

Bahamas to Create No-Take Reserve Network to Protect Fisheries, Fishermen

The government of the Bahamas has announced a plan to create five no-take reserves in its waters this year -- the first step in a process that could eventually close 20% of the country's marine environment to fishing, according to scientists and NGOs in support of the plan.

Announced on 13 January, the government plan designates five sites for no-take reserve status, based on a ranking of more than 30 candidate areas. The chosen sites, paired with the Bahamas' sole existing no-take reserve, would set aside roughly 4% (800 km²) of the country's marine environment as no-take areas, according to an estimate by the Bahamas Reef Environmental Education Foundation (BREEF), an NGO that initiated the reserve-creation effort. Supporters of the plan, including the science team charged with recommending sites, have encouraged the government to enlarge the nascent network in coming years to comprise one-fifth of Bahamian waters.

The government, represented by the Bahamian Department of Fisheries, has so far set no boundaries for the five reserves, pending consultations with local communities. Details, too, on the reserves' assessment and management of resources have yet to be worked out, though officials expect to rely on local communities to enforce the reserves' fishing ban.

The primary purpose of the reserves will be to protect the Bahamas' fish populations, which scientists have described as being generally healthy but showing signs of overconsumption and degradation. Through such protection, the reserves will provide long-term support for the fishing industry and the dive tourism sector.

"These reserves are as much social and political measures as they are fisheries management tools," said BREEF Chairman Nicholas Nuttall.

Building a Network

A US-based team of scientists with experience studying the Bahamas' marine environment helped the Bahamian government select the five sites, using a scoring system that ranked all candidate sites according to ecological and socioeconomic criteria (see box at the end of this article). The system ranked highest the sites considered to have both high ecological significance and positive (or neutral) socioeconomic effects if set aside as reserves.

The five proposed sites are North Bimini, the Berry Islands, South Eleuthera, the Exuma Cays, and the Northern Abaco Cays. Fishing pressure varies among the sites, with the Berry Islands and the Northern Abaco Cays serving as popular fishing grounds. The Berry Islands are the only site of the five that currently serves as a major spawning ground, including for conch, grouper, and sponges, according to Nuttall.

Not all of the five sites ranked high on the science team's ecological scorecard. The Bahamian Department of Fisheries reportedly selected the Northern Abaco Cays site due to strong community support for its protection, though the site scored relatively low for regional importance. The Department selected the North Bimini site -- also not a high scorer for regional importance -- for the nearby location of a shark research station, the presence of which could simplify monitoring and enforcement.

Ideally, said officials, the country's proposed no-take network would eventually be one link in a chain of reserves stretching beyond Bahamian waters. A network of no-take reserves, spread along the so-called Bahamian Archipelago from the Dominican Republic northwestward to the Bahamas, would allow the latter to continually replenish its living marine resources, with larvae spawned both inside and outside of Bahamian waters.

Supporters of the Bahamian plan say the work to protect the country's fisheries won't be complete until other countries join in the effort. "This is by no means the end of the story," said Kathleen Sullivan Sealey, a biologist from the University of Miami (Florida, US) who advised on the reserve-selection project. "There are 16 coastal systems in the [Bahamian] Archipelago. I have no doubt that these areas are ecologically important to the Bahamas."

Enforcement

The Department of Fisheries will have to rely on local communities to control fishing in the reserves, as the government has just one patrol boat, which it uses to enforce seasonal reserves at grouper spawning aggregation sites. The reliance on locals will depend upon wide public acceptance of the reserve plan, including by fishermen. Michael Braynen, the Bahamian Director of Fisheries, said he has observed public support for the reserve plan, though not everyone is behind it.

"I do expect outright opposition by some people in local communities to the proposed reserve areas," said Braynen. "In some cases this opposition will be based on their concerns about not having been involved earlier in the process. For some, this is something that the government never gets right, regardless of how early it's done." He added that other communities would view the reserve plan as favoring "foreigners" -- including tourists, land owners, and scientists -- or threatening locals' income or access to a food source. No official estimate exists for the reserves' expected short-term economic costs to local fishermen, though long-term benefits are expected to outweigh those costs.

"Obviously a great deal of our educational efforts will have to be directed toward demonstrating to the local communities that the reserves are being established for their benefit," said Braynen.

The science team's Mark Hixon of Oregon State University (US) said that voluntary compliance was the only way marine protected areas would work in developing nations. "Public education at all levels is essential, from formal education in the schools to fisheries extension officers hosting community workshops," said Hixon. By fostering a sense of community ownership of the reserves, he said, locals would be able to say, "This is our reserve, we enforce compliance, and we reap the benefits." He cited examples where he said community-based management had worked for MPAs, including in Samoa (King and Faasili, 1999, *Fisheries Management and Ecology*, 6:133-144) and Hawaii ("West Hawaii Council Approves Fish Management Areas", [MPA News](#), 1:1).

Existing Reserve at Exuma Cays

Notwithstanding seasonal no-take zones set up to protect grouper spawning aggregation sites, the present no-take reserve in the Bahamas is in Exuma Cays Land and Sea Park, in the central Bahamas. The Exuma Cays reserve covers 456 km².

According to the University of Miami's Sealey, the Exuma Cays reserve has not resulted in more fish outside the park, for two reasons. She cites an increase in the park's yacht tourism level -- from 500 "boat nights" in 1984 to over 17,000 "boat nights" in 1998 -- as creating a parallel increase in recreational fishing pressure. The tourist-driven fishing pressure has caused a 30%-60% decrease in large grouper numbers in waters surrounding the park. Second, the reserve might not be sufficient to protect large, long-lived species, such as groupers, that leave the park for spawning. Sealey said recent research on the home range of groupers, combined with population studies, should help indicate the size of reserves necessary for grouper protection.

It remains to be seen, following consultation between the government and local communities, whether the fishing ban at the newly proposed five sites will include restrictions on recreational fishing.

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The Site-Ranking System

The science team that ranked candidate sites for the Bahamian government used a scoring system that awarded points based on socioeconomic and ecological criteria. The system was as follows:

Socioeconomic Criteria

A. Fishing Impact

- 1 point = Major displacement of fishing activity
- 2 points = Minor displacement of fishing activity
- 3 points = Negligible displacement of fishing activity

B. Community Management

- 1 = No community nearby and no existing park
- 2 = Community nearby but support uncertain
- 3 = Supportive community nearby or existing park

C. Community Benefits

- 1 = Both non-consumptive benefits and spillover effect (of fish from reserve) negligible
- 2 = Minor non-consumptive benefits and/or spillover effect
- 3 = Major non-consumptive benefits and/or spillover effect

Ecological Criteria

A. Habitat Diversity

- 1 = Habitat sparse or degraded by human activities
- 2 = Healthy reef or seagrass/mangroves (not both)
- 3 = Both healthy reef and seagrass/mangroves

B. Regional Importance

- 1 = Negligible potential source of larvae for the Bahamas (NE corner of the Bahamas -- the Bahamas' net prevailing current runs from the southeast to the northwest)
- 2 = Minor potential source of larvae for the Bahamas (NE end of the Bahamas)
- 3 = Major potential source of larvae for the Bahamas (SE half of the Bahamas)

The team calculated the overall score for each candidate site by averaging the site's individual socioeconomic score, averaging its individual ecological score, then adding those two averages. The resulting "priority score", therefore, could range from 2 (lowest priority) to 6 (highest priority).

The science team's principals were Allan Stoner of the US National Marine Fisheries Service, Mark Hixon of Oregon State University (US), and Craig Dahlgren of the Center for Marine Conservation, a US-based NGO.

Tips from the Bahamas on Designing Reserves

The science team for the Bahamian site-selection project offered the following tips, among others, on reserve design:

State explicit goals, including both socioeconomic and ecological perspectives.

Make the reserve permanent. Previous experience has shown that reserves are rapidly decimated when opened, due to disproportionate targeting by fishermen. The benefits of no-take reserves accrue from their permanence.

Include a mixture of habitats for target species, including areas for larval settlement, juvenile survival and growth (nursery habitat), and adult activities (especially spawning).

Locate reserves close to fishing grounds for maximum benefit from the spillover effect.

Avoid areas with non-fisheries environmental problems, including heavy development of nearby land areas, pollution, sedimentation, and habitat degradation.

(Adapted by MPA News from "Scientific Review of the Marine Reserve Network Proposed for the Commonwealth of the Bahamas by the Bahamas Department of Fisheries," July 1999, by Allan Stoner, Mark Hixon, and Craig Dahlgren.)

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