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2006 At-sea Marbled Murrelet Population Monitoring

Research Progress Report

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Fish and Wildlife
Wildlife Program
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Cover photos: Marbled Murrelet (Josh London, NOAA) with Cape Alava (Steve Jeffries, WDFW) in the background.

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Abstract

The Marbled Murrelet was listed as a Threatened species in California, Oregon and Washington in 1992. A recovery plan was published in 1997 that outlined recovery strategies including developing and conducting standardized at-sea surveys. Along with federal and state researchers, Washington Department of Fish and Wildlife has participated in a program to estimate marbled murrelet population size and trends since 2000. This monitoring program uses at-sea line transects within 8 km of the Washington, Oregon, and northern California coastline in the area of the Northwest Forest Plan. There are two zones in Washington. Zone 1 includes the Strait of Juan de Fuca, Hood Canal and the San Juan Islands and is monitored by U.S. Forest Service Pacific Northwest Research Station. Washington Department of Fish and Wildlife has been responsible for monitoring the outer Washington coast (Zone 2), which is one of five designated Conservation Zones. Within Zone 2 there are two geographic strata based on marbled murrelet density: Stratum 1 (north coast – high density) and Statum 2 (south coast – low density). Each stratum is divided into primary sampling units (PSUs), which is a roughly rectangular area along approximately 20 km of coastline. In 2006, at-sea surveys began 16 May and ended 27 July and PSUs were accessed from four ports along the Washington coast. By design, all PSUs in Stratum 1 were sampled three times and PSUs in Stratum 2 were sampled once, except PSU 12, which is located at the mouth of Willapa Bay and was not sampled due to sustained adverse wind and tide conditions.

In Zone 2, highest concentrations of marbled murrelets were observed in PSU 6 located near Destruction Island for the third year in a row; however, high counts were far lower in 2006 (n = 72) than were observed in 2004 (n = 215) and 2005 (n = 90). Numbers of marbled murrelets observed in PSU 7 were lower in 2006, but there were more birds observed in PSU 4 (near the Quileute River in LaPush) than seen in previous years. There were no juvenile (Hatch Year) marbled murrelets observed in 2006; however, this study was designed to monitor breeding birds and not to estimate juvenile recruitment.

For all west coast zones combined, there has been no detectable decrease in the breeding at-sea murrelet population over 7 years of monitoring. When all zones are combined, we have ≥ 95% percent power of detecting a 5 percent annual decrease within a 9-year sampling period (Miller et al. 2006), but only 7 years of monitoring have been completed. For the Washington outer coast (Zone 2), density and population size estimates for 2006 suggest overall marbled murrelet density was slightly lower in 2006 than in the previous two years, but not as low as the 2000 and 2001 estimates. The population estimate for the Washington coast for 2006 was 2,381 birds (95% confidence interval = 1,672- 3,430 birds). For inland Washington waters, (Zone 1), there is currently no indication of a population decline, but additional years of sampling are needed to have a high power to detect a population decline should one occur (Miller et al. 2006). The population estimate for Zone 1 for 2006 was 5,899 birds (95% confidence interval = 4,013 - 8,208 birds).

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Introduction

In 1992, the marbled murrelet was listed under the Federal Endangered Species Act of 1973 as a Threatened species in California, Oregon and Washington. A recovery plan was published (U.S. Fish and Wildlife Service 1997) that outlined recovery strategies including developing and conducting standardized at-sea surveys. These surveys were viewed as important because they allow researchers to model population trends and because detecting changes in populations are critical to the evaluation of recovery actions and ultimately to the determination of recovery success or failure. In response to this recovery goal, the U.S. Fish and Wildlife Service, U.S. Forest Service and state wildlife agencies initiated a Marbled Murrelet monitoring strategy in 2000 (Raphael et al. 1999, 2004; Miller et al. 2006). The goal of this monitoring strategy is to estimate marbled murrelet population size and to detect changes in population size for the area between San Francisco and the Washington – Canada border. Results will be used to evaluate any USFWS incidental take criteria and to facilitate the Recovery Plan development and evaluation. In addition to meeting the requirements of the Endangered Species Act, long-term marbled murrelet monitoring is required to evaluate the effectiveness of the Northwest Forest Plan (Madsen et al. 1999). This plan is a large-scale ecosystem management plan for Federal lands in the Pacific Northwest. The marbled murrelet was identified as a conservation and monitoring target for evaluating the effectiveness of this plan. Finally, monitoring data are also being used to evaluate the effectiveness of the Habitat Conservation Plan for Washington State forested lands managed by the Department of Natural Resources.

Since 2000, Washington Department of Fish and Wildlife along with researchers from the US Forest Service, US Fish and Wildlife Service, Crescent Coastal Research, and the University of California Berkeley have been estimating marbled murrelet population size and trends using at-sea line transects within 8 km of the Washington, Oregon, and northern California coastline. These transects cover ~8,800 km^2. This area of coastline has been subdivided into the five Marbled Murrelet Conservation Zones identified in the Marbled Murrelet Recovery Plan (Figure 1; US Fish and Wildlife Service 1997). Washington Department of Fish and Wildlife has been responsible for monitoring the outer Washington coast (Zone 2 - from the northwest tip of the state to the mouth of the Columbia River; Figure 2).

The total population estimate for the U.S. coast south of the Canadian border (Figure 1) for 2003 was 22,200 (95% Confidence Interval 18,100-26,400) birds (on any single day) (Miller et al. 2006). At-sea monitoring from 2000-2003 observed the highest densities of marbled murrelets along the Oregon and northernmost California coasts and lowest along the California coast from the Humboldt-Mendocino County line to just south of San Francisco Bay (Miller et al. 2006). As reported in the 10-year report (Miller et al. 2006), a decrease in the size of the target population over the first four years of monitoring at the 5 percent significance level was not detected. However, when all zones are combined, we have ≥ 95% percent power of detecting a 5 percent annual decrease within a 9-year sampling period (Miller et al. 2006), but only 7 years of monitoring have been completed.

Here we summarize the methodology, sampling and results for the 2006 at-sea monitoring on Washington's outer coast (Cape Flattery to the south jetty of the Columbia River).

Methods

Sampling Design.
Marbled murrelets were monitored from mid-May through the end of July when the birds detected on the water are most likely local breeding birds. Conservation Zone 2 on the outer coast of Washington (Cape Flattery to the south jetty of the Columbia River) is divided into two geographic strata (Figure 2). Stratum 1 (north coast) extends from the northwest tip of Washington south to Point Grenville and Stratum 2 (south coast) extends from Point Grenville south to the south jetty of the Columbia River. In an effort to reduce variability in the population estimates, more sampling effort is devoted to Stratum 1 because the density of marbled murrelets is higher than in Stratum 2 (Thompson 1999).

The following is a detailed summary of the methodology used in Conservation Zone 2 and is consistent with the population monitoring methods developed by the Marbled Murrelet Effectiveness Monitoring program used throughout the Northwest Forest Plan area since 2000 (Raphael et al. 1999, 2004; Miller et al. 2006). Each stratum is divided into primary sampling units (PSUs), which is a roughly rectangular area about 20 km of coastline in length (Figure 3). There are 8 PSUs in Stratum 1 and 6 PSUs in Stratum 2 (Figure 2). The width of the PSU (the distance between the nearshore and offshore boundaries) varies by stratum. The PSUs meet end to end without any gaps along shore. Each PSU consists of two subunits, the nearshore and the offshore units (Figure 3). For Conservation Zone 2, the nearshore subunit starts at 350 m from shore and extends 1,500 m offshore to the "centerline". The offshore subunit extends 3,500 m offshore from the "centerline" in Stratum 1 and 6,500 m offshore from the "centerline" in Stratum 2 (Figure 3). These widths for the nearshore and offshore units were used because most marbled murrelets occur within 1,500 meters from shore and at least 95% of marbled murrelets occur within 5,000 and 8,000 m from shore in Strata 1 and 2, respectively (Thompson 1997a, 1997b, 1999).

Parallel transects are used in the nearshore subunit and zigzag transects are used in the offshore subunit. Within the inshore subunit, the length of the PSU (approximately 20 km) was divided into four segments that were approximately 5-km long and parallel to shore (Figure 3). The width of each subunit was divided into four bins parallel to shore and of equal size. One transect was randomly placed within each bin (without replacement) ensuring that transects were distributed spatially at different distances from shore (Figure 3). Within the bins, transect segments were selected in increments of 100-m distances from shore (Appendix 1). Within the offshore subunit, a zigzag transect traversed the entire width of the subunit and a portion of the length of the PSU; in some cases the entire length of the PSU. The zigzag configuration sampled across the density gradient associated with distance from shore while allowing less effort per area in this low marbled murrelet density subunit. The transect trajectory was determined from a random starting point. The length of the zigzag transect in each area was roughly calculated from a formula based on strata area and marbled murrelet densities (from previous data). See Miller et al. (2006) for further details.

Observer Training.
In 2006, three observers were new to the program. All observers had prior at-sea seabird identification experience. This was the fifth season for the boat operator. The crew consisted of one dedicated boat operator and three observers/data recorders. The data recorder and two observers (one

responsible for each side of the boat) switched duties at the beginning of each PSU. Observers had one week of training that consisted of office and on-water training. Office training included a presentation of background information, survey design and protocols, sampling methodology, line transect distance sampling methodology, and measurement quality objectives. On-water training included boat safety orientation, seabird identification, practice transects, and distance estimation testing using laser rangefinders. Boat safety training included instructions and reminders for weather and sea condition assessment, use of the radio, boat handling, proper boat maintenance, safety gear, rescue techniques, and emergency procedures. Washington Department of Fish and Wildlife observer training was designed to be consistent with training conducted by USFWS and other groups within the Marbled Murrelet Effectiveness Monitoring program (Huff et al. 2003, Mack et al. 2003).

During practice transects, observers were taught how to scan, where to focus their eyes, and which portions of the scan area are most critical. Distance estimates from the transect line are a critical part of the data collected and substantial time was spent practicing and visually 'calibrating' before surveys began, followed by quality assurance tests. During distance trials, each individual's direct estimate of perpendicular distance was compared to a perpendicular distance recorded with a laser rangefinder. These trials were conducted using stationary buoys as targets, which were selected at a range of distances from the transect line and in locations in front of as well as to the sides of the boat where marbled murrelets would be encountered on real surveys (see Huff et al. 2003 for details). Each Washington Department of Fish and Wildlife observer completed 100 distance estimates during pre-survey training.

Quality assurance tests were repeated weekly throughout the entire survey period where each observer was tested on their ability to accurately estimate distances. Observers made a set of five estimates of perpendicular distance to five targets and the actual perpendicular distance was measured with a laser rangefinder. After the first set of five, the observer's results were assessed. If all five estimates were within 15% of the actual distance, the trial was complete for that observer. If any of the five estimates were not within 15% of actual, the observer continued to conduct estimates in sets of five until all five distances were within 15% of actual distance. In addition, one of the project leads accompanied the survey crew and observed their overall performance and ability to detect marbled murrelets three times during the survey season and completed an audit form created by the Murrelet Monitoring Program (Huff et al. 2003). The results of the audit were shared with the observers after the survey day was completed for feedback and discussion.

Observer Methods.

Two observers scanned from 0^{o} off the bow to 90^{o} abeam of the vessel. More effort was expended watching for marbled murrelets close to the transect line ahead of the boat (within 45^{o} of line). Observers scanned continuously, not staring in one direction, with a complete scan taking about 4-8 seconds. Observers were instructed to scan far ahead of the boat for birds that flush in response to the boat and communicate between observers to minimize missed detections. Binoculars were used for species verification, but not for sighting birds. Observers relayed data via headsets to a person in the boat cabin who entered data directly onto a laptop computer with software that is interfaced with a GPS unit, which collects real time location data (detailed below). Consistent with previous years, survey speed was maintained at 8-12 knots and survey effort was ended if glare obstructed the view

of the observers, or if Beaufort wind scale was 3 or greater. Beaufort 3 is described as a gentle breeze, 7-10 knot winds, creating large wavelets, crests beginning to break, and scattered whitecaps.

Equipment.
As in previous years, a twin-outboard 26' Washington Department of Fish and Wildlife vessel, *Research 4,* was the survey platform. Data were collected during at-sea surveys using a windows based software program called DLOG2 (for 'datalog', developed by R.G. Ford, Inc., Portland, OR.) loaded onto a laptop computer. DLOG2 interfaces with a GPS and GIS overlays of the Washington shoreline and adjacent bathymetry, and uses these data to record GPS coordinates and perpendicular distance to shore at operator-defined time intervals (e.g. every 30 seconds). Transect survey length was calculated from the GPS trackline recorded in DLOG2. Additional data such as weather and sea conditions, on/off effort, and names of observers were recorded manually in DLOG2. One of the survey crew manually entered bird observation data including: species, number of birds, and behavior (flying, on water, flushed, etc.) in real time into the laptop as relayed from both the port and starboard observers through audio-headphones. In addition to these data, for each marbled murrelet sighting the following data were collected: group size (a collection of birds separated by less than or equal to 2 m at first detection and moving together, or if greater than 2 m the birds are exhibiting behavior reflective of birds together), estimated perpendicular distance of the bird(s) from the trackline of the boat at first detection regardless of distance from the line, plumage class (Strong 1998), and water depth (from boat depth finder). The DLOG2 program interfaces with a thermosalinograph, which was installed on *Research 4* to collect water parameter data (temperature and conductivity). Unfortunately, we were unable to collect these data during the 2006 season because of software incompatibility issues.

Survey Effort
At-sea surveys began 16 May and ended 27 July. PSUs were accessed from four ports along the Washington coast: Neah Bay (PSUs 1-3), La Push (PSUs 4-7), Westport (PSUs 8-11), and Ilwaco (PSUs 12-14). The survey schedule was established prior to the start of the season in the following manner: the sampling period was divided into three 18-day periods (excluding weekends and 2 holidays) to avoid clustered sampling and ensure PSUs were selected randomly without replacement and distributed evenly over the field season.

PSUs in Stratum 1 were sampled three times. To sample Stratum 1 (PSUs 1-8), a port (Neah Bay or LaPush) was randomly selected during each 18-day period. From the selected port, the PSU to be completed each day was randomly selected. Within each PSU, a coin flip determined whether to conduct the nearshore or offshore segment of the PSU first. After all PSUs were completed from that port, the same protocol of random selection of PSUs was completed from the other port.

PSUs in Stratum 2 were sampled once. To sample Stratum 2 (PSUs 9-14), a port (Westport or Ilwaco) was randomly selected and two PSUs were surveyed during each 18-day period. Within each PSU, a coin flip determined whether to conduct the nearshore or offshore segment of the PSU first.

Results

In 2006, three replicates of all PSUs in Stratum 1 were sampled. Weather (wind and swell) and tide precluded a complete survey of PSU 12 located along the mouth of Willapa Bay. This is the second year we were unable to complete a survey of this PSU, which is a difficult area to navigate and requires nearly perfect conditions (high tide, Beaufort 0-1 and low swell). Poor weather and rough seas precluded surveying on nine days. For the past three years, we have been unable to survey during the beginning of June primarily on the southern Washington coast.

Along the outer coast of Washington, physical features of the shoreline influenced navigation. In some instances, these physical features were permanent obstructions such as submerged groups of rocks or larger rocky islands (e.g. Cape Alava, Tatoosh Island). In other cases, these features were less permanent such as kelp beds. Tidal fluctuations and swell height causing waves to break also affected navigation. For Conservation Zone 2, the nearshore boundary was 350 m. In 2006, the innermost subunit (e.g. 350 or 450 m) had to be moved further from shore in order to be completed for nine subunits in Stratum 1. In these cases, the subunit was moved out from shore in 100 m increments until 75% or greater of the transect line could be surveyed. The reason for moving the subunit and the new distance from shore was documented. No subunits were moved in Stratum 2. The crew made every effort to follow the predetermined random schedule of nearshore and offshore surveys, but there were nine instances where the survey order had to be switched due to tide or swell height.

Data Analysis

Group size and perpendicular distance data were compiled for each marbled murrelet (or group of murrelets) observations and were sent to US Forest Service statistician Jim Baldwin for analysis. Jim Baldwin used the program DISTANCE and SAS to calculate densities and 95% confidence intervals (CI) as described in Miller et al. (2006) (Table 3, Figure 4).

Population Estimates and Trends – Washington Coast (Zone 2)

Overall, marbled murrelet density was slightly lower in 2006 than in the previous two years (Table 3, Figure 4). Results from 2000-2006 do not indicate that the at-sea breeding murrelet population in Zone 2 is decreasing but additional years of sampling are needed before we will have high power to detect a decline should one occur (Miller et al. 2006, Tables 3-9 a, b) (Zone 2; Figure 4). The 2006 population estimate for the Washington coast was 2,381 birds (95% CI = 1,672 - 3,430 birds, Table 3).

As in past years, higher densities of marbled murrelets were observed in Stratum 1 than Stratum 2 (Table 1). The highest concentrations of marbled murrelets were observed in PSU 6 located near Destruction Island; however high counts were far lower in 2006 (n = 72) than were observed in 2004 (n = 215) and 2005 (n = 90) (Table 2). In general, higher concentrations of marbled murrelets are observed in the nearshore segments. The peak counts of marbled murrelets in PSU 6 were higher in the offshore segments in 2004 and 2006 (128 and 58, respectively). The numbers of marbled murrelets observed in PSU 7 were lower in 2006 than in previous years, but there were more birds observed in PSU 4 than seen in previous years (Table 2). PSU 4 begins at the mouth of the Quileute

River in LaPush and extends north (Figure 2). Although we discuss trends at the PSU level here, it should be noted that this monitoring scheme was not designed to detect changes in murrelet population density at the PSU level.

Murrelets were not observed in PSU 2, Replicate 2 or in PSU 13 located in Stratum 2, which extends along the sandy Long Beach Peninsula (Figure 2). There were no juvenile (Hatch Year) marbled murrelets observed in any PSU during the season, but this monitoring scheme was not designed to track juvenile recruitment.

Population Estimates and Trends – Puget Sound and Strait of Juan de Fuca (Zone 1)

In Zone 1, there was no detectable decrease in the at-sea breeding murrelet population over 7 years of monitoring (2000-2006), but additional years of sampling are required before we will have high power to detect a trend should one occur (Miller et al. 2006, Tables 3-9a & b). The population estimate for Zone 1 for 2006 was 5,899 birds (95% confidence = 4,013 - 8,208 birds). Data for Zone 1 were gathered by the U.S. Forest Service Pacific Northwest Research Station.

Population Estimates and Trends – All zones combined

For all west coast zones combined, there has been no detectable change in the breeding at-sea murrelet population size over 7 years of monitoring (Figure 6). However, when all zones are combined, we have ≥ 95% percent power of detecting a 5 percent annual decrease within a 9-year sampling period (Miller et al. 2006), but only 7 years of monitoring have been completed. Consequently, power analyses indicate that additional years of monitoring are needed to detect a population decline with high confidence.

Figure 1. Marbled Murrelet Recovery Plan Conservation Zones (from Huff 2006).

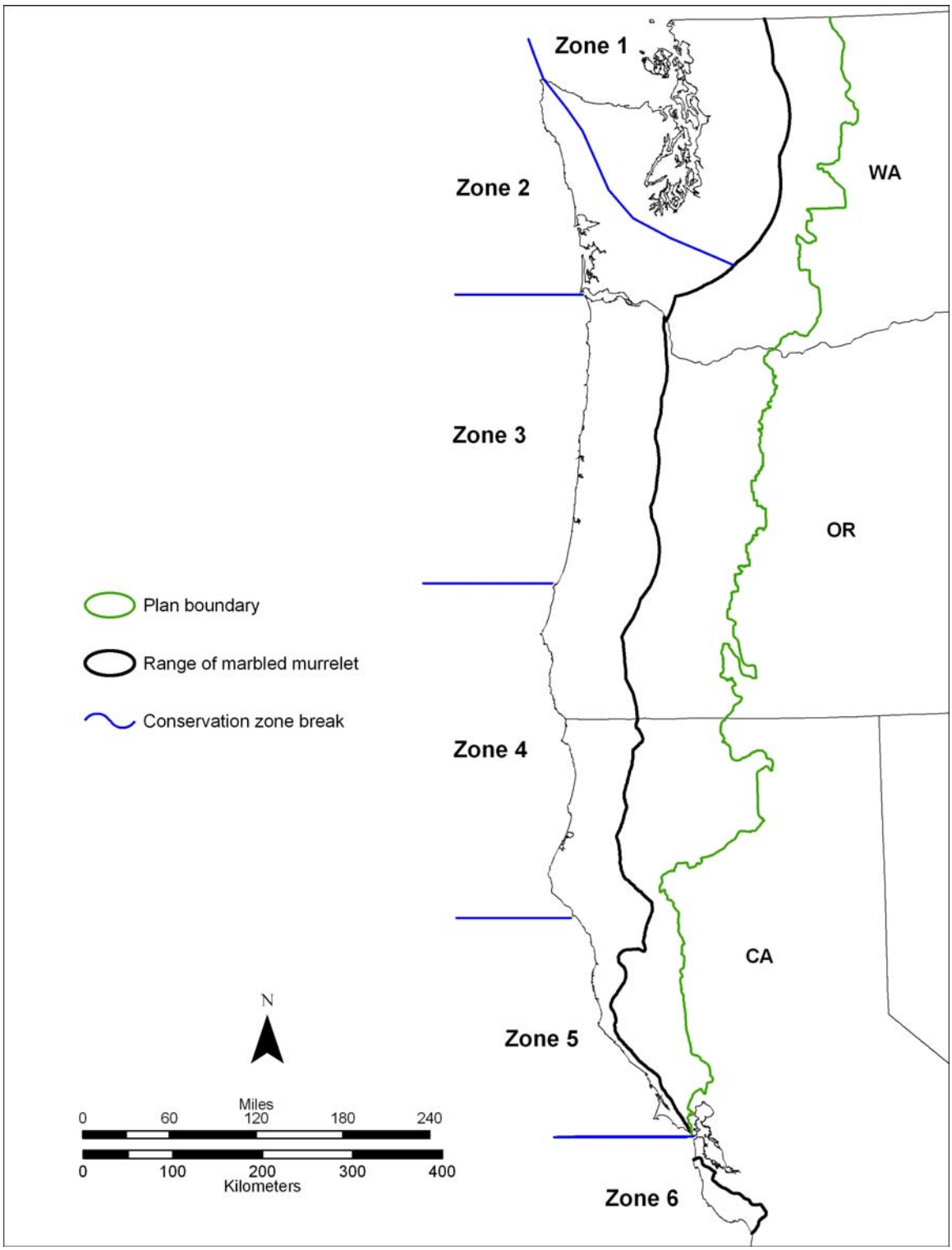

Figure 2. Stratums 1 and 2 along the outer coast of Washington and 14 PSUs in Conservation Zone 2 (from Raphael et al. 2004).

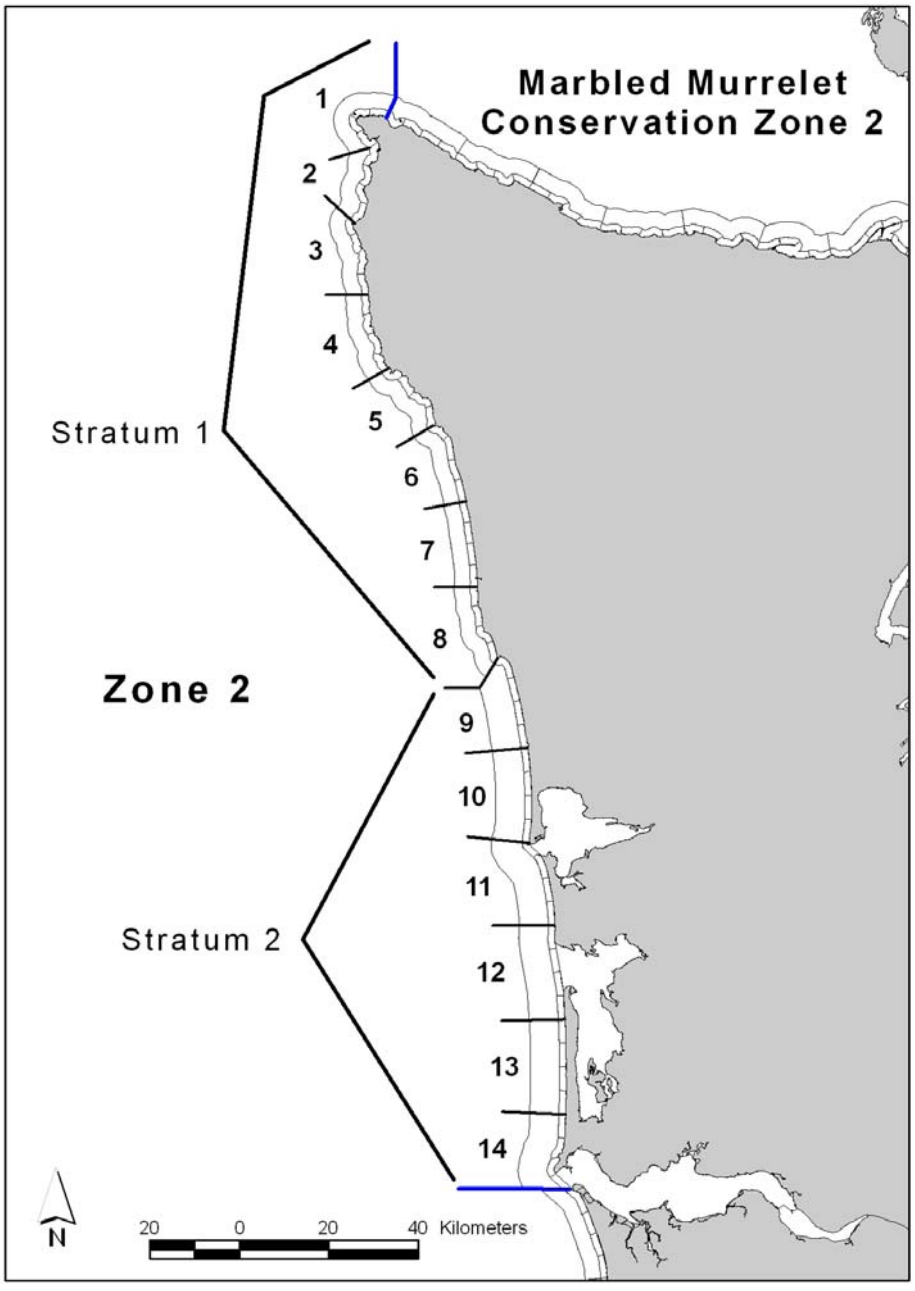

Figure 3. Marbled Murrelet monitoring primary sampling unit (PSU) illustrating nearshore and offshore subunits and 1500 m centerline. The nearshore unit is divided into four equal-length segments (about 5 km each) and four equal-width bins (bands parallel to and at increasing distances from the shore). One bin is selected (without replacement) for each segment of transect (from Raphael et al. 2004).

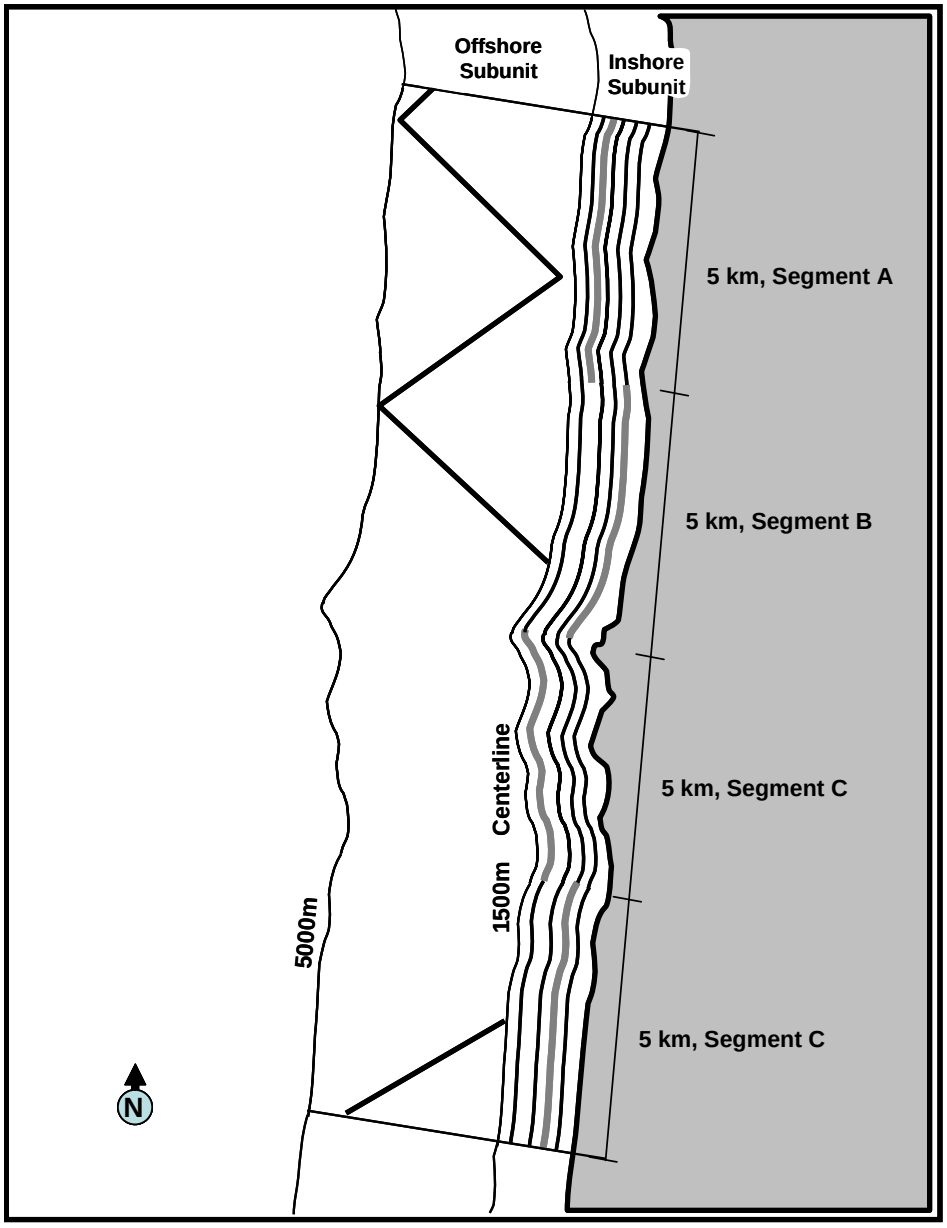

Figure 4. 2000-2006 Marbled Murrelet population densities (± 2 SE) for the Washington coast (Zone 2) and for the northern (Stratum 1) and southern (Stratum 2) portions of Zone 2.

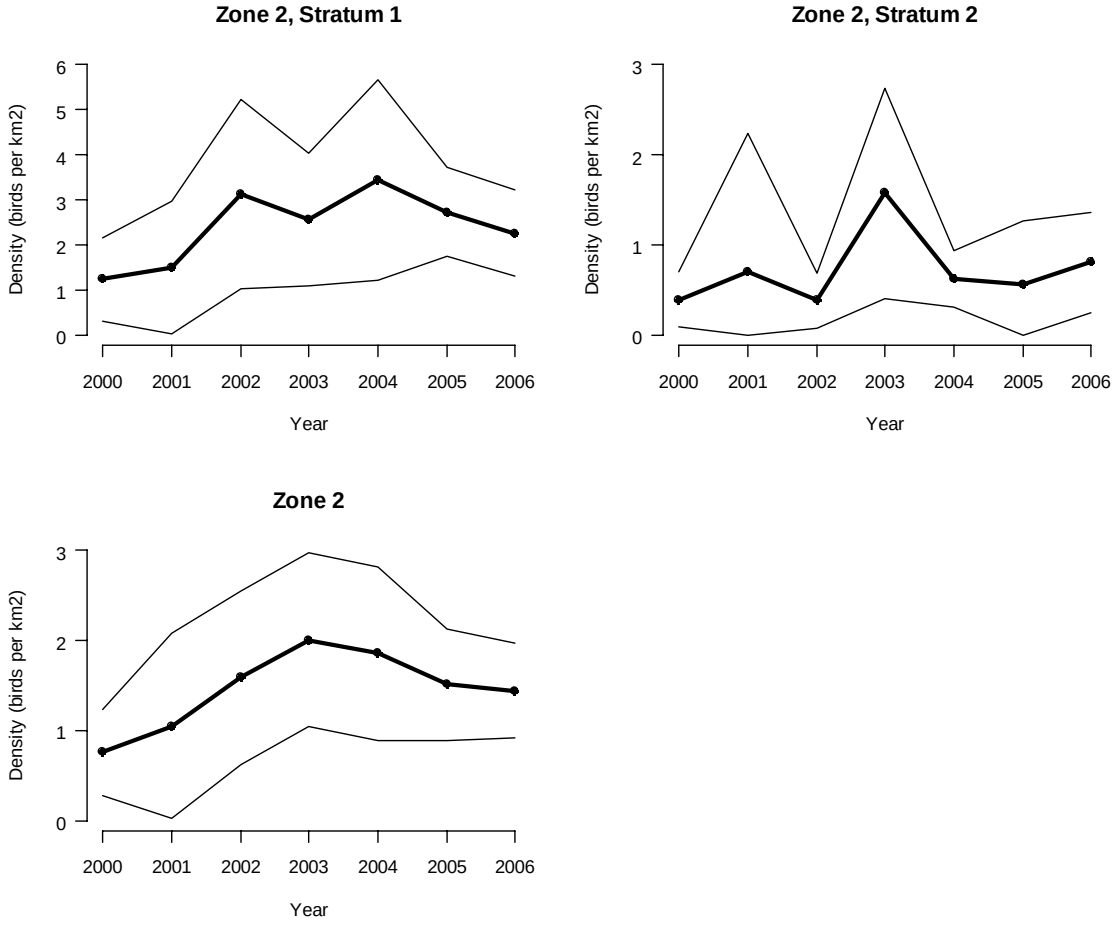

Figure 5. 2000-2006 Marbled Murrelet population densities (± 2 SE) for the inland waters of Washington (Zone 1). Data for this zone are gathered by the U.S. Forest Service Pacific Northwest Research Station

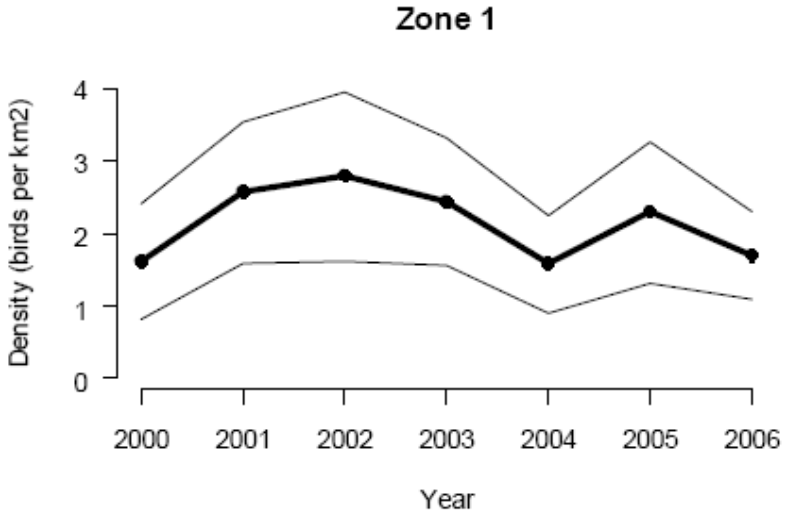

Figure 6. 2000-2006 Marbled Murrelet population densities (± 2 SE) for Conservation Zones 1-4. Zone 5 omitted because it was not sampled in 2006.

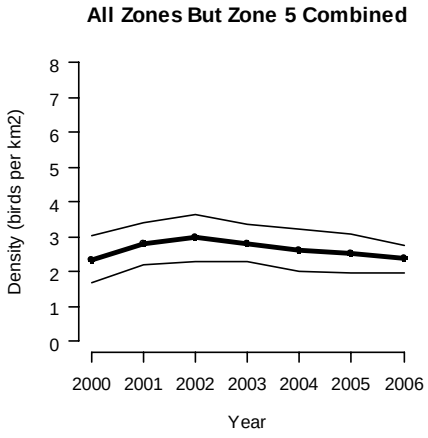

Table 1. Number of Marbled Murrelets (MaMu) in the nearshore (N) and offshore (O) subunits and distance surveyed (km) in each PSU during the 2006 survey season in Zone 2

Date	PSU	Replicate	N (km)	MaMu N	O (km)	MaMu O	Total (km)	MaMu Total
05/16/06	1	1	17.59	2	23.29	2	40.88	4
05/17/06	2	1	19.38	13	23.34	8	42.73	21
05/18/06	3	1	18.95	3	23.40	2	42.35	5
05/25/06	6	1	19.28	18	23.52	18	42.80	36
05/26/06	5	1	20.62	7	23.50	10	44.11	17
05/26/06	4	1	18.94	33	23.84	1	42.78	34
06/03/06	8	1	18.96	3	23.53	0	42.48	3
06/06/06	11	1	19.63	4	37.90	5	57.53	9
06/13/06	2	2	20.19	0	23.70	0	43.88	0
06/13/06	3	2	18.25	7	23.38	4	41.63	11
06/14/06	1	2	17.66	0	18.04	1	35.69	1
06/15/06	5	2	20.26	6	21.39	2	41.65	8
06/20/06	4	2	18.87	4	23.68	0	42.55	4
06/21/06	7	1	19.58	11	23.61	12	43.20	23
06/22/06	6	2	18.95	14	23.76	58	42.71	72
06/23/06	7	2	19.57	6	28.33	16	47.90	22
06/29/06	1	3	18.71	0	20.78	1	39.49	1
06/29/06	2	3	20.23	4	25.18	18	45.42	22
06/30/06	3	3	18.71	5	23.31	4	42.02	9
07/06/06	13	1	21.42	0	38.36	0	59.78	0
07/06/06	14	1	19.43	0	28.79	4	48.22	4
07/11/06	8	2	18.63	15	23.60	12	42.22	27
07/11/06	9	1	21.28	10	31.58	6	52.86	16
07/13/06	10	1	21.53	2	38.12	4	59.65	6
07/18/06	6	3	19.53	28	23.62	20	43.15	48
07/19/06	8	3	19.17	4	23.59	4	42.75	8
07/21/06	4	3	18.54	6	23.76	7	42.30	13
07/25/06	5	3	20.15	4	23.57	8	43.72	12
07/26/06	7	3	19.64	0	23.72	2	43.37	2

Table 2. Number of Marbled Murrelets observed by PSU and replicate during 2004-2006 seasons in Zone 2.

	2004			2005			2006		
	Replicate			Replicate			Replicate		
PSU	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**
1	8	26	14	18	14	8	4	1	1
2	17	6	7	28	5		21	0	22
3	30	22	6	18	17		5	11	9
4	2	5	7	3	15	1	34	4	13
5	25	44	11	18	18	12	17	8	12
6	112	215	23	40	48	90	36	72	48
7	38	42	26	65	30		23	22	2
8	19	37	1	11	24	26	3	27	8
9	18			9			16		
10	3			23			6		
11	5			0			9		
12	1								
13	5			5			0		
14	4			0			4		

Table 3. Marbled Murrelet population size and density estimates for Zone 2 during 2000-2006 breeding seasons.

Year	Zone	Stratum	Density	Std Err	% Std. Err.	Birds	Birds 95% CL Lower	Birds 95% CL Upper	Area (km^2)
2000	2	1	1.2287	0.4592	37.4%	890	422	1,712	724.470
2000	2	2	0.3903	0.1525	39.1%	361	190	713	925.934
2000	**2**	**0**	**0.7583**	**0.2394**	**31.6%**	**1,252**	**727**	**2,228**	**1,650.404**
2001	2	1	1.5059	0.7368	48.9%	1,091	186	2,254	724.470
2001	2	2	0.6987	0.7697	110.2%	647	104	2,449	925.934
2001	**2**	**0**	**1.0531**	**0.5164**	**49.0%**	**1,738**	**575**	**3,888**	**1,650.404**
2002	2	1	3.1313	1.0485	33.5%	2,269	397	3,471	724.470
2002	2	2	0.3790	0.1511	39.9%	351	0	542	925.934
2002	**2**	**0**	**1.5871**	**0.4850**	**30.6%**	**2,619**	**565**	**3,784**	**1,650.404**
2003	2	1	2.5615	0.7374	28.8%	1,856	1,073	3,168	724.470
2003	2	2	1.5744	0.5839	37.1%	1,458	521	2,355	925.934
2003	**2**	**0**	**2.0077**	**0.4800**	**23.9%**	**3,314**	**1,959**	**5,039**	**1,650.404**
2004	2	1	3.4367	1.1146	32.4%	2,490	1,236	4,000	724.470
2004	2	2	0.6281	0.1570	25.0%	582	330	864	925.934
2004	**2**	**0**	**1.8610**	**0.4822**	**25.9%**	**3,071**	**1,742**	**4,596**	**1,650.404**
2005	2	1	2.7283	0.4965	18.2%	1,977	1,212	2,641	724.470
2005	2	2	0.5568	0.3579	64.3%	516	146	1,552	925.934
2005	**2**	**0**	**1.5100**	**0.3069**	**20.3%**	**2,492**	**1,629**	**3,642**	**1,650.404**
2006	2	1	2.2608	0.4774	21.1%	1,638	1,009	2,413	724.470
2006	2	2	0.8025	0.2782	34.7%	743	364	1,355	925.934
2006	**2**	**0**	**1.4426**	**0.2641**	**18.3%**	**2,381**	**1,672**	**3,430**	**1650.404**

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