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SEI WHALE (*Balaenoptera borealis*): Nova Scotia Stock

STOCK DEFINITION AND GEOGRAPHIC RANGE

Indications are that, at least during the feeding season, a major portion of the Northwest Atlantic sei whale population is centered in northerly waters, perhaps on the Scotian Shelf (Mitchell and Chapman 1977). The southern portion of the species' range during spring and summer includes the northern portions of the US Atlantic Exclusive Economic Zone (EEZ) — the Gulf of Maine and Georges Bank. The period of greatest abundance there is in spring, with sightings concentrated along the eastern margin of Georges Bank and into the Northeast Channel area, and along the southwestern edge of Georges Bank in the area of Hydrographer Canyon (CETAP 1982). NMFS aerial surveys in 1999, 2000 and 2001 found concentrations of sei and right whales along the Northern Edge of Georges Bank in the spring. The sei whale is often found in the deeper waters characteristic of the continental shelf edge region (Hain *et al*. 1985), and NMFS aerial surveys found substantial numbers of sei whales in this region, south of Nantucket, in the spring of 2001. Similarly, Mitchell (1975) reported that sei whales off Nova Scotia were often distributed closer to the 2,000 m depth contour than were fin whales.

This general offshore pattern of sei whale distribution is disrupted during episodic incursions into more shallow and inshore waters. Although known to take piscine prey, sei whales (like right whales) are largely planktivorous, feeding primarily on euphausiids and copepods. In years of reduced predation on copepods by other predators, and thus greater abundance of this prey source, sei whales are reported in more inshore locations, such as the Great South Channel (in 1987 and 1989) and Stellwagen Bank (in 1986) areas (R.D. Kenney, pers. comm.; Payne *et al*. 1990). An influx of sei whales into the southern Gulf of Maine occurred in the summer of 1986 (Schilling *et al*. 1993). Such episodes, often punctuated by years or even decades of absence from an area, have been reported for sei whales from various places worldwide.

Based on analysis of records from the Blandford, Nova Scotia, whaling station, where 825 sei whales were taken between 1965 and 1972, Mitchell (1975) described two "runs" of sei whales, in June-July and in September-October. He speculated that the sei whale population migrates from south of Cape Cod and along the coast of eastern Canada in June and July, and returns on a southward migration again in September and October; however, such a migration remains unverified.

Mitchell and Chapman (1977) reviewed the sparse evidence on stock identity of northwest Atlantic sei whales, and suggested two stocks — a Nova Scotia stock and a Labrador Sea stock. The range of the Nova Scotia stock includes the continental shelf waters of the northeastern USA, and extends northeastward to south of Newfoundland. The Scientific Committee of the IWC, while adopting these general boundaries, noted that the stock identity of sei whales (and indeed all North Atlantic whales) was a major research problem (Donovan 1991). In the absence of evidence to the contrary, the proposed IWC stock definition is provisionally adopted, and the "Nova Scotia stock" is used here as the management unit for this stock assessment. The IWC boundaries for this stock are from the USA east coast to Cape Breton, Nova Scotia, thence east to longitude 42° W.

POPULATION SIZE

The total number of sei whales in the US Atlantic EEZ is unknown. However, two abundance estimates are available for portions of the sei whale habitat: from Nova Scotia during the 1970's, and in the US Atlantic EEZ during the springs of 1979-1981.

Mitchell and Chapman (1977), based on tag-recapture data, estimated the Nova Scotia, Canada, stock to contain between 1,393 and 2,248 sei whales. Based on census data, they estimated a minimum Nova Scotian population of 870 sei whales.

An abundance of 280 sei whales was estimated from an aerial survey program conducted from 1978 to 1982 on the continental shelf and shelf edge waters between Cape Hatteras, North Carolina and Nova Scotia (CETAP 1982). The estimate is based on data collected during the spring when the greatest proportion of the population off the northeast USA coast appeared in the study area. This estimate does not include a correction for dive-time or g(0), the probability of detecting an animal group on the track line. The CETAP report suggested, however, that correcting the estimated abundance for dive time would increase the estimate to approximately the same as Mitchell and Chapman's (1977) tag-recapture estimate. This estimate is more than 20 years out of date and thus almost certainly does not reflect the current true population size; in addition, the estimate has a high degree of uncertainty (i.e., it has a large CV), and it was estimated just after cessation of extensive foreign fishing operations in the region. There are no recent abundance estimates for the sei whale.

Minimum Population Estimate

The minimum population estimate is the lower limit of the two-tailed 60% confidence interval of the log-normally distributed best abundance estimate. This is equivalent to the 20th percentile of the log-normal distribution as specified by Wade and Angliss (1997). A current minimum population size cannot be estimated because there are no current abundance estimates (within the last 10 years).

Current Population Trend

There are insufficient data to determine the population trends for this species.

CURRENT AND MAXIMUM NET PRODUCTIVITY RATES

Current and maximum net productivity rates are unknown for this stock. For purposes of this assessment, the maximum net productivity rate was assumed to be 0.04. This value is based on theoretical modeling showing that cetacean populations may not grow at rates much greater than 4% given the constraints of their reproductive life history (Barlow *et al*. 1995).

POTENTIAL BIOLOGICAL REMOVAL

Potential Biological Removal (PBR) is the product of minimum population size, one-half the maximum productivity rate, and a "recovery" factor (MMPA Sec. 3. 16 U.S.C. 1362; Wade and Angliss 1997). The minimum population size is unknown. The maximum productivity rate is 0.04, the default value for cetaceans. The "recovery" factor, which accounts for endangered, depleted, threatened stocks, or stocks of unknown status relative to optimum sustainable population (OSP) is assumed to be 0.10 because the sei whale is listed as endangered under the Endangered Species Act (ESA). PBR for the Nova Scotia stock of the sei whale is unknown because the minimum population size is unknown.

ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY

There was no reported fishery-related mortality or serious injury to sei whales in fisheries observed by NMFS during 1997-2001. A review of NMFS stranding and entanglement records from 1997 through 2001 yielded an average of 0.2 human-caused mortalities per year as a result of one confirmed record from May 2, 2001 when a sei whale carcass was recovered in New York harbor after it slid off the bow of an arriving ship. Freshness of carcass and hemorrhaging around the dorsal impact area indicated the strike was pre-mortem. The only other NMFS record of a human-caused sei whale mortality was from November 17, 1994, when a sei whale carcass was observed on the bow of a container ship as it docked in Boston, Massachusetts.

Fishery Information

There have been no reported entanglements or other interactions between sei whales and commercial fishing activities monitored for interactions.

STATUS OF STOCK

The status of this stock relative to OSP in the US Atlantic EEZ is unknown, but the species is listed as endangered under the ESA. There are insufficient data to determine the population trends for sei whales. The total level of human-caused mortality and serious injury is unknown, but the rarity of mortality reports for this species suggests that this level is insignificant and approaching a zero mortality and serious injury rate. This is a strategic stock because the sei whale is listed as an endangered species under the ESA. A Recovery Plan for sei whales has been written and is awaiting legal clearance.

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