

Roberts Bank Terminal 2 Project – ECCC Undertaking #31 Response

On the issue of the numbers of Western Sandpipers that stopover at Roberts Bank, expressed as a percentage of global population

In this Undertaking, ECCC reviewed the calculations on the numbers of Western Sandpipers that use Roberts Bank during migration, expressed as a percentage of global population, hereafter 'percent use'. In this Undertaking, ECCC also includes population estimates for the Roberts Bank site for 1991 to 2018, as requested by Registered Participant Mr. Jones (Fraser Voices).

1. Data sources for calculating percent use

The value for 'percent use' value is calculated from two sources: (i) the estimate of numbers of birds stopping over at Roberts Bank; and (ii) the estimate of the global population of Western Sandpipers. The number of birds stopping over at Roberts Bank is derived from counts conducted by the Canadian Wildlife Service since 1991 (Drever et al. 2014). The global population estimate is based on counts at the Copper River Delta, Alaska, considered the terminal stopover site before birds disperse to breed (Bishop et al. 2000). The global population estimate (as quoted in Drever et al. (2014)) is derived from counts conducted over 4 years from 1992 to 1995 on the Copper River Delta (Bishop et al. 2000; Figure 1). These estimates range from 2.8 to 4.3 million birds, with a midpoint of 3.5 million birds. These estimates are now ~25 years old.

Both sources of count data vary due to annual and seasonal differences in weather conditions, observer experience, bird behavior, and other factors. However, they represent the best available information, and considered generally reliable.

2. Differing interpretations of text in Drever et al. (2014)

Differences in the estimates of the "percent use" by WESA have arisen due to different interpretations of Drever et al. (2014). Drever et al. (2014) presents trend analyses and population estimates of Western Sandpipers and Dunlin at the Roberts Bank study site from 1991 to 2013. The full text under consideration reads (page 20):

"The total Western Sandpiper population for the Pacific Flyway has been estimated to be 3.5 million birds (range = 2.8–4.3 million; Bishop et al. 2000, Morrison et al. 2001). Thus, the range of median population estimates of 600,000 birds in our study suggests that 14%–21% of the total flyway population regularly passes through the Brunswick Point study site during spring migration, and possibly up to 42%–64% in some years given the median population estimate of 1.8 million Western Sandpipers in 1994."

In ECCC's Written Submission (CEAR 1637) and Oral Presentation to the Panel (CEAR 1775), ECCC has estimated percent use as the higher range of values (42–64%) presented in Drever et al. (2014) because this value was derived from the time period when counts at Roberts Bank were conducted concurrently with counts at the Copper River Delta (Figure 1). In contrast, the Proponent's Oral Presentation to the Panel (CEAR 1778), presented ~17% of the total population of Western Sandpipers stop at Roberts Bank annually during their northward migration. ECCC understands the 17% value represents the midpoint value between 14 and 21%.

3. Decline in Western Sandpipers

The Western Sandpiper is currently considered a species in decline, in contrast to inferences made in Drever et al. (2014), which only included data to 2013. The most current available trend estimate derived from counts of Western Sandpipers at Roberts Bank show a negative trend (-2%/year) over time, 1991 to 2018 ($\beta_{yr} = -0.023$, $SE = 0.012$, $Z = -1.89$, $P = 0.059$), determined to be significant under the criteria set out in Skagen et al (2003) and Bart et al. (2005). These authors recommend an α -level of 0.15 to avoid Type 2 statistical errors. This negative trend in counts of

Western Sandpipers at Roberts Bank (1991 to 2017) was documented in a recent ECCC submission to the Panel, and provided as part of the reply to the 2016 and 2017 biofilm reports (CEAR #1346). Further, this decline appears to be occurring across much of the species' wintering range as observed in Audubon's Christmas Bird Counts, 1966 to 2017 (Meehan et al. 2018; Figure 2). The similarity between trends at Roberts Bank and from the large-scale Christmas Bird Counts underscores the utility of monitoring at Roberts Bank as an index of population-level trends.

Given the independently observed, ongoing decline of Western Sandpipers, the current global population of Western Sandpiper is likely lower than the estimate in Bishop et al. (2000). Therefore, to avoid underestimation, percent use should be calculated during the time period (1992-1995) when counts were conducted concurrently at Roberts Bank and the Copper River Delta sites.

4. Calculations of percent use

Using data from 1992 to 1995, percent use of Roberts Bank ranged from 15% to 51%, with an average of 29% of the total global population estimated by Bishop et. al. (2000). This calculation is based on median population estimates for Western Sandpipers at the Roberts Bank site between 1992 to 1995 that range from 560,000 to 1,813,000 (rounded to thousands), with an average of 1.012 million birds (Table 1). These calculations indicate that 17% is an underestimate of the true value. With the currently available data, ECCC is not aware of a better approach for calculating percent use, but is open to other methods that allow estimation and variance while accounting for the bias introduced from the long-term trends in counts. However, ECCC maintains that the higher values (42-64%) presented in Drever et al. (2014) represent an appropriate estimate for the purposes of describing the conservation value of the site and the potential consequences of loss or degradation of food supply for migrating sandpipers.

ECCC would further note that the 'waterbird' criteria for nominating a site as a wetland of international significance under the Ramsar Convention are a) Criterion 5: A wetland should be considered internationally important if it regularly supports 20,000 or more waterbirds; and b) Criterion 6: A wetland should be considered internationally important if it regularly supports 1% of the individuals in a population of one species or subspecies of waterbird. Thus, all the values discussed in this undertaking clearly indicate Roberts Bank is a site of high international significance.

Western Sandpipers at Roberts Bank site

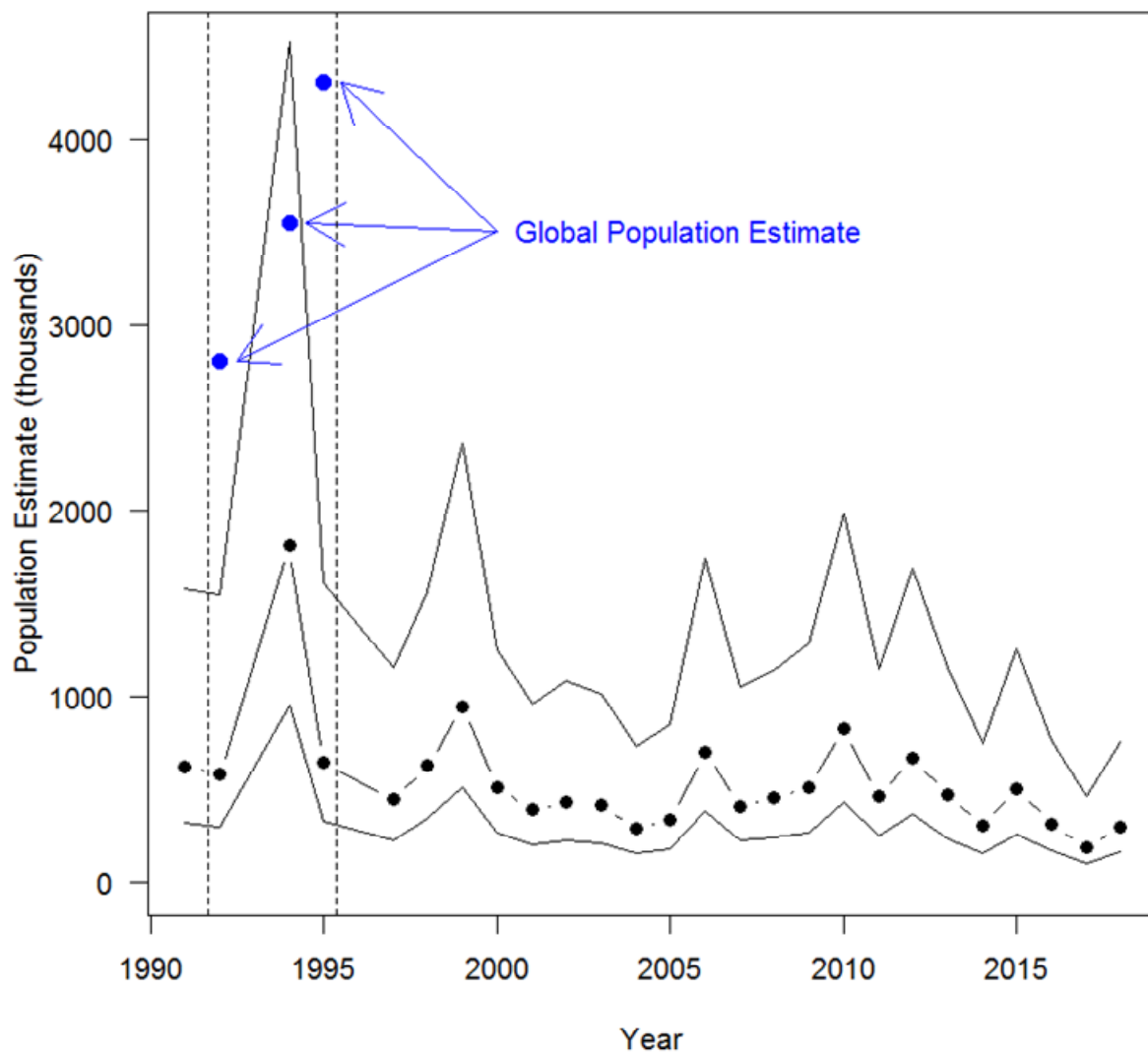


Figure 1. Population estimates of Western Sandpipers at the Roberts Bank study site, 1991 to 2018. Estimates derived from counts conducted during northward migration (April to May), following methods described in Drever et al. (2014). Dashed vertical lines indicate time period when counts were conducted concurrently at Roberts Bank and Copper River Delta (from which the global population is derived). The lines around population estimates represent the 95% confidence intervals.

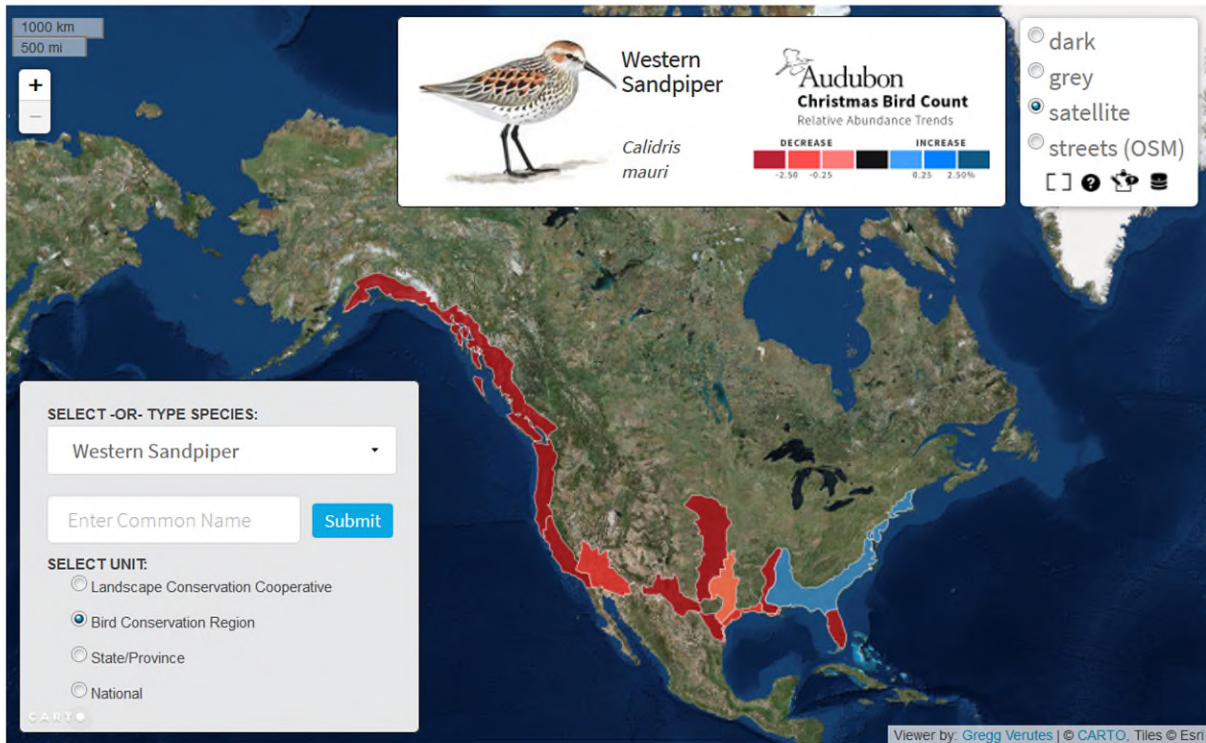


Figure 2. Trends in counts of Western Sandpiper, conducted as part of the Audubon Christmas Bird Count, 1966-2017. Map available at <https://www.audubon.org/conservation/where-have-all-birds-gone>. Colours of the polygons on the map denote trends over time as per the inset (red indicates declines, and blue indicates increases).

Table 1. Population estimates of Western Sandpipers at the Roberts Bank study site, 1991 to 2018. Estimates derived from counts conducted during northward migration (April to May), following methods described in Drever et al. (2014).

Year	Estimate (Median)	Lower Confidence Limit (2.5%)	Upper Confidence Limit (97.5%)
1991	624583	321428	1582010
1992	579611	301352	1548468
1994	1813719	952130	4520915
1995	643318	329901	1612011
1997	447285	231733	1152642
1998	627278	345996	1563263
1999	942717	508449	2367464
2000	512318	266636	1247778
2001	391513	208757	955989
2002	430866	227129	1084438
2003	416769	215172	1015494
2004	294693	159188	729761
2005	339914	182450	848467
2006	697779	383429	1741257
2007	413284	228310	1052664
2008	456867	246479	1136722
2009	512499	267048	1288372
2010	825699	435551	1987267
2011	467530	249542	1146677
2012	668872	369091	1685700
2013	470416	239334	1155729
2014	306758	157004	746930
2015	503421	258487	1257511
2016	315473	172789	762551
2017	191361	102652	468063
2018	297448	162728	755189

References

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