

COSEWIC Status Report

Addendum

on

Killer Whales (*Orcinus orca*)

by

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and

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Status Recommended:

Northeast Pacific Northern Resident Killer Whales	<i>SC</i> <i>Special Concern</i>
Northeast Pacific Southern Resident Killer Whales	<i>E</i> <i>Endangered</i>
Northeast Pacific Transient Killer Whales	<i>SC</i> <i>Special Concern</i>
Northeast Pacific Offshore Killer Whales	<i>SC</i> <i>Special Concern</i>
Northwest Atlantic / Eastern Arctic Killer Whales	<i>DD</i> <i>Data Deficient</i>

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Introduction

The status report for killer whales that was accepted by COSEWIC in May 1999 contains a comprehensive summary of what was known about killer whales until the late 1990s (Baird, 1999). Since then, three significant sets of studies have been published with new information about contaminant concentrations (Ross *et al.*, 2000), population genetics (Barrett-Lennard, 2000), and population sizes of killer whales in British Columbia (Ford & Ellis, 1999; Ford, Ellis & Balcomb, 2000). This new information has bearing on the listing of killer whales in Canada.

New Analyses

Genetic analysis reveals that there are 4 distinct populations of killer whales in BC. They consist of the marine mammal eating form (termed *transients*), two populations of fish eaters (*southern residents* and *northern residents*), and a fourth population that appears to reside on the open ocean and rarely comes into the coastal waters of BC (*offshores*). The analysis of Barrett-Lennard (2000) shows that very little if any gene flow occurs between these groups, or between these groups and neighboring populations in US waters. It also shows that the level of genetic diversity is very low in the southern resident population, suggesting that it has either been small for many generations or has been through a recent bottleneck.

Results from the genetic research are consistent with previous differences noted in the acoustic repertoires of the populations, and distinctive differences in diet, behaviour and dorsal fin shapes (Ford, 1984; Ford & Ellis, 1999; Ford *et al.*, 2000; Ford *et al.*, 1998). There are at least 3 other populations of killer whales in Alaska (2 transient populations and 1 resident form) (Matkin *et al.*, 1999).

There is no information about the genetics of killer whales in the Arctic and Atlantic Ocean.

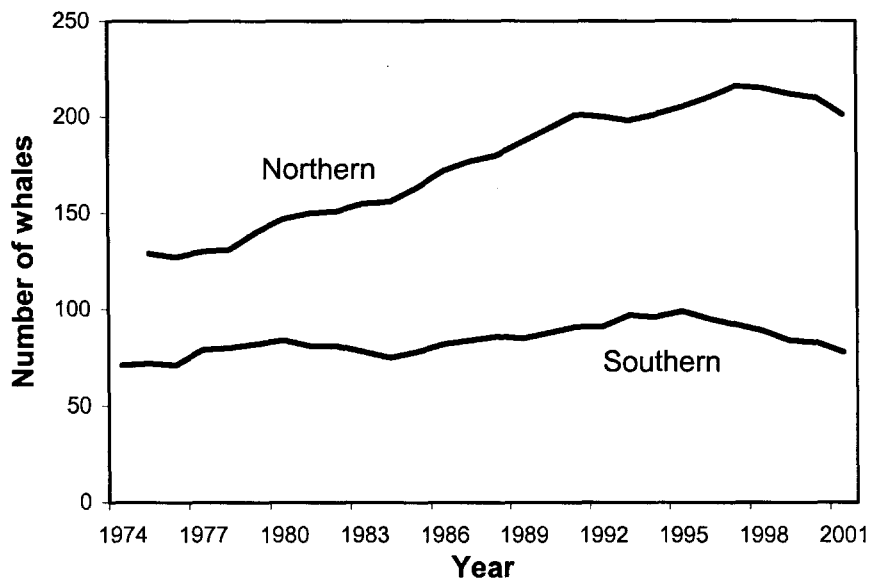
Under COSEWIC criteria, populations may be considered for designation if there exists a significant difference between them based upon genetic evidence and or other compelling evidence. Differences in genetics, acoustics, social behaviour, morphology, diets and ranges support the splitting of killer whales into five populations of national significance:

1. Northeast Pacific Northern Resident Killer Whales
2. Northeast Pacific Southern Resident Killer Whales
3. Northeast Pacific Transient Killer Whales
4. Northeast Pacific Offshore Killer Whales
5. Northwest Atlantic / Eastern Arctic Killer Whales

Population estimates are based on counts of individually recognizable killer whales. The relatively small numbers of killer whales in each population, the distinctiveness of the shapes of their dorsal fins, and the scars and colorations on their bodies, has allowed researchers to create photographic catalogues that identify the family trees and relatedness of all individuals, subpods, pods and populations. The most recent estimates of population size (all ages) are:

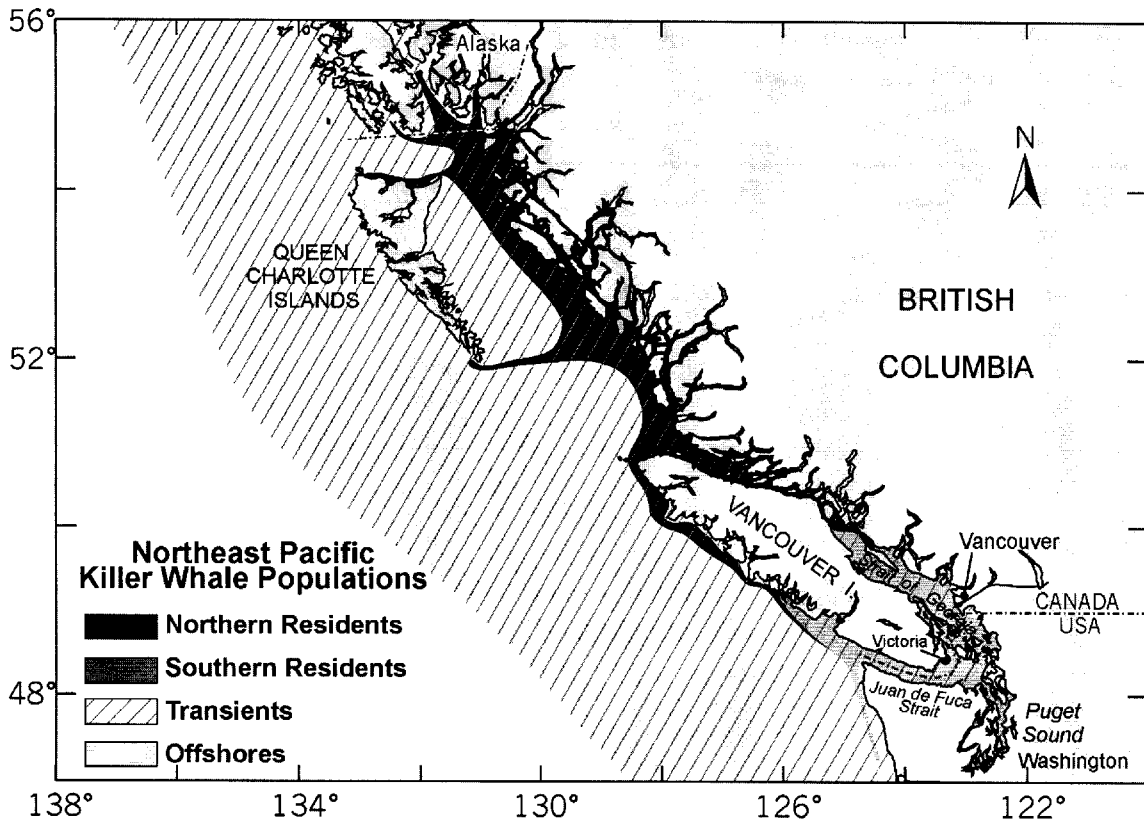
Population	Size	Source
NE Pacific Northern Residents	201	G.M. Ellis & J. Ford, unpubl. data
NE Pacific Southern Residents	78	K. Balcomb unpubl. data
NE Pacific Transients	219	Ford and Ellis 1999
NE Pacific Offshores	200	Ford and Ellis 1999
NW Atlantic / E Arctic	unknown	

**Northeast Pacific Resident Killer Whale
Population Sizes 1975-2001**



Note: Counts for northern residents are provisional, pending further analysis of 2001 data. Data are from G. Ellis and J. Ford, Pacific Biological Station, DFO, and K. Balcomb, Center for Whale Research.

Population distributions of killer whales in the Pacific Ocean are shown in the following map (adapted from Ross *et al.* 2000). Distributions of killer whales in the Northwest Atlantic and Eastern Arctic Oceans are unknown.



Contaminant analyses of biopsy samples from killer whales in British Columbia have revealed high organochlorine levels, especially PCBs (Ross *et al.* 2000). Compared to beluga whales in the St. Lawrence River, contaminant levels are twice as high in the fish eating southern residents, and four times higher in the marine mammal eating transients. These levels would adversely affect reproduction and immune system function in seals, but their effect on killer whales is unknown.

PCB Concentrations (mg kg⁻¹ lw)

	Males		Females		Source
	mean	sem	mean	sem	
NEP Northern Resident KWs	37.4	6.1	9.3	2.8	Ross <i>et al.</i> 2000
NEP Southern Resident KWs	146.3	32.7	55.4	19.3	Ross <i>et al.</i> 2000
NEP Transient KWs	251.2	54.7	58.8	20.6	Ross <i>et al.</i> 2000
Beluga Whales (St. Lawrence)	78.9		29.6		Muir <i>et al.</i> 1996

Evaluation and Proposed Status

Based on the foregoing, and the information contained within Baird (1999), the 5 populations of killer whales in Canada should be designated as follows:

NE Pacific Northern Resident Killer Whales. *SC – Special Concern.* This population is low (<250 mature individuals). It increased over 20 years to 216 individuals in 1997, but recent data suggest that the population since declined by approximately 7% over the past 4 years (G. Ellis and J. Ford, unpubl. data). Significant organochlorine levels have been measured in their blubber, but concentrations are lower than those reported for transient and southern resident killer whales (Ross *et al.*, 2000). Northern residents are subject to high levels of human interaction (boat traffic) that may have negative population consequences (Trites & Bain, 2000). They may also be vulnerable to changes in the abundance and availability of prey concomitantly caught by sport and commercial fisheries. This population meets Endangered Criteria (D1), but not the definition of Endangered (i.e., it is not in immediate danger of extinction).

NE Pacific Southern Resident Killer Whales. *E – Endangered.* This trans-boundary (Washington and British Columbia) population is low (<250 mature individuals) and has decreased by 20% over 6 years (from 98 killer whales in 1995, to 83 in 1999, and 78 in 2001). The southern residents population returned to historic highs following the removal of approximately 48 whales for the Aquarium industry during the 1960s and 1970s. Recent population modeling suggests that the decline may be partly attributed to a skewed age structure resulting from the removals, and that recovery may occur as more young females mature and begin to reproduce (P. Olesiuk, DFO, unpublished data). However, other modeling indicates that survival rates (by age and sex) in the most recent years examined (1993-1998) were lower than during any other period in the last 25 years (Dalheim *et al.*, 2000); and an additional seven individuals of both sexes and a wide range of ages died over the winter of 2000-2001 (K. Balcomb, unpubl. data). Organochlorine concentrations are four times higher than reported for northern residents (Ross *et al.*, 2000). The southern residents are also subject to significantly higher levels of vessel interactions due to the proximity of their summer range to large urban centers (Seattle, Victoria and Vancouver) (Trites & Bain, 2000). This population meets the quantitative criteria for listing as *endangered* (C1 and D1).

NE Pacific Transient Killer Whales. *SC – Special Concern.* This population consists of approximately 219 individuals (calves to mature adults) (Ford & Ellis, 1999). Historic numbers are not known, but are likely to have always been in the hundreds, as opposed to the thousands. The animals travel in small groups (typically 1-3 individuals) over a wide range (California to Alaska) and are not confined to any single small area. There are often many years between resightings of individuals (maximum time for one transient was 14 years), which makes it difficult to determine population trends. Their specialized diet of other marine mammals has resulted in them carrying the highest concentrations of

organochlorines reported for any marine mammal (Ross *et al.*, 2000). They may also be more susceptible to boat traffic because of interference with their passive acoustic method of hunting (G.M. Ellis, pers. comm.) Using the quantitative criteria D1 would result in an Endangered status. However, the transient population does not meet the definition of endangered and merits a listing of *special concern* due to the potential effects of contaminants on survival and reproduction.

NE Pacific Offshore Killer Whales. *SC – Special Concern.* This population is poorly studied and is believed to consist of at least 200 individuals (and likely fewer than 250 mature individuals). Population trends and life histories are not known, although some individuals from this population have been photographed as far south as central California and as far north as southeastern Alaska. Organochlorine concentrations in their tissues appear to be similar to those of northern residents (P. Ross, DFO, unpublished data). The offshore population lives on or near the major offshore routes for oil tankers. They may also compete with fisheries for prey. Offshore killer whales are not believed to be at risk of extirpation and are recommended for listing as a population of *special concern*.

Northwest Atlantic / Eastern Arctic Killer Whales. *DD – Data Deficient.* There is no new information to add to the original status report (Baird, 1999) about killer whales in these regions. Killer whales appear to be rarely seen in eastern Canada, and have been reported to prey on beluga whales in the Arctic. People living in the Arctic may be able to provide traditional knowledge that would significantly augment our understanding about this population of killer whales. Studies are required to determine whether the population distinctions that apply in the Pacific also apply to the Arctic and Atlantic regions of Canada. Until such studies are undertaken, the species remains *data deficient*.

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