Appendix I-Southeast Lake Michigan, Michigan and Indiana

This appendix provides information on the numbers and information used in selecting the southeast portion of Lake Michigan as a Sea Duck Joint Venture key habitat site. All aerial survey data were collected during a project led by Kevin Kenow (U.S. Geological Survey Upper Midwest Environmental Sciences Center, La Crosse, Wisconsin; Kenow et al. 2021). Additional information that assisted in designating key site boundaries, especially those areas important for Long tailed Ducks (*Clangula hyemalis*), came from descriptions of habitat use and movements of Long-tailed Ducks radio-marked on Lake Michigan provided by Fara (2018).

Brief Description of Aerial Surveys

Aerial surveys were conducted during September through May, 2009 through 2014. Survey areas were selected to evaluate avian risk to Type E botulism and to provide information on waterbird distributions to inform offshore wind energy development. Timing and selection of areas to be surveyed in a given month were focused on these issues and were highly influenced by plane availability and weather conditions. Surveys were flown along fixed-width transects. Transects generally paralleled shorelines and extended up to 32 km (20 mi) offshore. Surveys were flown at an average air speed of about 200 km/h (125 mph) and at an altitude of about 61 to 76 m (200 to 250 ft) above the water using a U.S. Fish and Wildlife Service (USFWS) fixed-wing aircraft (Partenavia P.68 Observer¹). Two observers, one on each side of the plane, identified and tallied waterbirds within 200-m-wide (1/8-mi) strip transects on either side of the plane. Distances were established using a clinometer, and the portion of the transect band beneath the plane that was not observable was estimated at 70.4 m (35.2 x 2) and 88 m (44 x2) at 61 and 76 m above ground level (AGL), respectively.

Brief Description of Appendix Contents

This appendix contains nine tables and three figures. Tables S1, S4, and S7 provide the raw counts of sea ducks observed on (within the 200 m transect) and off (beyond the 200 m transect) transect for the surveys that were encompassed by the southeast Lake Michigan key site during fall (September–November), winter (December–February), and spring (March–May), respectively. An additional survey area (South End) is included for this key site, as the key site extends slightly into the survey area, but total number of sea ducks reported does not include counts from the South End survey. Raw counts do not account for the visibility factors that may affect bird detectability during aerial surveys; therefore, we estimated the number of sea ducks using a visibility correction factor (Hodges et al. 2008) and present those numbers in tables S2, S5, and S8 for fall, winter, and spring, respectively. The estimated counts for the South End survey area are not included in the total number of sea ducks reported. Tables S3, S6, and S9 provide the transect distance, observed area within the 200 m transect width at 61 m AGL, and the density of all sea ducks for both the raw and visibility-corrected counts for fall, winter, and spring, respectively. Results from the South End survey are not included in the totals. Figures 1, 2, and 3 illustrate the distribution of sea ducks by month for the fall, winter, and spring seasons, respectively. In addition, all figures outline the aerial survey areas encompassed by the southeast Lake Michigan, Michigan and Indiana, key site.

References

Fara, L. J. 2018. Migration patterns, habitat use, prey items, and hunter harvest of Long-tailed Ducks (*Clangula hyemalis*) that overwinter on Lake Michigan. MS thesis, Southern Illinois University Carbondale, Carbondale, Illinois.

Hodges, J. I., D. J. Groves, and B. P. Conant. 2008. Distribution and abundance of waterbirds near shore in Southeast Alaska. Northwestern Naturalist 89:85–96.

Kenow, K. P., Fox, T. J., Houdek, S. C., Fara, L. J., and Lubinski, B. 2021. Lake Michigan Sea Duck Survey Data, 2009-2014: U.S. Geological Survey data release, https://doi.org/10.5066/P9FGR77R.

¹ Any use of trade, firm, or product names is for descriptive purposes only and does not imply endorsement by the U.S. government.

Table S1. Raw counts of sea ducks, by species, ¹ observed on and off transect during aerial surveys conducted over Lake Michigan during fall (September–November). Survey areas listed are only those encompassed by the southeast Lake Michigan key site. ²

Survey area	Survey date	On/Off transect	LTDU	WWSC	BLSC	SUSC	SCOT	COME	RBME	НОМЕ	MERG	COGO	BUFF	Total sea ducks
Allegan-Berrien Counties, MI	26 Sep 2012	On Off	0	0 0	0 0	0 0	0	0 0	0 0	0	0	0	0	0
Allegan-Berrien Counties, MI	24 Oct 2012	On Off	25 0	62	0	0	0	0	0	0	0	0	0	87 0
Allegan-Berrien Counties, MI	27 Nov 2012	On Off	0	27	0	0 0	6	7	1 0	0 0	2 0	4 0	10	57
Allegan-Berrien Counties, MI	25–26 Nov 2013	On Off	0 0	0 0	0 0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0 0
Allegan-Berrien Counties, MI	30 Oct 2013	On Off	15	0 0	0 0	0 0	25 0	0 0	8	0 0	35	0 0	0 0	83
Allegan-Berrien Counties, MI	19 Nov 2013	On Off	19	0	0	0	0	0	95 0	0	61 0	16 0	0	191 0
Ludington Bay	15 Nov 2010	On Off	1 0	3 0	0 0	0 0	0	1 0	1 0	0	0	0 0	0	6
Ludington Bay	27 Sep 2012	On Off	1 0	0	0	0	0	0	0	0	0	0	0	1 0
Ludington Bay	27 Nov 2012	On Off	1295 0	4 0	0	0	0	31 0	3	0	12 0	15 0	0	1360 0
Ludington Bay	26 Sep 2013	On Off	3	0	0	0	0	0	0	0	0	0	0	3
Ludington Bay	29–30 Oct 2013	On Off	330	1 0	0 0	0	0	30	4 0	0	20	0	0 0	385
Ludington Bay	20 Nov 2013	On Off	4065	0	0	0	0	3	1 0	0	28	0	0	4107
Oceana-Ottawa Counties, MI	26 Sep 2012	On Off	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0

Table S1. Continued.

Oceana-Ottawa	24 Oct 2012	On	25	0	0	0	0	0	0	0	1	0	0	26
Counties, MI	24 OCt 2012	Off	0	0	0	0	0	0	0	0	0	0	0	0
Oceana-Ottawa	27 Nov 2012	On	1702	0	0	0	0	1	65	0	9	118	0	1895
Counties, MI	27 NOV 2012	Off	1150	0	0	0	0	0	0	0	0	0	0	1150
Oceana-Ottawa	26 Sep 2013	On	0	0	0	0	0	0	0	0	0	0	0	0
Counties, MI	20 Sep 2013	Off	0	0	0	0	0	0	0	0	0	0	0	0
Oceana-Ottawa	30 Oct 2013	On	155	0	0	0	183	0	0	0	0	0	2	340
Counties, MI	30 Oct 2013	Off	100	0	0	0	0	0	0	0	0	0	0	100
Oceana-Ottawa	20 Nov 2013	On	6818	0	0	0	5	2	0	0	73	0	0	6898
Counties, MI	20 NOV 2013	Off	0	0	0	0	0	0	0	0	0	0	0	0
South End ²	15 Nov 2011	On	10	0	0	0	0	5	97	0	47	0	0	159
South Ellu	13 NOV 2011	Off	0	0	0	0	0	0	0	0	0	0	0	0
South End ²	25–26 Sep 2012	On	0	0	0	0	0	0	0	0	0	0	0	0
South Ella	23–20 Sep 2012	Off	0	0	0	0	0	0	0	0	0	0	0	0
South End ²	24 Oct 2012	On	3	0	0	0	0	0	0	0	0	0	0	3
South Ellu	24 OCt 2012	Off	0	0	0	0	0	0	0	0	0	0	0	0
South End ²	28 Nov 2012	On	75	0	0	0	0	42	1545	0	183	0	0	1845
South Ella	20 NOV 2012	Off	0	0	0	0	0	0	0	0	0	0	0	0
South End ²	25 Sep 2013	On	0	0	0	0	0	0	0	0	0	0	0	0
South Ellu	25 Sep 2015	Off	0	0	0	0	0	0	0	0	0	0	0	0
South End ²	30 Oct	On	1	0	0	0	0	0	15	0	0	0	0	16
South Ella	1 Nov 2013	Off	0	0	0	0	0	0	0	0	0	0	0	0
South End ²	19 Nov 2013	On	68	4	0	0	0	22	213	0	954	30	0	1291
South Ella	19 INOV 2013	Off	0	0	0	0	0	0	0	0	0	0	0	0
	Total Southeast Lake	On	14,454	97	0	0	219	75	178	0	241	153	12	15,439
	Michigan key site	Off	1250	0	0	0	0	0	0	0	0	0	0	1250

¹ LTDU = Long tailed Duck (*Clangula hyemalis*), WWSC = White-winged Scoter (*Melanitta deglandi*), BLSC = Black Scoter (*Melanitta americana*), SUSC = Surf Scoter (*Melanitta perspicillata*), SCOT = unidentified scoter species, COME = Common Merganser (*Mergus merganser*), RBME = Red-breasted Merganser (*Mergus serrator*), HOME = Hooded Merganser (*Lophodytes cucullatus*), MERG = unidentified merganser species, COGO = Common Goldeneye (*Bucephala clangula*), and BUFF = Bufflehead (*Bucephala albeola*).

Table S1. Continued.

² The South End survey area is only partially within the southeast Lake Michigan key site; as such, the south end survey area counts are not included in the total counts for the southeast Lake Michigan key site.

Table S2. Estimated counts of sea ducks, by species or species groups, observed on and off transect during aerial surveys conducted over Lake Michigan during fall (September–November) using a visibility correction factor (Hodges et al. 2008). Correction factor multipliers are shown in parentheses under each species or species group. Survey areas listed are only those encompassed by the southeast Lake Michigan key site.²

Cumulan amaa	Cumuou dot-	On/Off	LTDU	SCOTERS	MERGANSERS	COGO	BUFF	Total sea ducks
Survey area	Survey date	transect	(3.46)	(1.74)	(1.45)	(1.60)	(3.26)	
Allegan-Berrien	26 Sep 2012	On	0	0	0	0	0	0
Counties, MI	•	Off	0	0	0	0	0	0
Allegan-Berrien	24 Oct 2012	On	87	108	0	0	0	194
Counties, MI	21 001 2012	Off	0	0	0	0	0	0
Allegan-Berrien	27 Nov 2012	On	0	57	15	6	33	111
Counties, MI	27 NOV 2012	Off	0	0	0	0	0	0
Allegan-Berrien	25 26 N 2012	On	0	0	0	0	0	0
Counties, MI	25–26 Nov 2013	Off	0	0	0	0	0	0
Allegan-Berrien	20.0 2012	On	52	44	62	0	0	158
Counties, MI	30 Oct 2013	Off	0	0	0	0	0	0
Allegan-Berrien	10 N - 2012	On	66	0	226	26	0	318
Counties, MI	19 Nov 2013	Off	0	0	0	0	0	0
T 11 (D	15 N 2010	On	3	5	3	0	0	12
Ludington Bay	15 Nov 2010	Off	0	0	0	0	0	0
T 1' (D	27.5 2012	On	3	0	0	0	0	3
Ludington Bay	27 Sep 2012	Off	0	0	0	0	0	0
T 11 . D	27.M 2012	On	4481	7	67	24	0	4578
Ludington Bay	27 Nov 2012	Off	0	0	0	0	0	0
	26.0.2012	On	10	0	0	0	0	10
Ludington Bay	26 Sep 2013	Off	0	0	0	0	0	0
	20. 20. 0 . 20.12	On	1142	2	78	0	0	1222
Ludington Bay	29–30 Oct 2013	Off	0	0	0	0	0	0
	20.11	On	14,065	0	61	0	0	14,126
Ludington Bay	20 Nov 2013	Off	0	0	0	0	0	0
Oceana-Ottawa		On	0	0	0	0	0	0
Counties, MI	26 Sep 2012	Off	0	0	0	0	0	0

Table S2. Continued.

Oceana-Ottawa	24 Oct 2012	On	87	0	1	0	0	88
Counties, MI	24 Oct 2012	Off	0	0	0	0	0	0
Oceana-Ottawa	27 Nov 2012	On	5889	0	109	189	0	6186
Counties, MI	27 NOV 2012	Off	3979	0	0	0	0	3979
Oceana-Ottawa	26 Sep 2013	On	0	0	0	0	0	0
Counties, MI	20 Sep 2013	Off	0	0	0	0	0	0
Oceana-Ottawa	30 Oct 2013	On	536	318	0	0	7	861
Counties, MI	30 Oct 2013	Off	346	0	0	0	0	346
Oceana-Ottawa	20 Nov 2013	On	23,590	9	109	0	0	23,708
Counties, MI	20 NOV 2013	Off	0	0	0	0	0	0
South End ²	15 Nov 2011	On	35	0	216	0	0	251
South End	13 NOV 2011	Off	0	0	0	0	0	0
South End ²	25–26 Sep 2012	On	0	0	0	0	0	0
South Elia	23–20 Sep 2012	Off	0	0	0	0	0	0
South End ²	24 Oct 2012	On	10	0	0	0	0	10
South End	24 OCt 2012	Off	0	0	0	0	0	0
South End ²	28 Nov 2012	On	260	0	2567	0	0	2826
South Elia	20 NOV 2012	Off	0	0	0	0	0	0
South End ²	25 Sep 2013	On	0	0	0	0	0	0
South Life	23 Sep 2013	Off	0	0	0	0	0	0
South End ²	30 Oct-	On	3	0	22	0	0	25
South Ellu	1 Nov 2013	Off	0	0	0	0	0	0
South End ²	19 Nov 2013	On	235	7	1724	48	0	5126
South Ellu	19 NOV 2013	Off	0	0	0	0	0	0
	Total Southeast Lake	On	50,011	550	219	189	7	30,843
	MI key site	Off	4325	0	0	0	0	4325

¹ LTDU = Long-tailed Duck (*Clangula hyemalis*), SCOTERS = Scoter species, MERGANSER = Merganser species, COGO = Common Goldeneye (*Bucephala clangula*), and BUFF = Bufflehead (*Bucephala albeola*).

² The South End survey area is only partially within the southeast Lake Michigan key site; as such, the south end survey area counts are not included in the total counts for the southeast Lake Michigan key site.

Table S3. Fall (September–November) density estimates for all sea ducks combined using both raw counts and visibility corrected (Hodges et al. 2008) count estimates for observations on transect. Survey areas listed are only those encompassed by the southeast Lake Michigan key site.¹

Survey area	Survey date	Transect distance (km)	Transect area (km²) at 61 m AGL	Raw count density (sea ducks/km ²)	Corrected count density (sea ducks/km²)
Allegan-Berrien Counties, MI	26 Sep 2012	388.8	128.1	0	0
Allegan-Berrien Counties, MI	24 Oct 2012	391.6	129.1	0.7	1.5
Allegan-Berrien Counties, MI	27 Nov 2012	385.5	127.2	0.4	0.9
Allegan-Berrien Counties, MI	25–26 Sep 2013	376.4	124.1	0	0
Allegan-Berrien Counties, MI	30 Oct 2013	377.5	124.4	0.7	1.3
Allegan-Berrien Counties, MI	19 Nov 2013	378.1	124.6	1.5	2.5
Ludington Bay	15 Nov 2010	555.2	183.0	< 0.1	0.1
Ludington Bay	27 Sep 2012	210.6	69.4	0	0
Ludington Bay	27 Nov 2012	154.9	51.1	26.6	89.7
Ludington Bay	26 Sep 2013	147.2	48.5	0.1	0.2
Ludington Bay	29-30 Oct 2013	146.8	48.4	8.0	25.3
Ludington Bay	20 Nov 2013	148.1	48.8	84.1	284.9
Oceana-Ottawa Counties, MI	26 Sep 2012	456.7	150.5	0	0
Oceana-Ottawa Counties, MI	24 Oct 2012	352.5	116.2	0.2	0.8
Oceana-Ottawa Counties, MI	27 Nov 2012	456.2	150.4	12.6	41.1
Oceana-Ottawa Counties, MI	26 Sep 2013	347.0	114.4	0	0
Oceana-Ottawa Counties, MI	30 Oct 2013	342.3	112.8	3.0	7.6
Oceana-Ottawa Counties, MI	20 Nov 2013	345.9	114.0	60.5	207.9
South End ¹	15 Nov 2011	335.3	110.5	1.4	2.3
South End ¹	25–26 Sep 2012	572.6	188.7	0	0
South End ¹	24 Oct 2012	322.4	106.3	< 0.1	0.1
South End ¹	28 Nov 2012	581.4	191.6	9.6	14.7
South End ¹	25 Sep 2013	583.9	192.5	0	0
South End ¹	30 Oct-1-Nov 2013	578.2	190.6	0.1	0.1
South End ¹	19 Nov 2013	583.0	192.2	6.7	10.5
Total Southeast 1	Lake Michigan key site	3556.8	1172.4	2.8	4.4

¹ The South End survey area is only partially within the southeast Lake Michigan key site; as such, the total fall density estimate for the southeast Lake Michigan key site does not include data from the south end survey area.

Table S4. Raw counts of sea ducks, by species, ¹ observed on and off transect during aerial surveys conducted over Lake Michigan during winter (December–February). Survey areas listed are only those encompassed by the southeast Lake Michigan key site. ²

Survey area	Survey date	On/Off transect	LTDU	WWSC	BLSC	SUSC	SCOT	COME	RBME	НОМЕ	MERG	COGO	BUFF	Total sea ducks
Allegan-Berrien Counties, MI	8 Dec 2011	On Off	0	0 0	0	0	80 0	22 179	0 0	0	47 13	163 0	0	313 192
Allegan-Berrien Counties, MI	13 Feb 2012	On Off	96 2	25 0	0	0	0	131	5	0	38	197 0	15 0	507
Allegan-Berrien Counties, MI	6 Feb 2013	On Off	1699 1150	15 6	0 0	0 0	0 0	1510 0	0 0	0 0	0 0	17 0	0 0	3241 1156
Allegan-Berrien Counties, MI	24–25 Feb 2013	On Off	2984 1300	37 0	0	0	0	154 0	375 0	0	202 0	116 0	0	3868 1300
Allegan-Berrien Counties, MI	13 Dec 2013	On Off	82 0	14 0	0 0	0 0	104 0	768 0	0 0	0 0	125 0	2460 0	16 0	3569 0
Allegan-Berrien Counties, MI	9 Jan 2014	On Off	2687 700	0 0	0	0	0 0	2 0	0 0	0 0	0 0	72 0	0 0	2761 700
Allegan-Berrien Counties, MI	3 Feb 2014	On Off	26 10	0	0	0	150 200	0 0	0 0	0	0 0	0	0	176 300
Ludington Bay	8 Dec 2010	On Off	1226 700	2 0	0	0	0	46 0	0	0	0	0	0	1274 700
Ludington Bay	21 Jan 2012	On Off	768 0	62 0	0 0	0 0	0	124 0	2 0	0	110 0	3130 0	0	4196 0
Ludington Bay	4 Feb 2013	On Off	2850 1100	74 0	0	0	0	415 0	0	0	4	53 0	0	3396 1100
Ludington Bay	25 Feb 2013	On Off	1743 0	115 0	0	0	0	3 0	2 0	0	1 0	21	0	1885
Ludington Bay	18 Dec 2013	On Off	2629 0	8	0	0	25 0	10	0	0	8	172 0	0	2852
Ludington Bay	3 Feb 2014	On Off	1038	52 0	0 0	0 0	500	0 0	0 0	0 0	0 0	0 0	0 0	1590 0

Table S4. Continued.

Counties, MI	Oceana-Ottawa	20 Jan 2012	On	9468	0	0	0	0	692	0	0	50	112	0	10,322
Counties, MI	Counties, MI	20 Jan 2012	Off	700	0	0	0	0	0	0	0	80	0	0	780
Counties, MI	Oceana-Ottawa	4 6 Eab 2013	On	2703	7	0	0	0	64	1	0	0	13	0	2788
Counties, MI	Counties, MI	4-0 1 60 2013	Off	0	0	0	0	0	0	0	0	0	0	0	0
Counties, MI	Oceana-Ottawa	25 Eab 2012	On	3651	5	0	0	0	41	2	0	341	169	0	4209
Counties, MI 19 Dec 2013 Off 8650 0 0 0 0 0 0 2700 0 11,350 Oceana-Ottawa Counties, MI 9 Jan 2014 Off 2850 0 0 0 2 2 0 0 149 60 0 5570 Oceana-Ottawa Counties, MI 3 Feb 2014 Off 2850 0 <td>Counties, MI</td> <td>23 Feb 2013</td> <td>Off</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>100</td> <td>100</td> <td>0</td> <td>200</td>	Counties, MI	23 Feb 2013	Off	0	0	0	0	0	0	0	0	100	100	0	200
Counties, MI	Oceana-Ottawa	10 Dag 2012	On	12,637	0	0	0	0	22	0	0	3	624	0	13,286
Counties, MI	Counties, MI	19 Dec 2013	Off	8650	0	0	0	0	0	0	0	0	2700	0	11,350
Counties, MI Offf 2850 0	Oceana-Ottawa	0 Ion 2014	On	5377	0	0	0	2	2	0	0	149	60	0	5590
Counties, MI	Counties, MI	9 Jan 2014	Off	2850	0	0	0	0	0	0	0	0	0	0	2850
Counties, MI Off 0	Oceana-Ottawa	2 Eab 2014	On	10	60	0	0	0	0	0	0	0	0	0	70
South End² 9 Dec 2010 Off 0	Counties, MI	3 Feb 2014	Off	0	0	0	0	0	0	0	0	0	0	0	0
South End ² 7 Dec 2011 On 6 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	C 12	0 Day 2010	On	93	110	1	0	0	1057	0	0	0	0	3	1264
South End ² 7 Dec 2011 Off On On 263 38 On On On On On On On On On O	South End	9 Dec 2010	Off	0	0	0	0	0	0	0	0	0	0	0	0
South End ² 15 Feb 2012 On 263 38 0 0 0 0 40 302 0 99 15 0 757 Off 150 0 0 0 0 0 0 0 0 0 0 0 0 150 South End ² 24 Feb 2013 On 1180 27 0 0 0 132 286 0 502 36 0 2163 Off 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 South End ² 12-13 Dec 2013 On 115 0 0 0 0 0 132 286 0 502 36 0 2163 Off 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 South End ² 12-13 Dec 2013 On 115 0 0 0 0 413 231 0 119 213 1 1092 Off 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 South End ² 8 Jan 2014 On 539 25 0 0 20 279 0 0 72 35 0 970 South End ² 2 Feb 2014 On 4725 36 0 0 47 14 672 0 8 177 0 5679 Total Southeast Lake On 51,674 476 0 0 861 4006 387 0 1078 7379 32 65,893	C 42	7 Day 2011	On	6	0	0	0	0	4	0	0	320	41	0	371
South End² 15 Feb 2012 Off 150 0 0 0 0 0 0 0 0 0 150 South End² 24 Feb 2013 On 1180 27 0 0 0 132 286 0 502 36 0 2163 South End² 12-13 Dec 2013 Off 0<	South End	/ Dec 2011	Off	0	0	0	0	0	0	0	0	0	0	0	0
South End ² 24 Feb 2013 On 1180 27 0 0 0 132 286 0 502 36 0 2163 Off 0 0 0 0 0 0 0 0 0 0 0 0 0 0 South End ² 12-13 Dec 2013 On 115 0 0 0 0 0 0 0 0 0 0 0 0 0 0 South End ² 12-13 Dec 2013 On 539 25 0 0 20 279 0 0 0 72 35 0 970 South End ² 8 Jan 2014 Off 300 0 0 0 0 5 0 0 0 0 0 0 0 0 0 0 0 0 South End ² 2 Feb 2014 On 4725 36 0 0 47 14 672 0 8 177 0 5679 Off 0 0 0 0 0 0 0 0 0 0 0 0 Total Southeast Lake On 51,674 476 O 0 861 4006 387 O 1078 7379 32 65,893	G	15 E.1. 2012	On	263	38	0	0	0	40	302	0	99	15	0	757
South End² 24 Feb 2013 Off 0	South End-	15 Feb 2012	Off	150	0	0	0	0	0	0	0	0	0	0	150
South End ² 12–13 Dec 2013 On 115 0 0 0 0 413 231 0 119 213 1 1092 Off 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 South End ² 8 Jan 2014 On 539 25 0 0 20 279 0 0 72 35 0 970 Off 300 0 0 0 5 0 0 0 300 0 0 605 South End ² 2 Feb 2014 On 4725 36 0 0 47 14 672 0 8 177 0 5679 Off 0 0 0 0 0 0 0 0 0 0 0 0 Total Southeast Lake On 51,674 476 0 0 861 4006 387 0 1078 7379 32 65,893	C. 4. E. 12	24 E.1. 2012	On	1180	27	0	0	0	132	286	0	502	36	0	2163
South End ² 12–13 Dec 2013 Off 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	South End ²	24 Feb 2013	Off	0	0	0	0	0	0	0	0	0	0	0	0
South End ² 8 Jan 2014 On 539 25 0 0 20 279 0 0 72 35 0 970 Off 300 0 0 0 5 0 0 0 300 0 0 605 South End ² 2 Feb 2014 On 4725 36 0 0 47 14 672 0 8 177 0 5679 Off 0 0 0 0 0 0 0 0 0 0 0 0 0 Total Southeast Lake On 51,674 476 0 0 861 4006 387 0 1078 7379 32 65,893	G 4 F 12	10 12 D 2012	On	115	0	0	0	0	413	231	0	119	213	1	1092
South End ² 8 Jan 2014 Off 300 0 0 0 5 0 0 0 300 0 0 605 South End ² 2 Feb 2014 On 4725 36 0 0 47 14 672 0 8 177 0 5679 Off 0 0 0 0 0 0 0 0 0 0 0 0 0 Total Southeast Lake On 51,674 476 0 0 861 4006 387 0 1078 7379 32 65,893	South End ²	12–13 Dec 2013	Off	0	0	0	0	0	0	0	0	0	0	0	0
South End ² 2 Feb 2014 On 4725 36 0 0 0 47 14 672 0 8 177 0 5679 Off 0 0 0 0 0 0 0 0 0 0 0 0 Total Southeast Lake On 51,674 476 0 0 861 4006 387 0 1078 7379 32 65,893	G 4 E 12	0.1. 2014	On	539	25	0	0	20	279	0	0	72	35	0	970
South End ² 2 Feb 2014 Off 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	South End ²	8 Jan 2014	Off	300	0	0	0	5	0	0	0	300	0	0	605
Total Southeast Lake On 51,674 476 0 0 861 4006 387 0 1078 7379 32 65,893	G 4 E 12	0 F 1 2011	On	4725	36	0	0	47	14	672	0	8	177	0	5679
Total Southeast Lake On 51,674 476 0 0 861 4006 387 0 1078 7379 32 65,893	South End ²	2 Feb 2014	Off	0	0	0	0	0	0	0	0	0	0	0	0
- · · · · · · · · · · · · · · · · · · ·		Total Southeast Lake	On	51,674	476	0	0	861	4006	387	0	1078	7379	32	65,893
- ,			Off	17,162	6	0	0	200	179	0	0	193	2800	0	20,630

¹ LTDU = Long-tailed Duck (*Clangula hyemalis*), WWSC = White-winged Scoter (*Melanitta deglandi*), BLSC = Black Scoter (*Melanitta americana*), SUSC = Surf Scoter (*Melanitta perspicillata*), SCOT = unidentified scoter species, COME = Common Merganser (*Mergus merganser*), RBME = Red-breasted

Table S4. Continued.

Merganser (*Mergus serrator*), HOME = Hooded Merganser (*Lophodytes cucullatus*), MERG = unidentified merganser species, COGO = Common Goldeneye (*Bucephala clangula*), and BUFF = Bufflehead (*Bucephala albeola*).

² The South End survey area is only partially within the southeast Lake Michigan key site; as such, the south end survey area counts are not included in the total counts for the southeast Lake Michigan key site.

Table S5. Estimated counts of sea ducks, by species or species groups. Observed on and off transect during aerial surveys conducted over Lake Michigan during winter (December–February) using a visibility correction factor (Hodges et al. 2008). Correction factor multipliers are shown in parentheses under each species or species group. Survey areas listed are only those encompassed by the southeast Lake Michigan key site.

		On/Off	LTDU	SCOTERS	MERGANSERS	COGO	BUFF	
Survey area	Survey date	transect	(3.46)	(1.74)	(1.45)	(1.60)	(3.26)	Total sea ducks
Allegan-Berrien	8 Dec 2011	On	0	139	100	261	3	503
Counties, MI	6 DCC 2011	Off	0	0	278	0	0	278
Allegan-Berrien	13 Feb 2012	On	332	44	252	315	49	992
Counties, MI	13 Fe0 2012	Off	7	0	0	0	0	7
Allegan-Berrien	6 Feb 2013	On	5879	26	2190	27	0	8121
Counties, MI	0 Feb 2015	Off	3979	10	0	0	0	3989
Allegan-Berrien	24–25 Feb 2013	On	10,325	64	1,60	186	0	11,635
Counties, MI	24-23 Feb 2013	Off	4498	0	0	0	0	4498
Allegan-Berrien	13 Dec 2013	On	284	205	1295	3936	52	5772
Counties, MI	13 Dec 2013	Off	0	0	0	0	0	0
Allegan-Berrien	9 Jan 2014	On	9297	0	3	115	0	9415
Counties, MI	9 Jan 2014	Off	2422	0	0	0	0	2422
Allegan-Berrien	3 Feb 2014	On	90	261	0	0	0	351
Counties, MI	3 Feb 2014	Off	346	348	0	0	0	694
Ladinatan Dan	9 Day 2010	On	4242	3	67	0	0	4312
Ludington Bay	8 Dec 2010	Off	2422	0	0	0	0	2422
Idi	21 Jan 2012	On	2657	108	342	5008	0	8115
Ludington Bay	21 Jan 2012	Off	0	0	0	0	0	0
I 1' (D .	4 F.1. 2012	On	9861	129	608	85	0	10,682
Ludington Bay	4 Feb 2013	Off	3806	0	0	0	0	3806
I d'acteu De	25 E.I. 2012	On	6031	200	9	34	0	6273
Ludington Bay	25 Feb 2013	Off	0	0	0	0	0	0
I I' , D	10 D 2012	On	9096	57	26	275	0	9455
Ludington Bay	18 Dec 2013	Off	0	0	0	0	0	0

Table S5. Continued.

	Michigan key site	Off	59,692	358	539	4480	0	65,069
	Total Southeast Lake	On	178,791	2324	7934	11,806	104	200,961
able S5. Co	ntinued.							
South End ²	2 Feb 2014	On Off	16,349 0	0	0	0	0	17,782 0
		Off On	1038	9 144	435 1006	0 283	0	1482
outh End ²	8 Jan 2014	On	1865	78	509	56	0	2508
outh End ²	12–13 Dec 2013	On Off	398 0	0	1106 0	341 0	3	1848 0
odui Elia	24 Feb 2015	Off	0	0	0	0	0	0
South End ²	24 Feb 2013	On	4083	47	1334	58	0	5521
South End ²	15 Feb 2012	Off	519	0	0	0	0	519
		On	910	0 66	639	0 24	0	0 1640
outh End ²	7 Dec 2011	On Off	21	0	470	66	0	556
Jam Dila	, Dec 2010	Off	0	0	0	0	0	0
outh End ²	9 Dec 2010	On	322	193	1533	0	10	2057
Counties, MI	3 Heb 2017	Off	0	0	0	0	0	0
Oceana-Ottav	1/9	On	35	104	0	0	0	139
Counties, MI	0 Ion 2014	Off	9861	0	0	0	0	9861
Oceana-Ottav	NO.	On	18,604	3	219	96	0	18,923
Oceana-Ottav Counties, MI	10 1190 2013	On Off	43,724 29,929	0	36 0	998 4320	0	44,759 34,249
Counties, MI		Off	0	0	145	160	0	305
Oceana-Ottav	75 Hab 7013	On	12,632	9	557	270	0	13,468
Counties, MI	4–6 Feb 2013	Off	0	0	0	0	0	0
Oceana-Ottav	Wa 4 6 E-b 2012	On	9352	12	94	21	0	9480
Counties, MI	20 Ian 2012	Off	2422	0	116	0	0	2538
Oceana-Ottav	1/2	On	32,759	0	1076	179	0	34,014
udington Ba	ay 3 Feb 2014	On Off	3591 0	960 0	0	0	0	4552 0

¹ LTDU = Long-tailed Duck, SCOTERS = Scoter species, MERGANSER = Merganser species, COGO = Common Goldeneye (*Bucephala clangula*), and BUFF = Bufflehead (*Bucephala albeola*).

² The South End survey area is only partially within the southeast Lake Michigan key site; as such, the south end survey area counts are not included in the total counts for the southeast Lake Michigan key site.

Table S6. Winter (December–February) density estimates for all sea ducks combined using both raw counts and visibility corrected (Hodges et al. 2008) count estimates for observations on transect. Survey areas listed are only those encompassed by the southeast Lake Michigan key site.¹

Surrior area	Survey data	Transect distance	Transect area (km²) at 61 m AGL	Raw count density (sea ducks/km ²)	Corrected count density (sea ducks/km ²)
Survey area Allegan-Berrien Counties, MI	Survey date 8 Dec 2011	(km) 292.9	96.5	3.2	5.2
Allegan-Berrien Counties, MI	13 Feb 2012	484.0	159.5	3.2	6.2
Allegan-Berrien Counties, MI	6 Feb 2012	360.4	118.8	27.3	68.4
Allegan-Berrien Counties, MI	24–25 Feb 2013	387.3	127.7	30.3	91.1
			124.7	28.6	46.3
Allegan-Berrien Counties, MI	13 Dec 2013	378.2			
Allegan-Berrien Counties, MI	9 Jan 2014	364.7	120.2	23.0	78.3
Allegan-Berrien Counties, MI	3 Feb 2014	92.9	30.6	5.7	11.5
Ludington Bay	8 Dec 2010	547.5	180.5	7.1	23.9
Ludington Bay	21 Jan 2012	208.8	68.8	61.0	117.9
Ludington Bay	4 Feb 2013	205.6	67.8	50.1	157.6
Ludington Bay	25 Feb 2013	203.2	67.0	28.1	93.7
Ludington Bay	18 Dec 2013	148.2	48.8	58.4	193.6
Ludington Bay	3 Feb 2014	24.4	8.0	198.8	566.0
Oceana-Ottawa Counties, MI	20 Jan 2012	465.6	153.5	67.3	221.6
Oceana-Ottawa Counties, MI	4–6 Feb 2013	355.9	117.3	23.8	80.8
Oceana-Ottawa Counties, MI	25 Feb 2013	357.0	117.7	35.8	114.5
Oceana-Ottawa Counties, MI	19 Dec 2013	340.9	112.4	118.2	398.3
Oceana-Ottawa Counties, MI	9 Jan 2014	340.0	112.1	49.9	168.9
Oceana-Ottawa Counties, MI	3 Feb 2014	129.1	42.6	1.6	3.3
South End ¹	9 Dec 2010	851.6	280.7	4.5	7.3
South End ¹	7 Dec 2011	319.0	105.1	3.5	5.3
South End ¹	15 Feb 2012	588.4	193.9	3.9	8.5
South End ¹	24 Feb 2013	509.8	168.0	12.9	32.9
South End ¹	12-13 Dec 2013	583.6	192.4	5.7	9.6
South End ¹	8 Jan 2014	257.3	84.8	11.4	29.6
South End ¹	2 Feb 2014	367.2	121.0	46.9	146.9
Total Southeast La	ke Michigan key site	5686.6	1874.5	35.2	107.2

¹ The South End survey area is only partially within the southeast Lake Michigan key site; as such, the total fall density estimate for the southeast Lake Michigan key site does not include data from the south end survey area.

Table S7. Raw counts of sea ducks, by species, ¹ observed on and off transect during aerial surveys conducted over Lake Michigan during spring (March–May). Survey areas listed are only those encompassed by the southeast Lake Michigan key site. ²

Survey area	Survey date	On/Off transect	LTDU	WWSC	BLSC	SUSC	SCOT	COME	RBME	НОМЕ	MERG	COGO	BUFF	Total sea ducks
Allegan-Berrien Counties, MI	14 Mar 2012	On Off	198 0	0	0	0	0	0	12 0	0	1 0	93 0	0	304 0
Allegan-Berrien Counties, MI	4 Apr 2012	On Off	36 0	0	0	0	0	11	17 0	0	18	24	0	106 0
Allegan-Berrien Counties, MI	21–22 Mar 2013	On Off	766 0	90 0	0	0	172 0	580 0	210	0 0	2 0	110 0	0 0	1930 0
Allegan-Berrien Counties, MI	3–4 Apr 2013	On Off	4852 980	2 0	0	0	63 0	75 0	0 2	0	54 4	20	0	5066 986
Allegan-Berrien Counties, MI	25 Apr 2013	On Off	565 0	0 0	0 0	0 0	0 0	30 0	53 0	0 0	0 0	14 0	0	662 0
Allegan-Berrien Counties, MI	6 May 2014	On Off	143 0	0	0	0	0	4	31 0	0	18 0	2	0	198 0
Ludington Bay	17 Mar 2010	On Off	1291 0	45 0	0 0	0	0 0	54 0	0	0	0	12 0	0	1402 0
Ludington Bay	15 Mar 2011	On Off	645 30	99 0	0	0	0	21 0	0	0	0	3	0	768 30
Ludington Bay	4 Apr 2012	On Off	62 0	0	0	0	0 0	19 0	4 0	0	1 0	0	0	86 0
Ludington Bay	22 Mar 2013	On Off	263 0	2 0	0	0	0	130	15 0	0	1 0	4 0	0	415
Ludington Bay	4 Apr 2013	On Off	132	0 0	0 0	0 0	0	2 0	0 0	0 0	2 0	0 0	0	136 0
Ludington Bay	26 Apr 2013	On Off	10	1 0	0	0	0	4 0	24	0	0	0	0	39
Ludington Bay	6 May 2014	On Off	59 0	0 0	0 0	0 0	0 0	9	1 0	0 0	4 0	0 0	0 0	73 0

Table S7. Continued.

Oceana-Ottawa Counties, MI	14 Mar 2012	On Off	854 114	0	0	0	0	5 0	0	0 0	1 0	0 0	0	860 114
Oceana-Ottawa		On	105	0	0	0	0	1	12	0	8	5	0	131
Counties, MI	4 Apr 2012	Off	0	0	0	0	0	0	0	0	0	0	0	0
Oceana-Ottawa		On	2681	27	0	0	3	43	0	0	0	1	0	2755
Counties, MI	21–22 Mar 2013	Off	700	0	0	0	0	0	0	0	0	0	0	700
Oceana-Ottawa	4 4 2012	On	589	0	0	0	0	9	0	0	19	18	0	635
Counties, MI	4 Apr 2013	Off	0	0	0	0	0	0	0	0	0	0	0	0
Oceana-Ottawa	25 Apr 2013	On	157	0	0	0	0	32	15	0	0	0	0	204
Counties, MI	25 Apr 2015	Off	0	0	0	0	0	0	0	0	0	0	0	0
Oceana-Ottawa	6 May 2014	On	116	0	0	0	0	0	0	0	0	0	0	116
Counties, MI	0 May 2014	Off	0	0	0	0	0	0	0	0	0	0	0	0
South End ²	15 Mar 2011	On	375	16	0	0	0	510	0	0	0	101	0	1002
South End	13 With 2011	Off	0	0	0	0	0	331	0	0	0	0	0	331
South End ²	6–7 Apr 2011	On	2073	4	0	0	0	485	0	0	0	1	0	2563
South Life	0-7 Apr 2011	Off	0	0	0	0	0	0	0	0	0	0	0	0
South End ²	13 Mar 2012	On	254	0	0	0	0	70	346	0	93	88	0	851
South End	13 Wai 2012	Off	0	0	0	0	0	0	0	0	0	0	0	0
South End ²	3–4 Apr 2012	On	478	0	0	0	0	85	129	0	20	19	0	731
South End	3–4 Apr 2012	Off	0	0	0	0	0	0	0	0	0	0	0	0
South End ²	21 Mar 2013	On	744	0	0	0	0	198	169	0	27	22	1	1161
South End	21 Wai 2013	Off	0	0	0	0	0	0	0	0	0	0	0	0
South End ²	3 Apr 2013	On	2022	10	0	0	19	153	43	0	85	27	0	2359
South End	3 Apr 2013	Off	600	0	0	0	0	0	0	0	0	0	0	600
South End ²	24 Apr 2013	On	206	0	0	0	0	41	195	0	69	23	0	534
South Ellu	24 Apr 2013	Off	0	0	0	0	0	0	0	0	0	0	0	0
South End ²	24 Mar 2014	On	4157	22	0	0	23	520	427	0	10	37	0	5196
South Ellu	24 IVIAI 2014	Off	4550	0	0	0	0	0	0	0	0	0	0	4550
South End ²	5–6 May 2014	On	41	0	0	0	0	46	80	0	39	38	3	247
SOUUI EIIU	5-0 May 2014	Off	0	0	0	0	0	0	0	0	0	0	0	0

Table S7. Continued.

Total Southeast Lake	On	13,524	266	0	0	238	1029	394	0	129	306	0	15,866
Michigan key site	Off	1824	0	0	0	0	0	2	0	4	0	0	1830

¹ LTDU = Long-tailed Duck (*Clangula hyemalis*), WWSC = White-winged Scoter (*Melanitta deglandi*), BLSC = Black Scoter (*Melanitta americana*), SUSC = Surf Scoter (*Melanitta perspicillata*), SCOT = unidentified scoter species, COME = Common Merganser (*Mergus merganser*), RBME = Red-breasted Merganser (*Mergus serrator*), HOME = Hooded Merganser (*Lophodytes cucullatus*), MERG = unidentified merganser species, COGO = Common Goldeneye (*Bucephala clangula*), and BUFF = Bufflehead (*Bucephala albeola*).

² The South End survey area is only partially within the southeast Lake Michigan key site; as such, the south end survey area counts are not included in the total counts for the southeast Lake Michigan key site.

Table S8. Estimated counts of sea ducks, by species or species groups, observed on and off transect during aerial surveys conducted over Lake Michigan during spring (March–May) using a visibility correction factor (Hodges et al. 2008). Correction factor multipliers are shown in parentheses under each species or species group. Survey areas listed are only those encompassed by the southeast Lake Michigan key site.²

	G 1.	On/Off	LTDU	SCOTERS	MERGANSERS	COGO	BUFF	m . 1 . 1 . 1
Survey area	Survey date	transect	(3.46)	(1.74)	(1.45)	(1.60)	(3.26)	Total sea ducks
Allegan-Berrien 14 Mar 2012	On	685	0	19	149	0	853	
Counties, MI	Counties, MI	Off	0	0	0	0	0	0
Allegan-Berrien	Allegan-Berrien Counties MI 4 Apr 2012	On	125	0	67	38	0	230
Counties, MI	Off	0	0	0	0	0	0	
Allegan-Berrien	21–22 Mar 2013	On	2650	456	1148	176	0	4431
Counties, MI	21–22 Mar 2013	Off	0	0	0	0	0	0
Allegan-Berrien	2 4 4 2012	On	16,788	113	187	32	0	17,120
Counties, MI	3–4 Apr 2013	Off	3391	0	9	0	0	3400
Allegan-Berrien	25 A 2012	On	1955	0	120	22	0	2098
Counties, MI	25 Apr 2013	Off	0	0	0	0	0	0
Allegan-Berrien	CM 2014	On	495	0	77	3	0	575
Counties, MI	6 May /111/1	Off	0	0	0	0	0	0
T I' · D	17.14 2010	On	4467	78	78	19	0	4643
Ludington Bay	17 Mar 2010	Off	0	0	0	0	0	0
T 11 . D	1536 2011	On	2232	172	30	5	0	2439
Ludington Bay	15 Mar 2011	Off	104	0	0	0	0	104
* "	4.4. 2012	On	215	0	35	0	0	249
Ludington Bay	4 Apr 2012	Off	0	0	0	0	0	0
Y 11 - 5	22.14 2012	On	910	3	212	6	0	1132
Ludington Bay	22 Mar 2013	Off	0	0	0	0	0	0
T 11 . D	4.4. 2012	On	457	0	6	0	0	463
Ludington Bay	4 Apr 2013	Off	0	0	0	0	0	0
	25.4	On	35	2	41	0	0	77
Ludington Bay	26 Apr 2013	Off	0	0	0	0	0	0
		On	204	0	20	0	0	224
Ludington Bay	6 May 2014	Off	0	0	0	0	0	0

Table S8. Continued.

Oceana-Ottawa	14 Mar 2012	On	2955	0	9	0	0	2964
Counties, MI	14 With 2012	Off	394	0	0	0	0	394
Oceana-Ottawa	4 Apr 2012	On	363	0	30	8	0	402
Counties, MI	4 Apr 2012	Off	0	0	0	0	0	0
Oceana-Ottawa	21–22 Mar 2013	On	9276	52	62	2	0	9392
Counties, MI	21–22 Wai 2013	Off	2422	0	0	0	0	2422
Oceana-Ottawa 4 Apr 2013	On	2038	0	41	29	0	2107	
Counties, MI	4 Apr 2013	Off	0	0	0	0	0	0
Oceana-Ottawa 25 Apr 2013	On	543	0	68	0	0	611	
Counties, MI	23 Apr 2013	Off	0	0	0	0	0	0
Oceana-Ottawa	6 May 2014	On	401	0	0	0	0	401
Counties, MI	0 May 2014	Off	0	0	0	0	0	0
South End ²	15 Mar 2011	On	1298	28	740	162	0	2226
South End	13 Wai 2011	Off	0	0	480	0	0	480
South End ²	6–7 Apr 2011	On	7173	7	703	2	0	7884
South End	0-7 Apr 2011	Off	0	0	0	0	0	0
South End ²	13 Mar 2012	On	879	0	738	141	0	1758
South End	13 Mai 2012	Off	0	0	0	0	0	0
South End ²	3–4 Apr 2012	On	1654	0	339	30	0	2024
South End	3–4 Apr 2012	Off	0	0	0	0	0	0
South End ²	21 Mar 2013	On	2574	0	571	35	3	3184
South End	21 Wai 2013	Off	0	0	0	0	0	0
South End ²	3 Apr 2013	On	6996	50	407	43	0	7497
South End	5 Apr 2015	Off	2076	0	0	0	0	2076
South End ²	24 A 2012	On	713	0	442	37	0	1192
South End	24 Apr 2013	Off	0	0	0	0	0	0
C 41	24 Man 2014	On	14,383	78	1388	59	0	15,908
South End ²	24 Mar 2014	Off	15,743	0	0	0	0	15,743
Courtle Eur 12	5 (Mars 2014	On	142	0	239	61	10	452
South End ²	5–6 May 2014	Off	0	0	0	0	0	0

Table S8. Continued.

Total Southeast Lake	On	46,794	876	2250	489	0	50,411
Michigan key site	Off	6311	0	9	0	0	6320

¹ LTDU = Long-tailed Duck (*Clangula hyemalis*), SCOTERS = Scoter species, MERGANSER = Merganser species, COGO = Common Goldeneye (*Bucephala clangula*), and BUFF = Bufflehead (*Bucephala albeola*).

² The South End survey area is only partially within the southeast Lake Michigan key site; as such, the south end survey area counts are not included in the total counts for the southeast Lake Michigan key site.

Table S9. Spring (March–May) density estimates for all sea ducks combined using both raw counts and visibility corrected (Hodges et al. 2008) count estimates for observations on transect. Survey areas listed are only those encompassed by the southeast Lake Michigan key site.¹

	0 1.	Transect	Transect area (km²) at	Raw count density (sea	Corrected count density (sea
Survey area	Survey date 14 Mar 2012	(km) 385.9	61 m AGL 127.2	ducks/km ²) 2.4	ducks/km ²) 6.7
Allegan-Berrien Counties, MI					
Allegan-Berrien Counties, MI	4 Apr 2012	388.6	128.1	0.8	1.8
Allegan-Berrien Counties, MI	21–22 Mar 2013	389.3	128.3	15	34.5
Allegan-Berrien Counties, MI	3–4 Apr 2013	382.0	125.9	40.2	136.0
Allegan-Berrien Counties, MI	25 Apr 2013	387.5	127.7	5.2	16.4
Allegan-Berrien Counties, MI	6 May 2014	288.3	95.0	2.1	6.0
Ludington Bay	17 Mar 2010	260.0	85.7	16.4	54.2
Ludington Bay	15 Mar 2011	255.1	84.1	9.1	29.0
Ludington Bay	4 Apr 2012	203.6	67.1	1.3	3.7
Ludington Bay	22 Mar 2013	158.3	52.2	8.0	21.7
Ludington Bay	4 Apr 2013	206.8	68.2	2.0	6.8
Ludington Bay	26 Apr 2013	157.1	51.8	0.8	1.5
Ludington Bay	6 May 2014	149.5	49.3	1.5	4.6
Oceana-Ottawa Counties, MI	14 Mar 2012	462.8	152.5	5.6	19.4
Oceana-Ottawa Counties, MI	4 Apr 2012	462.2	152.3	0.9	2.6
Oceana-Ottawa Counties, MI	21-22 Mar 2013	353.8	116.6	23.6	80.5
Oceana-Ottawa Counties, MI	4 Apr 2013	354.9	117.0	5.4	18.0
Oceana-Ottawa Counties, MI	25 Apr 2013	354.8	116.9	1.7	5.2
Oceana-Ottawa Counties, MI	6 May 2014	241.1	79.5	1.5	5.1
South End ¹	15 Mar 2011	508.0	167.4	6.0	13.3
South End ¹	6–7 Apr 2011	623.0	205.3	12.5	38.4
South End ¹	13 Mar 2012	586.2	193.2	4.4	9.1
South End ¹	3–4 Apr 2012	579.6	191.0	3.8	10.6
South End ¹	21 Mar 2013	584.9	192.8	6.0	16.5
South End ¹	3 Apr 2013	584.8	192.8	12.2	38.9
South End ¹	24 Apr 2013	583.9	192.5	2.8	6.2
South End ¹	24 Mar 2014	584.9	192.8	27.0	82.5
South End ¹	5–6 May 2014	584.5	192.7	1.3	2.3
Total Southeast La	ke Michigan key site	5841.6	1925.4	8.3	26.2

¹ The South End survey area is only partially within the southeast Lake Michigan key site; as such, the total fall density estimate for the southeast Lake Michigan key site does not include data from the south end survey area.

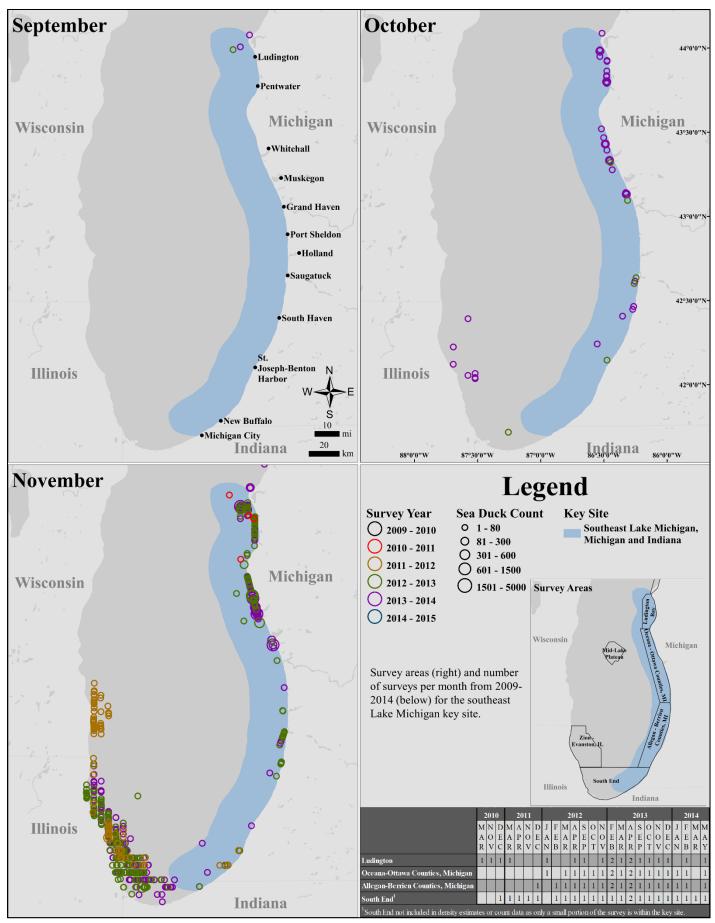


Figure S1. Maps depict sea duck counts from aerial surveys conducted over Lake Michigan from 2009–2014 during fall (September–November) for the Southeast Lake Michigan, Michigan and Indiana key site, by month.

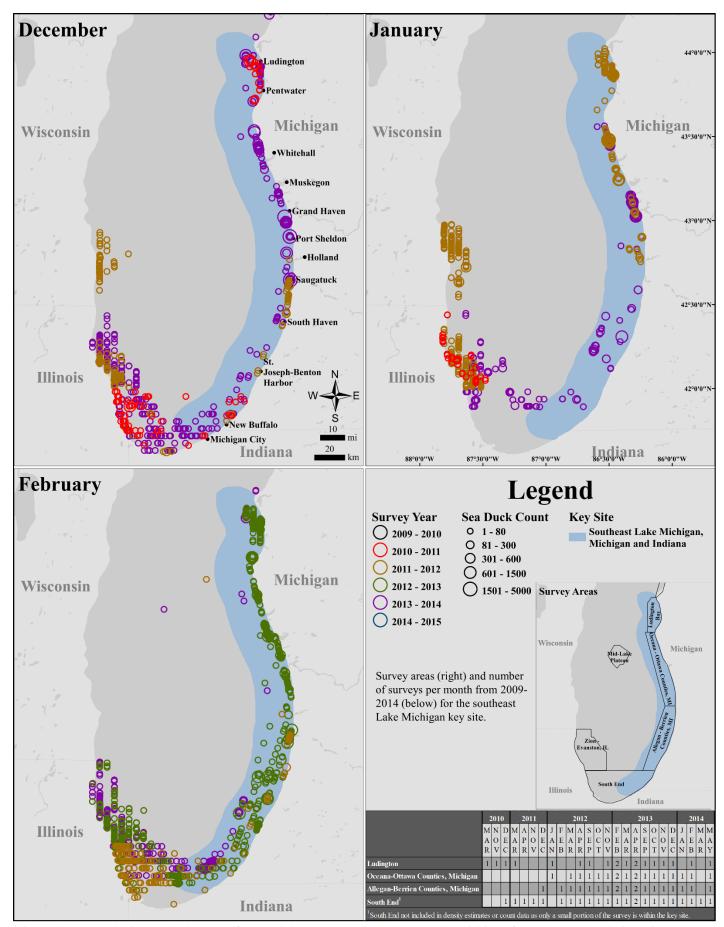


Figure S2. Maps depict sea duck counts from aerial surveys conducted over Lake Michigan from 2009–2014 during winter (December–February) for the Southeast Lake Michigan, Michigan and Indiana key site, by month.

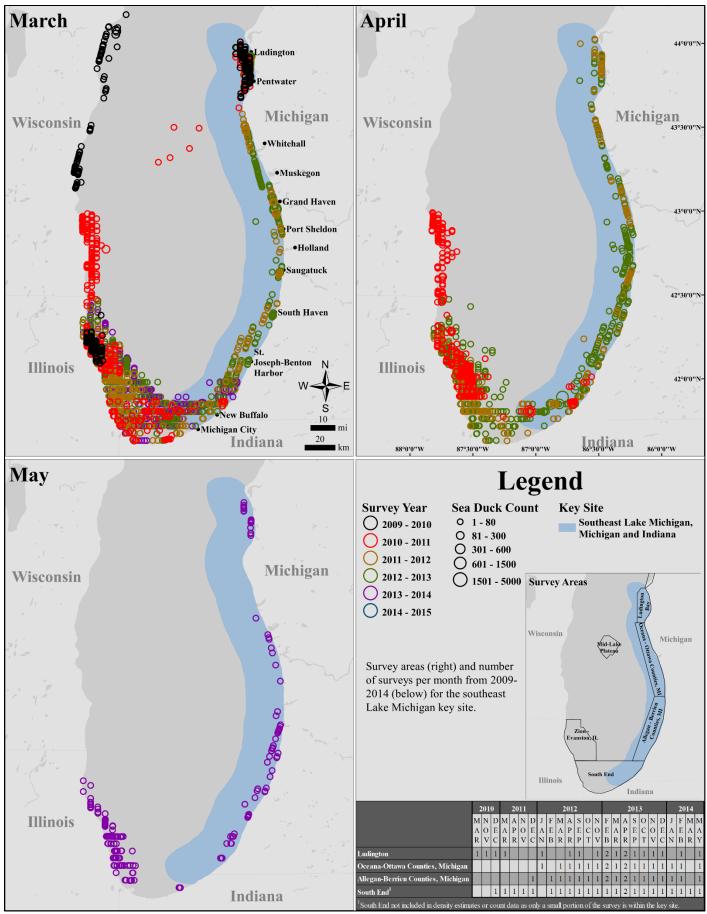


Figure S3. Maps depict sea duck counts from aerial surveys conducted over Lake Michigan from 2009–2014 during spring (March–May) for the Southeast Lake Michigan, Michigan and Indiana key site, by month.