

A Life History Review for Red Snapper in the Gulf of Mexico with an Evaluation of the Importance of Offshore Petroleum Platforms and Other Artificial Reefs

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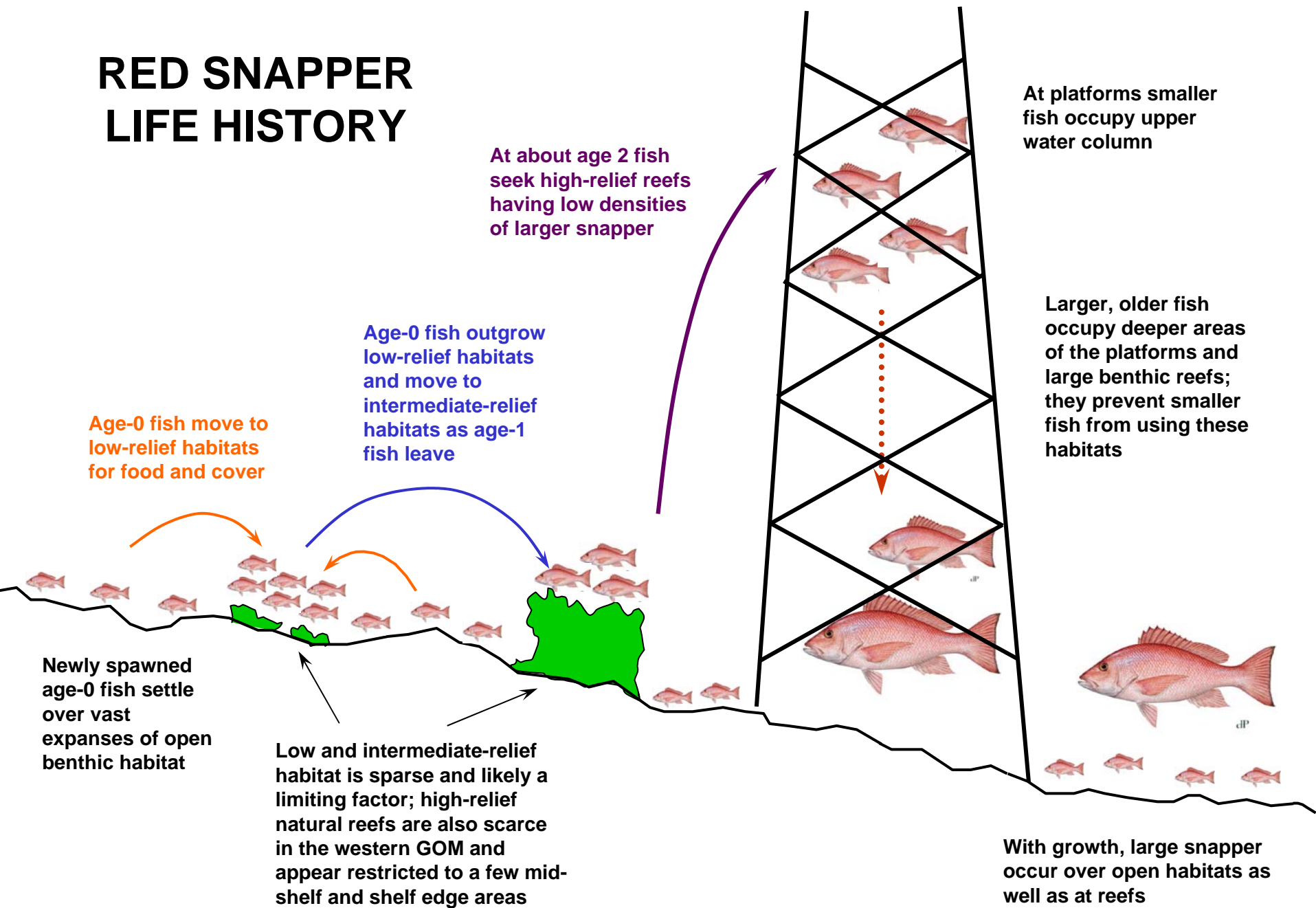
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RED SNAPPER LIFE HISTORY



Natural Reef Habitat

- **Based on Parker et al. (1983) and MMS No Activity Zones, high-relief natural reef habitat in the Gulf from Pensacola to Mexico is on the order of 1,578 km², mostly located along the shelf edge.**
- **This constitutes about 2% of the total shelf area.**
- **Versar, Inc. (2008) suggest that the area of natural reef having relief >1 m might be considerably more extensive on the inner- and mid-shelf; up to 15% in some areas. If this value is assumed to be representative of the entire shelf, the area of natural reef habitat would be about 11,686 km².**
- **Thus, natural high-relief habitat could be as much as 13,264 km² with most of it located on the mid- or inner-shelf as opposed to the outer-shelf.**

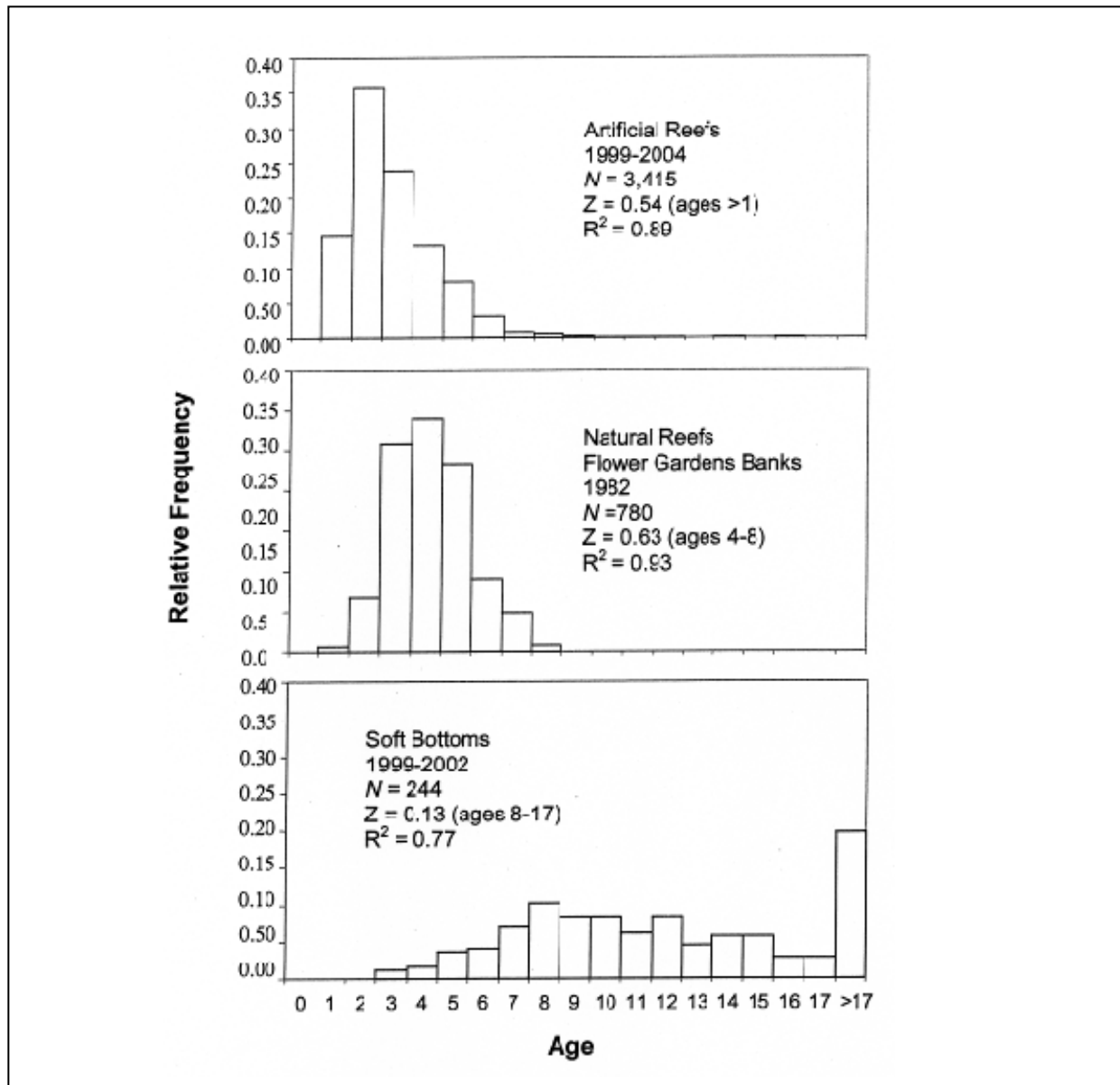
Artificial Reef Habitat

- **Some 4,000 offshore oil and gas platforms are located across the shelf in the western Gulf and provide on the order of 12 km² of artificial reef habitat.**
- **Platforms differ from natural reefs in many ways but a unique feature is that they span the entire water column.**
- **Offshore petroleum platforms extend from the beach to the abyss, from Alabama to southern Texas. The highest densities occur in shallow and mid-shelf areas.**

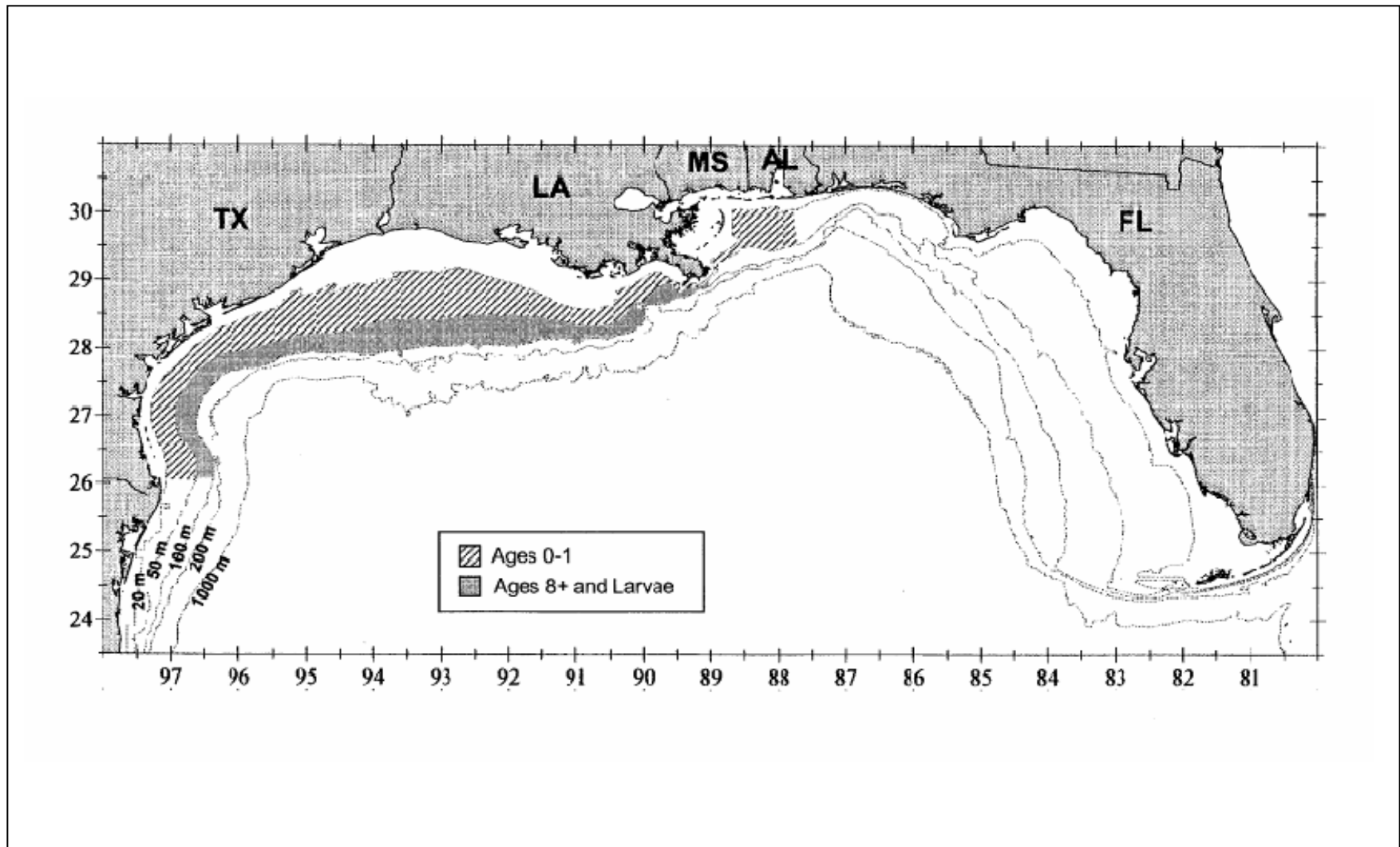
Artificial Reef Habitat

- **An area of 3,108 km² offshore Alabama has been designated for artificial reef placement and it is estimated that on the order of 10,000 small reefs occur in this area. Collectively, these reefs equate to a total area of 0.1 km². This is the largest of the artificial reef areas.**
- **The area of artificial reef habitat in the western Gulf is small compared to the area of natural reefs.**
- **However, artificial reef habitats (especially oil and gas platforms) located in nearshore and mid-shelf zones appear to be used by age2-red snapper much more than their proportional area would suggest.**

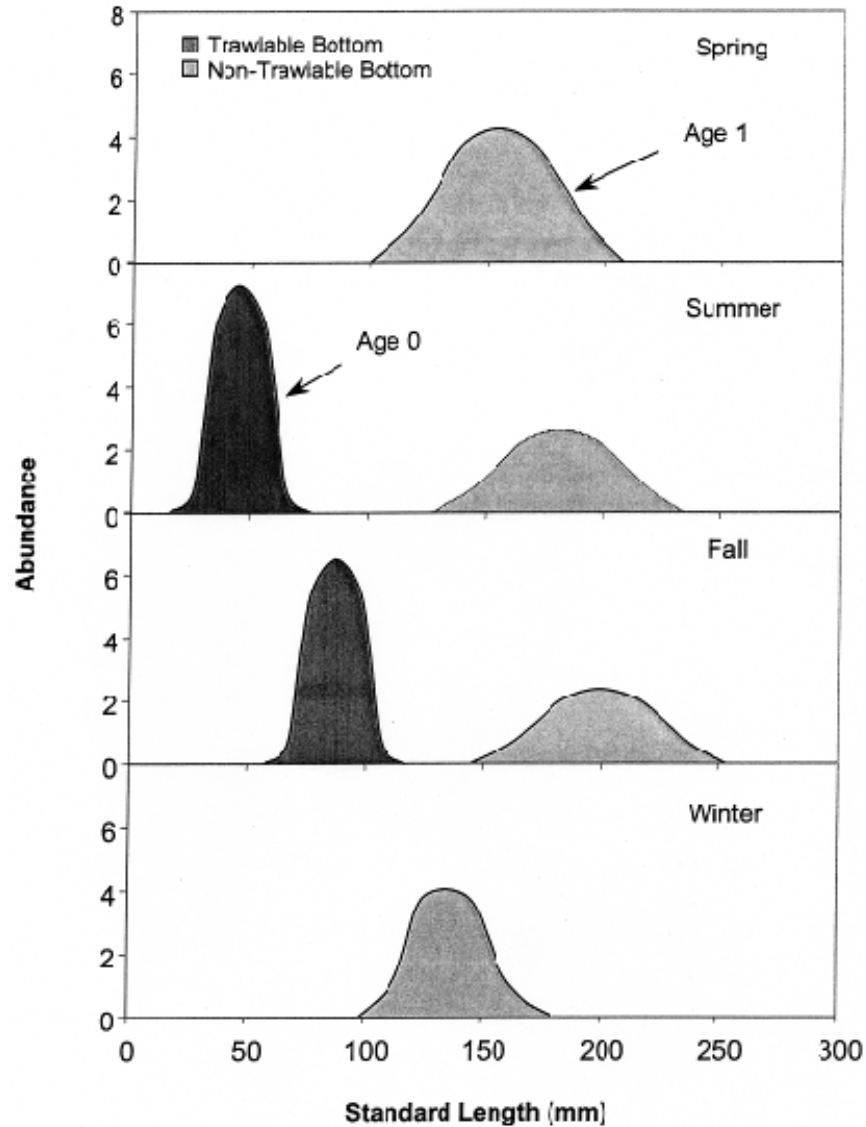
Adult Age Distribution by Habitat



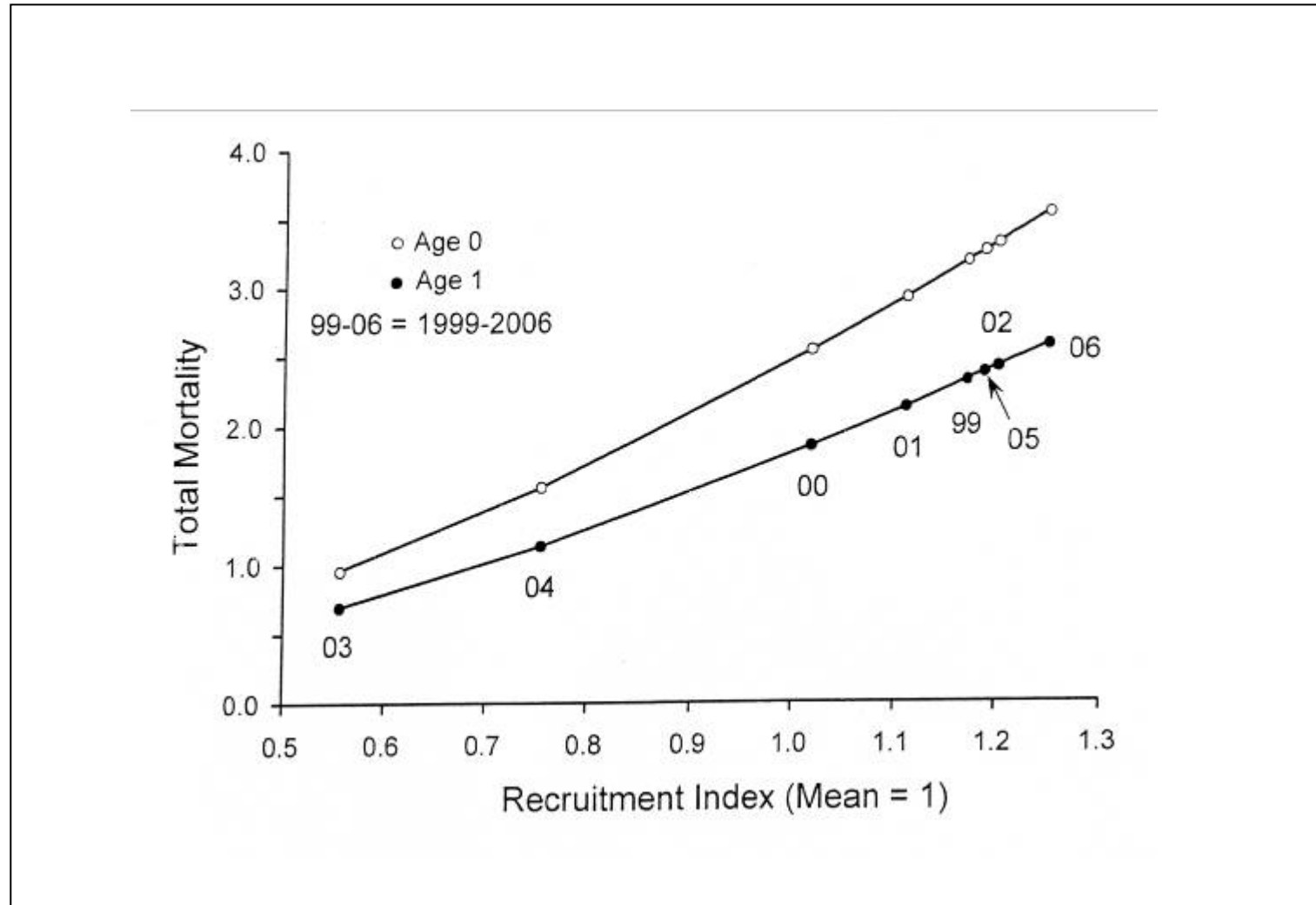
Distribution of Adults, Larvae, and Juveniles



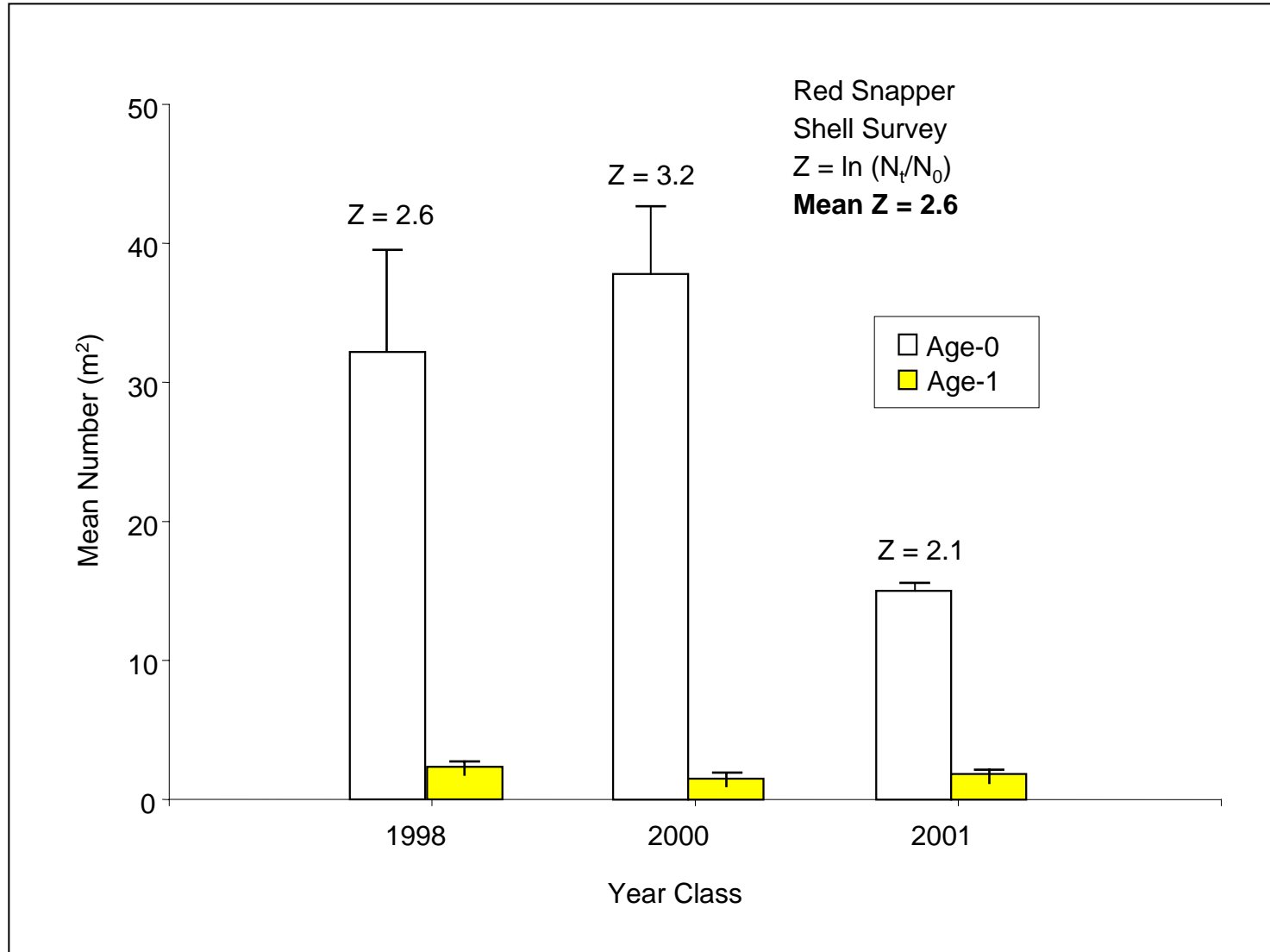
Juvenile Habitat Changes by Age



Density-Dependent Mortality in Young Red Snapper



The Szedlmayer Estimates of Total Age-0 Mortality for Red Snapper



Age-2 Population Size at Platforms – 1992

- **Stanley (1994) showed:**

5,304 (95% CI = 2,756) red snapper occupied each major platform offshore Louisiana during winter 1992.

- **Gallaway and Cole (1997) used the Stanley (1994) estimate along with (1) platform distribution, size and count data, and (2) red snapper age composition data to estimate:**

3 million (95% CI = 1.7 to 4.2 million) age-2 red snapper were present around oil platforms throughout the entire Gulf at the beginning of 1992.

Age-2 Population Size at Platforms – 1992

- **Goodyear's (1995) red snapper stock assessment estimated the total age-2 red snapper population in the Gulf at the beginning of 1992 was:**

3.7 million

- **Collectively, these data suggest 70 to 80% of the total age-2 red snapper population was living around offshore platforms in 1992.**

Age-2 Population Size at Platforms – 1995

- **Gitschlag et al. (2003) provided data from explosive platform removal monitoring studies in 1995 that suggested, on average:**
 - 775 (95% CI = 482 to 1,062) red snapper were present at each offshore platform, large and small combined.**
- **These data when multiplied times the number of platforms present in the Gulf in 1995 times the fraction of the fish that were age-2 suggested that:**
 - 1.1 million age-2 red snapper were present at offshore platforms in 1995.**

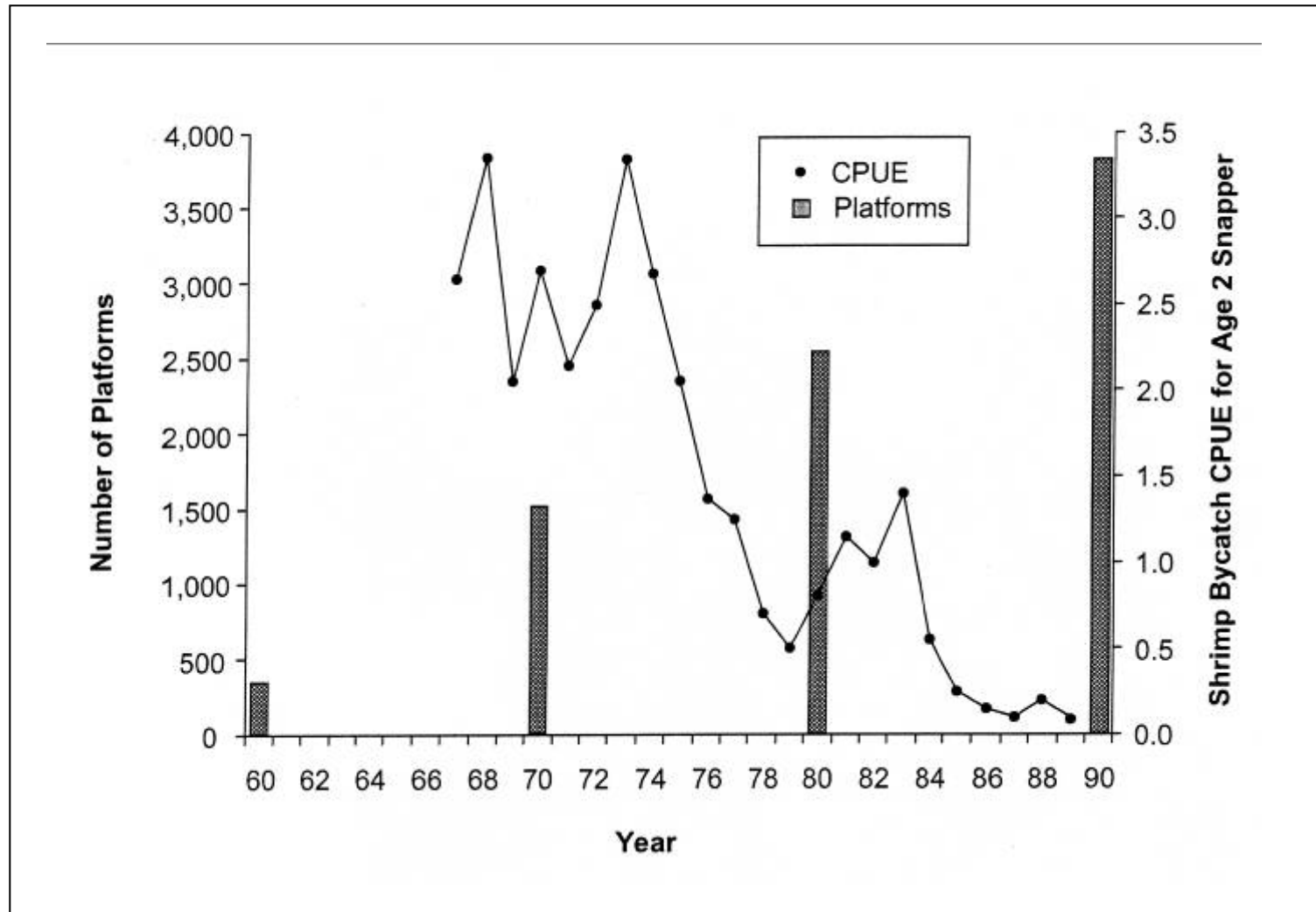
Age-2 Population Size at Platforms – 1995

- **The SEDAR7 (2005) red snapper stock assessment suggested that the total age-2 red snapper population in the western Gulf in 1995 was:**

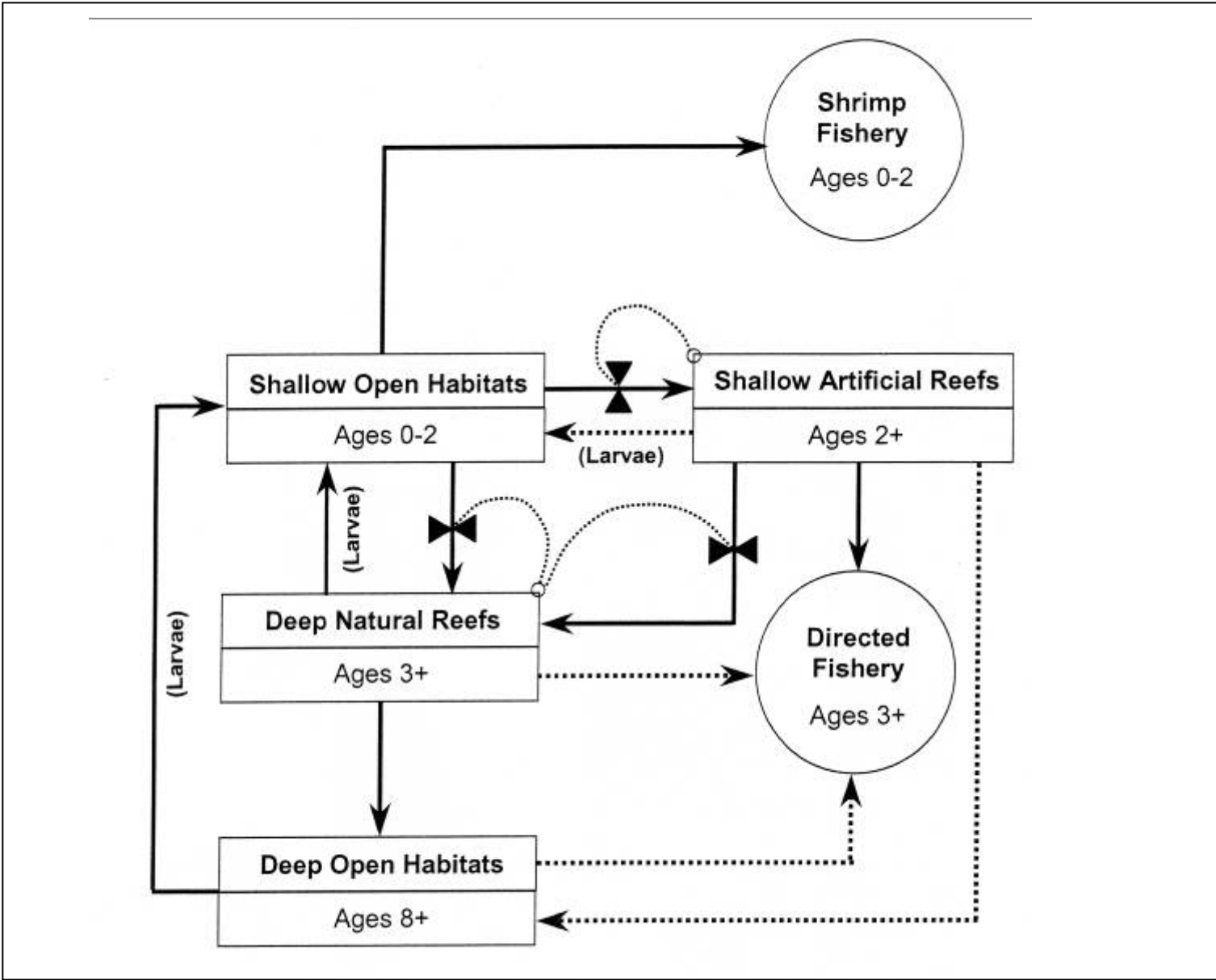
1.7 million

- **These data suggest that approximately 70% of all age-2 red snapper were living around offshore platforms in 1995.**

Trawl Catches of Age-2 Red Snapper in Shrimp Trawls vs. Offshore Platform Abundance



Red Snapper Habitat and Fishery Model



References

- Gallaway, B.J., and J.G. Cole. 1997. Cumulative ecological significance of oil and gas structures in the Gulf of Mexico: A Gulf of Mexico fisheries habitat suitability model. Phase II model description. U.S. Department of the Interior, U.S. Geological Survey, Biological Resources Division, USGS/BRD/CR-1907-0009 and Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA. OCS Study MMS 97-0044. 109 pp.
- Gitschlag, G.R., M.J. Schirripa, and J.E. Powers. 2003. Impacts of red snapper mortality associated with the explosive removal of oil and gas structures on stock assessments of red snapper in the Gulf of Mexico. In: Stanley, D.R. and A. Scarborough-Bull, eds. Fisheries, Reefs, and Offshore Development. American Fisheries Society Symposium 60:201–216.
- Goodyear, C.P. 1995. Red snapper in U.S. waters of the central Gulf of Mexico. NOAA NMFS Southeast Fisheries Science Center, Coastal Resources Division. Beaufort Laboratory. 84 pp.

References (continued)

- Parker, R.O., Jr., D.R. Colby, and T.D. Willis. 1983. Estimated amount of reef habitat on a portion of the U.S. South Atlantic and Gulf of Mexico continental shelf. *Bulletin of Marine Science* 33(4):935–940.
- SEDAR7. 2005. Stock Assessment report of SEDAR7, Gulf of Mexico Red Snapper. Charleston, SC. 480 pp.
- Stanley, D.R. 1994. Seasonal and spatial abundance and size distribution of fishes associated with a petroleum platform in the northern Gulf of Mexico. Ph.D. dissertation, Louisiana State University, Baton Rouge, LA.
- Versar, Inc. 2008. Literature search and data synthesis of biological information for use in management decisions concerning decommissioning of offshore oil and gas structures in the Gulf of Mexico. Report prepared for Minerals Management Service by Versar, Inc., Contract #1435-01-05-39082.