

II-1. WATERBIRD USE OF EAGLE RIVER FLATS FROM AERIAL SURVEYS, APRIL–OCTOBER, 2009

Dennis K. Marks and William D. Eldridge

U.S. Fish and Wildlife Service, Anchorage, AK

INTRODUCTION

Aerial surveys to monitor waterbird use of Eagle River Flats (ERF) during the spring, summer, and fall of 2009 were conducted by the U.S. Fish and Wildlife Service as part of the ongoing waterbird mortality and monitoring studies of ERF sponsored by the U.S. Army at Fort Richardson, Anchorage, Alaska. The purpose and history of these investigations have been presented elsewhere (Racine and Cate, Eds. 1996).

STUDY AREA

Eagle River Flats is a 870 hectares (ha) salt marsh complex on the south side of Knik Arm, approximately 10 kilometers (km) east of Anchorage (Fig. II-1-1). A detailed description of this area is presented in Racine and Cate, Eds. (1996).

METHODS

Aerial surveys of ERF were flown from 17 April through 3 November, 2009. Surveys were scheduled to be conducted once a week in spring, twice a month during summer and twice a week in fall, and were flown with a fixed-wing aircraft at an airspeed of 130 to 170 km/hr and an altitude of 30 to 45 m. Total coverage of ERF was obtained by overlapping transects. Numbers of waterbirds were counted or estimated and recorded by species or species group with an analog or digital voice recorder; bird numbers were classified by locations on ERF, using standardized study areas (Fig. II-1-1). When possible, waterfowl were recorded by individual ponds within each study area using a standardized pond-numbering system developed for the ERF database by the Cold Regions Research and Engineering Laboratory (CRREL). In 2009, all swans were observed in ponds and 94 percent of ducks surveyed were in ponds; only ducks and swans in ponds were used for density calculations. Pond areas were used to calculate duck and swan densities, whereas total area (ponds and uplands) was used to calculate goose densities since geese primarily use terrestrial habitat on ERF. Areas (ha) of permanent and intermittent ponds were obtained from

digitized maps provided by CRREL and used to convert bird numbers to densities within the study areas. Number, mean, percent of total, and density within each standardized area for waterfowl groups are presented in Appendix II-1-D.

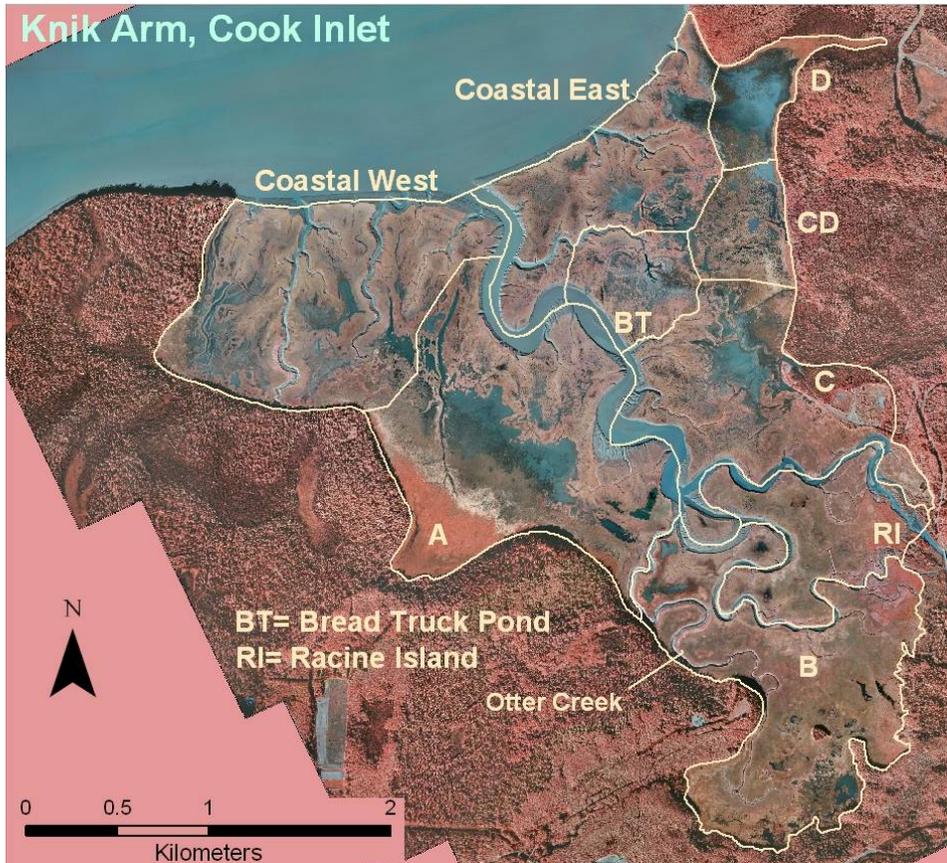


Figure II-1-1. ERF study area with standardized survey areas, ponds, sloughs and Eagle River.

RESULTS AND DISCUSSION

Environmental Conditions

In 2009, ERF experienced a slightly earlier spring breakup than in 2007 and 2008. By the end of April, pond surfaces were mostly clear of ice: on 17 April 2009 95% of ERF pond surfaces were frozen and no ducks were present, except in sloughs. On 24 April, ERF ponds were 30% ice and snow covered but ducks were present and using the open areas. By 29 April, water bodies were mostly open and waterfowl were observed in significant numbers. In mid October, ponds began freezing, but stayed open longer than in 2008. By 29 October, 80 percent of ponds surfaces were frozen and were 100% frozen less than a week later. While flood tides came in mid-August last year, flooding in 2009 occurred in the middle of September. During the first half of fall, conditions were very dry and pond levels were low (Collins pers. comm.). Summer moisture conditions are

explained in detail elsewhere in this report (Walsh, M.E. et al., Section III-2; Collins, Section III-3).

Abundance and Distribution of Waterbirds on ERF

Despite elevated military activity over the ERF restricted area, excellent flying weather translated to all scheduled aerial surveys being successfully completed in 2009. Twenty-three fall surveys were conducted and a total of 34 aerial surveys were conducted throughout the 2009 season (Appendix II-1-A). Both the first spring survey and the final fall survey were not included in density estimates because ponds were frozen and the few birds present were restricted to tidal sloughs and Eagle River. The number of surveys used to classify observations by area for spring, summer and fall were 6, 4 and 22, respectively. Species composition for all birds surveyed in 2009 was comparable to that of previous years (Fig. II-1-2; Appendix II-1-B).

Similar to past years, numbers of ducks and geese on ERF in 2009 showed a small peak in late April and early May; whereas the major influx of waterfowl began late July to early August and peaked mid August to late September (Fig. II-1-3, Appendix II-1-A). Of all ducks counted, nearly 98% were identified to species. Use of the nine study areas in ERF by waterfowl was also similar to past years with ducks again most concentrated in Areas D, CD and A.

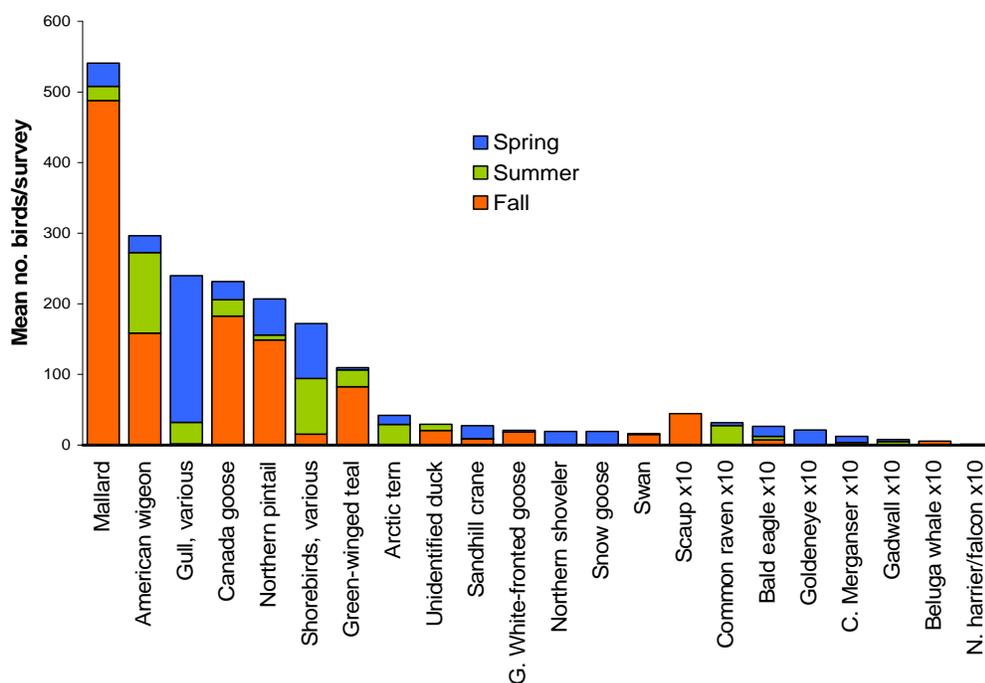


Figure II-1-2. Relative abundance of all species or species groups counted during ERF aerial surveys in 2009, listed in order of total abundance for all three seasons. For better resolution, the bars of less common species were expanded and represent numbers of individuals multiplied by 10.

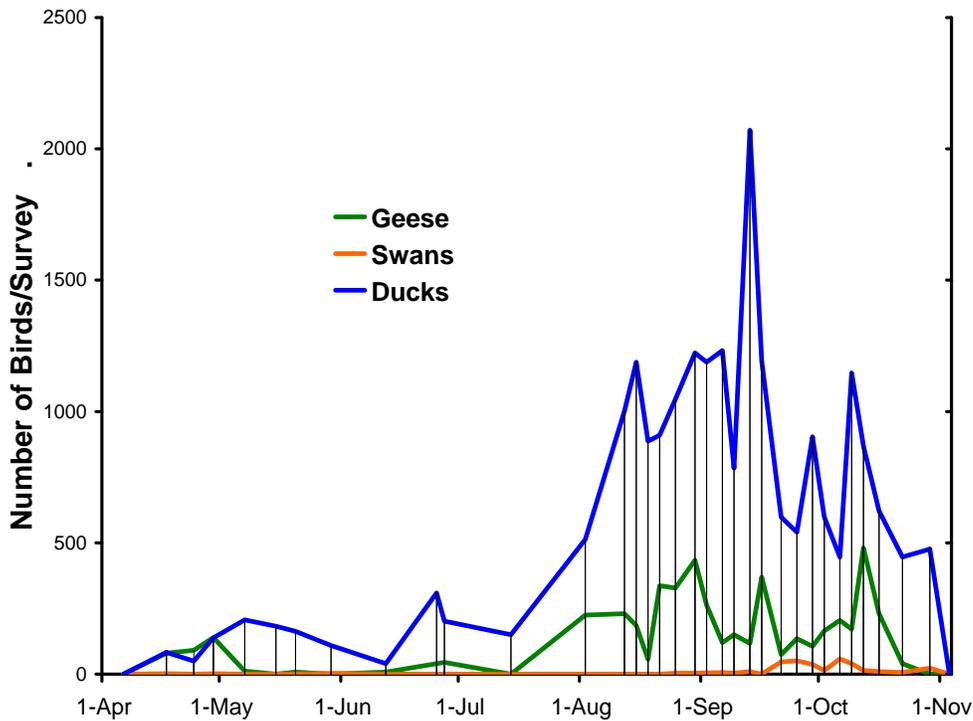


Figure II-1-3. Numbers of swans, geese, and ducks counted on ERF during aerial surveys in 2009. Vertical lines mark survey dates.

Ducks

Ten species of duck were identified on ERF in 2009. Average number of ducks for all months surveyed in 2009 was higher than previous years and averaged 670 ducks/survey (582, 641 and 578 for 2006, 2007 and 2008, respectively). Species composition in 2009 was very similar to previous years, and dabbling ducks comprised 99.4% of all identified ducks counted throughout the season. Mallards (*Anas platyrhynchos*), northern pintail (*A. acuta*), and American wigeon (*A. americana*) accounted for 89% of all dabbling ducks recorded on ERF in 2009; American green-winged teal (*A. crecca*), northern shoveler (*A. clypeata*) and gadwall (*A. strepera*) made up the remainder of identified dabbling ducks in 2009.

In spring, the number of ducks peaked on 7 May (8, 14 and 9 May in 2006, 2007 and 2008, respectively) and duck use of ERF was generally light (mean for spring, 142 ducks/survey). Area A had the highest numbers of ducks in spring 2009 with 46 percent of all ducks counted (Fig. II-1-5, top; Appendix II-1-C).

Fall migration phenology for ducks during fall 2009 was very similar to previous years, with peak numbers occurring early to mid September, though large numbers of ducks were present on ERF from early August (Fig. II-1-3, Appendix II-1-A). The mean number of ducks observed in fall 2009 surveys

(904/survey) was higher than in 2008 (837) but similar to 2006 and 2007 (912 and 981).

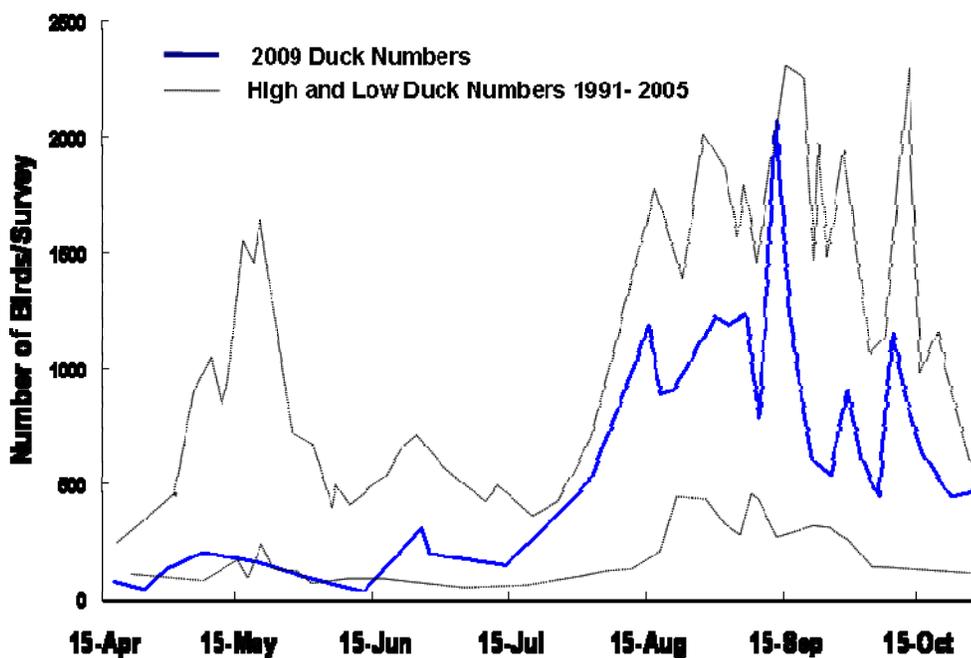


Figure II-1-4. Numbers of ducks observed during aerial surveys of ERF in 2009, compared to the low and high numbers of ducks observed from 1991 through 2005.

Similar to previous years, distribution of ducks in fall showed highest numbers and densities in areas A, D and CD. Area C and the few ponds in area B were also consistently used by ducks (Fig. II-1-5, bottom). In fall, 83 percent of all duck observations in ponds were identified to specific ponds, and the permanent ponds of areas D, CD and A were especially important to ducks (Fig. II-1-6). Ponds in C and Coastal East were also relatively important after flooding occurred in early fall.

Changes in Fall Pond Use by Ducks

Duck use between study areas has changed throughout the years due to variation in weather and water levels, treatability study activities, a rotation of pond remediation and other efforts to reduce exposure of ducks to white phosphorus (Fig. II-1-7, Appendix II-1-D). Of the four major habitat types used to classify duck locations (ponds, river, slough and shoreline), ponds, as expected, were by far the most important. Though not necessarily statistically significant, use of areas A and D continued to have a raised relative fall abundance of ducks and the use of ponds in areas B, Coastal West and Coastal East continued to show lowering levels of fall duck use relative to prior years; numbers in area C were also slightly down in 2009. A weakness in this comparison is related to those long- and short-term changes in pond boundaries

due to pumping and natural flooding (particularly in areas C, CD and D) making it difficult to consistently identify ponds.

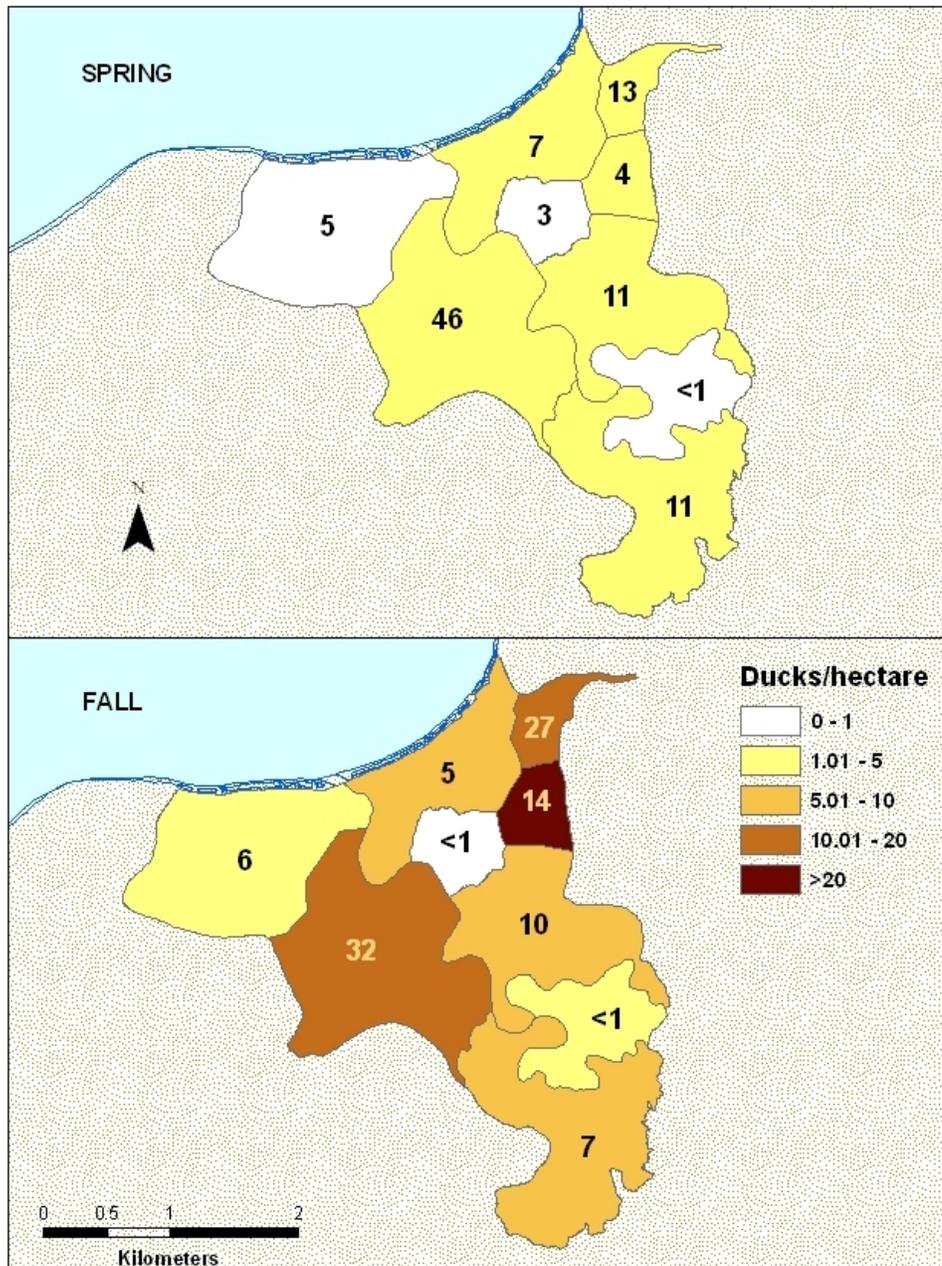


Figure II-1-5. Mean densities and distribution of ducks on ERF study areas in spring and fall 2009. Numbers within areas are the percent total ducks observed in each area. The area (ha) of permanent and intermittent ponds in each area was used to calculate densities.

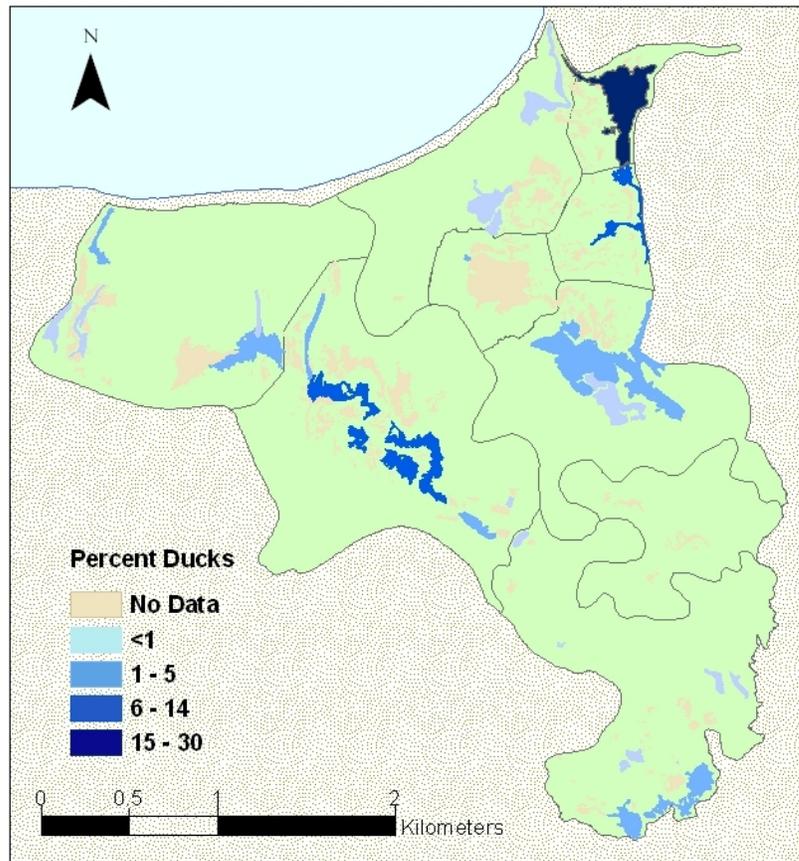


Figure II-1-6. Relative use of ponds by ducks, by percent, in fall 2009. Data are for duck observations classified to ponds; 96% of ducks observed in ponds were classified to pond number.

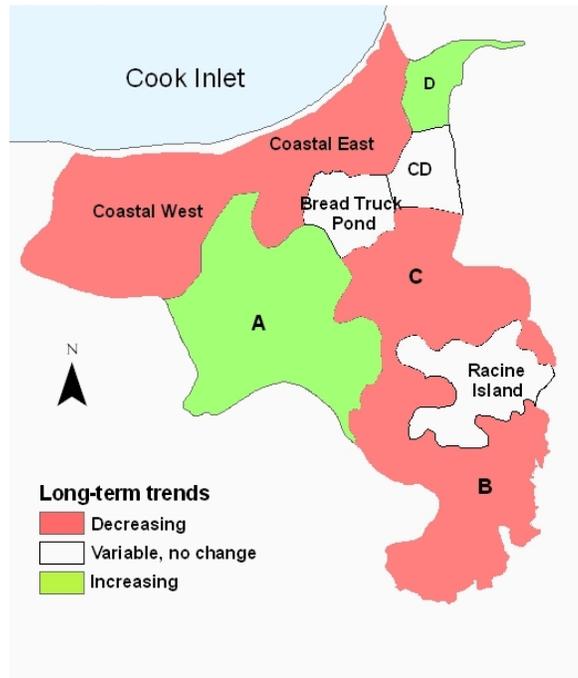


Figure II-I-7. Standardized areas of ERF showing trends of relative duck use for fall 1997-2009 aerial surveys.

Geese

Abundance of geese is variable from year to year. In 2008, a few large flocks made the lesser snow goose (*Chen caerulescens*) the most abundant waterfowl species to visit ERF in the spring. In 2009, large flocks of snow geese were not observed on ERF, though 53 percent of the 251 spring geese counted were snow geese. More consistently present on the flats, were Canada geese (*Branta canadensis*) comprising 39 percent of spring goose numbers, and “tule” greater white-fronted geese (*Anser albifrons elgasi*) comprised the remaining 8 percent. Timing of peak goose counts in 2009 was similar to that in 2005 and 2006; spring peak counts of all three goose species occurred toward the end of April. Primarily in the grassy areas or the mud banks of Eagle River, geese were mostly observed near the coast in Coastal West and Coastal East (Fig. II-1-8, top). Only a small number of Canada geese use ERF during summer for nesting or brood-rearing.

In 2009, 93 percent of all geese surveyed on ERF were counted in the fall. While many geese occupied ERF by late July, fall goose migration was similar to other years with the main influx of geese arriving in mid to late August and persisting on ERF through mid October. Canada geese were the most abundant of all fall geese counted, and accounted for 91 percent of fall geese, while greater white-fronted geese made up the remainder. Snow geese are often present in small numbers briefly on ERF in the fall, but were not observed in fall 2009. As in the past, the heaviest use by geese was near the coast in Coastal East and Coastal West and in area A (Fig. II-1-8, bottom; Appendix II-1-A, C).

Swans

Both tundra swans (*Cygnus columbianus*) and trumpeter swans (*C. buccinator*) occur on ERF though trumpeter swans are more common in the area (Appendix II-1-B). For this report results for swans are combined because the two species cannot be distinguished from the air. As is typical, swans only used ERF in small numbers during spring, with only six observed in 2009. Swans were much more abundant in fall and numbers peaked in early October at 58 individuals (average 15/fall survey), somewhat fewer than in previous years (113, 224 and 92 for 2006, 2007 and 2008; appendix II-1-A). They were primarily observed on lakes in Area CD, Area D and Coastal East, though small groups were also consistently observed on the few ponds in Area B (Fig. II-1-9, Appendix II-1-A, C).

Bald Eagles and other Raptors

Numbers of bald eagles (*Haliaeetus leucocephalus*) were low in 2009, though were observed more frequently than in 2008, on about half of all surveys flown in 2009. Up to four eagles were observed on a given survey including an adult with two juveniles in area CW (Appendix II-1-A). While specific shoreline surveys for eagles were not conducted, concentrations similar to earlier years of 50 or more eagles would have been noticed if present. Though never abundant in recent years (19 in 2007), lower eagle numbers may be due to decreased mortality of waterbirds on ERF. Northern harriers (*Circus cyaneus*) were only observed three times, although in past years CRREL personnel observed them on a daily basis. Peregrine falcon (*Falco peregrinus*), were occasionally seen as single birds and common ravens (*Corvus corax*) were observed infrequently in 2009 (7 counted on one survey; none in 2008, 7 in 2007).

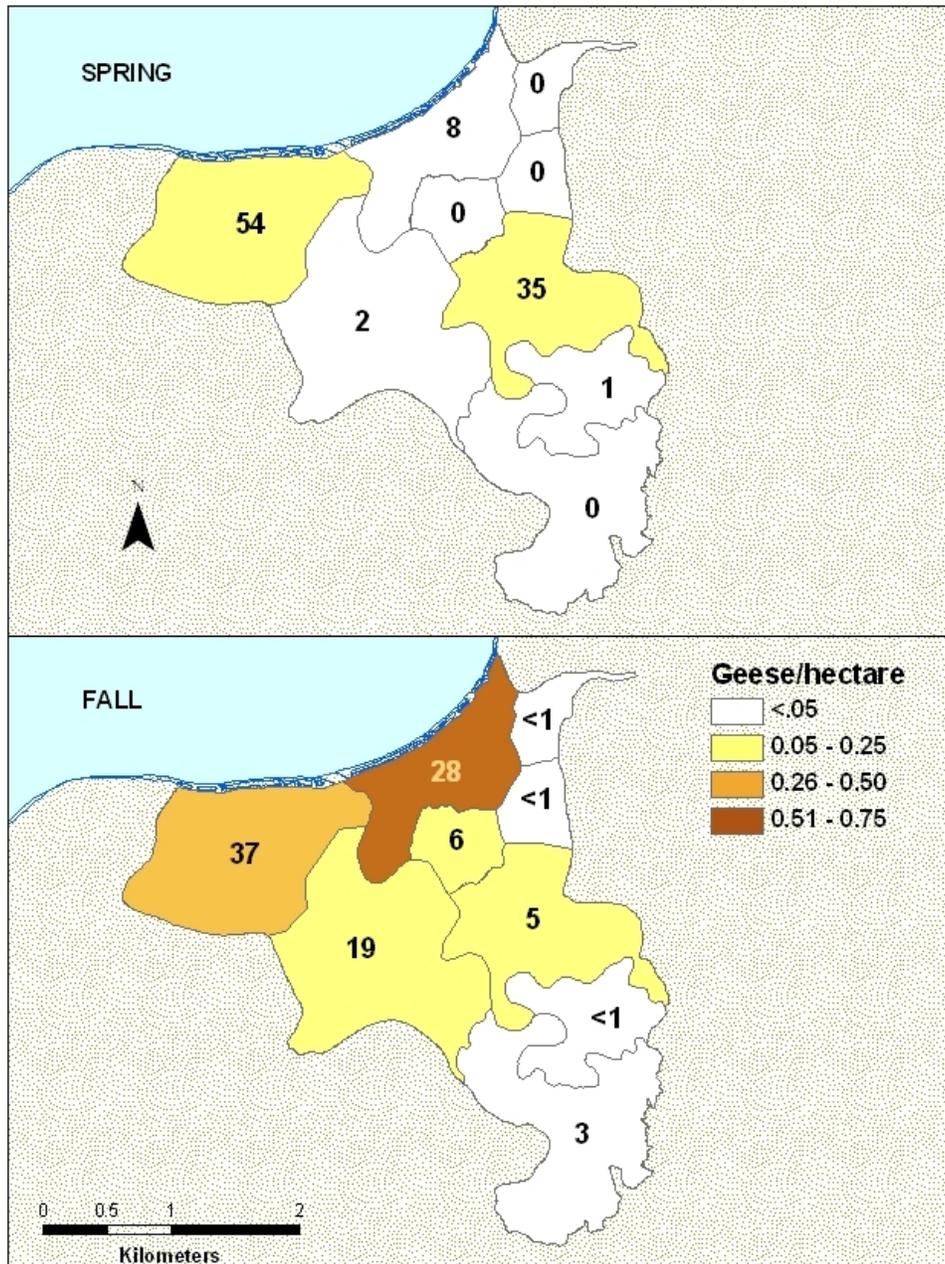


Figure II-1-8. Mean densities of geese on ERF study areas in spring and fall 2009. Numbers within areas are the percent of total geese observed in each area. Since most geese are distributed in the grass throughout the sections, total area (ha) within the boundaries of each area was used to calculate densities.

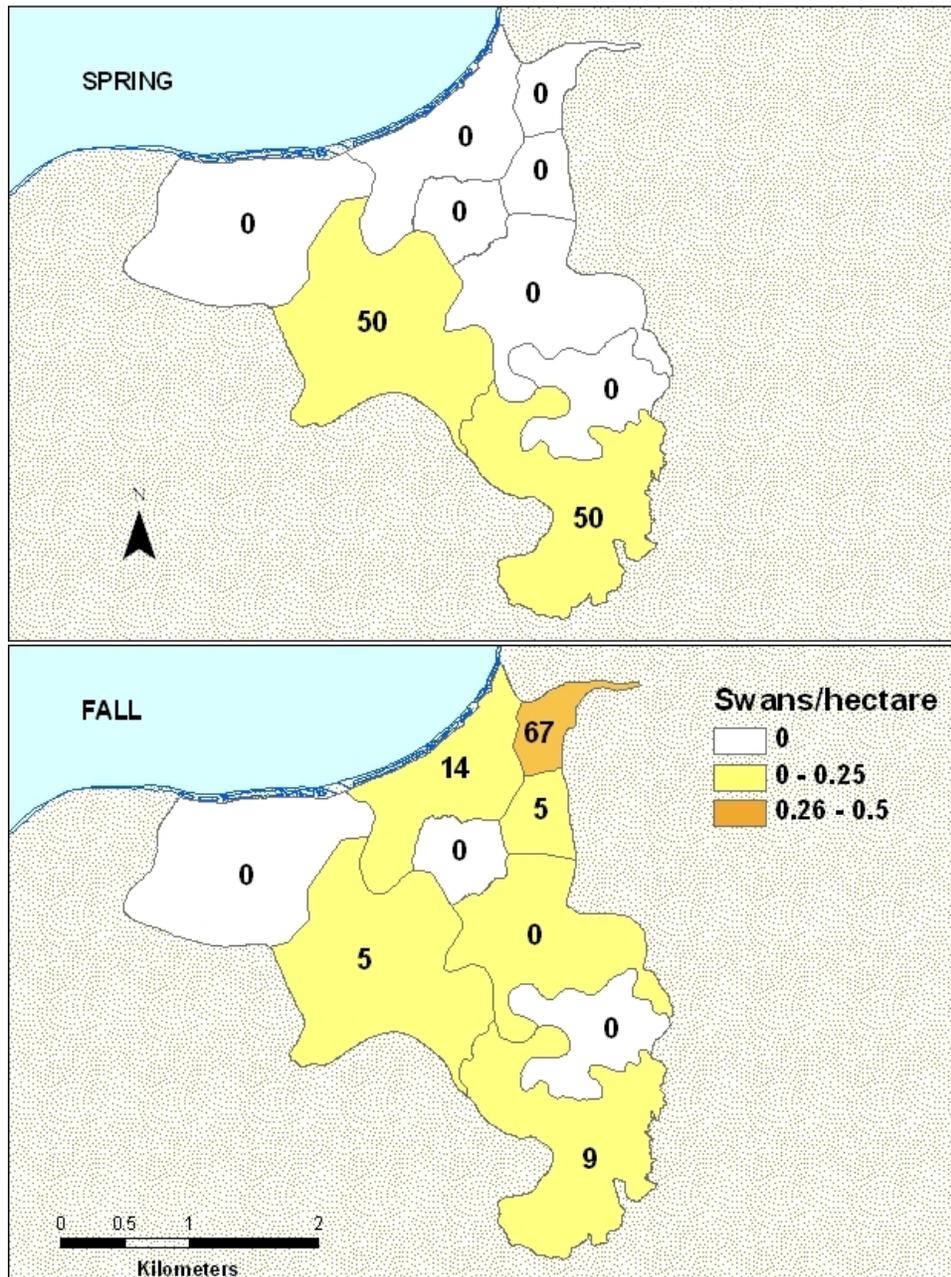


Figure II-1-9. Mean densities of swans on ERF study areas in spring and fall 2009. Numbers within areas are the percent of total swans observed in each area. The area (ha) of permanent and intermittent ponds in each area was used to calculate densities.

Shorebirds

Shorebirds were most abundant on ERF in spring (Appendix II-1-A). Although yellowlegs were sometimes recorded, all species of shorebirds were combined since they are difficult to identify from aircraft. Fewer shorebirds were

counted in 2009 than in previous years though more than in 2008 (2022, 2380, 969 and 1200 for 2006 to 2009, respectively). Common species on ERF include least sandpipers (*Calidris minutilla*), semi-palmated sandpipers (*C. pusilla*), western sandpiper (*C. mauri*), dowitchers (*Limnodromus* spp.), and greater and lesser yellowlegs (*Tringa* spp.). Pectoral sandpipers (*Calidris melanotos*) have been observed by CRREL personnel in previous years.

Gulls and Terns

Gull species were combined for aerial survey estimates (Appendix II-1-A). The most common species were mew gulls (*Larus canus*) and herring gulls (*L. argentatus*) but also present were glaucous-winged (*L. glaucescens*) and Bonaparte's gulls (*Larus philadelphia*). Arctic terns (*Sterna paradisaea*) were common through July. As of 2006, the mew gull colony formerly in Area D has only consisted of a few pairs.

Sandhill Cranes

Sandhill cranes (*Grus canadensis*) were observed on ERF more consistently than in previous years from spring through mid September 2009 (Appendix II-1-A) and totaled 319 for all surveys (353 and 121 in 2007 and 08). More than 40 were counted on several surveys and peaked at 70 birds in early May. One pair of cranes nested in Area C in 2006.

ACKNOWLEDGEMENTS

Thanks to Bob Platte, Bob Stehn, Julian Fischer, Chris Dau and Paul Anderson, USFWS Anchorage, for assistance with surveys and logistics and for comments on the study and report.

REFERENCES

Racine, C.H., and D.W. Cate (Eds.) (1996) Interagency expanded site investigation: Evaluation of white phosphorus contamination and potential treatability at Eagle River Flats, Alaska. FY 95 Final Report. CRREL Contract Report to U.S. Army, Alaska Directorate of Public Works, Ft. Richardson, Alaska.

Appendix II-1-A. Number of birds, by species or species group, observed for each aerial surveys of ERF in 2009 (page 1 of 3).

	4/17	4/24	4/29	5/7	5/15	5/20	5/29	6/12	6/25	6/27	7/14
Ducks											
Green-winged Teal				3	18		2		3	53	40
American Wigeon		1	9	4	49	71	32	6	301	90	60
Common Merganser			1		5						
Gadwall				2				2			
Goldeneye		3	12								
Mallard	33	34	57	24	40	31	12	23	3	39	15
Northern Pintail	50	12	53	143	34	39	28	8		20	
Northern Shoveler			5	31	36	22	35		2		
Scaup											
Unidentified Duck											35
Total Ducks	83	46	115	198	110	92	75	31	5	59	50
Geese											
Canada Goose	80	8	77	6		8		8	40	45	
Gr. White-fronted		8	3	6							
Snow Goose		75	60								
Total Geese	80	91	140	12		8		8	40	45	
Swans											
	2		2			1	3				
Other											
Sandhill Crane			35	70	19	2	2		2		
Arctic Tern			3	39	11	19	18	11	32	54	19
Gulls ¹	500	11	55	178	316	339	55	9	2	92	18
Shorebirds				150	262	132				15	300
Bald Eagle		4	2		1		3		1	1	
N.Harrier & falcons											
Common Raven		3						7	4		
Beluga Whale											

¹Gull species include Mew, Herring, Glaucous-winged, Bonaparte's

Appendix II-1-A (cont.). Number of birds, by species or species group, observed for each aerial surveys of ERF in 2009 (page 2 of 3).

	8/2	8/12	8/15	8/18	8/21	8/25	8/30	9/2	9/6	9/9	9/13
Ducks											
Green-winged Teal	50	120	165	125	147	79	122	256	87	23	80
American Wigeon	106	220	175	167	260	167	144	239	275	257	473
Common Merganser							8				
Gadwall											
Goldeneye											
Mallard	244	442	523	380	433	574	717	503	725	277	1055
Northern Pintail	93	175	235	155	55	227	157	190	115	227	310
Northern Shoveler											
Scaup							35				
Unidentified Duck	20	45	90	60	15		40		30		153
Total Ducks	357	662	848	595	503	801	949	693	870	504	1518
Geese											
Canada Goose	125	130	140	57	295	328	342	251	120	150	112
Gr. White-fronted	100	100	45		42		92	12			5
Snow Goose											
Total Geese	225	230	185	57	337	328	434	263	120	150	117
Swans											
						4	4	5	6	4	10
Other											
Sandhill Crane	4	4	2	2		6	8	27	44	43	47
Arctic Tern	2										
Gulls ¹		6	15	2	9						
Shorebirds		50	10	3	3	15		20	40	50	
Bald Eagle	1									1	1
N.Harrier & falcons				1	1						
Common Raven											
Beluga Whale					12						

¹Gull species include Mew, Herring, Glaucous-winged, Bonaparte's

Appendix II-1-A (cont.). Number of birds, by species or species group, observed for each aerial surveys of ERF in 2009 (page 3 of 3).

	9/21	9/25	9/29	10/2	10/6	10/9	10/12	10/16	10/22	10/29
Ducks										
Green-winged Teal	15	4			38	225	95	20		
American Wigeon	120	100	158	255		105	45	55		
Common Merganser										
Gadwall										
Goldeneye										
Mallard	311	157	360	226	407	644	684	457	446	470
Northern Pintail	100	279	379	115		160	45	90		6
Northern Shoveler			7	2						
Scaup	50					13				
Unidentified Duck										
Total Ducks	461	436	746	343	407	817	729	547	446	476
Geese										
Canada Goose	75	135	106	159	205	171	476	230	40	
Gr. White-fronted				6			5			
Snow Goose										
Total Geese	75	135	106	165	205	171	481	230	40	0
Swans										
	47	51	37	14	58	40	14	10	6	23
Other										
Sandhill Crane										
Arctic Tern										
Gulls ¹							2	5		
Shorebirds			25		100	25				
Bald Eagle		3	2	3		2	1		2	
N.Harrier & falcons										
Common Raven										
Beluga Whale										

¹Gull species include Mew, Herring, Glaucous-winged, Bonaparte's

Appendix II-1-B. Waterbird and habitats observed in Eagle River Flats 1991-2003 (from web site: <http://www.crrel.usace.army.mil/erf/ecology/ecology-birds.html>).

Species	Status	Habitat
Red-Throated Loon	r	Permanent Pond
Common Loon	r	Permanent Pond
Horned Grebe	u	Permanent Pond
Great Blue Heron	+	
Trumpeter Swan	c	Permanent Pond
Tundra Swan	u	Permanent Pond
Canada Goose	c	Vegetated Mudflat
Cackling Goose	u	Vegetated Mudflat
Brant	u	Vegetated Mudflat
Greater White-Fronted Goose	c	Vegetated Mudflat
Snow Goose	c	Vegetated Mudflat Bulrush Marsh
Mallard	c, B	Permanent Pond Permanent Pond
Northern Pintail	c	Temporary Pond Permanent Pond
American Wigeon	c, B	Temporary Pond Permanent Pond
Eurasian Wigeon	r	Temporary Pond Permanent Pond
Northern Shoveler	c	Temporary Pond
Cinnamon Teal	+	Permanent Pond
Blue-Winged Teal	r	Temporary Pond Permanent Pond
Green-Winged Teal	c, B	Temporary Pond
Ring-Necked Duck	r	Permanent Pond
Greater Scaup	r	Permanent Pond
Lesser Scaup	r	Permanent Pond
Long-Tailed Duck (Oldsquaw)	r	Permanent Pond
Common Goldeneye	r	Permanent Pond
Bufflehead	r	Permanent Pond
Common Merganser	r	Permanent Pond

c = common, **u** = uncommon, **r** = rare, **+** = casual or accidental, **B** = confirmed breeder in ERF, **b** = probable breeder in ERF

Appendix II-1-C. Number, mean, percent of total, and density for each standardized area for waterfowl groups surveyed in 2009. Data are presented by season and standardized area. Density of ducks and swans used pond area; for geese, total area of each area was used. Only ducks in ponds were used for these calculations. The number of surveys used to classify observations by area for spring, summer and fall were 6, 4 and 22, respectively.

Survey Area	Number			Mean (no./survey)			Percent of Total			Density (No./hectare)		
	Ducks	Geese	Swans	Ducks	Geese	Swans	Ducks	Geese	Swans	Ducks	Geese	Swans
Spring												
A	388	5	3	64.7	0.8	0.5	45.7	2.0	50.0	2.7	0.3	1.6
B	94		3	15.7	0.0	0.5	11.1	0.0	50.0	1.7	0.0	
Bread Truck	22			3.7	0.0	0.0	2.6	0.0	0.0	0.3	0.0	
C	93	89		15.5	14.8	0.0	11.0	35.5	0.0	1.0	14.4	0.0
CD	32			5.3	0.0	0.0	3.8	0.0	0.0	1.1	0.0	
Coastal East	58	20		9.7	3.3	0.0	6.8	8.0	0.0	1.3	2.6	0.0
Coastal West	44	135		7.3	22.5	0.0	5.2	53.8	0.0	0.5	48.5	0.0
D	111			18.5	0.0	0.0	13.1	0.0	0.0	1.6	0.0	
Racine Island	7	2		1.2	0.3	0.0	0.8	0.8	0.0	0.8	0.4	0.0
Summer												
A	188			47.0	0.0	0.0	26.8	0.0		1.9	0.0	
B	9			2.3	0.0	0.0	1.3	0.0		0.2	0.0	
C	26	45		6.5	11.3	0.0	3.7	48.4		0.4	26.0	0.0
CD	88			22.0	0.0	0.0	12.6	0.0		4.7	0.0	
Coastal East	300	8		75.0	2.0	0.0	42.8	8.6		9.9	0.2	0.0
Coastal West	11	40		2.8	10.0	0.0	1.6	43.0		0.2	57.5	0.0
D	79			19.8	0.0	0.0	11.3	0.0		1.7	0.0	
Fall												
A	6109	763	16	277.7	34.7	0.7	32.1	19.4	4.8	11.4	3.0	0.2
B	1364	100	31	62.0	4.5	1.4	7.2	2.5	9.3	6.8	0.7	2.1
Bread Truck	184	233		8.4	10.6	0.0	1.0	5.9	0.0	0.8	13.8	0.0
C	1888	200	1	85.8	9.1	0.0	9.9	5.1	0.3	5.7	1.6	0.0
CD	2616	32	16	118.9	1.5	0.7	13.8	0.8	4.8	25.4	0.1	12.7
Coastal East	978	1096	45	44.5	49.8	2.0	5.1	27.9	13.6	5.9	8.5	0.2
Coastal West	1068	1472		48.5	66.9	0.0	5.6	37.4	0.0	3.1	21.8	0.0
D	5051	11	223	229.6	0.5	10.1	26.6	0.3	67.2	19.6	0.0	397.1
Racine Island	51	25		2.3	1.1	0.0	0.3	0.6	0.0	1.6	0.7	0.0

Appendix II-1-D. Percent use of ERF study areas and major habitat types by ducks in fall 1997-2009.

Area/Habitat	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Coastal West	9.9	17.6	18.8	7.9	6.0	3.4	7.2	4.7	5.6	2.5	1.6	4.5	5.4
Ponds	5.6	9.1	10.9	5.8	5.4	1.9	1.1	1.7	1.4	1.7	1.6	3.1	4.6
Eagle River	<0.1	0.8	1.2	<0.1	0.2	1.1	5.3	2.9	4.0	0.5	<0.1	0.9	0.8
Knik Shoreline	4.3	7.6	6.6	1.8	0.2	<0.1	0.7	0.0	0.1	<0.1	0.0	0.5	<0.1
Area A	14.6	5.6	14.9	23.5	18.7	16.9	10.3	18.2	24.6	23.7	27.1	33.1	31.4
Ponds	14.5	5.0	11.5	16.7	9.8	7.6	5.0	7.8	11.9	14.8	26.1	30.3	30.7
Eagle River	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.1	1.6	2.8	0.7
Area B	25.0	19.2	20.1	19.0	10.5	21.4	33.0	19.3	9.8	14.3	6.0	5.0	7.2
Ponds	19.2	18.2	16.1	17.8	9.7	17.6	25.3	10.2	7.0	9.1	5.6	4.6	6.9
Eagle River	5.8	1.0	1.4	1.2	0.2	1.3	0.4	0.0	0.1	0.1	0.0	0.4	0.3
Otter Creek										0.4	0.2	<.01	<.01
Racine Island	0.6	1.1	1.5	0.7	0.2	0.1	0.6	1.0	0.4	<0.1	0.9	0.9	0.6
Ponds	0.6	1.1	1.5	0.7	0.2	0.1	0.6	1.0	0.4	<0.1	0.9	0.9	0.4
Area C	17.9	4.8	4.8	10.0	25.4	21.1	15.1	13.0	17.2	10.1	15.4	14.2	11.0
Ponds	2.4	4.7	1.0	4.6	23.3	15.5	13.6	4.1	10.2	7.9	14.3	13.0	9.5
Eagle River	15.5	0.1	1.0	4.8	0.3	0.1	0.0	0.1	1.9	0.2	1.4	1.2	1.5
Area CD	11.4	15.3	8.5	9.0	12.5	17.5	17.4	14.0	13.0	15.9	14.8	11.9	13.2
Ponds	11.4	15.3	3.7	5.7	8.1	12.8	10.6	6.3	8.8	11.5	14.8	11.9	13.2
Bread Truck	1.3	1.9	2.3	3.7	0.0	0.1	0.3	3.5	2.0	2.0	4.1	2.3	0.9
Ponds	1.3	1.9	1.1	1.5	0.0	0.0	0.0	0.9	0.2	0.5	4.0	1.6	0.8
Eagle River	<0.1	<0.1	1.2	2.0	0.0	0.1	0.3	2.4	1.7	1.4	0.1	0.7	0.1
Coastal East	9.1	21.1	9.1	6.6	3.6	0.7	4.4	7.2	11.6	7.2	4.4	4.6	4.9
Ponds	2.8	9.3	5.0	4.5	5.4	0.4	0.0	3.3	5.8	6.3	3.9	2.1	4.2
Knik Shoreline	6.3	11.7	0.9	1.4	0.2	0.0	0.0	0.2	0.2	0.0	0.1	2.5	0.0
Area D	10.7	13.4	20.0	19.7	23.1	19.0	11.8	19.0	15.7	24.3	25.8	23.5	25.4
Ponds	10.7	13.4	13.3	19.6	23.1	18.9	10.3	16.7	15.7	24.0	25.8	23.5	25.4