Fish Spawning Aggregations: Let's Compare Pacific Ocean to the Gulf and Caribbean

Agregaciones Reproductivas de Peces: Comparando el Océano Pacífico con el Golfo y el Caribe

Agrégations de Frai des Poissons: Comparaisons Entre L'océan Pacifique Et Le Golfe Et Les Caraïbes

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ABSTRACT

Are there differences or similarities between the Pacific Ocean and the Gulf and Caribbean regions? We know that fish spawning aggregations occur throughout the world's oceans and there seems to be variations between species and regions. Science and Conservation of Fish Aggregations (SCRFA) is compiling information on these aggregations in a global database, which now holds over 1,000 records. Through analysis of records in the Pacific Ocean and the Gulf and Caribbean region, we can now compare what fish spawn where and how.

KEY WORDS: Fish, spawn, aggregation, Pacific Ocean, Caribbean

INTRODUCTION

A fish spawning aggregation is a grouping of a single species of fish that has gathered together in greater densities than during non-spawning times, with the specific purpose of reproducing. Typically such aggregations form at the same place(s) at approximately the same time(s) each year. Many coral reef fish species that have long been important for food and livelihoods reproduce by gathering in large, concentrated and predictable spawning aggregations. Particularly over the last two decades, these have become the target of expanding fishing pressure. Yet we are only recently beginning to understand their value to coral reef health, fishing communities and their vulnerability to fishing, (Russell et al. 2014).

METHODS

Science and Conservation of Fish Aggregations (SCRFA) maintains a global database of over 1000 records for over 200 species of fish from 44 fish families in 52 countries. The records are available online, and most are for Serranidae (groupers) and Lutjanidae (snappers), with other families that contain several aggregating species being Carangidae, Acanthuridae, Siganidae, Labridae, and Scaridae. Each record in the Database is for one species at one aggregation site, (SCRFA Fish Aggregation Database 2014). SCRFA's Fish Aggregation Database holds extensive information on spatial and temporal characteristics and the current status of fish aggregations globally. From this Database we have done a simple analysis of the differences and similarities between fish that aggregate to spawn in the Pacific Ocean and the Caribbean.

Records were downloaded from the Database into an Excel spreadsheet for a simple comparison of numbers and percentages. Records for six families, Acanthuridae, Scaridae, Labridae, Carangidae, Lutjanidae, and Serrandiae were compared between the Pacific Ocean and the Caribbean regions. For each of these families, the solar phase, lunar phase, season, habitat, management and current status were compared.

RESULTS

652 records were downloaded for the six families: 309 for the Pacific Ocean and 347 for the Caribbean region. The majority of the records were for Lutjanidae, 107 records, and Serranidae, 390 records, Figure 1. The solar and lunar phases preferred by the six families were compared as well as the season, Table 1. There are many differences in habitats preferred by the families.

The type of management in place was compared for Serranidae and Lutjanidae because they make up most of the records, Table 2. The current status of all six families combined as a percentage of aggregations in each region is shown in Figure 2.

DISCUSSION

Serranidae is the most common family in the Database for each region, with 185 records for the Pacific Ocean, and 205 records for the Caribbean, Fig 1. All six families aggregate to spawn at consistent solar and lunar times in both regions, for example, Serranidae aggregate at afternoon and dusk on the full, new and 3rd quarter moons in both regions. However, there was some variation in the seasons preferred, Table 1.

The types of habitats preferred by Serranidae in each region are similar, with outer reef slope and reef promontory preferred, although reef channels are also preferred by Serrandiae in the Pacific Ocean. For the other 5 families, the preferred habitat varied considerably, for example, Lutjanidae prefer outer reef slope and reef promontory in the Caribbean, but prefer reef channel and reef promontory in the Pacific Ocean. Acanthuridae prefer drop off and outer reef slope in the Caribbean, but prefer reef channel and reef promontory in the Pacific Ocean. This variation could be due to the lack of data on habitats in the records, and should be improved over time.

It is a concern that for Serranidae, only 26% are managed in the Pacific Ocean, where as 40% are managed in the Caribbean. The management is mostly MPAs, time/ area closures and seasonal sales bans. For the Lutjanidae, none are actively managed in the Pacific Ocean, and only 41% are managed in the Caribbean, mostly using MPAs, Table 2.

In comparing the current status recorded in the 652 records, it is apparent that over 70% of the Pacific Ocean aggregations are unknown, and 16% are decreasing. In the Caribbean, 45% are unknown and 30% are decreasing. Both regions show a similar trend in the number of aggregations that have gone, being 4% in the Pacific Ocean and 2% in the Caribbean, Figure 2.

Table 1. Solar phase, lunar phase and season preferred for aggregations of six families in the Pacific Ocean and Caribbean region.

	Solar Phase	Lunar Phase	Season
Serranidae			
Pacific	Dusk	Full, New, 3rd Qtr	All
Caribbean	Afternoon	Full, New, 3rd Qtr	All
Scaridae			
Pacific	All	All	All
Caribbean	All	All	All
Lutjanidae			
Pacific	Dusk	Full, 3rd Qtr	All
Caribbean	Dusk	Full, 3rd Qtr	Summer
Labridae			
Pacific	Afternoon	All	Autumn, Spring
Caribbean	Dusk	All	All
Carangidae			
Pacific	Dusk	New	All
Caribbean	Dusk	Full, 3rd Qtr	not Winter
Acanthuridae			
Pacific	Afternoon, Dusk	All	All
Caribbean	Afternoon	All	All

Table 2. Number and percentage of aggregations managed in the Pacific Ocean and Caribbean region.

	Serranidae		Lutjanidae	
	Pacific	Caribbean	Pacific	Caribbean
Records	185	205	15	92
Managed	26%	40%	0%	41%
MPA	15%	16%	0%	27%
Time/ Area Closure	6%	12%	0%	8%
Seasonal Sales Bans	12%	16%	0%	4%

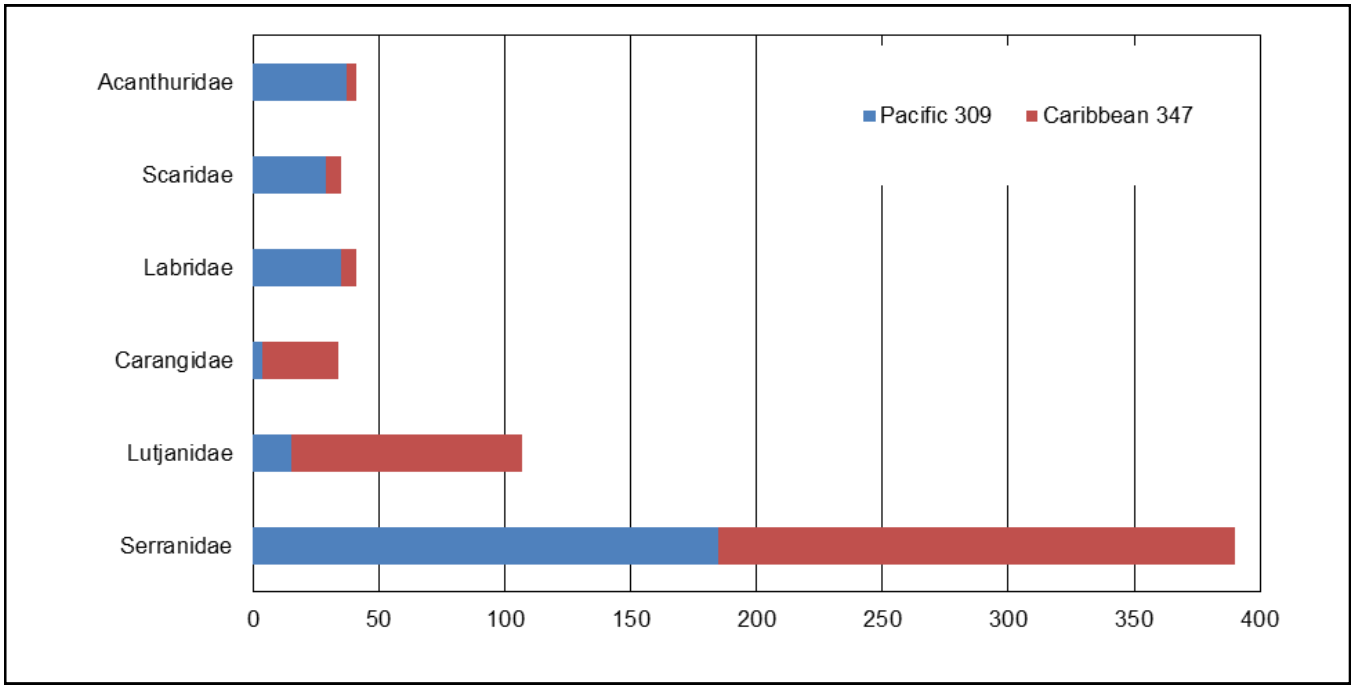

Figure 1. 652 records of six families in the Pacific Ocean and Caribbean region.

As the number and quality of records in the Database increases, a greater understanding of fish aggregations will be realised. There is more information and management of fish aggregations in the Caribbean than in the Pacific Ocean, likely due to the longer history of scientific enquiry about aggregations in the Caribbean. Science and management of fish aggregations in the Pacific Ocean should be increased.

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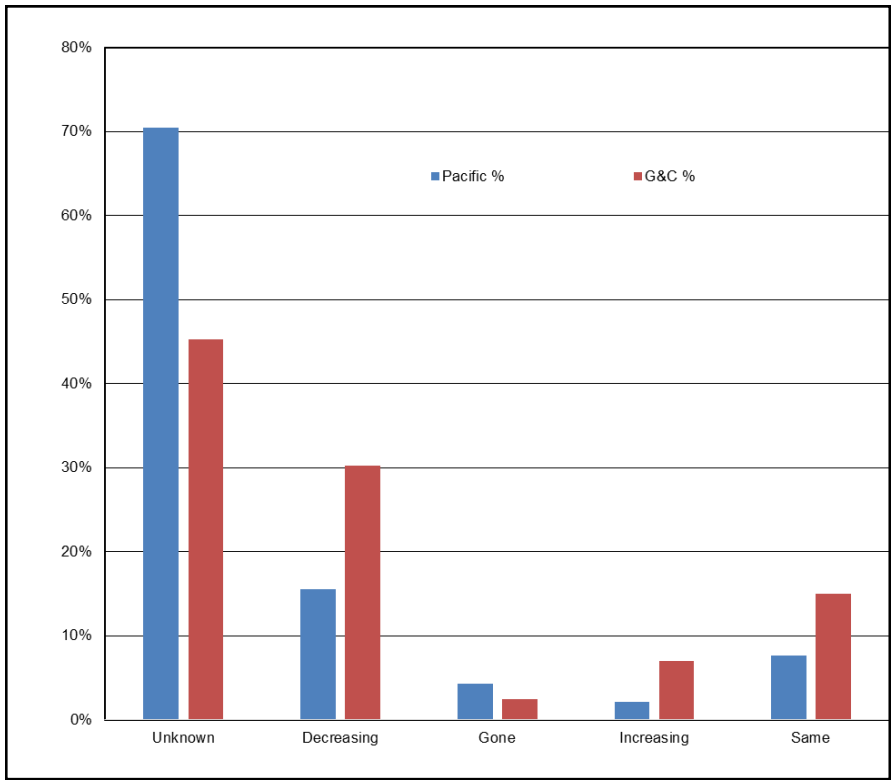

Figure 2. Status of aggregations in the Pacific Ocean and the Caribbean region.