

Casco Bay Shorebird Monitoring Project

Year-Three (2011) Progress Report



Roosting Least Sandpipers (*Calidris minutilla*), Royal River marshes, Casco Bay.

June 2012

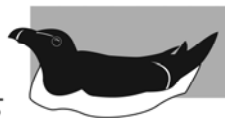
Biological Conservation
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INTRODUCTION

This document provides a summary of shorebird-use during the third field season of the Casco Bay Shorebird Monitoring Project. Relative to other coastal areas in Maine, Casco Bay shorebird habitats are particularly vulnerable to degradation, given the heightened potential for coastal development, disturbance, and other factors in a landscape where industrial and residential land-use patterns prevail. This collaborative project provides enhanced monitoring resolution at key shorebird feeding and roosting areas designated as Significant Wildlife Habitat by the Maine Department of Inland Fisheries and Wildlife (MDIFW). Specific project objectives include:

1. Evaluate the effectiveness of existing Significant Wildlife Habitat mapping and other habitat protection measures for shorebirds in Casco Bay, based on the most current data demonstrating status and trends in habitat-use.
2. Identify and map areas used by shorebirds that are not currently documented as shorebird feeding or roosting areas in Casco Bay, including habitats located on islands and ledges where data are currently lacking.
3. Apply enhanced knowledge of shorebird use in Casco Bay by the following means:
 - a. distribute key findings of the project to coastal municipalities to inform local planning decisions
 - b. integrate refined and updated shorebird status, distributional data, and trends into State of Maine permit review processes
 - c. submit data to the Manomet Center for Conservation Sciences for inclusion in the International Shorebird Survey database.

METHODS

Survey Sites

In 2011, surveyed sites designated as mainland shorebird feeding and roosting areas by MDIFW included: Upper New Meadows River, Maquoit Bay, Cousins River, Royal River, Presumpscot River, Back Cove, Mackworth Island Flats, and the Upper Fore River (referred as “Stroudwater” in previous reports) (Appendix A). The New Meadows River site was subject to roosting surveys in 2011 because 2009-2010 data suggested little feeding activity by shorebirds and its tidal marsh characteristics are more typical of a roosting site. (Moore 2009, 2010) The site referred to as the “Upper Fore River” in previous years, which is actually located in the lower Fore River, supported relatively little shorebird use in 2009 and 2010. After discussions with MDIFW, who noted a similar trend, this site was dropped from the 2011 surveys and subsequent monitoring

effort will likely be suspended. In addition to mainland sites, Biological Conservation and USFWS surveyed 52 Casco Bay island and ledge complexes between the western shore of the Bay and its eastern extreme (Small Point).

Mainland Shorebird Surveys

The survey methodology and protocol for mainland sites adopted the basic framework for field methods/protocols provided by the Program for Regional and International Shorebird Monitoring Manager's Monitoring Manual (Skagen et al. 2009) and the International Shorebird Survey (ISS). ISS "Option 2" guidelines were adapted to reflect regional shorebird phenology and migration patterns. For monitoring of feeding areas, field crew conducted one survey during each of these periods: July 15-31, August 1-15, August 16-31, September 1-15, September 16-30, and October 1-15. In 2011 we conducted surveys at mainland roosting sites during the third, fourth and fifth of these periods, which is the observed peak of seasonal shorebird abundance in Casco Bay. To lessen the likelihood of counting the same birds on more than one site visit, the 2011 protocol incorporated an increase in the interval between site visits to two weeks.

Another protocol change expanded the daily survey period to include at least some of the afternoon, providing surveys concluded at least two hours before sunset. This change allowed field crew additional flexibility in scheduling surveys. At each site, field crew identified a tidal elevation at each pre-designated observation point/area that would afford the most representative and efficient counts of birds. The daily timing of surveys was determined by NOAA tide predictions (corrected for each site) and weather effects (onshore wind or rain/runoff) that occasionally offset the timing of corrected high and low tide predictions. Most survey effort focused on feeding habitat, because these areas supported the greatest densities and diversity of readily observable birds. Surveys were rescheduled when high winds, heavy rains, unexpected tidal shifts were likely to influence either habitat-use by shorebirds or survey accuracy. Field crew surveyed assigned sites alone, with the exception of the Presumpscot River and Upper Fore River, which encompass expansive mudflats that required two surveyors working in close coordination (e.g. using cell phones or radios to alert one another of notable bird movements in the area).

Island and Ledge Shorebird Roosting Surveys

During the first year of the project, 17 islands and ledges were surveyed once for roosting shorebirds by Robert Houston of the U.S. Fish and Wildlife Service and Slade Moore of Biological Conservation within about 2 hours of high tide. In 2010, Biological Conservation surveyed 24 island and ledge groups between Bailey Island and Ram Island Ledge one to five times each. During the 2011 field season, 52 island-ledge complexes between the western and eastern extents of Casco Bay were surveyed up to four times each (most were surveyed twice). Sites thought to have the most potential for roosting shorebirds were relatively small, unpopulated islands or ledges that were not dominated

by shoreside woodlands or development, the assumption being that these sites offered habitat relatively free of disturbance and predation risk. Island-ledge roosting surveys were conducted within a period 2.5 hours before and after high tide based on observations in Casco Bay that shorebirds seek refuge from rising waters on the mudflats 2-3 hours after low tide. The relatively narrow window in which to conduct surveys limited the number of sites that could be confidently surveyed on any one day. The timing and number of vessel survey days was limited by a combination of scheduling and weather constraints.

Observations

Observations were recorded on data sheets provided to field crew. Even with large numbers of highly mobile birds were present on the flats, actual counts of individuals were often possible. When conditions prevented counts, estimates were made. At times, observer's distance to birds precluded identification of diagnostic features necessary for species identification. For instance, the smallest species of the genera *Calidris*, which include the Semipalmated (*C. pusilla*), Western (*C. mauri*), and Least (*C. minutilla*) Sandpipers, among others, present a particular identification challenge when viewed at considerable distances. When identification to species was not possible, the small calidrid species were collectively referred to as "peeps."

Along with counts and estimates, survey crew also documented the timing of notable bird movements such as ingress/egress from each site. Along with each day's data sheets, crew provided annotated maps indicating the locations of observation sites and concentrations of shorebirds observed.

Quality Assurance and Data Handling

Surveyors were asked to review data sheets for missing and/or erroneous entries immediately following each survey. The Project Coordinator reviewed incoming data sheets to ensure fidelity to the established data collection protocol. Data were entered under standardized site/date, with the appropriate ISS tide code appended. After data entry was complete, the Project Coordinator compared data sheets against keyed data to ensure the accuracy of data entry.

Shorebird Banding Pilot Study

The low number of roosting birds observed relative to those counted during feeding surveys was a major reason for conducting island-ledge surveys. Another approach to determine where birds roost involves tracking individual birds using leg bands and/or radio telemetry, where transmitters are temporarily attached to captured birds who are then tracked for their length of stay (possibly up to several weeks). We explored these options by first testing the feasibility of catching birds. With assistance from MDIFW

and Biodiversity Research Institute, Biological Conservation mobilized materials and field crew for capture operations at the site with highest shorebird abundances (Presumpscot). Several factors limited our effectiveness by narrowing the seasonal window during which capture operations might be most effective, including 1) limited funding and a late notification of award, 2) an unanticipated requirement to undergo institutional animal care training prior to field operations, 3) scheduling conflicts among the mostly “borrowed” crew, and 4) unfavorable weather. As a result, only three of the planned five to 10 net deployment days were accomplished. No birds were captured.

RESULTS AND DISCUSSION

Mainland Shorebird Feeding Areas

Results of 2011 feeding surveys are provided in Table 1. The most notable trend was a sharp increase in the abundance of Semipalmated Sandpipers and also unidentified peeps, most of which were probably Semipalmated Sandpipers. The total number of shorebirds observed in 2011 was 20,054, versus 15,658 for 2010. The total number of peeps observed in 2011 was 18,152, a 26% increase over 2010 peep numbers. Not all sites experienced increases, but notable exceptions included the Presumpscot River, whose observed peep abundances increased by 49%. Overall, most sites remained relatively steady in their annual shorebird abundance rankings, with the Presumpscot River supporting the largest numbers of feeding birds. Peak abundances of peeps were observed during the early-mid September period (Figure 1), reflecting the height of juvenile Semipalmated Sandpiper migration through southern Maine.

Mainland Shorebird Roosting Surveys

A new timing protocol for mainland roosting surveys was implemented in 2011 (Table 2). Only 2009 and 2010 data collected during the survey periods prescribed in 2011 are provided in Table 2, so a simple comparison of yearly totals is not advisable. However, it can at least be said that notable interannual abundance shifts among roosting sites was not apparent. In 2011 the number of birds observed at roosting sites (1,463) was about 10% of those observed during feeding surveys (15,212) conducted during the same survey periods, so the disparity between yearly total numbers of feeding vs. roosting birds followed the trend of earlier surveys.

Island and Ledge Roosting Shorebird Surveys

Our observations documented a few islands and ledge sites supporting relative handfuls of shorebirds. Most notable among these in 2011 was the Clapboard Island Ledge complex, which was scouted in 2010 for possible inclusion in subsequent surveys

Table 1. Seasonal shorebird abundance observed during six visits each to designated feeding areas in Casco Bay, July 15 - October 15, 2009-2011.

Species observed	Maquoit Bay			Royal River			Presumpscot River			Mackworth Flats			Back Cove			Upper Fore River ^A			Annual Total		
	2009	2010	2011	2009	2010	2011	2009	2010	2011	2009	2010	2011	2009	2010	2011	2009	2010	2011	2009	2010	2011
Black-bellied Plover	155	179	210	17	2	1	118	219	412	0	4	0	83	65	51	0	2	21	373	471	695
American Golden Plover	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	2
Semipalmated Plover	53	93	52	74	114	147	9	28	278	259	12	24	90	64	126	27	60	187	512	371	814
Killdeer	0	0	1	0	0	0	0	0	0	0	0	0	2	0	0	0	7	0	2	7	1
American Avocet	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Greater Yellowlegs	85	71	69	14	17	30	7	32	28	0	1	1	96	50	44	1	1	13	203	172	185
Lesser Yellowlegs	33	37	40	6	1	4	3	9	4	1	0	1	2	1	1	3	1	0	48	49	50
Yellowlegs spp.	9	0	0	0	2	15	0	0	0	0	0	0	0	0	0	0	0	0	9	2	15
Solitary Sandpiper	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	2	0	0	5
Willet	7	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0	1
Spotted Sandpiper	1	6	1	1	0	0	1	9	2	0	1	0	1	0	1	0	2	9	4	18	13
Whimbrel	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Hudsonian Godwit	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
Ruddy Turnstone	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0
Red Knot	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2	0	0	3
Semipalmated Sandpiper	130	609	342	237	458	643	308	3,513	10,400	47	1,900	1,693	656	798	849	259	936	1,510	1,637	8,214	15,437
Western Sandpiper	0	0	0	1	0	0	0	0	2	0	0	0	0	0	0	0	0	0	1	0	2
Least Sandpiper	60	78	73	29	55	16	1	19	6	1	18	3	18	16	12	13	12	34	122	198	144
White-rumped Sandpiper	0	12	8	1	0	0	0	0	12	0	0	0	0	1	7	1	0	5	2	13	32
Baird's Sandpiper	0	1	1	0	0	0	0	0	2	0	0	0	1	0	0	0	0	0	1	1	3
Pectoral Sandpiper	0	4	2	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	7	2
Unidentified Peep spp. ^B	0	0	0	307	1,874	2,493	2,665	3,491	30	0	11	8	0	49	1	719	587	0	3,691	6,012	2,532
Dunlin	18	38	23	0	0	0	0	0	5	0	0	0	0	2	2	0	0	3	18	40	33
Buff-breasted Sandpiper	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	0	0	0	0	0	11
Short-billed Dowitcher	76	48	56	0	0	0	13	12	4	2	10	0	1	10	6	0	0	2	92	80	68
Long-billed Dowitcher	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Unidentified Dowitcher spp.	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Unidentified short-leg spp.	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Total, by site	627	1,179	880	688	2,523	3,354	3,125	7,332	11,188	310	1,957	1,730	951	1,059	1,113	1,023	1,608	1,789	6,724	15,658	20,054

^A The Upper Fore River site was formerly referred to as "Stroudwater River." The Lower Fore River (formerly "Upper Fore River") site was not surveyed in 2011 due to relatively low observed shorebird use.

^B Any small calidrid sandpiper species often lumped under the heading "peeps" when conditions prevent identification to species. Most peeps observed in our study area are Semipalmated Sandpipers.

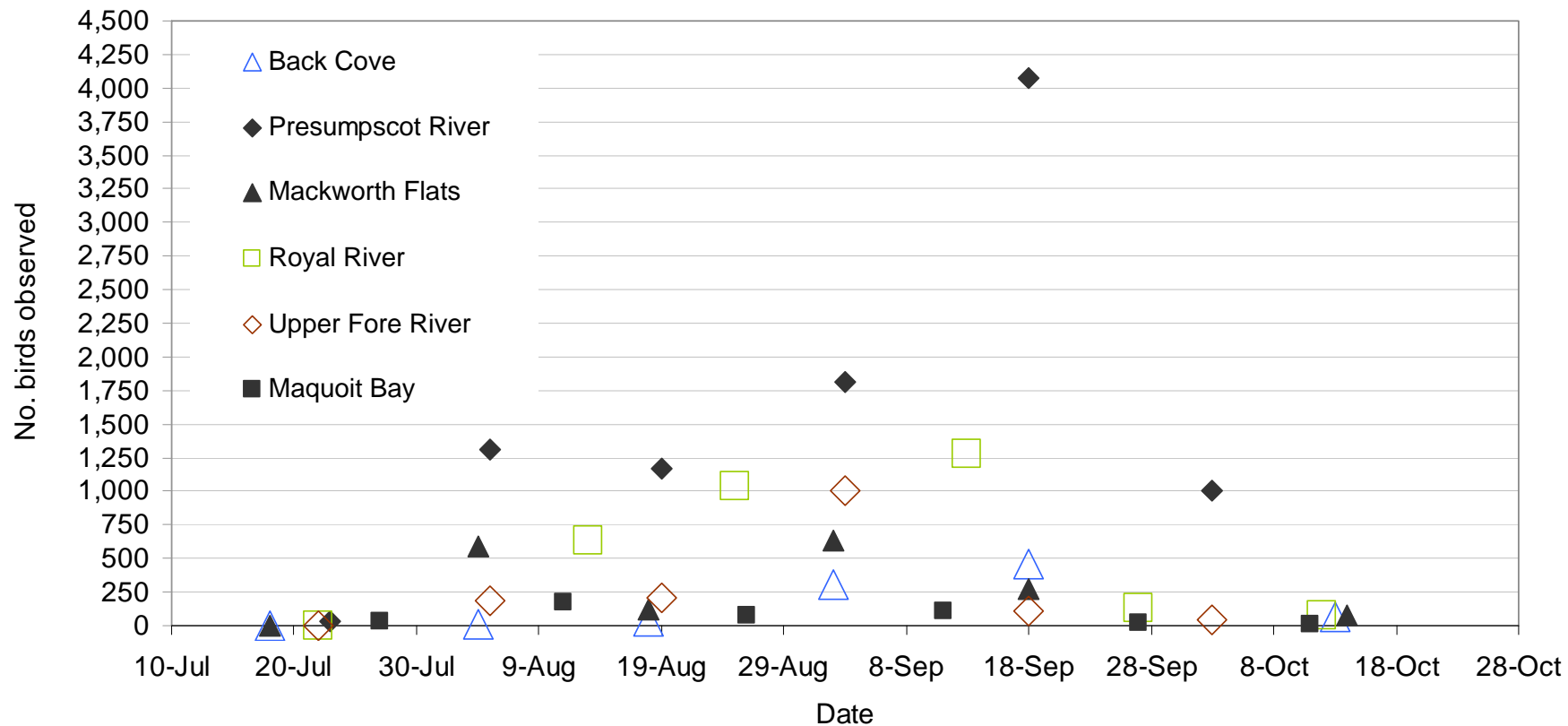


Figure 1. Migration phenology of small calidrid sandpipers (mostly Semipalmated Sandpipers) observed at Casco Bay shorebird feeding areas in 2011.

Table 2. Seasonal shorebird abundance observed during surveys at designated roosting areas in Casco Bay, 2009-2011. In 2011, one survey each was conducted 15-31 Aug, 1-15 Sep, and 16-30 Sep. If less than three surveys were conducted according to that timing, the number of conforming surveys is provided in the year field (in parentheses).

Species observed	Upper New Meadows	Ma-quoit Bay	Royal River		Cousins River			Mackworth Flats			Back Cove	Upper Fore River ^A		Annual Total		
	2011	2011	2010 (2)	2011	2009 (1)	2010	2011	2009 (2)	2010 (1)	2011	2011	2009 (1)	2011	2009	2010	2011
Black-bellied Plover	0	210	0	1	0	0	0	42	0	0	59	0	21	42	0	291
American Golden Plover	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	2
Semipalmated Plover	0	12	0	147	0	0	24	0	0	2	4	2	61	0	0	250
Killdeer	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
American Avocet	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
Greater Yellowlegs	4	4	0	0	0	13	27	0	0	0	71	0	3	0	13	109
Lesser Yellowlegs	4	19	0	0	1	32	0	0	0	0	2	0	0	1	32	25
Unidentified Yellowlegs spp.	0	0	0	15	0	10	3	0	0	0	0	0	0	0	10	18
Solitary Sandpiper	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Willet	0	1	0	0	1	0	0	0	0	0	0	0	0	1	0	1
Spotted Sandpiper	1	0	0	0	0	0	0	0	0	1	2	1	0	0	0	4
Whimbrel	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Hudsonian Godwit	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ruddy Turnstone	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red Knot	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
Semipalmated Sandpiper	7	30	0	1	0	12	16	40	0	0	80	1	201	40	12	335
Least Sandpiper	88	48	0	1	5	96	1	3	1	7	5	15	1	8	97	151
White-rumped Sandpiper	0	0	0	0	0	0	0	0	0	0	2	0	1	0	0	3
Baird's Sandpiper	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
Pectoral Sandpiper	0	1	0	0	5	0	0	0	0	0	0	0	0	5	0	1
Unidentified Peep spp. ^B	0	0	80	42	0	178	83	0	0	8	104	100	0	0	258	237
Dunlin	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	3
Short-billed Dowitcher	0	5	0	0	0	0	0	0	0	0	11	0	0	0	0	16
Wilson's Snipe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total, by site	105	333	80	208	12	341	154	85	1	19	345	119	289	97	422	1,453

^A Upper Fore River was formerly referred to as "Stroudwater River." Surveys at Lower Fore River (formerly "Upper Fore River") were suspended in 2011 due to low shorebird use.

^B Any small calidrid sandpiper species often lumped under the heading "peeps" when conditions prevent identification to species. Most peeps observed in our study area are Semipalmated Sandpipers.

(Tables 3-5). During one 2011 survey at this site, we observed close to 300 Semipalmated Sandpipers feeding in the rockweed (*Fucus* spp.) that bordered the eastern shoreline of the southernmost ledge. Shorebirds were not observed during a subsequent visit, but a nearby merlin (*Falco columbarius*) on Clapboard Island may have deterred shorebirds from using the site. Stepping Stones was the one site from previous years included in the 2011 list of sites. Despite observing hundreds of shorebirds during 2009 and 2010 surveys of this site, no birds were observed in 2011. It bears mentioning that 2010 records indicated the potential for fewer shorebird observations at Stepping Stones as August progresses. Whether that is a repeatable seasonal trend is unknown, but the lack of birds in 2011 raises the question of whether initiating island-ledge surveys later than planned may have hindered our success in observing birds at some sites.

CONCLUSIONS AND RECOMMENDATIONS

Surveys at the monitored sites are providing valuable insights into use of Casco Bay habitats by shorebirds. In at least one case (Royal River), we've documented that the boundaries of State-designated shorebird habitat does not encompass all areas of peak shorebird habitat-use. At other sites, data suggest that shorebird-use may have declined. However, with only three consecutive years of monitoring effort, prudent use of these data suggests that implementation of management revisions be approached with care. With support for continued monitoring of designated sites, we anticipate a dataset whose duration and resolution will provide decision makers with defensible, science-based information that enhances the conservation of shorebirds in Casco Bay.

Given funding constraints, islands and ledges have not been subject to the same survey frequency as mainland sites. Setting aside that important fact, it appears that relatively large aggregations (500-1,000) of roosting shorebirds on islands and ledges may be uncommon or rare. To obtain more conclusive results, an increase in the number of island-ledge surveys per site and total number of sites visited may be required during at least one "representative" season.

Where most Casco Bay shorebirds roost when mudflats are flooded is a persistent, unanswered question. Do they roost on island-ledge systems? Do they use designated roosting areas outside of Casco Bay. Do adults and juveniles use the same types of roosting habitats? Island-ledge surveys may yet hold some promise toward finding some answers, but tracking the movements of a sufficient number of birds from feeding areas to roosting sites would probably provide more conclusive results. Toward that end, the feasibility of tracking methods such as radio telemetry or radar can be explored in light of multiple factors, including the potential risk to study subjects, personnel and equipment requirements, overall project cost, and the conservation benefit each method is likely to provide.

Table 3. Shorebirds observed during Casco Bay island-ledge roosting surveys from Mackworth I. to Mere Pt., August 26-September 26, 2011. The number of surveys is provided beneath each site name.

Species observed	The Brothers 1	So. Clapboard I. Ledges 2	Falmouth Daymarker 18 Ledge 2	Basket I. 2	The Nubbin 2	So. Cousins I. Cove 1	Cousins I. -Blaney Pt Ledge 2	Upper Green Is. 2	Little French Is. 2	Little French Is. Ledges 2	French Is. 1	Bustins Ledge 2	Little Bustins I. 2	Crab I. 2	Bowman I. 2	Pound of Tea 2	Moore Pt. I. 2	Sow I. 1	Sow and Pigs Ledges 2	Sister I. Ledge 2
Black-bellied Plover		1								14	1				11					18
Semipalmated Plover		1								6	2									
Whimbrel																				
Ruddy Turnstone																				
Red Knot																				
Semipalmated Sandpiper		283		4	6			45		24	62			5	4					1
Unidentified Peep spp. ^A								3						1						

^A Any small calidrid sandpiper species often lumped under the heading "peeps" when conditions prevent identification to species. Most peeps observed in our study area are Semipalmated Sandpipers.

Table 4. Shorebirds observed during Casco Bay island-ledge roosting surveys from Middle Bay to Lukse Sound, August 26-September 26, 2011. The number of surveys is provided beneath each site name.

Species observed	1	1	2	2	1	4	2	2	1	2	2	2	1	2	2	3	3	1	1
	Black Rock	Brant Ledge	Grassy Ledges	Irony	Little Whaleboat Ledges	Goose Nest	Stockman I.	Little Birch I.	Horse I.	Crow I.	Stave I.	Ministerial I.	Bates I.	Stepping Stones	College Rock	Ram I.	Inner Green I.	Outer Green I.	Junk of Pork
Black-bellied Plover						3					8						3		
Semipalmated Plover																	1		
Whimbrel																			
Ruddy Turnstone																	3		
Red Knot																			
Semipalmated Sandpiper																8	2		
Unidentified Peep spp. ^A																	4		

^A Any small calidrid sandpiper species often lumped under the heading "peeps" when conditions prevent identification to species. Most peeps observed in our study area are Semipalmated Sandpipers.

Table 5. Shorebirds observed during Casco Bay island-ledge roosting surveys between Bailey I and Small Pt., August 26- September 26, 2011. The number of surveys is provided beneath each site name.

Species observed	Pond I.	Cedar Ledges	Yellow Rock	Two Bush I.	Elm Islands	Jenny I.	Flag I.	Long Ledges	Roque I.	East Brown Cow	No. Mark Island	White Bull I.	East Ragged I. Ledges
Black-bellied Plover	1	1	1	1	1	1	1	1	1	2	1	2	3
Semipalmated Plover					23								
Whimbrel					1								
Ruddy Turnstone			1							2			
Red Knot								2					
Semipalmated Sandpiper					5			3					
Unidentified Peep spp. ^A												4	

^A Any small calidrid sandpiper species often lumped under the heading "peeps" when conditions prevent identification to species. Most peeps observed in our study area are Semipalmated Sandpipers.

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Appendix A. Casco Bay MDIFW-designated shorebird survey sites.
Black and orange sites represent feeding and roosting areas, respectively.

