
 2. Increase habitat complexity through the installation of fish attractors
 3. Establish a saratoga fishery through translocation
 4. Enhance aquatic vegetation by establishing lily beds
 5. Encourage anglers to fish away from closed access areas



Habitat enhancement actions

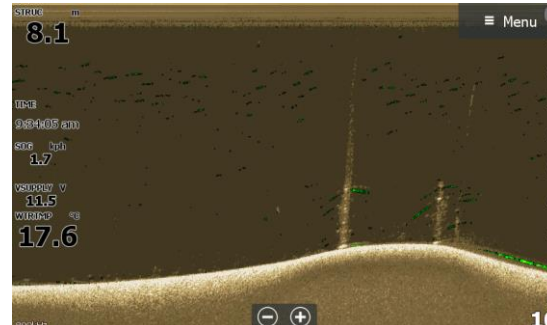
- Introduce 6 habitat types around the dam
 - 80 synthetic trees
 - 51 spiders
 - 24 brush bundles
 - 24 ballasted half-pipes
 - 4 rock piles
 - 10 snowflake lily beds
- Installation is currently underway



North Pine Dam



- 2,180 ha (5,400 acres)
- Mixed species fishery
- Undertaken by local stocking group
- High abundance of sports fish in the dam
- Limited access area for boat fishers
- Goal was to attract more fish into the accessible area
- Installed synthetic trees and spiders at 5 sites
- Clusters of 20 trees and spiders per site



Leslie Dam

- 1,260 ha (~3,100 acres) when full
- Warwick District Fish Stocking Association
- Project objectives
 1. Increase the carrying capacity of Murray cod in the dam by increasing the amount of suitable habitat
 2. Increase the recruitment opportunities for native fish through increased survival of stocked fingerlings and improving the potential spawning habitat availability for natural breeding
 3. Increasing the opportunity for recreational fishers to catch native fish both from the bank and from a boat



G. Schmida



G. Schmida



G. Schmida

Hard structures and breeding pipes



So much more to learn.....

- There is now strong interest in impoundment habitat enhancement in Australia
- Awaiting trial results to determine the direction forward
- Initial results indicate some habitat designs are effective at attracting Australian fish species
- More data is needed to determine if FAS improve angling catch
- Still the big questions of how much habitat to add and the most cost effective deployment patterns?
- We are looking to establish partnerships to jointly answer some of these questions
- If you are interested please let me know

The end goal



Acknowledgements

A large number of people and organisations have been involved in these projects, including:



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- Jenny Shiau



Pine Rivers Fish Management Association Inc.



Toowoomba and District Fish Stocking Ass.

Warwick District Fish Stocking Ass.

