Check List the journal of biodiversity data

NOTES ON GEOGRAPHIC DISTRIBUTION

Check List 17 (6): 1633–1637
https://doi.org/10.15560/17.6.1633

PENSOFT

Lutjanus inermis (Peters, 1869), Golden Snapper, range extension to the Galapagos Islands

D. Ross Robertson[1*], Carol D. Cox[2], Robert L. Cox[2]

1 Smithsonian Tropical Research Institute, Balboa, Panama • DRR: robertsondr@si.edu http://orcid.org/0000-0003-3972-149X

2 Independent Photographers, Port St. Joe, Florida, USA • CDC: ccox202202@gmail.com • RLC: rcox@mchsi.com

* Corresponding author

Abstract

The well-cataloged marine fish fauna of the Galapagos Islands includes eight of the 12 species of snappers (Lutjanidae) found in the Tropical Eastern Pacific. A recent recreational scuba dive in the Galapagos produced photographs of an additional snapper species, *Lutjanus inermis* (Peters, 1869), which was sufficiently common as to likely have a recently established resident population.

Keywords

Citizen science, new record, oceanic island, reef-fish, scuba diving, Tropical Eastern Pacific

Academic editor: Hudson Tercio Pinheiro | Received 2 August 2021 | Accepted 22 November 2021 | Published 25 November 2021

Citation: Robertson DR, Cox CD, Cox RL (2021) *Lutjanus inermis* (Peters, 1869), Golden Snapper, range extension to the Galapagos Islands. Check List 17 (6): 1633–1637. https://doi.org/10.15560/17.6.1633

Introduction

The Tropical Eastern Pacific (TEP) is home to 12 species of snappers (Lutjanidae) in three genera: *Aphareus furca* (Lacepède, 1801), *Hoplopagrus guentherii* Gill, 1862, *Lutjanus aratus* (Günther, 1864), *Lutjanus argentiventris* (Peters, 1869), *Lutjanus colorado* Jordan & Gilbert, 1882, *Lutjanus guttatus* (Steindachner, 1869), *Lutjanus inermis* (Peters, 1869), *Lutjanus jordani* (Gilbert, 1898), *Lutjanus novemfasciatus* Gill, 1862, *Lutjanus peru* (Nichols & Murphy, 1922), *Lutjanus viridis* (Valenciennes, 1846), and *Pristipomoides zonatus* (Valenciennes, 1830). All except *A. furca* and *P. zonatus* are endemic to the TEP. The 10 regional endemics are all widely distributed within the region, spanning the continental shore from Mexico to Colombia and, in some cases, Peru. Some also occur at the region's isolated offshore islands. The largest of those islands is the Galapagos Archipelago, where, currently, eight species are known to be present: *H. guentheri*, *L. aratus*, *L. argentiventris*, *L. novemfasciatus*, and *L. viridis* are common there, while *L. guttatus*, *L. jordani*, and *P. zonatus* are rare. *Aphareus furca*, *L. colorado*, *L. inermis*, and *L. peru* currently have no confirmed records from the archipelago. Here we report that *L. inermis* also is present and locally common in the Galapagos.

The native range of *L. inermis*, Golden Snapper, is from the southern Gulf of California to Ecuador on the mainland and at the two oceanic islands of Cocos and Malpelo. It is not known from two other oceanic islands, the Revillagigedos and Clipperton. The Galapagos Archipelago, a UNESCO World Heritage Center, is a

set of volcanic islands ~1000 km offshore of Ecuador. Golden Snapper is not listed among major modern ichthyofaunal lists of that archipelago (Grove and Lavenberg 1997; McCosker and Rosenblatt 2010; Ruiz et al. 2011; Charles Darwin Foundation 2021). It is not recorded at those islands in either a major guide to the genus by Allen (1985) or in general guides to TEP fishes (Allen and Robertson 1994; Allen 1995; Robertson and Allen 2015). The only primary-source record of this species at the Galapagos is by Wellington (1975), who simply noted it as present in his list of *The Shore and Near Shore Fishes of the Galapagos Islands* (Wellington 1975: 246, table VI-12) without further comment. That table listed one other *Lutjanus* species, *L. viridis*, but none of the other four common snappers currently known from the islands. Subsequently Grove and Lavenberg (1997: 387) rejected that *L. inermis* record as lacking confirmation. Ruiz et al. (2011), in their checklist of the archipelago's fishes, included *L. inermis* among a set of eight species whose records were rejected, and an updated archipelago list by McCosker and Rosenblatt (2010) did not mention that species. Furthermore, there are no records of this species in the Galapagos in the databases of major global aggregators of location records of fishes (GBIF 2021; OBIS 2021; FishNet 2 2021). Finally, more recent observations of reef fishes at widely distributed sites in the Galapagos by experienced observers also failed to record *L. inermis* but did include all five common species mentioned above (Edgar 2011; Llerena-Martillo 2018; Fierro-Arcos et al. 2021; Bruneel et al. 2021; see also Zimmerhackle et al. 2015). The only indications of the occurrence of *L. inermis* at those islands other than Wellington's (1975) report is the IUCN Red List assessment of this species (Rojas et al. 2010), which shows it present in the northern Galapagos. That assessment has a short bibliography that contains no indication of the source of information relating to its occurrence in the archipelago. G.M. Wellington (deceased 2014) continued to conduct research in the Galapagos, including on fishes (e.g., Victor et al. 2001) for several decades after his 1975 report, and did not contact J. Grove about Grove and Lavenberg's (1997) rejection of his *L. inermis* record (J.S. Grove, pers comm. to DRR, August 2021). Hence, it is likely that his initial report was erroneous and perhaps arose due to lack of familiarity with lutjanids at a time when little information was available about their appearance. For example, Allen (1985) in his FAO guide to the snappers of the world stated that the live coloration of *L. inermis* was unknown.

On 11 July 2021, CC and RC observed a school of more than 100 individuals of *L. inermis* and photographed some of them during a scuba dive on the rocky reef of the shores of Rocas Gordon, a popular Galapagos dive site ~3 km east of Isla Santa Cruz (Fig. 1). The

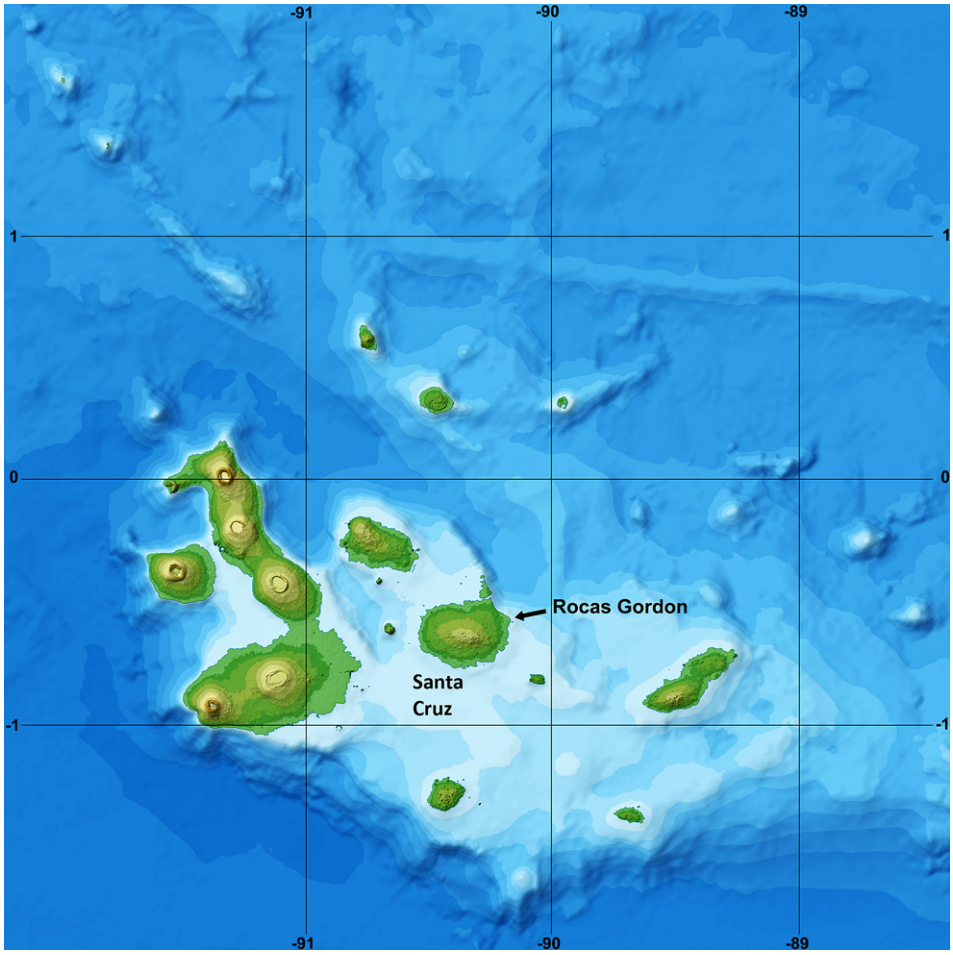

Figure 1. Location of Rocas Gordon on the east side of Isla Santa Cruz, Galapagos. Base map Eric Gaba, Wikimedia, CC SA-BY 3.

Figure 2. Golden Snapper at Rocas Gordon. Part of a midwater school of *Lutjanus inermis* adults at Rocas Gordon, Galapagos, 11 July 2021. Seven individuals (including three whole fish, three heads and one tail) are visible in the top panel. Photos: C. Cox.

fish in that school, which was in midwater, 15 m below the surface and ~20 m above the bottom, were all about 25–30 cm long, making them adults (see below). Figure 2 shows two images of those fish, one with seven individuals. CC and RC were on a recreational diving excursion to the Galapagos and visited various locations between 9–19 July 2021. They observed no other *L. inermis* at 10 other dive sites dispersed through the archipelago: Isla Seymour, Isla Mosquera; Isla Champion, Isla Floreana, Cabo Marshall (Isla Isabella), Roca Cousins, Isla Beagle, Isla Daphne Menor, and the two islands of the northern Galapagos—Isla Darwin and Isla Wolf.

Results

***Lutjanus inermis* (Peters, 1869)**

Photographic record. ECUADOR – **Galapagos**, Rocas Gordon, 00.567°S, 090.143°W; 15 m depth; 11.VII, 2021; C. Cox observer; >100 individuals observed, a group of seven photographed.

Identification. *Lutjanus inermis* is a small species, only reaching about 39 cm in total length. *Lutjanus inermis* can be readily distinguished from other TEP snappers by its slender, fusiform body, sharply pointed snout, and large, forked tail. Adults have grey bodies, with fine dark grey lines on the scale rows of the body, ~10 horizontal lines below the lateral line, and ~20 mainly oblique lines above. Adults often have characteristically yellow caudal and dorsal fins and a yellow stripe extending forwards on the center of the body from the yellow caudal peduncle. However, they sometimes lack yellow coloration, or it is restricted to indistinct yellow tones on the caudal fin. All the other *Lutjanus* species known from the Galapagos also occur in shallow water. The most similar congener to *L. inermis* in the Galapagos and TEP is *L. aratus*, which is common in the Galapagos. Like *L. inermis*, it occurs in midwater aggregations. In *L. aratus*, which reaches a much larger size than *L. inermis* (100 cm in total length), adults have an elongate body, but a more rounded snout and a less strongly forked tail than *L. inermis*. While *L. aratus* also has dark longitudinal stripes on a grey body, it has fewer (~10 total, above and below the lateral line), wider dark stripes than *L. inermis* and all of them are parallel to the longitudinal body axis rather than oblique above the lateral line as in *L. inermis*. Both species often have reddish tones to the body that become visible when photographed underwater with flashes, and when recently fished. Small juveniles of *L. inermis* are grey, striped fish with an elongate white spot on the back under the soft dorsal fin. They resemble and are known to aggregate with the schooling, planktivorous damselfish *Azurina atrilobata* (Gill, 1862) (Allen and Robertson 1994), which is a common species in the Galapagos. Juvenile *L. aratus,* which have shorter, deeper bodies than adults, have indistinct dark bars on striped, grey bodies. Photographs of both species are available at Robertson and Allen (2015) and iNaturalist (2021). *Lutjanus inermis* has a depth range of 0–70 m and is commonly found in schools of dozens to hundreds of adults around shallow reefs, often in the water column tens of meters above the bottom.

Discussion

This report provides the first confirmed published record of *Lutjanus inermis* in the Galapagos. The occurrence of an aggregation of 100+ adults could indicate the existence of a resident, self-sustaining population in the archipelago. However, that school also could be the product of recruitment by a single large cohort of pelagic larvae from the mainland, ~1,000 km from the Galapagos, or from Malpelo or Cocos islands, ~1000 km and 700 km from the archipelago, respectively. All *Lutjanus* species have pelagic eggs and larvae, and most of the Neotropical species have pelagic larval durations of at least several weeks (Zapata and Herron 2002). The resemblance of juvenile *L. inermis* to *Azurina atrilobata* likely means that juvenile recruits of this species tend not to be noticed in damselfish aggregations, and only become more obvious as adults. The Galapagos have a considerable spatial variation in oceanographic conditions that range from tropical to temperate in different part of the archipelago (Glynn and Wellington 1983). The marine environment there also is highly dynamic, due to major influences of ENSO events (Glynn 1988). There have been 13 El Niño-Southern Oscillations (ENSOs) since 1980, including five strong events (NOAA 2021). Those events can be associated with influxes of species of fishes and invertebrates not previously known in the Galapagos (Grove 1985; Glynn 1988; Victor et al. 2001).

The occurrence of a substantial group of adults of *L. inermis* at one site in the Galapagos raises the question of why it evidently has not had a long-established population in the archipelago. The existence of populations of *L. inermis* at Cocos and Malpelo islands indicates that insular environments, including some parts of the Galapagos, provide suitable conditions. The little information available on the diet of *L. inermis* notes that it includes fish, invertebrates, and zooplankton (Allen 1995). *Lutjanus* species usually have large mouths, with strong, pointed teeth on the jaws, including an outer row of canines, with large fangs at the front. In contrast, *L. inermis* has a relatively small mouth, and the jaw teeth are small, with no canines or fangs (Allen 1985). Recreational fly-fishers in Baja California catch this species at the surface in 70 m deep water (J. Snow pers. comm. to DRR, July 2021). The morphology and behavior of this species indicate that it is semi-pelagic and likely feeds mainly on planktonic organisms. Strong ENSO events have strong negative effects on populations of fishes and other organisms that rely on planktonic and other pelagic resources in the Galapagos (Glynn 1988), including the apparent extinction of a planktivorous damselfish endemic to the archipelago (Grove 1984; Grove and Lavenberg 1997). If *L. inermis* is primarily reliant on planktonic foods, then past ENSO events may have extinguished previous resident populations. Understanding of the zoogeographical significance of this new local population at the Galapagos would benefit from monitoring the abundance and size-composition of the Rocas Gordon population, determining whether there are other local populations nearby on Isla Santa Cruz, and assessment of the diet of this species on the mainland and at other offshore islands if not at the Galapagos. Apart from a study of its reproduction (Lucano-Ramírez et al. 2012), very little is known about the ecology and general biology of this species.

Acknowledgements

We thank one unidentified reviewer for useful suggestions relating to the manuscript.

Author' Contributions

Conceptualization: DRR; Visualization CC; Writing – original draft: DRR. Writing - review and editing: DRR, CC, RC.

References

Allen GR (1985) FAO species catalogue: Snappers of the world; An annotated and illustrated catalogue of lutjanid species known to date. FAO (Food and Agriculture Organization of the United Nations), Rome, Italy. Fisheries Synopsis No. 125, 6: 1–208.

Allen GR (1995) Lutjanidae. In: Fischer W, Krupp F, Schneider W, Sommer C, Carpenter KE, Niem VH (Eds). Guia FAO para la identificación para los fines de la pesca. Pacifico centro-oriental. Volumen III. Vertebrados—parte 2. FAO, Rome, Italy, 1231–1244.

Allen GR, Robertson DR (1994) Fishes of the tropical eastern Pacific. Crawford House Press, Bathurst, Australia, 332 pp.

Bruneel S, Van Echelpoel W, Ho L, Raat H, Schoeters A, De Troyer N, Sor R, Ponton-Cevallos J, Vandeputte R, Van der heyden C, De Saeyer N, Forio MAE, Bermudez R, Dominguez-Granda L, Luca S, Moens T, Goethals P (2021) Assessing the drivers behind the structure and diversity of fish assemblages associated with rocky shores in the Galapagos Archipelago. *Journal of Marine Science and Engineering* 9: 375. https://doi.org/10.3390/jmse9040375

Charles Darwin Foundation (2021) Galapagos species checklist. https://www.darwinfoundation.org/en/datazone/checklist. Accessed on: 2021-7-30.

Edgar GJ, Banks SA, Bessudo S, Cortés J, Guzmán HM, Henderson S, Martinez C, Rivera F, Soler G, Ruiz D, Zapata FA (2011) Variation in reef fish and invertebrate communities with level of protection from fishing across the Eastern Tropical Pacific seascape. Global Ecology and Biogeography 20: 730–743.

Fierro-Arcos D, Marín Jarrín JR, Aburto-Oropeza O, Harvey ES, Rastoin-Laplane E, Salinas-de-León P (2021) Mangrove fish assemblages reflect the environmental diversity of the Galapagos Islands. Marine Ecology Progress Series 664: 183–205. https://doi.org/10.3354/meps13628

FishNet 2 (2021) http://www.fishnet2.net/. Accessed on: 2021-7-30.

GBIF (2021) Global Biodiversity Information Facility: https://www.gbif.org/. Accessed on: 2021-7-30.

Glynn PW (1988) El Niño-Southern Oscillation 1982–1983: nearshore population, community, and ecosystem responses. Annual Review of Ecology and Systematics 19: 309–345.

Glynn PW, Wellington GM (1983) Corals and coral reefs of the Galapagos Islands. University of California Press, Berkeley, USA, 319 pp.

Grove JS (1985) Influence of the 1982–1983 El Niño event upon the ichthyofauna of the Galápagos Archipelago. In: Robinson G, del Pino EM (Eds.) El Niño en las Islas Galápagos: el evento de 1982–1983. Fundación Charles Darwin para las Islas Galápagos, Quito, Ecuador, 191–198.

Grove JS, Lavenberg RJ (1997) The fishes of the Galápagos Islands. Stanford University Press, Stanford, USA, 863 pp.

iNaturalist (2021) https://www.inaturalist.org/observations?place_id=any&taxon_id=104858. Accessed on: 2021-7-30.

Llerena-Martillo Y, Peñaherrera-Palma C, Espinoza ER (2018) Fish assemblages in three fringed mangrove bays of Santa Cruz Island, Galapagos Marine Reserve. Revista Biologia Tropical 66: 674–687.

Lucano-Ramírez G, Ruiz-Ramírez S, González-Sansón G, Ceballos-Vázquez BP (2012) Biología reproductiva del pargo *Lutjanus inermis* (Perciformes: Lutjanidae), en el Pacífico central mexicano. Revista Biologia Tropical 60: 393–403.

McCosker JE, Rosenblatt RH (2010) The fishes of the Galápagos archipelago: an update. Proceedings of the California Academy of Sciences (Series 4). 61 (Supplement 2): 167–195.

NOAA (2021) Multivariate ENSO index version 2 (MEI.v2). https://psl.noaa.gov/enso/mei/. Accessed on: 2021-7-30.

OBIS (2021) Ocean Biogeographic Information System. https://obis.org/. Accessed on: 2021-7-30.

Robertson DR, Allen GR (2015) Shorefishes of the Tropical Eastern Pacific: online information system. Version 2.0. Smithsonian Tropical Research Institute, Balboa, Panama. http://biogeodb.stri.si.edu/sftep/en/pages. Accessed on: 2021-7-30.

Rojas P, Cotto A, Acero A, Bessudo S (2010) *Lutjanus inermis.* The IUCN Red List of Threatened Species 2010: e.T183282A8086365. https://doi.org/10.2305/iucn.uk.2010- 3.rlts.t183282a8086365.en

Ruiz D, Chiriboga A, Banks S (2011). CDF checklist of Galapagos fish – FCD lista de especies de peces de Galápagos. In: Bungartz F, Herrera H, Jaramillo P, Tirado N, Jímenez-Uzcategui G, Ruiz D, Guézou A, Ziemmeck F (Eds.) Charles Darwin Foundation Galapagos species checklist – Lista de especies de Galápagos de la Fundación Charles Darwin. Charles Darwin Foundation / Fundación Charles Darwin, Puerto Ayora, Galápagos, Ecuador. http://www.darwinfoundation.org/datazone/checklists/vertebrates/pisces/. Accessed on: 2021-7-30.

Victor BC, Wellington GM, Robertson DR, Ruttenberg B (2001) The effects of the El Niño-Southern Oscillation event on the distribution of reef associated labrid fishes in the eastern Pacific Ocean. Bulletin of Marine Science 69: 279–288.

Wellington GM (1975) The Galapagos coastal marine environments: a resource report to the Department of National Parks and Wildlife, Quito, Ecuador, 357 pp.

Zapata FA, Herrón PA (2002) Pelagic larval duration and geographic distribution of tropical eastern Pacific snappers (Pisces: Lutjanidae). Marine Ecology Progress Series 230: 295–300.

Zimmerhackel JS, Schuhbauer AC, Usseglio P, Heel LC, Salinas-de-Leon P (2015) Catch, bycatch and discards of the Galapagos Marine Reserve small-scale handline fishery. PeerJ 3: e995. https://doi.org/10.7717/peerj.995