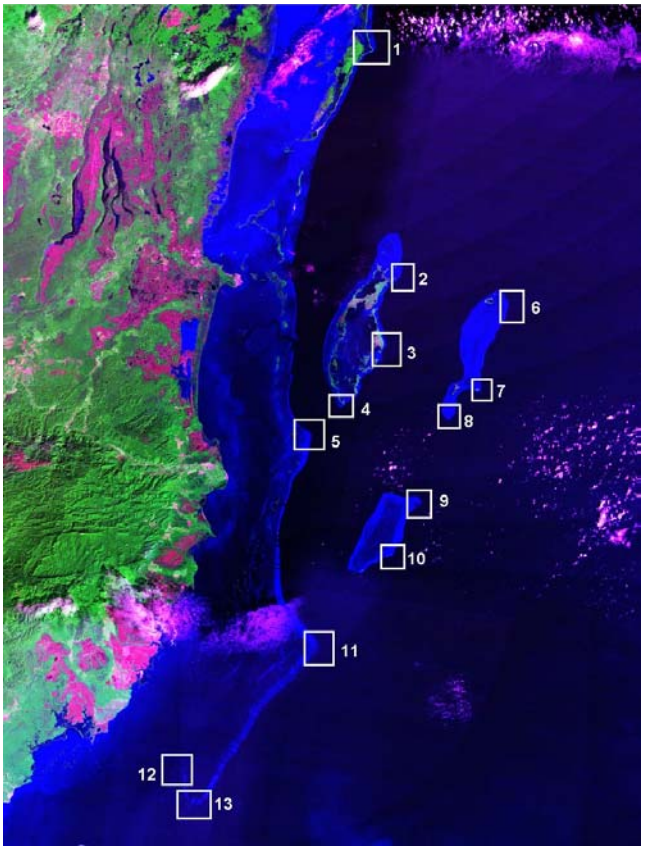
SPAWNING AGGREGATIONS IN BELIZE

A REPORT GENERATED FOR THE WORKSHOP,
"TOWARDS A SUSTAINABLE MANAGEMENT OF NASSAU GROUPERS IN BELIZE"

BY

William D. Heyman
The Nature Conservancy
July 30, 2001



Purpose: The purpose of this document is to share scientific understanding of spawning aggregations in Belize and elsewhere with local communities, commercial fishermen, fisheries managers, students, scientists, and other interested parties. It is hoped that if people understand spawning aggregations better, and their vulnerability, they will help to protect these crucially important places on reefs. The Satellite image above shows the location of several multi-species spawning aggregation sites that should probably be protected in order to help sustainably manage the coral reef fisheries of Belize.

The Nature Conservancy®
Saving the Last Great Places

Introduction and Background:

Fisheries form in important part of Belize's economy and culture. Fishermen all over the country have witnessed marked declines in the availability of product – a trend that is common around the world. In order to manage fish stocks sustainably, fishermen and managers must better understand the life history and biology of exploited species and protect the most vulnerable times and places.

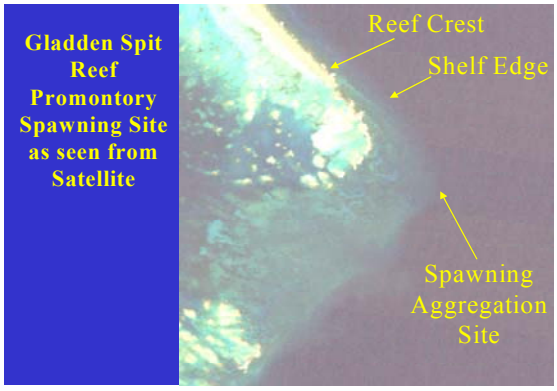
Most commercially important reef fish aggregate to spawn in very specific times and places. Nassau Groupers aggregate each year around the full moon in either December or January in very specific locations. Fishermen have located these aggregations in several places around the Caribbean and fished them virtually to extinction. Grouper spawning aggregations have experienced near total collapse in Mexico, Honduras, Puerto Rico, Cayman Islands, Bermuda, U.S. Virgin Islands, and the Dominican Republic. Grouper aggregations have also been severely damaged in Belize, at sites such as Mexico Rocks, Rise and Fall Bank, and Caye Glory, as indicated by Green Reef's recent national Grouper Spawning Aggregation Assessment. At Caye Glory, for example, once Belize's most productive grouper bank, where catches reached 2 tons per day in the late 1960's, the January 2001 assessment revealed a maximum of 21 fish underwater. Fishermen at the site caught only 9 fish during four days of intense fishing. A similar fate is not unlikely for snappers, and other aggregating finfish if heavy exploitation at spawning aggregation sites continues.

This paper was written to examine patterns in the locations and timing of reef fish spawning aggregations in Belize and other places, and to explore the conservation implications of these patterns. The hypothesis is that reef promontories with steep dropoffs serve as desirable locations for spawning in a variety of reef fish species so protection of these promontories within marine reserves will confer heightened conservation of many important reef fish species.

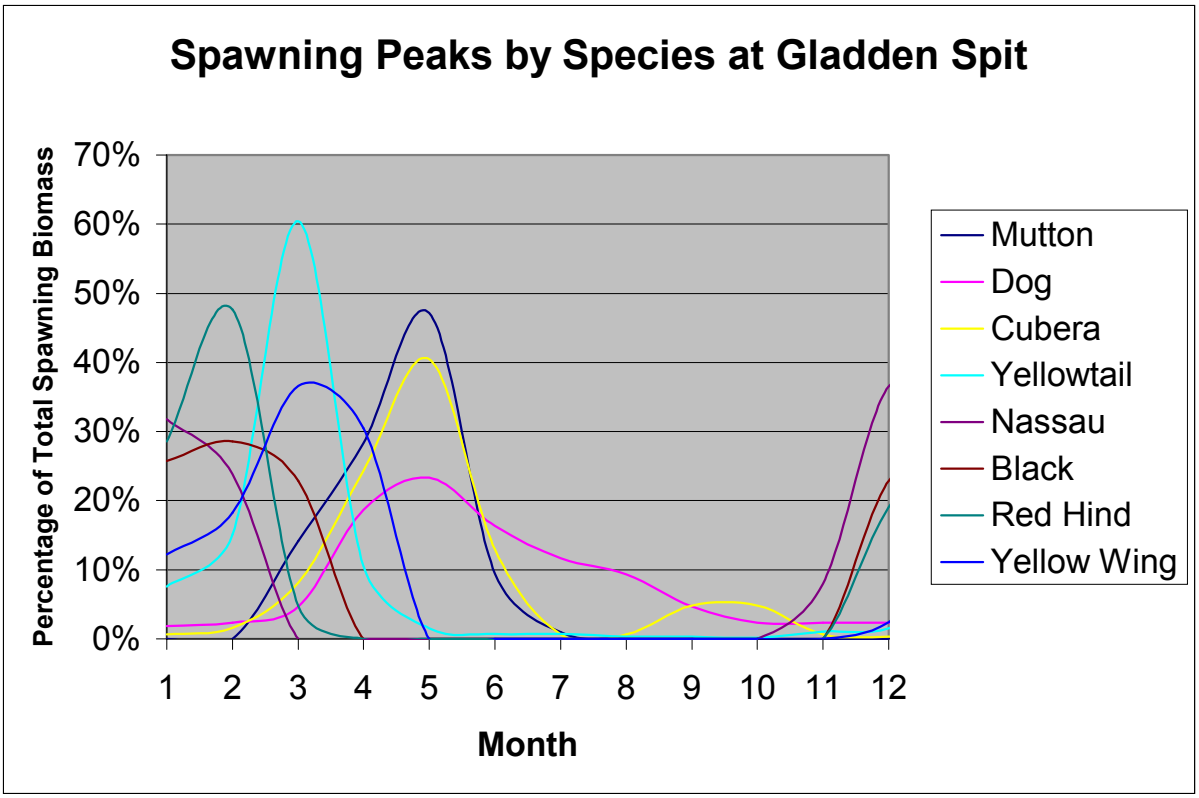
Methods and Results:

The findings from this report result from a three-year study of the Gladden Spit spawning aggregation from March 1998 – June 2001, and from results obtained during the National Grouper Spawning Aggregation Assessment, sponsored by Green Reef in January, 2001.

First I interviewed fishermen about the fish that spawn at Gladden Spit (below) including most importantly, Elvis "Waga" Leslie, Carlton Young, Sr., Eloy Cuevas, Alfred Williams, Junie Faux, and Brian Young. Our team conducted monthly assessments at Gladden, using SCUBA and diving within the aggregation, we have been able to describe a pattern of multiple species using the Gladden Spit site for spawning as shown in Table 1 and Figure 1. Figure 1 below indicates the seasonal spawning

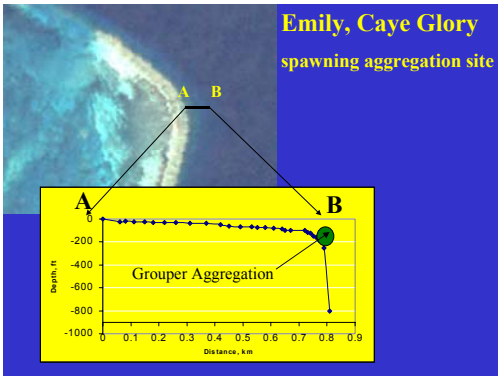


activity for some of the main fish that aggregate at Gladden Spit. This pattern is well known to some fishermen, who capitalize on this knowledge to harvest spawning fish. A more complete list of fish using the Gladden Spit reef promontory for spawning can be seen in Table 1 at the end of the document.



Many Reef Promontories have Multiple Species Spawning Aggregations

The figure on the front cover of this report shows the location of all known Nassau grouper spawning aggregation sites in Belize. These sites are located at reef promontories or sharp bends in reefs and atolls. A detailed view of the Emily, Caye Glory Site can be seen below. The spawning site is located at the sharp bend point in the reef, where the reef drops steeply into deep water. This site is well known as the most productive grouper fishing spot in the country of Belize, with catches in the 1960s of over 2 tons per day, and reduced to only 21 fish during the spawning time in January 2001. During the January survey, our team of divers also noted aggregations of black groupers, yellow wing groupers, but also jolthead porgies, black margates, and trunkfish. During the National Nassau Grouper Aggregation Study, it was determined that several of the surveyed sites also had aggregations of these other species



suggesting that perhaps many of the reef promontory Nassau Grouper Aggregation sites also have aggregations of many species.

At Riley's Hump in the waters of the Florida, a spawning aggregation site with a similar shape was shown to have aggregations of 7 grouper species and 5 snapper species, much like those in Belize. Local fishermen and scientists recently helped to get the area declared a "no-take zone" in order to protect the spawning fish there. It is expected that Riley's Hump will help to revitalize commercially important fish throughout Florida.

In Indonesia's Komodo National Park, eight reef promontory aggregation sites have been identified as multiple species aggregation sites for groupers. These sites have all been closed to fishing in order to help depressed grouper populations recover.

Conservation Implications:

If the pattern that we are seeing is correct, then many reef promontories that have Nassau Grouper spawning aggregations also harbor spawning aggregations for many commercially important reef fish species. These sites should certainly be protected from fishing in order to help manage regional fisheries sustainably. By protecting just a few small, but important areas, which serve as larval "source" sites, we can contribute greatly to sustainable fisheries management in Belize and around the world.

Acknowledgements:

This work was completed through the participation of a great many participants including Eloy Cuevas, Alfred Williams, Dan Castellanos, Jr. Nicanor Requena, Rachel Graham, Brian Young, Mito Paz, Tim Boucher, , Elvis "Waga" Leslie, Lawrence Leslie, Lennox Leslie, Mateus "Tamba" Nicholas and others.

Table 1: Spawning aggregations at Gladden Spit (draft)

	Common Name	Latin Name	Local Name	Spawning status[1]	Apparent Spawning Season
1	Mutton snapper	*Lutjanus analis*	Mutton Snapper	* +	March – June
2	Cubera snapper	*Lutjanus cyanopterus*	Black Snapper	* + □	March-June & Sept-Oct
3	Dog snapper	*Lutjanus jocu*	Dogteeth snapper	* + □	April-June peak spawn all year
4	Yellowtail Snapper	*Ocyurus chrysurus*	Yellowtail	* +	Feb - March
5	Nassau grouper	*Epinephelus striatus*	Grouper	* +	Dec-March
6	Rock Hind	*Epinephelus adscensionis*	Jimmy Hind	*	Dec - Feb
7	Red Hind	*Epinephelus guttatus*	Jimmy Hind	* +	Jan, Feb
8	Coney	*Epinephelus fulvus*	Butterfish	*	Dec-Feb
9	Grasby	*Epinephelus cruentatus*	Butterfish	*	Dec-Feb
10	Black Grouper	*Myctoperca bonaci*	Rockfish	* +	Jan-March
11	Tiger Grouper	*Mycteroperca tigris*	Fringy Tail	* +	Dec-Jan
12	Yellowfin Grouper	*Myctoperca venenosa*	Rockfish or Yellowwing	* +	Jan-March
13	Permit	*Trachionatus fulcatus*	permit	*	April - May
14	Almaco Jack	*Seriola rivoliana*	Black Jack	* +	Oct - Nov
15	Amber Jack	*Seriola dumerili*	Ocean jack	* +	April-June; Oct – Nov
16	Bar Jack	*Caranx ruber*	Jack	+	April-May
17	Blue Runner	*Caranx crysos*	Longtail jack		April-May
18	Yellow Jack	*Caranx bartholomaei*	Yellow tail Jack	* +	June - July
19	Jack crevalle	*Caranx hippos*	Black meat	* +	April-June
20	Horseye jack	*Caranx latus*	Horseye jack	* +	April-June
21	Black margate	*Anisotremus surinamensis*	Margaret fish	+	Feb; April-June
22	White margate	*Haemulon album*	Margaret fish	+	Jan; April-June
23	Kingfish	*Scomberomerus regalis*	Kingfish	+	April-May
24	Hogfish	*Lachnolaimus maximus*	Hog snapper	+ □	Jan - May
25	Ocean triggerfish	*Canthidermis sufflamen*	Ocean trigger	+	April-May; Aug
26	Jolthead Porgy	*Calamus bajonado*	Porgy	+	Jan
27	Trunkfish	*Lactophrys trigonus*	trunkfish	+ □	March
28	Smooth trunkfish	*Lactophrys triqueter*	Trunkfish	+ □	May

1 Spawning status: * = reported by fishermen; + = observed one or more spawning signs - aggregating in abnormally large numbers, having hydrated egg and distended bellies, courtship behavior and coloration; □ = observed to spawn. Prime fisherman informants are Alfred Williams, Eloy Cuevas, Elvis "Waga" Leslie, Brian Young, and Carleton Young, Sr., Adrian Faux.