

# Juveniles of the Caribbean's largest coral reef snapper do not use reefs

Received: 13 May 2005 / Accepted: 27 June 2005 / Published online: 19 August 2005  
© Springer-Verlag 2005



**Fig. 1** In situ pigmentation of juvenile cubera snapper. Estimated total length: 12 cm. Photographed at a depth of 1 m at the base of red mangrove roots in a 4-m deep channel, Big Torch Key, FL

The cubera snapper, *Lutjanus cyanopterus* (Lutjanidae), is widely distributed in the Caribbean and can reach 160 cm total length (TL), the largest snapper in the region (Allen 1985). However, the early life stages have never been recorded on reefs or photographed in situ in any habitat. Juvenile records are limited to museum specimens collected only from vegetated estuarine habitats or observations of larger subadults during field surveys (Christensen 1965; Starck 1970). From offshore reef areas, juveniles below 15 cm TL still remain uncollected and uncensused.

Distinctive in situ pigmentation characterizes juveniles recently observed in the Florida Keys (Fig. 1). Diagnostic characters to at least 4 cm TL (smaller sizes based on museum materials) include approximately 9 pale vertical bands, a narrow body depth, and oblique dorsal scale rows (Lindeman et al. 2005). These characters differ from similar congeners such as gray snapper, *L. griseus*, which can co-occur in shallow, vegetated habitats. Additional diagnostics include an absence of yellow fin pigment which, coupled with a lower body depth, distinguish juvenile schoolmaster snapper, *L. apodus*, which also have vertical bands.

Information on juvenile ecology is limited, although adults occur in several well-studied regions. All evidence suggests that cubera settle in vegetated or softbottom habitats in shallow-water and not on reef structures. Subsequent to settlement, they occupy mangrove habitats from at least 5 cm

to 30 cm TL. Juvenile age and growth in cubera is unstudied. Estimates of juvenile growth in the similar gray snapper vary substantially among studies (Claro et al. 2001). It is within the ranges of these studies to estimate that a 15 cm TL cubera is 1–2 years of age. The exact age at which cubera snapper first migrate to offshore reefs is also not known. Starck (1970) observed individuals above 35 cm TL in deep inshore channels. Subadults may begin to migrate offshore to deeper areas with more hard structure by age 2–3.

It is common for marine species using estuarine habitats to be termed estuarine dependent. The term dependence implies obligate use and testable hypotheses. For example, if a species often occurs in estuarine habitats but all life stages are also recorded from non-estuarine areas (facultative = opportunistic use), dependence is logically excluded. In the southeast United States, the juveniles of many snapper species can occur in bays and typically display some type of ontogenetic cross-shelf migration. However, conspecifics of the same age can often be found outside of coastal bays or in outer, euhaline portions of bays. Therefore, these snappers, including gray snapper, are estuarine opportunistic, not dependent (Lindeman et al. 2000). Juveniles of the cubera snapper cannot yet be excluded by such tests in the southeast United States. Notably, the significance of estuarine habitats to reef fish ecology is not diminished; continued reductions in area or water quality of estuaries will negatively impact the early life history of a wide array of reef fishes by reducing the quantity and quality of shelter and feeding resources during the highly vulnerable early life stages, whether inshore habitat use is facultative or obligate.

**Acknowledgements** Funding provided by the John D. and Catherine T. MacArthur Foundation, Oak Foundation, and Kaplan Family Fund. Assistance was provided by M. Burton, R. Claro, R.G. Gilmore, C. Koenig, P. Mumby, D. Snyder, and Capt. Peter Gladding.

## References

- Allen GR (1985) Snappers of the world. F.A.O. species catalog. Volume 6. F.A.O. Fish Synopsis (125):208
- Christensen RF (1965) An ichthyological survey of Jupiter Inlet and Loxahatchee River, Florida. Ph.D. Dissertation, Florida State University, Tallahassee, FL. pp 318
- Claro R, Lindeman KC, Parenti LR (eds) (2001) Ecology of the marine fishes of Cuba. Smithsonian Institution Press, Washington, DC, 257 pp
- Lindeman KC, Pugliese R, Waugh GT, Ault JS (2000) Developmental patterns within a multispecies reef fishery: management applications for essential fish habitats and protected areas. *Bulletin of Marine Science* 66(3):929–956
- Lindeman KC, Richards WJ, Lyczkowski-Shultz J, Drass DM, Paris CB, Leis JM, Lara M, Comyns BH (2005) In: Richards WJ (ed) *Lutjanidae: snappers*, pp 1549–1585 *Early stages of Atlantic fishes*. CRC Press. pp 2581
- Starck WA (1970) Biology of the gray snapper, *Lutjanus griseus* (Linnaeus), in the Florida Keys. *Stud Trop Oceanogr Univ Miami* 10:1–150

K. C. Lindeman (✉)

Environmental Defense, Oceans Program, 485 Glenwood Ave., Satellite Beach, FL 32937, USA  
E-mail: klindeman@ed.org

D. DeMaria

Sea Samples, 369 Westshore Drive, Summerland Key, FL 33042, USA

# Reef sites