

The Status and Occurrence of Piping Plover (*Charadrius melodus*) in British Columbia.

By Rick Toochin. Submitted: April 15, 2018.

Introduction and Distribution

The Piping Plover (*Charadrius melodus*) is an endangered shorebird that according to Bird Life International (2018) has a worldwide population of only 8000 birds. This species inhabits wide, open beaches, alkali flats, and sand flats of North America (COSEWIC 2013). It breeds primarily along the Atlantic coast from North Carolina to eastern Canada and the French Islands of Saint Pierre and Miquelon, inland along rivers and wetlands of the northern Great Plains from Nebraska to the southern Prairie Provinces, and along portions of the western Great Lakes in the United States and western Ontario (Elliott-Smith and Haig 2004). In winter, most individuals are found on coastal beaches, sand flats, and mudflats from the Carolinas to Yucatan; some scatter through the Bahamas and the West Indies (Elliott-Smith and Haig 2004). During the past 50 years, breeders have disappeared from Illinois, Indiana, Ohio, Pennsylvania, Lake Ontario, the Gaspé Peninsula, and the north shore of Quebec (Haig and Oring 1985, Haig *et al.* 2005, (Elliott-Smith and Haig 2004). There are five pairs or fewer that breed in each of the following: St. Pierre and Miquelon Islands; Lake of the Woods, Minnesota and Ontario; Wisconsin; Kansas; and Iowa (Haig *et al.* 2005). Recent re-colonization includes sites in Colorado, Kansas, and in Wisconsin on Lake Superior and Lake Michigan (Haig *et al.* 2005). Since 1990, there have been fewer breeding sites in the American Northern Great Plains and the Prairie region of Canada (Elliott-Smith and Haig 2004). Overall numbers have also declined in the Prairie region of Canada and along the eastern and western periphery of their range in the American Northern Great Plains (Elliott-Smith and Haig 2004). The eastern populations in the United States have increased, particularly in the central part of their range in areas such as New England and New York, but numbers have declined in eastern Canada and along the southern edge of the range in North Carolina (Elliott-Smith and Haig 2004). Distribution along the Great Lakes is greatly restricted compared to historical range (Russell 1983a, Haig *et al.* 2005). Great Lakes numbers almost doubled between 1991 and 2001 and have now almost tripled (to 100 breeding individuals (Elliott-Smith and Haig 2004); however, Great Lakes birds represent less than 2.0% of the species range and most historic sites have not been recolonized except in Wisconsin (Haig *et al.* 2005)

Numerous studies have been conducted across the species' range, and conservation efforts are well organized in breeding areas across North America (Elliott-Smith and Haig 2004). Several recent efforts have also focused on winter areas (Elliott-Smith and Haig 2004). The Piping Plover's coexistence with human use of beaches is increasingly dependent on management that includes fencing nests, restricting off-road vehicle access, and predator control (Elliott-Smith

and Haig 2004). Fewer than 3,000 breeding pairs of Piping Plovers were detected in the United States and Canada in 2001 (Elliott-Smith and Haig 2004).

The species was considered a single unit and designated Threatened in April 1978 (COSEWIC 2013). Status re-examined and designated Endangered in April 1985 (COSEWIC 2013). In May 2001, the species was re-examined and split into two groups according to subspecies (COSEWIC 2013). The subspecies of Piping Plover (*Charadrius melodus circumcinctus*) was designated Endangered in May 2001 (COSEWIC 2013). Status re-examined and confirmed in November 2013 (COSEWIC 2013). This plover is divided into two subspecies based on geographic distribution, presence or absence of complete neckband, and mitochondrial DNA (Elliott-Smith and Haig 2004).

The nominate subspecies of the Piping Plover (*Charadrius melodus melodus*) is found in Atlantic populations (Elliott-Smith and Haig 2004). These birds nest along beaches in New Brunswick, Prince Edward Island, Nova Scotia, Quebec, Newfoundland, Saint Pierre and Miquelon (France), southern Maine, New Hampshire, Rhode Island, Massachusetts, Connecticut, New York, New Jersey, Delaware, Maryland, Virginia, and North Carolina (Haig *et al.* 2005). Breeding birds observed in South Carolina on Waites Island during 1990 and 1991 (Murray and McDavit 1993), but no birds recorded there recently (Elliott-Smith and Haig 2004).

The interior subspecies of the Piping Plover (*Charadrius melodus circumcinctus*) is found breeding on the Northern Great Plains and the range extends from alkali wetlands in south-eastern Alberta through southern Saskatchewan and Manitoba to Lake of the Woods in south-western Ontario and north-western Minnesota, south along major prairie rivers (Yellowstone, Missouri, Niobrara, Platte, and Loup), the Arkansas River and reservoirs in eastern Colorado, the Kansas River in Kansas, and alkali wetlands in north-eastern Montana, North Dakota, South Dakota, Nebraska, and Iowa (Ferland and Haig 2002, Haig *et al.* 2005). This species is occasionally sighted on Lake Athabasca in northern Saskatchewan (Adams 1984). Piping Plover breeding sites along the Great Lakes are restricted to several beaches along Lakes Superior, Michigan, and Huron in northern Michigan and Wisconsin (U.S. Fish and Wildlife Service 2003c, Haig *et al.* 2005, (Elliott-Smith and Haig 2004).

The Piping Plover breeds on open sandy beaches and a variety of habitats (Elliott-Smith and Haig 2004). Birds observed in the Northern Great Plains and the Prairie region of Canada during a 2001 census used the following habitat types: alkali lakes (34.3%), reservoirs (31.3%), rivers (19.7%), freshwater lakes (7.6%), dry alkali lakes (2.4%), sandpits (2.3%), industrial ponds (0.4%), and gravel mines (0.1%; Haig *et al.* 2005). Piping Plovers use beaches, sand flats, dredge islands, and drained river floodplains where vegetative cover is usually less than 20% (Haig

1986, Schwalbach 1988, Sidle and Kirsch 1993). Natural islands occur midstream in wide, open-channel beds, while spoil islands created by sand and gravel-mining operations are located adjacent to the river (Elliott-Smith and Haig 2004). Habitat on large inland lakes such as Lake Winnipeg, in Manitoba, Lake of the Woods, Minnesota, and the Great Lakes (Elliott-Smith and Haig 2004) On the Atlantic coast, the Piping Plover prefers beaches that are sparsely vegetated with open sand, gravel, or cobble, that is frequently found adjacent to sand dunes (Haig 1986, Brown 1987d, Burger 1987b, Wemmer 2000, Wemmer *et al.* 2001).

During the 2001 census of the Atlantic states and provinces, Piping Plovers were observed in the following habitat types: barrier islands (39.2%), ocean fronts (37.1%), bays (11.6%), sand bars (2.2%), spoil islands (1.4%), tidal creeks/marshes (1.2%), peninsulas (1.0%), reservoirs (0.2%), brackish lakes (0.1%), rivers (0.1%) and industrial ponds (<0.1%) (Haig *et al.* 2005). Birds using large lakes, rivers, or coastal beaches frequently place nests in or near Least Tern (*Sternula antillarum*), Common Tern (*S. hirundo*), or Arctic Tern (*S. paradisaea*) colonies (Cairns 1977, Burger 1987b, Schwalbach 1988). On Atlantic Coast, areas with access to ephemeral pools, salt-pond, or bay habitat preferred and may result in increased fledging success for beach nesting birds (Loegering and Fraser 1995, Regosin 1998, Elias *et al.* 2000).

Peak spring migration for Piping Plovers occurs in mid-April (Elliott-Smith and Haig 2004). This species is scarce on Texas winter grounds by mid-May (Elliott-Smith and Haig 2004). Piping Plovers arrive at southern Manitoba and central North Dakota breeding areas the third week of April to second week of May (Prindiville 1986, Elliott-Smith and Haig 2004). Males seen before females at some local breeding sites such as Clandeboye Bay, at Lake Manitoba, but both sexes seem to arrive simultaneously at major sites such as West Shoal Lake, in Manitoba (Elliott-Smith and Haig 2004). Male birds may then disperse to smaller sites alone or with a female (Elliott-Smith and Haig 2004). Spring Piping Plovers in New Jersey arrive in early to mid-March, peak late March to mid-April (Elliott-Smith and Haig 2004). In Massachusetts, first spring arrivals occur around March 15 and peak in late April-early May (Elliott-Smith and Haig 2004).

Knowledge of migration routes and stop over sites is incomplete (Elliott-Smith and Haig 2004). In the fall, small groups of Atlantic birds move south along the coast and may stop at several places en route to the wintering grounds (Elliott-Smith and Haig 2004). Large congregations are seen at Atlantic Coast sites during the fall; in some cases these congregations may represent pre-migratory staging by local breeders (Elliott-Smith and Haig 2004). However, some mid-latitude sites such as the Outer Banks of North Carolina, receive more birds in fall than during the breeding season or winter which suggests at least some Atlantic birds are stopping to refuel between migration bouts (Elliott-Smith and Haig 2004). The Atlantic Coast migration pathway is

similar during the spring, but stopover use is not well documented (Elliott-Smith and Haig 2004).

In fall, Piping Plovers depart the Massachusetts breeding sites by late August (Strauss 1990, Macivor 1990). Some Manitoba and North Dakota birds leave breeding sites in late June or early July and even earlier in years when bad weather destroys first nests, but others with nests hatching in late July or early August stay into September (Elliott-Smith and Haig 2004). Generally, females go first, then unpaired males, males with fledglings, followed by unaccompanied juveniles (Elliott-Smith and Haig 2004). Peak return to Texas beaches is in August and September, although small numbers may arrive as late as November (Elliott-Smith and Haig 2004).

Inland breeding Piping Plovers appear to migrate nonstop to the Gulf of Mexico or the Atlantic Coast (Elliott-Smith and Haig 2004). Birds from the Great Lakes and the Northern Plains are rare at seemingly appropriate inland stopover places such as the Great Salt Plains National Wildlife Refuge, in Oklahoma, and Cheyenne Bottoms National Wildlife Refuge, in Kansas (Haig 1986). Existing stopover records suggest that migration routes are predominantly south/southeast in the fall (Elliott-Smith and Haig 2004). However, a single Manitoba breeder was seen during the fall on Lake Erie, suggesting some inland birds may first migrate east to the Atlantic before flying south (Elliott-Smith and Haig 2004). States with the greatest number of fall records were Illinois and Tennessee; each had over 40 records, but they spanned a number of years, and most were of single birds (Elliott-Smith and Haig 2004). Spring migration patterns appear similar, with few inland breeders stopping on the flight north (Elliott-Smith and Haig 2004). Many states have single records of spring migrants, but Iowa was the only state with greater than 40 records (Elliott-Smith and Haig 2004).

The Piping Plover winters in the United States from North Carolina south on the Atlantic Coast and across the entire Gulf Coast, with the greatest number of birds in Texas (Haig *et al.* 2005). Pertinent information regarding winter distribution of the Piping Plover outside United States is currently incomplete (Haig *et al.* 2005). Low winter numbers may in part be a product of reduced detection relative to breeding season surveys due to inclement weather, diffuse habitat, and increased mobility during winter (Haig *et al.* 2005, Elliott-Smith and Haig 2004). While the International Piping Plover Census aims to standardize survey effort, greater local monitoring efforts on breeding grounds may also contribute to seasonal disparity in numbers (Elliott-Smith and Haig 2004). Results from the three International Piping Plover Censuses indicate the Northern Plains breeders winter predominantly on the Gulf Coast, while Atlantic breeders winter further south on Atlantic Coast (Elliott-Smith and Haig 2004). Most birds from Great Lakes observed on Atlantic Coast and Gulf Coast of Florida (94%) (Elliott-Smith and

Haig 2004), but some winter further west along the Gulf Coast (Ferland and Haig 2002). Band re-sightings indicate some individuals that winter together also occupy the same breeding sites (Haig *et al.* 2005, Elliott-Smith and Haig 2004); however, among Great Lakes birds only one pair is known to have wintered together (Elliott-Smith and Haig 2004). Some birds cross over to the Gulf and to the Atlantic and birds from distant breeding areas may winter together at multiple winter sites (Elliott-Smith and Haig 2004). Massachusetts's birds have wintered in Texas and Michigan birds shared sites with Eastern Canada and South Dakota birds (Haig and Oring 1988a, Haig *et al.* 2005).

Outside the United States, the Laguna Madre of Tamaulipas, Mexico may be an important wintering area (Mabee *et al.* 2001). Other sightings from sites in Mexico include Veracruz, northern Yucatan, northern Quintana Roo, Puerto Peñasco, Sonora, and San Blas, Nayarit (Howell 1993b, Haig and Oring 1985). Previously the Piping Plover was thought to be a rare winter visitor in Cuba (Blanco *et al.* 1993b), however, increased surveying suggests small numbers regularly winter in Cuba and the Bahamas (Ferland and Haig 2002, Haig *et al.* 2005, Elliott-Smith and Haig 2004). There are occasional sightings of Piping Plovers from Barbados, Bermuda, Puerto Rico, Virgin Islands, Haiti, Guadeloupe, and Curacao (Haig and Oring 1985, Ridgely *et al.* 2003, Haig *et al.* 2005, Elliott-Smith and Haig 2004). There are historic records of Piping Plovers from Jamaica and Dominican Republic (Haig and Oring 1985), but none seen on recent surveys (Elliott-Smith and Haig 2004). There are also occasional records of the Piping Plover for south-western Ecuador, and no other records for South America or the mainland south of northern Mexico (Haig 1985, Ridgely *et al.* 2003).

Along the west coast of North America, the Piping Plover is an accidental vagrant. In California, there are 4 accepted records by the California Bird Records Committee (Hamilton *et al.* 2007). One is an April record, the rest involve birds that either turned up in the late fall to spend the winter or birds that wintered (Hamilton *et al.* 2007). In Oregon, there are 2 accepted records by the Oregon Bird Records Committee with the first record an adult in fading alternate plumage Neahkahnie Beach, in Tillamook County, September 6 and 8, 1986 and 1 bird from the South Jetty Siuslaw River, in Lane County, on August 20, 2012 (OFO 2016). In Washington State, there is a single accepted record by the Washington Bird Records Committee of an adult photographed at Reardan, in Lincoln County from July 13-16, 1990 (Wahl *et al.* 2005, WBRC 2016). In British Columbia, the Piping Plover is an accidental species with 1 photographed record and 2 sight records (Toochin *et al.* 2014).

Identification and Similar Species

The identification of the Piping Plover is covered in all standard North American field guides. This is a small plover measuring 18 cm in length, with a wingspan of 48 cm, and weighing 43-63

grams (Sibley 2000, Dunn and Alderfer 2011). The Piping Plover is coloured like a very pale Semipalmated Plover (*Charadrius semipalmatus*), usually easily distinguishable when a direct comparison is possible (Paulson 2005). Beware of any aged leucistic Semipalmated Plover, an extremely rare plumage, but can look similar to a Piping Plover (D. Cecile Pers. Comm.). If the plumage is too difficult to distinguish then look at structural features such as the longer tibia found on all ages of the Semipalmated Plover when compared to the Piping Plover (D. Cecile Pers. Comm.).

Adults hold breeding (Alternate) plumage from February to August (Sibley 2000). The forehead is white, with a black frontal-bar virtually reaching the eyes (Message and Taylor 2005). There is a distinct white supercilium that is mainly to the rear of the all dark eye (Sibley 2000). Across the breast on adult male is a narrow, complete, or broken black breast-band (Message and Taylor 2005). On adult female the breast-band is brown and often incomplete (Message and Taylor 2005). There is a narrow white neck collar that extends around the auricular patch, the throat, and to the face (Message and Taylor 2005). The bill is thick, stubby, with an orange base, and a black tip (Dunn and Alderfer 2011). The crown, nape, and auricular area are all soft gray-brown upper parts (Sibley 2000). The wings folded extend to tail tip (Hayman *et al.* 1986). In flight the upper-wing has gray upper-parts and wing coverts with black secondaries and primaries that show a prominent white wing bar (Message and Taylor 2005). The underside of the wing in flight is white (Sibley 2000). The lower breast to the vent is white (Dunn and Alderfer 2011). The upper tibia is short with the rest of the tarsus long and bright orange (Message and Taylor 2005). The tail when open has white upper tail coverts with a dark tail tip that is edged in white along the outer feather tips (Sibley 2000).

Winter (Basic) plumage is held from September to February (Sibley 2000). Looks very much like breeding adult birds, but the bill is entirely black, there is no black bar across the forehead, and the breast band is not black, but a pale grayish-brown (Message and Taylor 2005). The legs are orange (Dunn and Alderfer 2011).

Juvenile plumage is held from July to September (Sibley 2000). Birds at this age are similar in appearance to winter plumaged adults, but have pale fringes to the upper-part feathers, producing a scaly effect (Message and Taylor 2005).

Flight call is a soft, whistled “*peep*” that is given by both birds standing and in flight (O’Brien *et al.* 2006). Frequently gives alarm call that is a soft “*pee-werp*”, with the second syllable much lower in pitch (O’Brien *et al.* 2006).

The Snowy Plover (*Charadrius nivosus*) is similarly pale above, but is quite noticeably smaller measuring 16 cm in length with a thinner, longer bill, and with longer legs that range in colour from dark-gray to dull grayish-yellow (Dunn and Alderfer 2011). The Semipalmated Plover is similar to the Piping Plover in size and proportions, but has much darker upperparts and always has dark colouration on the lores and auriculars (Sibley 2000, Dunn and Alderfer 2011). The Wilson's Plover (*Charadrius wilsonia*) has a much longer, heavier bill, gray to grayish-pink legs, and darker upperparts (Message and Taylor 2005). Among these species, only Piping Plover shows a complete white band across upper tail coverts in flight (Elliott-Smith and Haig 2004).

Occurrence and Documentation

The Piping Plover is an accidental vagrant species anywhere in British Columbia with a single photographed record (D. Cecile Pers. Comm.). The first record for British Columbia involved 2 adult birds found by Brenda Jackson near Waglisla, Bella Bella on August 30, 1976 (Shepard 1977a, Campbell *et al.* 1990b). There are no photographs taken and the record lacked details and as a result was left as hypothetical by Campbell *et al.* (1990b). The second record for British Columbia was a juvenile found by the late Phil Gehlen at a farm pond in Vernon on September 10, 2000 (Gehlen 2000).

The third record for British Columbia, but the first photographed record for the province was an adult in breeding plumage found by Doug Martin and was seen by other observers between 96th-72th St., in Boundary Bay, in Delta from August 24-25, 2017 (D. Cecile Pers. Comm.). There was initial confusion about the identity of this bird given that the original pictures taken were of lesser quality and incredibly in the same area was a rare leucistic Semipalmated Plover (D. Cecile Pers. Comm.). Fortunately good quality photographs were taken which eventually confirmed the identification as a Piping Plover (D. Cecile Pers. Comm.). These pictures can be viewed at:

<http://bcbirdalert.blogspot.ca/2017/08/rba-piping-plover-in-delta-august-24.html>.

The bird that turned up in Boundary Bay could have been miss-directed by the heavy smoke that blanketed British Columbia and parts of Alberta in the summer of 2017 (M. Meredith Pers. Comm.). In fall migration, the Piping Plover tends to fly nonstop to the Gulf of Mexico to the wintering grounds in a south to southeastern direction away from British Columbia. It would seem unlikely that this species, unless it encounters some environmental reason, such as severe weather or heavy smoke from massive forest fires, would venture very often into British Columbia. Areas most likely to have any future records would include the East Kootenay or possibly the Cariboo regions of the province.

Table 1: Records of Piping Plover for British Columbia:

- 1.(1) juvenile September 10, 2000: Phil Gehlen: farm pond in Vernon, Okanagan (Gehlen 2000, Toochin *et al.* 2014)
- 2.(1) adult breeding plumage August 24-25, 2017: Doug Martin, mobs (photo) 96th-72th St., Boundary Bay (D. Cecile Pers. Comm.)

Hypothetical Records

- 1.(2) adults August 30, 1976: Brenda Jackson: near Waglisla, Bella Bella (Shepard 1977a, Campbell *et al.* 1990b)

Acknowledgements

I want to thank Don Cecile for editing the original manuscript and providing details on the Boundary Bay Piping Plover. I also want to thank Meteorologist Mitch Meredith for information on the 2017 British Columbia Fires.

References

- Adams, C. I. G. 1984. Piping Plover at Lake Athabasca, Saskatchewan: a significant northward expansion. *Can. Field-Nat.* 98: 59-60.
- BirdLife International (2018). Species factsheet: *Charadrius melodus*. Downloaded from <http://www.birdlife.org> on 24/01/2018. Recommended citation for factsheets for more than one species: BirdLife International (2018) IUCN Red List for birds. [Online Resource] Retrieved from <http://www.birdlife.org> [Accessed: January 24, 2018].
- Blanco, P., J. P. Goosen, H. González Alonso and J. Sirois. 1993b. Occurrences of the Piping Plover in Cuba. *J Field Ornithol.* 64: 520-526.
- Brown, S. 1987d. Comparative breeding biology of the Piping Plover and Spotted Sandpiper. Master's Thesis, Univ. Michigan, Ann Arbor.
- Burger, J. 1987b. Physical and social determinants of nest site selection in Piping Plover in New Jersey. *Condor* 89: 881-918.
- Cairns, W. E. 1977. Breeding biology and behaviour of the Piping Plover (*Charadrius melodus*) in southern Nova Scotia. M. Sc. thesis, Dalhousie Univ., Halifax, N.S.
- COSEWIC. 2013. COSEWIC assessment and status report on the Piping Plover *Circumcinctus* subspecies (*Charadrius melodus circumcinctus*) and the *melodus* subspecies (*Charadrius melodus melodus*) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xiv + 39 pp. (www.registrelep-sararegistry.gc.ca/default_e.cfm).

- Dunn, J. L. and J. Alderfer. 2011. National Geographic Field Guide to the Birds of North America. National Geographic Society, Washington D.C. 574pp.
- Elias, S. P., J. D. Fraser and P. A. Buckley. 2000. Piping Plover brood foraging ecology on New York barrier islands. *J. Wildl. Manage.* 64: 346-354.
- Elliott-Smith, Elise and Susan M. Haig. 2004. Piping Plover (*Charadrius melodus*), version 2.0. In *The Birds of North America* (P. G. Rodewald, editor). Cornell Lab of Ornithology, Ithaca, New York, USA. [Online Resource] Retrieved from <https://doi.org/10.2173/bna.2> [Accessed: February 1, 2018].
- Ferland, C. L. and S. M. Haig. 2002. 2001 International Piping Plover census. Corvallis, OR.: U.S. Geological Survey, Forest and Rangeland Ecosystem Science Center.
- Fish, U.S. and Wildlife Service. 2003c. Recovery Plan for the Great Lakes Piping Plover (*Charadrius melodus*). Ft. Snelling, Minnesota: U.S. Fish and Wildl. Serv.
- Haig, S. M. 1985. The status of the Piping Plover in Canada. Ottawa, Ont: Nat. Mus. Canada.
- Haig, S. M. 1986. Piping Plover distribution and biology. Washington, DC: U. S. Fish & Wildlife Service.
- Haig, S. M. and L. W. Oring. 1985. The distribution and status of the Piping Plover throughout the annual cycle. *J. Field Ornithol.* 56: 334-345.
- Haig, S. M. and L. W. Oring. 1988a. Distribution and dispersal in the Piping Plover. *Auk* 105: 630-638.
- Haig, S. M., C. L. Ferland, D. Amirault, F. J. Cuthbert, J. Dingleline, J. P. Goosen, A. Hecht and N. McPhillips. 2005. A complete species census and evidence for regional declines in piping plovers. *J. Wildl. Manage.* 69(1): 160-173.
- Hamilton, R. A., M. A. Patten, and R. A. Erickson. 2007. Rare Birds of California: A work of the California rare bird record committee. Western Field Ornithologists, Camarillo, California. 605pp.
- Hayman, P., J. Marchant and T. Prater. 1986. Shorebirds: An identification guide to the waders of the world. Boston: Houghton Mifflin Company.
- Howell, S. N. G. 1993b. Status of the Piping Plover in Mexico. *Euphoria* 2: 51-54.
- Loefering, J. P. and J. D. Fraser. 1995. Factors affecting Piping Plover Chick survival in different brood-rearing habitats. *J. Wildl. Manage.* 59: 646-655.

- Mabee, T. J., J. H. Plissner, S. M. Haig and J. P. Goossen. 2001. Winter distributions of North American plover in the Laguna Madre regions of Tamaulipas, Mexico and Texas, USA. *Wader Study Group Bull.* 94: 39-43.
- Macivor, L. K. 1990. Population dynamics, breeding ecology, and management of Piping Plovers on outer Cape Cod, Massachusetts. Master's Thesis, Univ. Mass., Amherst, MA.
- Message, S. and D. Taylor. 2005. *Shorebirds of North America, Europe and Asia: A Guide to Identification.* Princeton University Press, New Jersey.
- Murray, R. and M. W. McDavit. 1993. First nesting records of Piping Plover in South Carolina. *Chat* 57: 10-11.
- OFO. 2016. Oregon Field Ornithologists - Records Committee. [Online resource] <http://www.oregonbirds.org/index.html>. [Accessed: December 6, 2017].
- O'Brien, M., R. Crossley, and K. Karlson. 2006. *The Shorebird Guide.* Houghton Mifflin Co., New York. 477pp.
- Paulson, D. 2005. *Shorebirds of North America: The Photographic Guide.* Princeton University Press, New Jersey. 362pp.
- Prindiville, E. M. 1986. Habitat selection and productivity of Piping Plovers in central North Dakota. Master's Thesis, Univ. Missouri, Columbia, MO.
- Regosin, J. V. 1998. Chick behavior, habitat use, and reproductive success of Piping Plovers at Goosewing Beach, Rhode Island. *J. Field Ornithol.* 69: 228-234.
- Ridgely, R. S., T. F. Allnutt, T. Brooks, D. K. McNicol, D. W. Mehlman, B. E. Young and J. R. Zook. 2003. *Digital distribution maps of the birds of the Western Hemisphere, version 1.0.* Arlington, VA: NatureServe.
- Russell, R. P. 1983a. The Piping Plover in the Great Lakes region. *Am. Birds* no. 37:951-955.
- Schwalbach, M. J. 1988. Conservation of Least Terns and Piping Plovers along the Missouri River and its major western tributaries in South Dakota. Master's Thesis, South Dakota State Univ., Brookings, SD.
- Sibley, D. A. 2000. *The Sibley field guide to birds.* Alfred A. Knopf, New York. 545pp.
- Sidle, J. G. and E. M. Kirsch. 1993. Least Tern and Piping Plover nesting at sand pits in Nebraska. *Waterbirds* 16: 139-148.

- Strauss, E. 1990. Reproductive success, life history patterns, and behavioral variation in a population of Piping Plovers subjected to human disturbance. Ph. D. diss., Tufts Univ., Boston, MA.
- Toochin, R., J. Fenneman and P. Levesque. 2014. British Columbia Rare Bird List: Casual and Accidental Records: January 1, 2014: 3rd Edition. [Online resource] Retrieved from <http://ibis.geog.ubc.ca/biodiversity/efauna/documents/BCRareBirdListVersionXZABC.pdf> [Accessed: December 9, 2015].
- Wahl, T. R, B. Tweit, and S. Mlodinow. 2005. Birds of Washington: Status and Distribution. Oregon State University Press, Corvallis, Oregon. 436pp.
- WBRC. 2016. Washington Bird Records Committee – Summary of Decisions. Washington Ornithological Society, Seattle, WA. [Online resource] <http://www.wos.org/wbrccaccepteddec2014.pdf> [Accessed: July 12, 2017].
- Wemmer, L. 2000. Conservation of the Piping Plover (*Charadrius melodus*) in the Great Lakes Region: A Landscape Ecosystem Approach. Ph. D. dissertation, University of Minnesota.
- Wemmer, L. C., U. Ozesmi and F. J. Cuthbert. 2001. A habitat-based population model for the Great Lakes population of the Piping Plover (*Charadrius melodus*). Biol. Conserv. 99: 169-181.