Migration of Mutton Snapper (*Lutjanus analis*) Between Home Range Areas and Spawning Aggregation Sites in the US Virgin Islands

Migración de Pargo Criollo (*Lutjanus analis*) entre los Rangos de Hogar y los Sitios de Agregaciónes Reproductivas en las Islas Vírgenes de los Estados Unidos

La Migration du Vivaneau sorbe (*Lutjanus analis*) entre les Domaine D'habitation et les Sites D'agrégation des Frayères en aux Îles Vierges Américaines

SARAH HEIDMANN[1]*, BARBARA KOJIS[1], CHRISTOPHER BIGGS[2], and RICHARD NEMETH[1]
[1]*University of the Virgin Islands, #2 John Brewers Bay, St. Thomas, Virgin Islands 00802 USA.*
**sarah.heidmann@gmail.com*
[2]*University of Texas at Austin, 750 Channel View Drive, Port Aransas, Texas 78373 USA.*

EXTENDED ABSTRACT

Many large coral reef fish participate in transient fish spawning aggregations (tFSAs), events at certain times of year during which fish migrate tens of hundreds of kilometers to spawn in large groups at specific locations (Domeier and Colin 1997). One such species of economic and ecological importance in the US Virgin Islands is the mutton snapper (*Lutjanis analis*). They are smaller in length and girth than most transiently-spawning groupers and snappers, such as Nassau grouper, dog snapper, and Cubera snapper, and therefore probably migrate shorter distances to spawn. In the Virgin Islands, mutton snapper are known to use a site called Tampo, south of the island of St. John, and a site at the West Bank of St. Croix. They are also suspected to use a site on the Grammanik Bank, south of St. Thomas, where other snapper aggregations have been documented (Biggs and Nemeth 2016). The search for the locations of these aggregations and their source populations is an active area of research. Most previous studies have focused on either home range movements or movements around a spawning aggregation, not both.

To track individuals to and from aggregation sites, this study utilized passive acoustic telemetry (VEMCO), an effective method for quantifying spatiotemporal movements of many fish for long, continuous periods of time. Arrays were placed at the three spawning sites across the US Virgin Islands, as well as at Brewers Bay (St. Thomas), Lang Bank (St. Croix), and Buck Island (St. Croix) (Figure 1). Mutton snapper were tagged at Brewers Bay and at the West Bank.

One individual from the West Bank in St. Croix was detected once at Lang Bank in May 2016, and at Buck Island on two separate days, 10 days apart, in November of 2016. The distance traveled was about 48 km. The timing of these latter detections, far from the full moon and therefore not part of a spawning migration, suggests that the home range is likely somewhere nearby. Two individuals from Brewers Bay, showing high residence time there of > 90% by hour for most of the year, were detected at Tampo in June and July 2017, a distance traveled of about 30 km.

Similar examples of documented reef fish migrations between home ranges and spawning sites are rare in the literature, and often encountered by chance. In two separate instances in the Bahamas, a Nassau grouper was tagged for a study and subsequently caught by a fisherman at a spawning site 110 km away (Colin 1992) and 220 km away (Bolden, 2000). A similar migration was documented in a mutton snapper tagged on St. John that was detected at the Grammanik Bank (Pittman et al. 2014). This example and the two presented here are indeed shorter distances than those of the two Nassau grouper, as to be expected based on body size. Future research should focus on the route that these individuals are taking between home ranges and spawning sites, addressing questions such as whether they follow reef habitats, and if the route changes over time. Species like mutton snapper are vulnerable to fishing during reproductive periods, due to a high concentration of large fish at predictable times and places. Knowledge of how these fish migrate to and from these aggregations is essential to the implementation of effective management strategies.

Figure 1. Locations of acoustic receiver arrays in the US Virgin Islands. Yellow stars represent spawning sites and red hearts represent home range sites. Image from Google Maps.

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