

# **NEAR SHORE SURVEYS OF ALASKA'S ARCTIC COAST, 1999-2003**



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MIGRATORY BIRD MANAGEMENT  
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## Abstract

Near-shore sea duck and loon surveys were conducted along the north coast of Alaska in 1998, 1999, 2001, 2002 and 2003. Lagoons and coastline were flown from Kasegaluk Lagoon to the Canadian Border in 2002 and 2003. Partial surveys were flown in 1998, 1999 and 2001, due to weather and computer problems. There was no survey in 2000. Data from the 1998 survey was incomplete and is not reported here. The total survey area is more extensive, geographically, than prior surveys that involved only areas of concern, namely the Arctic National Wildlife Refuge lagoon system and coastal areas associated with potential or ongoing oil development activities. Declining long-tailed duck populations prompted the survey, but other species of waterfowl and waterbirds were also recorded. Population trends are not reported because only two surveys were complete (2002 and 2003). Of thirteen geographic areas delineated within the census area in 2002 and 2003, long-tailed duck numbers were highest in Kasegaluk Lagoon, Elson Lagoon, Admiralty Bay, Jones/Return Islands and McClure/Stockton Islands areas and Arctic National Wildlife Refuge lagoons. Common Eiders were mainly found in Kasegaluk Lagoon, Peard Bay and the McClure/Stockton Islands area. King eider and surf scoter distribution varied from 2002 to 2003, and scaup numbers were proportionately higher in Smith Bay. Kasegaluk Lagoon and Smith Bay held the highest numbers of northern pintails. Pacific loons were recorded in all geographic areas, with the exception of Admiralty Bay in 2003. Highest proportions of red-throated loons were found in Smith Bay, Elson Lagoon and the Jones/Return Islands area in 2002 and in Kasegaluk Lagoon, the Jones/Return Islands area and Arctic National Wildlife Refuge lagoons in 2003. The Barrow Southwest area held the highest proportion of yellow-billed loons in both 2002 and 2003.

## Introduction

Chukchi and Beaufort Sea coastal lagoons are used by significant numbers of breeding and post-breeding migratory birds during the short arctic summer when waters are mostly ice free. Predominant species are long-tailed ducks (*Clangula hyemalis*), eiders (*Somateria spp.*), scoters (*Melanitta spp.*), Pacific loons (*Gavia pacifica*), red-throated loons (*Gavia stellata*) and yellow-billed loons (*Gavia adamsii*).

Knowledge about population trends and distribution of molting birds is critical to assessing impacts occurring as a result of increased human activity along the north coast of Alaska. The Sea Duck Joint Venture has listed the acquisition of information about population dynamics of long-tailed ducks as a high priority. These surveys are intended to furnish information regarding density/distribution of molting birds in near-shore habitats and provide baseline data for undeveloped areas. These data can be used for development planning and for comparison with less disturbed areas to assess impacts of human disturbance.

Previous studies of Beaufort Sea coastal lagoons have shown long-tailed ducks to be the predominant staging and molting species (Schmidt 1974, Bartels 1973, Gollop and Richardson 1974, Ward and Sharp 1974, Harrison 1977, Divoky 1979, Johnson and Richardson 1981, Bartels and Zellhoefer 1983, Johnson 1984, Bartels and Doyle 1984, Brackney et al. 1987, Garner and Reynolds 1986, Johnson and Gazey 1992). Kasegaluk Lagoon, along the Chukchi Sea coast is also important to migrating and molting long-tailed ducks (Johnson et al. 1992). Long-tailed ducks are the most abundant species using the coastal lagoons and have been the most intensely studied (Schorger 1947, Gollop and Richardson 1974, Johnson and Richardson 1981, Brackney and Platte 1986, Taylor 1986, Johnson and Herter 1989). Johnson and Gazey (1992) identified the long-tailed duck as an indicator species for monitoring the effects of oil-field related activities in the Beaufort Sea because of their abundance and potential susceptibility to disturbance.

In Alaska, spring breeding pair surveys conducted for the past 44 years by the USFWS, Migratory Bird Management, Juneau have indicated a steady decline in the number of long-tailed ducks observed south of the Arctic Coastal Plain (ACP). Long-tailed duck numbers declined 67 per cent from 1977 to 1998 (Hodges et al. 1996, Conant and Groves 1998). The ACP population remained fairly stable from 1986 to 2002, with recent surveys suggesting a slow decline (Brackney and King 1994, Brackney and King 1995, Brackney and King 1996, King and Brackney 1997, Mallek et al. 2004). As a result, the long-tailed duck has been designated by the U. S. Fish and Wildlife Service as a "species at risk" and a comprehensive population status review of the Bering/Pacific long-tailed duck population was prepared (Wilbor 1999).

Long-tailed ducks migrate north along the Chukchi Sea coast and east along the Beaufort Sea coast from wintering areas in the Bering Sea and north Pacific to breeding areas on the Alaska, Yukon and Northwest Territory coastal plain and islands of the Canadian arctic. There is some evidence for a northerly migration across interior Alaska and the Brooks Range to the ACP (Irving 1960, Johnson et al. 1975, Johnson and Herter 1989). Many Canadian breeding long-tailed ducks presumably join Alaskan birds to molt in the central Beaufort Sea lagoons (Salter et al. 1980, Johnson and Herter 1989).

Long-tailed ducks and other marine birds show affinity for barrier island habitats (Johnson 1982, Johnson 1984; Johnson and Gazey 1992). Passes between barrier islands have been shown to concentrate birds both in the open water and along

shorelines (Martin and Moiteret 1981). Brackney and Platte (1986) observed long-tailed ducks feeding heavily in passes between barrier islands.

In Alaska, Kasegaluk Lagoon and Peard Bay in the northern Chukchi Sea, and lagoon systems off the Arctic National Wildlife Refuge have been identified by Wilbor (1999) as major long-tailed duck molting and pre-migratory areas. Brackney, et al. (1987) identified barrier island formed coastal lagoons from Demarcation Point to Oliktok Point as primary molting and migratory staging areas for over 30,000 long-tailed ducks. Central Beaufort Sea lagoons are also important to other marine birds. Harrison Bay supports substantial numbers of scoters, king and spectacled eiders, and yellow-billed and red-throated loons in summer and fall (Fischer et al. 2001). High concentrations of long-tailed ducks and common eiders were found at Thetis Island ( Schamel 1974, Johnson 1984) and the Stockton Islands (Fischer et al. 2001). The nearshore waters between Bullen Point and Point Thomson also held high densities of long-tailed ducks in 1999 and 2000 (Fischer et al. 2001).

Earlier aerial surveys and studies of bird use along the Alaska ACP have been conducted in the lagoon systems of the Arctic National Wildlife Refuge and the central Beaufort Sea between Spy Island and Brownlow Point. Studies were conducted to obtain an index of relative numbers of migratory birds using coastal lagoons, including molting long-tailed ducks. Some surveys examined the distribution of long-tailed ducks up to 16 km offshore on the Beaufort Sea (Frickie and Schmidt 1974, Bartels and Doyle 1984), and one survey area extended up to 60 km from shore (Fischer et al. 2001).

Aerial surveys of bird use of the Arctic National Wildlife Refuge lagoon system were initiated in 1970 and continued sporadically until they were standardized in 1981 (Schmidt 1974, Frickie and Schmidt 1974, Bartels and Zellhoefer 1983, Bartels and Doyle 1984, Brackney et al. 1987). Ten selected lagoons, most along the coast of the Arctic National Wildlife Refuge, (Demarcation Bay, Egaksrak Lagoon, Nuvagapak Lagoon, Oruktalik Lagoon, Tapkaurak Lagoon, Jago Lagoon, Arey Lagoon, Simpson Cove, Tamayariak Lagoon, and Brownlow Lagoon) were surveyed annually from 1981 to 1986 (Brackney et al. 1987). Four additional lagoons (Sadlerochit Lagoon, Kaktovik Lagoon, Siku Lagoon, and Angun Lagoon/Pokok Bay) were first surveyed in 1984 (Brackney et al. 1987). Standardized aerial surveys of the Arctic National Wildlife Refuge lagoon system were not conducted from 1986 until this project was initiated in 1998.

Aerial surveys covering the same nearshore and barrier island areas as this survey, were conducted to monitor common eider populations (Dau and Taylor 2000a, Dau and Taylor 2000b, Dau and Anderson 2001, Dau and Anderson 2002, Dau and Hodges 2003). Surveys of nesting common eiders and other breeding birds were conducted on offshore islands on the Beaufort Sea (Moiteret 1998) and aerial videography was used to record eider nests on barrier islands (Anthony 1999). Migrating king and common eiders were counted as they passed Point Barrow (Suydam et al. 1997, Suydam et al. 2000) and bird use of Kasegaluk Lagoon was reported by Johnson et al. (1992), Johnson (1993), Moiteret and Suydam (1996), and Moiteret and Suydam (1997).

Seasonal abundance of long-tailed ducks in the Arctic National Wildlife Refuge lagoon system during 1981-1985 indicated a gradual buildup of birds in July with a peak in late July or early-mid August followed by a decline into mid-September (Garner and Reynolds 1986). Johnson and Gazey (1992) describe the long-tailed duck flightless molt as beginning in mid-July and ending by early September. This information, along with reports from other surveys and local observers, serves as a basis for the timing of this survey. Although this survey is designed to coincide with expected peak occurrence of long-tailed ducks, other species were also recorded. Many of these species may not be represented in peak numbers at the time of the survey.

## **Methods**

Cessna 206 single-engine fixed-wing aircraft on amphibious floats were used for this survey. Two observers, including the pilot, identified and estimated numbers of birds from each side of the aircraft and recorded data. Either parallel tracks or a computer moving map program were used to assure complete coverage of all near-shore habitats. The aircraft were flown at an altitude of 30 to 50 meters above ground level, at a ground speed of 100 to 120 knots. Locations of sightings were entered into an onboard computer using specialized software (John I. Hodges, MBM, Juneau) interfaced with a global positioning system (GPS). Data were transcribed using another program (John I. Hodges, MBM, Juneau) and downloaded into Arcview 3.3 for display and analysis.

The survey area is divided into 29 segments along the ACP of Alaska. Survey segments were allocated to 13 geographic areas (see appendix). For each of the complete surveys (2002 and 2003) the proportion of total birds was calculated by species in each geographic area.

When GPS positions were missing, longitude and latitude data were interpolated using previous and following data points or by referring to corresponding times and locations from the aircraft moving map track files. Inclement weather, causing incomplete coverage, and erroneous or discontinuous data records due to equipment malfunctions, precluded analysis of 1998 data and limited use of 1999 and 2001 data. Due to the absence of these problems, data sets collected in 2002 and 2003 were complete.

## **Results**

Near shore surveys were conducted on the following dates: 1999 - August 11 and 14; 2001 - July 23 to 26; 2002 - July 30 to August 2; 2003 - July 30 to August 2. Adverse weather and equipment problems precluded complete coverage of the survey area in 1999 and 2001. Survey total and number of birds recorded within each of 13 geographic areas for the 2002 and 2003 surveys are listed in Table 1. Proportions of total birds recorded within each of the 13 geographic areas are reported in Table 2. Species distribution for the 1999, 2001, 2002 and 2003 surveys are presented in the appendix to this report. Observations depicted are locations of the aircraft and not precise locations of birds.

**Table 1. Survey total and number of birds recorded in each of 13 geographic areas.**

Species	KLAG	WWRT	PBAY	BASW	ELAG	ABAY	SBAY	LNLV	HBAY	JRISL	MSISL	AWRW	AWRE	TOTAL
Long-tailed Duck 2002	4189	107	1925	22	7526	10614	5108	4531	2415	16714	8910	3248	8752	74061
Long-tailed Duck 2003	4518	25	2122	0	14641	9683	1678	1234	293	17610	15305	4798	23167	95074
Common Eider 2002	693	93	732	61	270	0	356	152	24	81	673	153	46	3334
Common Eider 2003	846	264	3608	132	77	2	4	3	160	553	800	166	161	6776
King Eider 2002	149	65	143	0	124	0	30	151	11	6	1615	48	54	2396
King Eider 2003	38	18	632	344	1489	200	440	1	0	779	208	0	0	4149
Surf Scoter 2002	65	0	0	6	0	11	448	200	3142	1305	0	115	191	5483
Surf Scoter 2003	177	0	56	20	60	0	145	25	1	519	172	80	301	1556
Scaup 2002	0	0	0	0	0	12	115	85	117	0	0	27	52	408
Scaup 2003	205	0	0	25	0	118	393	1	109	11	7	51	383	1303
Northern Pintail 2002	435	0	20	0	18	103	605	241	12	50	109	19	124	1736
Northern Pintail 2003	92	0	0	3	0	45	100	3	36	0	15	10	40	344
Pacific Loon 2002	34	6	1	3	24	12	50	44	18	44	68	34	89	427
Pacific Loon 2003	29	7	25	7	23	0	2	2	3	18	28	54	47	245
Red-throated Loon 2002	7	0	0	0	47	2	107	12	17	61	19	20	18	310
Red-throated Loon 2003	28	0	6	4	7	0	6	0	1	42	6	15	24	139
Yellow-billed Loon 2002	0	2	19	33	19	41	16	7	21	24	17	3	8	210
Yellow-billed Loon 2003	5	1	18	19	9	6	1	0	2	8	0	0	17	86

\* See appendix for abbreviations of geographic areas.

Seventy-five per cent of long-tailed ducks recorded in 2002 and 89 per cent of those recorded in 2003 were located in Elson Lagoon, Admiralty Bay, Jones/Return Islands and McClure/Stockton Islands areas and Arctic National Wildlife Refuge lagoons. Over 29 per cent of all long-tailed ducks in 2003 were found in Arctic National Wildlife Refuge lagoons, almost twice the per cent observed in 2002. Large numbers in 2003 may have been due to a geographic shift of molt migrants from the Canadian arctic.

Common eiders were mainly found in Kasegaluk Lagoon, Peard Bay and the McClure/Stockton Islands area in 2002 and 2003. These areas consistently held the highest concentrations of common eiders and accounted for 63 and 78 per cent of the total recorded in 2002 and 2003, respectively. In 2003, Peard Bay accounted for 53 per cent of total birds recorded.

King eider distribution varied from 2002 to 2003. In 2002, most (67 per cent) king eiders were found in the McClure/Stockton Islands area and, in 2003, the highest number of birds (36 per cent) occurred in Elson Lagoon.

Surf scoters were also concentrated in different areas in 2002 than in 2003. Harrison Bay held 57 per cent in 2002 and the Jones/Return Islands area and Arctic National Wildlife Refuge lagoons held 33 per cent and 24 per cent, respectively, in 2003.

Scaup numbers were proportionately higher in Smith Bay in both 2002 (28 per cent) and 2003 (30 per cent). Smith Bay, the Lonely area and Harrison Bay held over 77 per cent of total scaup recorded in 2002, and the Arctic National Wildlife Refuge lagoons accounted for 30 per cent of total scaup recorded in 2003.

Northern Pintails were most common in Kasegaluk Lagoon and Smith Bay in both 2002 (60 per cent) and 2003 (55 per cent).

Pacific loons were recorded in all geographic areas in 2002 and 2003, with the exception of Admiralty Bay in 2003. Highest numbers of Pacific loons were found in Arctic National Wildlife Refuge lagoons (28 per cent in 2002 and 41 per cent in 2003).

Red-throated loons were most common in Smith Bay in 2002 (35 per cent), with Elson Lagoon, the Jones/Return Islands area and Arctic National Wildlife Refuge lagoons contributing a combined 46 per cent. In 2003, Kasegaluk Lagoon, the Jones/Return Islands area and Arctic National Wildlife Refuge lagoons accounted for 78 per cent of red-throated loons.

The Barrow Southwest area was the only geographic area which consistently held a substantial portion of yellow-billed loons in 2002 and 2003 (16 and 22 per cent, respectively). Admiralty Bay held 19 per cent of all yellow-billed loons in 2002, and Peard Bay and the Arctic National Wildlife Refuge lagoons held a combined 40 per cent in 2003.



**Table 2. Proportion of total birds recorded within each of 13 geographic areas. Numbers represent per cent of total birds observed in 2002 and 2003.**

Species	KLAG	WWRT	PBAY	BASW	ELAG	ABAY	SBAY	LNLV	HBAY	JRISL	MSISL	AWRW	AWRE
Long-tailed Duck 2002	5.66	0.14	2.60	0.03	10.16	14.33	6.90	6.12	3.26	22.57	12.03	4.39	11.82
Long-tailed Duck 2003	4.75	0.03	2.23	0.00	15.40	10.18	1.76	1.30	0.31	18.52	16.10	5.05	24.37
Common Eider 2002	20.79	2.79	21.96	1.83	8.10	0.00	10.68	4.56	0.72	2.43	20.19	4.59	1.38
Common Eider 2003	12.49	3.90	53.25	1.95	1.14	0.03	0.06	0.04	2.36	8.16	11.81	2.45	2.38
King Eider 2002	6.22	2.71	5.97	0.00	5.18	0.00	1.25	6.30	0.46	0.25	67.40	2.00	2.25
King Eider 2003	0.92	0.43	15.23	8.29	35.89	4.82	10.60	0.02	0.00	18.78	5.01	0.00	0.00
Surf Scoter 2002	1.19	0.00	0.00	0.11	0.00	0.20	8.17	3.65	57.30	23.80	0.00	2.10	3.48
Surf Scoter 2003	11.38	0.00	3.60	1.29	3.86	0.00	9.32	1.61	0.06	33.35	11.05	5.14	19.34
Scaup 2002	0.00	0.00	0.00	0.00	0.00	2.94	28.19	20.83	28.68	0.00	0.00	6.62	12.75
Scaup 2003	15.73	0.00	0.00	1.92	0.00	9.06	30.16	0.08	8.37	0.84	0.54	3.91	29.39
Northern Pintail 2002	25.06	0.00	1.15	0.00	1.04	5.93	34.85	13.88	0.69	2.88	6.28	1.09	7.14
Northern Pintail 2003	26.74	0.00	0.00	0.87	0.00	13.08	29.07	0.87	10.47	0.00	4.36	2.91	11.63
Pacific Loon 2002	7.96	1.41	0.23	0.70	5.62	2.81	11.70	10.30	4.22	10.30	15.93	7.96	20.84
Pacific Loon 2003	11.84	2.86	10.20	2.86	9.39	0.00	0.82	0.82	1.22	7.35	11.43	22.04	19.18
Red-throated Loon 2002	2.26	0.00	0.00	0.00	15.16	0.65	34.52	3.87	5.48	19.68	6.13	6.45	5.81
Red-throated Loon 2003	20.14	0.00	4.32	2.88	5.04	0.00	4.32	0.00	0.72	30.22	4.32	10.79	17.27
Yellow-billed Loon 2002	0.00	0.95	9.05	15.71	9.05	19.52	7.62	3.33	10.00	11.43	8.10	1.43	3.81
Yellow-billed Loon 2003	5.81	1.16	20.93	22.09	10.47	6.98	1.16	0.00	2.33	9.30	0.00	0.00	19.77

\* Numbers are rounded to nearest hundredth, therefore, the sum of percentages may not equal 100 per cent. See appendix for abbreviations of geographic areas.

The appendix to this report contains distribution maps and numbers for each species within each geographic area. Other species of birds and mammals were recorded, but are not discussed in this report.

## **Discussion**

Difficulties in obtaining a complete data set for the entire coast were consistent with those experienced during past surveys. An example is the 1985 survey of the Arctic National Wildlife Refuge coastal lagoon system (Brackney et al. 1987). Three aerial surveys were conducted on the coastal lagoons of the refuge in 1985. Data from the second survey was omitted from the analysis because of conditions of marginal weather that reduced visibility on several lagoons. And a planned fourth survey was not completed because of adverse weather conditions. Recording equipment malfunctions (GPS units and computers) also contributed to incomplete data sets for the surveys reported here.

The final report of the baseline study for the 1002 Arctic Coastal Plain area of the Arctic National Wildlife Refuge (Garner and Reynolds 1986) recommended that additional studies be done in shoreline and lagoon areas potentially impacted by development. The report also suggested that the coastline be mapped according to shoreline type and levels of bird use and factors causing concentrations of long-tailed ducks in gaps between barrier islands (passes) be identified.

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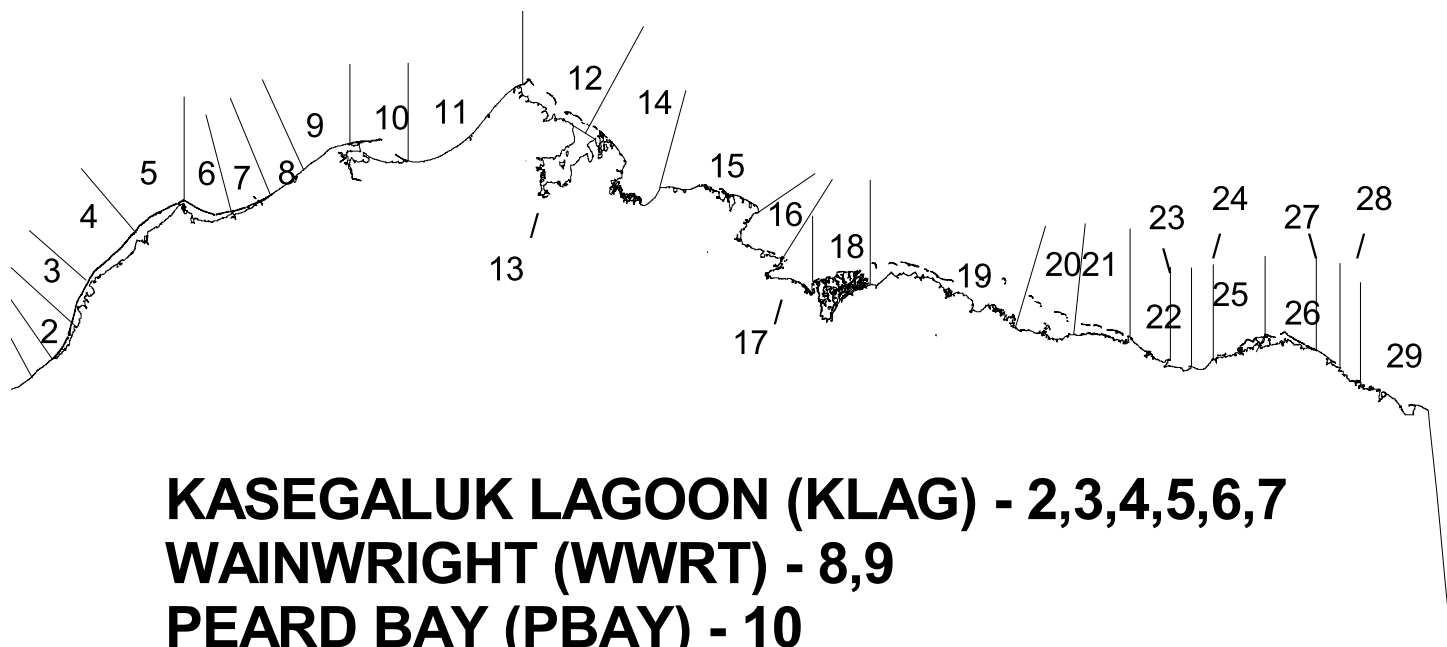
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# Appendix

# NEARSHORE SURVEYS OF ALASKA'S ARCTIC COAST, 1999-2003

## SEGMENTS



**KASEGALUK LAGOON (KLAG) - 2,3,4,5,6,7**

**WAINWRIGHT (WWRT) - 8,9**

**PEARD BAY (PBAY) - 10**

**BARROW SOUTHWEST (BASW) - 11**

**ELSON LAGOON (ELAG) - 12**

**ADMIRALTY BAY (ABAY) - 13**

**SMITH BAY (SBAY) - 14**

**LONELY (LNLV)- 15**

**HARRISON BAY (HBAY) - 16,17,18**

**JONES/RETURN ISLANDS (JRISL) - 19**

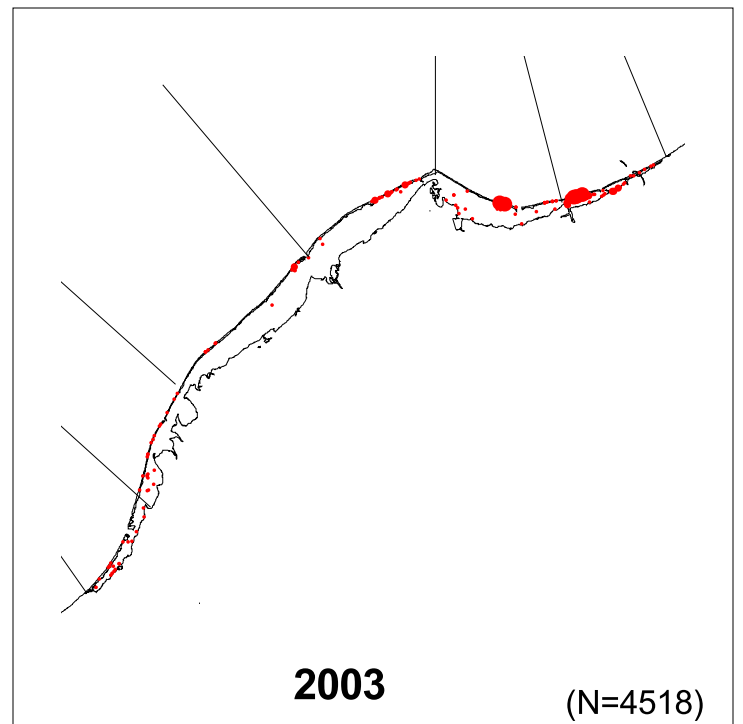
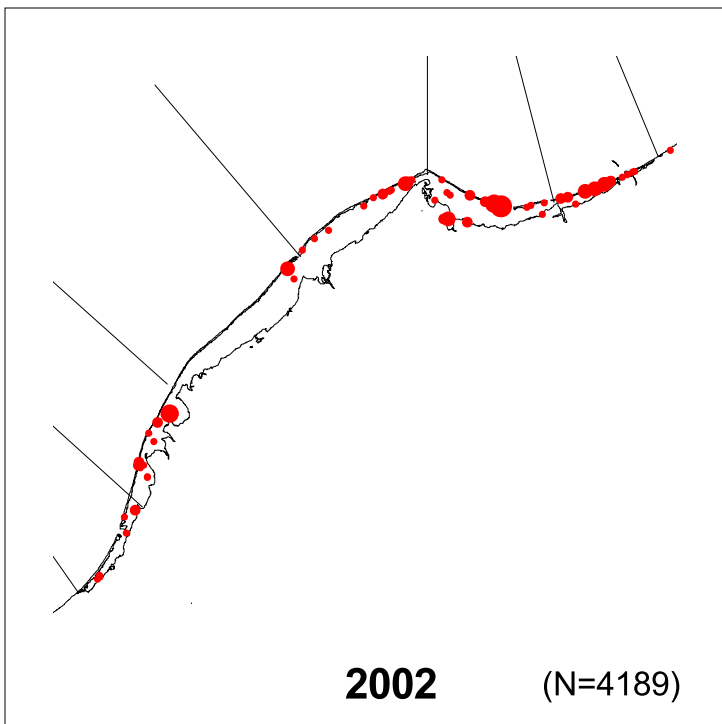
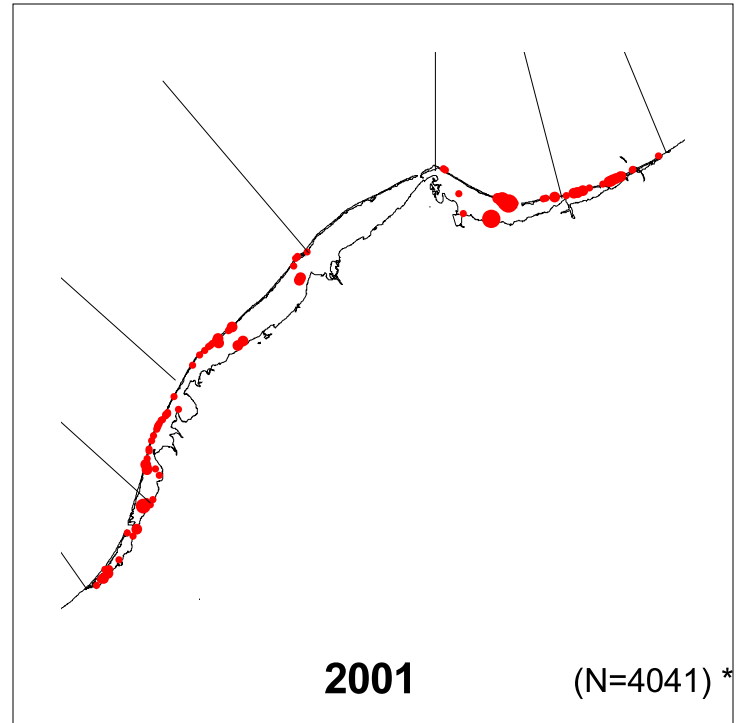
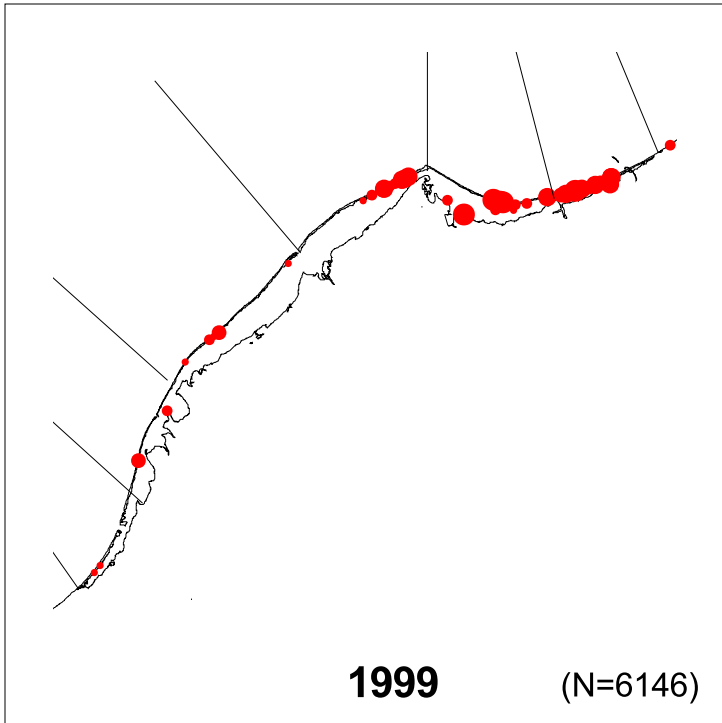
**MCCLURE/STOCKTON ISLANDS (MSISL) - 20,21**

**ARCTIC NWR WEST (AWRW) - 22,23,24,25**

**ARCTIC NWR EAST (AWRE) - 26, 27, 28, 29**



# LONG-TAILED DUCK OBSERVATIONS KASEGALUK LAGOON

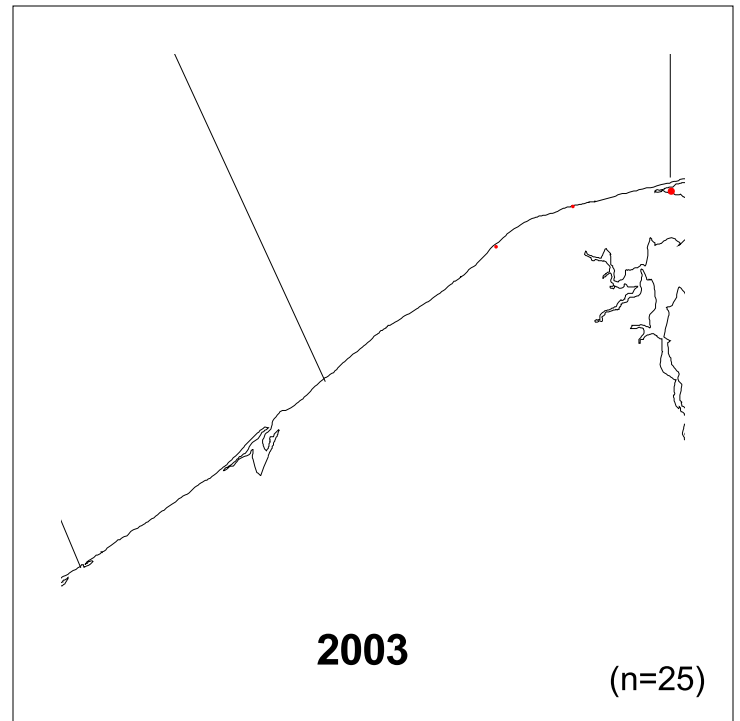
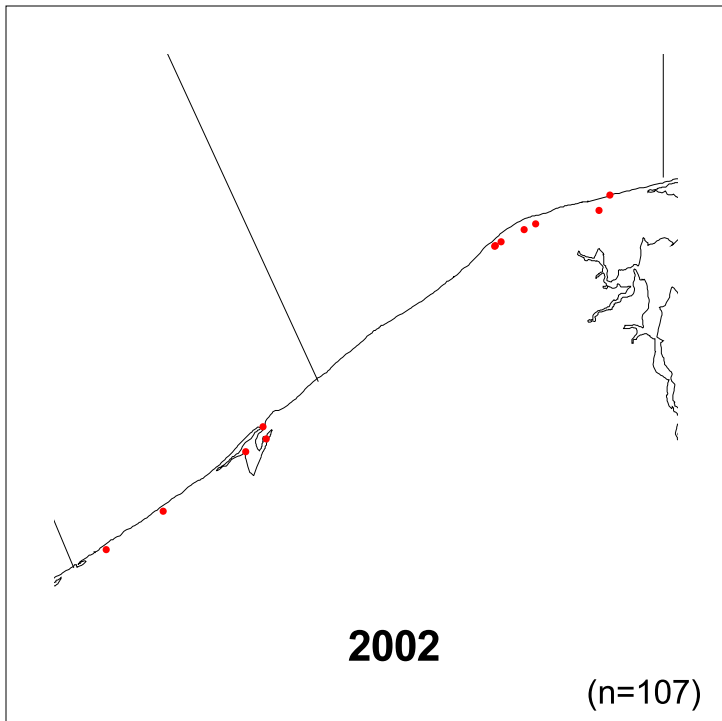
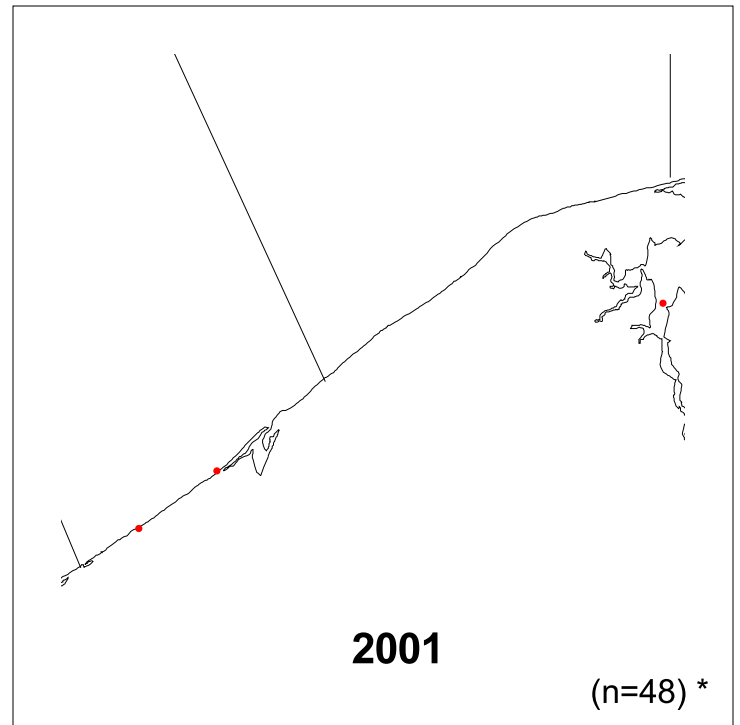
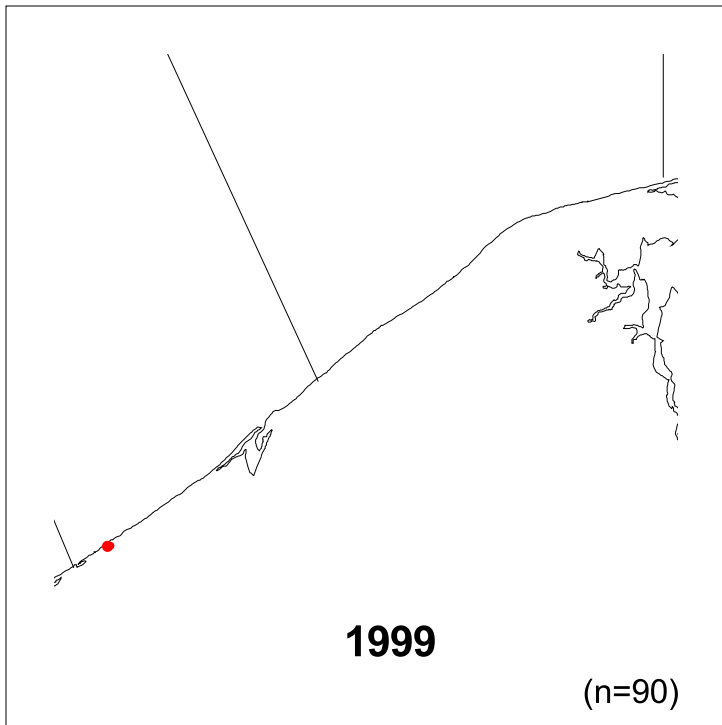


## Long-tailed Duck Observations

- 1 - 36
- 37 - 100
- 101 - 220
- 221 - 435
- 436 - 1400

\* = Incomplete Count

# LONG-TAILED DUCK OBSERVATIONS WAINWRIGHT

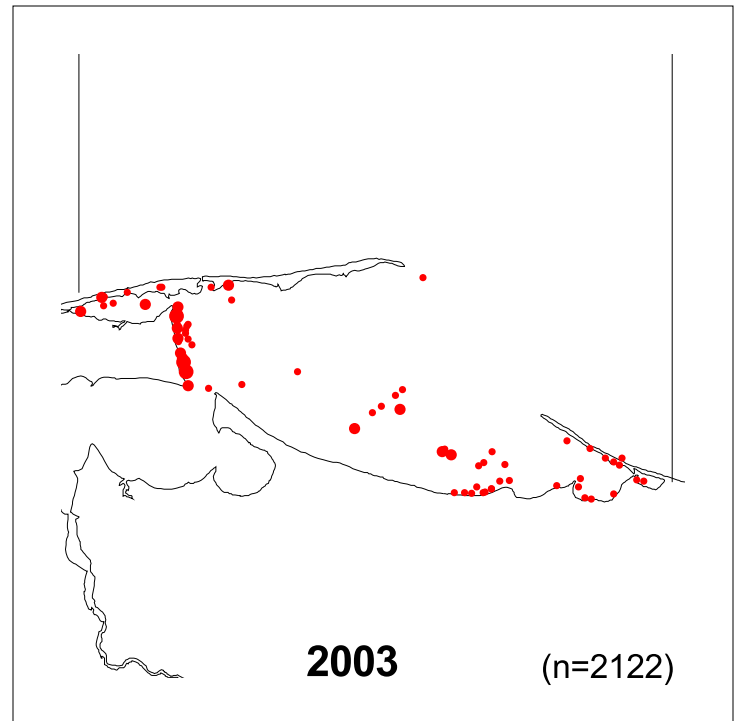
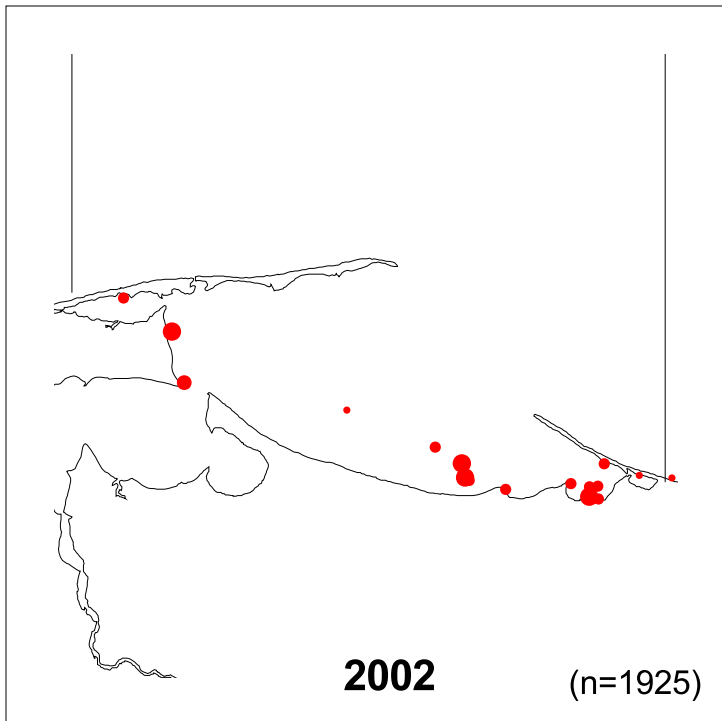
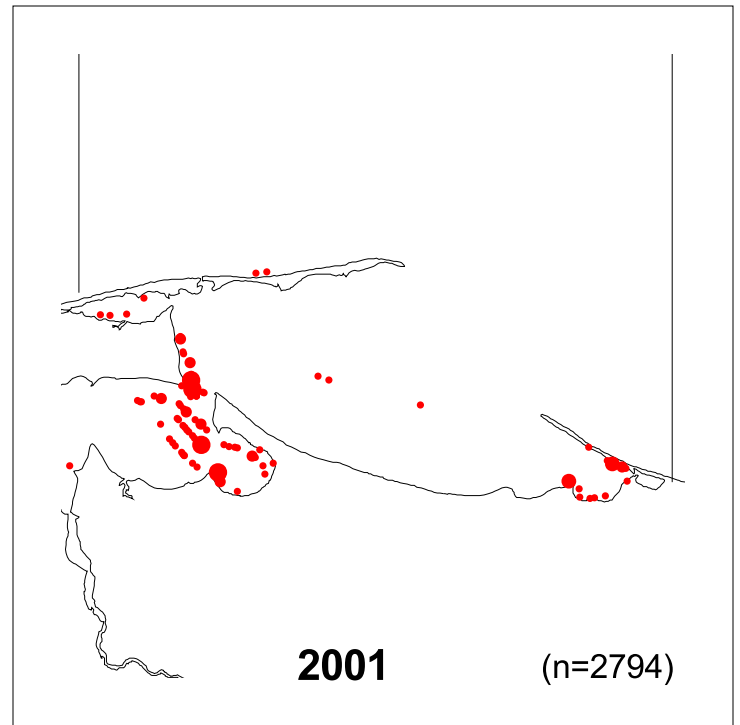
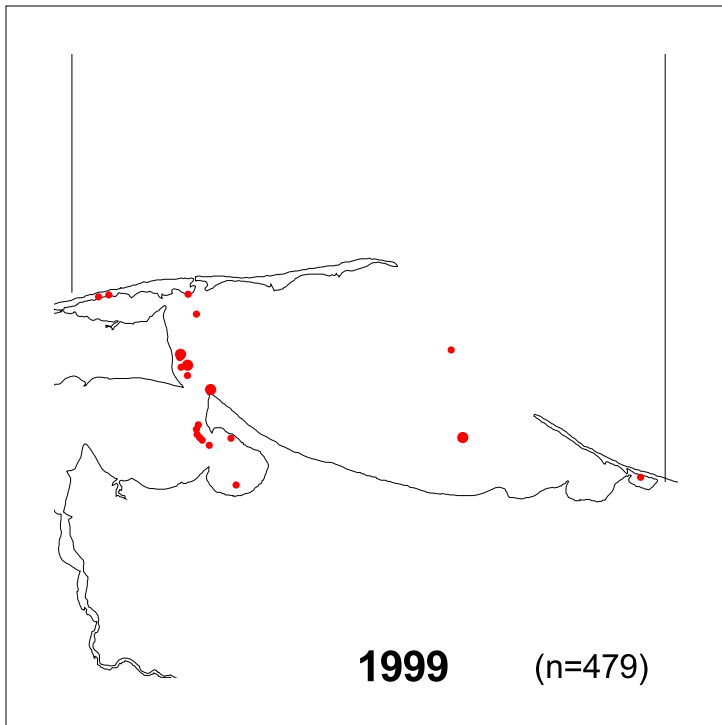


## Long-tailed Duck Observations

- 1 - 36
- 37 - 100
- 101 - 220
- 221 - 435
- 436 - 1400

\* = Incomplete Count

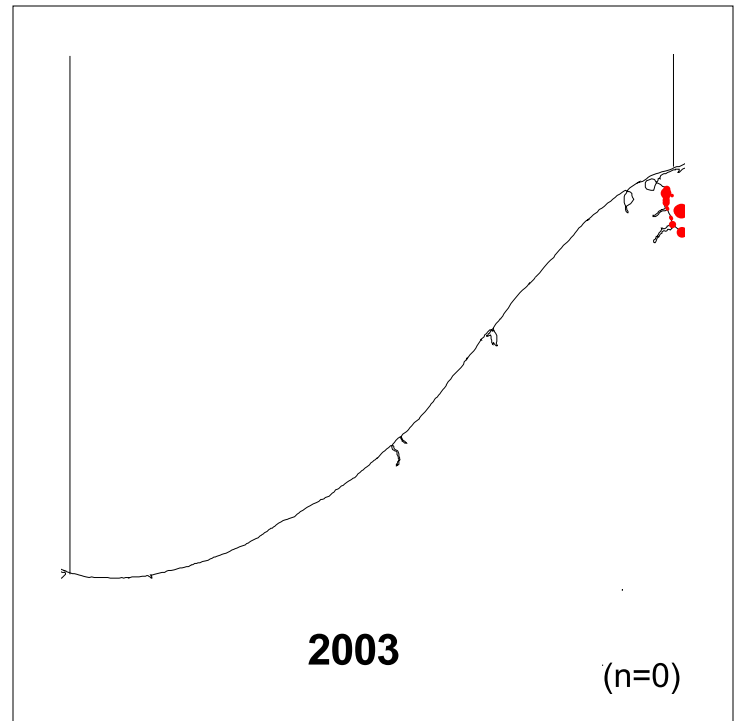
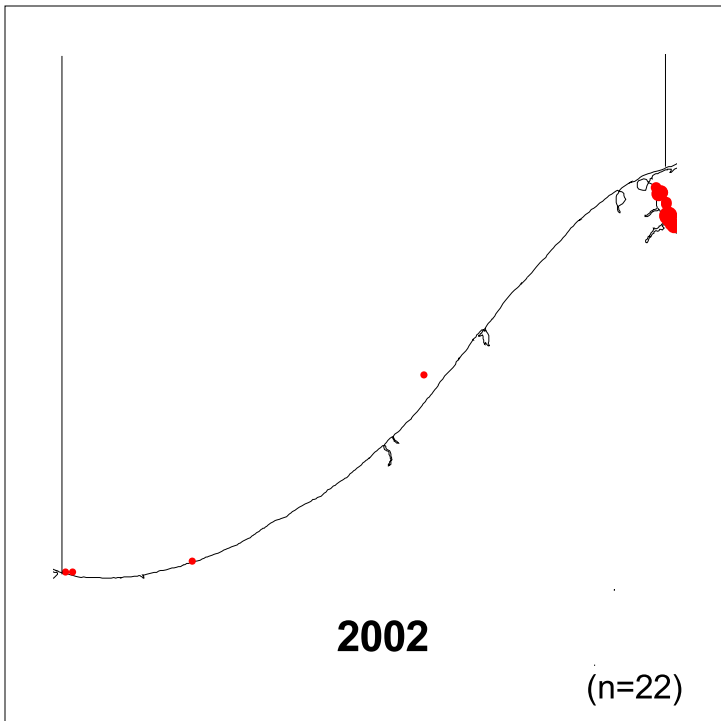
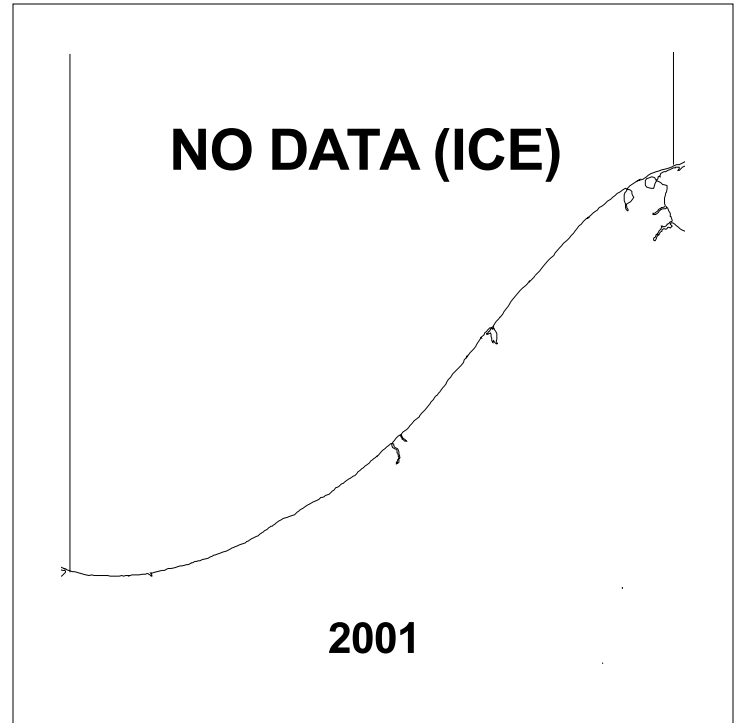
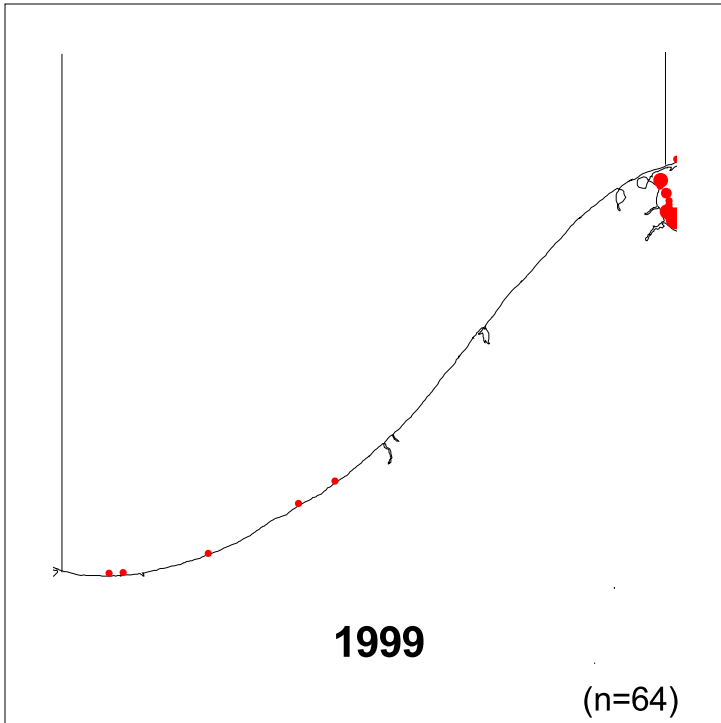
# LONG-TAILED DUCK OBSERVATIONS PEARD BAY



## Long-tailed Duck Observations

- 1 - 36
- 37 - 100
- 101 - 220
- 221 - 435
- 436 - 1400

# LONG-TAILED DUCK OBSERVATIONS BARROW SOUTHWEST

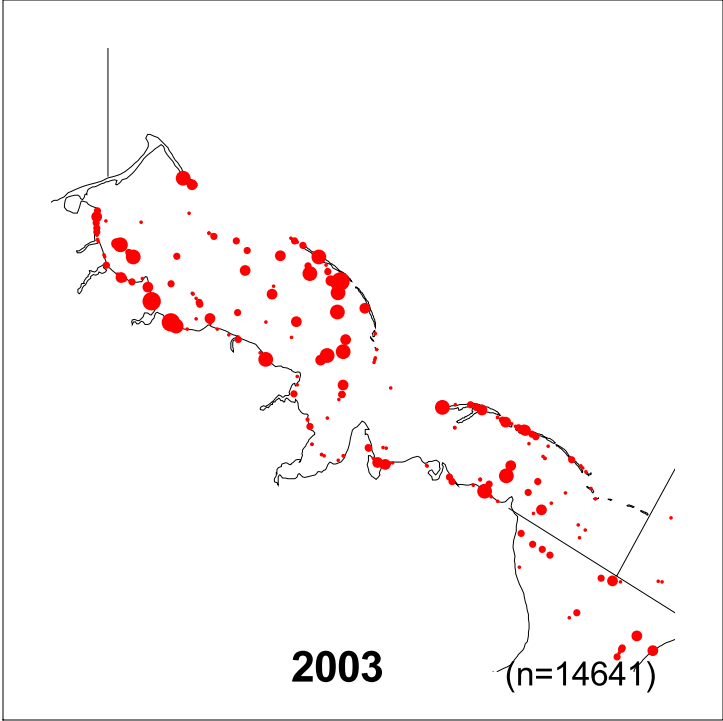
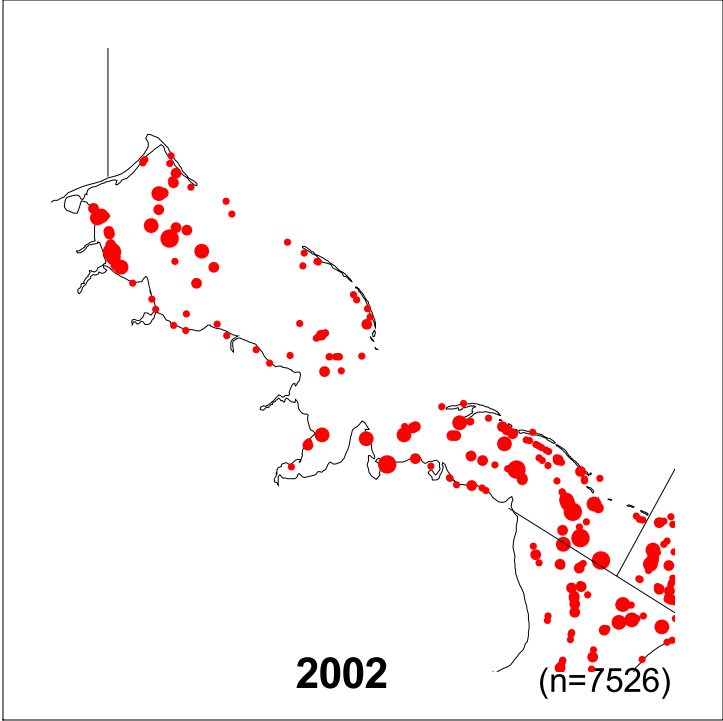
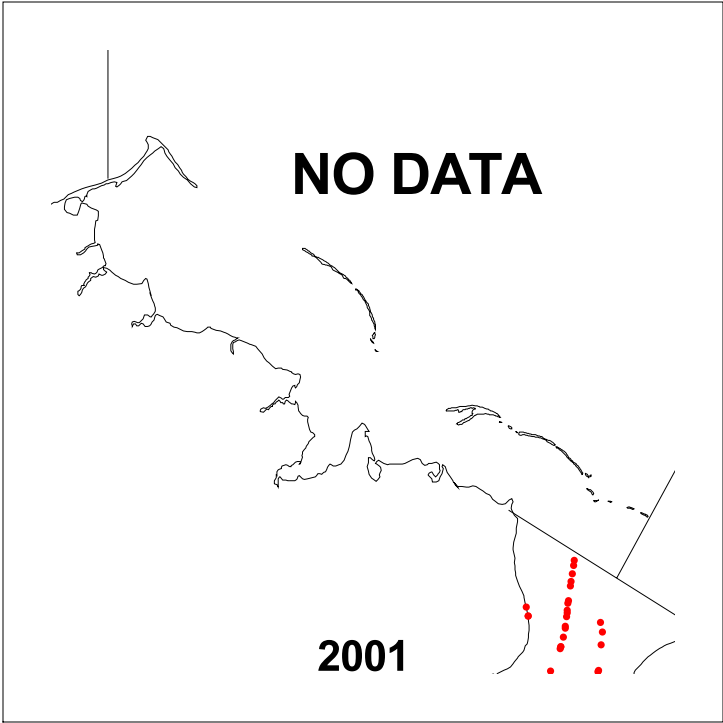
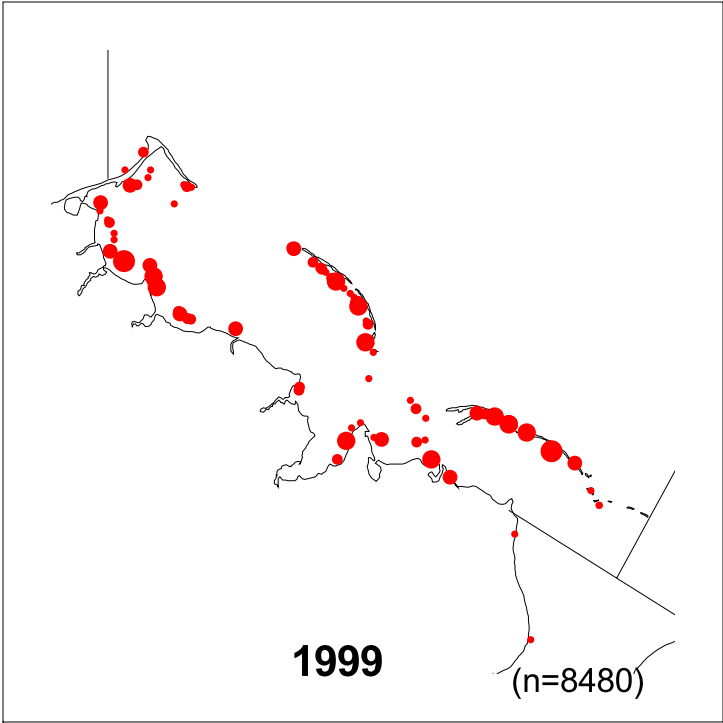


## Long-tailed Duck Observations

- 1 - 36
- 37 - 100
- 101 - 220
- 221 - 435
- 436 - 1400

# LONG-TAILED DUCK OBSERVATIONS

## ELSON LAGOON

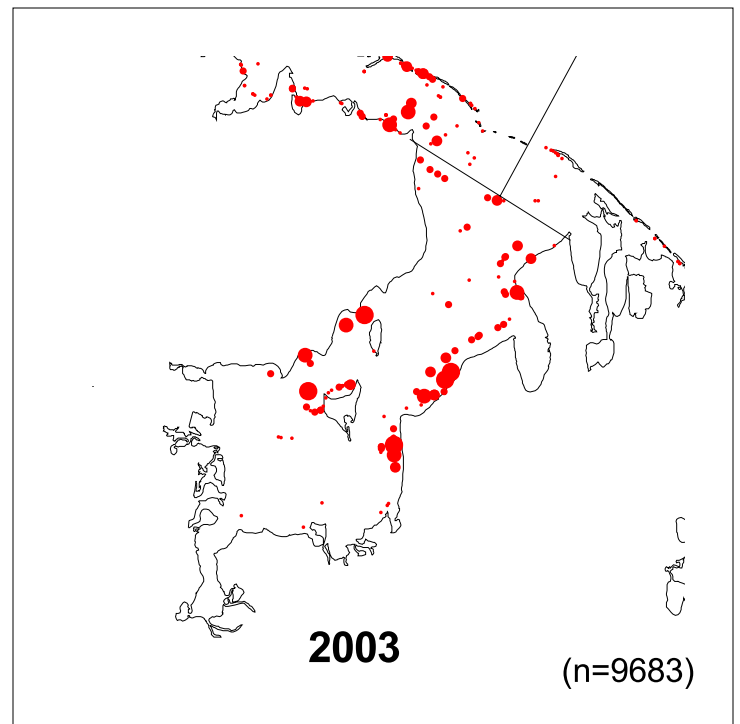
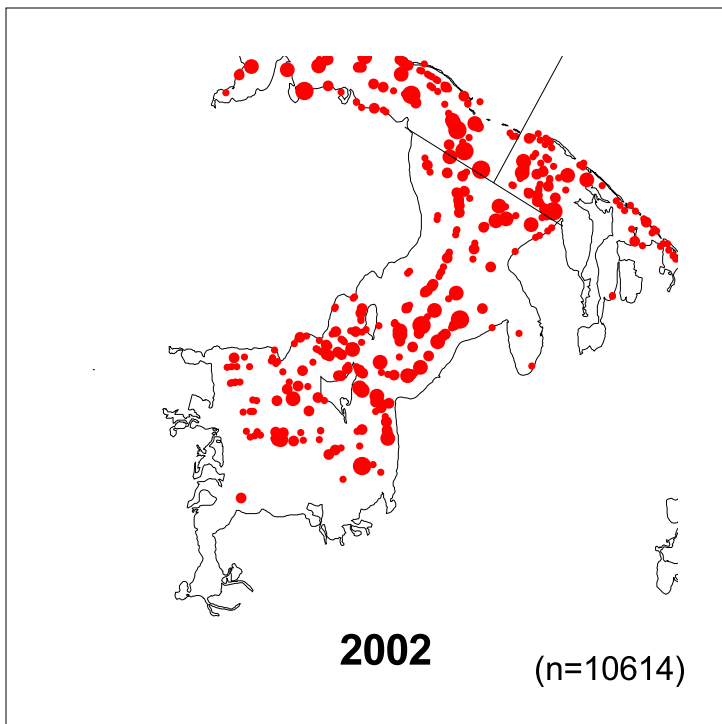
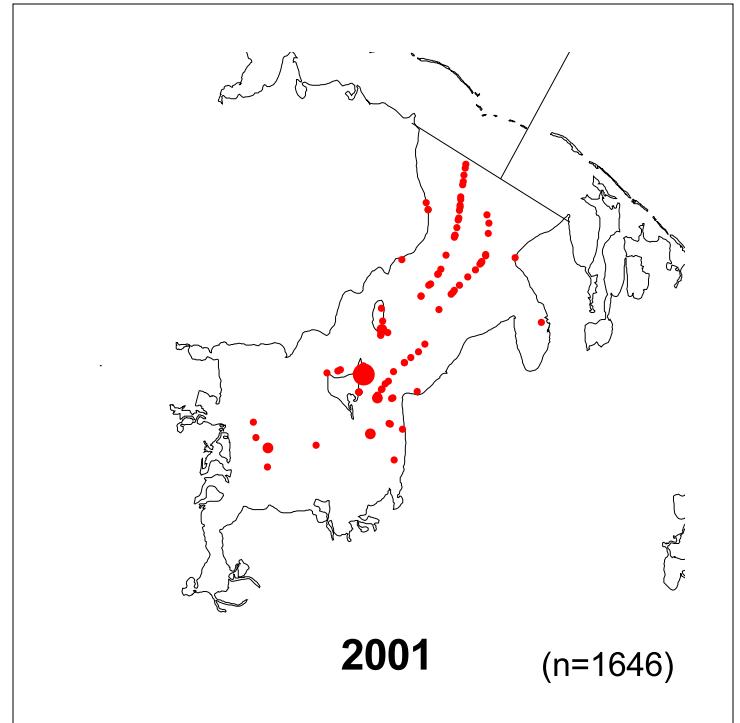
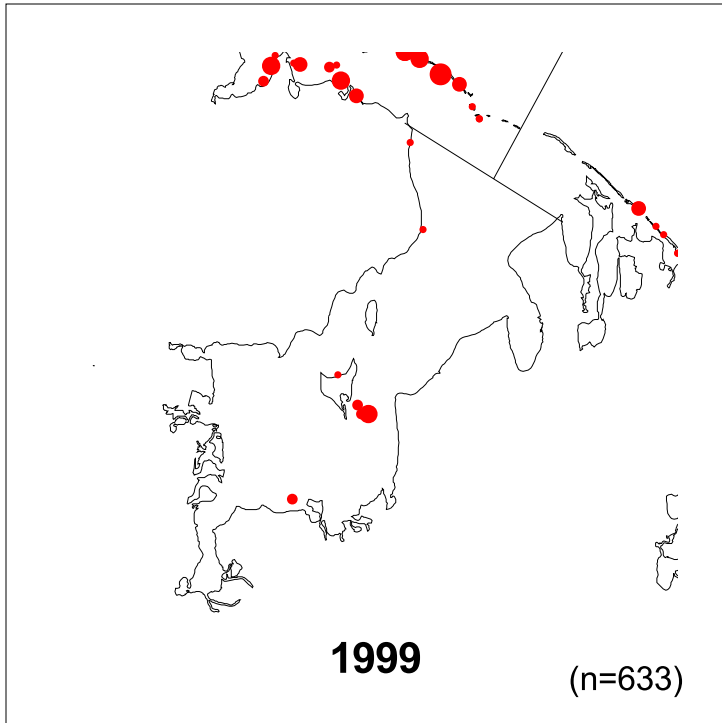


### Long-tailed Duck Observations

- 1 - 36
- 37 - 100
- 101 - 220
- 221 - 435
- 436 - 1400

# LONG-TAILED DUCK OBSERVATIONS

## ADMIRALTY BAY

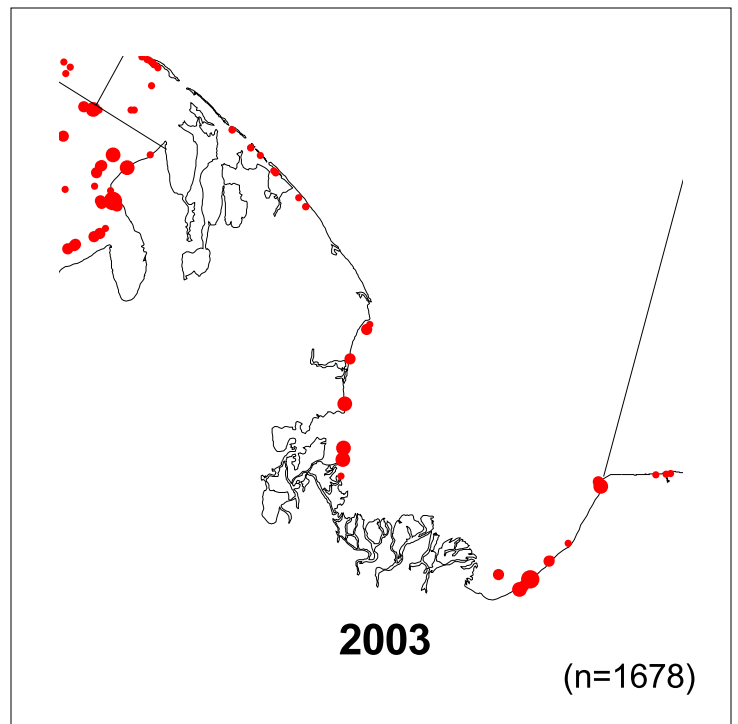
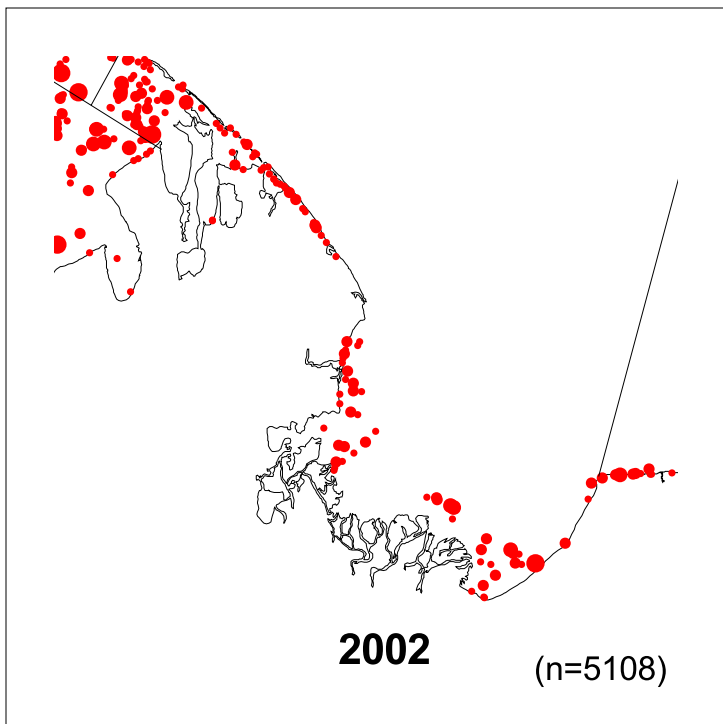
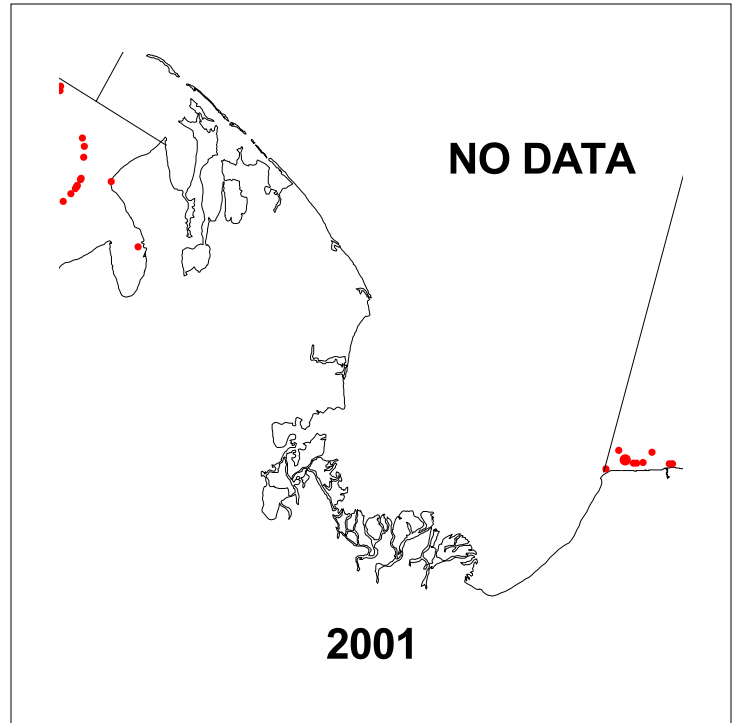
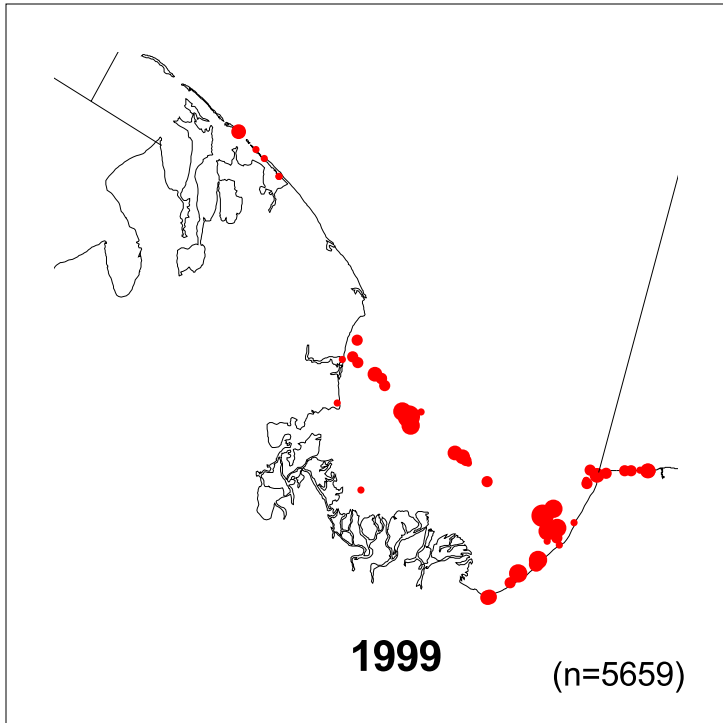


### Long-tailed Duck Observations

- 1 - 36
- 37 - 100
- 101 - 220
- 221 - 435
- 436 - 1400

# LONG-TAILED DUCK OBSERVATIONS

## SMITH BAY

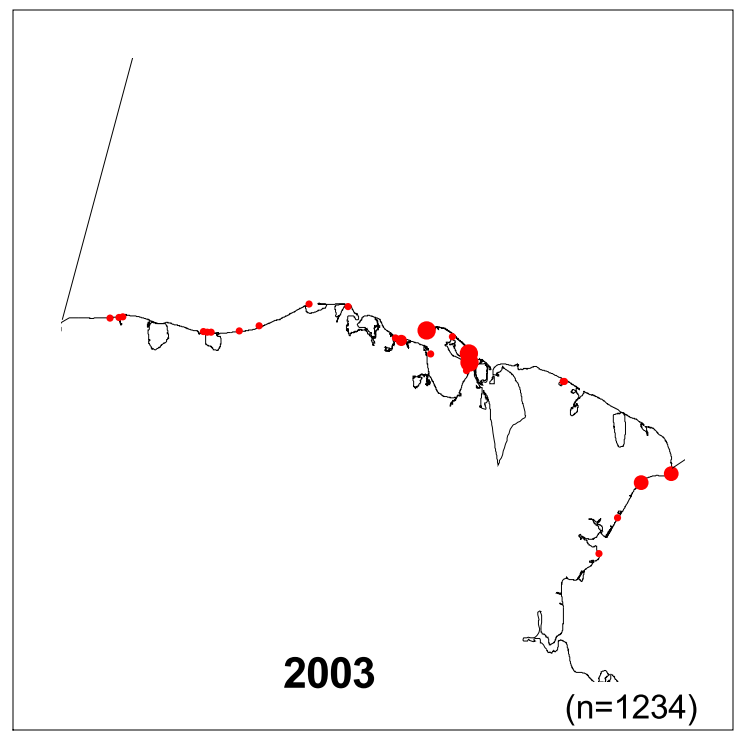
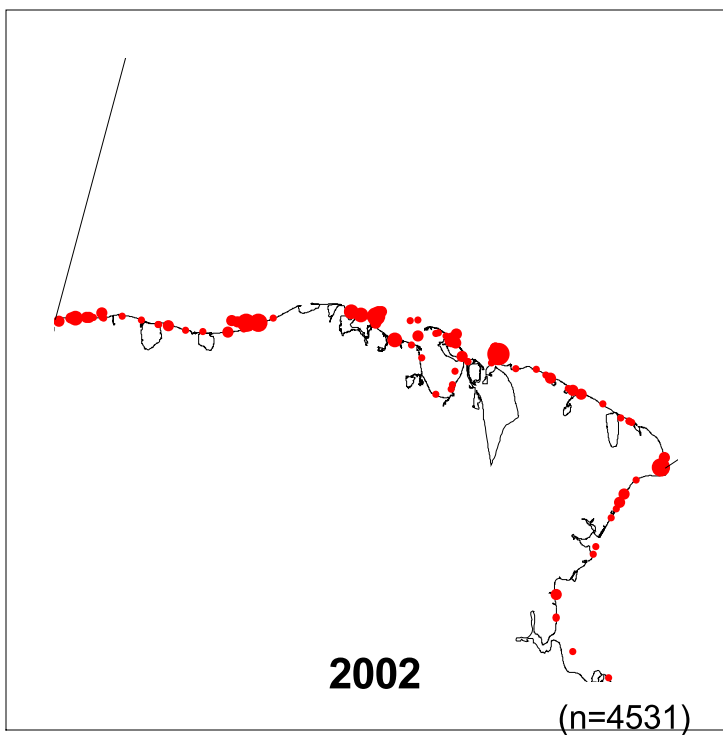
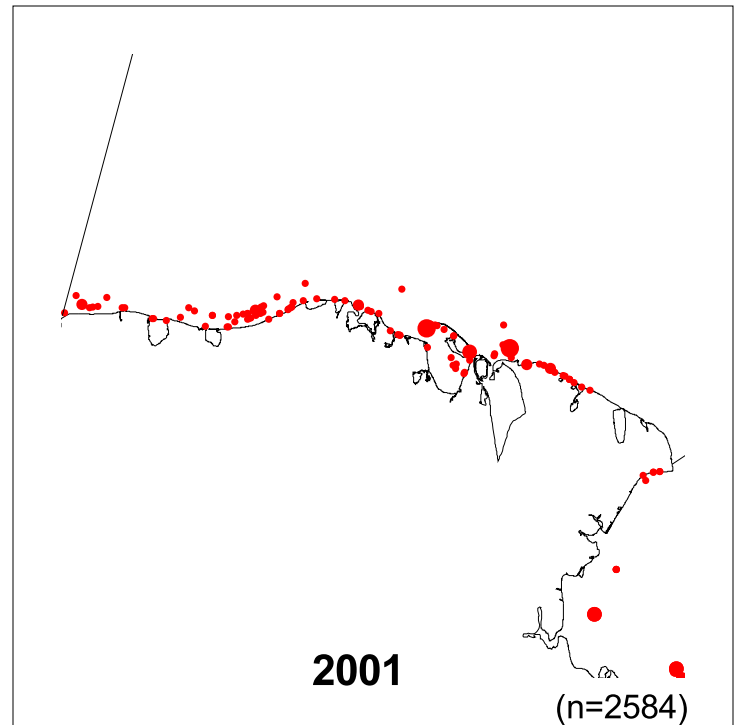
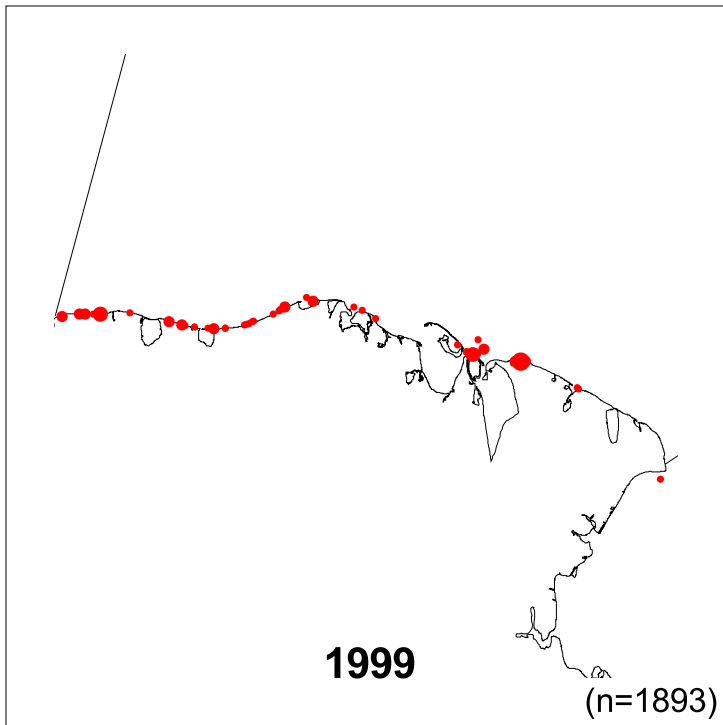


### Long-tailed Duck Observations

- 1 - 36
- 37 - 100
- 101 - 220
- 221 - 435
- 436 - 1400

# LONG-TAILED DUCK OBSERVATIONS

## LONELY



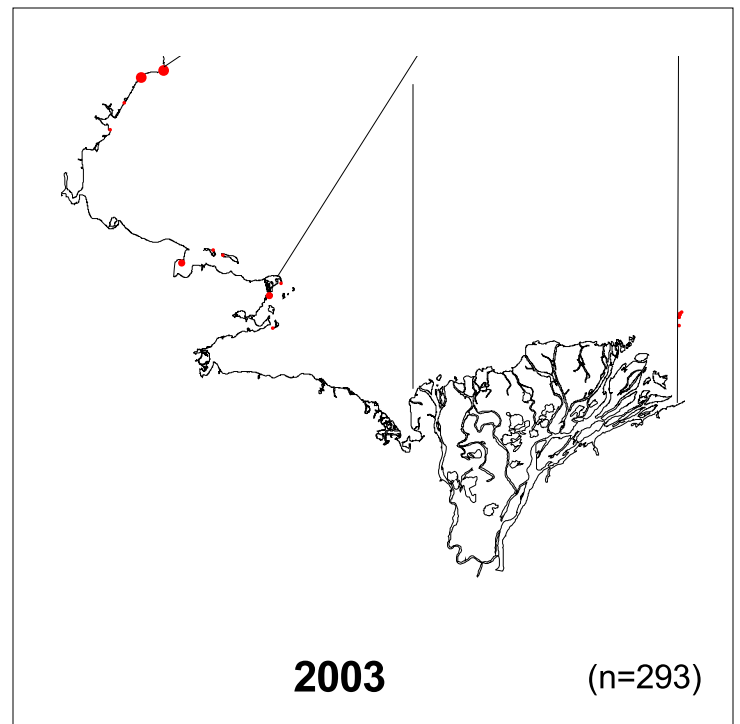
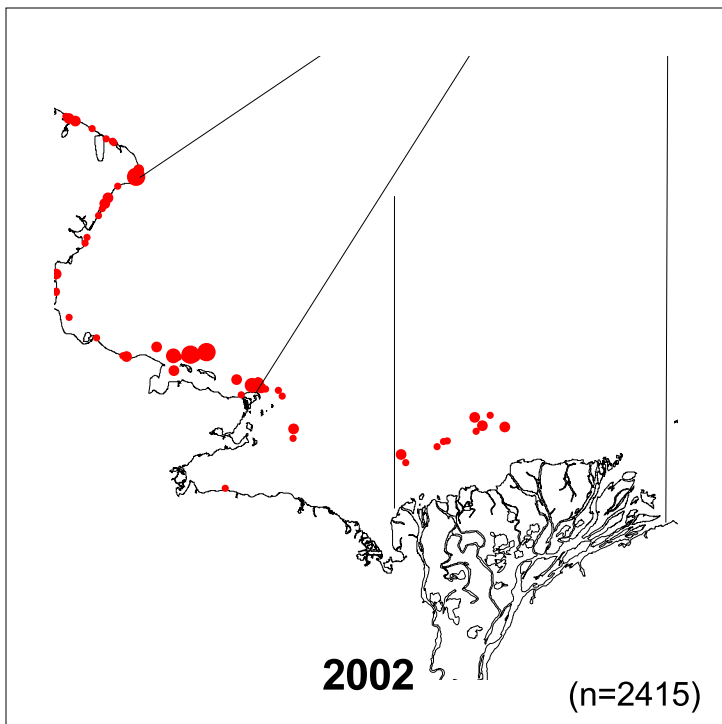
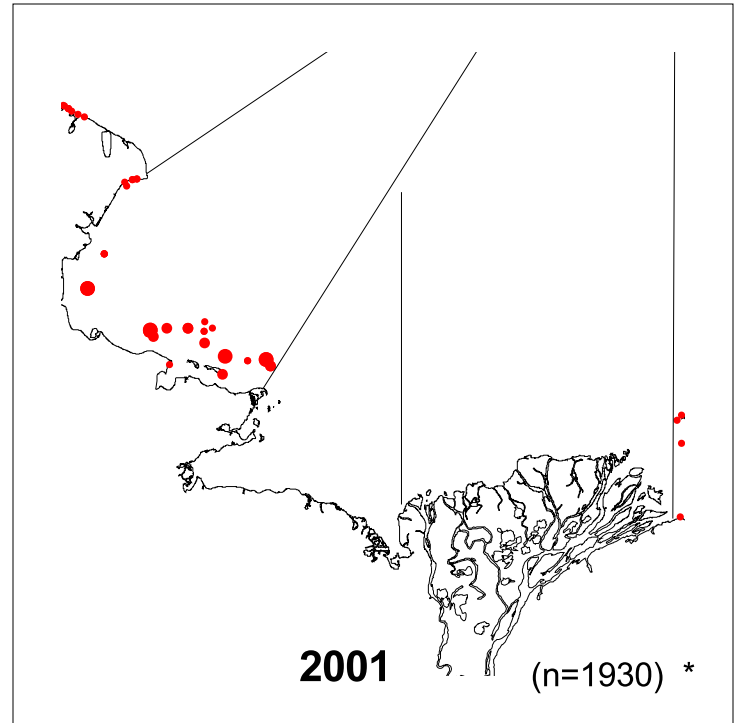
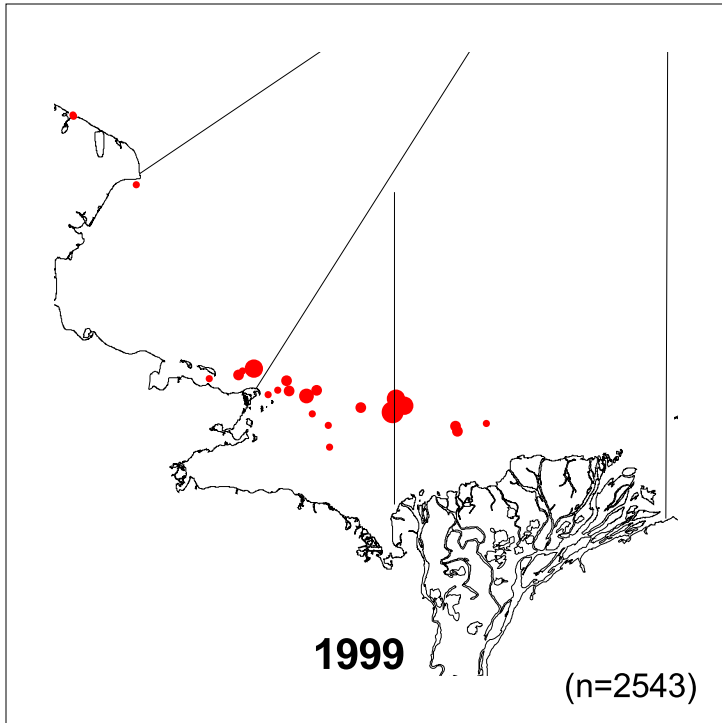
### Long-tailed Duck Observations

- 1 - 36
- 37 - 100
- 101 - 220
- 221 - 435
- 436 - 1400



# LONG-TAILED DUCK OBSERVATIONS

## HARRISON BAY



### Long-tailed Duck Observations

- 1 - 36
- 37 - 100
- 101 - 220
- 221 - 435
- 436 - 1400

\* = Incomplete count

# LONG-TAILED DUCK OBSERVATIONS JONES/RETURN ISLANDS

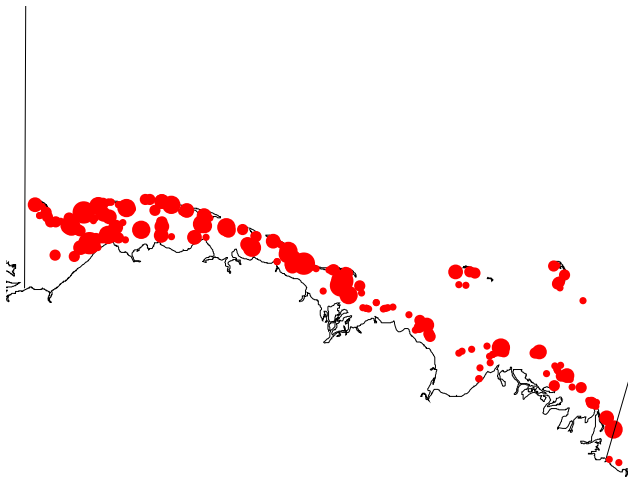
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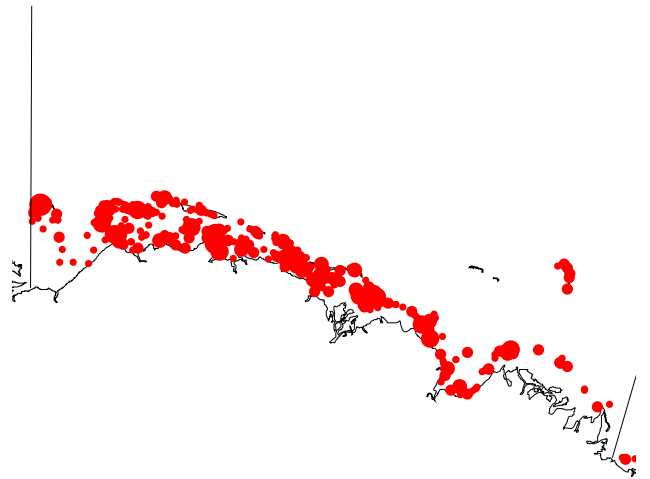
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(n=8732)



**2002**

(n=16714)



**2003**

(n=17610)

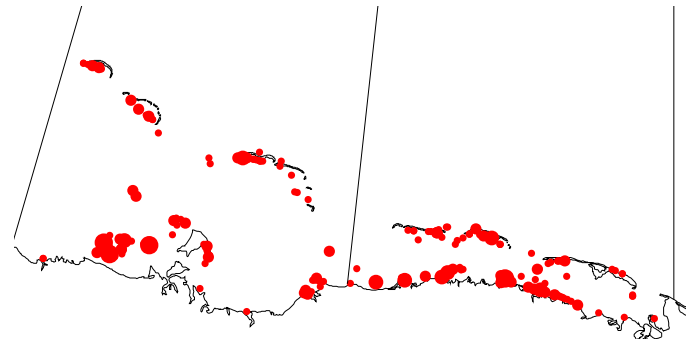
Long-tailed Duck Observations

- 1 - 36
- 37 - 100
- 101 - 220
- 221 - 435
- 436 - 1400

# LONG-TAILED DUCK OBSERVATIONS MCCLURE/STOCKTON ISLANDS

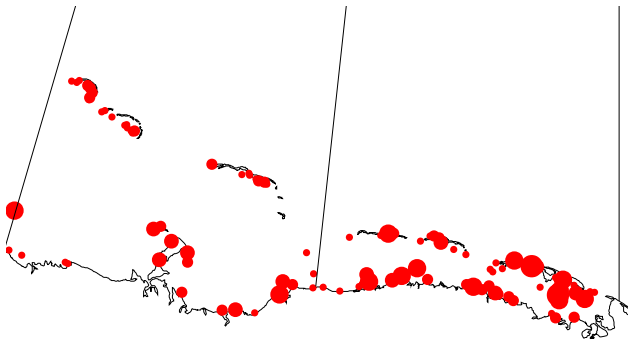
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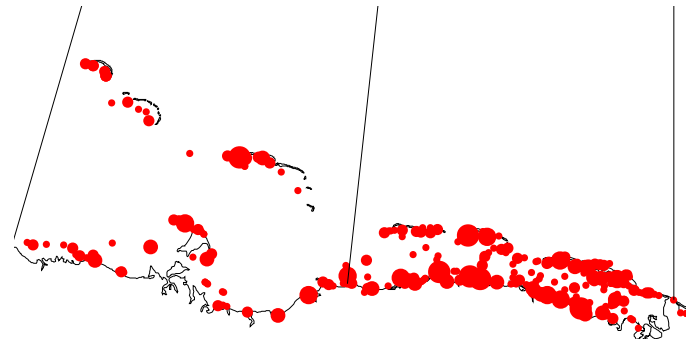
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(n=6938)



**2002**

(n=8910)



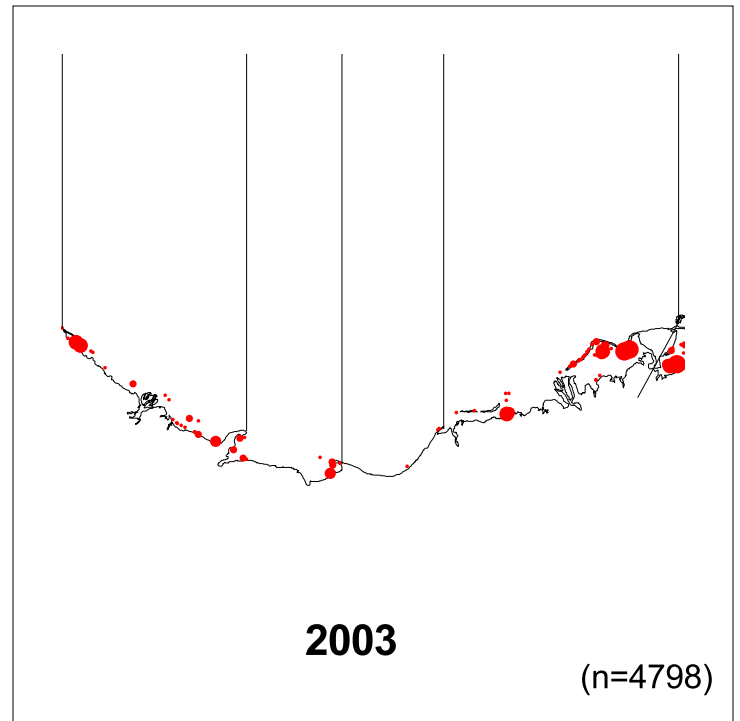
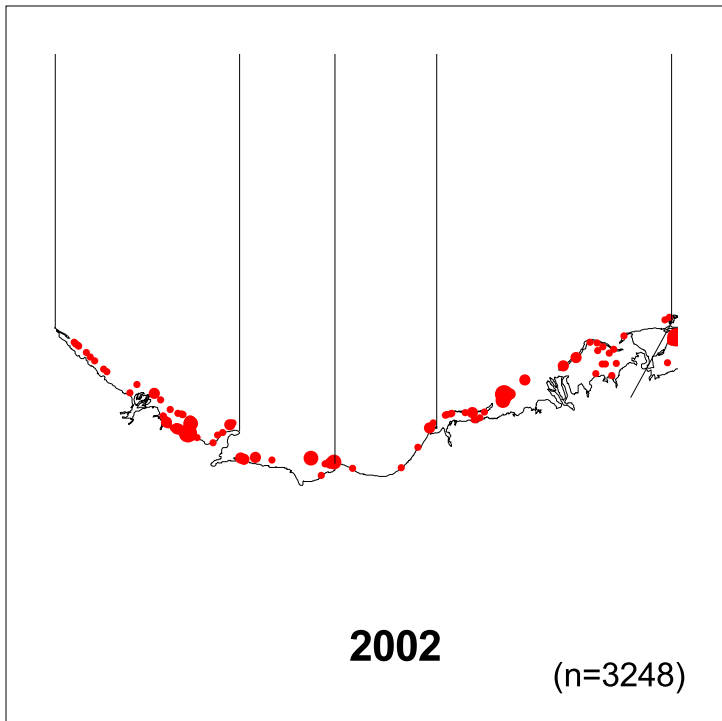
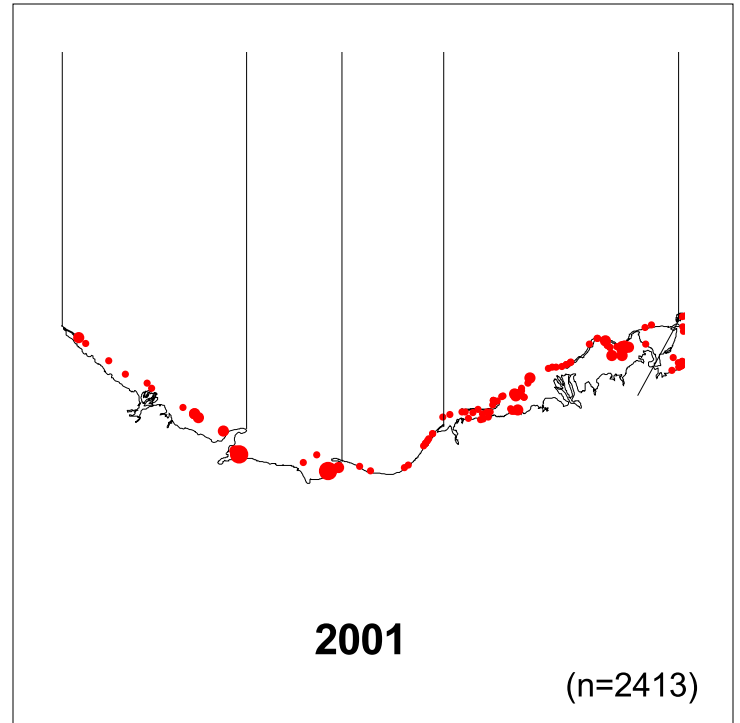
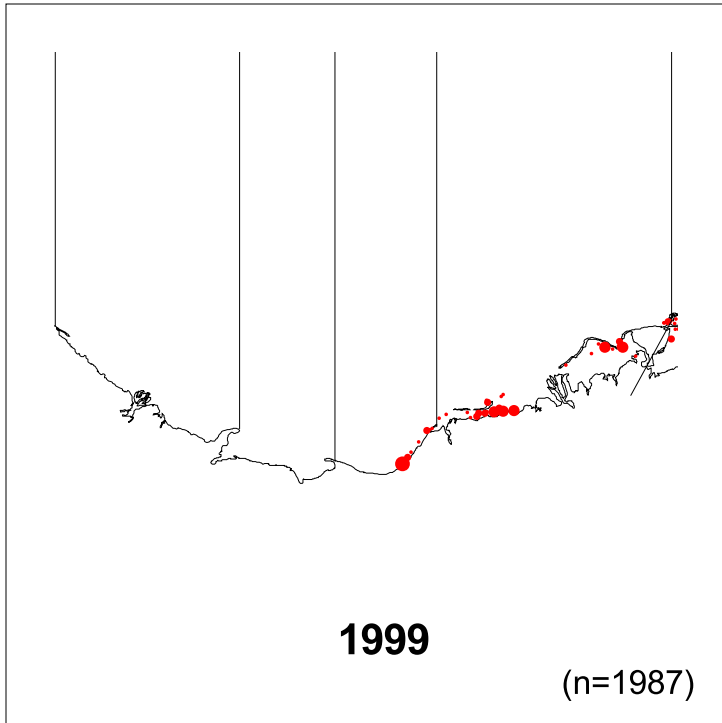
**2003**

(n=15305)

## Long-tailed Duck Observations

- 1 - 36
- 37 - 100
- 101 - 220
- 221 - 435
- 436 - 1400

# LONG-TAILED DUCK OBSERVATIONS ARCTIC NATIONAL WILDLIFE REFUGE - WEST

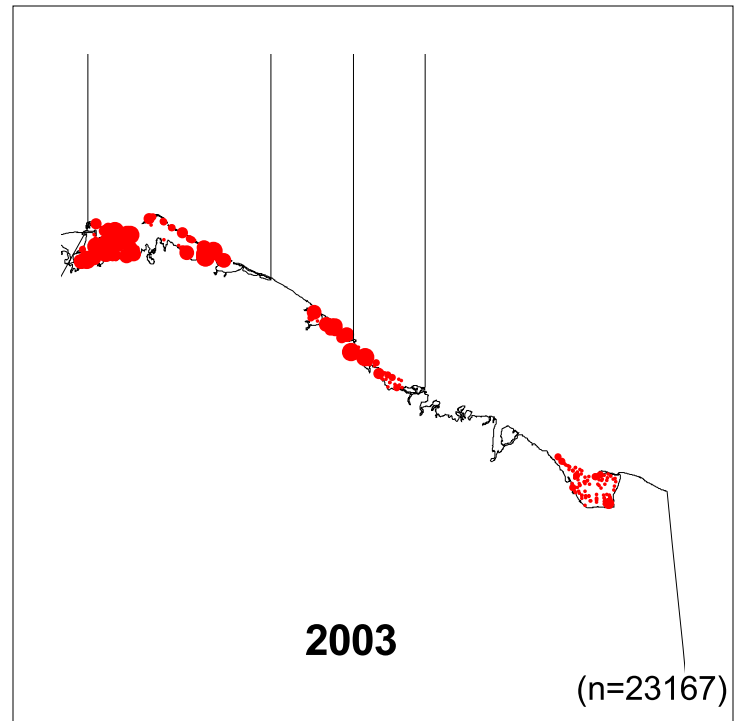
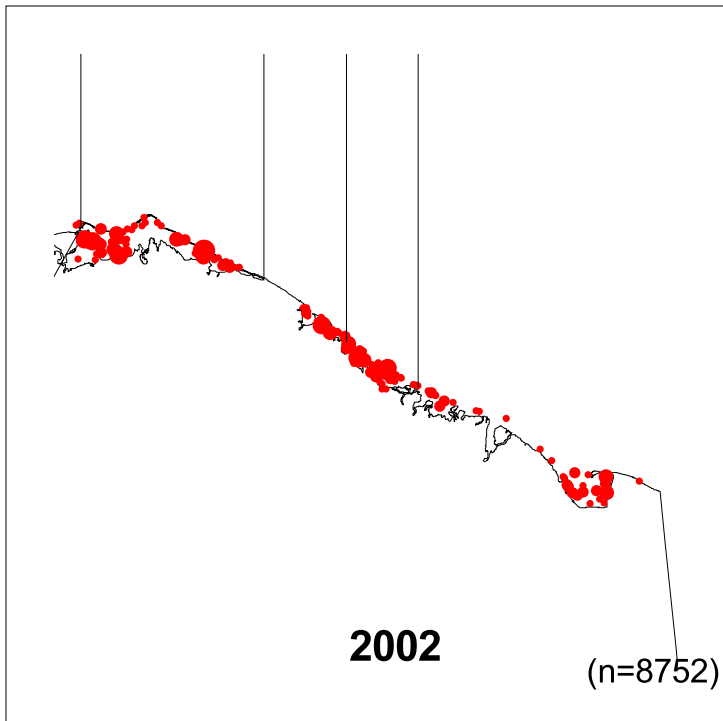
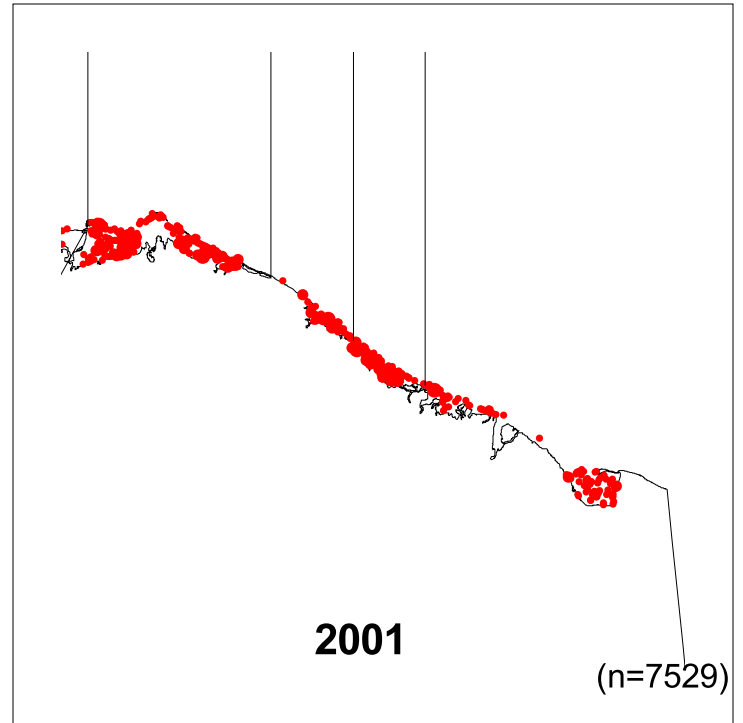
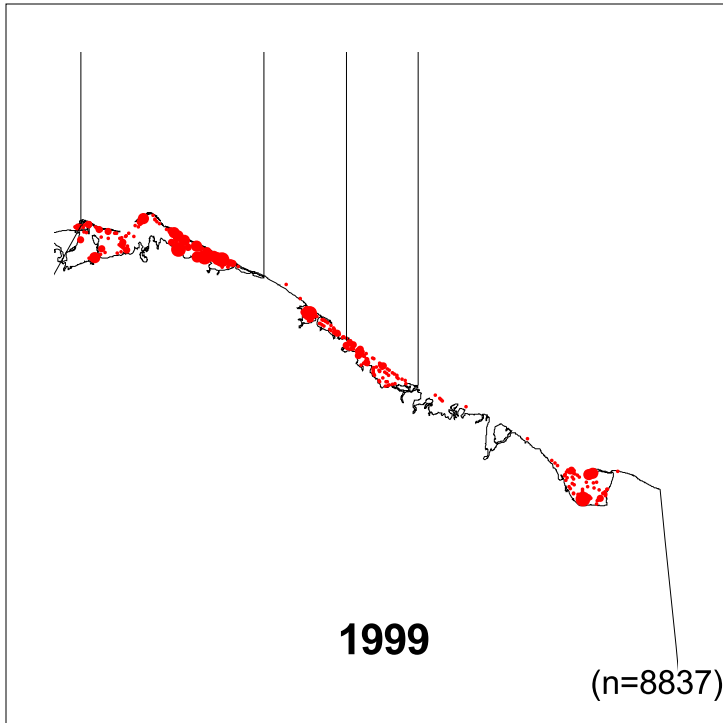


## Long-tailed Duck Observations

- 1 - 36
- 37 - 100
- 101 - 220
- 221 - 435
- 436 - 1400

# LONG-TAILED DUCK OBSERVATIONS

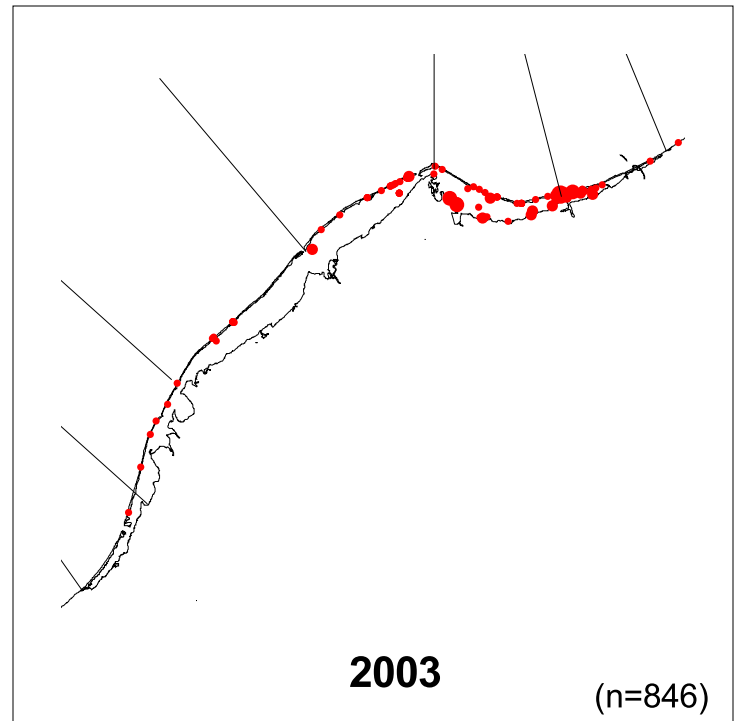
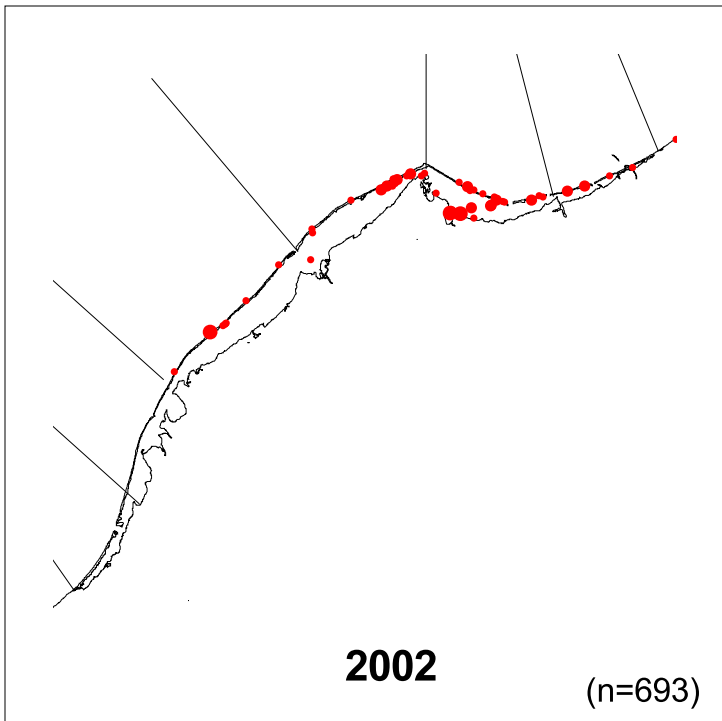
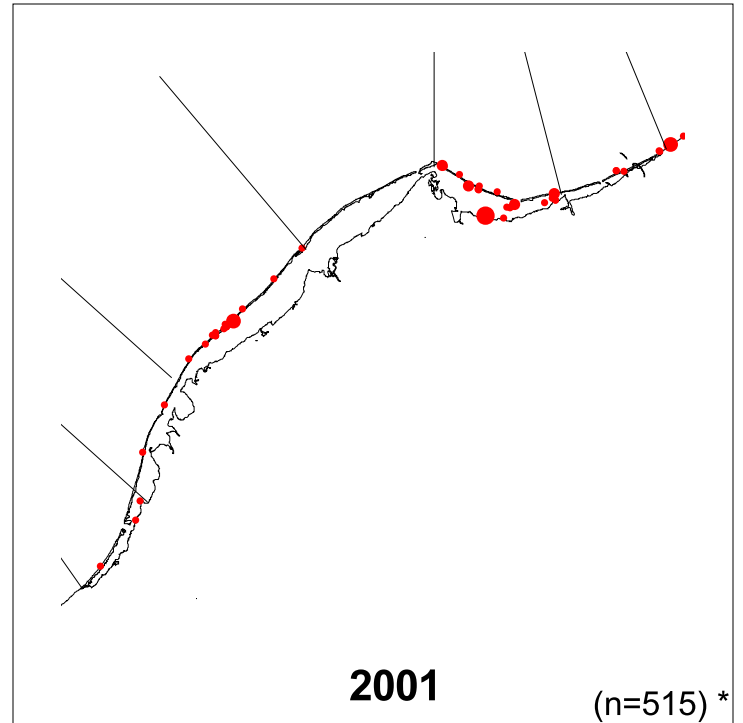
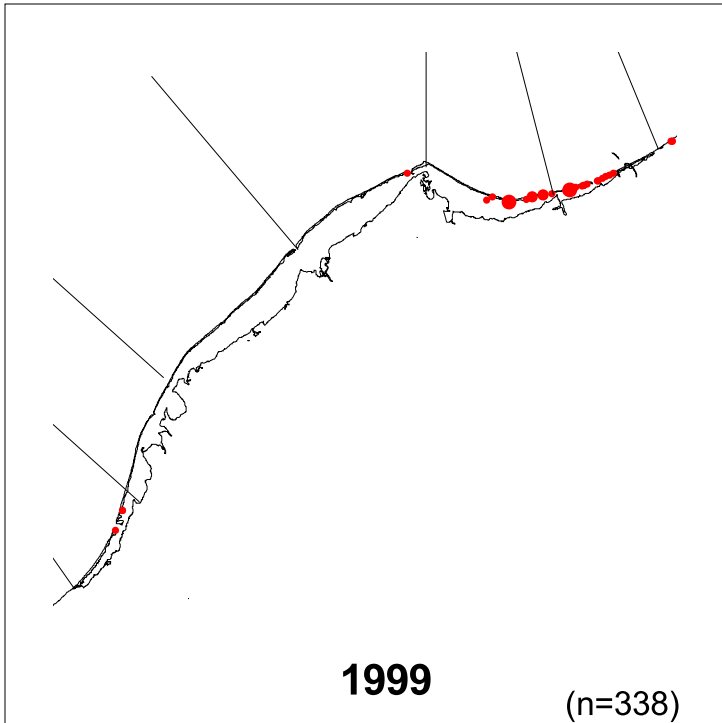
## ARCTIC NATIONAL WILDLIFE REFUGE - EAST



### Long-tailed Duck Observations

- 1 - 36
- 37 - 100
- 101 - 220
- 221 - 435
- 436 - 1400

# COMMON EIDER OBSERVATIONS KASEGALUK LAGOON

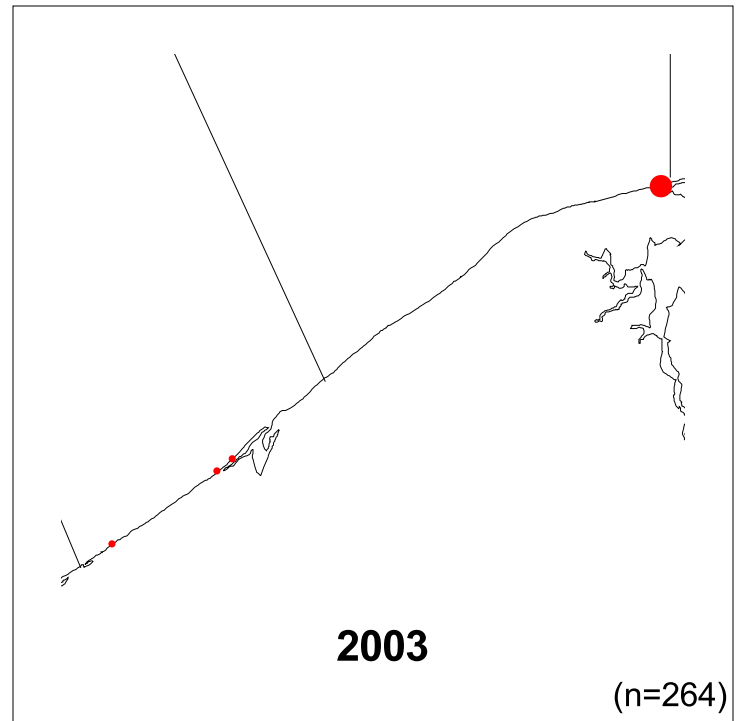
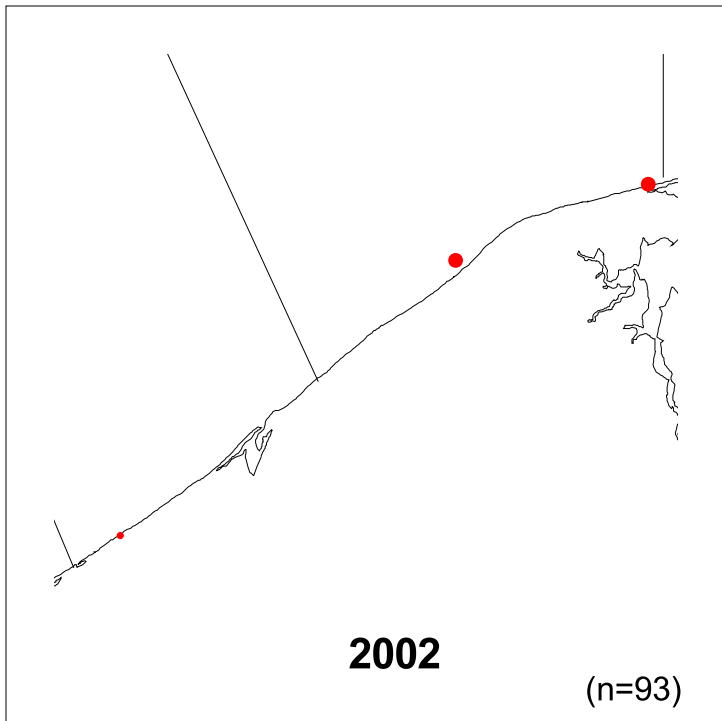
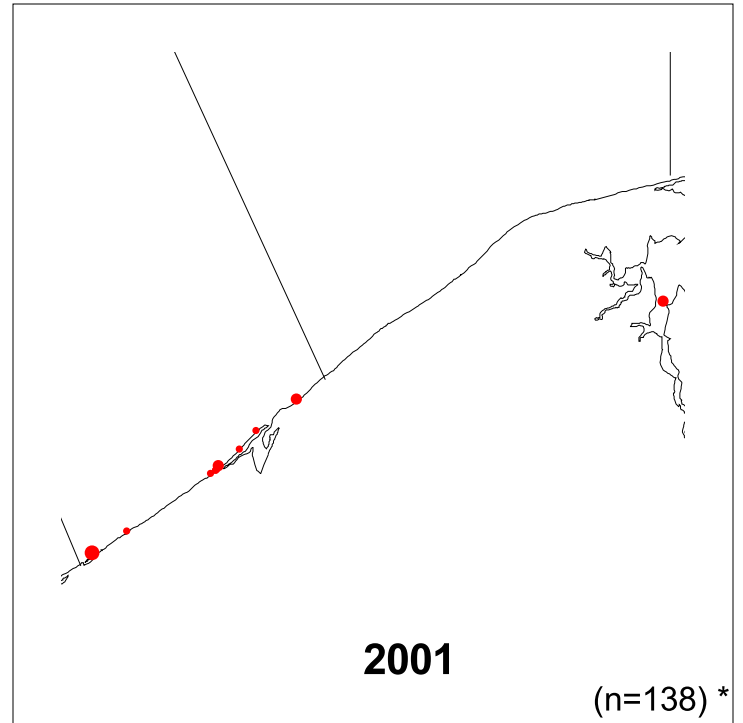
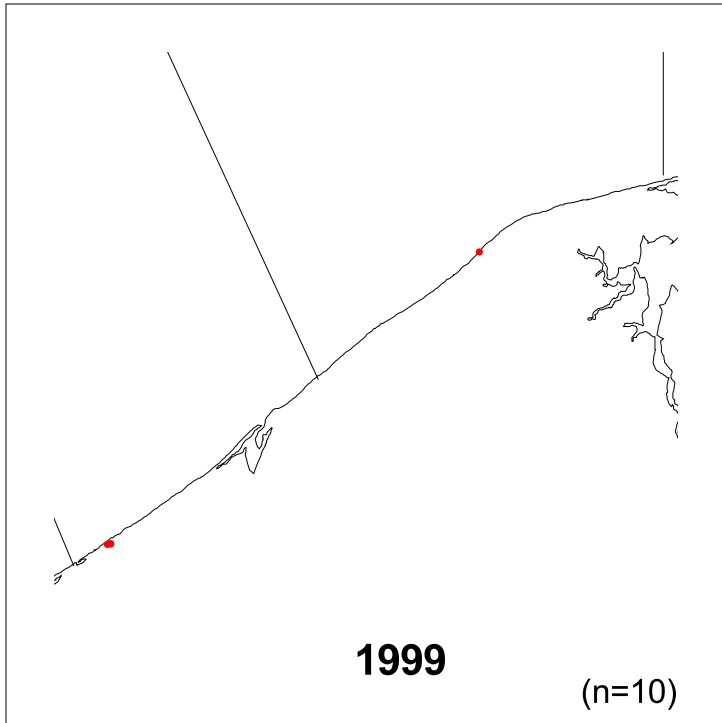


## Common Eider Locations

- 1 - 13
- 14 - 40
- 41 - 85
- 86 - 220
- 221 - 550

\* = Incomplete Count

# COMMON EIDER OBSERVATIONS WAINWRIGHT

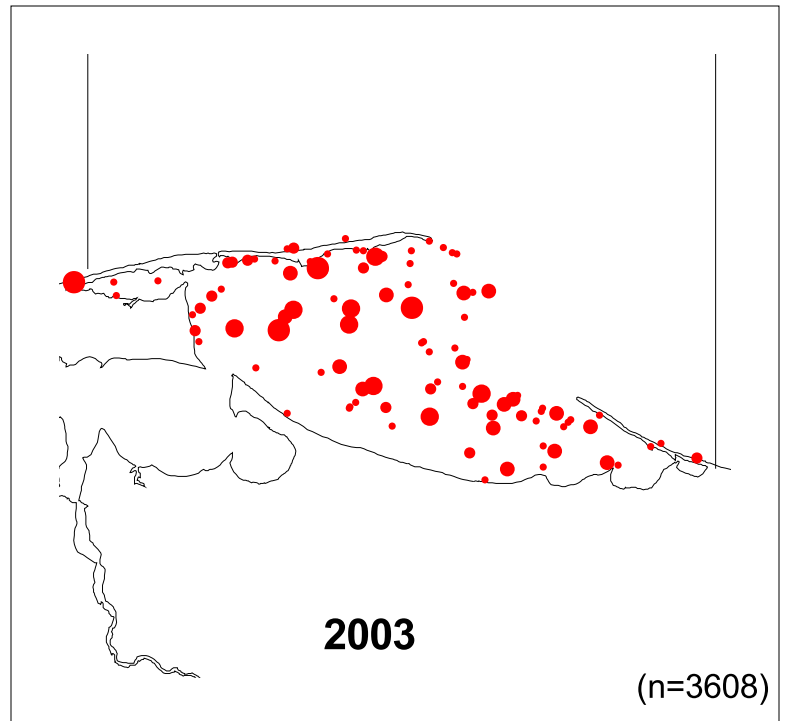
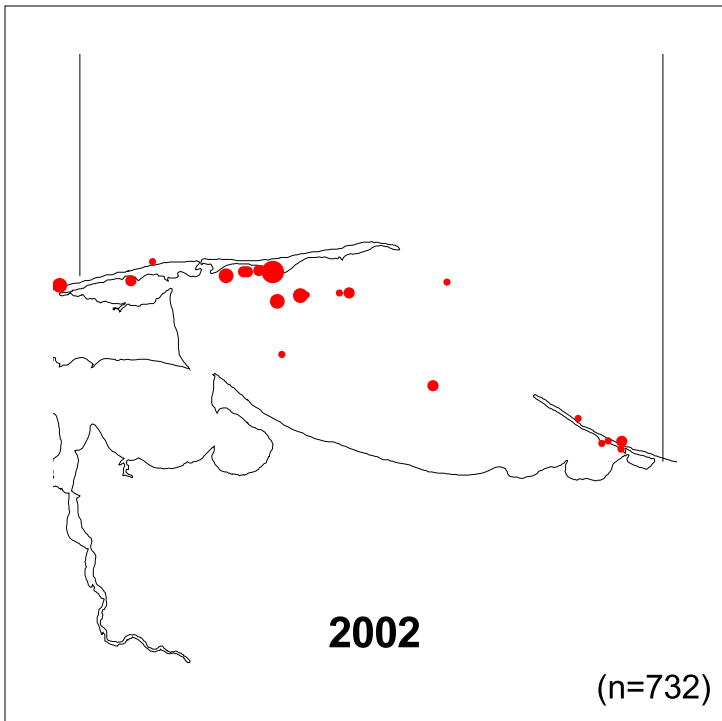
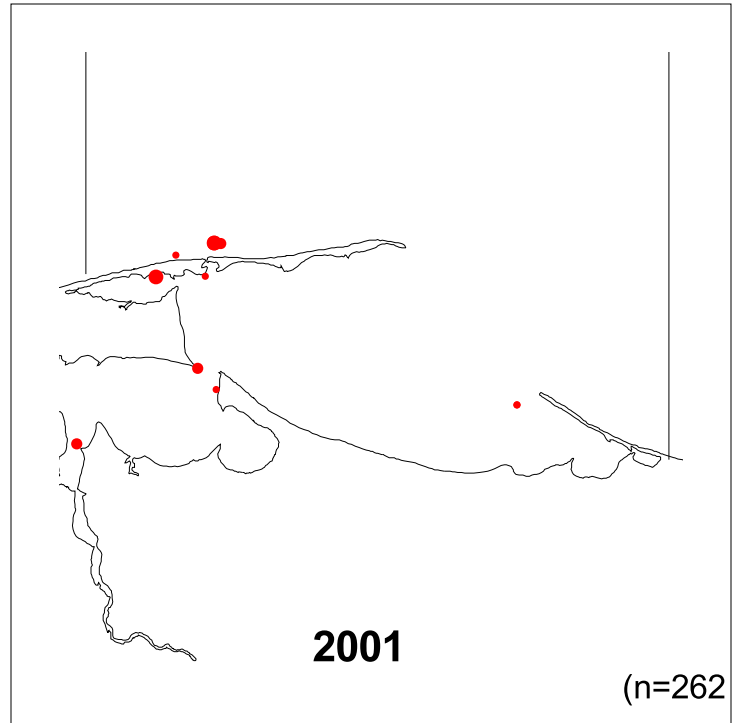
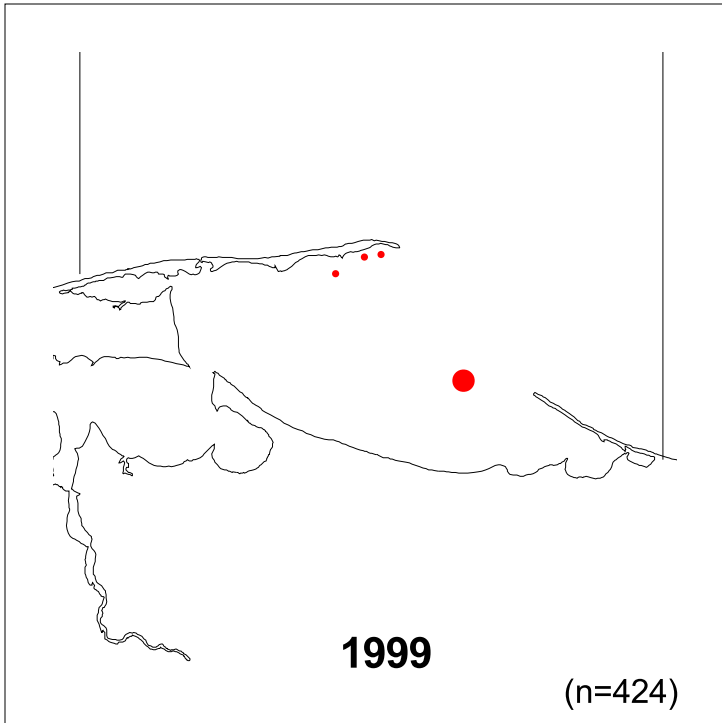


## Common Eider Locations

- 1 - 13
- 14 - 40
- 41 - 85
- 86 - 220
- 221 - 550

\* = Incomplete Count

# COMMON EIDER OBSERVATIONS PEARDBAY

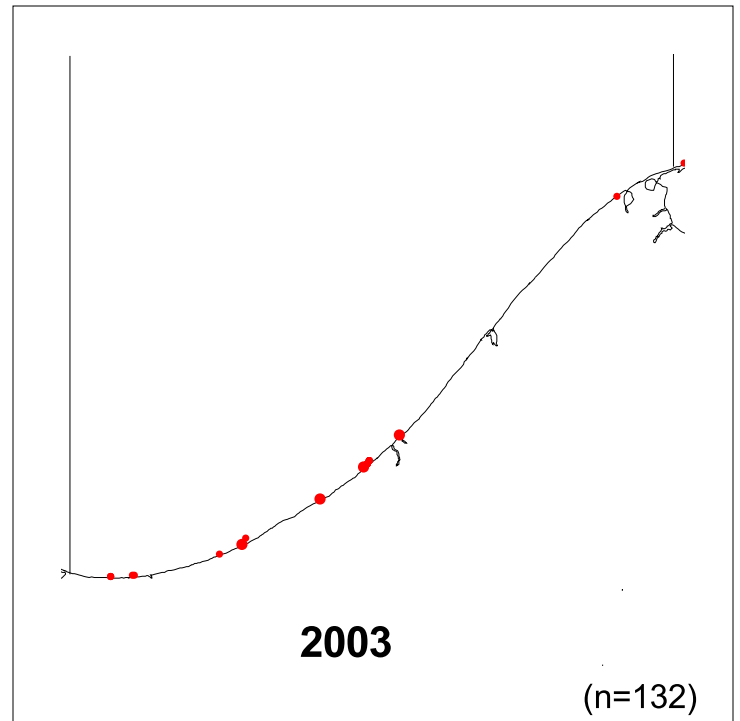
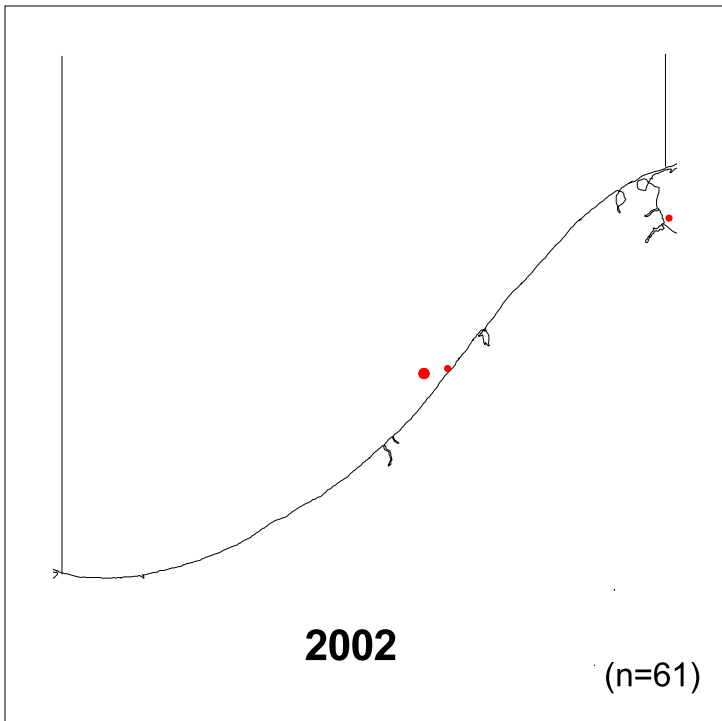
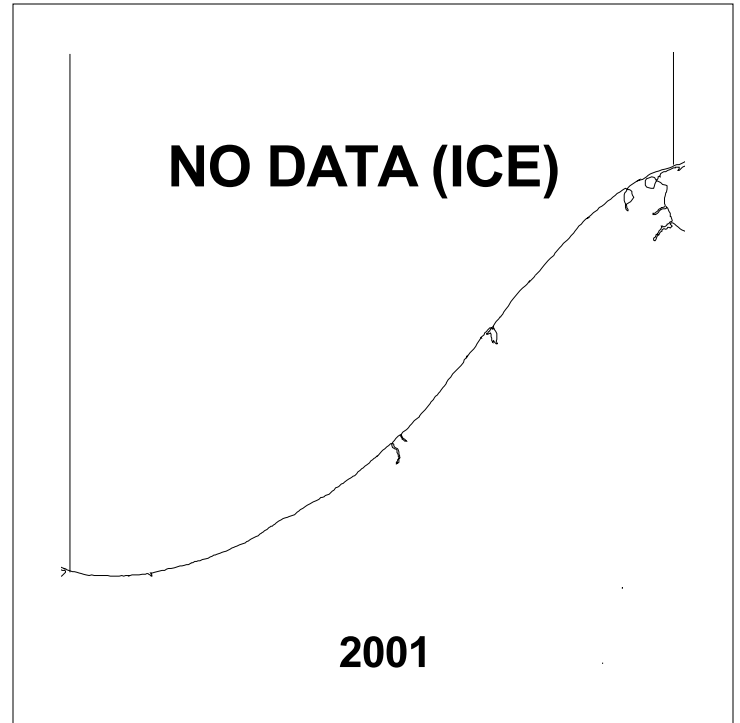
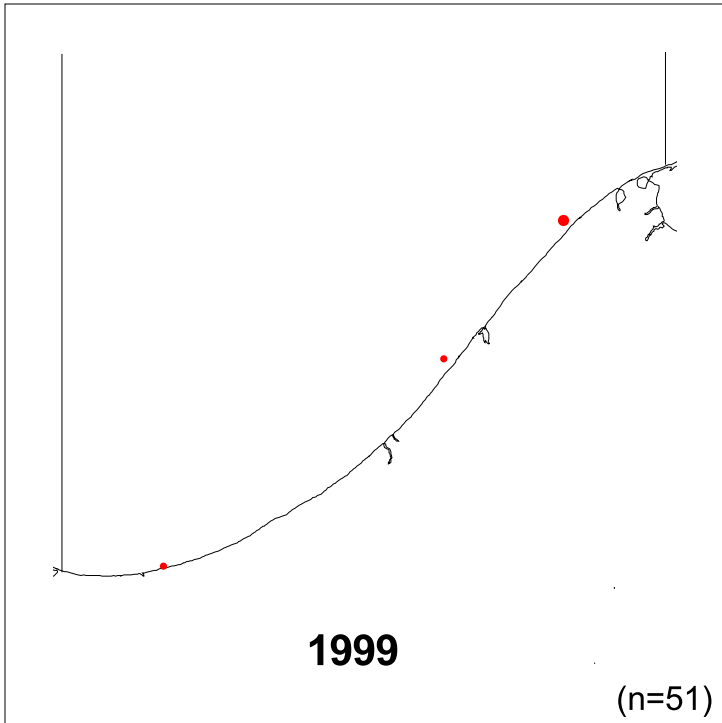


## Common Eider Locations

- 1 - 13
- 14 - 40
- 41 - 85
- 86 - 220
- 221 - 550



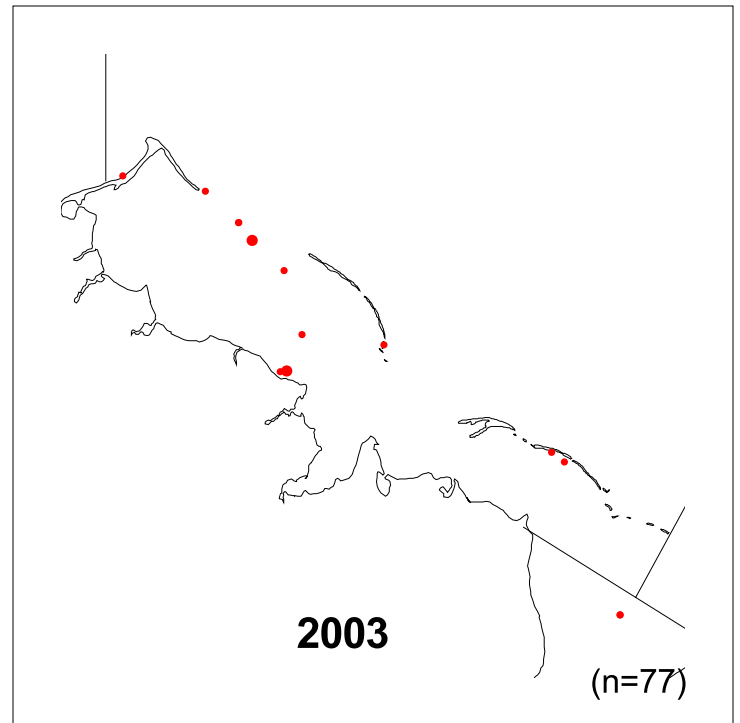
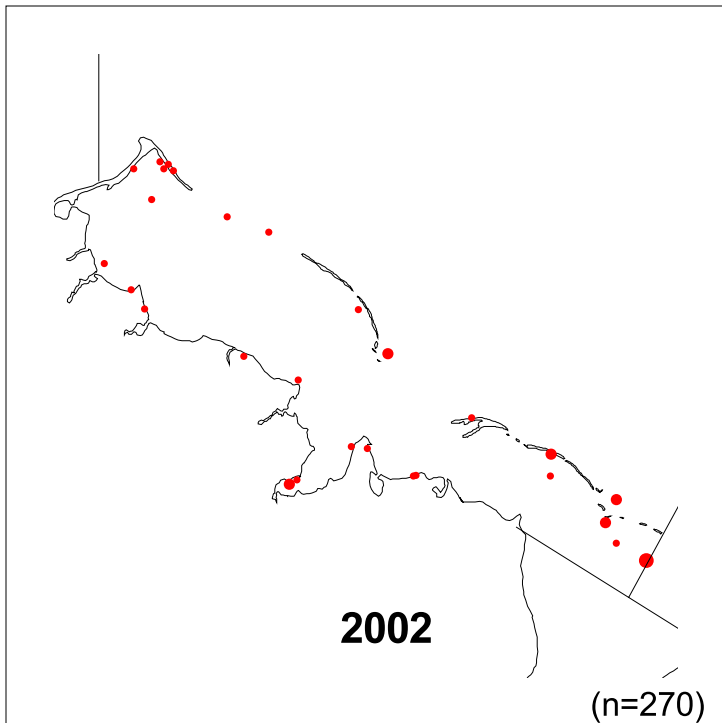
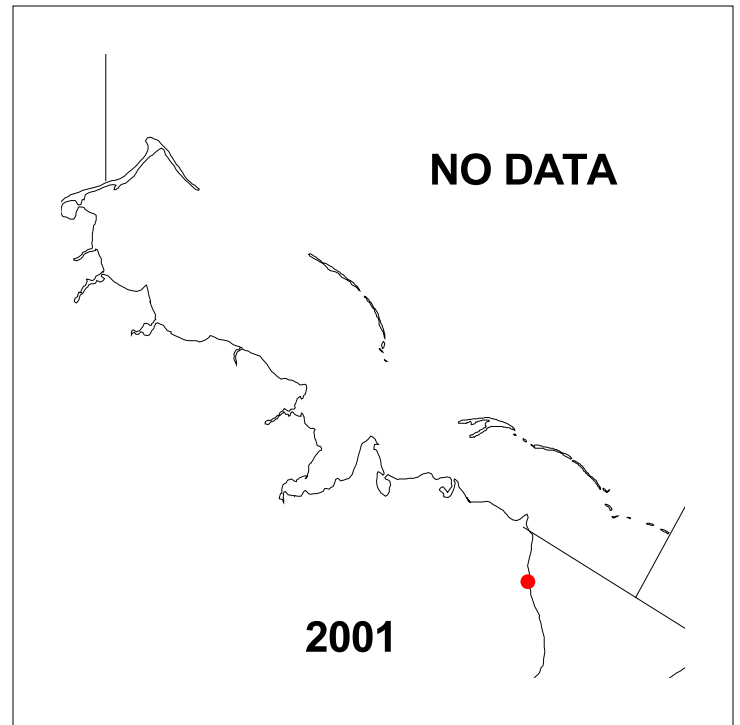
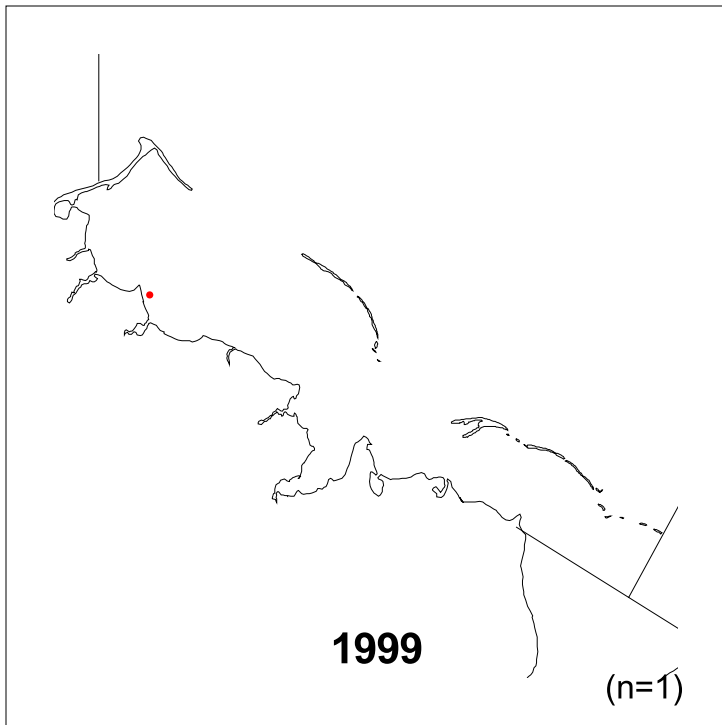
# COMMON EIDER OBSERVATIONS BARROW SOUTHWEST



## Common Eider Locations

- 1 - 13
- 14 - 40
- 41 - 85
- 86 - 220
- 221 - 550

# COMMON EIDER OBSERVATIONS ELSON LAGOON

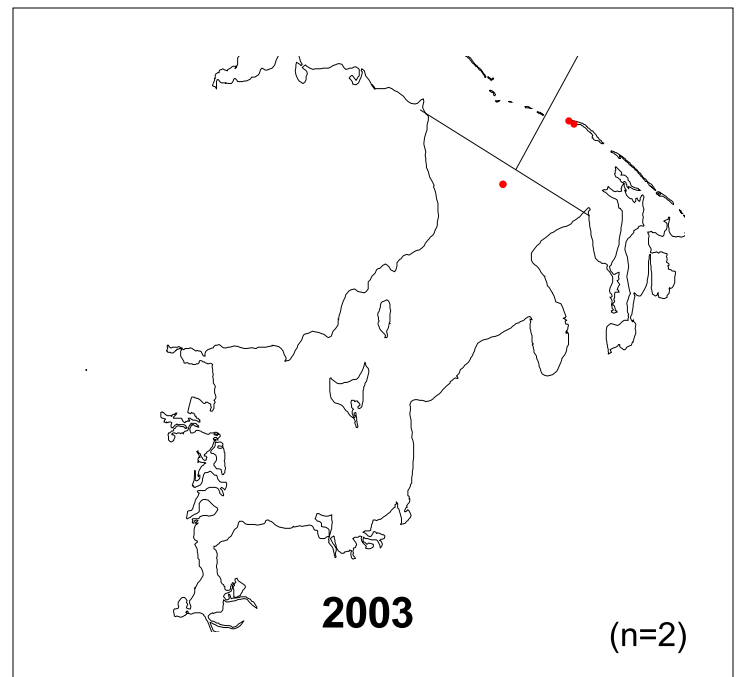
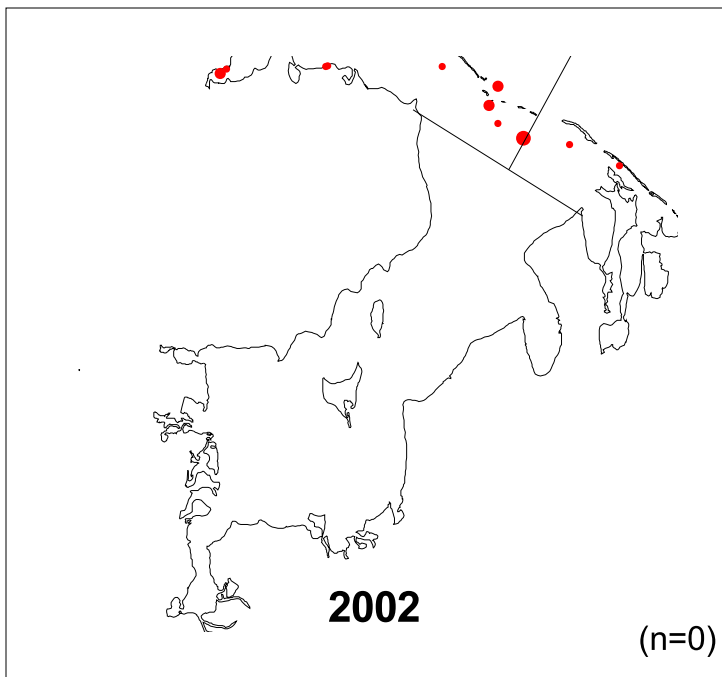
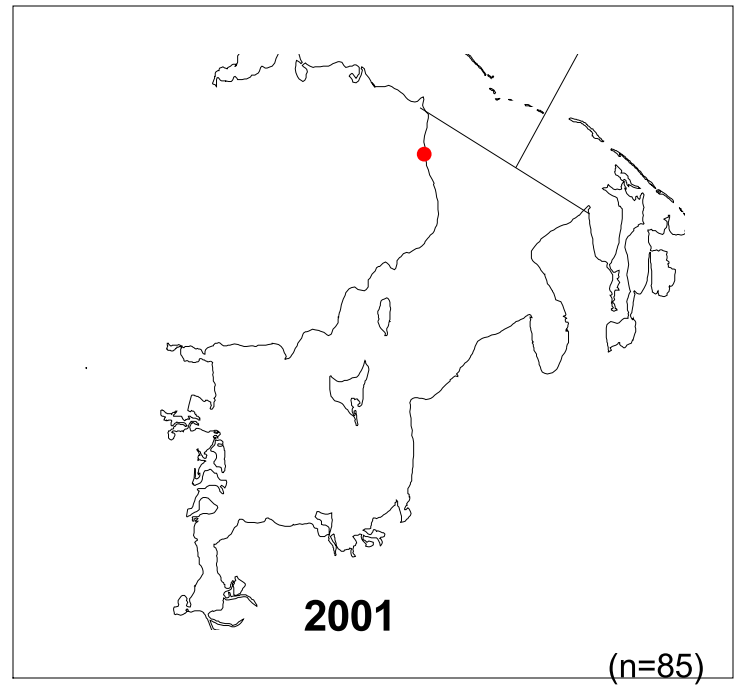
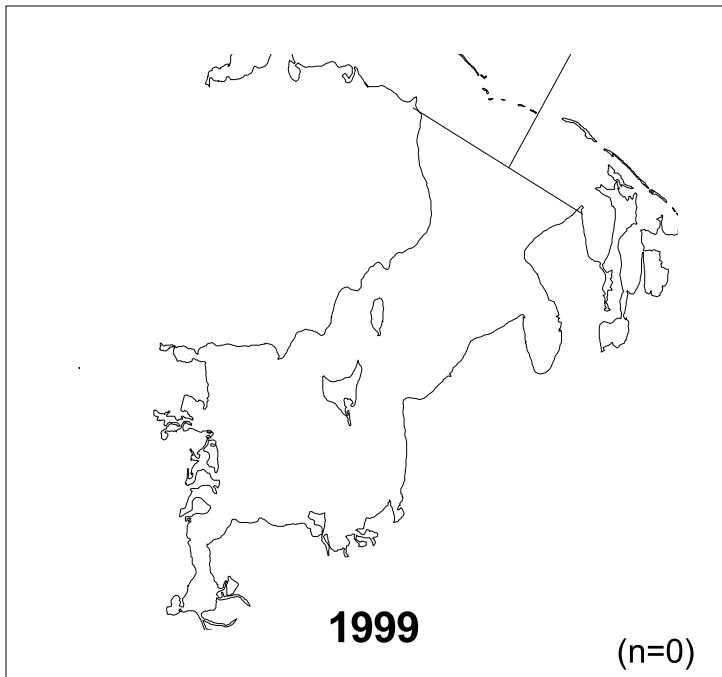


## Common Eider Locations

- 1 - 13
- 14 - 40
- 41 - 85
- 86 - 220
- 221 - 550

# COMMON EIDER OBSERVATIONS

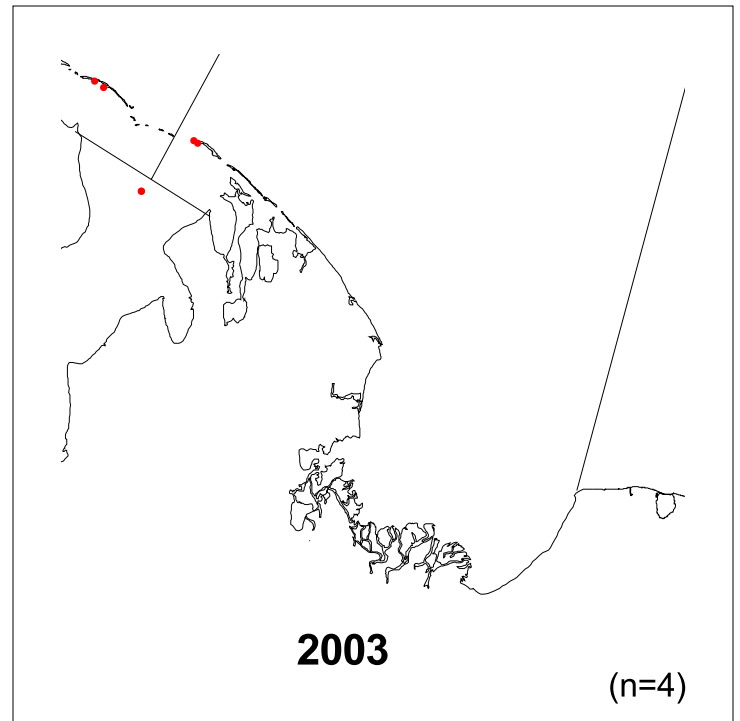
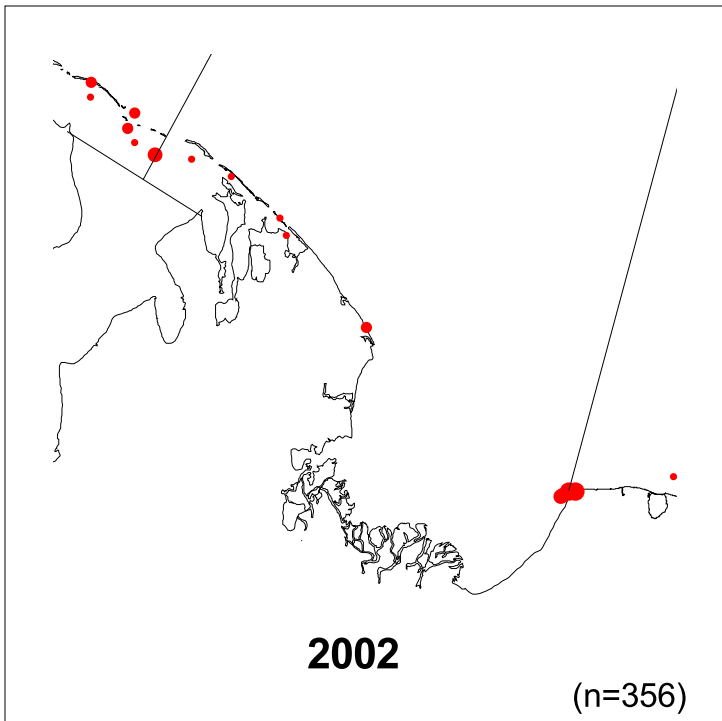
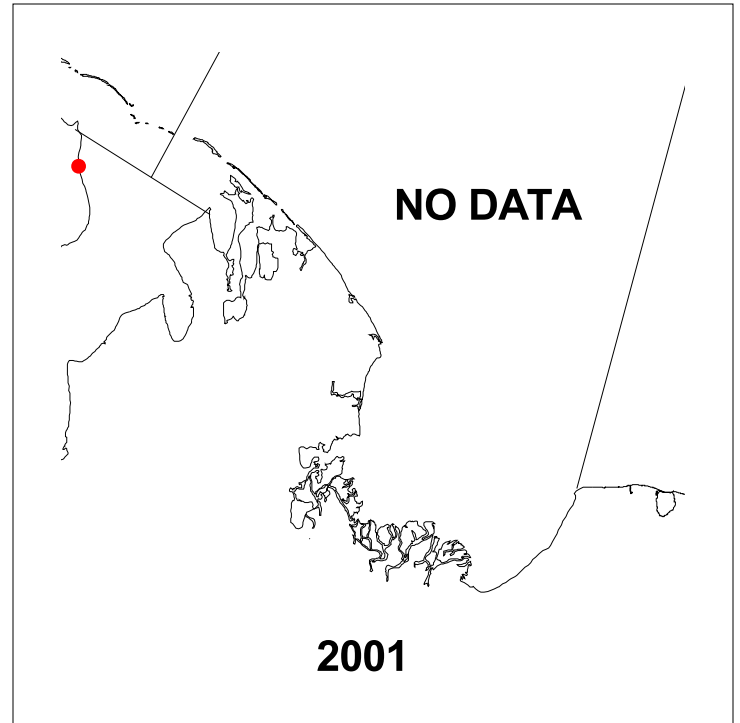
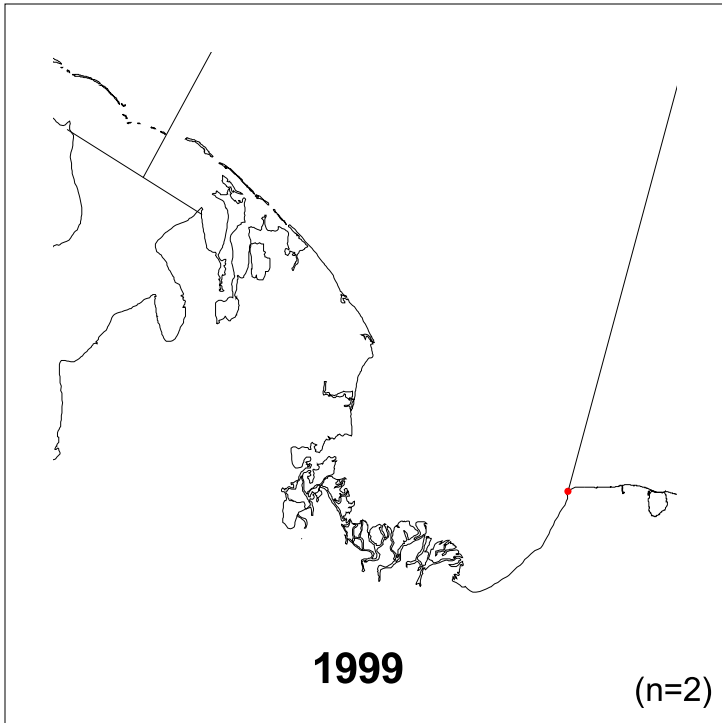
## ADMIRALTY BAY



### Common Eider Locations

- 1 - 13
- 14 - 40
- 41 - 85
- 86 - 220
- 221 - 550

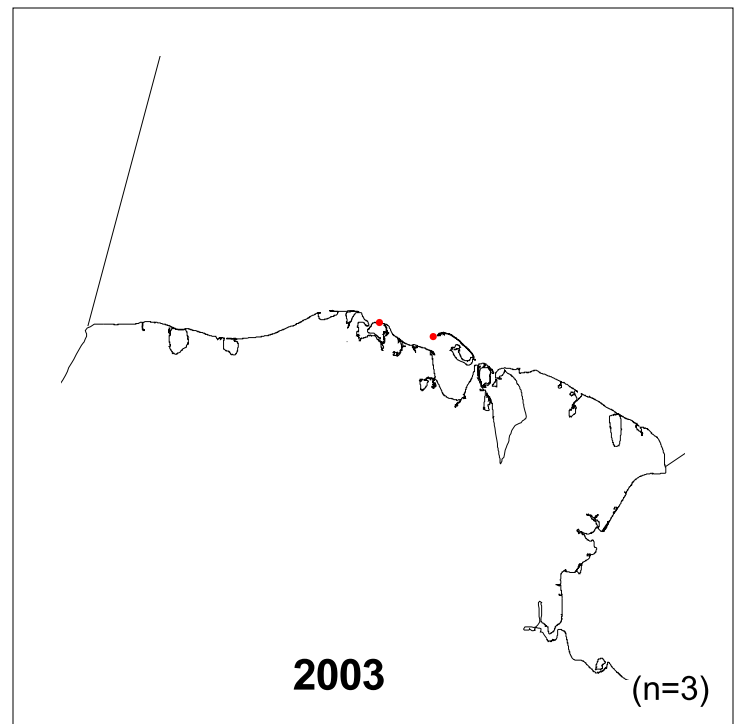
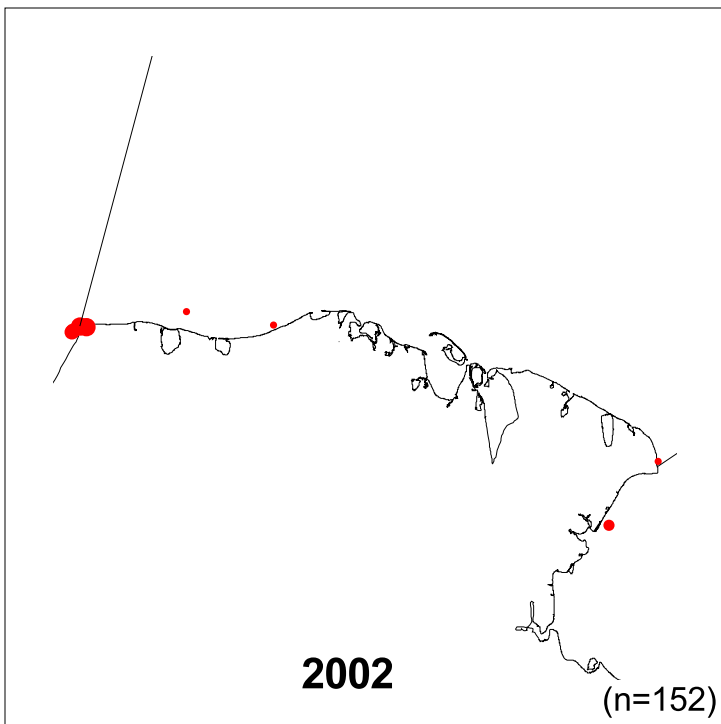
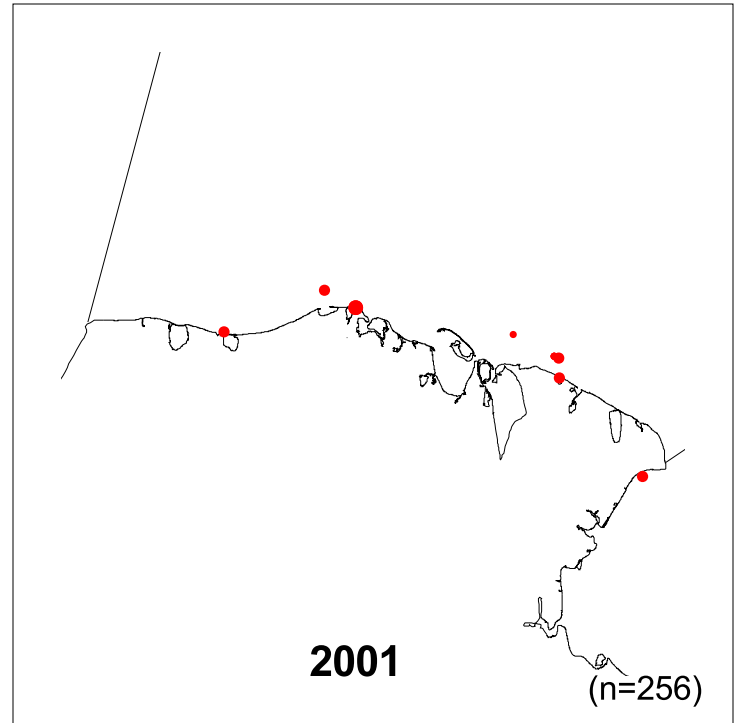
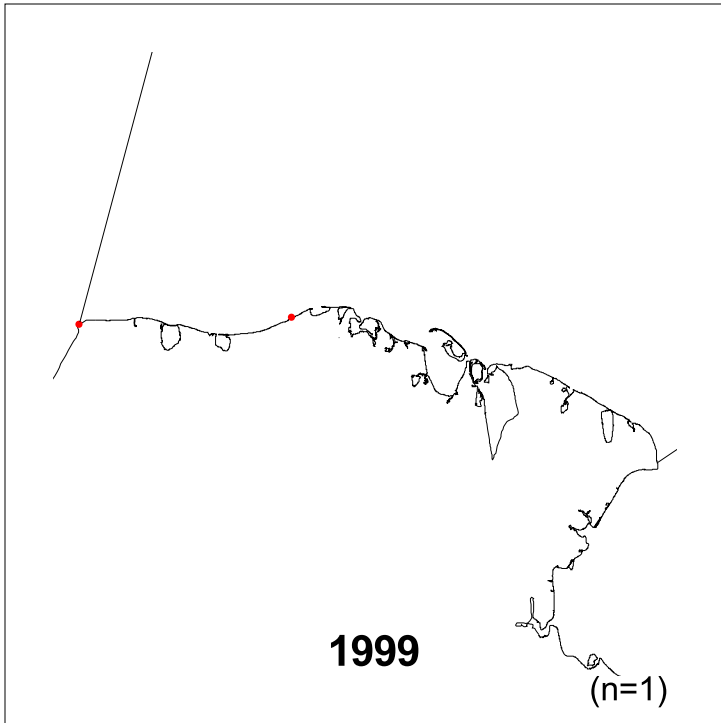
# COMMON EIDER OBSERVATIONS SMITH BAY



## Common Eider Locations

- 1 - 13
- 14 - 40
- 41 - 85
- 86 - 220
- 221 - 550

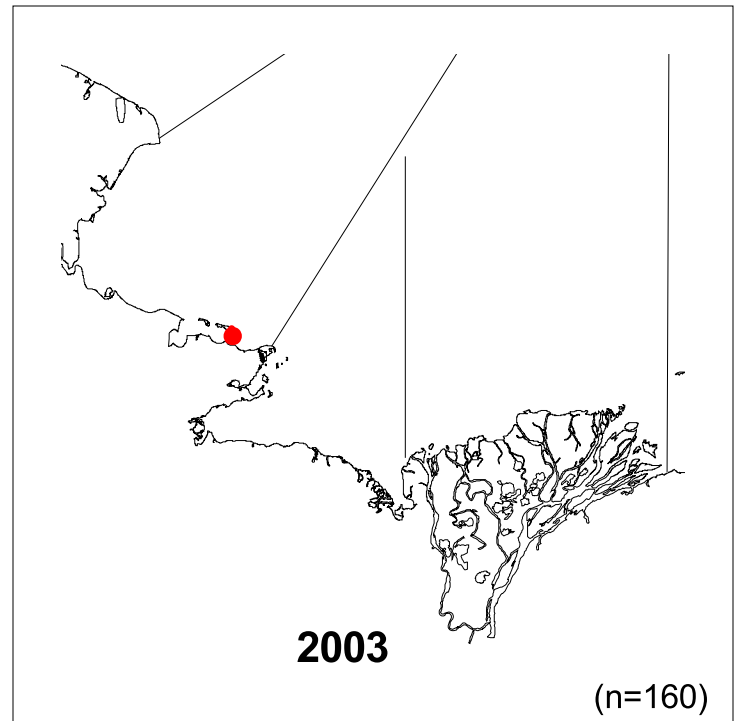
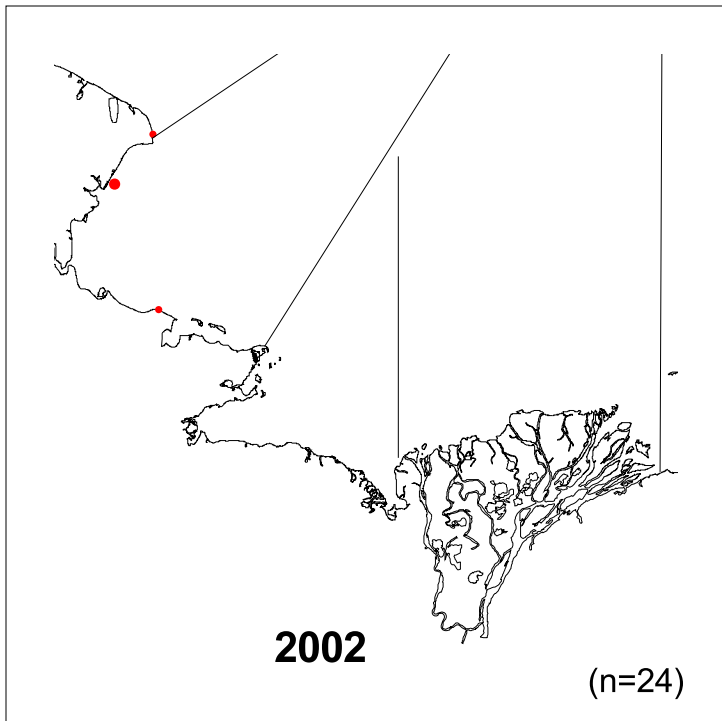
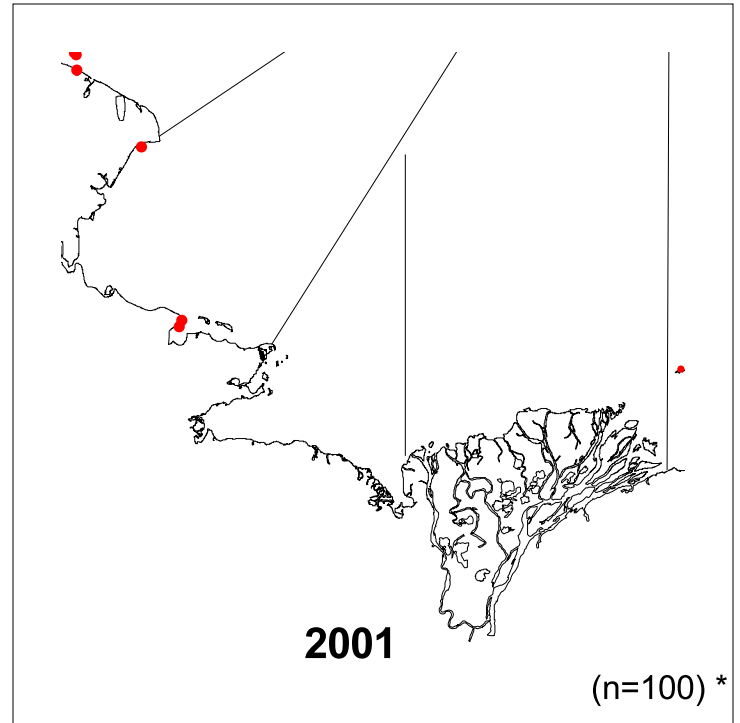
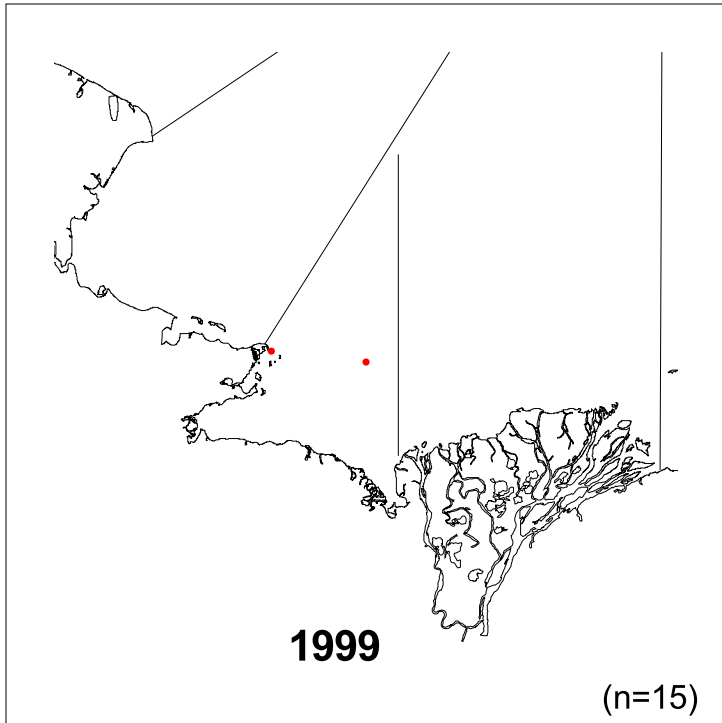
# COMMON EIDER OBSERVATIONS LONELY



## Common Eider Locations

- 1 - 13
- 14 - 40
- 41 - 85
- 86 - 220
- 221 - 550

# COMMON EIDER OBSERVATIONS HARRISON BAY



## Common Eider Locations

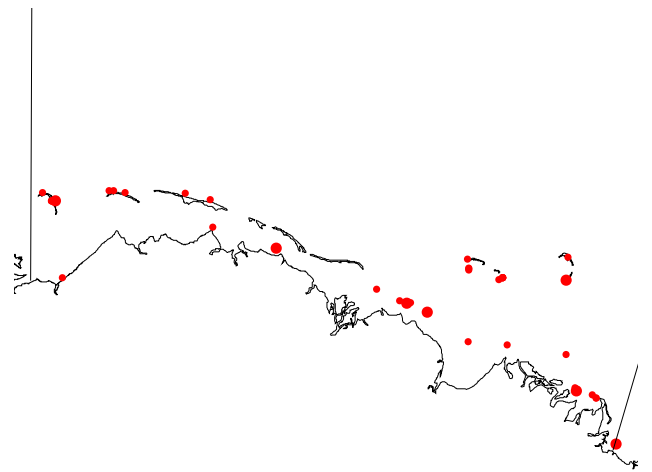
- 1 - 13
- 14 - 40
- 41 - 85
- 86 - 220
- 221 - 550

\* = Incomplete Count

# COMMON EIDER OBSERVATIONS JONES/RETURN ISLANDS

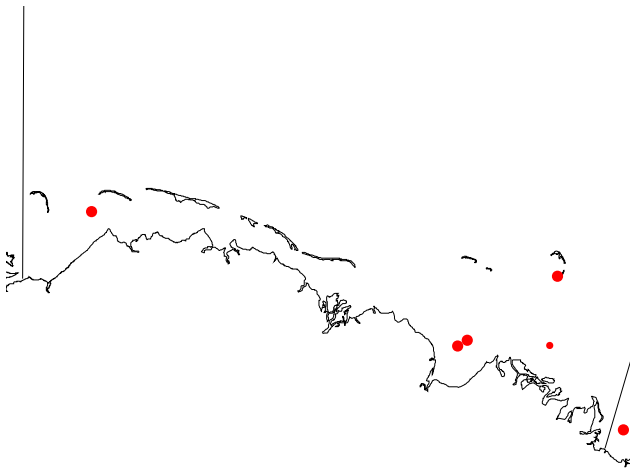
**NO DATA**

**1999**



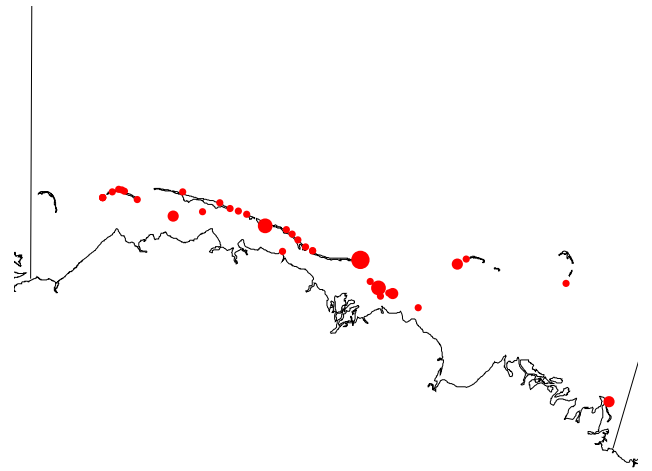
**2001**

(n=270)



**2002**

(n=81)



**2003**

(n=553)

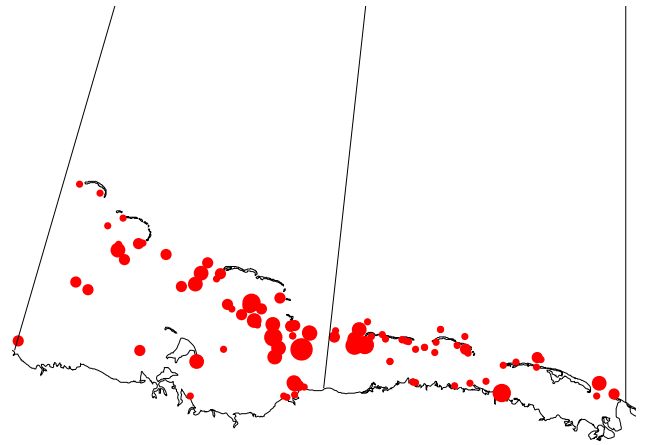
## Common Eider Locations

- 1 - 13
- 14 - 40
- 41 - 85
- 86 - 220
- 221 - 550

# COMMON EIDER OBSERVATIONS MCCLURE/STOCKTON ISLANDS

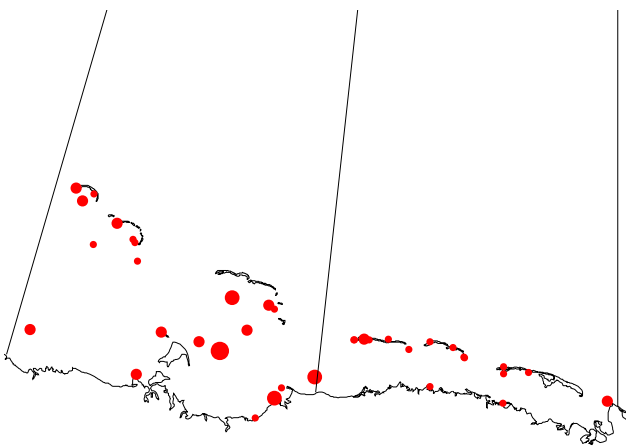
**NO DATA**

**1999**



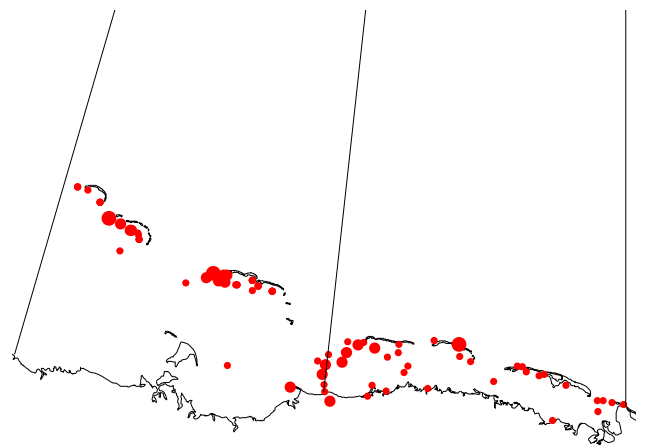
**2001**

(n=2985)



**2002**

(n=673)



**2003**

(n=800)

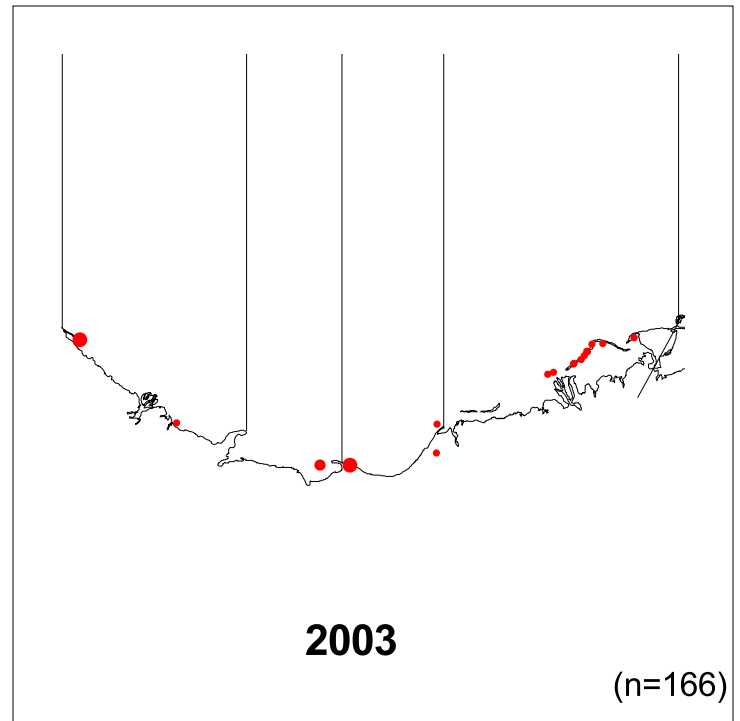
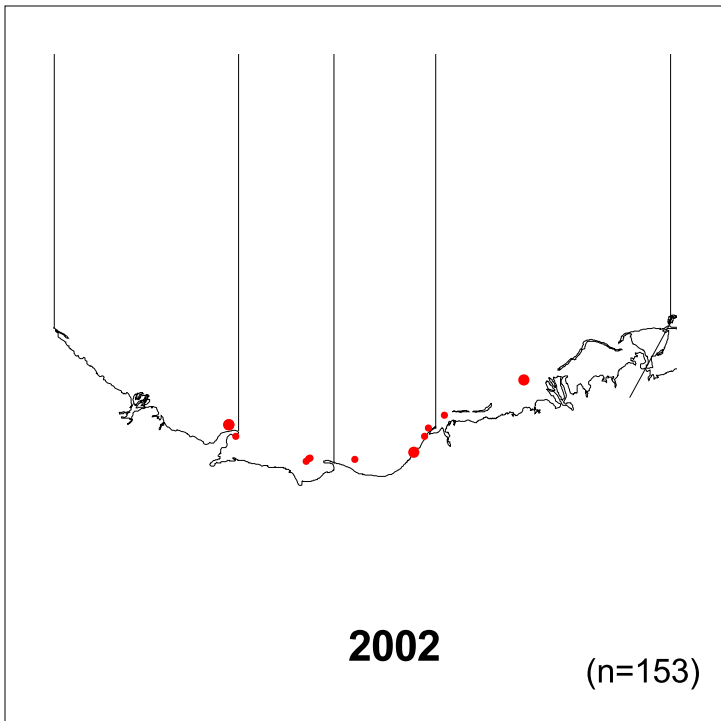
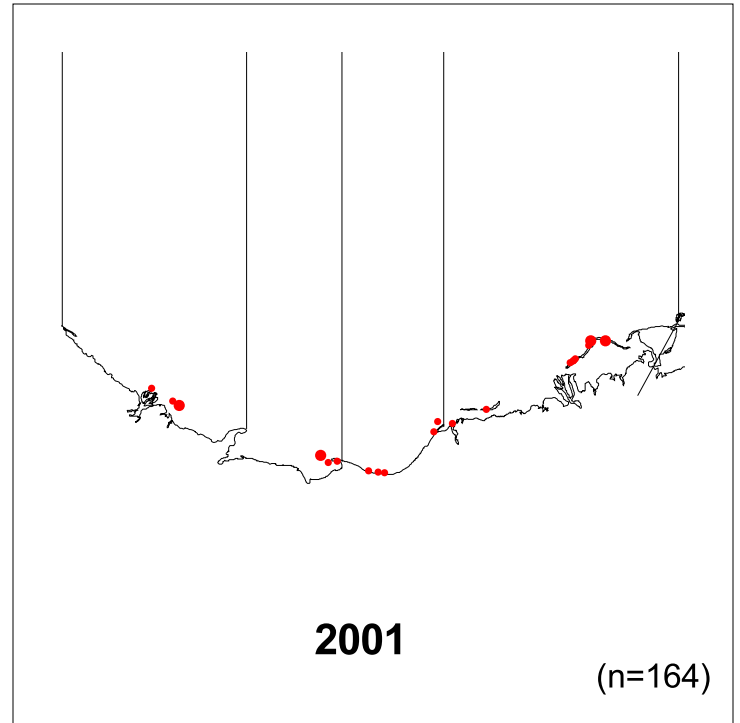
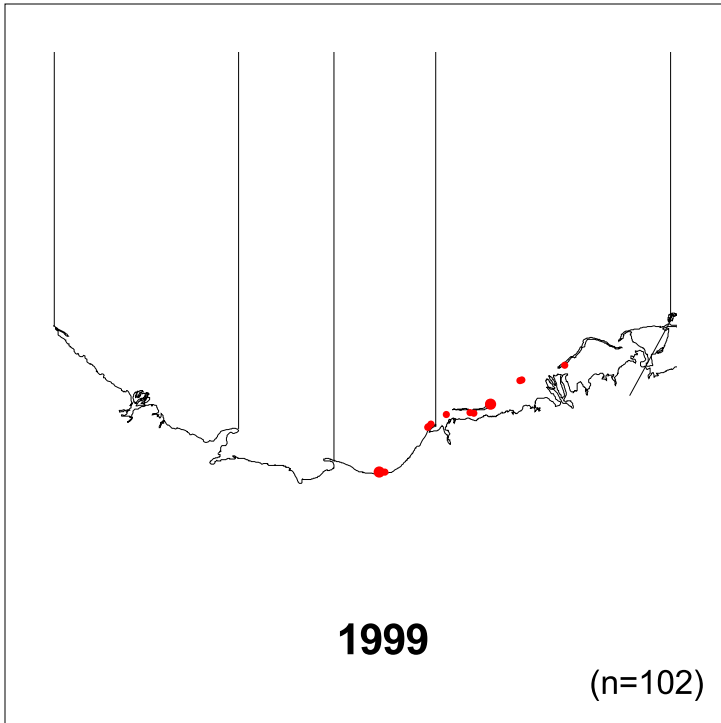
## Common Eider Locations

- 1 - 13
- 14 - 40
- 41 - 85
- 86 - 220
- 221 - 550



# COMMON EIDER OBSERVATIONS

## ARCTIC NATIONAL WILDLIFE REFUGE - WEST

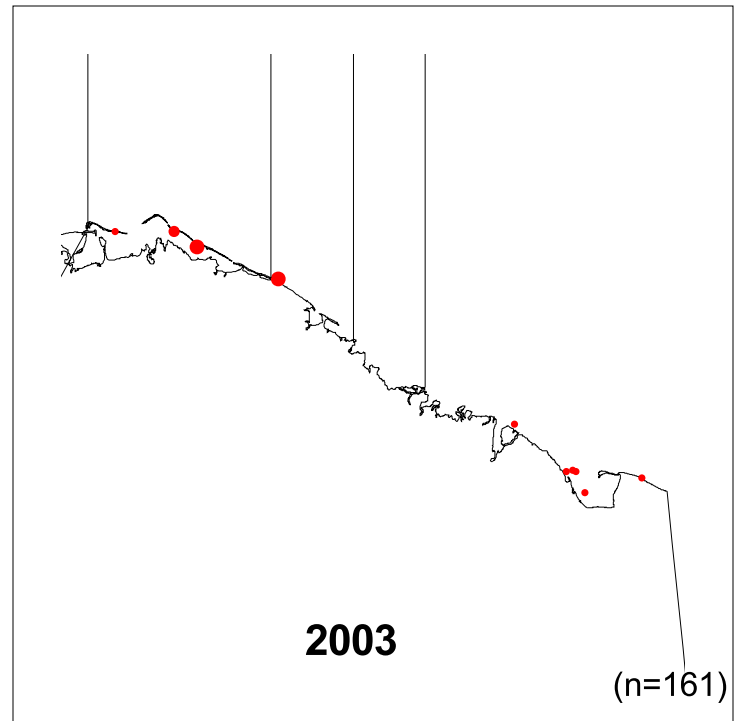
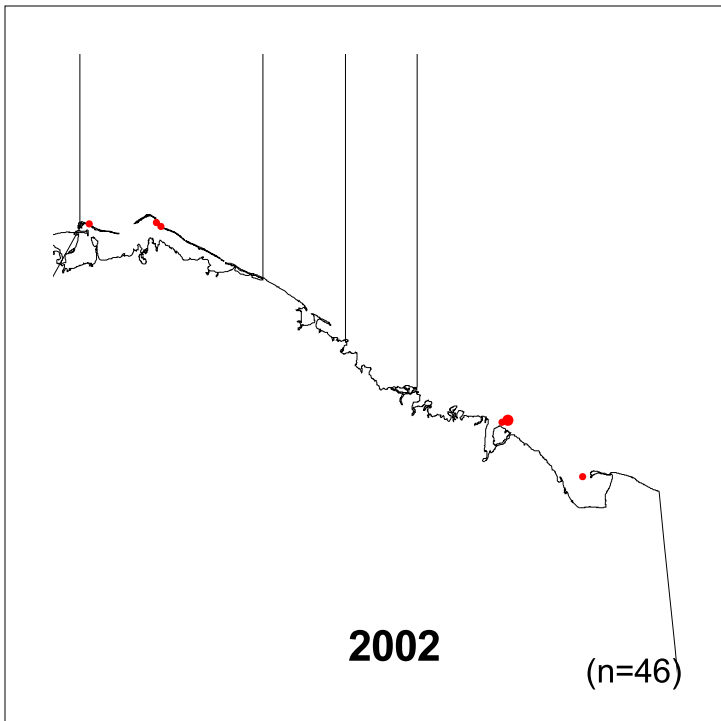
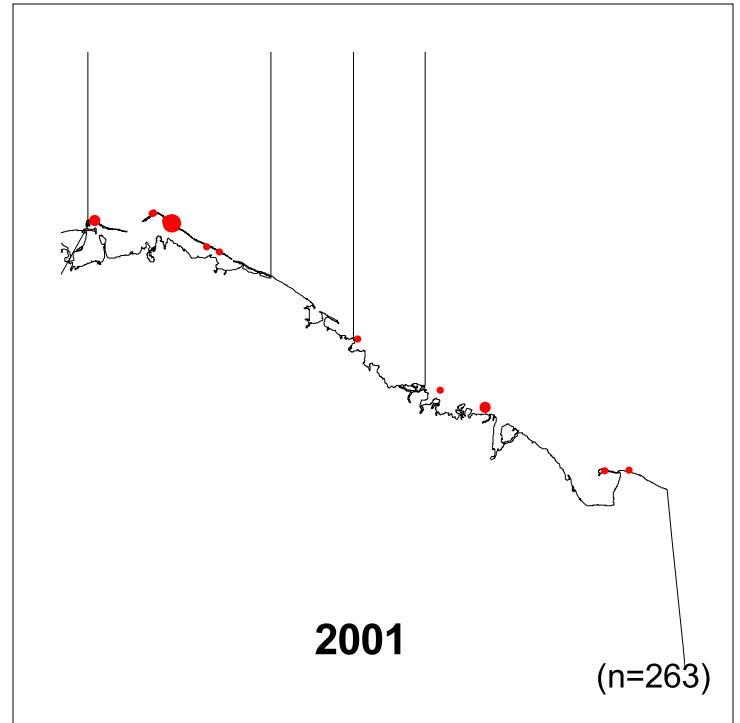
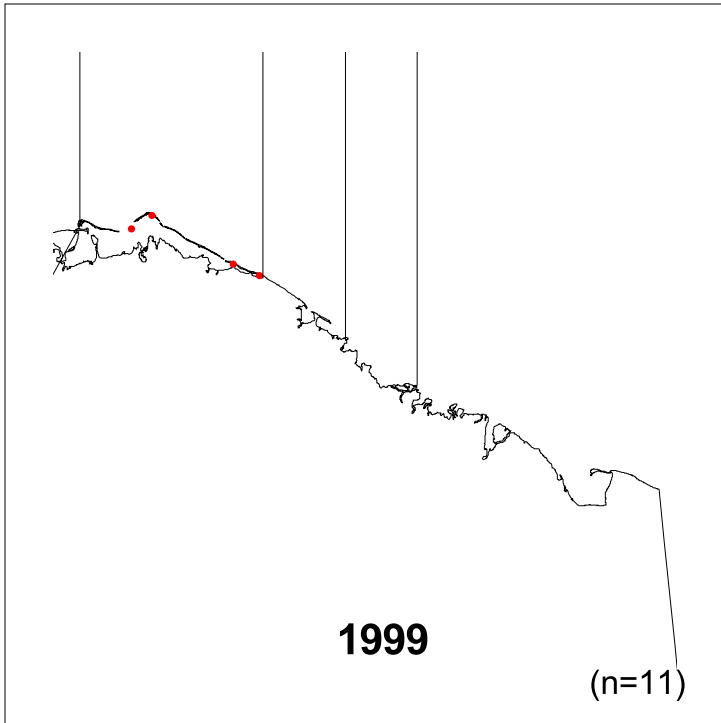


### Common Eider Locations

- 1 - 13
- 14 - 40
- 41 - 85
- 86 - 220
- 221 - 550

# COMMON EIDER OBSERVATIONS

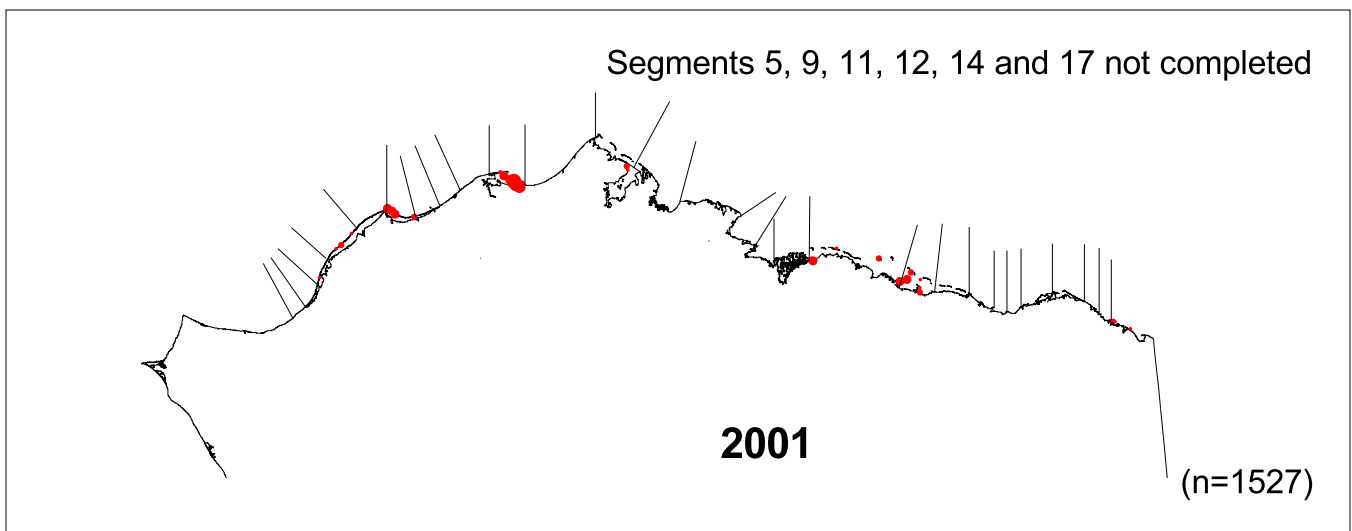
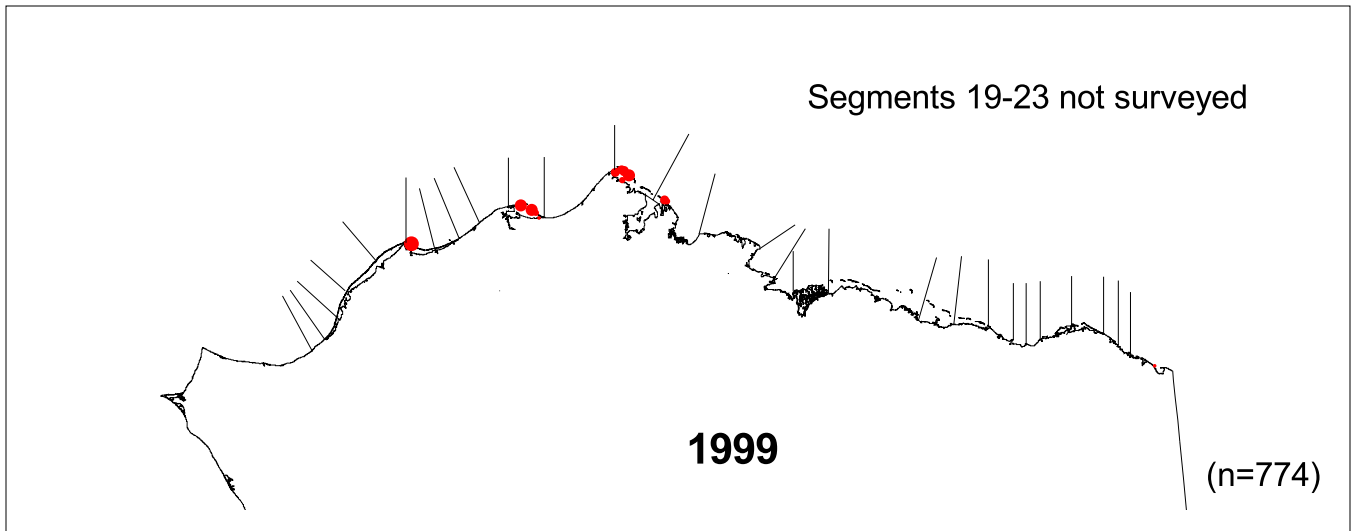
## ARCTIC NATIONAL WILDLIFE REFUGE - EAST



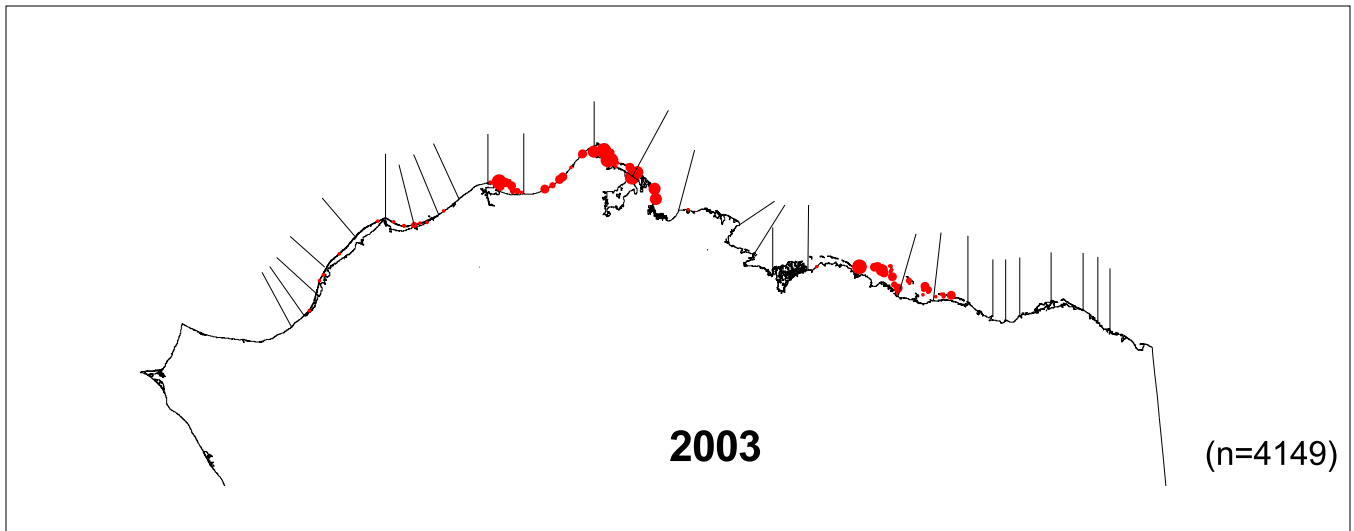
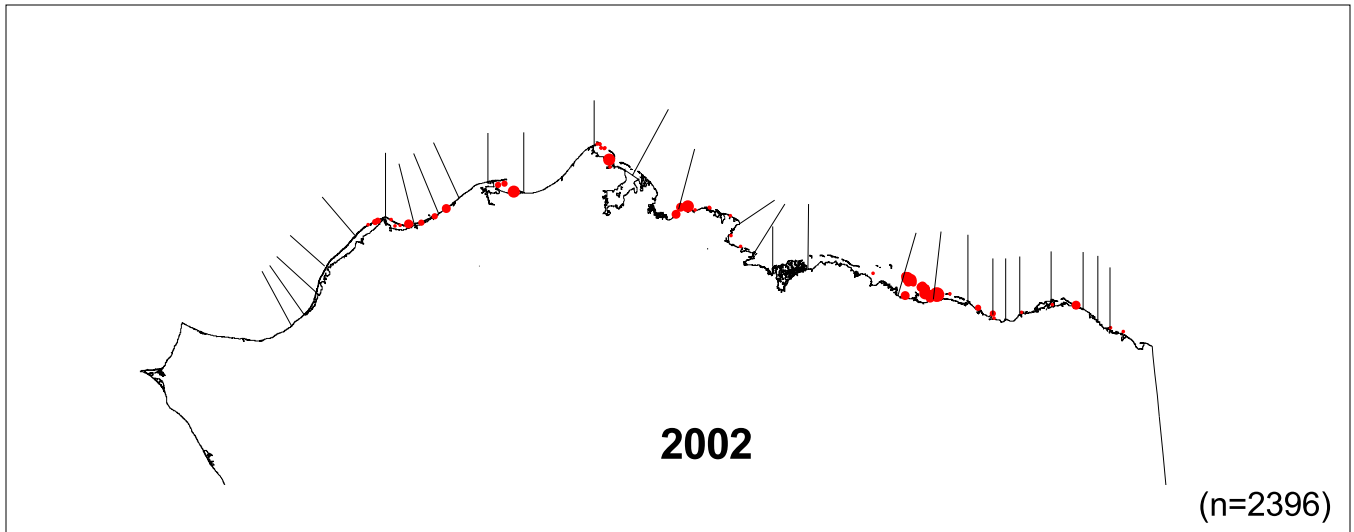
### Common Eider Locations

- 1 - 13
- 14 - 40
- 41 - 85
- 86 - 220
- 221 - 550

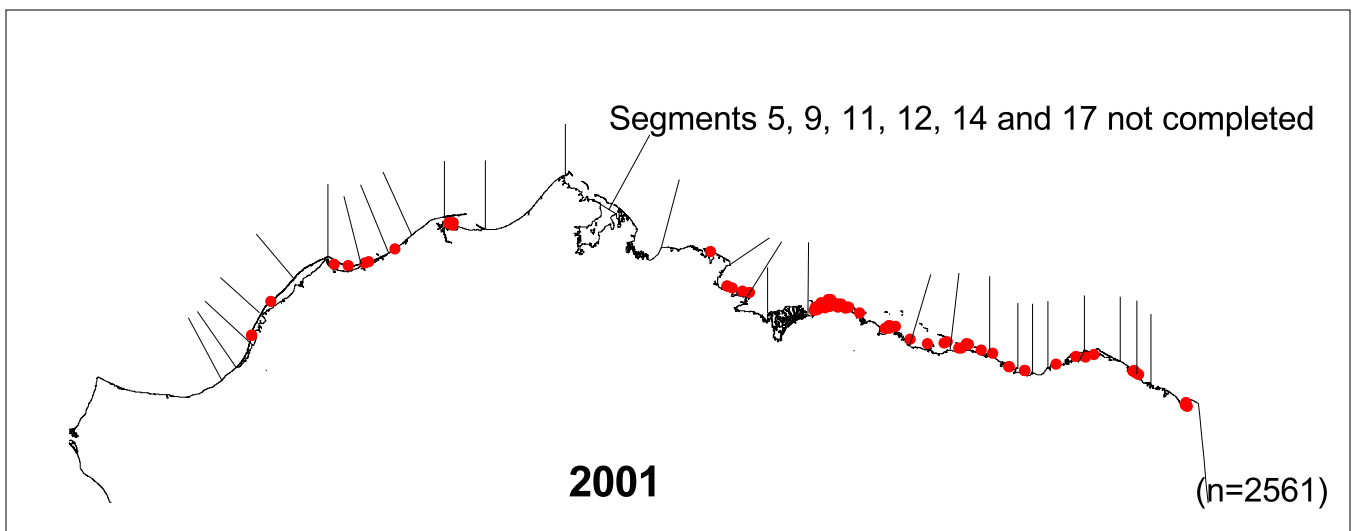
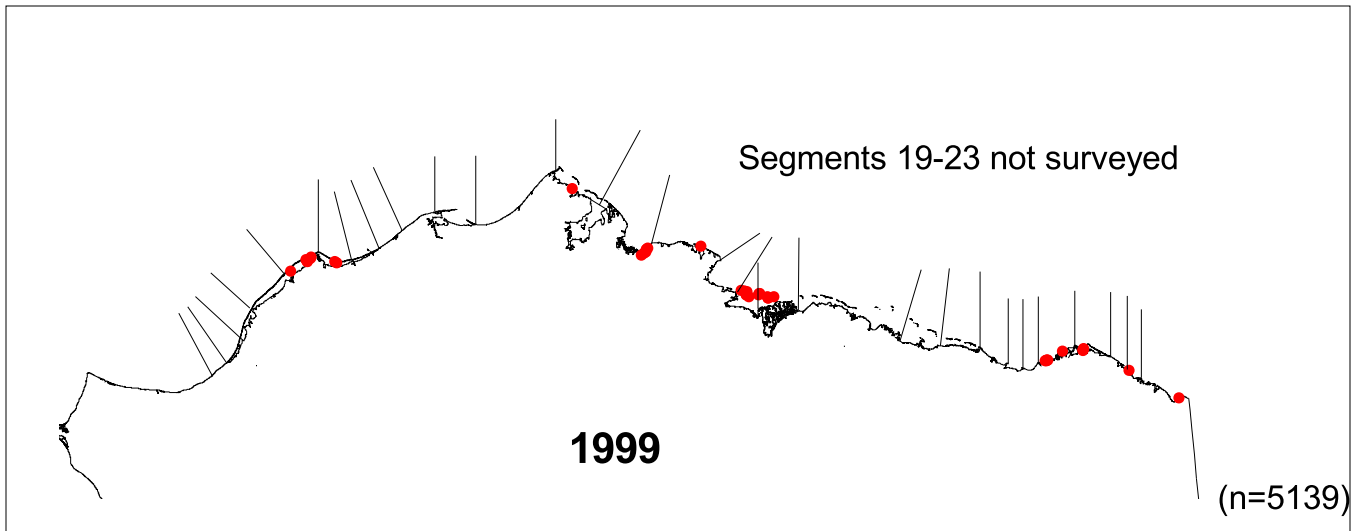
# KING EIDER OBSERVATIONS



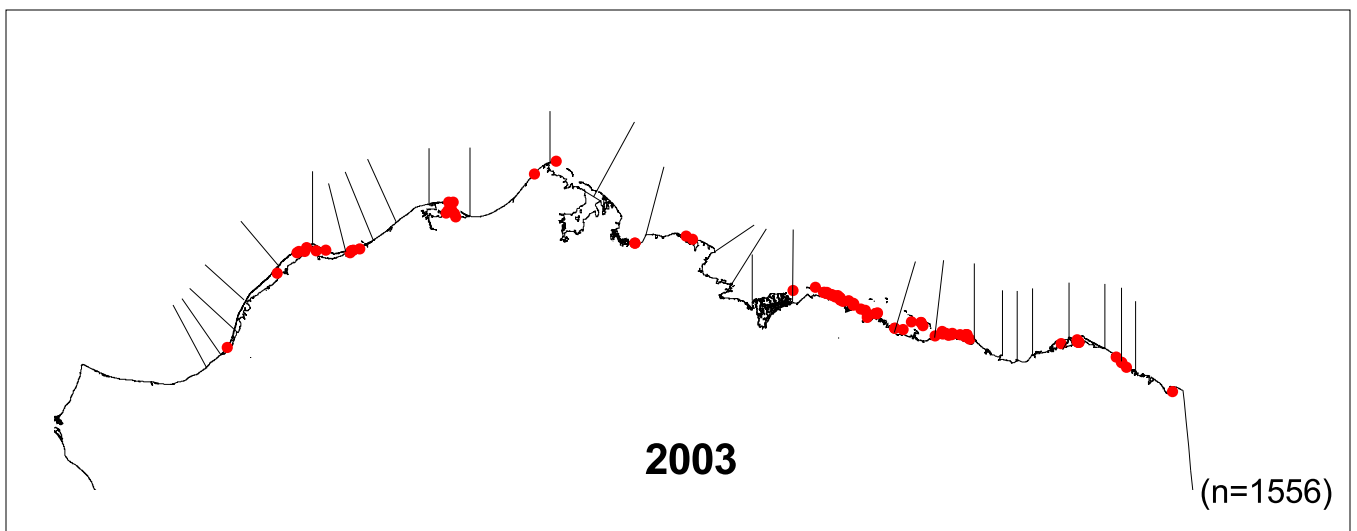
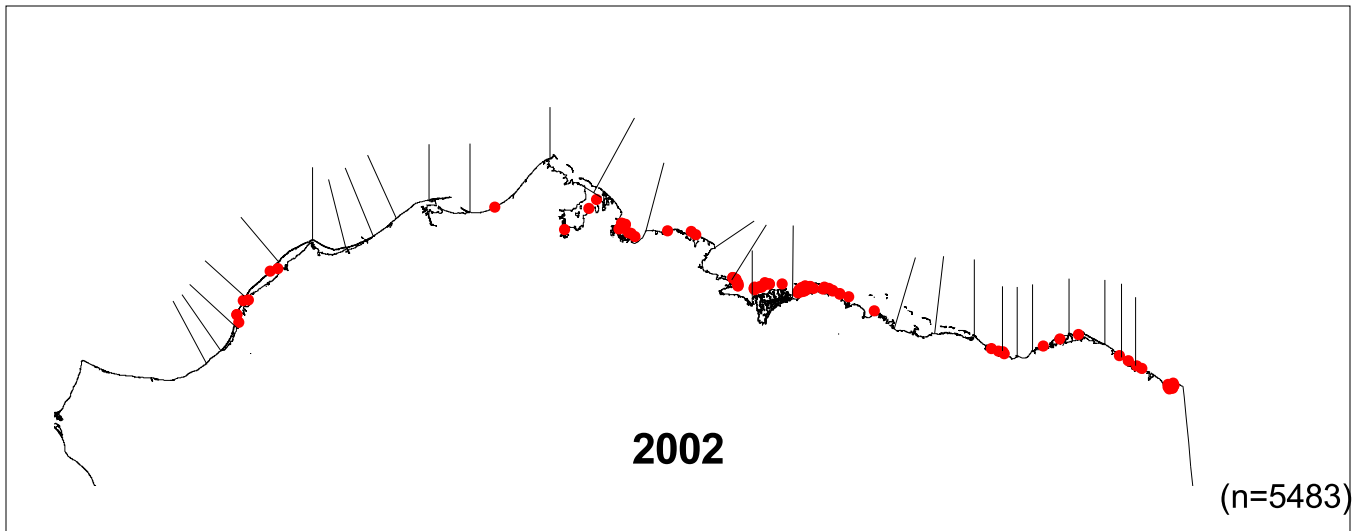
# KING EIDER OBSERVATIONS



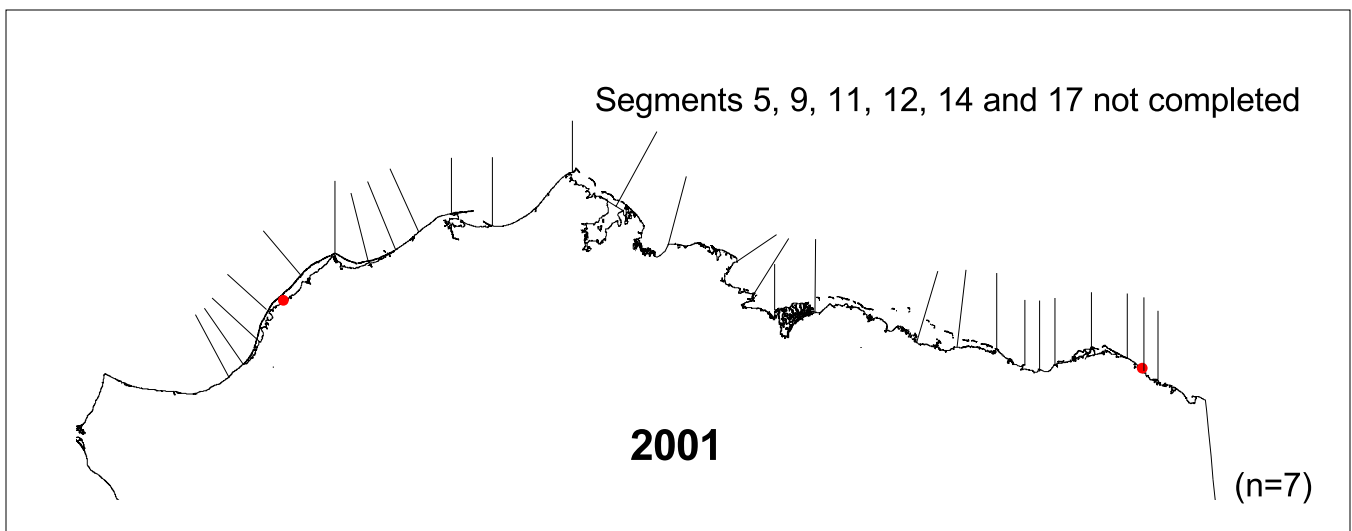
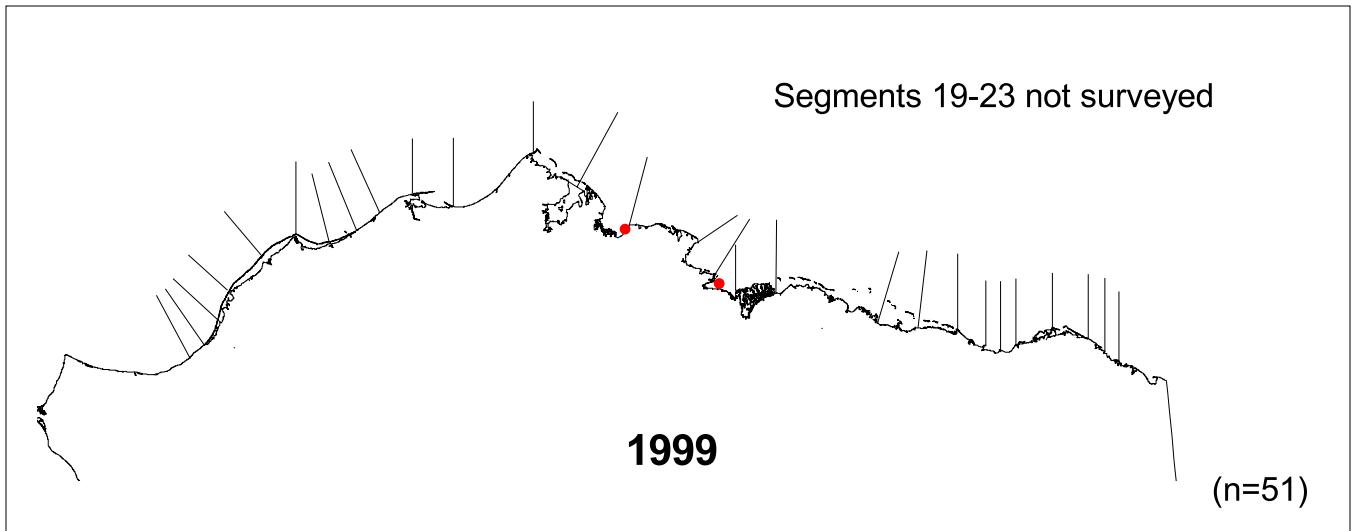
# SURF SCOTER OBSERVATIONS



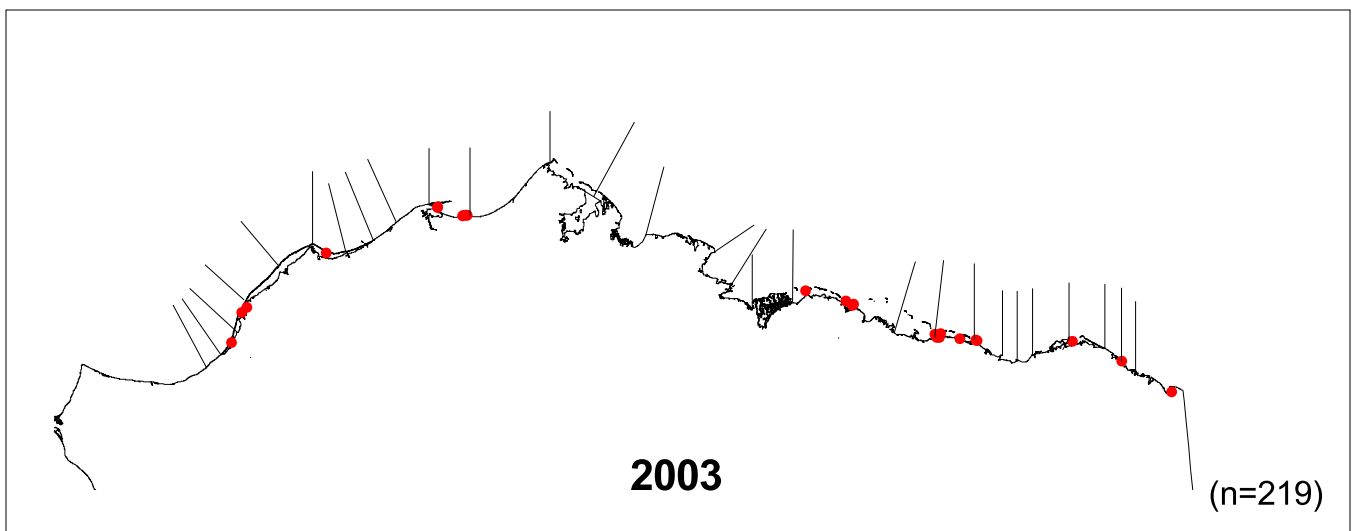
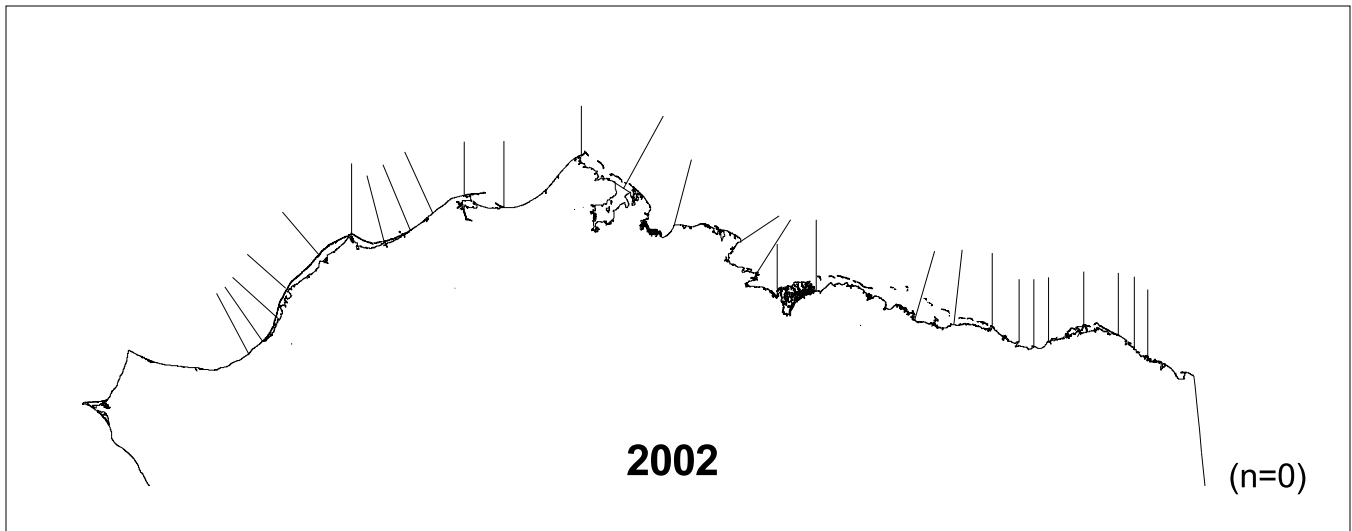
# SURF SCOTER OBSERVATIONS



# BLACK SCOTER OBSERVATIONS

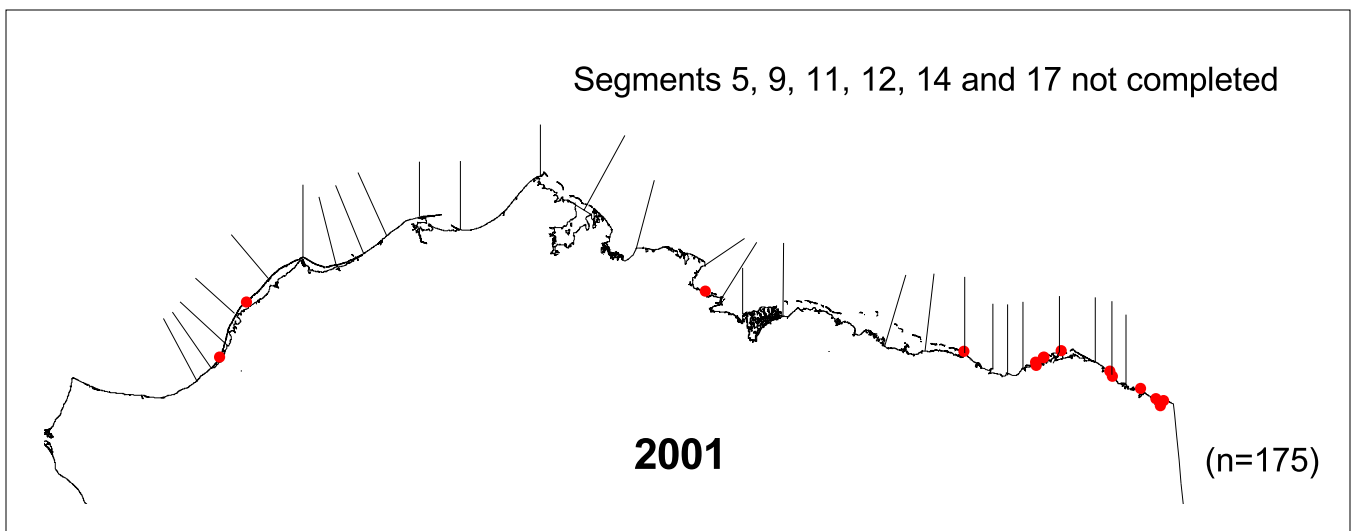
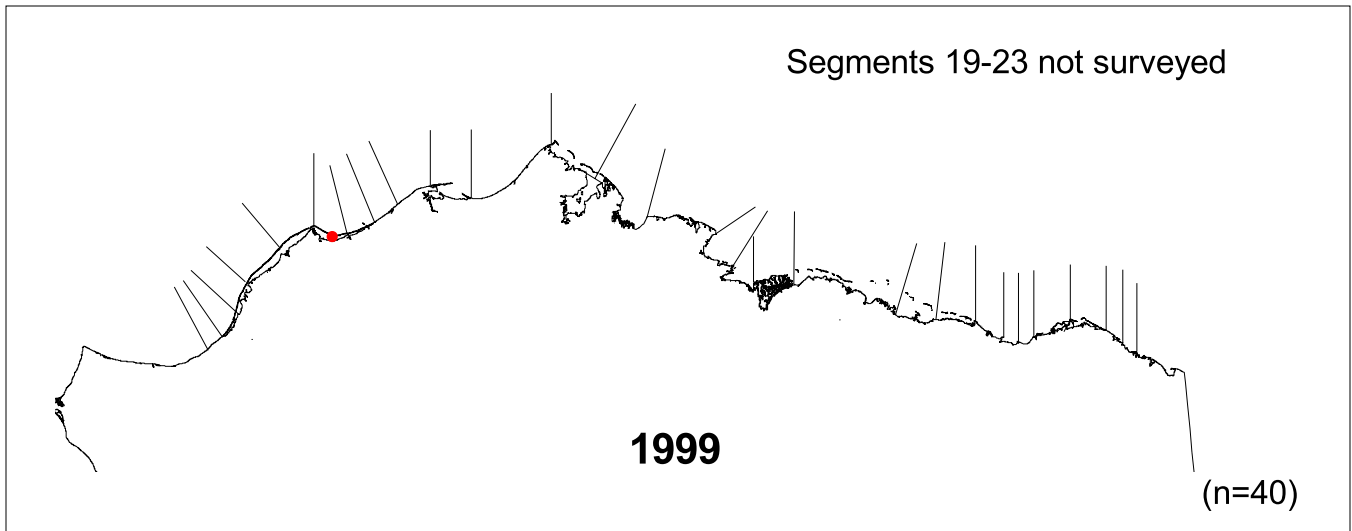


# BLACK SCOTER OBSERVATIONS

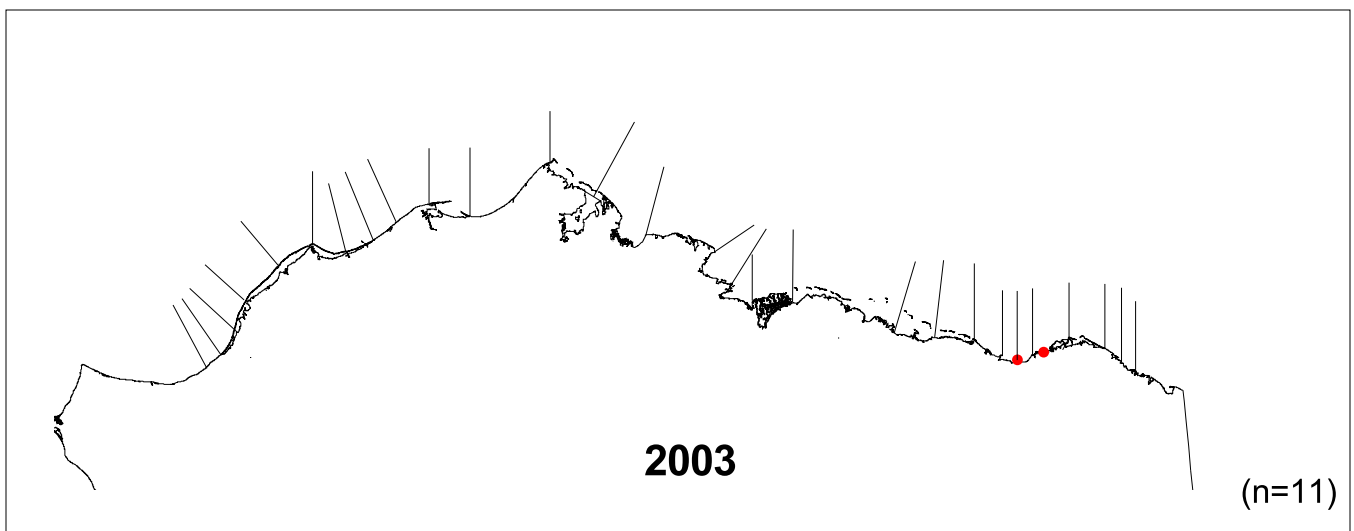
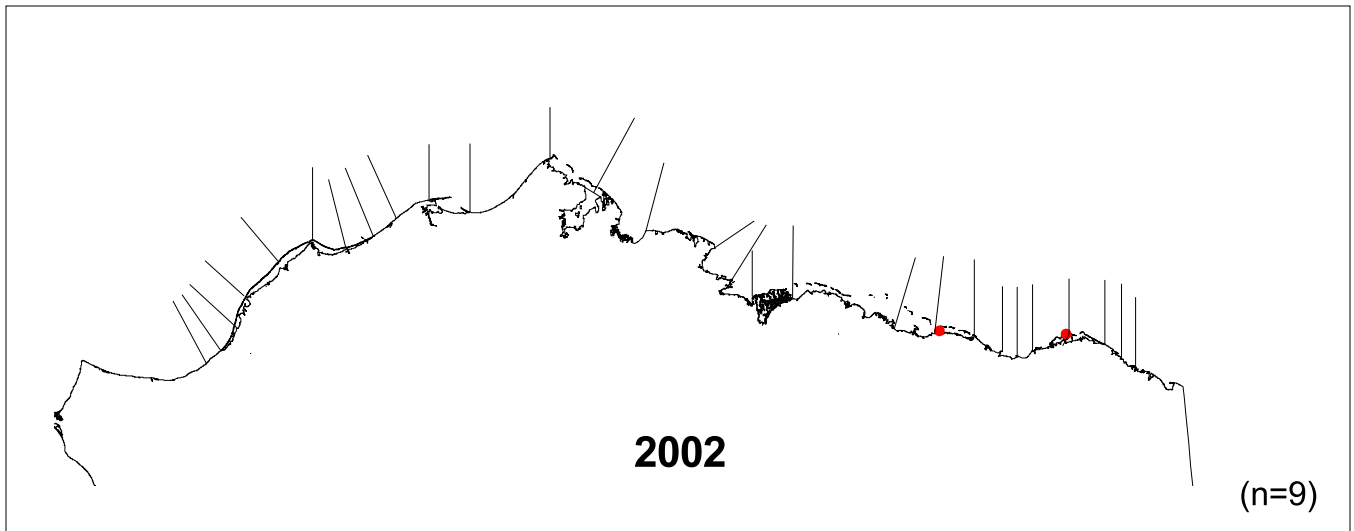




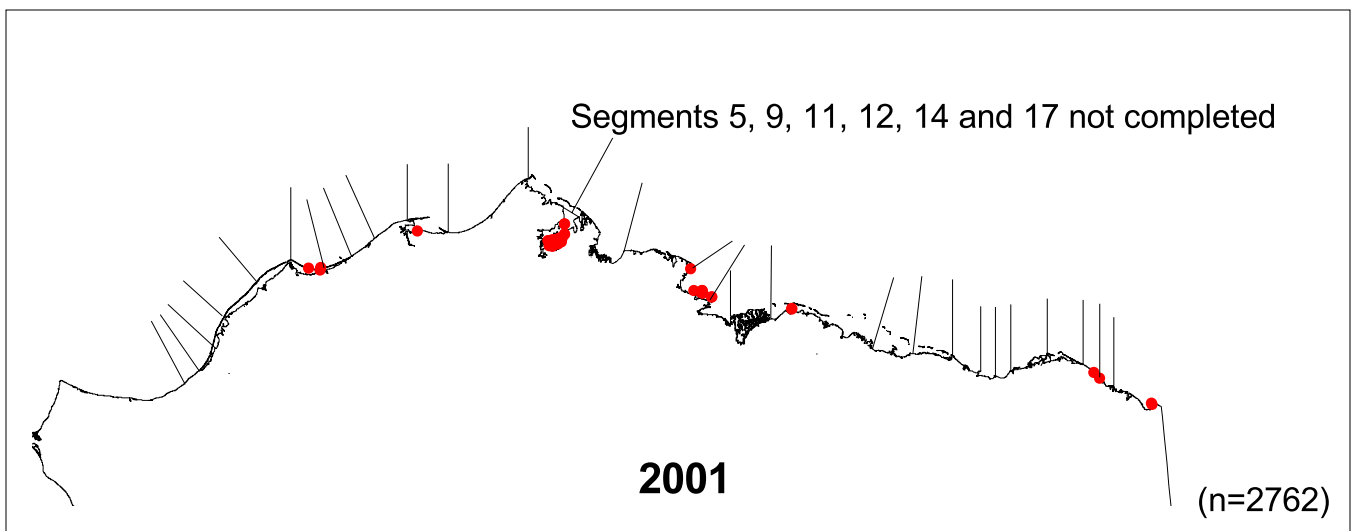
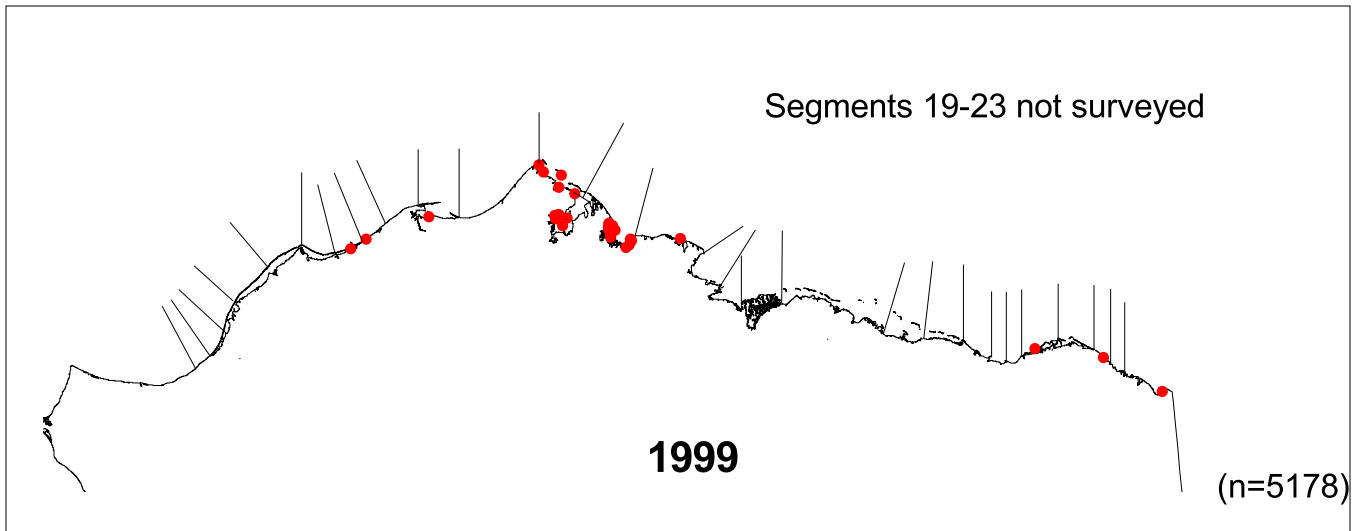
# WHITE-WINGED SCOTER OBSERVATIONS



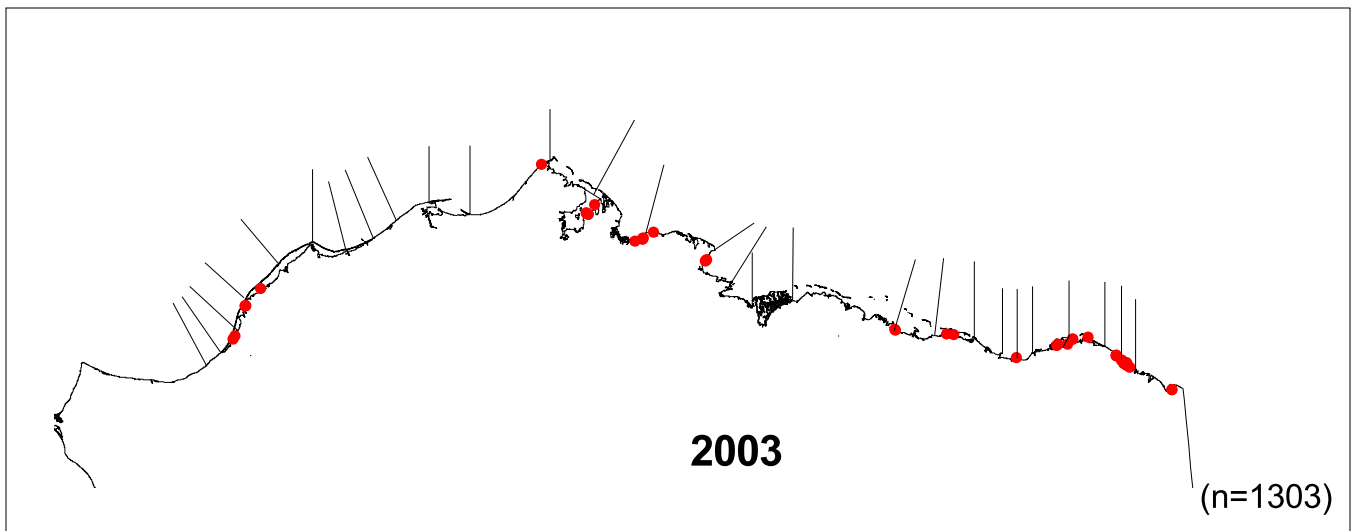
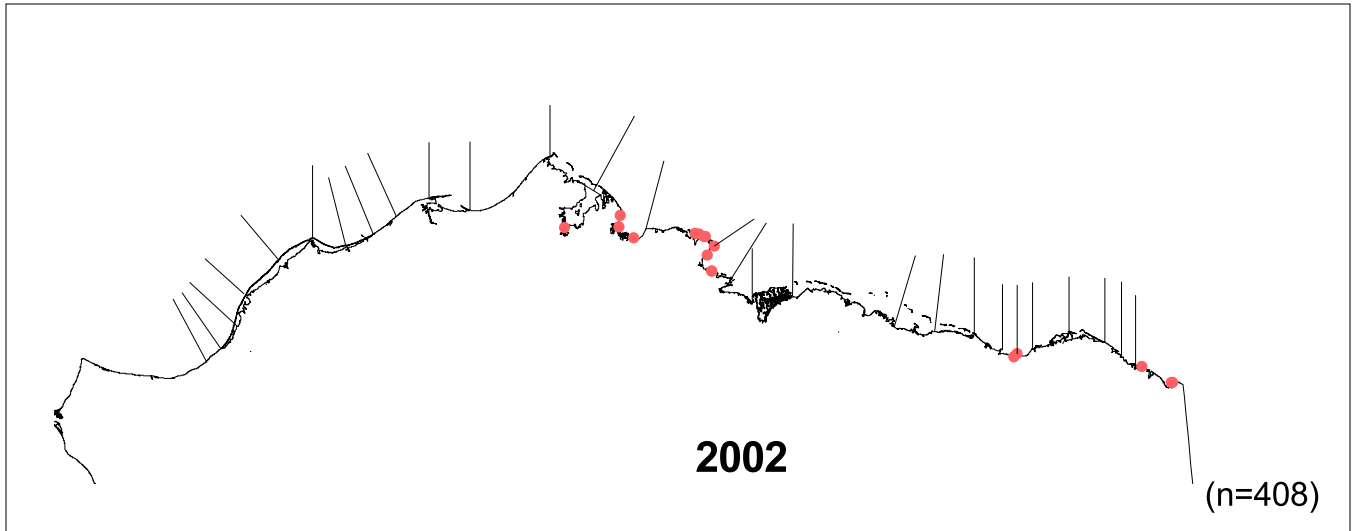
# WHITE-WINGED SCOTER OBSERVATIONS



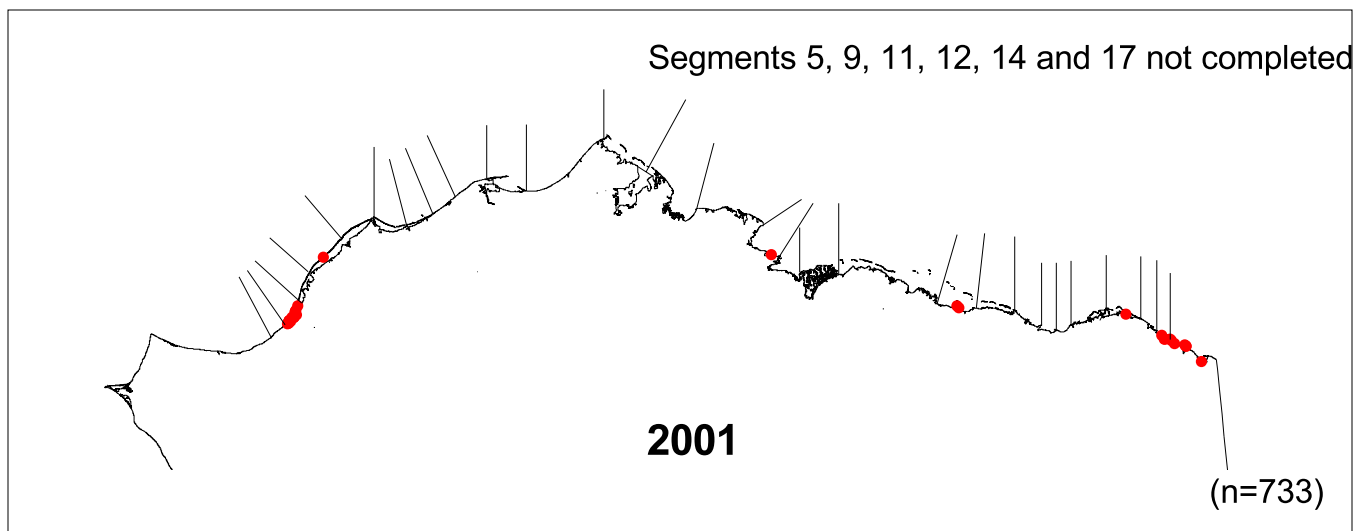
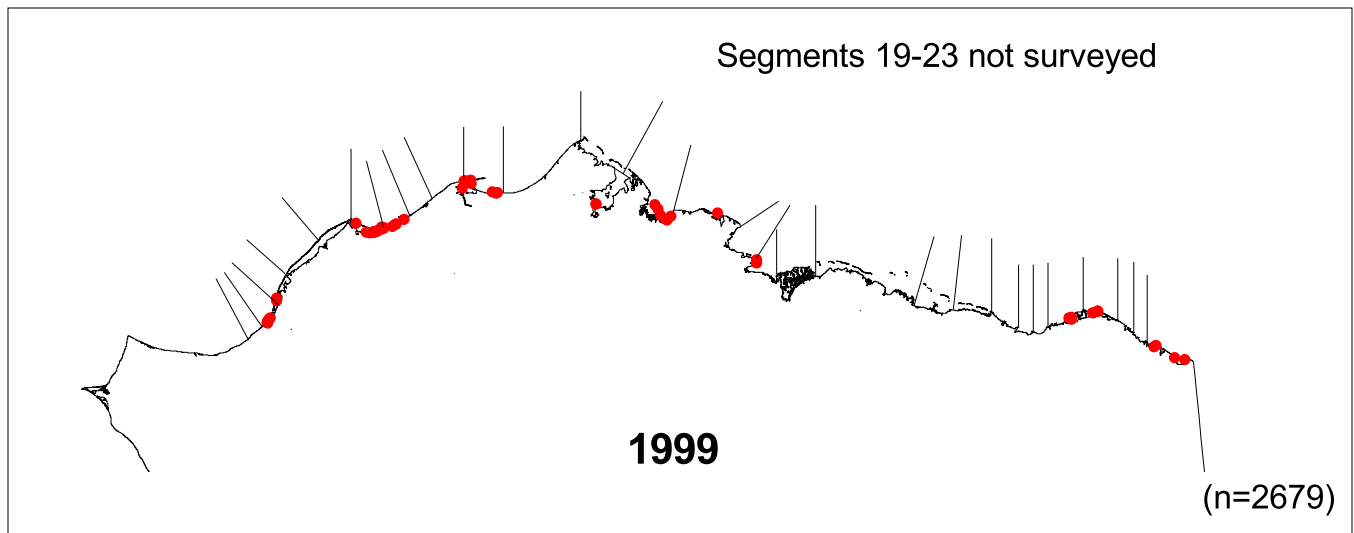
# SCAUP OBSERVATIONS



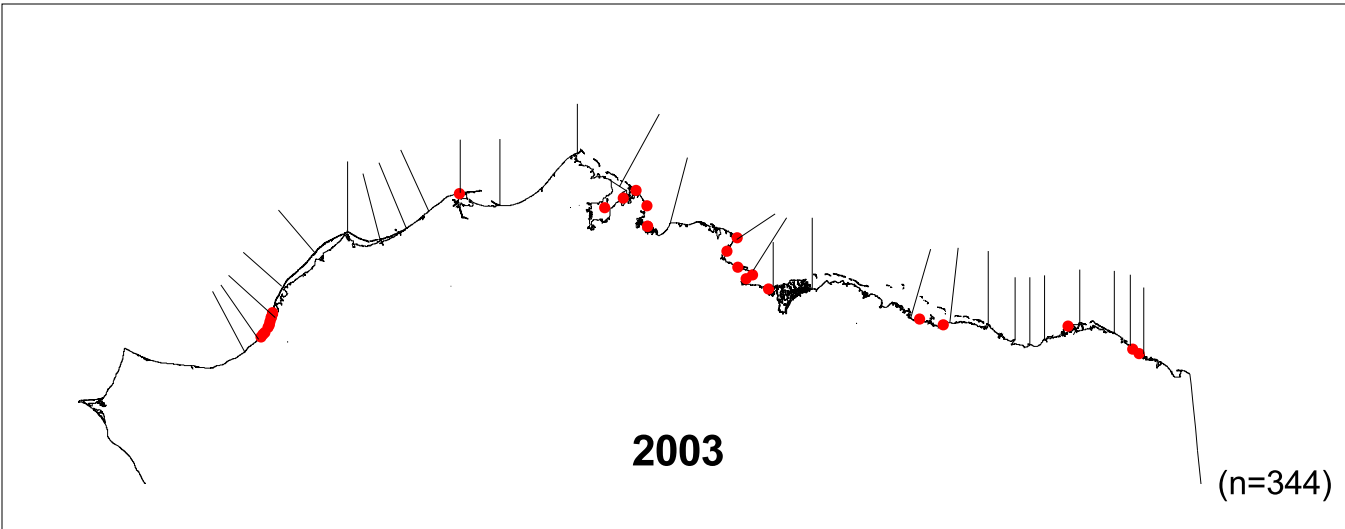
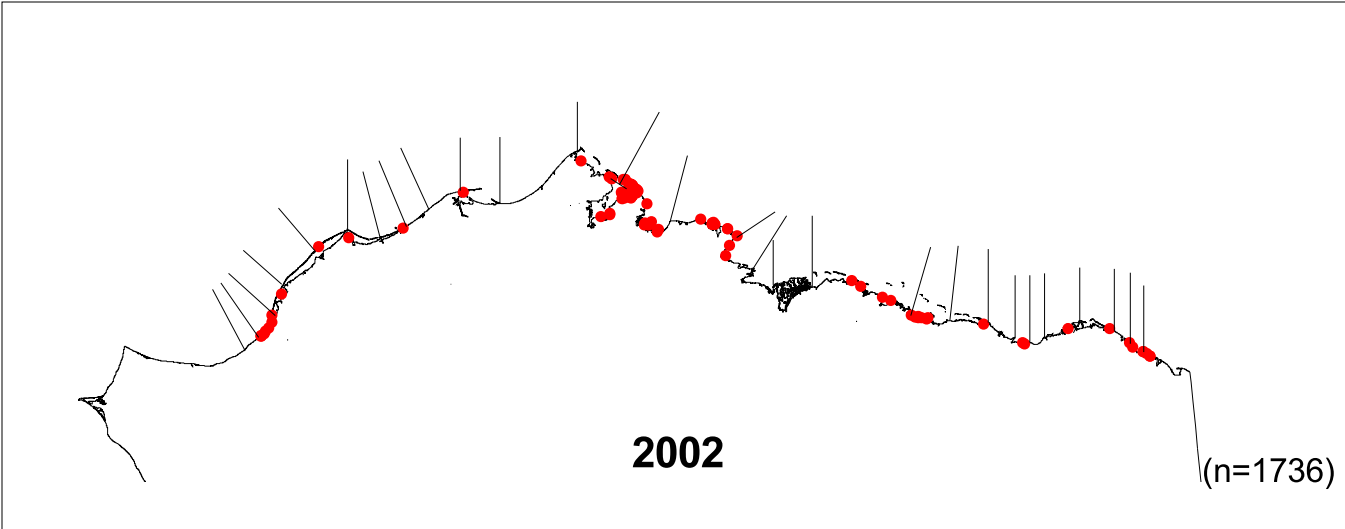
# SCAUP OBSERVATIONS



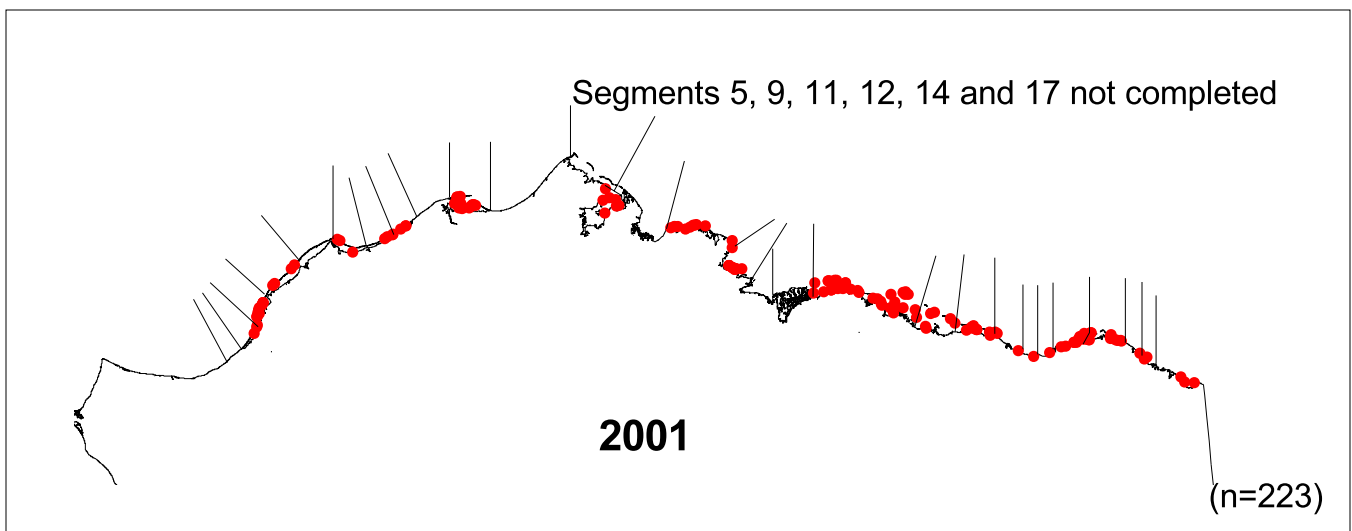
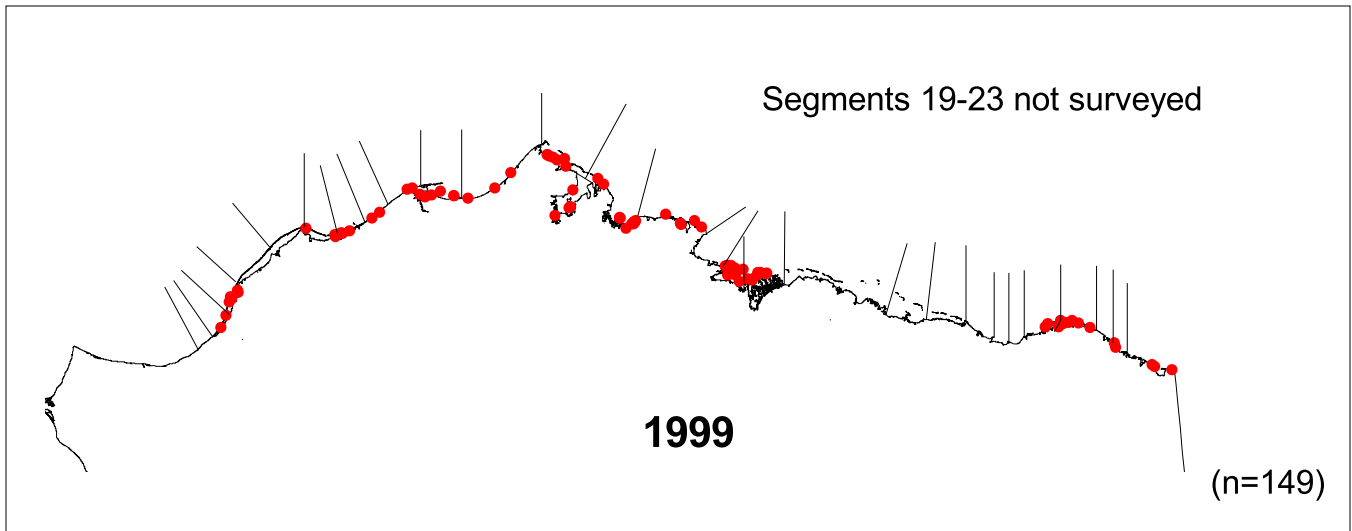
# NORTHERN PINTAIL OBSERVATIONS



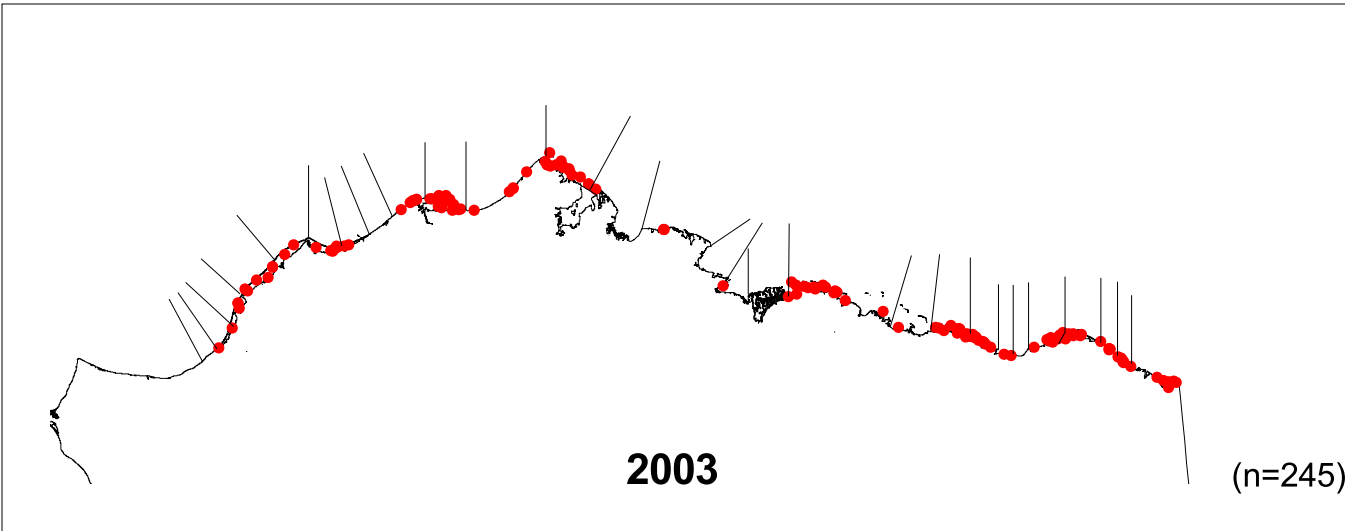
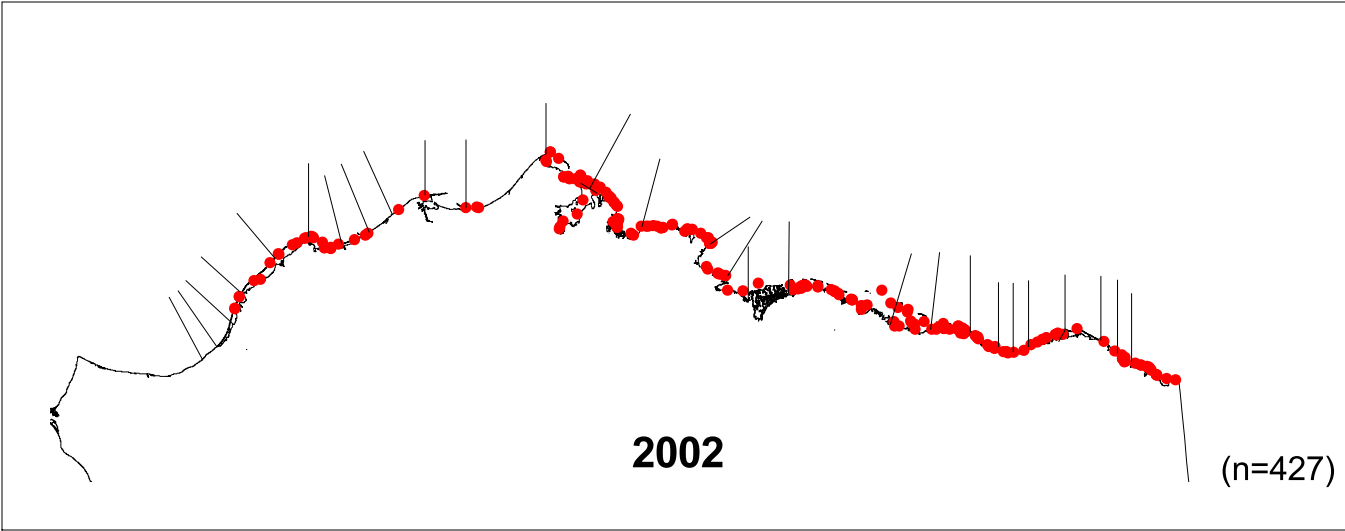
# NORTHERN PINTAIL OBSERVATIONS



# PACIFIC LOON OBSERVATIONS

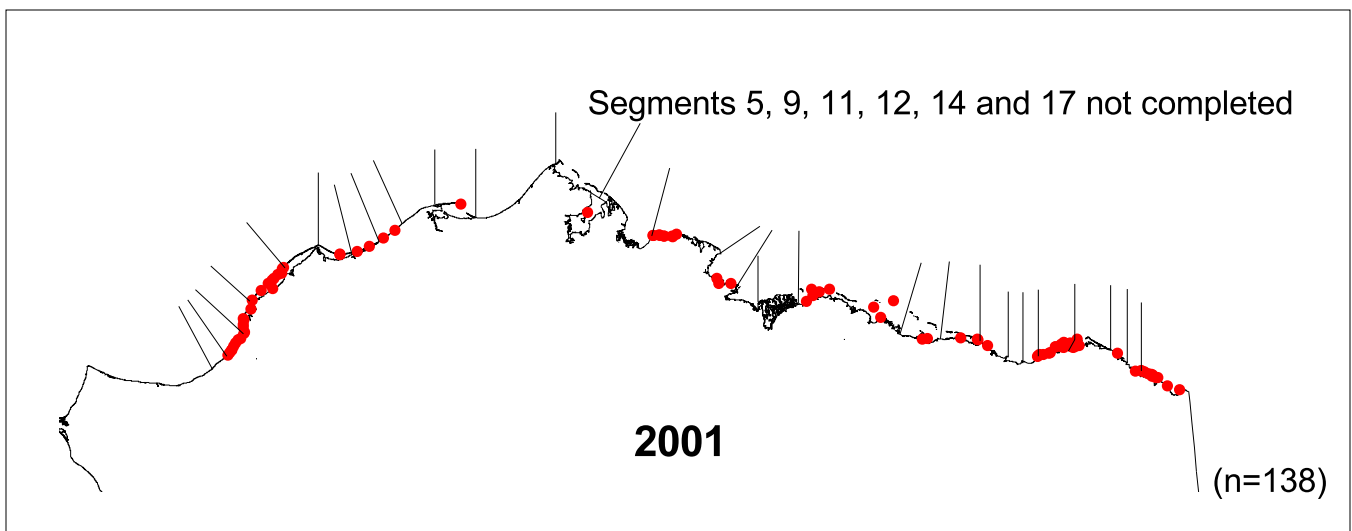
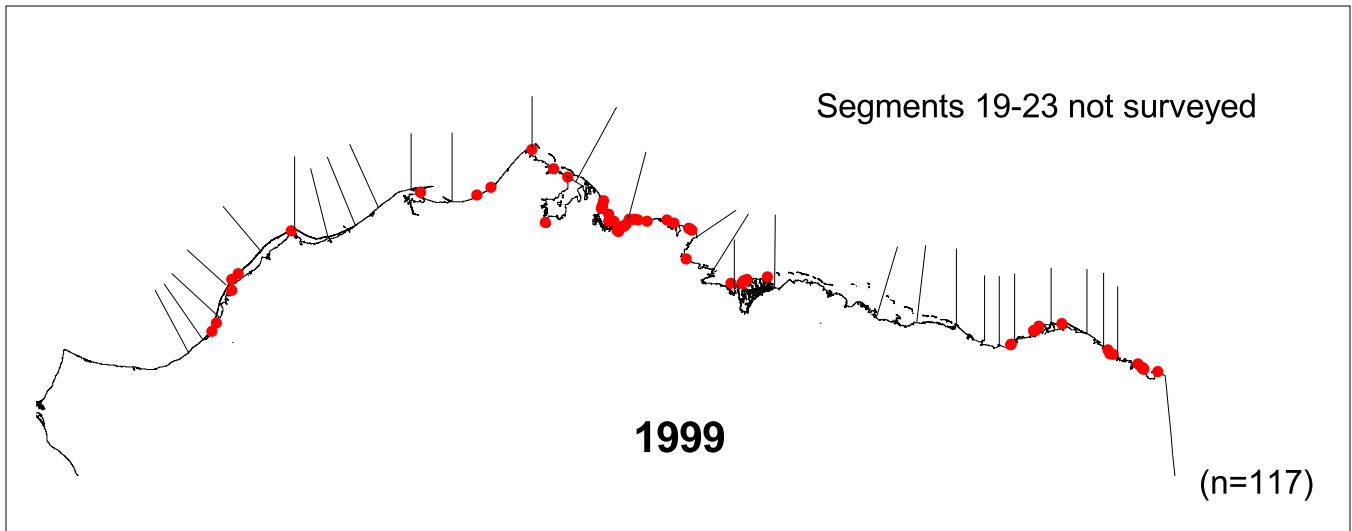


# PACIFIC LOON OBSERVATIONS

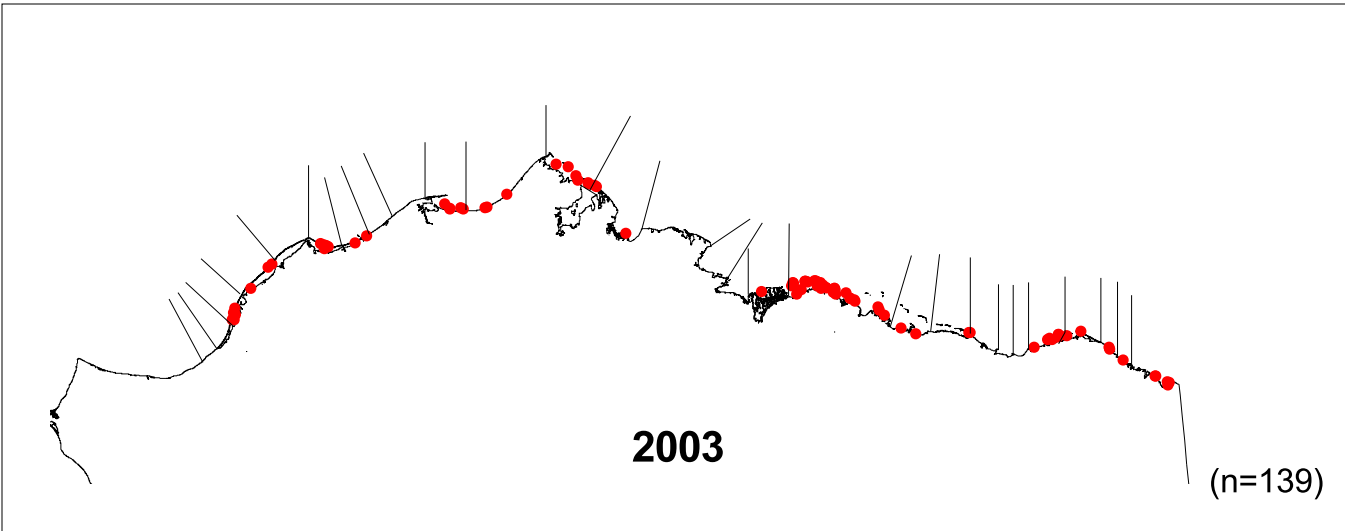
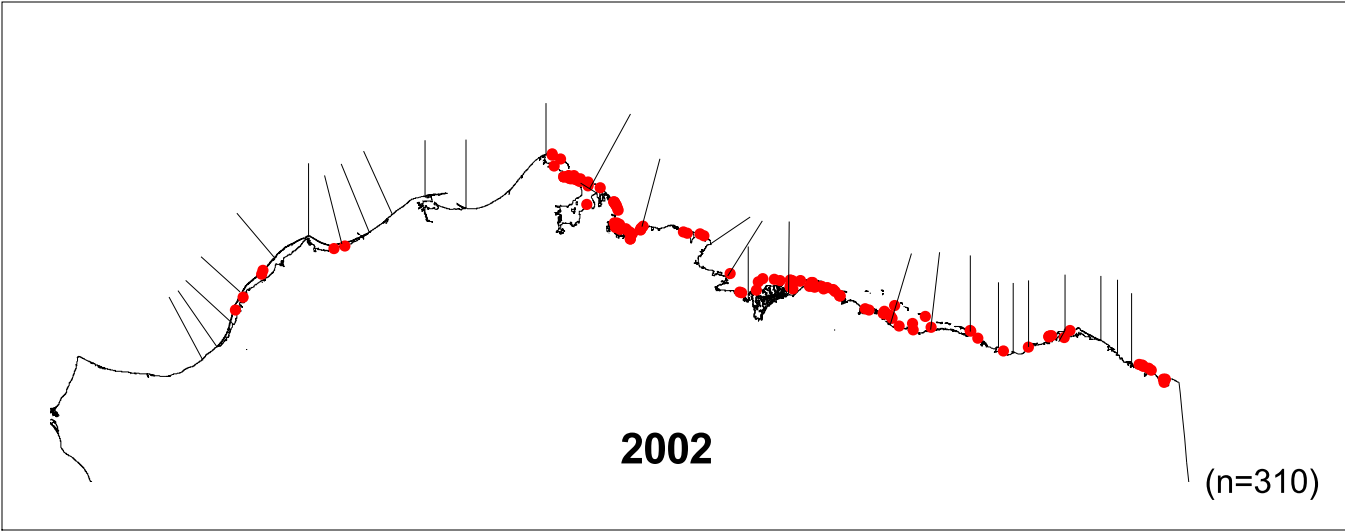




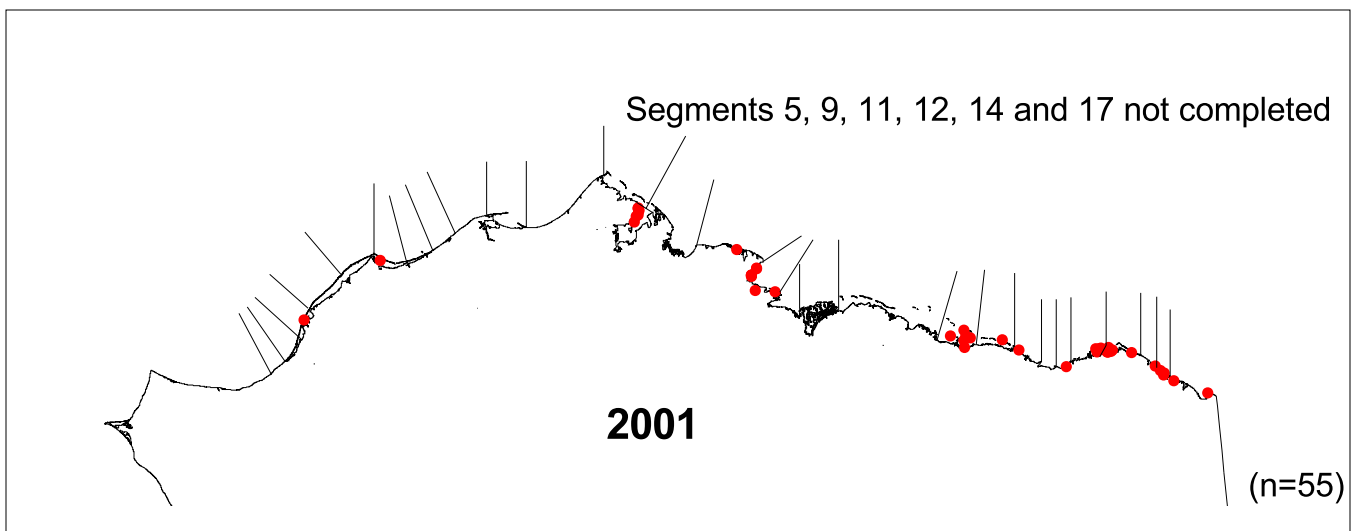
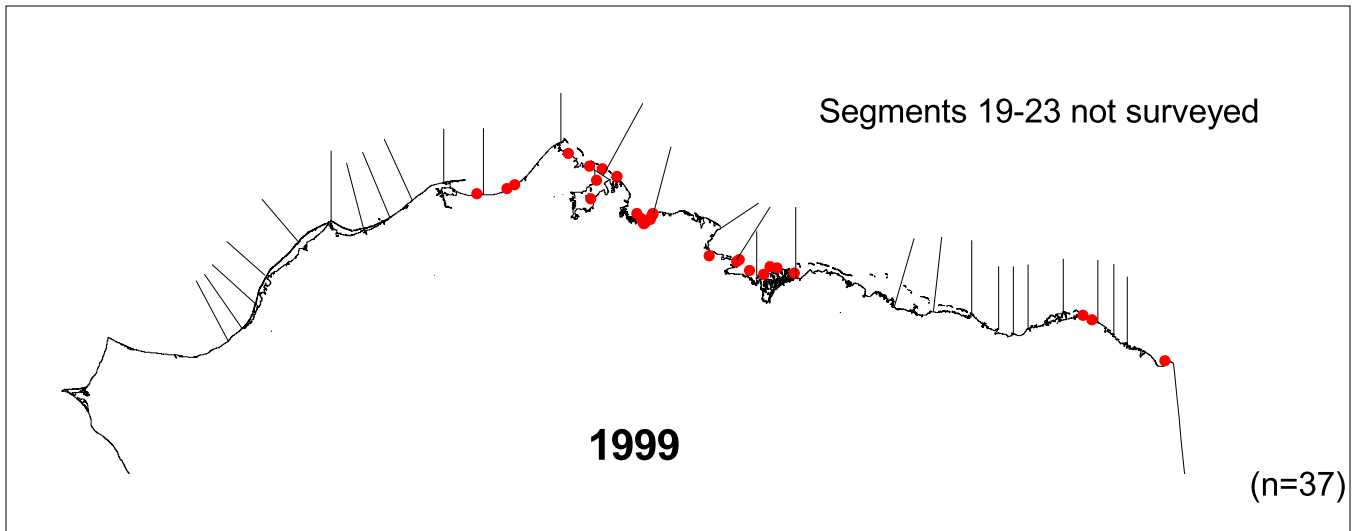
# RED-THROATED LOON OBSERVATIONS



# RED-THROATED LOON OBSERVATIONS



# YELLOW-BILLED LOON OBSERVATIONS



# YELLOW-BILLED LOON OBSERVATIONS

