Amberjack Culture

Progresses at Oceanic Institute

Charles W. Laidley, Ph.D.
claidley@oceanicinstitute.org

Robin J. Shields, Ph.D.
Anthony C. Ostrowski, Ph.D.

The Oceanic Institute
Makapuu Point
41-202 Kalanianaole Highway
Waimanalo, Hawaii 96795 USA
claidley@oceanicinstitute.org

The natural spawning of wild-caught amberjacks at OI enabled the production of several thousand juveniles.

Amberjacks, *Seriola* sp., have excellent aquaculture potential due to their adaptability to conditions of intensive culture, extremely fast growth, and high market value. Substantial commercial production already exists for yellowtail, *Seriola quinqueradiata*, and greater amberjack, *Seriola dumerili*, in Japan. The southern kingfish, *Seriola lalandi*, is raised in Australia. Seriolid culture is also being developed in the Mediterranean and Latin America.

However, a combination of difficulties in establishing reliable egg supply and commercially viable hatchery technologies has generally limited commercial amberjack production to the growout of wild-collected fingerlings. Even in Japan, where the industry is most developed, fingerling supplies continue to limit production and lead to large yearly shifts in market price.

Hatchery Technology

With grant assistance from the National Oceanic and Atmospheric Administration and state of Hawaii, USA, the Oceanic Institute (OI) began working on hatchery technology for amberjack culture in the mid-1990s. It achieved natural spawns of wild-collected adults of both the greater amberjack and longfin or Almaco jack, *Seriola rivoliana*. Although both species have spawned at OI, the longfin amberjack known locally as kahala has been much more adaptable to captivity. It is emerging as a prime candidate for the emerging offshore farming sector in Hawaii.

The natural spawning of wild-caught amberjacks in 1999 was a significant achievement that enabled the production of several thousand juveniles using intensive hatchery rearing techniques at OI. The resulting F1 progeny were grown to maturation in 25-m^3 outdoor growout tanks using a commercial pelleted marine grower diet. The fish demonstrated excellent growth rates, achieving mean body weights of over 2 kg in the first year and near 5 kg at two years of age (Figure 1).

Although maintaining actively spawning stocks of wild-collected amberjacks has proven difficult due to the species' susceptibility to a number of parasitic and bacterial pathogens, the successful closing of the life cycle has allowed the use of domesticated F1 and F2 stocks as broodstock.

Domesticated Broodstock

In captivity, male amberjack began maturing within the first year and actively spermiated at 21-22 months of age. Female amberjack mature slightly slower than males, with a rapid increase in gonadosomatic index and near-simultaneous onset of spawning at 24 months of age.

Under ambient photoperiod and temperature in Hawaii, F1 broodstock have spawned for over two years without interruption. They exhibit some seasonality in reproductive output, but remain in reproductive condition throughout the year (Figure 3). Tanks containing 20 adults have yielded an average of 13 spawns/month with mean fecundity of 154,000 eggs/spawn and mean a fertility rate of 43%. Spawn size and fertility rates have both increased over time, indicating the value of long-term broodstock holding.

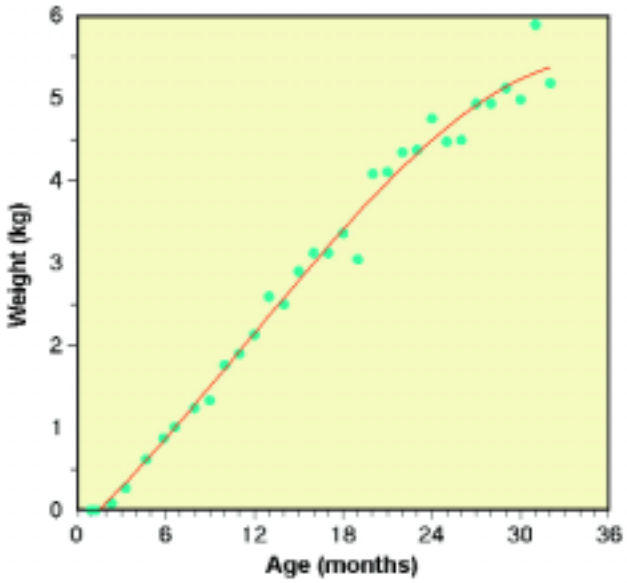


Figure 1. *Growth of captive-spawned and -reared amberjack in captivity at Oceanic Institute. Fish were fed twice daily to satiation until 9 months of age and once daily thereafter. Water temperature 26° C.*

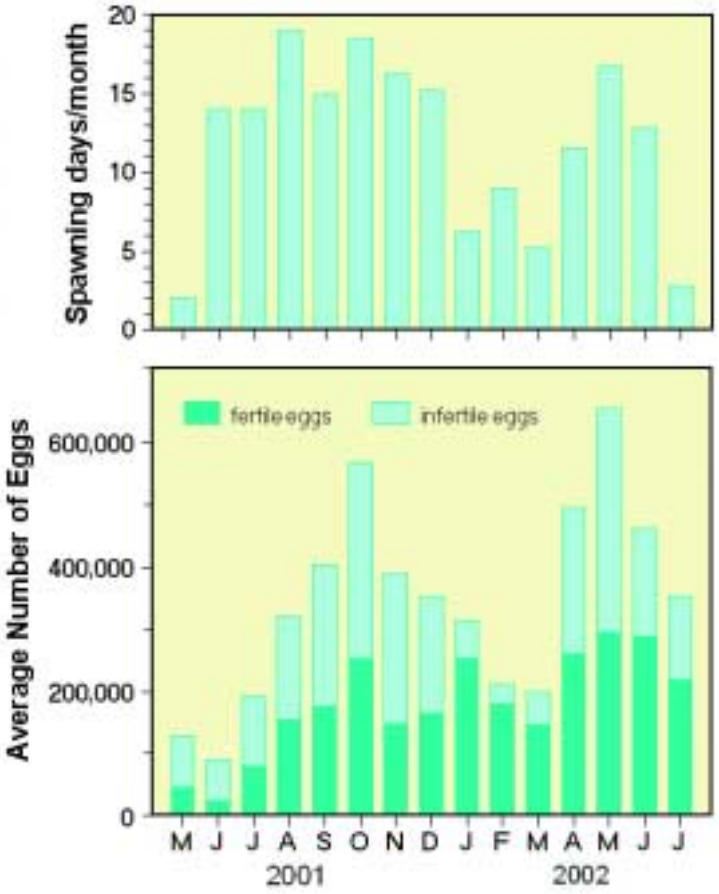
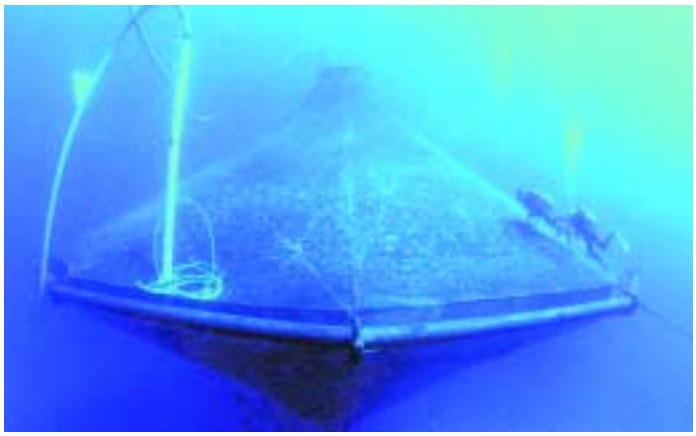


Figure 2. *Spawn frequency and egg production of captive-reared amberjack broodstock in outdoor spawning tanks.*



Amberjacks are being grown in submersible offshore cages in Hawaiian waters.

In 2003, OI achieved spawning of the F2 populations at just under 2 years of age, indicating the ability of this species to be fully domesticated. Ongoing research at OI is directed at increasing stock biosecurity and improving fingerling production technologies to secure reliable year-round fingerling supplies at commercial scales of operation.

Offshore Cage Production

Pilot-scale production in offshore cages was initiated in January 2004. Several thousand amberjack fingerlings were stocked into a submersible offshore cage operated by Cates International to begin evaluating the performance of this species in the offshore environment.