Photo-identification Catalogue of Bigg's (Transient) Killer Whales From Coastal Waters of British Columbia, Northern Washington, and Southeastern Alaska

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by

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ABSTRACT

Towers, J.R., Ellis, G.M., and Ford, J.K.B. 2012. Photo-identification catalogue of Bigg's (transient) killer whales from coastal waters of British Columbia, northern Washington, and southeastern Alaska. Can. Data Rep. Fish. Aquat. Sci. 1241: v + 127 p.

Killer whales are easily recognizable by the appearance of their naturally occurring markings in both photographs and during field observations. This report presents updated identification images and demographic data for Bigg's (transient) killer whales known from numerous encounters between 1974 and 2012 in the coastal waters of British Columbia, northern Washington, and southeastern Alaska. These data are intended to facilitate studies and observations of Bigg's killer whales and serve as a supplement to future publications.

RÉSUMÉ

Towers, J.R., Ellis, G.M., and Ford, J.K.B. 2012. Photo-identification catalogue of Bigg's (transient) killer whales from coastal waters of British Columbia, northern Washington, and southeastern Alaska. Can. Data Rep. Fish. Aquat. Sci. 1241: v + 127 p.

Il est facile de reconnaître un épaulard grâce à la manifestation de leurs marques naturelles tant en photos qu'au cours d'observations sur le terrain. Le présent rapport fait état de nouvelles données démographiques et images pour l'identification des spécimens d'épaulards migrateurs recensés lors de nombreuses rencontres survenues entre 1974 et 2012 dans les eaux côtières de la Colombie-Britannique, du nord de l'État de Washington et du sud-est de l'Alaska. Ces données visent à favoriser les études et les observations relatives à l'épaulard migrateur et à compléter les publications à venir.

PREFACE

This catalogue presents identification photos and demographic data for Bigg's killer whales that are known to frequent coastal waters of British Columbia, northern Washington, and southeastern Alaska. Both left and right side identification images of individuals thought to be alive in 2012, as well as schematic diagrams that include deceased animals are provided. Schematic diagram boxes are faded for individuals that are not represented by an identification photograph on the same page and shaded for animals that are deceased. Animals are laid out alphanumerically in clusters of maternally related individuals that are known to regularly associate at the time of publication. Solid lines represent positively known relationships between individuals and dotted lines represent probable relationships that have been inferred from many years of observations. Individuals are named with alphanumeric designations based on their relation to their mother (when known) or by the order in which they were encountered. Approximate year of birth and sex (when known) are provided with each individual. Birth years of animals that were adults when first encountered are generally given as maximums. In most cases, ages given for older females have not been adjusted to compensate for the age(s) of their probable offspring.

Only individuals that have been encountered numerous times over several years and their kin are included in this catalogue. These animals have shown site fidelity to coastal waters of British Columbia, northern Washington, and southeastern Alaska and therefore are the individuals that are most likely to continue to be observed in these waters. As it is our intention to maintain on-going population studies of Bigg's killer whales through photo-identification we appreciate being forwarded any high-resolution photos from encounters with these whales. Photographs of animals that may not be represented in the following pages are of particular interest to us. Observers should send photos to pacific.whales@dfo-mpo.gc.ca and abide by the marine mammal regulations when viewing and photographing Bigg's killer whales unless authorized under a marine mammal research permit to make close approaches.

Identification photos and demographic data presented in this report are intended to facilitate on-going field research of Bigg's killer whales and provide the general public with a guide to enhance their observations. It would not have been possible without the contributions of identification photos and associated field notes from many colleagues, especially: Jim Borrowman, Volker Deecke, Brian Falconer, Brian Gisborne, Mark Malleson, Dena Matkin, Rod Palm, and Jan Straley. This report is also intended to supplement further publications focused on Bigg's killer whales, however, demographic data are not to be analyzed for further studies without our permission. Identification images and schematic diagrams are also not to be reproduced without permission, except in printed personal copies.

1.0 INTRODUCTION

Killer whales were first found to be individually recognizable in the early 1970s from photographs of their natural markings (Bigg et al. 1976). Subsequent photo-identification studies in coastal waters of the northeastern Pacific proved to be valuable for describing killer whale populations (Balcomb et al. 1982; Bigg 1982), their life histories (Bigg et al. 1987; Olesiuk et al. 1990, 2005; Ford et al. 1994; Matkin et al. 1999a), social systems (Bigg et al. 1990; Matkin et al. 1999b; Baird and Whitehead 2000), abundance (Ford et al. 2000, 2007; Ellis et al. 2011), ranges (Ford and Ellis 1999; Ford et al. 2000; Dahlheim et al. 2008), diets (Ford et al. 1998, 2010; Saulitis et al. 2000; Ford and Ellis 2005, 2006), and acoustics (Ford 1991; Barrett-Lennard et al. 1996; Deecke et al. 2005, 2010).

Three separate killer whale ecotypes are found off the northwest coast of North America: residents, offshores, and Bigg's (also known as transients[1]). These ecotypes do not mix despite living in the same habitats, and as a result they are reproductively isolated and genetically distinct (Barrett-Lennard 2000). Each has distinct vocal patterns and prey preferences. Resident killer whales have a wide range of calls unique to each clan (Ford 1987). They feed on fish, with a strong preference for salmon, particularly Chinook salmon (Ford et al. 1998, 2010; Saulitis et al. 2000). Offshore killer whales also have a large vocal repertoire and feed on various large fish species including sharks (Ford et al. 2000, 2011; Dahlheim et al. 2008). Bigg's killer whales are often silent and have only a small variety of known calls (Deecke et al. 2005). They are known to frequent coastal waters year round and have been observed to prey on harbour and elephant seals, northern fur seals, Steller and California sea lions, harbour and Dall's porpoises, Pacific white-sided dolphins, and occasionally minke and grey whales, and seabirds (Baird and Dill 1995; Black et al. 1997; Ford et al. 1998; Ford and Ellis 1999; Barrett-Lennard et al. 2011). Recent genetic studies by Morin et al. (2010) have suggested that residents and offshores should be classified as separate sub-species pending analysis of additional data and that Bigg's should be given full species status.

Like resident killer whales, Bigg's killer whales in the northeastern Pacific are known from various different populations (Ford et al. 2007). With the exception of the depleted AT1 population of the northern Gulf of Alaska (Matkin et al. 2012), the criteria for defining these populations, however, remain unclear. The basic social unit in Bigg's killer whale populations is the maternal group, which typically consists of an adult female and her offspring. Both male and female offspring are occasionally known to disperse from their maternal group (Ford and Ellis 1999; Baird and Whitehead 2000). Some individuals remain more or less permanently dispersed while others disperse only temporarily. The social dynamics of Bigg's killer whales are thus different from the highly stable matrilineal structure of residents, in which dispersal is extremely rare. Maternal groups usually consist of 2–5 individuals, however, larger groups (>20 animals) composed of individuals from various maternal groups have commonly been observed in British Columbia and adjacent waters in recent years (DFO unpubl. data). Life history parameters of Bigg's killer whales, such as age at maturity, reproductive rates, and longevity, appear to be

[1] We have chosen to use the name 'Bigg's killer whale' rather than 'transient killer whale' based on recommendations proposed by the global killer whale research community (Ford 2011) to honour the late Dr. Michael Bigg, pioneering killer whale research scientist.

similar to those of resident killer whales as described by Olesiuk et al. (2005).

In 2001 and again in 2008, Bigg's killer whales in British Columbia were classified as Threatened under the Species at Risk Act (SARA) due to their relatively low abundance and the high levels of chemical contaminants found in their tissue, which result from feeding at a high trophic level (Fisheries and Oceans Canada 2007). Factors contributing to their low numbers may include historically diminished food supply resulting from the large-scale reduction of pinnipeds in the 1900s by directed culling, bounty hunting, and commercial harvesting (DFO 2010). It is also likely that Bigg's killer whales experienced some mortality due to shootings by commercial fishers. Persistent bioaccumulating toxins (PBTs) such as polychlorinated biphenyls (PCBs) and polybrominated diphenyl ethers (PBDEs) occur in high levels in Bigg's killer whales from British Columbia (Ross et al. 2000; Ross 2006). Similar levels of these chemicals are known to negatively affect the health of some mammals and are therefore of concern to the recovery of these killer whales (Ross 2006).

Since 1987, updated photo-identification catalogues of Bigg's killer whales known from British Columbia and adjacent waters have been published approximately every 10 years (Bigg et al. 1987; Ford and Ellis 1999; Ellis et al. 2008). Since the publication of the last catalogue four years ago, Bigg's killer whale mortality has been low and recruitment high. As a result, the previous catalogue quickly became outdated. In this report we present the latest identification photos and genealogies of individual Bigg's killer whales (Appendix) documented from numerous encounters spanning several years in the coastal waters of British Columbia, northern Washington, and southeastern Alaska.

2.0 MATERIALS AND METHODS

Bigg's killer whales were encountered and photo-identified during field studies in coastal waters of British Columbia from 1974 to 2012. Identification photos were also collected from other researchers operating in the coastal waters of southeastern Alaska, Washington, Oregon, and California. In addition, professional mariners and members of the public contributed photos from encounters dating as far back as 1958. In total, many hundreds of individual photographers contributed thousands of identification photos to our long-term studies of Bigg's killer whales.

Historically, we used 35 mm film to acquire photographs of the left sides of individual Bigg's killer whales. With the onset of digital photographic technology in the 2000s, and an increase in both encounters with this population and identification photo contributors, we began to also acquire photographs of the animal's right sides. Bigg's killer whales were encountered during cetacean research excursions as well as by responding to sighting reports. Further details on field methods used to photo-identify Bigg's killer whales are similar to those used for our studies of resident killer whales in the region as outlined by Ellis et al. (2011).

Due to the large volume of photo-identification data acquired each year from this population (>15,000 identification photos per annum), digital photo metadata working standards were implemented using the application Photo Mechanic® (Towers et al. 2012). Identification

image data presented in this report were analyzed using these standards and high-quality left and right side identification images of individual Bigg's killer whales were edited and modified using Adobe Photoshop®. The catalogue framework was designed using Adobe InDesign®.

3.0 ACKNOWLEDGEMENTS

Our research on Bigg's killer whales would not be possible without data contributions from hundreds of individuals and their respective affiliations. Foremost, we wish to thank the following individuals who have made significant contributions to our research, many of whom are also listed in Table 1 as having identification photos that appear in this report: Robin Abernethy, Ken Balcomb, Lance Barrett-Lennard, Susan Berta, Caitlin Birdsall, Nancy Black, Melissa Boogaards, Jim and Mary Borrowman, Ainsley Brown, Randy Burke, John Calambokidis, Miray Campbell, Randy Carpenter, Rich Chiovitti, Ed Chutter, Nic Dedeluk, Volker Deecke, Ramona de Graaf, Mike de Roos, John Durban, Dave Ellifrit, Candice Emmons, Mark Evans, Brian Falconer, Jason Feaver, John Forde, Marie Fournier, Randy Frank, Chris Gabrielle, Debbie Gardiner, Howard Garrett, Wayne Garton, Brian Gisborne, Mike Greenfelder, Karen Hansen, Brad Hanson, Tony Heald, Kathy Heise, Bill Herbert, Jackie Hildering, Stan Hutchings, Jeff Jacobsen, Barb Koot, Steve Lewis, Heather Lord, Bill and Donna Mackay, Mark Malleson, Dena Matkin, Ed McDonald, Roger McDonnell, Murray McGregor, Christie McMillan, John Moran, Alex Morton, Hermann Mueter, Janet Neilson, Linda Nichol, Stef Olcen, Robin Orr, Mayuko Otsuki, Rod Palm, Bruce Paterson, Jake Pattison, James Pilkington, Erin Rechsteiner, Leah Robinson, Marvin Robinson, Dennis Rogers, Greg Schorr, Alisa Schulman-Janiger, Peter Schulze, Eric Simkin, Paul Spong, Chelsea Stanley, Eugene Stewart, Jan Straley, Eva Stredulinsky, Helena Symonds, Wendy Szaniszlo, Nick Templeman, Earl Thomas, Wendy Thompson, Leah Thorpe, Howard Tom, Tim Tom, Dave and Maureen Towers, Andrew Trites, Jane Watson, Bruce Whittington, Rob Williams, Janie Wray, and Brianna Wright. We extend further thanks to Eva Stredulinsky for reviewing the Appendix of this report.

We also wish to thank the following organizations for their important contributions to our studies of Bigg's killer whales over the years: BC Cetacean Sightings Network, BC Parks, Canadian Coast Guard, Cascadia Research Collective, Center for Whale Research, Fisheries and Oceans Canada, Git'Gaat First Nation, Glacier Bay National Park, Gwaii Haanas Parks, Laskeek Bay Conservation Society, MERS Marine Education and Research Society, North Coast Cetacean Society/Cetacealab, Northwest Fisheries Science Center, Oceans Initiative, Orca Network, Pacific Orca Society/Orcalab, Raincoast Conservation Society, Strawberry Isle Marine Research Society, University of British Columbia Marine Mammal Research Unit, and the University of Alaska Southeast. Furthermore, we would also like to thank the following businesses for their co-operation with our studies of Bigg's killer whales: Alaska Sea Adventures, Bluewater Adventures, Juan De Fuca Express Water Taxi, Langara Fishing Lodge, Mackay Whale Watching, Orcella Expeditions, Prince of Whales Whale Watching, Seasmoke Whale Watching, and Stubbs Island Whale Watching. We apologize to any individual, organization, or business we have missed.

Table 1. Photographers and the numbers of photos from each that appear in this report.

PHOTOGRAPHER	# of PHOTOS
Robin Abernethy	1
Ken Balcomb	2
Carita Bergman	2
Melissa Boogaards	1
Jim Borrowman	3
John Calambokidis	2
Rich Chiovitti	1
Ed Chutter	5
Dave Ellifrit	6
Graeme Ellis	97
Brian Falconer	3
Jason Feaver	3
Rick Fleischman	1
John Ford	8
Mike Ford	1
John Forde	2
Randy Frank	3
Chris Gabrielle	1
Jay Gaydos	1
Brian Gisborne	68
Mike Greenfelder	2
Jackie Hildering	2
Harvey Humchitt	1
Ian Jansthma	2
Lauri Jemison	4
Mark Malleson	88

PHOTOGRAPHER	# of PHOTOS
Dena Matkin	10
Christie McMillan	12
Janet Neilson	2
Linda Nichol	1
Stef Olcen	1
Naeco Palm	1
Rod Palm	2
Bruce Paterson	4
Jake Pattison	5
Kathy Peavey	1
James Pilkington	4
Leah Robinson	2
Jordan Roderick	1
Dennis Rogers	1
Peter Schulze	1
Chelsea Stanley	1
Eugene Stewart	2
Wendy Szaniszlo	4
Nick Templeman	4
Leah Thorpe	1
Howard Tom	3
Dave Towers	1
Jared Towers	154
Rob Williams	1
Brianna Wright	6

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APPENDIX

Photo-identification catalogue of Bigg's (transient) killer whales from coastal waters of British Columbia, northern Washington, and southeastern Alaska.

T002B ♀ 1979



T002C ♀ 1989



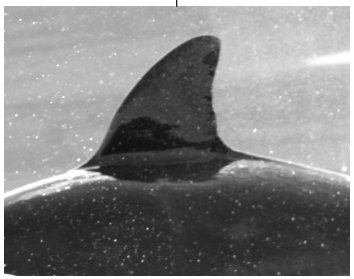
T002C1 ♂ 2002



T002C2 2005



T002C3 2011



T002B ♀ 1979



T002C ♀ 1989



T002C1 ♂ 2002

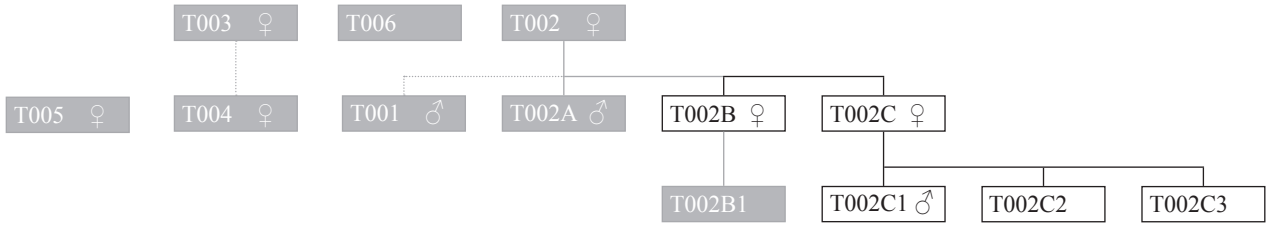


T002C2 2005



T002C3 2011





T007 ♀ ≤1961



T007A ♂ 1976



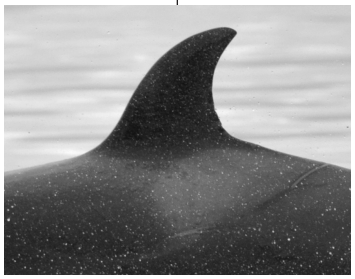
T007B ♀ 1982

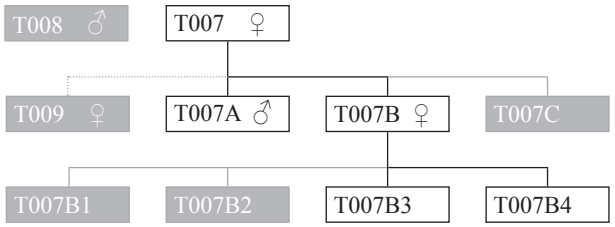


T007B3 2005



T007B4 2010





T007 ♀ ≤1961



T007A ♂ 1976



T007B ♀ 1982



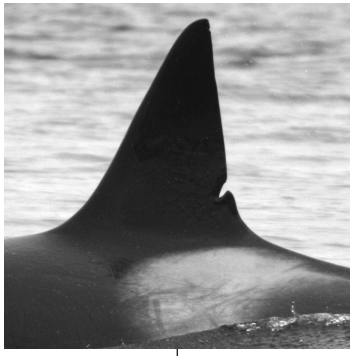
T007B3 2005



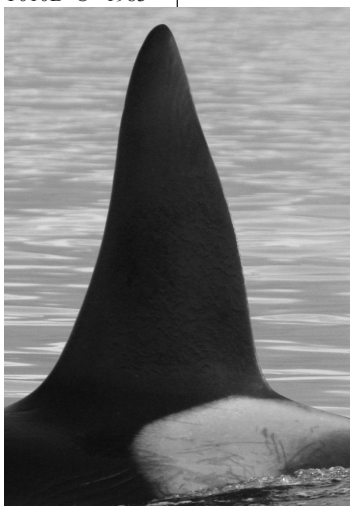
T007B4 2010



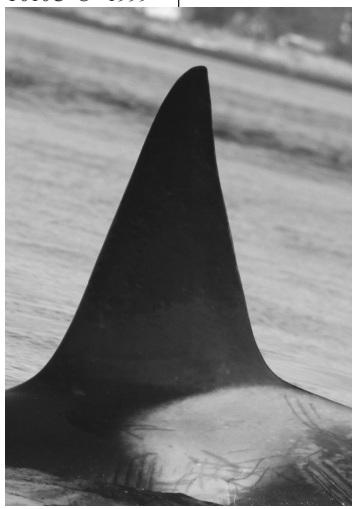
T010 ♀ ≤1963



T010B ♂ 1983



T010C ♂ 1999



T011 ♀ ≤1963



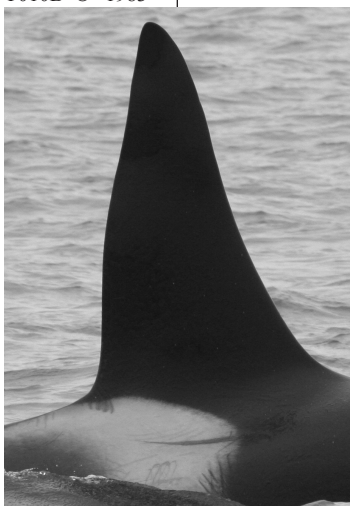
T011A ♂ 1978



T010 ♀ ≤1963



T010B ♂ 1983



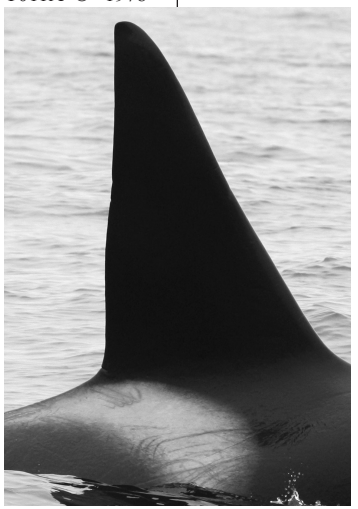
T010C ♂ 1999

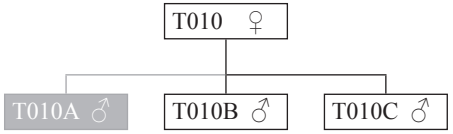


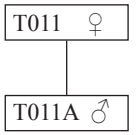
T011 ♀ ≤1963



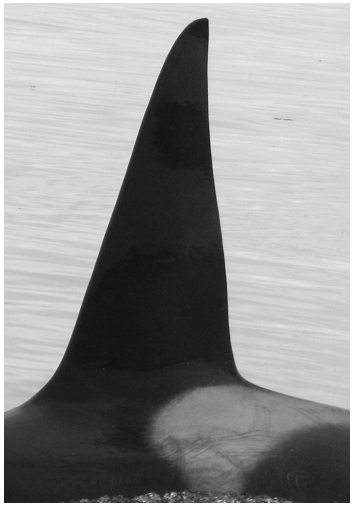
T011A ♂ 1978

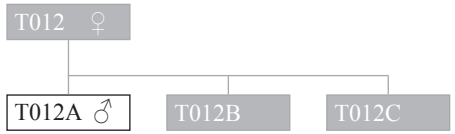




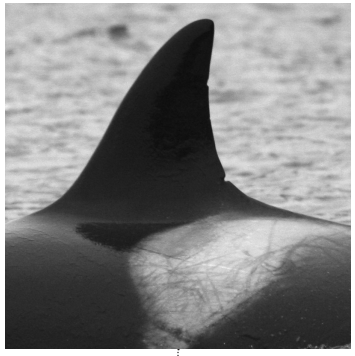


T012A ♂ 1982

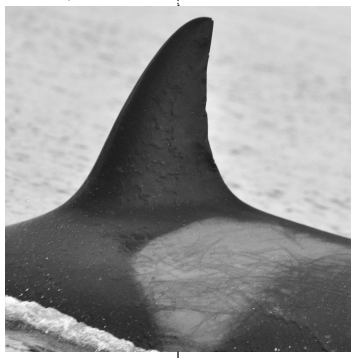


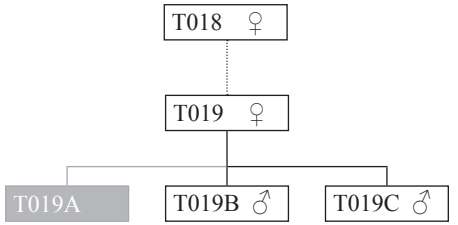


T018 ♀ <1974



T019 ♀ ≤1969





T019B ♂ 1995



T019C ♂ 2001



T012A ♂ 1982



T018 ♀ <1974



T019 ♀ ≤1969



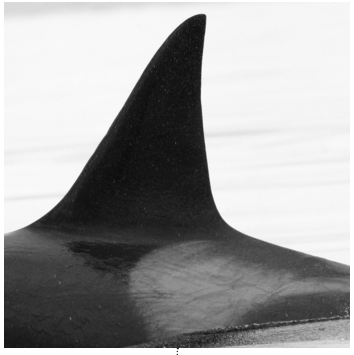
T019B ♂ 1995



T019C ♂ 2001



T021 ♀ <1968



T020 ♂ ≤1963



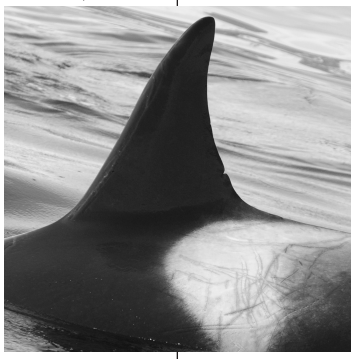
T023 ♀ ≤1965



T023C ♀ 1990



T023D ♀ 1993



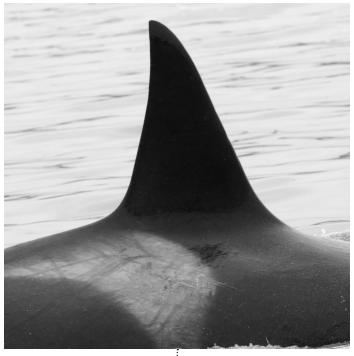
T023C3 2009



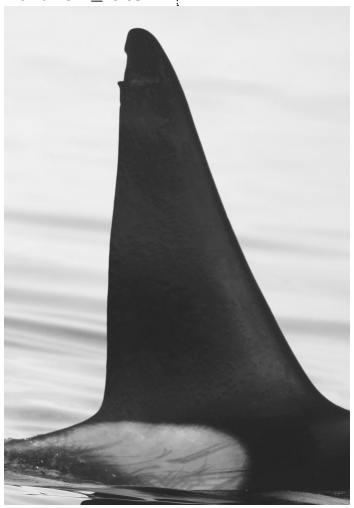
T023D3 2012



T021 ♀ <1968



T020 ♂ ≤1963



T023 ♀ ≤1965



T023C ♀ 1990



T023C3 2009

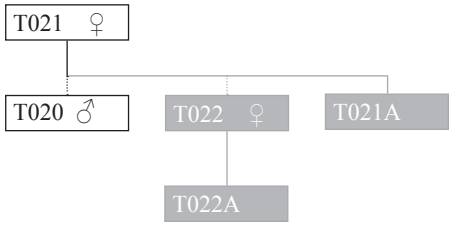


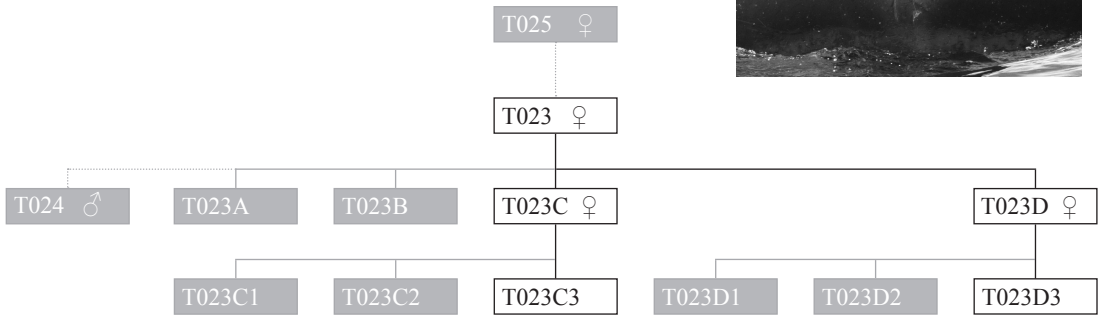
T023D ♀ 1993



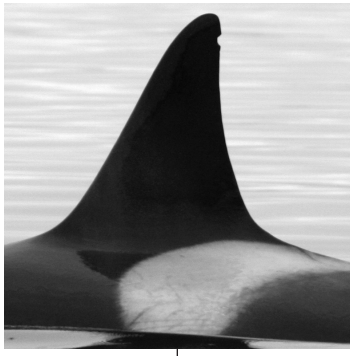
T023D3 2012







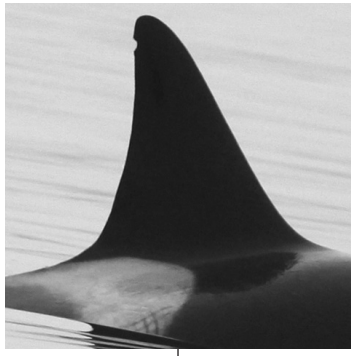
T026 ♀ ≤1966



T026A ♀ 1990

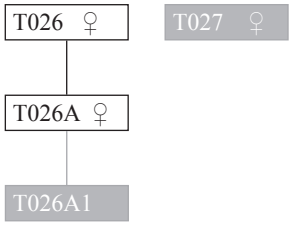


T026 ♀ ≤1966



T026A ♀ 1990





This catalogue presents identification photos and demographic data for Bigg's killer whales that are known to frequent coastal waters of British Columbia, northern Washington, and southeastern Alaska. Both left and right side identification images of individuals thought to be alive in 2012, as well as schematic diagrams that include deceased animals are provided. Schematic diagram boxes are faded for individuals that are not represented by an identification photograph on the same page and shaded for animals that are deceased. Animals are laid out alphanumerically in clusters of maternally related individuals that are known to regularly associate at the time of publication. Solid lines represent positively known relationships between individuals and dotted lines represent probable relationships that have been inferred from many years of observations. Individuals are named with alphanumeric designations based on their relation to their mother (when known) or by the order in which they were encountered. Approximate year of birth and sex (when known) are provided with each individual. Birth years of animals that were adults when first encountered are generally given as maximums. In most cases, ages given for older females have not been adjusted to compensate for the age(s) of their probable offspring.

Only individuals that have been encountered numerous times over several years and their kin are included in this catalogue. These animals have shown site fidelity to coastal waters of British Columbia, northern Washington, and southeastern Alaska and therefore are the individuals that are most likely to continue to be observed in these waters. As it is our intention to maintain on-going population studies of Bigg's killer whales through photo-identification we appreciate being forwarded any high-resolution photos from encounters with these whales. Photographs of animals that may not be represented in the following pages are of particular interest to us. Observers should send photos to pacific.whales@dfo-mpo.gc.ca and abide by the marine mammal regulations when viewing and photographing Bigg's killer whales unless authorized under a marine mammal research permit to make close approaches.

Identification photos and demographic data presented in this report are intended to facilitate on-going field research of Bigg's killer whales and provide the general public with a guide to enhance their observations. It would not have been possible without the contributions of identification photos and associated field notes from many colleagues, especially: Jim Borrowman, Volker Deecke, Brian Falconer, Brian Gisborne, Mark Malleson, Dena Matkin, Rod Palm, and Jan Straley. This report is also intended to supplement further publications focused on Bigg's killer whales, however, demographic data are not to be analyzed for further studies without our permission. Identification images and schematic diagrams are also not to be reproduced without permission, except in printed personal copies.

T028 ♀ ≤1972



T028A ♂ 1994



T028B 1997



T028C 2003



T028D 2007



T028 ♀ ≤1972



T028A ♂ 1994



T028B 1997

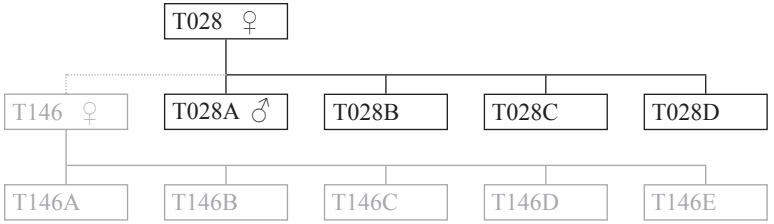


T028C 2003



T028D 2007





T030 ♀ ≤1967



T030A ♂ 1986



T030B ♀ 1993

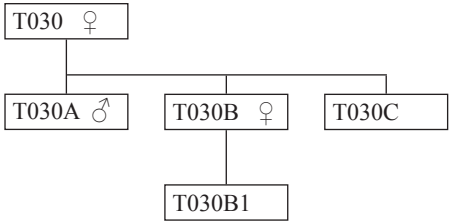


T030C 2005

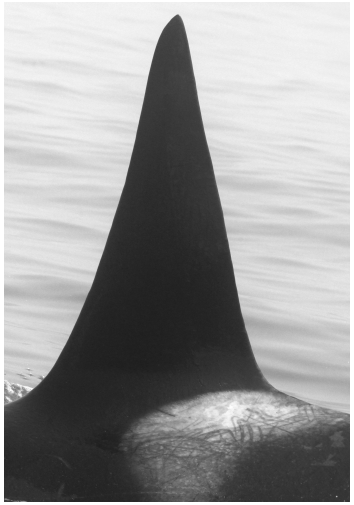


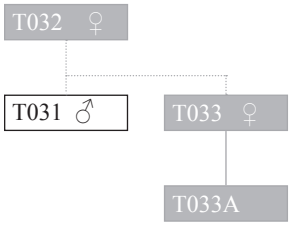
T030B1 2012





T031 ♂ ≤1954





T030 ♀ ≤1967



T030A ♂ 1986



T030B ♀ 1993



T030B1 2012



T030C 2005



T031 ♂ ≤1954



T034 ♀ ≤1970



T034A 2007



T035 ♀ ≤1970



T035A ♀ 1998



T035A1 2010



T034 ♀ ≤1970



T034A 2007



T035 ♀ ≤1970

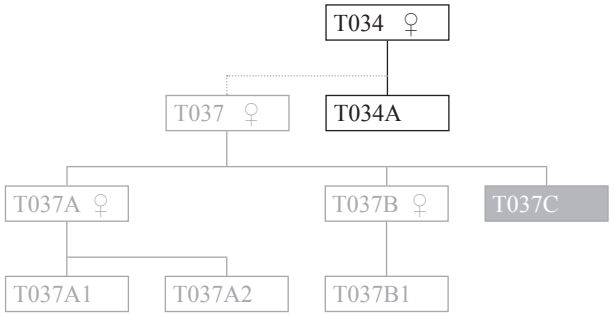


T035A ♀ 1998



T035A1 2010







T036 ♀ ≤1970



T036A ♀ 1990



T036B ♀ 1998



T036A1 2005

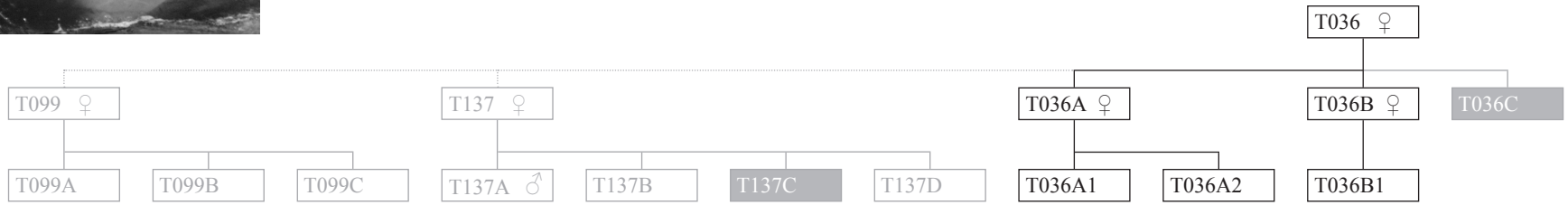


T036A2 2012



T036B1 2009





T036 ♀ ≤1970



T036A ♀ 1990



T036B ♀ 1998



T036A1 2005



T036A2 2012



T036B1 2009



T037 ♀ 1979



T037A ♀ 1994



T037B ♀ 1998



T037A1 2007



T037A2 2009



T037B1 2012

