

**Balancing the recreational lobster diver fishery with
the small scale commercial lobster trap fishery in Bermuda**

**Equilibrar la pesquería recreativa de buzo de langosta espinosa con
la pesquería comercial con trampas en las Bermudas**

**Équilibrer la pêche récréative des plongeurs au homard avec
la pêche commerciale aux casiers aux Bermudes**

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EXTENDED ABSTRACT

In Bermuda, Caribbean spiny lobster, *Panulirus argus*, has traditionally been targeted by a small scale commercial trap fishery and also by recreational free-divers, with the typical conflict arising between the commercial and recreational sectors. Historically, the commercial fishery utilized arrowhead traps, which were used to trap finfish outside of the lobster season, while divers utilized a noose or a spear.

The Fisheries Act, 1972, formalized a number of customary stewardship practices, legislating a fishery closure during the summer reproductive season, and setting a minimum size for retention of 92 mm CL. Initially, the recreational lobster diver fishery remained loosely regulated, although divers were restricted to using only a noose for capturing lobsters and the use of SCUBA was officially prohibited. A daily bag limit was also imposed, although the limit varied somewhat over time. At this time, certain inshore areas were also placed off-limits to all forms of lobster fishing.

Amidst declining catches of finfish from the grouper-snapper complex in the 1980s, the 1984 Fisheries Management Plan sought to eliminate the diver fishery and reserve the available lobsters for the trap fishery in order to help maintain the profitability of the commercial fishery. However, diving for lobsters is a specialized fishing activity (*sensu* Loomis and Holland, 1997) with an above average number of highly engaged participants, and, in response, the Bermuda Amateur Lobster Catchers' Association was formed to lobby against the closure of the recreational lobster fishery (Government of Bermuda, 2000).

After some negotiations, the Fisheries Regulations were amended to create a recreational lobster diver licensing program. Licenses cost \$10 and came with additional terms and conditions, including a daily bag limit of 2 lobsters per licence holder and the requirement to report fishing activity (Government of Bermuda, 2000). This facilitated tracking of diver numbers and their catches.

From the 1980s through 2016, the number of recreational lobster diving licences issued each season rose from approximately 400 to just over 500, although numbers fluctuated throughout this period. The total reported catch from the recreational fishery was also highly variable, ranging from a minimum of 929 to a maximum of 5,181 lobsters in a given season, although it is believed that the minimum value represented serious under-reporting. The reported catch was affected by obvious factors such as diver numbers and experience levels, as well as the weather and prevailing sea conditions during the lobster season, especially the hurricane-prone month of September. However, it was also greatly affected by concurrent changes to the commercial fishery.

After fish traps were banned in 1990, the commercial lobster fishery transitioned from traditional arrowhead traps to the use of specifically developed rectangular traps with escape gaps (Ward and Luckhurst, 1996). There was a six year period of experimental fishing to refine the design of these traps, with trap fishing restricted to areas deeper than 10 m and only a limited number of commercial fishers participating. During this time, the commercial harvest of lobsters fell dramatically and the supply of lobsters in the local market was impacted. As a result, many people took up lobster diving and, with no trapping taking place in shallow waters, recreational catches reached an all-time high. Although there had been incremental increases in the cost of a lobster diving licence in previous years, the price was increased to \$120 in 1990, in an attempt to constrain the number of licences through market forces.

When the commercial trap fishery reopened fully in 1996, some trapping was permitted in areas shallower than 10 m deep for at least part of the season, generally the latter half, although the portion of the season and the number of traps permitted varied from year to year. Commercial fishers are assigned to eastern and western 'inshore' areas to distribute fishing effort. A central 'no trapping' reservoir area was carved out to separate trapping and the diver fishery, with the aim of reducing intersectoral conflict.

Despite its level of specialization, the recreational lobster diver fishery shows patterns typical of recreational fisheries, with many casual participants and fewer highly engaged individuals (Government of Bermuda, 2000; Robertson and Pitt, 2013). Lobster diving is concentrated at the start of the season because the water is warmer and sea conditions are better, and usually more than a third of the season's catch is reported from the month of September. Average seasonal catches are in the range of 7-14 lobsters per licence holder. Many participants only fish on 1-3 days and catch their bag limit of 2 lobsters, but a few very active fishers continue to dive throughout the winter and may catch >50 lobsters in a season (Fig 1).

However, it has been observed that the bag limit promotes high-grading, as does the annual tournament that takes place on the first weekend of the season and awards prizes for the largest lobsters caught.

Over the years, many divers purchased licences even when they did not fish because they feared that licences might be eliminated or capped in the future and they wanted to maintain their history of participation. However, if they did not fish, they often did not bother to report their effort and catch, or lack thereof. This brought both the true level of fishing activity and the validity of the reported catch levels into question, particularly from the perspective of the commercial fishers. To improve the accuracy of the catch statistics, lobster divers who did not report in a timely manner had their licences suspended for a season.

Recreational lobster divers have typically caught the equivalent of ~10% of the commercial catch (Robertson and Pitt, 2013), although catches were much higher during the early 1990s while the commercial fishery was being restructured and appeared to be lower when catch reporting was less stringently enforced. Yet the limits imposed by free-diving combine with prevailing autumn wind and weather patterns to concentrate the recreational harvest in shallower waters, particularly off the west end of the island (Robertson and Pitt, 2013; Fig 2), fueling conflict with the commercial fishers in that area.

A decline in the abundance of lobsters over the past 5 years, as manifested in decreased catch per unit effort (CPUE) for the commercial trap fishery, particularly in the shallower 'inshore' areas, necessitated harvest controls for the 2017-18 season (Dept of Environment and Natural Resources, 2020). Restrictions on the commercial fishery included fewer traps allowed inshore and a reduction in the number of licences issued. Given that both sectors operate in the area showing the greatest declines, commercial fishers called for equivalent restrictions on recreational fishers in the form of a cap on the number of licences.

The Lobster Divers' Association represented their sector in meetings with commercial fishers, and agreed that a cap of 500 licences could be set for that season and would only penalize those who had not complied with reporting. Although this was unpopular, the cap was not reached, so numbers were further reduced to 450 and then 375 for subsequent seasons. Only for the 2020-21 season was the cap of 375 reached, with excess demand, because COVID-19 has impacted employment levels as well as travel and other leisure activities. However, it has been acknowledged that these are exceptional circumstances and the limit has largely been accepted without too much resistance.

Collaborating more closely with the Lobster Divers' Association has also made it easier for fisheries managers to connect with this sector for research and management purposes. Having the Association as a point of contact has expanded opportunities for biological sampling of lobsters from the recreational sector, including at the annual tournament. Importantly, this has provided access to larger lobsters than are typically harvested by the commercial trap fishery and has facilitated collection of carapaces and ossicles for an age and growth study because those harvesting lobsters for personal consumption are not bound

to the half shell presentation demanded by restaurants. Members of the Lobster Divers' Association have also been active participants in the stakeholder working groups convened to assist with the development of marine spatial planning in Bermuda (see Pitt et al., this issue).

These experiences demonstrate the value in encouraging the formation of stakeholder organizations amongst various groups of marine resource users.

KEYWORDS: Spiny lobster, recreational fishing, diver fisheries, intersectoral conflict, Bermuda

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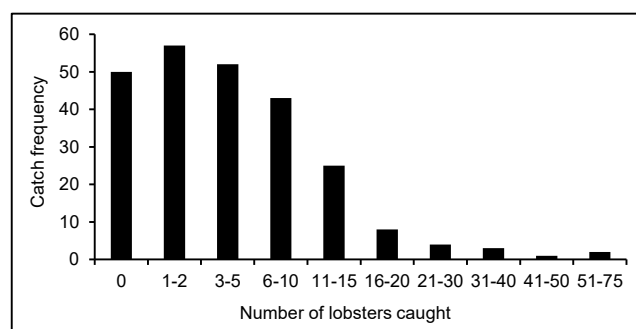


Figure 1. Catch frequency (total number of lobsters caught per licence holder) in the recreational fishery during the 2018-19 season.

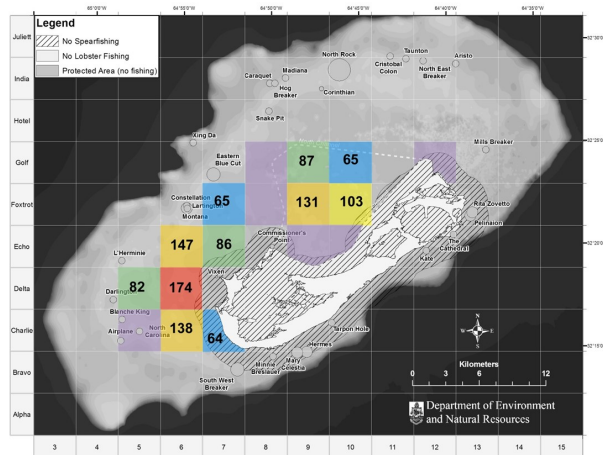


Figure 2. Heat map from the 2018-19 season showing the typical distribution of recreational lobster catches around Bermuda, highlighting all grid squares where more than 25 lobsters were reported caught.