ECOSYSTEM STATUS INDICATORS
Herring

Togiak Herring Population Trends

Contribution by Fred West, Alaska Department of Fish and Game
Last updated: November 2004

An age-structured analysis model developed by Fritz Funk was used to assess Pacific herring population trends in the Togiak District of Bristol Bay (Funk et al. 1992). Abundance peaked in the early 1980's with approximately 2.5 billion fish when herring from the 1977 and 1978 year classes recruited into the fishery as age-4 fish in 1981 and 1982 (Figure 52). Beginning in 1983, total abundance steadily declined until modest recruitment events occurred in 1991 and 1992 from the 1987 and 1988 year classes. We are currently seeing moderately strong recruitment from the 1996 and 1997 year classes that recruited into the fishery in 2000 and 2001. Temporal trends in Togiak herring abundance show that total abundance in much of the 1980s was above the 1978 - 2003 average but fell below in 1989 and has remained below average since, with the exception of slightly above average values in 1991 and 1992 (Figure 52).

The high abundance estimates in the early 1980's may be a result of projecting backwards from the ASA model which was used beginning in 1993. The aerial survey data for the same time period conflicts with those estimates yielding much lower biomass estimates. This has not yet been resolved, but the aerial survey data is currently being used to "ground truth" the ASA estimates. With the 1996 and 1997 recruitment entering the fishery in strength now, and the outlook that recent mild years should also provide substantial recruitment to the stock, the status of the Togiak herring stock has been changed from "nominal decline" to "stable".

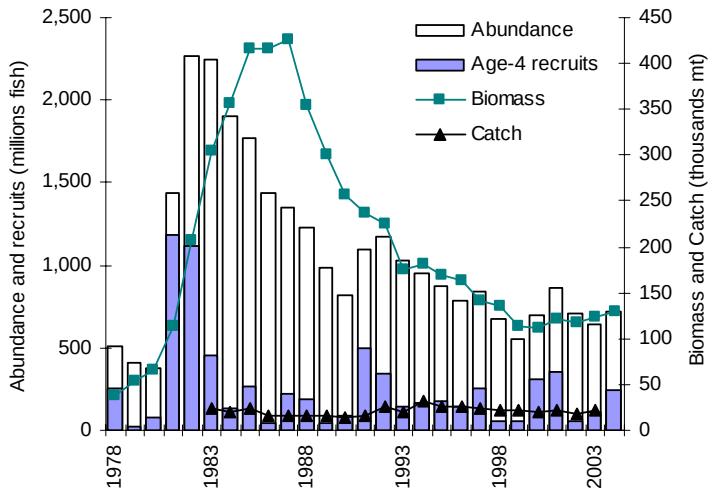

Figure 52. Total abundance, age-4 recruits, mature biomass, and total harvest of Pacific herring in the Togiak District of Bristol Bay, 1978 – 2004.

Pacific herring recruitment trends are highly variable, with large year classes occurring occasionally at regular intervals of approximately every 9-10 years (Figure 52). These large recruitment events drive the Togiak herring population. Environmental conditions may be the critical factor that influences strength of herring recruitment. Williams and Quinn (2000) have demonstrated that Pacific herring populations in the North Pacific are closely linked to environmental conditions with temperature having the strongest correlation. A general consensus in fisheries points towards the larval stage of herring life history as being the most important factor for determining year class strength (Cushing 1975, Iles and Sinclair 1982). Ocean conditions relative to spawn run timing would greatly influence the strength of each year class. Closer examination of trends in sea surface temperature, air temperature, and Bering Sea ice cover specific to the Bristol Bay area may find a specific correlate for Togiak herring recruitment.