

**Annual Report to SeaGrant**  
**Agreement No. R/MPA-6B 09-015**

**Baseline Characterization of Newly Established Marine Protected Areas Within the  
North Central California Study Region - Seabird Colony and Foraging Studies**

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31 March 2011

## Introduction

The U.S Fish and Wildlife Service (USFWS) portion of the North Central Coast Study Region (NCCSR) of California baseline study for seabirds project (co-PI, Gerry McChesney) was conducted cooperatively by USFWS and research associates hired through a cooperative agreement with Humboldt State University (HSU). A total of six seasonal staff were hired to study breeding productivity, breeding population sizes, seabird foraging and human disturbance to seabirds from mid-April to mid-September at the following seabird colonies: Point Reyes; Point Resistance; Millers Point Rocks; Double Point Rocks; and Devil's Slide Rock & Mainland (Figures 1-4). This report summarizes accomplishments made during the 2010 season, provides preliminary results from our efforts (see attached figures and tables), and provides timelines for work remaining. A separate report from co-Principal Investigator Dan Robinette describes accomplishments by PRBO Conservation Science.

## Seabird Productivity

Productivity, measured as the numbers of chicks fledged per breeding pair, was determined for the following species: Common Murre, *Uria aalge* (Table 1); Brandt's Cormorant, *Phalacrocorax penicillatus* (Table 2); Pelagic Cormorant, *Phalacrocorax pelagicus*; Western Gull, *Larus occidentalis*; and Black Oystercatcher, *Haematopus bachmani* (Table 3). Common Murres are monitored within standardized plots at Point Reyes and Devil's Slide Rock and opportunistically on the Devil's Slide mainland. Other species are monitored opportunistically depending on current year nest locations.

For this study, we added productivity monitoring of the Pigeon Guillemot (*Cephus columba*) at Point Reyes. This species is more difficult to study because they nest mostly in inaccessible crevices under rocks and in cliffs. In 2010, we worked with Point Reyes National Seashore staff and engineers from Winzler & Kelly in February and March 2010 to design nest boxes similar to those used by this species at other locations (Figure 5). In April 2010, 20 nest boxes were installed at the "Fish Dock" at Drakes Bay where a small colony nests on cross piles underneath the dock. Only one box was used in 2010 (Figure 6); one egg was seen, but it did not hatch. Three additional guillemot breeding sites under the dock that were not in nest boxes also were monitored; three chicks hatched (from two sites), and one fledged. Box usage may have been low because boxes were installed just before the breeding season after birds had begun to arrive. It also may take more time for birds to discover boxes as breeding sites. We are hoping that since the boxes have been available all winter and during the pre-breeding season, more birds will use them in 2011.

## Seabird Breeding Population Sizes

To assess relative breeding population sizes, land-based nest and/or bird counts of Brandt's Cormorants, Pelagic Cormorants, Black Oystercatchers, Western Gulls, and Pigeon Guillemots were conducted weekly during the breeding season (Table 4). To provide more complete colony coverage, nest and bird surveys from mainland vantage points were augmented with boat surveys conducted at Devil's Slide Rock and Mainland on 6 June and Point Reyes and Drakes Bay colonies on 8 July.

A planned survey of all other nearshore seabird colonies in the NCCSR was postponed until 2011 because of unfavorable El Niño conditions and a delayed breeding season. However, on 6 June 2010, all colonies between Mussel Point and Pillar Point Harbor in San Mateo County were surveyed. Counts from these sample colonies, in addition to others mentioned above, will be used for comparison to 2011 surveys.

### Seabird Foraging

In spring 2010, we worked with seabird project co-Principal Investigator Dan Robinette of PRBO Conservation Science to develop protocols for monitoring seabird foraging in standardized zones both within and outside MPAs at Point Reyes and Millers Point Rocks, . Please refer to separate report submitted by Dan Robinette for progress on foraging monitoring and data collected at other seabird colonies.

### Boat Disturbance

Prior to the seabird breeding season, protocols were revised for monitoring boat approaches and disturbances at seabird colonies to include a zone for newly-established Special Closures at Point Reyes Headlands, Point Resistance, Stormy Stack, and Devil's Slide Rock (Table 5). Additionally, previous disturbance data (2001-2009) were compiled to be included for our baseline assessment (Figure 7).

All boats and other watercraft observed approaching within 1,500 feet (457 m) of a study colony were recorded along with associated disturbance events affecting murre and other seabirds. Numbers of disturbance events and numbers of disturbance events per observation hour are reported for comparisons between colonies and years (Tables 6, 7).

### Other objectives stated in original proposal that were not met in 2010:

- Observations on guillemot diet were not possible due to viewing conditions. Chick provisioning was not observed in 2010. Attempts will be made to obtain diet data in 2011.
- Regurgitations from cormorant colonies were not collected due to logistical constraints of safely accessing active colonies following the breeding season.

### Work remaining:

- Purchasing of additional field equipment needed for 2011 data collection.
- Colony monitoring and foraging surveys will be conducted again during the 2011 breeding season, beginning in mid-April.
- Survey of all nearshore colonies in the NCCSR is scheduled for 6-17 June 2011.
- Data entry, proofing, and preliminary analyses from August 2011 to October 2011.
- Analyses and write-up of final report during 2012 and early 2013. This will include compilation of special closure violations at the South Farallon Islands.

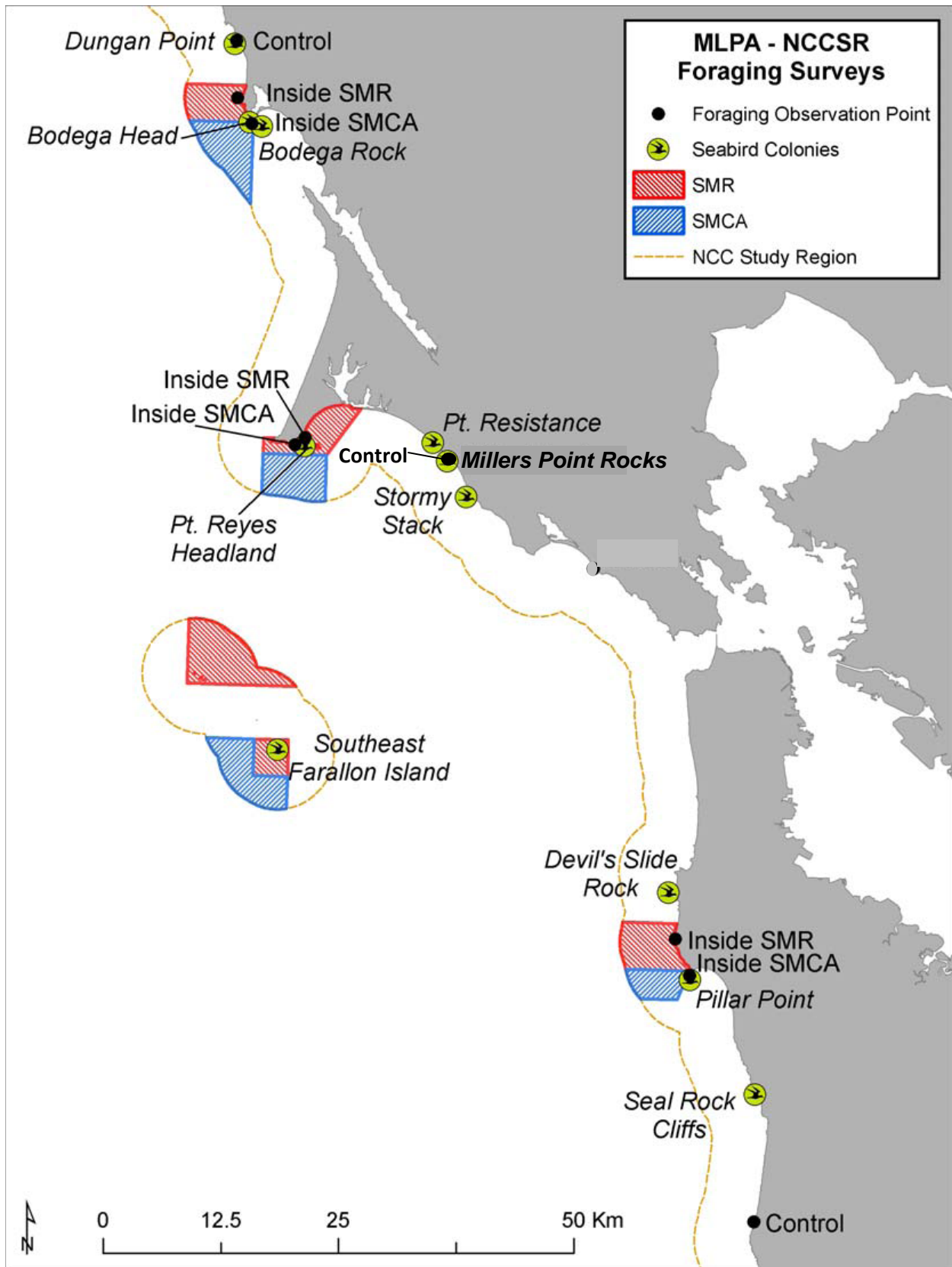


Figure 1. Seabird colonies and foraging observation points monitored in 2010.

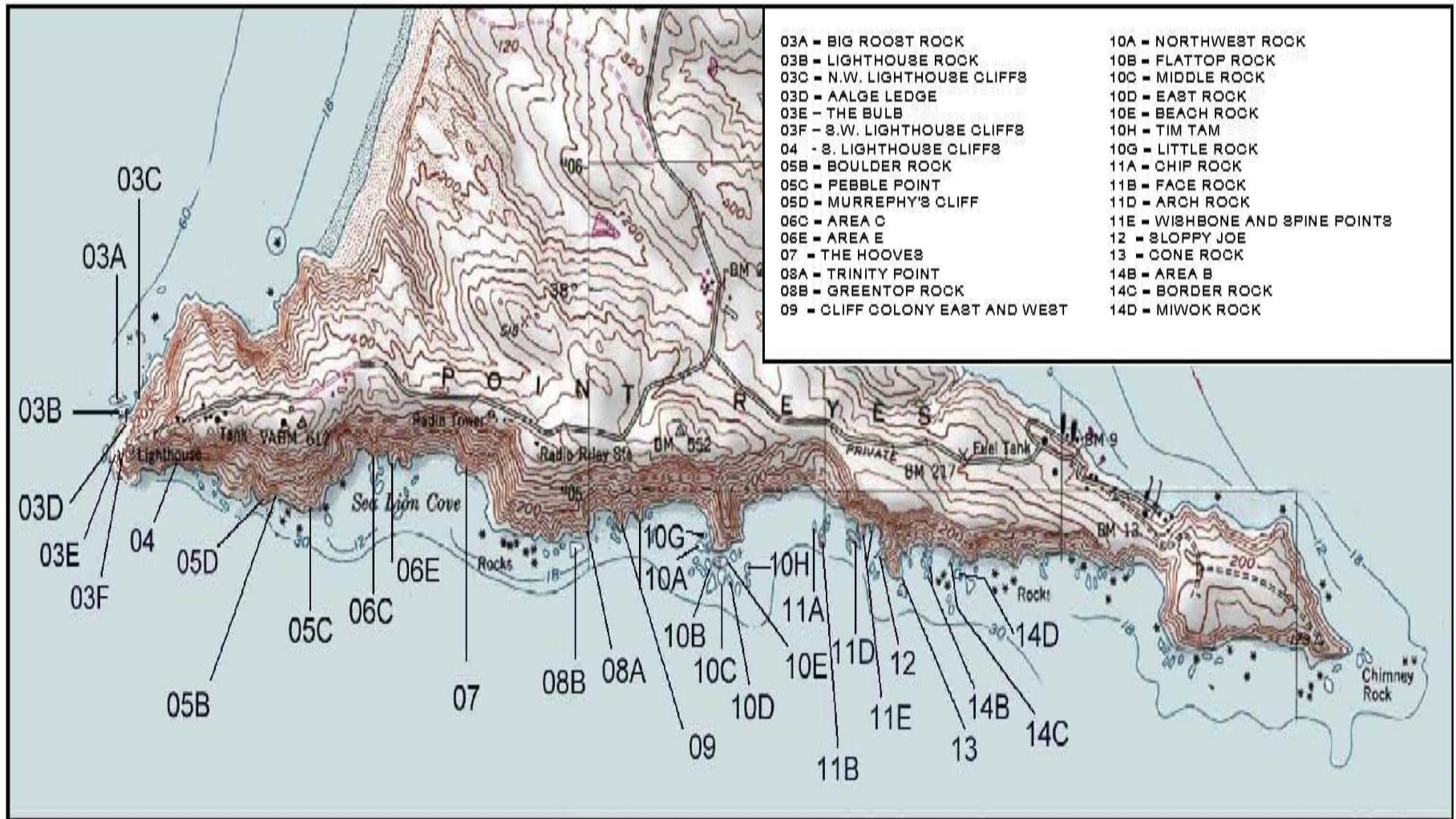


Figure 2. Map of Point Reyes (Headlands), including seabird subcolonies.

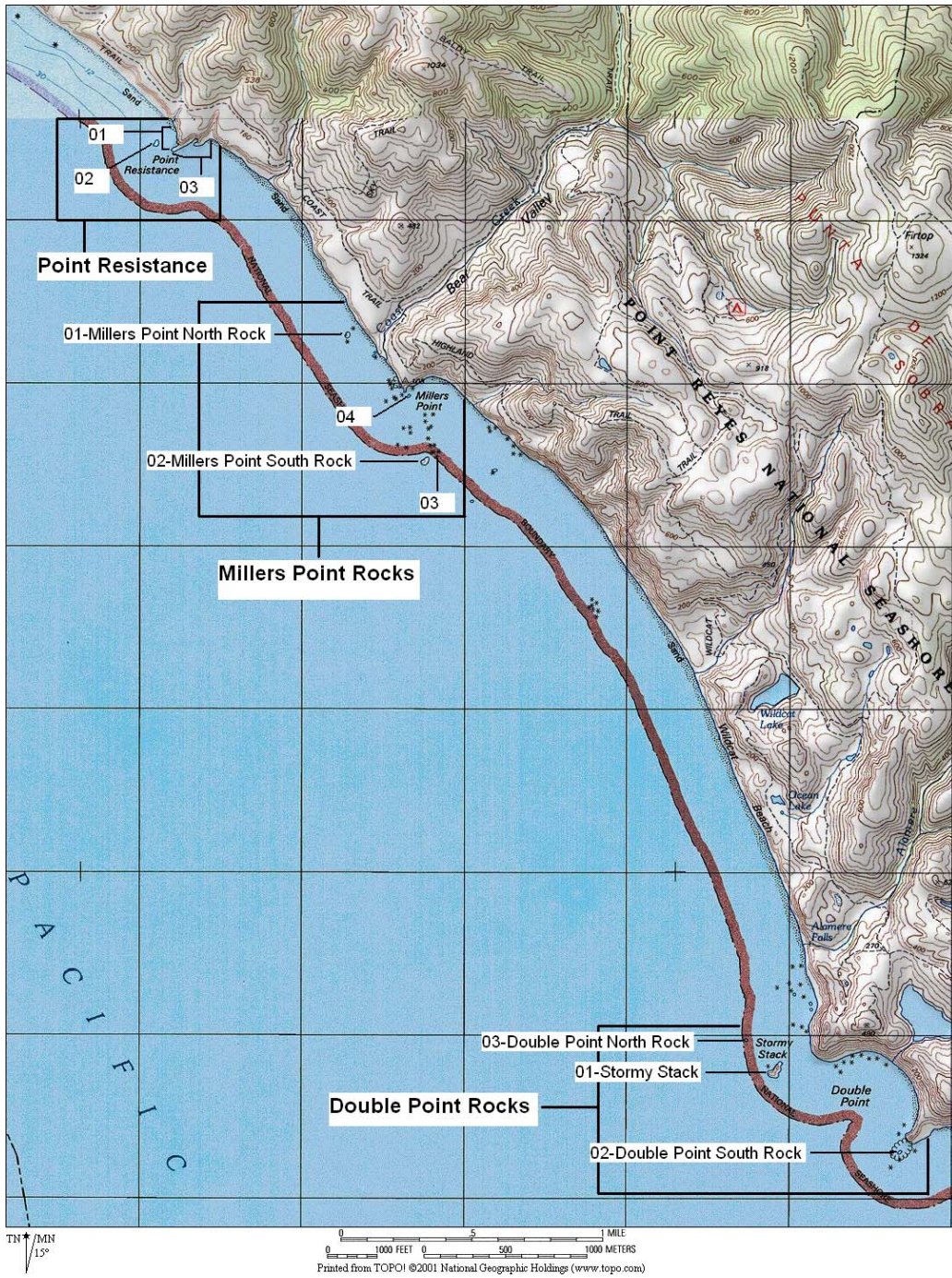


Figure 3. Map of Drakes Bay Colony Complex, including Point Resistance, Millers Point Rocks and Double Point Rocks colonies and subcolonies.

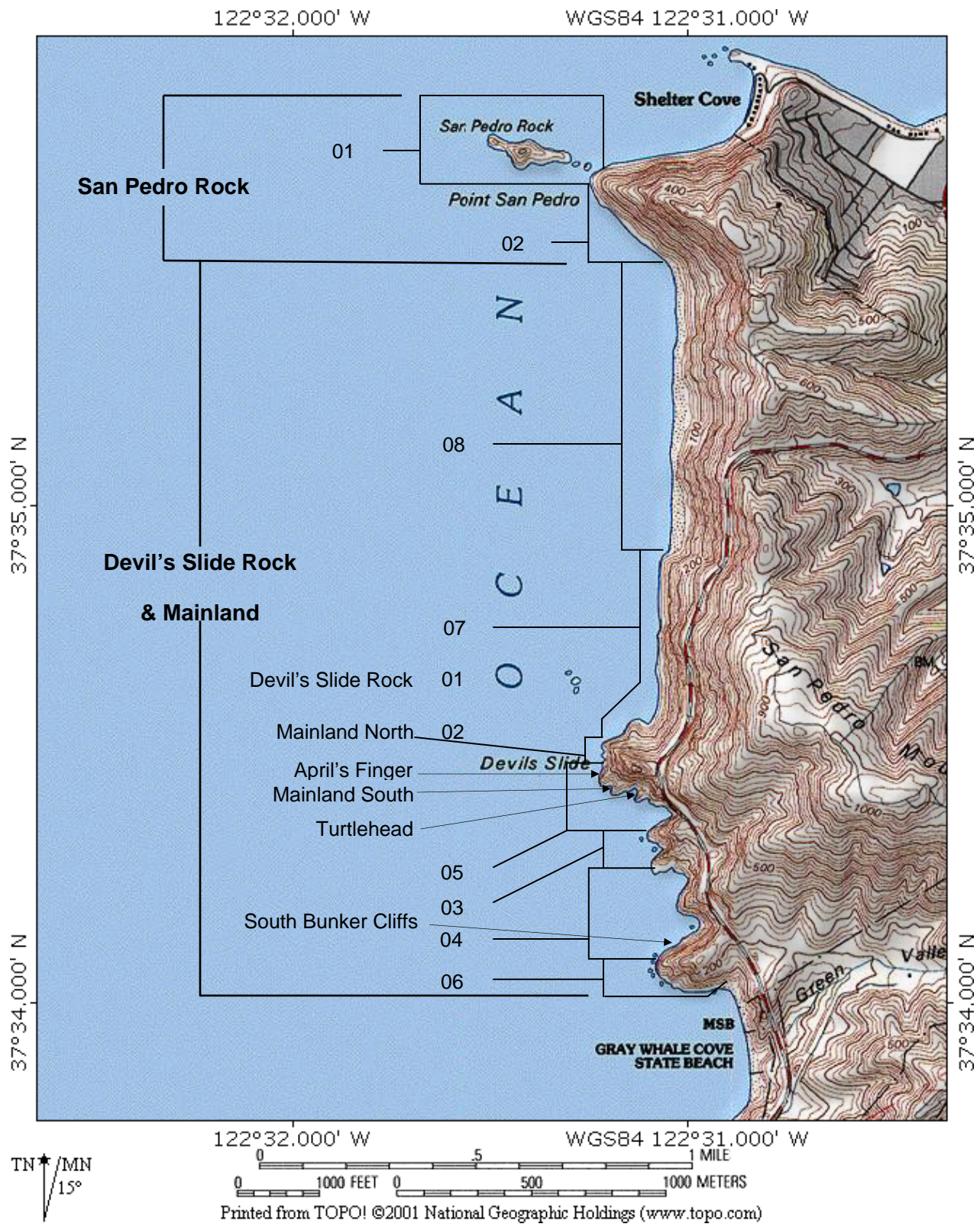


Figure 4. Map of Devil's Slide Colony Complex, including San Pedro Rock and Devil's Slide Rock & Mainland colonies and subcolonies.

Table 1. Common Murre breeding phenology and reproductive success at Point Reyes (2 plots and combined), Devil's Slide Rock & Mainland (DSR, 3 plots; DSM; and combined), and Castle Rocks & Mainland (2 plots), 2010. Means (range; n) are reported.

Colony/Plot	No. Sites Monitored	No. Egg Laying Sites	Mean Lay Date <sup>1</sup>	No. Eggs Laid	Mean Hatch Date	Hatching Success <sup>2</sup>	Mean Fledge Date	Fledging Success <sup>3</sup>	Chicks Fledged per Pair
<b>Point Reyes (PRH)</b>									
PRH-Ledge	89	72	2 June (5/22-6/25;63)	75	4 July (6/22-7/26; 50)	72.0% (75)	29 July (7/17-8/20; 51)	96.3% (54)	0.72 (72)
PRH-Edge	72	61	30 May (5/19-6/14;49)	61	1 July (6/20-7/18; 42)	78.0% (59)	25 July (7/13-8/11; 45)	97.8% (46)	0.74 (61)
<b>PRH- (combined)</b>	161	133	1 June (5/19-6/25;112)	136	3 July (6/20-7/26; 92)	74.6% (134)	27 July (7/13-8/20; 96)	97.0% (100)	0.73 (133)
<b>Devil's Slide Rock and Mainland (DSRM)</b>									
DSR-A	87	81	4 June (5/11-6/25;70)	86	7 July (6/26-7/26;61)	82.6% (86)	31 July (7/17-8/15;70)	98.6% (71)	0.86 (81)
DSR-B	79	66	1 June (5/22-6/20;59)	68	3 July (6/26-7/22;59)	88.2% (68)	28 July (7/17-8/14;56)	93.3% (60)	0.85 (66)
DSR-C	10	0	-	0	-	0.0% (0)	-	0.0% (0)	0.0 (0)
<b>DSR (combined)</b>	176	147	3 June (5/11-6/25;129)	154	5 July (6/26-7/26;120)	85.1% (154)	30 July (7/17-8/15;126)	96.2% (131)	0.86 (147)
DSM	108	42	6 June (5/26-7/7;33)	42	8 July (6/30-7/13;21)	50.0% (42)	31 July (7/23-8/4;19)	90.5% (21)	0.45 (42)
<b>DSR, DSM (combined)</b>	284	189	3 June (5/11-7/7;162)	196	5 July (6/26-7/26;141)	77.6% (196)	30 July (7/17-8/15;145)	95.4% (152)	0.77 (189)



Table 2. Brandt's Cormorant breeding phenology and reproductive success at Point Reyes, Devil's Slide Rock & Mainland, and Castle Rocks & Mainland, 2010. Reported are means (range; n).

Colony/ Subcolony	No. Breeding Sites	Clutch Initiation Date <sup>1</sup>	Clutch Size <sup>1</sup>	No. Chicks Hatched/Pair <sup>2</sup>	Hatching Success <sup>2</sup>	Fledging Success <sup>2</sup>	Breeding Success <sup>2</sup>	No. Chicks Fledged/Pair <sup>2</sup>	Breeding Success/ Nest <sup>3</sup>
<b>Point Reyes</b>									
Green Top (PRH-08-B)	57	12 June (5/25-7/9; 28)	2.9 (2-4; 28)	2.17 (0-3; 54)	75.5% (0-100; 155)	87.5% (0-100; 120)	65.1% (0-100; 149)	1.91 (0-3; 55)	0.98 (55)
Ocho Ledge (PRH-08-C)	22	28 June (6/11-7/9; 8)	2.6 (2-3;8)	1.86 (0-3; 22)	73.2% (0-100; 56)	57.6% (0-100; 33)	41.3% (0-100; 46)	1.06 (0-3; 18)	0.50 (18)
<b>Total - Point Reyes</b>	79	16 June (5/25-7/9; 36)	2.9 (2-4; 36)	2.08 (0-3; 76)	74.9% (0-100; 211)	81.0% (0-100; 153)	59.5% (0-100; 195)	1.70 (0-3; 73)	0.86 (73)
Point Resistance (PRS-02)	3	23 June (6/22-6/25; 2)	3.0 (3; 1)	2 (2; 1)	66.7% (67; 3)	100% (100; 2)	ND	1.00 (0-2; 2)	0.50 (2)
<b>Devil's Slide Rock &amp; Mainland</b>									
Devil's Slide Rock (DSR-01)	63	2 June (5/10-7/17;60)	2.3 (1-4;61)	1.3 (0-3;68)	55.3% (0-100;161)	78.7% (0-100;89)	43.5% (0-100;161)	1.13 (0-3;62)	0.61 (62)

<sup>1</sup> Includes first clutches only.

<sup>2</sup> Includes replacement clutches.

<sup>3</sup> Breeding success per nest is defined as the proportion of egg-laying nests that fledged at least one chick

Table 3. Productivity of Pelagic Cormorants, Black Oystercatchers, and Western Gulls at Castle Rocks & Mainland, Devil's Slide Rock & Mainland, and Point Reyes in 2010. Reported are means (range; n) or (n).

	Pelagic Cormorant			Black Oystercatcher			Western Gull					
	N	No. of Chicks Fledged	Chicks Fledged/ Pair	Breeding Success/ Nest <sup>1</sup>	N	No. of Chicks Fledged	Chicks Fledged/ Pair	Breeding Success/ Nest <sup>1</sup>	N	No. of Chicks Fledged	Chicks Fledged/ Pair	Breeding Success/ Nest <sup>1</sup>
Point Reyes	2	1	0.50 (0-1;2)	0.50 (2)	1	0	0.0 (0;1)	0.0 (1)	13	10	0.77 (0-3;13)	0.46 (13)
Drakes Bay	10	20	2.0 (0-3;10)	0.90 (10)	2	0	0.0 (0; 2)	0.0 (2)	1	0	0.0 (0; 1)	0.0 (1)
Devil's Slide Rock & Mainland	75	176	2.35 (0-4;75)	0.88 (75)	1	0	0.0 (0;1)	0.0 (1)	8	8	1.00 (0-3;8)	0.63 (8)

<sup>1</sup> Breeding success per nest is defined as the proportion of egg-laying nests that fledged at least one chick.



Figure 5. Pigeon Guillemot Nest Box



Figure 6. Map of numbered nest boxes and additional nest sites monitored at the Point Reyes Fish Dock.

Table 4. Seasonal counts of nests for Brandt’s Cormorants (BRCO), Pelagic Cormorants (PECO), Black Oystercatchers (BLOY), Western Gulls (WEGU), and of birds for Pigeon Guillemots (PIGU), obtained during land, boat, and combined land/boat counts (total), 2010. ND = No Data.

Species	Colony	Land <sup>1</sup>	Boat	Total Count <sup>2</sup>
Brandt’s Cormorant	Point Reyes	174	100	254
	Point Resistance	5	0	5
	Miller’s Point Rocks	4	3	4
	Double Point Rocks	29	0	29
	Bird Island (Point Bonita)	0	-	0
	Devil’s Slide Rock & Mainland	50	19	52
	San Pedro Rock	0	0	0
Pelagic Cormorant	Point Reyes	20	173	189
	Point Resistance	10	9	10
	Miller’s Point Rocks	7	7	14
	Double Point Rocks	0	5	5
	Devil’s Slide Rock & Mainland	73	45	81
	San Pedro Rock	0	0	0
Black Oystercatcher	Point Reyes	2	1	3
	Point Resistance	1	0	1
	Miller’s Point Rocks	1	0	1
	Double Point Rocks	0	1	1
	Devil’s Slide Rock & Mainland	1	0	1
Western Gull	Point Reyes	131	20	151
	Point Resistance	0	0	0
	Miller’s Point Rocks	9	1	10
	Double Point Rocks	7	2	9
	San Pedro Rock	3	6	6
	Devil’s Slide Rock & Mainland	10	11	17
Pigeon Guillemot	Gray Whale Cove South	0	1	1
	Point Reyes	264 <sup>3</sup>	394	-
	Point Resistance	33	7	-
	Millers Point Rocks	49	3	-
	Double Point Rocks	50	12	-
	Devil’s Slide Colony Complex	149	184	-
	Gray Whale Cove South	0	0	-

<sup>1</sup> Sum of high seasonal counts at each subcolony or subarea, except where indicated.

<sup>2</sup> Combination of land and boat surveys. Boat counts included only nests not included in land-based surveys, except for Pigeon Guillemots which included whole-colony counts.

<sup>3</sup> Single day survey of entire Point Reyes colony.

Table 5. Number of boats recorded within special closures 2008-2010.  
 Special Closures became effective May 1, 2010.

	<b>2008</b>	<b>2009</b>	<b>2010</b>
Point Reyes Headlands Special Closure <sup>1</sup>	3	1	1
Point Resistance Rock Special Closure <sup>2</sup>	0	0	2
Double Point/Stormy Stack Special Closure <sup>2</sup>	2	1	5
Devil's Slide Rock Special Closure <sup>3</sup>	14	16	2

<sup>1</sup> For 2008-2009, previous observations were reviewed and the locations of all boats recorded within 1000 feet of shore within the boundaries of the new Special Closure were included.

<sup>2</sup> For 2008-2009, previous observations were reviewed and all boats recorded within 300 feet of the Devil's Slide Rock plus all boats that were recorded between the mainland and Devil's Slide Rock were included.

<sup>3</sup> For 2008-2009, previous observations were reviewed and all boats recorded within 300 feet of the rock were included.

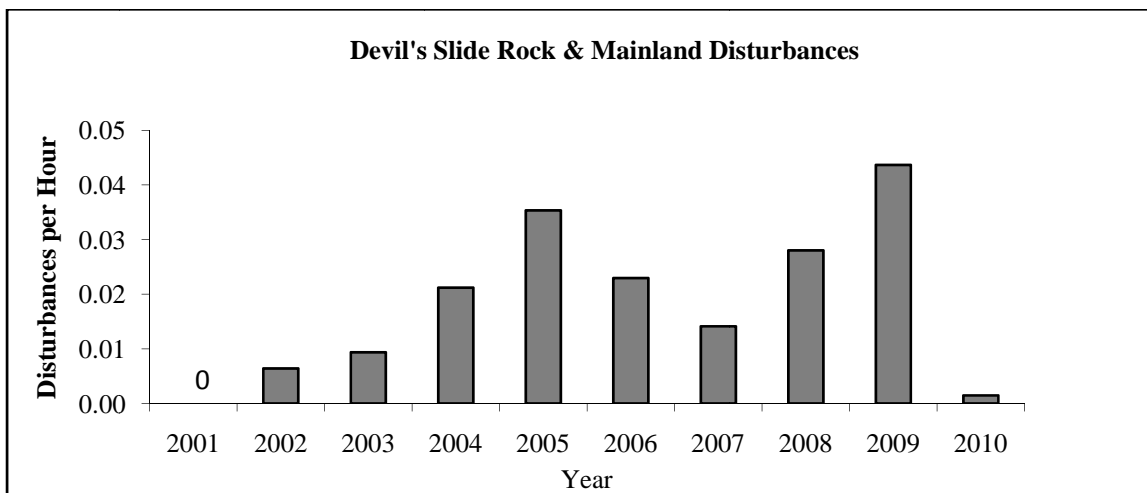
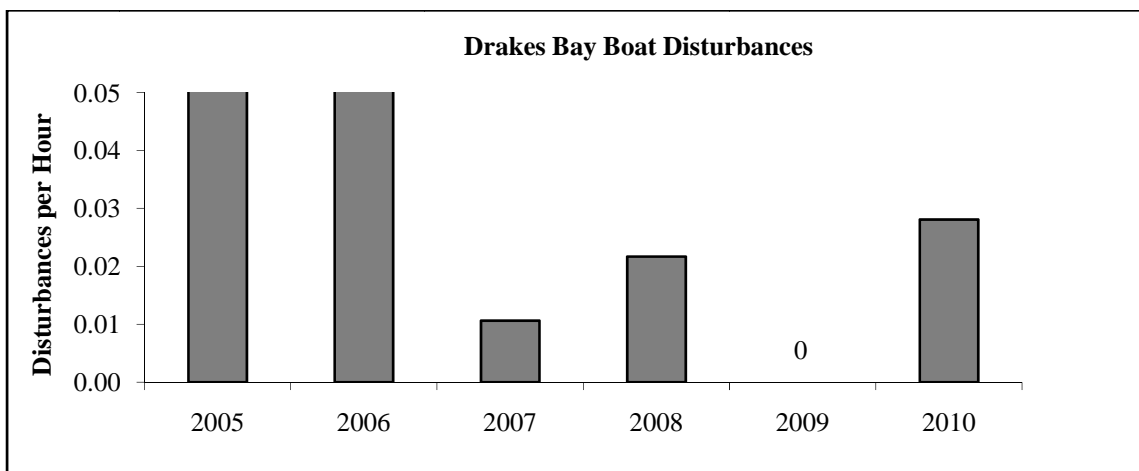
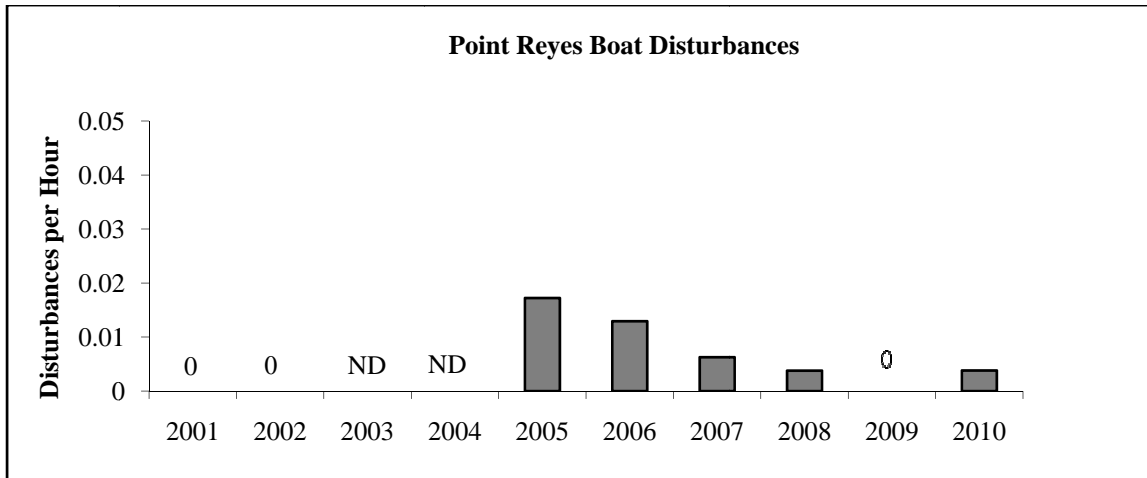


Figure 7. Long term watercraft disturbance rates at Point Reyes, Drakes Bay Colony Complex, and Devil's Slide Rock & Mainland.

Table 6. Numbers of observed boats recorded within 1,500 feet (460 meters) and resulting disturbances to all seabirds at monitored colonies, 2010. Total number observed and number per observer hour are reported.

Colony Name	Total Observations	No. Obs/hr	No. Disturbance Events			Total/hr <sup>1</sup>	No. Disturbance Events/hr	Flush or Displace/hr
			A	D	F			
Point Reyes	13	0.025	2	0	0	0.004	0	0
Point Resistance	2	0.038	0	0	0	0	0	0
Millers Point Rocks	5	0.061	0	0	1	0.012	0.012	0.012
Double Point Rocks	31	0.260	0	0	6	0.050	0.050	0.050
Devil's Slide Rock	7	0.010	0	0	1	0.001	0.001	0.001

<sup>1</sup> Events where birds exhibited agitation (A), flushing (F), or displacement (D).

Table 7. Numbers of events and mean (range) numbers of Common Murres (COMU), Brandt's Cormorants (BRCO), Pelagic Cormorants (PECO), Brown Pelicans (BRPE), Western or Unknown Gulls (WEGU/UNGU), Black Oystercatchers (BLOY), and Pigeon Guillemots (PIGU) flushed or displaced by boats at monitored colonies in 2010.

Colony Name	Mean No. Seabirds Flushed/Displace	COMU Disturbance		BRCO Disturbance		PECO Disturbance		BRPE Disturbance		WEGU/UNGU Disturbance		BLOY Disturbance		PIGU Disturbance	
		No. Events	Mean No. birds	No. Events	Mean No. birds	No. Events	Mean No. birds	No. Events	Mean No. birds	No. Events	Mean No. birds	No. Events	Mean No. birds	No. Events	Mean No. birds
Point Reyes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Point Resistance	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Millers Pt. Rocks	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Double Pt. Rocks	15 (5-24)	2	16.5 (10-23)	5	10.2 (3-20)	0	0	2	3 (2-4)	0	0	0	0	0	0
Devil's Slide Rock	26	0	0	1	26	0	0	0	0	0	0	0	0	0	0