ADDITIONS TO THE REEF FISH FAUNA OF
CAYO ALBUQUERQUE,
SEAFLOWER BIOSPHERE RESERVE
(COLOMBIAN CARIBBEAN)

*Natalia Rivas E., Arturo Acero P., Jose J. Tavera,
Alfredo Abril-Howard, and Nacor Bolaños-Cubillos*

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ADDITIONS TO THE REEF FISH FAUNA OF CAYO ALBUQUERQUE, SEAFLOWER BIOSPHERE RESERVE (COLOMBIAN CARIBBEAN)

NATALIA RIVAS E.¹, ARTURO ACERO P.¹, JOSE J. TAVERA²,
ALFREDO ABRIL-HOWARD¹, and NACOR BOLAÑOS-CUBILLOS³

ABSTRACT

This publication presents the list of fish fauna gathered during a scientific expedition to Cayo Albuquerque (12°07'N, 81°52'2" W) Colombia, the southernmost cay of the Archipelago of San Andrés, Providencia and Santa Catalina, which includes the Seaflower Biosphere Reserve. Data was collected through visual censuses in coral reef formations and seagrass beds, between September 23 and October 3, 2018. A total of 191 species were registered, distributed in 50 families, with Labridae (24) and Serranidae (22) showing the highest species richness. Twenty-five species are new reports for Albuquerque.

INTRODUCTION

The Archipelago of San Andrés, Providencia and Santa Catalina in the western Caribbean is composed of three main islands and a large number of small islands, cays, atolls, and shoals that stretch from northeast to southwest over ~180,000 km² (Abril-Howard et al., 2012; Gamboa et al., 2012) (Figure 1). In recognition of the archipelago's size, location, fishing resources, species diversity, ecosystem richness, and other attributes, UNESCO in 2000 designated the archipelago as the Seaflower Biosphere Reserve (Taylor et al., 2012).

The Seaflower Biosphere Reserve encompasses significant Caribbean coral reef complexes and 77% of the coral reef formations of Colombia (Abril-Howard et al., 2012). Since 2015, Colombian research institutions have participated in annual scientific expeditions to remote areas of the Reserve, to increase knowledge of their ecosystems and species richness. This paper presents the list of fish fauna inventoried during the 2018 expedition to the southern limit of the reserve, Cayo Albuquerque (Southwest Cay; Figure 1).

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Figure 1. Archipelago of San Andres, Providencia and Santa Catalina.

METHODS

Data were gathered during the Seaflower expedition to Cayo Albuquerque ($12^{\circ}07'N$, $81^{\circ}52'2''W$), from September 23 to October 3, 2018. In each of 35 stations (Figure 2) of coral reefs and seagrass beds (2 to 30 m deep), 30 minute underwater visual surveys were carried out using SCUBA and free-diving techniques. In addition, species recorded (with video or still photography) by the project “Diversity and relative abundance of elasmobranchs in Cayo Albuquerque” (Colombia Azul Foundation, NOVA Southern University, and Florida International University) and by other expedition scientists were included.

The main source of census comparisons were reef data from (i) Bolaños-Cubillos et al. (2015), to determine which reports were new to the cays, and (ii) Acero et al. (2019), which summarizes the fish biodiversity data collected during former Seaflower Expeditions (2015–2017) at the northern portion of the Reserve, including the islands of Roncador, Serrana, and Serranilla.

Figure 2. Sampling stations (red circles) and coral reef formations (light gray areas) around Cayo Albuquerque. Adapted from Taylor et al. (2012).

RESULTS AND DISUSSION

A total of 191 fish species from 50 families were observed at the stations surveyed around Albuquerque. Previous reports of the ichthyofauna of the cays (Fowler, 1944; Birdsong and Emery, 1967; Victoria and Gómez, 1984; and Gómez and Victoria, 1986) were included in the list compiled by Mejía et al. (1998), which reports a total of 119 species. After a rigorous compilation of those works and additional sampling, Bolaños-Cubillos et al. (2015) presented a list of 336 species recognized for the south section of the reserve (Bolívar and Albuquerque; Figure 1).

This work adds 25 new reports to the known species of Cayo Albuquerque (Table 1). Labridae is the family that has the highest species richness (24), including four species not previously detected in the cays (*Cryptotomus roseus*, *Halichoeres pictus*, *H. poeyi*, and *Xyrichtys martinicensis*). Serranidae is represented by 22 species in total, including three new reports for the study area (*Hypoplectrus maculiferus*, *H. randallorum*, and *Serranus baldwini*).

Amongst the islands sampled in previous Seaflower Expeditions, Albuquerque exhibited the highest fish species richness (191), compared to 140 species recognized for Roncador in 2015, 155 for Serrana in 2016, and 166 for Serranilla in 2017 (Acero et al., 2019). The fish biodiversity found in Albuquerque during

the short visual census includes more than 12% of the total number of species recognized for the Greater Caribbean in depths shallower than 100 m (Robertson et al., 2019).

The information gathered in Albuquerque is consistent with data from the northern islands (Acero et al., 2019), specifically the relatively low abundance and/or absence of larger, generally high commercial value species such as *Seriola dumerili*, *Calamus bajonado*, *Scarus coeruleus*, *Epinephelus striatus*, *Mycteroperca bonaci*, and *M. venenosa*, among others. This is probably related to fishing pressure inside the reserve (Chasqui et al., 2017) and indicates the urgent need to continue monitoring and evaluating species richness and populations status of these species.

Table 1. Fish biodiversity found during a short visual census in Cayo Albuquerque, Seaflower Biosphere Reserve (Colombian Caribbean). The list is organized phylogenetically; orders and families of cartilaginous fishes followed Nelson et al. (2016) and bony fishes Betancur-R et al. (2017). * indicates a new report for Cayo Albuquerque. *D indicates a contribution by Diego Cardeñosa, Colombia Azul Foundation. Families with uncertain ordinal status are listed as *incertae sedis* within the Series Carangaria, Ovalentaria, and Eupercaria (Betancur-R et al., 2017).

ORDER	FAMILY	SPECIES
Orectolobiformes	Ginglymostomatidae	<i>Ginglymostoma cirratum</i> (Bonnaterre, 1788)
Carcharhiniformes	Carcharhinidae	<i>Carcharhinus perezii</i> (Poey, 1876)
		<i>Rhizoprionodon terraenovae</i> (Richardson, 1836) *D
	Sphyrnidae	<i>Sphyrna mokarran</i> (Rüppell, 1837) *D
Myliobatiformes	Dasyatidae	<i>Hypanus americanus</i> (Hildebrand & Schroeder, 1928)
	Myliobatidae	<i>Aetobatus narinari</i> (Euphrasen, 1790)
Anguilliformes	Muraenidae	<i>Echidna catenata</i> (Bloch, 1795) *
		<i>Gymnothorax funebris</i> Ranzani, 1839
		<i>Gymnothorax miliaris</i> (Kaup, 1856)
		<i>Gymnothorax moringa</i> (Cuvier, 1829)
		<i>Gymnothorax vicinus</i> (Castelnau, 1855)
	Congridae	<i>Heteroconger longissimus</i> Günther, 1870
	Ophichthidae	<i>Ahlia egmontis</i> (Jordan, 1884)
		<i>Myrichthys breviceps</i> (Richardson, 1848)
		<i>Ophichthus ophis</i> (Linnaeus, 1758) *

Table 1. Continued

Aulopiformes	Synodontidae	<i>Synodus intermedius</i> (Spix & Agassiz, 1829)
		<i>Synodus saurus</i> (Linnaeus, 1758) *
		<i>Synodus synodus</i> (Linnaeus, 1758)
Holocentriiformes	Holocentridae	<i>Holocentrus adscensionis</i> (Osbeck, 1765)
		<i>Holocentrus rufus</i> (Walbaum, 1792)
		<i>Myripristis jacobus</i> Cuvier, 1829
		<i>Neoniphon marianus</i> (Cuvier, 1829)
		<i>Neoniphon vexillarium</i> (Poey, 1860)
Syngnathiiformes	Mullidae	<i>Mulloidichthys martinicus</i> (Cuvier, 1829)
		<i>Pseudupeneus maculatus</i> (Bloch, 1793)
	Callionymidae	<i>Callionymus bairdi</i> (Jordan, 1888)
	Aulostomidae	<i>Aulostomus maculatus</i> Valenciennes, 1841
Kurtiiformes	Apogonidae	<i>Apogon lachneri</i> Böhlke, 1959
		<i>Apogon maculatus</i> (Poey, 1860)
		<i>Apogon pseudomaculatus</i> Longley, 1932 *
		<i>Apogon quadrisquamatus</i> Longley, 1934
		<i>Apogon townsendi</i> (Breder, 1927)
Gobiiformes	Gobiidae	<i>Coryphopterus dicrus</i> Böhlke & Robins, 1960
		<i>Coryphopterus eidolon</i> Böhlke & Robins, 1960
		<i>Coryphopterus personatus</i> (Jordan & Thompson, 1905)
		<i>Coryphopterus tortugae</i> (Jordan, 1904) *
		<i>Elacatinus evelynae</i> (Böhlke & Robins, 1968)
		<i>Elacatinus horsti</i> (Metzelaar, 1922)
		<i>Priolepis hipoliti</i> (Metzelaar, 1922)
	Oxudercidae	<i>Ctenogobius saepepallens</i> (Gilbert & Randall, 1968) *
		<i>Gnatholepis thompsoni</i> Jordan, 1904

Table 1. Continued

ORDER	FAMILY	SPECIES
<i>incertae sedis</i> - Carangaria	Sphyraenidae	<i>Sphyraena barracuda</i> (Edwards, 1771)
		<i>Sphyraena picudilla</i> Poey, 1860 *§
Carangiformes	Echeneidae	<i>Echeneis naucrates</i> Linnaeus, 1758
		<i>Remora remora</i> (Linnaeus, 1758) *
	Carangidae	<i>Caranx bartholomaei</i> (Cuvier, 1833)
		<i>Caranx crysos</i> (Mitchill, 1815)
		<i>Caranx hippos</i> (Linnaeus, 1766)
		<i>Caranx latus</i> Agassiz, 1831
		<i>Caranx lugubris</i> Poey, 1860
		<i>Caranx ruber</i> (Bloch, 1793)
		<i>Elagatis bipinnulata</i> (Quoy & Gaimard, 1825)
		<i>Seriola rivoliana</i> Valenciennes, 1833
		<i>Trachinotus falcatus</i> (Linnaeus, 1758)
		<i>Trachinotus goodei</i> Jordan & Evermann, 1896
Pleuronectiformes	Bothidae	<i>Bothus lunatus</i> (Linnaeus, 1758)
<i>incertae sedis</i> - Ovalentaria	Pomacentridae	<i>Abudefduf saxatilis</i> (Linnaeus, 1758)
		<i>Abudefduf taurus</i> (Müller & Troschel, 1848)
		<i>Chromis cyanea</i> (Poey, 1860)
		<i>Chromis insolata</i> (Cuvier, 1830)
		<i>Chromis multilineata</i> (Guichenot, 1853)
		<i>Microspathodon chrysurus</i> (Cuvier, 1830)
		<i>Stegastes adustus</i> (Troschel, 1865)
		<i>Stegastes diencaeus</i> (Jordan & Rutter, 1897)
		<i>Stegastes leucostictus</i> (Müller & Troschel, 1848)
		<i>Stegastes partitus</i> (Poey, 1868)

Table 1. Continued

<i>incertae sedis</i> - Ovalentaria [continued]	Pomacentridae [continued]	<i>Stegastes planifrons</i> (Cuvier, 1830)
		<i>Stegastes xanthurus</i> (Poey, 1860)
<i>incertae sedis</i> - Ovalentaria	Grammatidae	<i>Gramma loreto</i> Poey, 1868
		<i>Gramma melacara</i> Böhlke & Randall, 1963
		<i>Lipogramma trilineata</i> Randall, 1963 *
	Opistognathidae	<i>Opistognathus aurifrons</i> (Jordan & Thompson, 1905)
Gobiesociformes	Gobiesocidae	<i>Acyrtops beryllinus</i> (Hildebrand & Ginsburg, 1926) *
Blenniiformes	Tripterygiidae	<i>Enneanectes boehlkei</i> Rosenblatt, 1960
	Chaenopsidae	<i>Acanthemblemaria spinosa</i> Metzelaar, 1919
		<i>Emblemaria pandionis</i> Evermann & Marsh, 1900*
		<i>Hemiemblemaria simula</i> Longley & Hildebrand, 1940 *
	Labrisomidae	<i>Gobioclinus bucciferus</i> Poey, 1868
		<i>Malacoctenus aurolineatus</i> Smith, 1957 *
		<i>Malacoctenus boehlkei</i> Springer, 1959
		<i>Malacoctenus macropus</i> (Poey, 1868)
		<i>Malacoctenus triangulatus</i> Springer, 1959
		<i>Malacoctenus versicolor</i> (Poey, 1876)
		<i>Paraclinus nigripinnis</i> (Steindachner, 1876)
	Blenniidae	<i>Entomacrodus nigricans</i> Gill, 1859
		<i>Ophioblennius macclurei</i> (Silvester, 1915)
Gerreiformes	Gerreidae	<i>Eucinostomus lefroyi</i> (Goode, 1874) *
		<i>Gerres cinereus</i> (Walbaum, 1792)
Labriformes	Labridae	<i>Bodianus rufus</i> (Linnaeus, 1758)
		<i>Clepticus parrae</i> (Bloch & Schneider, 1801)
		<i>Cryptotomus roseus</i> Cope, 1871 *
		<i>Halichoeres bivittatus</i> (Bloch, 1791)

Table 1. Continued

ORDER	FAMILY	SPECIES
Labriformes [continued]	Labridae [continued]	<i>Halichoeres garnoti</i> (Valenciennes, 1839)
		<i>Halichoeres maculipinna</i> (Müller & Troschel, 1848)
		<i>Halichoeres pictus</i> (Poey, 1860) *
		<i>Halichoeres poeyi</i> (Steindachner, 1867) *
		<i>Halichoeres radiatus</i> (Linnaeus, 1758)
		<i>Lachnolaimus maximus</i> (Walbaum, 1792)
		<i>Scarus coelestinus</i> Valenciennes, 1840
		<i>Scarus coeruleus</i> (Bloch, 1786)
		<i>Scarus iseri</i> (Bloch, 1789)
		<i>Scarus taeniopterus</i> Desmarest, 1801
		<i>Scarus vetula</i> Bloch & Schneider, 1801
		<i>Sparisoma atomarium</i> (Poey, 1861)
		<i>Sparisoma aurofrenatum</i> (Valenciennes, 1840)
		<i>Sparisoma chrysopteron</i> (Bloch & Schneider, 1801)
		<i>Sparisoma radians</i> (Valenciennes, 1840)
		<i>Sparisoma rubripinne</i> (Valenciennes, 1840)
		<i>Sparisoma viride</i> (Bonnaterre, 1788)
		<i>Thalassoma bifasciatum</i> (Bloch, 1791)
		<i>Xyrichtys martinicensis</i> Valenciennes, 1840 *
		<i>Xyrichtys splendens</i> Castelnau, 1855
Chaetodontiformes	Chaetodontidae	<i>Chaetodon capistratus</i> Linnaeus, 1758
		<i>Chaetodon ocellatus</i> Bloch, 1787
		<i>Chaetodon striatus</i> Linnaeus, 1758
		<i>Prognathodes aculeatus</i> (Poey, 1860)
incertae sedis- Eupercaria	Sciaenidae	<i>Equetus lanceolatus</i> (Linnaeus, 1758)

Table 1. Continued

<i>incertae sedis</i> - Eupercaria [<i>continued</i>]	Sciaenidae [<i>continued</i>]	<i>Equetus punctatus</i> (Bloch & Schneider, 1801)
Acanthuriformes	Acanthuridae	<i>Acanthurus chirurgus</i> (Bloch, 1787)
		<i>Acanthurus coeruleus</i> Bloch & Schneider, 1801
		<i>Acanthurus tractus</i> Poey, 1860
<i>incertae sedis</i> - Eupercaria	Pomacanthidae	<i>Holacanthus ciliaris</i> (Linnaeus, 1758)
		<i>Holacanthus tricolor</i> (Bloch, 1795)
		<i>Pomacanthus arcuatus</i> (Linnaeus, 1758)
		<i>Pomacanthus paru</i> (Bloch, 1787)
	Malacanthidae	<i>Malacanthus plumieri</i> (Bloch, 1786)
Lutjaniformes	Haemulidae	<i>Anisotremus virginicus</i> (Linnaeus, 1758)
		<i>Brachygenys chrysargyreum</i> (Günther, 1859)
		<i>Emmelichthys atlanticus</i> Schultz, 1945
		<i>Haemulon album</i> Cuvier, 1830
		<i>Haemulon carbonarium</i> Poey, 1860
		<i>Haemulon flavolineatum</i> (Desmarest, 1823)
		<i>Haemulon macrostomum</i> Günther, 1859 *
		<i>Haemulon parra</i> (Desmarest, 1823)
		<i>Haemulon plumierii</i> (Lacepède, 1801)
		<i>Haemulon sciurus</i> (Shaw, 1803)
		<i>Haemulon vittatum</i> (Poey, 1860)
	Lutjanidae	<i>Lutjanus analis</i> (Cuvier, 1828)
		<i>Lutjanus apodus</i> Walbaum, 1792
		<i>Lutjanus griseus</i> (Linnaeus, 1758)
		<i>Lutjanus jocu</i> (Bloch & Schneider, 1801)
		<i>Lutjanus mahogoni</i> (Cuvier, 1828)

Table 1. Continued

ORDER	FAMILY	SPECIES
Lutjaniformes [continued]	Lutjanidae [continued]	<i>Ocyurus chrysurus</i> (Bloch, 1791)
Lobotiformes	Lobotidae	<i>Lobotes surinamensis</i> (Bloch, 1790)
Spariformes	Sparidae	<i>Calamus calamus</i> (Valenciennes, 1830)
Priacanthiformes	Priacanthidae	<i>Heteropriacanthus cruentatus</i> (Lacepède, 1801)
Tetraodontiformes	Ostraciidae	<i>Acanthostracion polygonius</i> Poey, 1876
		<i>Acanthostracion quadricornis</i> (Linnaeus, 1758)
		<i>Lactophrys bicaudalis</i> (Linnaeus, 1758)
		<i>Lactophrys trigonus</i> (Linnaeus, 1758)
		<i>Lactophrys triqueter</i> (Linnaeus, 1758)
	Diodontidae	<i>Diodon holocanthus</i> Linnaeus, 1758
		<i>Diodon hystrix</i> Linnaeus, 1758
	Tetraodontidae	<i>Canthigaster rostrata</i> (Bloch, 1786)
		<i>Sphoeroides spengleri</i> (Bloch, 1785)
	Monacanthidae	<i>Aluterus monoceros</i> (Linnaeus, 1758) *
		<i>Aluterus scriptus</i> (Osbeck, 1765)
		<i>Cantherhines macrocerus</i> (Hollard, 1853)
		<i>Cantherhines pullus</i> (Ranzani, 1842)
		<i>Monacanthus tuckeri</i> Bean, 1906
	Balistidae	<i>Balistes capriscus</i> Gmelin, 1789
		<i>Balistes vetula</i> Linnaeus, 1758
		<i>Canthidermis sufflamen</i> (Mitchill, 1815)
		<i>Melichthys niger</i> (Bloch, 1786)
Pempheriformes	Pempheridae	<i>Pempheris schomburgkii</i> Müller & Troschel, 1848
Centrarchiformes	Kyphosidae	<i>Kyphosus vaigiensis</i> (Quoy & Gaimard, 1825)

Table 1. Continued

Centrarchiformes [continued]	Cirrhitidae	<i>Amblycirrhitus pinos</i> (Mowbray, 1927)
Perciformes	Serranidae	<i>Cephalopholis cruentata</i> (Lacepède, 1802)
		<i>Cephalopholis fulva</i> (Linnaeus, 1758)
		<i>Epinephelus guttatus</i> (Linnaeus, 1758)
		<i>Hypoplectrus aberrans</i> Poey, 1868
		<i>Hypoplectrus chlorurus</i> (Cuvier, 1828)
		<i>Hypoplectrus guttavarius</i> (Poey, 1852)
		<i>Hypoplectrus indigo</i> (Poey, 1851)
		<i>Hypoplectrus maculiferus</i> (Poey, 1871) *
		<i>Hypoplectrus nigricans</i> (Poey, 1852)
		<i>Hypoplectrus providencianus</i> Acero P. & Garzón-Ferreira, 1994
		<i>Hypoplectrus puella</i> (Cuvier, 1828)
		<i>Hypoplectrus randallorum</i> Lobel, 2011 *
		<i>Hypoplectrus unicolor</i> (Walbaum, 1792)
		<i>Liopropoma rubre</i> Poey, 1861
		<i>Mycteroperca bonaci</i> (Poey, 1860)
		<i>Mycteroperca interstitialis</i> (Poey, 1860)
		<i>Mycteroperca tigris</i> (Valenciennes, 1833)
		<i>Mycteroperca venenosa</i> (Linnaeus, 1758)
		<i>Rypticus saponaceus</i> (Bloch & Schneider, 1801)
		<i>Serranus baldwini</i> (Evermann & Marsh, 1899) *
		<i>Serranus tabacarius</i> (Cuvier, 1829)
		<i>Serranus tigrinus</i> (Bloch, 1790)
	Scorpaenidae	<i>Pterois volitans</i> (Linnaeus, 1758)
		<i>Scorpaena plumieri</i> Bloch, 1789

§ Name favored for the Southern Sennet following van der Laan and Fricke (2020).

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