

## Distribution, Origins, Biology, and Ecology of Juvenile Steelhead (*Oncorhynchus mykiss*) in the Gulf of Alaska in Summer 1993–2000

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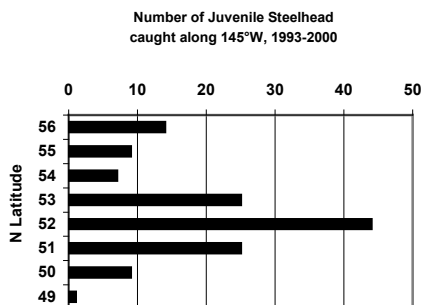
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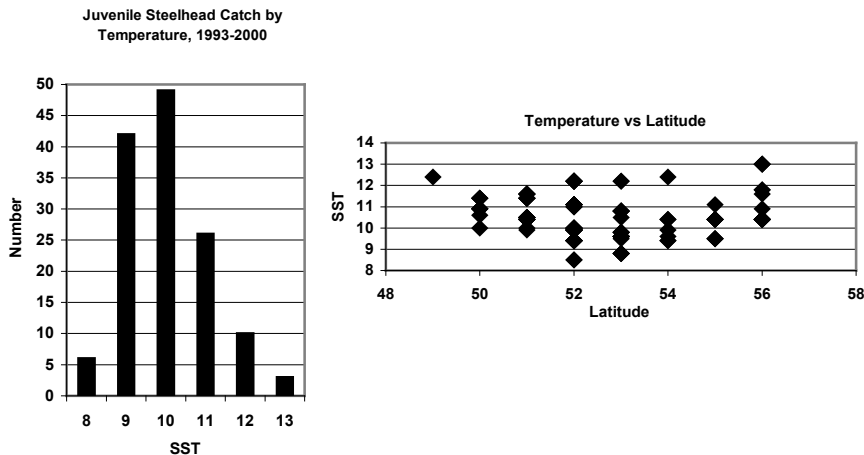
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Published high-seas research vessel data (1955–1985) has shown that juvenile steelhead (*Oncorhynchus mykiss*) are widely distributed in offshore waters of the Gulf of Alaska (Burgner et al. 1992) by mid-summer of their first year at sea. We present new information on juvenile steelhead collected during summer research cruises of the T/S *Oshoro maru* in the central Gulf of Alaska, 1993–2000. Varied-mesh surface gillnets (2.45 km long, 6 m deep) were used to catch salmonids at fishing stations located at 1° latitude intervals along 145°W from 49°N to 56°N. A total of 134 juvenile (ocean age-0) steelhead was caught over the 8-year study. Juvenile steelhead were distributed along the entire transect, but catches were highest in the area between 51°N–53°N, particularly at 52°N (Fig. 1). There was no apparent relationship between sea surface temperatures (SST) and distribution of juvenile steelhead. The highest catches were at 10°C, which reflects mean SSTs at the 52°N station (Fig. 2). Six coded-wire tagged juvenile steelhead, released from US Pacific Northwest hatcheries in April and recovered in July (1980, 1996–1998) along the transect, included three inland summer-run steelhead from the Snake R., Idaho, two winter-run steelhead from the Cowlitz R., Washington (lower Columbia R. tributary), and a coastal winter-run steelhead from the Salmon R., Washington (Queets R. tributary). Juvenile steelhead grow rapidly during their first summer at sea, and their mean body sizes in 1993–2000 (fork length (FL) = 332 mm; body weight (BW) = 395 g; n = 134 fish) were similar to those reported for 1955–1985 (FL = 337 mm, n = 245; BW = 391 g, n = 53 fish) (Fig. 3). There are no published detailed data on feeding habits of juvenile steelhead in offshore waters. We found that juvenile steelhead fed primarily on small squid (*Beryteuthis* spp.) and larval and juvenile fish (Fig. 4). The food habits data show considerable interannual variation, which may be related to changes in prey abundance or distribution of prey with respect to environmental conditions. Recently published data indicates that mesoscale (200–300 km) and small (< 200 km) eddies, observed every year along the 145°W transect, may strongly influence primary productivity and distribution of fish and their prey in this region (Onishi et al. 2000).

**Fig. 1.** The number of juvenile steelhead caught by gillnet sampling at fishing stations located at 1° -latitude intervals along 145°W in summer 1993–2000.



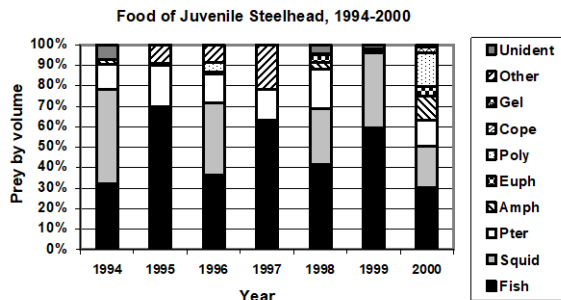
**Fig. 2.** The number of juvenile steelhead caught by sea surface temperature (SST, °C), and SSTs by latitude along 145°W in summer 1993–2000.



**Fig. 3.** Average length (mm) and weight (g) of juvenile steelhead caught along 145°W in summer 1994–2000. Sample sizes by year: 1994 = 13 fish, 1995 = 9 fish, 1996 = 29 fish, 1997 = 17 fish, 1998 = 27 fish, 1999 = 9 fish, 2000 = 29, 1994–2000 = 133 fish.



**Fig. 4.** Percentage composition (by volume) of major prey categories in stomach contents of juvenile steelhead caught along 145°W in summer 1994–2000. Sample sizes by year: 1994 = 12 fish, 1995 = 8 fish, 1996 = 29 fish, 1997 = 17 fish, 1998 = 24 fish, 1999 = 9 fish, 2000 = 27 fish. Pter = pteropod, Amph = amphipod, Euph = euphausiid, Poly = polychaete, Cope = copepod, Gel = gelatinous zooplankton, Unident = unidentified prey.



**REFERENCES**

Burgner, R.L., J.T. Light, L. Margolis, T. Okazaki, A. Tautz, and S. Ito. 1992. Distribution and origins of steelhead trout (*Oncorhynchus mykiss*) in offshore waters of the North Pacific Ocean. Int. North Pac. Fish. Comm. Bull. No. 51.

Onishi, H., S. Ohtsuka, and G. Anma. 2000. Anticyclonic, baroclinic eddies along 145°W in the Gulf of Alaska in 1994–1999. Bull. Fac. Fish., Hokkaido Univ. 51: 31–43. (In Japanese with English abstract)