Regional variation in the benefit of no-take marine reserves on reproductive output of the common coral trout, *Plectropomus leopardus*.

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No-take marine reserves potentially protect against overfishing by allowing larger, older, and more fecund fish to prosper. However, few studies have empirically tested the effect of no-take marine reserves on reproductive output, particularly for hermaphroditic species. We estimated batch fecundity from hydrated ovaries of the major target species in the Great Barrier Reef (GBR) coral reef finfish fishery, the common coral trout *Plectropomus leopardus*. Coral trout were collected from reefs zoned open and closed to fishing in the moderately fished central (Townsville, ~18.5ºS) and lightly fished northern (Lizard Island, ~14.5ºS) regions of the GBR over four spawning seasons (1998 – 2001). There were significant but weak positive relationships between batch fecundity and female fork length (r^2=0.226, p<0.001, n=415), somatic weight (r^2=0.187, p<0.001, n=403) and age (r^2=0.086, p<0.001, n=400). Townsville's protected reefs were the only reefs where the fecundity-length relationship was significantly and consistently positive each year. This pattern was driven by larger spawners producing significantly more eggs per batch, and the high number of females in spawning condition caught on Townsville's protected reefs compared to fished reefs and Lizard Island's fished and protected reefs. Although protecting larger *P. leopardus* from fishing will increase reproductive output, this study highlights the need to consider regional variation in reproductive output of exploited species when designing marine protected areas. The large amount of variation in the length-fecundity relationship may also be confounded by sex change in protogynous hermaphrodites like *P. leopardus*, indicating marine reserves may not benefit all reproductive strategies equally.

An integrated risk assessment for climate change: analysing the vulnerability of sharks and rays on the Great Barrier Reef

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An Integrated Risk Assessment for Climate Change (IRACC) was developed and applied to analyse the vulnerability of sharks and rays on Australia's Great Barrier Reef (GBR) to climate change. The IRACC merges traditional climate change vulnerability frameworks with approaches from fisheries ecological risk assessments. This assessment accommodates uncertainty and can identify exposure factors, at-risk species and their key biological and ecological attributes, critical habitats and ecological processes, and major knowledge gaps. Consequently, the IRACC can provide a foundation upon which to develop climate change response strategies. Applied to the sharks and rays of the GBR, the assessment indicates that freshwater/estuarine, and reef associated sharks and rays are most vulnerable to climate change, and that vulnerability is driven by case-specific interactions of multiple factors and species attributes. Changes in temperature, freshwater input and ocean circulation will have the most widespread effects on these species. Although relatively few GBR sharks and rays were assessed as highly vulnerable, their vulnerability increases when synergies with other factors are considered. This is especially true for freshwater/estuarine and coastal/inshore sharks and rays. Reducing the impacts of climate change on the GBR's sharks and rays requires a range of approaches including mitigating climate change and addressing habitat degradation and sustainability issues. Species specific conservation actions may be required for higher risk species. The assessment identified many knowledge gaps concerning GBR habitats and processes and highlights the need for improved understanding of the biology and ecology of the sharks and rays of the GBR.