Measuring productivity of Australian tropical estuaries using standing stock analysis

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Value of tropical rivers and estuaries

- Regulating Services
- Cultural Services
- Supporting services
Values in northern Australia

Great Fishing experiences and itineraries

A saltwater fly fisher's fantasy

Top Australian freshwater fishing experiences

Top deep sea fishing experiences

Australia's greatest fly fishing adventures

Top Australian saltwater sport fishing experiences

3 days deep sea fishing on Kangaro Island

Hefty Hinchinbrook Barra Worth the Drive

Rob Wood | First Published: October 2011

The winter weather may test the patience and passion of many anglers, however the thought of landing thick winter barra is just too tempting for me!

Every year, along with my fishing buddy Craig Griffith and my son Tommy, I select for an area that will produce some quality fish and set up camp for a few days. It’s always tough to convince my wife that we need to go and catch some barra in the winter as it’s usually the time we get all the maintenance done around the house.

Lifestyle

Lucky No. 13 for Million Dollar Fish angler

The first million dollar fish has been caught.

On Mornings with Adam Steer

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Threats to tropical estuaries
Importance of valuation

• Accurate valuation improves management of ecosystem services and resources

• Facilitate the comparison of relative values between habitats, systems and regions

Productivity estimates

• Effectively value the contribution of a habitat & ecosystem or region to local fisheries
Productivity estimates

- Current estimates limited to few species
- No estimates at system/within system scale
- No multi-species estimates
- Differences between and within systems are likely but unknown
Data requirements

- Species information
- Growth/mortality rates
- Recruitment/emigration rates
- Size frequency distribution
- Standing stock of the population
- Areal extent of the population
Data collection

- Traditional methods such as beam trawls and drop samples are impractical, inefficient and unreliable in tropical estuaries.
Alternate capture methods?
Measuring growth rates
Project objectives

1. Develop a method for producing accurate and reliable estimates of standing stock biomass for fish and prawns in tropical estuaries

2. Investigate the potential for standing stock measures to produce proxy estimates of productivity and other population metrics

3. Investigate the scale at which productivity and population metrics can be reliably estimated using the standing stock method
Deliverable data

- Growth & mortality rates
- Biomass contribution
- Recruitment/emigration phases and times
- Length-weight relationships
Capture method

- Cast nets deployed from boats during low tides
- 2.8m monofilament drawstring net – 5mm mesh
- Deployed haphazardly along edge habitats e.g. banks and mangrove forest boundaries
Reaches
- Upstream
- Midstream
- Downstream

Site
- Alligator Creek
- 20km east of Townsville

Replicates
- fortnightly, stratified seasonally
- 30 replicate nets per reach
Capture method
Capture method
Results
Results
length frequency distribution for the population of Southern Herring (*Herklostichthys castelnauyi*) sampled from Alligator Creek from December 2015 to April 2016.
Reach scale cohort analysis

length frequency distribution for the population of Southern Herring (*Herklostichthys castelnauii*) sampled from Alligator Creek from December 2015 to April 2016.
Results

• Three species successfully estimated growth rates in all reaches, these were also the most common species
• Greatest growth rates observed during Wet season
• Growth rates for some species varied within seasons
Conclusions

- Comparisons of larger scales e.g. between estuaries possible for many species
- Standing stock method requires less effort than traditional methods, and works for multiple species
- Standard method applicable to a range of species and habitats
- Further replication will allow spatial/temporal comparisons
Further research

- Mortality estimates using length-based methods
- Recruitment
- Emigration (stock export)
- Comparisons between reaches
- Productivity estimates
References and acknowledgements

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• Claudia Trave, Cesar Herrera, Gillis Horner, NOAA Fisheries, NOW India, Fishbase.org
• www.catchmore.fish/Articles/Display/11713-Hefty-Hinchinbrook-Barra-Worth-the-Drive
• www.saiab.ac.za/
• www.abc.net.au
• http://www.kfdu.com.au
• Townsville Bulletin

References

Questions?

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