

# THE MARBLED MURRELET IN OREGON, 1899-1987

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**Abstract.** Historical and recent at-sea and inland records (from 1899 to 1987) of Marbled Murrelets (*Brachyramphus marmoratus*) were compiled to summarize the current status of the species in Oregon. The murrelet has a clumped distribution along the coast and in the adjacent Coast Range. Highest at-sea abundance occurred at river mouths along the central Oregon Coast, between Yaquina and Heceta heads. Although no nests of this species have been found, one fledged young and two downy chicks were observed at inland locations, up to 40 km from the ocean, between 1918 and 1940, and one fledged young was found 14 km inland in 1987. Adult murrelets have recently (1958-1987) been found up to 47 km inland at 14 forested sites. Seven areas were considered occupied sites or potential nesting areas, and seven were thought to be corridors of travel between nesting areas and the ocean. Potential nesting areas were located in Douglas-fir (*Pseudotsuga menziesii*) ( $n = 6$ ) and Sitka spruce (*Picea sitchensis*) ( $n = 1$ ) forests greater than 100 years in age. The loss of mature and old-growth nesting habitat through current timber management practices must be considered a threat to populations of Marbled Murrelets in Oregon. Inland activity patterns of adults and cataloguing systems for all site-specific information are presented. Additional information is needed on distribution, population numbers, habitat selection at landscape and stand levels, breeding ecology, and effects of disturbance on this species.

**Key words:** *Brachyramphus marmoratus*; breeding status; distribution; Marbled Murrelet; Oregon; population decline.

## INTRODUCTION

Knowledge of the nesting behavior, habitat preferences, and population status of the Marbled Murrelet (*Brachyramphus marmoratus*) is incomplete. All evidence from recent discoveries of tree nests in southeast Alaska and northern California, locations of chicks and eggs on the ground, and observations of murrelets in mature and old-growth forests of the Pacific Northwest, suggests this species prefers older-aged forests (Binford et al. 1975; Paton and Ralph 1988; Quinlan and Hughes 1990; Singer et al., in press; Carter and Erickson, this volume; Leschner and Cummins, this volume). Additionally, concen-

trations of murrelets at sea during the breeding season appear associated with the distribution of older-aged forests near the ocean (Sowls et al. 1980, Nelson 1990).

In the Coast Ranges of Oregon, forested lands have been intensively managed for timber since the early 1900's. Today's landscape pattern consists of a mosaic of young and mature forests; old-growth has been reduced to small, rare, isolated patches (Harris 1984). This widespread conversion of mature and old-growth forests to younger, even-aged forests has generated concern about the impact of the potential permanent loss of murrelet nesting habitat (Marshall 1988).



We have summarized records of the murrelet in Oregon from 1899–1987 to assess the impacts of a century of habitat modification on this species. We report on breeding records, inland observations, activity patterns, threats to murrelet populations, and outline distribution patterns at sea.

#### METHODS

We compiled year-round, published and unpublished records of Marbled Murrelets at-sea (within 21 km of shore) and at inland areas throughout Oregon. Historical records were obtained through an extensive search of the literature, and recent information was acquired from professional and amateur ornithologists through a statewide request for information. Most records involved incidental observations of murrelets. However, sightings were also recorded during two inland, one estuarine, and five at-sea surveys. Most of these surveys were not designed specifically to document the numbers and distribution of murrelets.

##### *At-sea surveys*

J. M. Scott counted murrelets on the central Oregon Coast while conducting systematic studies of marine diving ducks (Scott 1973) off Newport and Yaquina Head from May–October, 1969–1973 (Fig. 1). Two transects were run at Yaquina Head: one ran parallel to shore in water less than 21 m deep and originated off the Yaquina River, 6.3 km south of Yaquina Head; the other originated 0.4 km off Yaquina Head in water 20 m deep and ran 14.0 km offshore to water 82 m deep. Transects were conducted weekly during the summer months (May–August), and monthly in September and October, for a total of 28 and 39 nearshore and offshore transects, respectively. Murrelets were counted from the right side of the flying bridge (3.5 m above the water line) of the 11-m RV *Paiute*, traveling at 12.5 km/hour. All birds observed in a 180°-arc around the bow of the vessel were counted and their occurrence noted by 0.4-km segments. The behavior, direction of flight, group size, and age of each murrelet sighted were recorded on standardized forms. Weather and sea conditions (wind velocity, chop, fog, swell height) were held within a minimum range. The effect of glare and time of day on the behavior of the birds, and the ability to see them were minimized by running the first transect of the day between

4–5 hours after sunrise and by confining surveys to conditions of at least 200 m visibility.

Varoujean and Pitman (1980) opportunistically counted murrelets on trips to and from seabird nesting colonies between 19 April and 28 July 1979. The surveys covered most of the Oregon Coast, except stretches from the mouth of the Columbia River to Seaside (Clatsop County), from Florence to Coos Bay (Lane to Coos counties), and from Crooked Creek (south of Bandon) to Blackrock Point (north of Cape Blanco) (Curry County) (Fig. 1). R. Lowe (unpublished data) counted murrelets in Tillamook and Lincoln counties during seabird colony surveys between April and September, 1986 and 1987; methods were similar to Varoujean and Pitman (1980).

Varoujean and Williams (1987) conducted strip transects for murrelets parallel to and within 1.5 km of the shoreline between 14 April and 6 June in 1986, and 7 May and 30 June 1987. Survey starting points were random and opportunistic, varying with trips to and from murrelet capture points between Newport and Coos Bay (Lincoln to Coos counties) (Fig. 1). Surveys were conducted adjacent to three habitat types: (1) sandy shores within 3 km of river or harbor mouths, (2) sandy shores >3 km from river and harbor mouths, and (3) rocky shores. Counts were made with the unaided eye from an inflatable Zodiac at speeds varying from 5 to 15 km/hour. Transect widths varied from 50–200 m depending on sea conditions and light levels. Flying murrelets were not included in the surveys.

Bayer (1986) counted murrelets and other seabirds from the midpoint on the south jetty of the Yaquina River (Lincoln County) between 1 June and 20 August 1982, and 29 April and 9 September 1983. All murrelets were counted with a 20-power spotting scope within 1.5 km south and 1.0 km west of the observation point, and between the north and south jetties. From 1974–1983, Bayer (1986, unpublished data) also conducted systematic surveys of shorebirds and seabirds in Lincoln County at eight locations in Yaquina and Siletz estuaries, five at the Salmon estuary, and twelve at Devils Lake. Counts were made when lighting and water conditions did not affect or obscure observations of birds.

M. L. C. McAllister conducted a five-day (7–11 July 1985), land-based survey by counting murrelets at sea from 13 selected observation points along the central Oregon Coast between the Yachats River and Heceta Head (Lincoln and

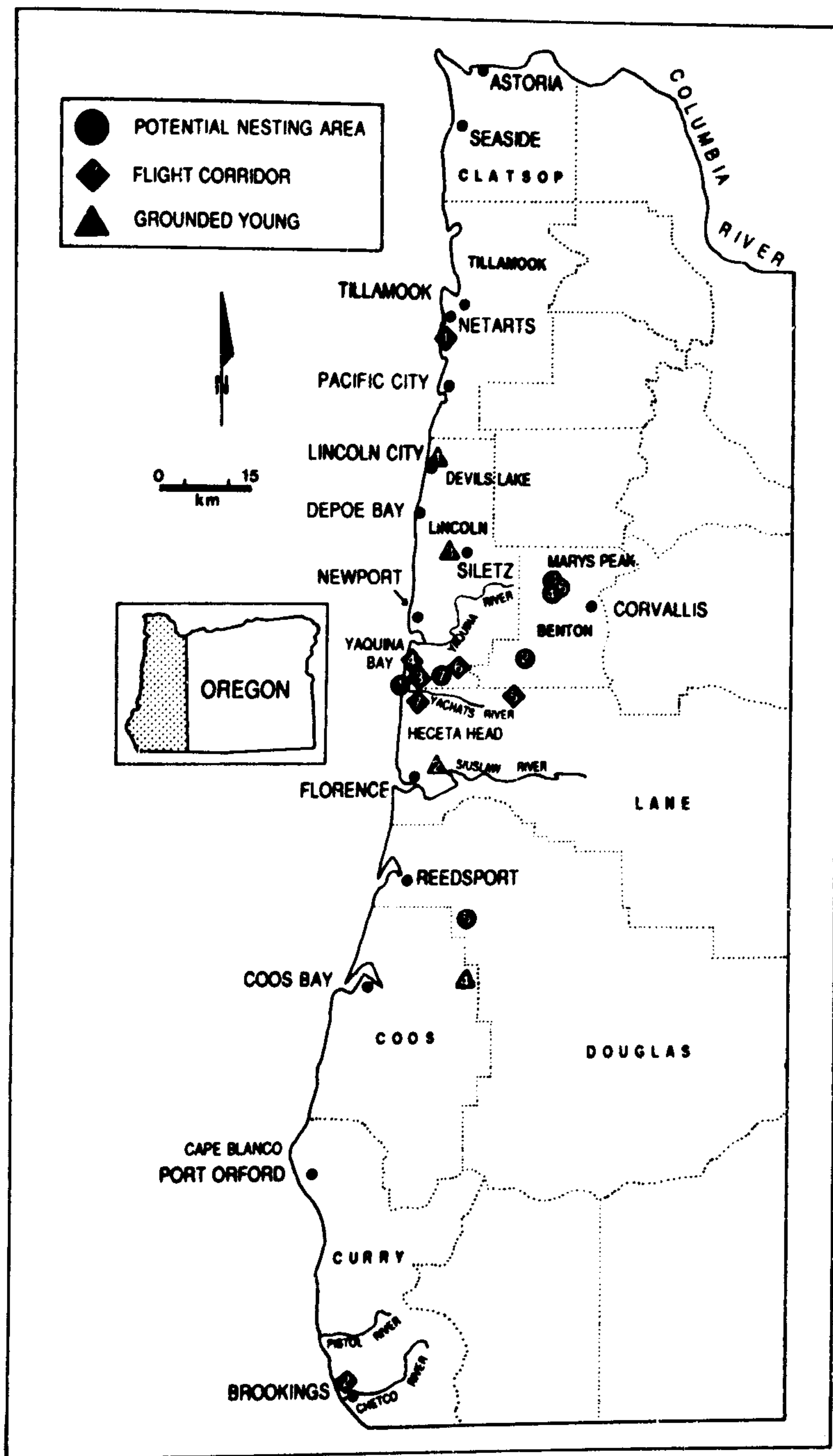


FIG. 1. Western Oregon study area including the distribution of inland sightings of Marbled Murrelets and localities of at-sea sightings referred to in text. Inland areas are numbered as follows: Potential nest sites: (1) Cape Creek, (2) Honey Grove, (3) North Fork Rock Creek 1, (4) North Fork Rock Creek 2, (5) Remmy Creek, (6) Rock Creek, (7) School Fork; Flight Corridors: (1) Cape Lookout, (2) Chetco River, (3) Cummins Creek, (4) Gwynn Creek, (5) Prairie Peak, (6) Seits Ridge, (7) Yachats River; Grounded Young: (1) Devils Lake, (2) North Fork Siuslaw River, (3) Siletz, (4) South Fork Coos River.



Lane counties). Surveys were conducted with a 15-power spotting scope; all birds within 1.5 km of survey locations were counted.

#### *Inland surveys*

Nelson (1989) conducted variable circular plot surveys (Reynolds et al. 1980) for forest birds in 27 old-growth (>200 years), nine mature (80–200 years), and nine young (60–80 years) inland forest stands in the Oregon Coast Ranges (Benton, Lincoln, Lane, Douglas, and Coos counties). Seven to 12 sampling stations, depending on stand size, were systematically located at 100 m intervals in each study site. A minimum of six and maximum of eight surveys were conducted at each site between 30 April and 4 July 1985 and 1986. Surveys began within 15 minutes of official sunrise and continued until 4 hours after official sunrise (determined using a table constructed by the Oregon State University Climatic Research Institute). No surveys were conducted during rainy, windy, or foggy conditions. Visual and auditory detections of murrelets were recorded during an eight-minute count period at each station, and at any time before or after survey points. A single detection was defined as the visual or auditory observation of one or more murrelets acting in a similar manner.

Varoujean and Williams (1987) conducted dawn and dusk counts of murrelets from six fixed observation points along the Remmy Creek basin (Coos County) between 17 July and 21 August 1986 ( $n = 18$ ) and 22 June and 10 August 1987 ( $n = 9$ ) (Fig. 1). All murrelets heard or seen flying within the basin were recorded. Information collected during each survey included number of birds, number of calls, and direction of flight.

We separated inland sightings into two groups, flight corridors and occupied sites. Flight corridors refer to specific routes used by murrelets for flying to and from the ocean to inland nest stands. Murrelets seen or heard travelling at high speeds above creeks, ridges, or forest canopies, with no documented use of a specific forested area, were considered to be using a flight corridor. Birds observed flying through, into or out of the forest canopy, landing in trees, or calling from stationary locations were classified as occupied sites or potential nest stands.

#### *Marbled Murrelet data base*

We anticipate increased efforts in the near future by various state and federal agencies to sur-

vey for Marbled Murrelets in inland forest habitats of western Oregon, resulting in a large inventory of known murrelet locations. Developing a database where all site-specific information can be stored and accessed would facilitate efforts to determine the distribution of these alcids, and simultaneously provide management agencies and interested persons with current information regarding the abundance and distribution of murrelets.

Records of the murrelet are presently being compiled within a computerized database by the Oregon Natural Heritage Program as part of a comprehensive effort to track all threatened and endangered species. The Oregon Natural Heritage Program is a private non-profit organization operated by the Nature Conservancy in cooperation with the Oregon Division of State Lands. Each murrelet record provides information on the legal location, ownership, habitat characteristics, number of birds observed, date, and the source of the sighting or information (see Appendix 1).

## RESULTS

### *At-sea distribution*

Historically, Woodcock (1902) first listed the Marbled Murrelet for Oregon at Yaquina Bay. He quoted B. J. Bretherton as saying the murrelet is "common in May, June and September in Yaquina Bay." A review of museum collections by Bayer (1989) indicated that most specimens of murrelets were taken during the summer, along the central Oregon Coast in the 1920's and 1930's. Over 90% of the specimens were collected in Lincoln, Lane, and Tillamook counties, with only a few specimens from Coos and Clatsop counties. Specifically, at least 30 birds were collected from Depoe Bay alone (Lincoln County), and high numbers were also found at Pacific City and Netarts in Tillamook County (Gabrielson and Jewett 1940, Bayer 1989). From 1932 to 1937, R. Ferris (Bayer and Ferris 1987) also observed many birds along the central to northern Oregon Coast, with largest numbers occurring between Cape Kiwanda (north of Pacific City) and the Salmon River estuary in Tillamook and Lincoln counties, respectively (Appendix 2). Gabrielson and Jewett (1940) listed the murrelet as a regular summer resident off the coast of Tillamook, Lincoln, and Lane counties. These collections and sightings prompted Gabrielson and Jewett (1940) to proclaim the central coast as the center of abundance for Marbled Murrelets in Oregon.

TABLE 1. At-sea records of Marbled Murrelets along the central Oregon Coast (Three Arch Rocks to Alsea Bay) collected during the 1986 and 1987 Oregon Seabird Colony Surveys (R. Lowe, personal communication).

Location	Date	No. birds	Notes
<b>Tillamook County</b>			
Three Arch Rocks	23 Jul 1987	2	1 juvenile, 1 winter plumage or juvenile
<b>Lincoln County</b>			
Gull Rock to Otter Rock	8 Jul 1986	2	1.6 km west of Gull Rock
Yaquina Bay to Yaquina Head	8 Jul 1986	2	breeding plumage
Yaquina River mouth to 8 km west	8 Jul 1986	1	juvenile
Gull Rock to Otter Rock	29 Jul 1986	30	
Boiler Bay	23 Apr 1987	2	winter plumage
N. Jetty Yaquina River to Yaquina Head	11 May 1987	60	intentional Marbled Murrelet count
N. Jetty Yaquina River to Yaquina Head	12 May 1987	20	
S. Jetty Yaquina River to Thiel Creek	12 May 1987	20	
Thiel Creek to Beaver Creek	12 May 1987	8	
Outer Seal Rock to Driftwood State Park	12 May 1987	51	
Driftwood State Park to N. Jetty Alsea River	12 May 1987	16	
Yaquina Bay to Yaquina Head	17 Jun 1987	2	
Yaquina Head to 2 km west	22 Jul 1987	8	
Yaquina Bay to Yaquina Head	22 Jul 1987	5	
Boiler Bay to 2 km west	25 Aug 1987	3	

J. M. Scott recorded 91 murrelets (median = 0.05 birds/km) between the north jetty of the Yaquina River and Yaquina Head from 1969–1973 (Appendix 3). Birds were more abundant in the nearshore waters (median =  $0.1 \pm 0.2$  birds/km;  $N = 28$  transects) than offshore waters (median =  $0.0 \pm 0.0$  birds/km;  $N = 39$  transects), although they were relatively uncommon throughout this area (overall median =  $0.05 \pm 0.5$  birds/km).

In 1979, Varoujean and Pitman (1980) observed 311 murrelets while surveying seabird colonies along the Oregon Coast. Overall, 76% were found offshore of Tillamook, Lincoln, and Lane counties, with concentrations occurring from Lincoln City to Gleneden Beach (Lincoln County), and from Seal Rocks (Lincoln County) to Heceta Head (Lane County) (Fig. 1). Birds were uncommon in Clatsop, Coos and Curry counties, and Douglas County was not surveyed. From these counts, Varoujean and Pitman (1980) estimated the breeding population in Oregon to be 1000 pairs. R. Lowe (unpubl. data) observed murrelets in May and July 1986–87 between Yaquina Bay and Yaquina Head during seabird surveys conducted in Tillamook and Lincoln coun-

ties (Table 1). No population estimates were made based on these sightings.

Varoujean and Williams (1987) conducted transects between Coos and Yaquina bays and found an average density of 12.9 murrelets/km<sup>2</sup> (SE = 2.1). The greatest aggregations occurred within 3 km of the entrances of rivers and bays (primarily Coos Bay and the Siuslaw River), instead of > 3 km from river mouths or along rocky shores. Using this average, Varoujean and Williams (1987) projected the breeding population size in Oregon to be 5100 individuals or roughly 2500 pairs. This figure was likely an overestimate of the state's population, as the area surveyed (roughly one-third of the Oregon Coast) represented coastal waters with disproportionately high densities of murrelets. Also, surveys conducted on consecutive days in the same area were highly variable (ranging from 3.5 to 28.1 birds/km<sup>2</sup>). These observations indicate difficulties in developing accurate population estimates for murrelets in Oregon.

Bayer (1986) did not observe any murrelets from the south jetty of the Yaquina River between 1 June and 20 August 1982. Reasons for their absence in that year were unknown. How-



**TABLE 2.** Marbled Murrelets recorded during systematic counts from the South Jetty of the Yaquina River, Oregon, 1982-83 (Bayer 1986).

Date	No. birds	Date	No. birds
1 Jun-20 Aug 1982 (N = 120 surveys)	0		
20 Apr 1983	2	5 Jul 1983	2
29 Apr 1983	0	6 Jul 1983	32
1 May 1983	0	7 Jul 1983	9
2 May 1983	0	8 Jul 1983	0
3 May 1983	0	9 Jul 1983	0
4 May 1983	2	14 Jul 1983	0
5 May 1983	0	15 Jul 1983	2
6 May 1983	0	16 Jul 1983	2
7 May 1983	0	17 Jul 1983	0
9 May 1983	0	18 Jul 1983	0
10 May 1983	0	19 Jul 1983	0
11 May 1983	0	20 Jul 1983	0
16 May 1983	0	21 Jul 1983	0
19 May 1983	0	22 Jul 1983	19
20 May 1983	0	28 Jul 1983	0
21 May 1983	0	29 Jul 1983	0
24 May 1983	0	31 Jul 1983	0
25 Jul 1983	0	1 Aug 1983	0
26 May 1983	0	4 Aug 1983	0
2 Jun 1983	0	6 Aug 1983	0
10 Jun 1983	0	9 Aug 1983	1
14 Jun 1983	0	10 Aug 1983	0
15 Jun 1983	0	12 Aug 1983	0
17 Jun 1983	0	13 Aug 1983	0
21 Jun 1983	0	15 Aug 1983	0
22 Jun 1983	0	16 Aug 1983	0
23 Jun 1983	0	17 Aug 1983	0
28 Jun 1983	0	18 Aug 1983	0
29 Jun 1983	0	9 Sep 1983	53

ever, he recorded a total of 124 birds between 29 April and 9 September 1983 in the lower Yaquina estuary and river mouth (Table 2). Murrelets were most abundant during July ( $\bar{x} = 3.9/\text{survey}$ ,  $n = 17$  censuses), and rare to non-existent throughout the remainder of the breeding season (only 1 seen on 21 censuses in June and August). No murrelets were counted during R. Bayer's (unpubl. data) Lincoln County estuary and lake surveys from 1974-1983. In addition, no recent observations of murrelets on lakes and estuaries in other areas of Oregon were reported. At present, murrelets appear to be rare in bays, estuaries and lakes along the entire coast.

In July 1985, M. L. C. McAllister counted 729 murrelets along a 21-km stretch of the coast from the mouth of the Yachats River to Heceta Head (Table 3). Birds in this area were concentrated at the mouths of three drainages, including the Yachats River, and Tenmile and Bob creeks. From this 5-day survey, the state population was estimated to be less than 4000 individuals.

Many observers throughout Oregon have considered the murrelet an uncommon seabird, although they have been observed reliably at several locations throughout the breeding season (April-August) on the north and central coast including the south jetty of the Columbia River, Cape Meares, Boiler Bay, Depoe Bay, Yaquina Head, the Umpqua River mouth, and Shoreacres State Park (see Appendix 2). In most cases, only one to six murrelets were observed from these locations. However, 50 or more murrelets have occasionally been sighted from some of these observation points on a single survey. Most of these areas are known as good birding spots, leading to the numerous records compiled there. However, other favorite birding locations on the south coast (Bandon, Port Orford) generally produced few sightings of murrelets. Murrelets were considered uncommon in Curry County in spring and summer (J. Rogers, personal communication), except along Euchre Creek, and the Pistol and Chetco Rivers (A. Thoresen, S. Heinl, P. Paton, pers. comm.).

Fewer observations of murrelets occurred in winter. Murrelets have been seen infrequently during Christmas Bird Counts (CBC). Bayer and Krabbe (1984) reported that murrelets were observed on only 10% of CBC's in Tillamook (1973-1982) and Coos Bay (1972, 1974-1982), and 25% of CBC's in Port Orford (1979-1982). None were recorded in the Columbia River (1979-1982), Yaquina Bay (1973-1982), or Gold Beach (1974-1980) CBC's. Seasonal shifts in distribution along the coast may partially account for the lower number of records during this time period. During late October and November, they often have been encountered flying rapidly southward among flocks of migrant seabirds and waterfowl (D. Fix, pers. comm.), and were more common along the southern coast in fall and winter than during the breeding season (J. Rogers, pers. comm.).

#### *Breeding records*

No nests of Marbled Murrelets have been discovered in Oregon. There are, however, three historical and one recent record of juvenile murrelets found at inland locations in the central Coast Range (Fig. 1).

Jewett (1930) and Gabrielson and Jewett (1940) reported that on 8 September 1918, A. B. Johnson found a dead fledgling along the upper north fork of the Siuslaw River near Minerva, 10 km inland from Heceta Head, Lane County. Gabrielson and Jewett (1940) and Jewett (1934b)

TABLE 3. Numbers of Marbled Murrelets observed at sea from shore during a five-day survey along the central Oregon Coast, 1985 (M. L. C. McAllister, unpubl. data).

Location	Date	No. birds	Time (PDT)	Notes
<b>Lincoln County</b>				
N. Yachats River	7 Jun 1985	17	1100-1230	7 pair, 3 singles
Yachats River mouth	7 Jun 1985	152	1230-1520	17 pair, 10 singles
S. Yachats River	7 Jun 1985	62	1520-1615	25 pair, 12 singles
Captain Cooks Chasm	8 Jun 1985	1	0730	
Yachats River mouth	10 Jun 1985	53	0800-0915	19 pair, 15 singles
Yachats River mouth	11 Jun 1985	52	0800-0900	14 pair, 21 singles, 1 group of 3
<b>Lane County</b>				
Sea Lion Point	9 Jun 1985	0	0800-1000	
Bob Creek mouth	9 Jun 1985	0	1830-1930	
Cummins Creek mouth	9 Jun 1985	20	1930-2100	10 pair
Strawberry Hill Viewpoint	10 Jun 1985	0	0930-1000	
N. Tenmile Creek	10 Jun 1985	114	1000-1025	39 pair, 16 singles, 4 groups of 3, 1 group of 8
S. Tenmile Creek	10 Jun 1985	16	1025-1035	7 pair, 2 singles
Bob Creek mouth	10 Jun 1985	5	1035-1050	2 pair, 1 single
China Creek mouth	10 Jun 1985	37	1050-1130	17 pair, 3 singles
Heceta Head	10 Jun 1985	1	1130-1200	1 single
Sea Lion Point	10 Jun 1985	0	1200-1230	
N. Tenmile Creek	11 Jun 1985	168	0900-0930	55 pair, 15 singles, 5 groups of 3, 2 groups of 4, 1 group of 5, 1 group of 6, 1 group of 9
Strawberry Hill Viewpoint	11 Jun 1985	22	0930-1000	8 pair, 6 singles
Gwynn Creek	11 Jun 1985	9	1000-1015	2 pair, 5 singles
Yachats River mouth	11 Jun 1985	0	1015-1045	

reported that on 4 September 1933, S. Jewett Jr. and L. Scott found a newly-hatched downy young, 1.6 km inland in a logged-off area adjacent to an old-growth stand of Sitka spruce (*Picea sitchensis*) at Devils Lake, Lincoln County. These juvenile murrelets were collected and placed in the J. R. Slater Museum of Natural History, University of Puget Sound (Tacoma, Washington) (Bayer 1989). On 22 July 1940, a logger picked up a downy young at the base of a cliff in a forested area 40 km up the south fork of the Coos River, Coos County (Barber 1941). On 21 September 1987, a live fledgling was discovered in a parking lot in the town of Siletz, Lincoln County, 14 km inland (Heinl 1988; R. Lowe, personal communication). This individual was released at Yaquina Bay the following day.

Marbled Murrelet breeding in Oregon has been further substantiated by sightings of live (off-shore) and dead (beached) juveniles along the coast. A total of 44 juvenile murrelets have been recorded off Clatsop, Tillamook, Lincoln, Lane, and Coos counties between 29 June and 21 Sep-

tember, and between 1933 and 1987 (Table 1; Appendices 2 and 4) (see also Varoujean and Williams [1987]). Sightings of juveniles off the Oregon Coast occur relatively frequently, however, and are often not reported in the literature or observers field notes. In addition to sightings of juveniles, adult murrelets have been observed carrying fish on flights inland during July at Coos Bay (Coos County) and at Young's Bay on the Columbia River (Clatsop County) (Appendix 2), and Varoujean and Williams (1987) captured 14 adults in 1986 and 1987 with fully developed brood patches.

#### Inland sightings

The first known inland observations of adult Marbled Murrelets in Oregon occurred in 1958. A. Thoresen (pers. comm.) detected 4-10 birds at dusk on a regular basis as they flew east past his house and up the Chetco River valley during summer 1958 (Fig. 1, Table 4, Appendix 5). F. Schrock and R. Gerig (pers. comm.) saw at least one pair of murrelets fly east over the parking



TABLE 4. Summary of inland observations of Marbled Murrelets in Oregon, 1958–1987.

Site location County	Land ownership	Total no.		No. surveys	No. surveys birds record- ed	Source
		Birds detected	Detec- tions			
Cape Lookout Tillamook Co.	State Park	2	1	1	1	R. Gerig (pers. comm.)
Chetco River Curry Co.	Private	360+ <sup>a</sup>	70+	70+	70+	A. Thoresen (pers. comm.)
Cummins Creek Lane Co. (1984)	Siuslaw NF	425+ <sup>a</sup>	51+	17	17	J. Anderson (pers. comm.)
Cummins Creek Lane Co. (1985–86)	Siuslaw NF	26	11	17	8	Nelson 1986
Gwynn Creek Lincoln Co.	Siuslaw NF	32	12	17	7	Nelson 1986
Prairie Peak Lane Co.	Salem BLM	3	2	15	2	Nelson 1986
Seits Ridge Lincoln Co.	Siuslaw NF	4	1	1	1	A. Contreras and R. Hoyer (pers. comm.) <sup>b</sup>
Yachats River Lincoln Co.	Private	7	3	4	3	Marshall 1988; M. McAllister (pers. comm.)
<b>Potential Nest Stands</b>						
Cape Creek Lincoln Co.	Siuslaw NF	20	14	4	4	M. McAllister (pers. comm.)
Honey Grove Benton Co.	Salem BLM	2	1	15	1	Nelson 1986
N. Fk. Rock Creek 1 Benton Co.	Siuslaw NF	14	8	15	4	Nelson 1986; Mattocks 1986
N. Fk. Rock Creek 2 Benton Co.	Siuslaw NF	20	9	19	8	Nelson 1986; Mattocks 1986
Remmy Creek Douglas Co.	Coos Bay BLM	136	36	27	13	Varoujean and Williams 1987
Rock Creek Benton Co.	City Corvallis	3	1	15	1	Nelson 1986
School Fork Lincoln Co.	Siuslaw NF	7	2	1	1	M. McAllister (pers. comm.)

<sup>a</sup> Exact number of detections unknown.

<sup>b</sup> Also cited in Heint 1988.

lot at Cape Lookout (Tillamook County) in spring 1979. In 1984, J. Anderson (pers. comm.) heard these alcids fly up and down the Cummins Creek drainage at dawn between 15 and 31 July. In 1985 and 1986, Nelson (1986) detected birds in seven of 49 (14%) inland forest stands. Nelson's (1986) observations occurred in five old-growth (>200 years) and two mature (80–200 years) forest study sites. No sightings occurred in young forests (<80 years). Between 1985 and 1987, A. Contreras and R. Hoyer (pers. comm.), M. L. C. McAllister, and Varoujean and Williams (1987) observed murrelets at five additional older-aged (≥60 yr) forest stands. These 14 sites ranged from 1 to 47 km inland and from the east side of Marys Peak, Benton County, south to the Chetco River, Curry County (Fig. 1). Eleven of the 14 sites occurred within the central Coast Range, in Lincoln, Benton or Lane counties. Generally, Marbled Murrelets were seen or heard as birds flew

over old-aged forest canopies or up inland river drainages at or shortly after dawn.

We classified seven of these sites as flight corridors and seven as occupied sites or potential nest stands (Fig. 1, Table 4). In total, a minimum of 221 detections involving >1059 birds were recorded at these 14 inland sites: 71 at occupied sites, and 150 along flight corridors. A majority (57%) of the inland sites were associated with old-growth forests (≥200 years) on moderate to steep slopes facing away from the prevailing northwesterly winds (Table 5).

#### *Inland activity patterns*

From information collected at these inland sites, several facts about Marbled Murrelet activity patterns in Oregon have been determined: (1) Murrelets have been seen or heard calling from roadsides and within forested stands, between 1 February and 31 December. The peak



TABLE 5. Characteristics of forest stands\* associated with inland observations of Marbled Murrelets in Oregon (see sites in Table 4).

Site name	Distance inland (km)	Average stand or drainage age (yr)	Average diameter (DBH, cm)	Average slope (%)	Aspect
<b>Flight Corridors</b>					
Cape Lookout <sup>b</sup>	<1	200			
Chetco River <sup>b</sup>	<1	60			
Cummins Cr.	3	200	48	30	SW
Gwynn Cr.	3	80	35	28	S
Prairie Peak	37	400	67	37	NW
Seits Ridge <sup>b</sup>	19	60			SE
Yachats River	2	60	35	40	N
<b>Potential Nest Stands</b>					
Cape Cr. <sup>b</sup>	1	200	60	45	NE
Honey Grove	42	225	59	16	NE
N. Fk. Rock Cr. 1	46	200	62	17	N
N. Fk. Rock Cr. 2	47	325	68	34	SE
Remmy Cr. <sup>c</sup>	39	300	65	40	N
Rock Cr. Dam	47	115	30	22	SE
School Fk. <sup>b</sup>	5	100	39	35	SE

\* Unless otherwise noted, data source includes the Old-Growth Wildlife Habitat Program, USDA For. Serv., Forest and Range Exp. Stn., Olympia, Washington, 98502.

<sup>b</sup> Habitat characteristics assessed from aerial photos (1987, Color Infrared, 1:18,000).

<sup>c</sup> Habitat summarized by Varoujean and Williams (1987).

period of detections occurred between 15 May and 31 July. (2) Birds were recorded between 0458 and 0810 (PDT) (Appendix 5). The earliest detections occurred 30 minutes prior to official sunrise and the latest observations were recorded 110 minutes after official sunrise. (3) Murrelets used flight corridors, primarily above coastal creeks, to initiate travel inland. Prominent and steep ridges may also have affected flight patterns to and from inland forested areas. (4) Observations occurred in older-aged Douglas-fir (*Pseudotsuga menziesii*) forests ( $\geq 60$  years), up to 47 km inland. Potential nest stands were greater than 100 years in age. (5) Numbers recorded varied considerably, both temporally and spatially. It appeared that murrelets sporadically visited inland forested stands (with the exception of some areas during the peak activity period in July; i.e., Cummins Creek and the Chetco River).

## DISCUSSION

### Population status

Murrelets along the coast of Oregon were clumped or patchy in distribution. The variation in numbers between the north, central, and south coast during the breeding season was determined to be associated with the distribution of inland older-aged forests (see also Nelson [1990]). This pattern was also documented in northern California (Sowls et al. 1980). In addition, concentrations of birds were most often located at the

mouths of rivers and creeks. They appeared to be rare in bays, estuaries, and lakes in contrast to Alaska, British Columbia, and Washington where use of these areas occurs more frequently (Sowls et al. 1978; Sealy and Carter 1984; Carter and Sealy 1986; Speich et al., this volume). Although most surveys and incidental observations occurred along the central coast from Cape Meares south to Coos Bay, the largest aggregations within this area were located between Yaquina and Heceta heads. Other concentrations of murrelets along the central coast occurred off Cape Meares, Tillamook County, and Boiler and Depoe bays, Lincoln County. The coast north of Seaside and south of Coos Bay have not been extensively surveyed, but occasional concentrations of murrelets have been sighted off the mouth of the Columbia River on the north coast and at the mouths of Euchre Creek and the Chetco River on the south coast. For the most part, however, they appear to be loosely scattered and occur in relatively low numbers along the north and south coast (see also Nelson [1990]).

Since 1970, the distribution of incidental at-sea sightings have coincided with historic information, except that large numbers are now rarely reported from the mouth of the Columbia River, Yaquina Bay, and Tillamook County. Cantwell (Taylor 1921) reported that they were common at the mouth of the Columbia River (Clatsop County) in mid May, where he collected three



females containing eggs in their oviducts. Current observers (J. Gilligan, T. Love, H. Nehls, pers. comm.), however, reported seeing murrelets only irregularly in this area; murrelet occurrence was unpredictable and infrequent. In addition, few to none were recorded during aerial and from-shore surveys in 1980, 1983, and 1989 (Hazel 1981; Speich et al., this volume; S. K. Nelson, unpubl. data). At Yaquina Bay, historically, Woodcock (1902) and Gabrielson and Jewett (1940) reported murrelets as common, whereas more recent reports listed them as rare (R. Bayer 1986, unpubl. data). Murrelets also appear to be less common in Tillamook County than previously reported by Gabrielson and Jewett (1940) and Bayer and Ferris (1987). These are some indications that suggest populations in Oregon may have declined.

After a careful review of the data from offshore counts of this species presented herein and more recent land-based surveys from selected observation points along the north, central, and south coast, 1988–1990 (S. K. Nelson, unpubl. data), we believe that less than 1000 pairs of murrelets occur in Oregon. More than 70% of these birds occur between Yaquina and Heceta heads in association with the largest remaining older-aged forests in the Coast Ranges.

#### *Conservation problems*

Three major threats to murrelet populations have been identified: gill-net fishing, oil pollution, and harvesting of old-growth forests (Sealy and Carter 1984, Marshall 1988). Gill-net fishing was outlawed in estuaries and bays along the Oregon Coast before 1942, and currently occurs only in the Columbia River. No records of murrelets killed in gill-nets were discovered. The threat of the gill-net fishing mortality to murrelet populations in Oregon is minimal at present.

Three major oil spills have occurred in Oregon's coastal waters and rivers: the 1978 *Toyota Maru* spill in the Columbia River, the November 1983 *Blue Magpie* spill in Yaquina Bay, and the March 1984 *Mobil* oil tanker spill in the Columbia River near St. Helens (United States Coast Guard 1978, United States Fish and Wildlife Service 1984, Kennedy and Baca 1985). For the most part, the extent of seabird mortality from these spills was not documented and searches for carcasses were limited (but see Speich and Thompson [1987], Bayer [1988]). No official records (published or unpublished) of murrelet mortality were discovered; however, beached bird

surveys following the 1983 *Blue Magpie* spill revealed that a minimum of 2 murrelets died (Appendix 4). Other undocumented murrelet mortality probably occurred as in each case oil reached the open ocean polluting preferred nearshore feeding habitat of this species. Oil spills from tankers and proposed offshore development have the potential to greatly impact murrelet populations.

The widespread conversion of old-growth and mature forests to younger, even-aged forests throughout the Oregon Coast Ranges has been proceeding at a rapid rate over the last 50 years (2.5% annual harvest rate of old-growth) (Morrison 1988). Less than 5% of the forests in this area are >200 years in age (<115,340 ha) and less than 31% are >100 years in age (Haynes 1986, Morrison 1988). In addition, the remaining older-aged forests are currently being severely fragmented. As an example, on the Siskiyou National Forest 44% of the scattered old-growth patches were <32 ha in size or within 122 m of a road or clearcut (Morrison 1988). Small stand size may decrease reproductive success and increase predation at nest sites. The concurrent change in tree species composition from Sitka spruce to Douglas-fir forests within a few kilometers of the shoreline may also impact murrelet populations. We believe that dense, large, tall, moss covered spruce trees located close to the ocean in the *Picea sitchensis* Zone (Franklin and Dyrness 1973) provided excellent nesting habitat for this species along most of the north and central Oregon Coast.

Evidence provided by recent and historical records suggests that the center of abundance for Marbled Murrelets in Oregon occurs along the central Coast and inland Coast Range, in Lincoln, Lane, Benton, and southern Tillamook counties. The concentration of murrelets in this region was associated with the presence of suitable nesting habitat, and the abundance of coastal rivers along this part of the shoreline. Old-growth and mature forest stands provide critical nesting habitat while waters north and south of the mouths of rivers and bays provide needed foraging habitat. The central Oregon Coast contains some of the largest remaining tracts of old-growth and mature forest habitat. The largest remaining tracts of older-aged forest in this area occur within the Siuslaw National Forest (<12,600 ha of old-growth) and on Bureau of Land Management lands (31,445 ha; includes Douglas County) (Morrison 1988; D. Preston,



pers. comm.). Two smaller old-growth stands (<40 ha total) are located on lands managed by the Oregon State Parks (Neptune) and Nature Conservancy (Cascade Head).

Although the northern Oregon Coast (Clatsop and northern Tillamook counties) has numerous coastal rivers, the adjacent forest lands are owned principally by private timber companies and now contain virtually no old-growth forest. The only remaining pockets of old-growth on the north coast occur in: six areas managed by the Oregon State Parks (Saddle Mountain, Ecola, Oswald West, Cape Meares, Cape Lookout, Van Duzer Corridor); one Tillamook County Park (Munson Creek Falls); and two small stands managed by The Nature Conservancy (Rockaway Natural Area, Tillamook Head) (Morrison 1988). Marbled Murrelets were uncommon both inland and at sea along this portion of the coast.

Although the southern Oregon Coast (south of Coos Bay) has numerous scattered tracts of old-growth forest (Morrison 1988), this region is characterized by rocky shorelines, headlands, sand dunes, and fewer coastal rivers. This area is considered to be part of the Klamath Mountain Province (Franklin and Dyrness 1973), which is physiographically distinct from the Oregon Coast Ranges Province to the north. Due to the differing environmental conditions and unique geologic history of the Siskiyou Mountains in this Province, coastal forests are characterized by greater floristic diversity, more xeric conditions, and a narrower Sitka spruce zone compared to the north coast (Franklin and Dyrness 1973). Recent inland surveys in the Siskiyou Mountains (Nelson 1990, unpubl. data) indicated that murrelets were present in the mature and old-growth mixed-conifer forests of this area, although they occurred in lower numbers than the central coast. Murrelets were also more widely scattered, accounting in part for fewer offshore and inland observations along the south coast.

The greatest threat facing the Marbled Murrelet is the limited understanding of its abundance, distribution, demography, behavior, and habitat preferences both at sea and inland (Marshall 1988). In Oregon and elsewhere in the Pacific Northwest, all available information indicates that nesting sites are associated with older-aged forests (Paton and Ralph 1988; Nelson 1990; Carter and Erickson, this volume; Leschner and Cummins, this volume). Murrelet nesting habitat may already be severely restricted in Oregon, and the continued loss and fragmentation of old-

er-aged forests poses a serious threat to the continued survival of the species. Time is of the essence for answering many questions about the biology of this unique species and preserving nesting habitat.

## EPILOG

Since 1987, seven Marbled Murrelet tree nests were discovered in mature and old-growth forests of the central Oregon Coast Range. All nests were located in old-growth Douglas-fir ( $n = 6$ ) or Sitka spruce ( $n = 1$ ) trees >152 cm in diameter and >50 m in height. In addition, extensive surveys to determine the distribution of the murrelet in western Oregon have been conducted (Nelson 1990). The murrelet was found to be most abundant in old-growth forests (mean tree diameter  $\geq 82$  cm) and did not use forests with trees <46 cm in diameter. These new research findings support the data and positions presented in this paper.

## ACKNOWLEDGMENTS

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APPENDIX 1. Site-specific information for Marbled Murrelets in Oregon. The Oregon Natural Heritage Data Base Program, 1205 NW 25th, Portland, OR 97210.

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Site Name:	Mary's Peak
County, State:	Benton County, Oregon
Name:	<i>Brachyramphus marmoratus</i>
Common name:	Marbled Murrelet
Species Record #:	007
Township	012S
Range:	007W
Section(s):	11, 13, 14
Latitude:	443155
Longitude:	1233020
Quad Name:	Mary's Peak, Wren
Directions to Site:	Mary's Peak-North Fork Rock Creek and Rock Creek Reservoir. Hwy. 34, south 8 km from Philomath to Rock Creek Road (FS RD# 3405), then 5.6 km to Forest Service Road #3409, continue 1.6 km to stand.
1st Observation at this site:	1986
Most Recent Observation at this site:	1988
Habitat:	Old-growth Douglas-fir forest. Three stands 16-19 ha in size, aged 115, 200 and 325 years, located 45-47 km from the coast. Majority of the birds in the 325 year old stand.
Elevation:	244 m
Data:	1985: No birds heard 1986: Total of 34 birds reported during spring 1986, not more than 4 in a single group; reports based on 10 aural and 4 visual detections. Birds initiated circular flight from stand interior between 0520-0730 PDT, circled the stand several times, and flew rapidly towards west on each occasion.
Comments:	No nests located, but nesting suspected due to regular sightings of adult murrelets here during breeding season.
Ownership:	Alsea Ranger District, Siuslaw National Forest
Reference:	Nelson, S. K. 1986. Observations of Marbled Murrelets in inland, old-aged forests of western Oregon. U.S. Dep. Agric., For. Serv., Pacific Northwest Exp. Stn., Olympia, Washington, Contr. No. 54.

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APPENDIX 2. At-sea records of Marbled Murrelets in Oregon, 1923-1987.

Location	Date	No. birds	Notes	Source
<b>Clatsop County</b>				
Off Seaside	23 Sep 1932	1+	common	Jewett 1932
S. Jetty Columbia River	21 May 1965	6		H. Nehls (pers. comm.)
S. Jetty Columbia River	23 May 1965	3		H. Nehls (pers. comm.)
S. Jetty Columbia River	13 Aug 1966	4		Crowell and Nehls 1966
S. Jetty Columbia River	13 May 1967	4		H. Nehls (pers. comm.)
S. Jetty Columbia River	18 May 1968	4		H. Nehls (pers. comm.)
North Coast	Jun 1971	2+		Crowell and Nehls 1971
Columbia River mouth	26 Jun 1971	6		J. M. Scott (pers. comm.)
Columbia River mouth	27 Jun 1971	8		J. M. Scott (pers. comm.)
Columbia River mouth	28 Jun 1971	7		J. M. Scott (pers. comm.)
Columbia River mouth	23 Jul 1971	2+	Youngs Bay, with fish	Crowell and Nehls 1971; Marshall 1988
North Coast	Aug 1971	2+		Crowell and Nehls 1971
S. Jetty Columbia River	6 May 1972	1+		B. Lucas (pers. comm.)
S. Jetty Columbia River	4 May 1974	4+	2 pair, 1+ individuals	B. Lucas, H. Nehls (pers. comm.)
S. Jetty Columbia River	10 May 1974	1		H. Nehls (pers. comm.)
S. Jetty Columbia River	13 Sep 1975	1	winter plumage	H. Nehls, D. Fix (pers. comm.)
Columbia River mouth	15-31 May 1976	25+		Crowell and Nehls 1976
S. Jetty Columbia River	31 May 1976	6	3 pair	H. Nehls (pers. comm.)
S. Jetty Columbia River	8 May 1977	1+		B. Stotz, G. Gillson (pers. comm.)
S. Jetty Columbia River	1 Jun 1976	3		H. Nehls (pers. comm.)
S. Jetty Columbia River	16 Oct 1976	6	flying out mouth	H. Nehls (pers. comm.)
Columbia River mouth	12 Nov 1976	14		H. Nehls (pers. comm.)
S. Jetty Columbia River	27 Nov 1976	2		H. Nehls (pers. comm.)
S. Jetty Columbia River	21 May 1977	2		H. Nehls (pers. comm.)
S. Jetty Columbia River	17 Jun 1977	8		H. Nehls (pers. comm.)
Columbia River mouth	30 Jul 1977	1		H. Nehls (pers. comm.)
S. Jetty Columbia River	21 Aug 1977	1+	1 in partial alternate plumage	D. Fix (pers. comm.)
S. Jetty Columbia River	6 May 1978	5-6		D. Fix (pers. comm.)
S. Jetty Columbia River	15 Jul 1978	2		H. Nehls (pers. comm.)
S. Jetty Columbia River	29 Jul 1978	1		H. Nehls (pers. comm.)
S. Jetty Columbia River	12 May 1979	8+	4 pair (2 pair flying northward past jetty), 1+ individuals	D. Fix, B. Lucas (pers. comm.)
S. Jetty Columbia River	13 May 1979	6		H. Nehls (pers. comm.)
S. Jetty Columbia River	9 Jun 1979	2		H. Nehls (pers. comm.)
S. Jetty Columbia River	25 Aug 1979	3		T. Crabtree (pers. comm.)
S. Jetty Columbia River	20 Oct 1979	1+		B. Lucas (pers. comm.)
S. Jetty Columbia River	4 May 1980	8		J. Gilligan, D. Irons (fide H. Nehls)
S. Jetty Columbia River	1 Jun 1980	1+	many	T. Mickel (fide H. Nehls)
S. Jetty Columbia River	22 Jun 1980	1		H. Nehls (pers. comm.)
S. Jetty Columbia River	28 Jun 1980	5	flying north	H. Nehls (pers. comm.)
S. Jetty Columbia River	26 Jun 1981	6		H. Nehls (pers. comm.)
Clatsop Spit	30 Aug 1981	1		R. and J. Krabbe (pers. comm.)
S. Jetty Columbia River	1 Jun 1983	2		H. Nehls (pers. comm.)
S. Jetty Columbia River	24 Jun 1983	5		H. Nehls (pers. comm.)
S. Jetty Columbia River	Dec 1983	1+		B. Bellin (pers. comm.)
Columbia River mouth	13 Apr 1984	3	serial survey	Speich et al. (this volume)

## APPENDIX 2. Continued.

Location	Date	No. birds	Notes	Source
S. Jetty Columbia River	22 Jun 1984	3		H. Nehls (pers. comm.)
S. Jetty Columbia River	12 Jul 1984	1		H. Nehls (pers. comm.)
S. Jetty Columbia River	15 Jul 1984	1+		B. Toelle (fide H. Nehls)
S. Jetty Columbia River	29 Sep 1984	1	winter plumage	H. Nehls (pers. comm.)
S. Jetty Columbia River	17 Apr 1985	2		H. Nehls (pers. comm.)
S. Jetty Columbia River	17 Jul 1985	2		H. Nehls (pers. comm.)
S. Jetty Columbia River	20 Jul 1985	25		B. O'Brien (fide E. Eltzroth)
S. Jetty Columbia River	23 Jul 1985	2	adult with juvenile	T. Crabtree, T. Love (fide H. Nehls)
S. Jetty Columbia River	27 Jul 1985	40+		S. Heinl, M. Hunter (pers. comm.)
S. Jetty Columbia River	31 Jul 1985	1		H. Nehls (pers. comm.)
S. Jetty Columbia River	21 May 1986	4		H. Nehls (pers. comm.)
S. Jetty Columbia River	8 Jun 1986	50		P. Pickering (fide E. Eltzroth)
S. Jetty Columbia River	28 Jun 1986	6		D. Bates (fide H. Nehls)
S. Jetty Columbia River	2 Jul 1986	3		H. Nehls (pers. comm.)
S. Jetty Columbia River	23 Jul 1986	1		H. Nehls (pers. comm.)
S. Jetty Columbia River	10 Sep 1986	1		S. Heinl (pers. comm.)
S. Jetty Columbia River	21 Sep 1986	1		T. Shelmerdine (pers. comm.)
North Coast	Oct 1986	1+	few	Fix 1987
S. Jetty Columbia River	9 May 1987	14		H. Nehls, T. Mickel, R. Maertz, B. Stotz, G. Gillson (pers. comm.)
Columbia River mouth	10 May 1987	3	pelagic trip	B. Stotz, G. Gillson, P. Sullivan (pers. comm.)
Hammond	10 May 1987	2	pelagic trip	B. Stotz, G. Gillson (pers. comm.)
S. Jetty Columbia River	13 May 1987	1		H. Nehls (pers. comm.)
S. Jetty Columbia River	18 May 1987	1+	several	B. Stotz (pers. comm.)
S. Jetty Columbia River	8 Jun 1987	4+	several pairs seen and heard displaying	Pickering 1987
S. Jetty Columbia River	22 Jul 1987	1		H. Nehls (pers. comm.)
S. Jetty Columbia River	26 Jul 1987	1		P. Sullivan (pers. comm.)
Tillamook County				
Tillamook Bay	3 Jan 1964	6	record high for Christmas bird count before 1965	Cruickshank 1965; Contreras 1977
Nehalem	15-19 Jun 1964	5		Boggs and Boggs 1964
Tillamook Bay	3 Jan 1965	6		Cruickshank 1965
Tillamook Bay	26 Dec 1966	3		Cruickshank 1967
Barview Jetty, Tillamook Bay	10 Jun 1967	3		H. Nehls (pers. comm.)
Barview Jetty, Tillamook Bay	27 Aug 1968	2	adult with juvenile	Crowell and Nehls 1968; H. Nehls (pers. comm.)
Barview Jetty, Tillamook Bay	13 Nov 1970	6		H. Nehls (pers. comm.)
Cape Meares	3 Aug 1971	6	from boat	H. Nehls (pers. comm.)
Cape Meares	2 Aug 1972	1+		B. Lucas (pers. comm.)
Cape Meares	30 Aug 1975	3	adult with 2 juveniles	H. Nehls (pers. comm.)
Cape Meares	6 Aug 1977	2		J. Gilligan (fide H. Nehls)
Barview Jetty, Tillamook Bay	21 Sep 1977	3	adult with 2 juveniles	H. Nehls (pers. comm.)
S. Jetty Tillamook River	11 Feb 1978	2		H. Nehls (pers. comm.)
Cape Meares	12 Aug 1978	1+		J. Gilligan (fide H. Nehls)
Tillamook Bay	16 Dec 1978	2		Heilbrun and McQueen, 1979



## APPENDIX 2. Continued.

Location	Date	No. birds	Notes	Source
Cape Meares	28 Apr 1979	6	3 pairs, breeding plumage	D. Fix (pers. comm.)
Cape Meares	29 Apr 1979	6		H. Nehls (pers. comm.)
Cape Meares	5 May 1979	2		D. Irons (fide H. Nehls)
Cape Meares	12 May 1979	2		D. Rogers (fide H. Nehls)
Cape Meares	25 Aug 1979	2		J. Carlson (pers. comm.)
Cape Meares	31 Aug 1979	8		D. Fix (pers. comm.)
Barview Jetty, Tillamook Bay	22 Mar 1980	5	flying north	H. Nehls (pers. comm.)
Cape Meares	10 May 1980	2		D. Irons, J. Gilligan (fide H. Nehls)
Cape Meares	2 Aug 1980	1+	many	J. Gilligan, T. Crabtree, O. Swisher (fide H. Nehls)
Cape Meares	17 Aug 1980	2		A. Contreras (pers. comm.)
Cape Meares	1 Sep 1980	2		T. Mickel (pers. comm.)
Cascade Head	1 Sep 1980	1+		R. and J. Krabbe (pers. comm.)
Cape Meares	13 Sep 1980	2		T. Mickel (pers. comm.)
Cape Falcon	Aug 1981	1+		D. Kapan (pers. comm.)
Tillamook Bay	Aug 1981	1		B. Bellin (pers. comm.)
Cape Meares	8 Aug 1981	1+	many	J. Gilligan, O. Swisher (fide H. Nehls)
Cape Meares	19 Aug 1981	1+		C. Watson (pers. comm.)
Tillamook Head	29 Aug 1981	1+		R. and J. Krabbe (pers. comm.)
Cape Meares	29 Aug 1981	2		Ramsey 1981, R. and J. Krabbe (pers. comm.)
Cape Meares	30 Aug 1981	1+		B. Combs (pers. comm.)
Cape Meares	12 Sep 1981	3		T. Mickel (pers. comm.)
Tillamook Head	30 Dec 1981	1		R. and J. Krabbe (pers. comm.)
Cape Meares	21 Aug 1982	1+		B. Combs (pers. comm.)
Garibaldi	28 Aug 1982	18	pelagic trip	R. and J. Krabbe (pers. comm.)
Cape Meares	1 Sep 1982	30		H. Nehls (pers. comm.)
Tillamook Head	18 Sep 1982	1+		R. and J. Krabbe (pers. comm.)
Cape Meares	3 Oct 1982	12		D. Fix (pers. comm.)
Barview Jetty, Tillamook Bay	9 Jul 1983	1		H. Nehls (pers. comm.)
Cape Meares	6 Aug 1983	20		J. Gilligan (fide H. Nehls)
Cape Meares	12 Aug 1983	1+		B. Combs (pers. comm.)
Cape Meares	13 Aug 1983	5	approaching basic plumage	S. Heintz (pers. comm.)
Cape Meares	20 Aug 1983	15		D. Parmen (fide H. Nehls)
Cape Meares	4 Sep 1983	1+		B. Combs (pers. comm.)
Tillamook Bay	5 Sep 1983	1+		R. and J. Krabbe (pers. comm.)
Manzanita	24 Sep 1983	50		Irons 1984
Cape Meares	28 Apr 1984	3		R. and J. Krabbe (pers. comm.)
Manzanita	7 May 1984	1+	many	T. Crabtree (fide H. Nehls)
Cape Meares	12 May 1984	1+	many	J. Gilligan (fide H. Nehls)
Cape Lookout	12 May 1984	1+	many	J. Gilligan (fide H. Nehls)
Manzanita	10 Aug 1984	1+	many	T. Crabtree (fide H. Nehls)
Cape Meares	17 Aug 1984	1+		B. Combs (pers. comm.)
Cape Meares	1 Sep 1984	2+		R. Gerig (pers. comm.)
Garibaldi	21 Oct 1984	1	pelagic trip	V. Teale (pers. comm.)
Cape Meares	4 Sep 1985	4		H. Nehls (pers. comm.)
Cape Meares	22 Sep 1984	30		Fix 1985a, J. Gatchet (fide H. Nehls)
Manzanita	30 Mar 1985	2		T. Crabtree (fide H. Nehls)
Cape Meares	28 Apr 1985	2		J. Gatchet (fide H. Nehls)
Harts Cove	11 Jun 1985	8	4 pair	M. McAllister (pers. comm.)

## APPENDIX 2. Continued.

Location	Date	No. birds	Notes	Source
Cape Meares	7 Jul 1985	1		M. Patterson (pers. comm.)
Cape Meares	13 Jul 1985	1		M. Hunter (pers. comm.)
Cape Meares	18 Aug 1985	2		S. Heint (pers. comm.)
Cape Meares	14 Sep 1985	2		D. Swanson (pers. comm.)
Garibaldi	14 Sep 1985	10		J. Johnson (fide H. Nehls)
Cape Meares	11 Oct 1985	1	1000 PDT	T. Shelmerdine (pers. comm.)
Barview Jetty, Tillamook Bay	26 Feb 1986	2		H. Nehls (pers. comm.)
Cape Meares	8 Jul 1986	1		H. Nehls (pers. comm.)
Cape Meares	17 Aug 1986	2		P. Sullivan (pers. comm.)
Cape Meares	30 Aug 1986	8		R. Gerig (pers. comm.)
Cape Meares	13 Oct 1986	2		B. Stotz (fide H. Nehls)
Cape Meares	18 Sep 1987	27		B. Stotz (fide H. Nehls)
S. Jetty Tillamook Bay	18 Sep 1987	1		B. Stotz (fide H. Nehls)
Nestucca River mouth	21 Nov 1987	3+		M. McAllister (pers. comm.)
Cape Meares	4 Dec 1987	2		T. Staudt (fide H. Nehls), T. Shelmerdine (pers. comm.)
Lincoln County				
Newport	20 Jul 1923	1+	few	I. Gabrielson (fide R. Bayer)
Yaquina River mouth	6 Jul 1926	1+	few, from boat	I. Gabrielson (fide R. Bayer)
Newport	20 Jul 1931	15-18	seen over bar	Jewett 1931
Depoe Bay to Otter Rock	19 Aug 1932	2+		Bayer and Ferris 1987
Depoe Bay	25-27 Aug 1933	3	pair with juvenile	Jewett 1933
Depoe Bay	9 Sep 1933	2	adult and juvenile at sea	Jewett 1933
Depoe Bay	28 Jun 1934	1+		R. Bayer (pers. comm.)
Depoe Bay	24-25 Aug 1934	1+	uncommon	Jewett 1934a
Depoe Bay	25 May 1936	1		Bayer and Ferris 1987
Salmon River	3 Jun 1937	2+		Bayer and Ferris 1987
Depoe Bay	8 Jun 1937	2+		Bayer and Ferris 1987
Depoe Bay	16 Jul 1937	2	juveniles	R. Bayer (pers. comm.)
Depoe Bay	8 Sep 1940	1	at sea	S. Jewett (fide R. Bayer)
Depoe Bay	22 Sep 1940	5	offshore	S. Jewett (fide R. Bayer)
Sea Rocks	19 May 1966	7		Crowell and Nehls 1968
S. Jetty Yaquina Bay	3 Aug 1968	3	in winter plumage; with Ancient Murrelets	Crowell and Nehls 1968
Yaquina Head	9 May 1969	1		J. M. Scott (pers. comm.)
S. of Yaquina Head	16 May 1969	2	pair	J. M. Scott (pers. comm.)
N. of Yaquina Jetty	16 May 1969	2	0.37 km north of jetty, flying north	J. M. Scott (pers. comm.)
Yaquina Jetty to Sea Buoy	23 May 1969	3		J. M. Scott (pers. comm.)
Yaquina Bay to Seal Rock	20 Jun 1969	2		J. M. Scott (pers. comm.)
N. of Yaquina Bay	27 Jun 1969	1	0.8 km north of bay, flying south	J. M. Scott (pers. comm.)
N. of Yaquina Jetty	15 Aug 1969	2	4.8 km north of jetty	J. M. Scott (pers. comm.)
N. of Sea Buoy	20 Oct 1969	3	0.8 km north of buoy on water	J. M. Scott (pers. comm.)



## APPENDIX 2. Continued.

Location	Date	No. birds	Notes	Source
Boiler Bay	15 Aug 1970	7		Crowell and Nehls 1970
Yaquina Head	8 May 1971	2		R. Bayer (pers. comm.)
N. of Yaquina Jetty	10 May 1971	1	0.4 km north of jetty	J. M. Scott (pers. comm.)
W. of Yaquina Jetty	11 May 1971	1	0.8 km north of jetty, breeding plumage	J. M. Scott (pers. comm.)
Boiler Bay	19 May 1971	1		H. Nehls (pers. comm.)
N. of Yaquina Head	20 Jun 1971	1	breeding plumage	J. M. Scott (pers. comm.)
N. of Yaquina Head	22 Jun 1971	3	breeding plumage	J. M. Scott (pers. comm.)
W. of Gull Rock	26 Jun 1971	2	1.6 km west of Gull Rock, breeding plumage	J. M. Scott (pers. comm.)
Yaquina Head	2 Jul 1971	1	juvenile, diving	J. M. Scott (pers. comm.)
Near Night Rock	10 Jul 1971	1	juvenile	J. M. Scott (pers. comm.)
N. of Yaquina Head	11 Jul 1971	1	diving	J. M. Scott (pers. comm.)
N. of Yaquina Head	16 Aug 1971	5	1 juvenile or winter plumage	J. M. Scott (pers. comm.)
S. of Yaquina Head	17 Aug 1971	8	4 pairs, possibly up to 10 pairs	J. M. Scott (pers. comm.)
Yaquina Head	17 Aug 1971	5		R. Bayer (pers. comm.)
Yaquina Head	26 Sep 1971	3	under Hwy 101	D. MacDonald (pers. comm.)
Yaquina Bay	Mar 1975	1	bridge	D. Faxon (pers. comm.)
Newport to Cape Foulweather	16 Jun 1971	10	from boat	H. Nehls (pers. comm.)
Yachats	27 Jul 1975	1+		R. Bayer (pers. comm.)
Newport	28-29 Jul 1975	1	pelagic trip	Crowell and Nehls 1975
Newport	21 Aug 1975	1+		G. Gillson (pers. comm.)
Newport	22 Aug 1975	1+		G. Gillson (pers. comm.)
Depoe Bay	21 Apr 1976	1+	many	R. Bayer (pers. comm.)
Yaquina Head	23 May 1976	1+		C. Watson (pers. comm.)
Yaquina Head	18 Aug 1976	3		C. Watson (pers. comm.)
Boiler Bay	12 Nov 1976	1+		G. Gillson (pers. comm.)
Yaquina Bay	11 Dec 1976	1+		R. Bayer (pers. comm.)
Yaquina Head	4 Aug 1977	2+		R. Bayer (pers. comm.)
Beverly Beach State Park	10 Sep 1977	2		R. Bayer (pers. comm.)
Yaquina Head	8 Jul 1978	6		H. Nehls (pers. comm.)
Boiler Bay	18 Jul 1978	3		R. Bayer (pers. comm.)
Seal Rocks	26 Aug 1978	13	pelagic trip	G. Gillson (pers. comm.)
Depoe Bay	26 Aug 1978	60		E. and E. Eltzroth (pers. comm.)
Yaquina Head	26 Sep 1978	1+		R. Bayer (pers. comm.)
Yaquina Head	12 Nov 1978	1+		R. Bayer (pers. comm.)
Whale Cove	13 Mar 1979	2		R. Smith (fide H. Nehls)
Yaquina Head	21 Apr 1979	1+		R. Bayer (pers. comm.)
Yaquina Head	Jun 1979	1+		R. Bayer (pers. comm.)
Yaquina Head	Jul 1979	1	juvenile	B. Olson (fide H. Nehls)
Yaquina Head	26 Aug 1979	10		E. and E. Eltzroth (pers. comm.)
Yaquina Bay	11 Oct 1979	1		Watson 1980a
Yaquina Bay	8 Dec 1979	2		R. Bayer (pers. comm.)
Yaquina Head	Feb 1980	1+		M. Sawyer (pers. comm.)

## APPENDIX 2. Continued.

Location	Date	No. birds	Notes	Source
Yaquina Head	2 Feb 1980	8		R. Bayer (pers. comm.)
Yaquina Head	21 Feb 1980	8		Watson 1980b
Yaquina Head	23 Feb 1980	1+		R. Bayer (pers. comm.)
Yaquina Head	1 Mar 1980	1		D. Irons (fide H. Nehls)
Yachats	19 Jun 1980	5		C. Watson (pers. comm.)
Boiler Bay	8 Jul 1980	1	winter plumage or juvenile	H. Nehls (pers. comm.)
Boiler Bay	22 Aug 1980	1+		R. Bayer (pers. comm.)
Waldport	23-24 Aug 1980	2	Coastal Birding Weekend	R. and J. Krabbe (pers. comm.)
Yaquina Head	23-24 Aug 1980	7	Coastal Birding Weekend	R. and J. Krabbe (pers. comm.)
Yaquina Head	1 Sep 1980	1+		R. and J. Krabbe (pers. comm.)
Yaquina Head	22 Sep 1980	1+		R. and J. Krabbe (pers. comm.)
Yaquina Head	8 Feb 1981	1		R. Bayer (pers. comm.)
Yaquina Head	8 Mar 1981	1+		R. Bayer (pers. comm.)
Yaquina Head	4 Apr 1981	1		R. and J. Krabbe (pers. comm.)
Yaquina Head	18 Apr 1981	2		R. and J. Krabbe (pers. comm.)
Newport to Waldport	19 Apr 1981	1+		R. and J. Krabbe (pers. comm.)
Yaquina Head	25 Apr 1981	1+		R. and J. Krabbe, R. Bayer (pers. comm.)
Yaquina Head	9 Jul 1981	1+		C. Watson (pers. comm.)
S. of Yaquina Head	Aug 1981	12		Ramsey 1981, C. Marsh (fide E. Eltzroth)
Yaquina Head	15 Aug 1981	1+		L. Paul (fide H. Nehls)
Yaquina Head	20 Aug 1981	2		A. Contreras (pers. comm.)
Yaquina Head	12 Sep 1981	7		R. Bayer (pers. comm.)
Yaquina Head	13 Sep 1981	4		T. Mickel (pers. comm.)
Cape Perpetua	8 Nov 1981	1		T. Mickel (pers. comm.)
Yaquina Head	20 Mar 1982	3		R. and J. Krabbe (pers. comm.)
Yaquina Head	27 Mar 1982	1+		C. Marsh (fide H. Nehls)
S. Jetty Yaquina River	3 Apr 1982	2		R. and J. Krabbe (pers. comm.)
Yaquina Head	10 Apr 1982	4		R. and J. Krabbe (pers. comm.)
Yaquina Head	26 Apr 1982	2		R. and J. Krabbe (pers. comm.)
Boiler Bay	2 May 1982	2		R. and J. Krabbe (pers. comm.)
Yaquina Head	8 May 1982	1		R. Bayer (pers. comm.)
Yachats	20 Jun 1982	8		T. Mickel (pers. comm.)
Yachats	21 Jul 1982	5	with 1 Ancient Murrelet pelagic trip	Harrison-Tweet et al. 1982
Newport	28 Jul 1982	6		R. and J. Krabbe (pers. comm.)
Yaquina Head	31 Jul 1982	2		R. Bayer (pers. comm.)
Yaquina Head	1 Aug 1982	2		R. Bayer (pers. comm.)
S. Jetty Yaquina River	3 Aug 1982	1		S. Heintz (pers. comm.)
Waldport	3 Aug 1982	1+		R. and J. Krabbe (pers. comm.)
Yaquina Bay	4 Aug 1982	6	3 adults with 3 juveniles	H. Nehls (pers. comm.)



## APPENDIX 2. Continued.

Location	Date	No. birds	Notes	Source
Yaquina Head	8 Aug 1982	1+		R. Bayer (pers. comm.)
Yaquina Head	19 Aug 1982	1+		R. Bayer (pers. comm.)
Yaquina Head	26 Aug 1982	1+		C. Watson (pers. comm.)
Yaquina Head	6 Nov 1982	6		R. and J. Krabbe (pers. comm.)
Boiler Bay	18 Nov 1982	10		R. Bayer (pers. comm.)
Yaquina Head	21 Nov 1982	1		R. and J. Krabbe (pers. comm.)
Yaquina Head	11 Dec 1982	6		R. Bayer, R. and J. Krabbe (pers. comm.)
Yaquina Head	3 Feb 1983	2		R. and J. Krabbe (pers. comm.)
Yaquina River jetties	24 Feb 1983	1+		R. Bayer (pers. comm.)
Yaquina Head	9 Apr 1983	1+		R. Bayer (pers. comm.)
Boiler Bay	19 Apr 1983	8		R. Bayer (pers. comm.)
S. Jetty Yaquina River	6 Jul 1983	110	unusual occurrence	R. Bayer (pers. comm.)
Yaquina Head	9 Jul 1983	1+		R. Bayer (pers. comm.)
Yachats	19 Jul 1983	1+		C. Watson (pers. comm.)
Yaquina Head	1 Aug 1983	2		R. and J. Krabbe (pers. comm.)
Seal Rock	20 Aug 1983	1		R. and J. Krabbe (pers. comm.)
Boiler Bay	22 Aug 1983	83		Evanich and Fix 1983, P. Pickering (fide E. Eltzroth)
Lincoln City	27 Aug 1983	1+		R. and J. Krabbe (pers. comm.)
Yaquina Bay	27 Aug 1983	1+	pelagic trip	R. and J. Krabbe (pers. comm.)
Yaquina River mouth	29 Aug 1983	1	basic plumage	M. Hunter (pers. comm.)
Yachats	3 Sep 1983	4		T. Mickel (pers. comm.)
Boiler Bay	11 Sep 1983	33		R. Bayer (pers. comm.)
Yaquina Bay	17 Sep 1983	2	pelagic trip	R. and J. Krabbe (pers. comm.)
Boiler Bay	22 Sep 1983	95		R. Bayer (pers. comm.)
Yaquina River jetties	8 Oct 1983	4		R. Bayer (pers. comm.)
Yaquina Head	5 Nov 1983	2		R. and J. Krabbe (pers. comm.)
N. of Yaquina Head	19 Nov 1983	1	oiled. Blue Magpie spill	R. and J. Krabbe (pers. comm.)
Yaquina Bay	31 Dec 1983	4		Rubega et al. 1984
Lincoln City	Dec 1983	1+	some	Irons and Heintz 1984
Yaquina Bay	Feb 1984	1+		R. and J. Krabbe (pers. comm.)
Boiler Bay	2 Feb 1984	5		Irons and Heintz 1984
Boiler Bay	4 Feb 1984	2		H. Nehls (pers. comm.)
Seal Rock	May 1984	2		R. and J. Krabbe (pers. comm.)
Yaquina Head	12 May 1984	15+	most in alternate plumage	S. Heintz (pers. comm.)
Yaquina River jetties	29 Jun 1984	1+		R. Bayer (pers. comm.)
S. Jetty Yaquina River	19 Aug 1984	2		R. and J. Krabbe (pers. comm.)
Boiler Bay	13 Oct 1984	15+		S. Heintz, M. Hunter (pers. comm.)
Boiler Bay	13 Oct 1984	40		R. Bayer (pers. comm.)
Boiler Bay	14 Oct 1984	50		R. Bayer (pers. comm.)
Boiler Bay	17 Oct 1984	25		R. Bayer (pers. comm.)
Cape Perpetua	20 Oct 1984	3		T. Mickel (pers. comm.)
Boiler Bay	27 Oct 1984	3-4		S. Heintz (pers. comm.)

## APPENDIX 2. Continued.

Location	Date	No. birds	Notes	Source
Yaquina Head	Winter 1984	6		Heinl 1985
Boiler Bay	12 Jan 1985	1+		R. Bayer (pers. comm.)
Yaquina Head	12 Jan 1985	2		D. Lusthoff (fide H. Nehls)
Yaquina Head	19 Jan 1985	6	basic plumage	S. Heinl (pers. comm.)
Yaquina River mouth	25 Jan 1985	2		T. Mickel (pers. comm.)
Yachats River mouth	26 Jan 1985	2		M. McAllister (pers. comm.)
Whale Cove	3 Feb 1985	2		J. Evanich, B. Bellin (fide H. Nehls)
Yaquina Head	6 Mar 1985	2		T. Mickel (pers. comm.)
Boiler Bay	24 Mar 1985	3		R. Gerig (pers. comm.)
Boiler Bay	24 Apr 1985	1+		R. Bayer (pers. comm.)
Boiler Bay	28 Apr 1985	1		S. Heinl (pers. comm.)
Boiler Bay	11 May 1985	4	alternate plumage	S. Heinl (pers. comm.)
Cape Foulweather	11 Jun 1985	2	pair	M. McAllister (pers. comm.)
Yaquina Head	17 Jul 1985	3		R. Bayer (pers. comm.)
S. Jetty Yaquina River	20 Jul 1985	1	breeding plumage, flying north	M. Hunter (pers. comm.)
Boiler Bay	21 Jul 1985	16	8 pairs on water (one in basic plumage), others flying by	S. Heinl, M. Hunter (pers. comm.)
Yaquina Head	21 Jul 1985	4	breeding and basic plumage	S. Heinl, M. Hunter, R. Bayer (pers. comm.)
Yaquina Head	24 Jul 1985	1+		R. Bayer (pers. comm.)
Yaquina Head	25 Jul 1985	1		R. Bayer (pers. comm.)
Yaquina Head	1 Aug 1985	1+		R. Bayer (pers. comm.)
Yaquina Head	14 Aug 1985	1+		R. Bayer (pers. comm.)
Yachats	16 Aug 1985	1		R. Bayer (pers. comm.)
Rocky Creek State Park	26 Aug 1985	1		H. Nehls (pers. comm.)
Boiler Bay	5 Oct 1985	24		P. Pickering, D. Faxon (pers. comm.)
Yaquina Bay	5 Oct 1985	1	pelagic trip	S. Heinl (pers. comm.)
Boiler Bay	19 Nov 1985	6		R. Bayer (pers. comm.)
Lincoln City	28 Dec 1985	35		Leukering and Fix 1986
Spanish Head	28 Dec 1985	3		S. Heinl (pers. comm.)
Yaquina Bay	5 Jan 1986	4		Leukering and Fix 1986
Boiler Bay	16 Jan 1986	20		R. Bayer (pers. comm.)
Boiler Bay	18 Jan 1986	10		R. Bayer (pers. comm.)
Boiler Bay	19 Jan 1986	20		R. Bayer (pers. comm.)
Boiler Bay	20 Jan 1986	20		R. Bayer (pers. comm.)
Boiler Bay	25 Jan 1986	1+	with 12+ Ancient Murrelets	V. Teale (pers. comm.)
Boiler Bay	26 Jan 1986	60		Force and Mattocks 1986, Heinl 1986
Boiler Bay	1 Feb 1986	1+	many	T. Shelmerdine (pers. comm.)
Boiler Bay	9 Feb 1986	1	winter plumage	M. Patterson (pers. comm.)
Boiler Bay	12 Feb 1986	4		P. Sullivan (pers. comm.)
Boiler Bay	16 Apr 1986	4		R. Bayer (pers. comm.)
Yaquina Head	26 Apr 1986	2		R. Bayer, G. Gillson (pers. comm.)
Boiler Bay	3 May 1986	20		S. Heinl (pers. comm.)



## APPENDIX 2. Continued.

Location	Date	No. birds	Notes	Source
Boiler Bay	8 May 1986	15	6 pair; group of 3 (winter plumage)	R. Lowe (pers. comm.)
Boiler Bay	10 May 1986	25+	on water and flying by	S. Heini (pers. comm.)
Yaquina Head	6 Jul 1986	2	pair, 1330 PDT	K. Liska (pers. comm.)
Yaquina Head	7 Jul 1986	1		R. Bayer (pers. comm.)
Yaquina Head	8 Jul 1986	2	1 in winter plumage, 1100 PDT	R. Bayer, K. Liska (pers. comm.)
Yaquina Head	9 Jul 1986	2	pair, 1200-1300 PDT	K. Liska (pers. comm.)
Yaquina Head	28 Aug 1986	1	winter plumage, 1145-1300 PDT	K. Liska (pers. comm.)
Yachats	6 Sep 1986	2		T. Mickel (pers. comm.)
Boiler Bay	17 Oct 1986	4		D. Bates (fide H. Nehls)
Yaquina Head	18 Oct 1986	1		R. Bayer (pers. comm.)
Boiler Bay	26 Nov 1986	2		H. Nehls (pers. comm.)
Yaquina Bay	3 Jan 1987	9		Leukering and Fix 1987
Boiler Bay	7 Feb 1987	11		T. Love, S. Janes (fide H. Nehls), T. Shelmerdine (pers. comm.)
Boiler Bay	10 May 1987	10		T. Mickel (pers. comm.)
Yaquina Head	29 Jul 1987	1+	1 juvenile or winter plumage, 1015-1020 PDT	R. Bayer, K. Liska (pers. comm.)
Yaquina Head	23 Aug 1987	1+	1 juvenile or winter plumage, 1210 PDT	R. Bayer, K. Liska (pers. comm.)
Yaquina Head	24 Aug 1987	1+	1 juvenile or winter plumage, 1220 PDT	R. Bayer, K. Liska (pers. comm.)
Yaquina Bay	2 Sep 1987	1		H. Nehls (pers. comm.)
Yaquina Head	7 Sep 1987	5	2 singles, group of 5, 0900-1030 PDT	R. Bayer, K. Liska (pers. comm.)
Yaquina Head	26 Sep 1987	1		T. Shelmerdine (pers. comm.)
S. Jetty Yaquina River	3 Oct 1987	2		G. Gillson (pers. comm.)
Depoe Bay	3 Nov 1987	2		J. Gilligan (fide H. Nehls)
Boiler Bay	8 Nov 1987	12	20+ Ancient Murrelets	V. Teale, R. Gerig, J. Johnson (pers. comm.)
Boiler Bay	22 Nov 1987	12		J. Johnson (pers. comm.)
Boiler Bay	8 Dec 1987	10		J. Johnson (pers. comm.)

## APPENDIX 2. Continued.

Location	Date	No. birds	Notes	Source
Boiler Bay	10 Dec 1987	40	with 200 Ancient Murrelets	D. Irons, J. Johnson (pers. comm.)
Boiler Bay	11 Dec 1987	10		J. Johnson (pers. comm.)
Boiler Bay	12 Dec 1987	5+		S. Heint, R. Gerig, T. Staudt (pers. comm.)
Boiler Bay	13 Dec 1987	3		T. Shelmerdine (pers. comm.)
Lane County				
Sea Lion Caves	16 Jul 1987	4		Crowell and Nehls 1972
Sea Lion Caves	17 Mar 1980	3		S. Gordon (fide H. Nehls)
Heceta Head	22 Jun 1980	7		C. Watson (fide H. Nehls)
Strawberry Hill Wayside	28 Jun 1980	4		T. Mickel (pers. comm.)
Bray's Point	2 Aug 1980	6		T. Mickel (pers. comm.)
Rock Creek	25 Apr 1981	2		T. Mickel (pers. comm.)
Sea Lion Caves	20 Aug 1981	1		A. Contreras (pers. comm.)
Bob Creek mouth	21 Jul 1982	5		A. Contreras (pers. comm.)
S. Jetty Siuslaw River	11 May 1983	75+		Mattocks and Hunn 1983
N. of Florence	29 Jun 1983	3	1 juvenile with 2 adults	Mattocks et al. 1983
Siuslaw River	17 Jul 1983	2		T. Mickel (pers. comm.)
Cummins Creek mouth	29 Jul 1983	2	adult with juvenile	R. and J. Krabbe (pers. comm.)
Strawberry Hill Wayside	17 Sep 1983	5		S. Heint (pers. comm.)
Bray's Point	25 Sep 1983	2		S. Heint (pers. comm.)
Bob Creek	26 Aug 1984	2		T. Mickel (pers. comm.)
Heceta Head	26 Aug 1984	2		T. Mickel (pers. comm.)
Bob Creek	12 May 1985	4		T. Mickel (pers. comm.)
Heceta Head	9 Jul 1985	3-4		S. Heint, M. Hunter (pers. comm.)
Heceta Head	7 Aug 1985	1	breeding plumage	M. Hunter (pers. comm.)
Baker Beach	14 Aug 1985	6+	on water; others seen flying by	S. Heint, M. Hunter (pers. comm.)
Heceta Head	21 Aug 1985	1	breeding plumage	M. Hunter (pers. comm.)
Heceta Head	4 Sep 1985	1		S. Heint, M. Hunter (pers. comm.)
Sea Lion Caves	15 Sep 1985	2		M. Hunter (pers. comm.)
N. Jetty Siuslaw River	5 Nov 1985	20	most in pairs, flying south	D. Fix, S. Heint (pers. comm.)
Siuslaw River mouth	11 Nov 1985	2		T. Mickel (pers. comm.)
N. Jetty Siuslaw River	16 Nov 1985	2	flying south	S. Heint, D. Fix (pers. comm.)
Heceta Head	16 Nov 1985	1		T. Mickel (pers. comm.)
Siuslaw River mouth	21 Nov 1985	10	on water and flying south	S. Heint (pers. comm.)
Siuslaw River mouth	27 Dec 1985	30+	mostly flying	Leukering and Fix 1986, S. Heint (pers. comm.)
Siuslaw River mouth	2 Mar 1986	10	1 pair performing mating display	S. Heint (pers. comm.)
Heceta Head	6 Apr 1986	2		T. Mickel (pers. comm.)
Heceta Head	2 Oct 1986	10	flying south	S. Heint (pers. comm.)
Florence	27 Dec 1986	14		Leukering and Fix 1987
Sea Lion Caves	10 May 1987	6		T. Mickel (pers. comm.)
Sea Lion Caves	31 May 1987	1+	many	S. Heint (pers. comm.)



## APPENDIX 2. Continued.

Location	Date	No. birds	Notes	Source
Sea Lion Caves	26 Jul 1987	3		T. Mickel (pers. comm.)
Siuslaw River mouth	23 Aug 1987	2		T. Mickel (pers. comm.)
Douglas County				
Umpqua River	20 Jul 1981	36	0.6-1.9 km upriver	L. Thornburgh (pers. comm.)
Umpqua River mouth	2 Sep 1982	1+		M. Sawyer (pers. comm.)
Umpqua River mouth	15 May 1983	2		M. Sawyer (pers. comm.)
Umpqua River mouth	1 May 1983	1+		R. Maertz (pers. comm.)
Umpqua River mouth	12 Jul 1983	4	pairs	M. Sawyer (pers. comm.)
Umpqua River mouth	15 Jul 1983	6	2 pairs, 2 singles	M. Hunter (pers. comm.)
Winchester Bay	16 Jul 1983	15-20		M. Hunter (pers. comm.)
Umpqua River mouth	8 Aug 1983	8-9	pairs and singles flying north; alternate plumage	S. Heintz (pers. comm.)
Umpqua River mouth	25 Aug 1983	10		M. Sawyer (pers. comm.)
Winchester Bay	26 Aug 1983	1+		M. Hunter (pers. comm.)
Umpqua River mouth	27 Aug 1983	4	pelagic trip	T. Mickel (pers. comm.)
Umpqua River mouth	29 Apr 1984	1+		R. Maertz (pers. comm.)
Umpqua River mouth	10 Apr 1985	6		Fix 1985b, M. Sawyer (pers. comm.)
Umpqua River mouth	12 May 1985	50		M. Sawyer, D. Fix (pers. comm.)
Umpqua River	1 Jul 1985	12	pelagic trip, <1.2 km offshore	L. Thornburgh (pers. comm.)
Umpqua River mouth	27 Jan 1986	2		M. Sawyer (pers. comm.)
Umpqua River mouth	2 Aug 1986	2		M. Sawyer (pers. comm.)
Umpqua River mouth	9 Aug 1986	4		M. Sawyer (pers. comm.)
Umpqua River mouth	14 May 1987	1+		R. Maertz (pers. comm.)
Umpqua River mouth	1 Aug 1987	1+		R. Maertz (pers. comm.)
Umpqua River mouth	17 Oct 1987	2	pelagic trip	T. Mickel (pers. comm.)
Coos County				
N. of Pony Slough	30 Mar 1968	1+		V. Teale (pers. comm.)
Coos Bay	24 Jul 1969	8+	several pairs with fish flew inland; pelagic trip	Crowell and Nehls 1969, H. Nehls (pers. comm.)
Bandon	20 Oct 1973	1		B. Fawver (pers. comm.)
Coos Bay	19 Dec 1976	5		Heilbrun and McQueen 1977
S. Jetty Coos River	30 Apr 1977	2	pair, alternative plumage	A. McGie (pers. comm.)
Shoreacres State Park	4 Jul 1978	1	basic plumage	A. McGie (pers. comm.)
Shoreacres State Park	10 Sep 1978	2	pair, basic plumage	A. McGie (pers. comm.)
Shoreacres State Park	23 Sep 1979	4	basic plumage	A. McGie (pers. comm.)
Coos Bay	2 Dec 1979	1		A. McGie (pers. comm.)
Cape Arago State Park	4 Feb 1980	3	basic plumage	A. McGie (pers. comm.)
Bandon Rocks	23 Aug 1980	1		B. Fawver, J. Thomas (pers. comm.)
Coquille Estuary	23 Aug 1980	2	pair	R. and J. Krabbe (pers. comm.)

APPENDIX 2. Continued.

Location	Date	No. birds	Notes	Source
Shoreacres State Park	23 Aug 1980	16	in pairs	R. and J. Krabbe, A. McGie (pers. comm.)
Coos Bay Estuary	25 Aug 1980	3	near airport; 1 adult with 2 juveniles	E. G. White-Swift (fide E. Eltzroth)
Shoreacres State Park	27 Sep 1980	2	pair	R. and J. Krabbe, E. Eltzroth (pers. comm.)
Shoreacres State Park	5 Jul 1981	2	1 alternate, 1 basic plumage	A. McGie (pers. comm.)
Elk River mouth	14 Aug 1981	1+		J. Rogers (fide M. McAllister)
Shoreacres State Park	17 Oct 1981	13	basic plumage	A. McGie, L. Thornburgh (pers. comm.)
Shoreacres State Park	22 Nov 1981	2	basic plumage	A. McGie (pers. comm.)
Elk River mouth	7 Aug 1982	1		J. Rogers (fide M. McAllister)
Cape Arago State Park	20 Aug 1982	4		P. Sullivan (pers. comm.)
North Bend to Cape Blanco	27 Aug 1982	4		M. Moore (pers. comm.)
Coos River mouth	29 Apr 1983	5	pelagic trip	V. Teale, T. Mickel (pers. comm.)
Cape Arago State Park	30 Apr 1983	1		H. Nehls (pers. comm.)
Coos Bay	30 Apr 1983	3		R. and J. Krabbe (pers. comm.)
Coos Bay	1 May 1983	1+	pelagic trip	R. Maertz, M. Hunter (pers. comm.)
Shoreacres State Park	1 May 1983	2	pair, alternate plumage	A. McGie (pers. comm.)
Elk River mouth	7 Aug 1983	3		J. Rogers (fide M. McAllister)
Shoreacres State Park	24 Aug 1983	26	alternate and basic plumage	A. McGie (pers. comm.)
Cape Arago State Park	9 Sep 1983	30	most basic plumage	A. McGie (pers. comm.)
Coos Bay	18 Dec 1983	1		Rubega et al. 1984
Shoreacres State Park	6 Feb 1984	3	basic plumage	A. McGie (pers. comm.)
Shoreacres State Park	4 Aug 1984	1		L. Thornburgh (pers. comm.)
Shoreacres State Park	26 Aug 1984	3		L. Thornburgh (pers. comm.)
Shoreacres State Park	2 Sep 1984	2		L. Thornburgh (pers. comm.)
Port Orford	6 Sep 1984	2		J. Rogers (fide M. McAllister)
Shoreacres State Park	23 Sep 1984	5		L. Thornburgh (pers. comm.)
Hunter Creek mouth	29 Jan 1985	2		M. McAllister (pers. comm.)
Cape Arago State Park	16 Apr 1985	10		L. Thornburgh (pers. comm.)
Cape Arago State Park	30 Aug 1985	1+		B. Stotz (pers. comm.)
Shoreacres State Park	5 Oct 1985	12		L. Thornburgh (pers. comm.)
Shoreacres State Park	18 Jan 1986	1		L. Thornburgh (pers. comm.)
Cape Arago State Park	25 Jan 1986	1		B. Fawver (pers. comm.)
Cape Arago State Park	7 Apr 1986	1		M. Patterson (pers. comm.)
Coquille River mouth	23 Aug 1986	2		P. Sullivan (pers. comm.)
Bandon Rocks	20 Sep 1986	2		L. Thornburgh (pers. comm.)



## APPENDIX 2. Continued.

Location	Date	No. birds	Notes	Source
Shoreacres State Park	21 Sep 1986	4		L. Thornburgh (pers. comm.)
Cape Arago State Park	6 May 1987	2		B. Stotz (pers. comm.)
Bandon	28 May 1987	1+	off Face Rock	B. Stotz (pers. comm.)
Coos River	1 Aug 1987	5		P. Sullivan (pers. comm.)
Shoreacres State Park	22 Aug 1987	1		B. Fawver (pers. comm.)
Coos Bay	23 Aug 1987	1	winter plumage	H. Sands (pers. comm.)
Shoreacres State Park	23 Aug 1987	1		B. Fawver (pers. comm.)
Curry County				
State Line	12 Sep 1926	1	in surf	S. Jewett (fide R. Bayer)
Chetco River mouth	Sumner 1958	4-20+	daily, in pairs or groups of 3-8	A. Thoresen (pers. comm.)
Pistol River mouth	17 Jul 1966	4		Crowell and Nehls 1966
Brookings	6 Sep 1970	1		V. Teale (pers. comm.)
Cape Blanco	28 Apr 1979	1		J. Rogers (fide M. McAllister), A. Contreras (pers. comm.)
Euchre Creek	26 Aug 1979	6		F. and A. Parker, B. Fawver (pers. comm.)
Euchre Creek	10 Sep 1980	100		J. Gilligan, D. Irons (fide H. Nehls)
Pistol River mouth	15 Aug 1981	10		J. Evanich (fide H. Nehls)
Port Orford	27 Dec 1981	1		Heilbrun and McQueen 1982
N. of Humbug Mtn.	26 Aug 1983	1+		B. Stotz (pers. comm.)
Port Orford to Humbug Mtn.	8 Sep 1983	2+		M. Moore (pers. comm.)
N. of Humbug Mtn.	28 Apr 1984	1+		B. Stotz (pers. comm.)
N. of Humbug Mtn.	15 Aug 1985	8		B. Stotz (pers. comm.)
Rogue River mouth	14 Oct 1985	1		V. Teale, D. Lusthoff (pers. comm.)
N. of Humbug Mtn.	16 May 1986	1+		B. Stotz (pers. comm.)
N. of Humbug Mtn.	11 Sep 1986	1+		B. Stotz (pers. comm.)
Chetco River mouth	Oct 1986	1		H. Sands (pers. comm.)
N. of Humbug Mtn.	10 Sep 1987	1+		B. Stotz (pers. comm.)
Port Orford	3 Jan 1987	1		Leukering and Fix 1987, S. Heini (pers. comm.)
S. of Brookings	20 Jun 1987	30+		S. Heini (pers. comm.)

\* 1+ = at least one; 2+ = at least two.

APPENDIX 3. At-sea records of Marbled Murrelets off Yaquina Head (nearshore and offshore) and the Columbia River during transect surveys, 15 June 1969-17 September 1971 (J. M. Scott, unpubl. data).

Date	Transect no.	Transect location	No. 0.4 km segments	Greatest distance offshore (km)	No. birds	Group sizes	Birds km
15 Jun 69	1	Offshore	40	14.0	2	2	0.1
15 Jun 69	2	Offshore	40	14.0	0		0.0
27 Jun 69	4	Offshore	40	14.0	0		0.0
27 Jul 69	6	Offshore	40	14.0	10	1, 1, 2, 2, 2, 2	0.7
27 Jul 69	8	Offshore	40	14.0	0		0.0
27 Jul 69	9	Offshore	40	14.0	0		0.0
3 Aug 69	10	Offshore	40	14.0	0		0.0
3 Aug 69	12	Offshore	40	14.0	0		0.0
15 Aug 69	14	Offshore	40	14.0	0		0.0
21 Aug 69	16	Offshore	40	21.0	0		0.0
20 Oct 69	18	Offshore	40	14.0	0		0.0
26 Nov 69	19	Offshore	40	14.0	0		0.0
26 Nov 69	20	Offshore	40	14.0	0		0.0
26 Nov 69	60	Nearshore	17	0.4	0		0.0
11 Feb 70	21	Offshore	40	14.0	0		0.0
11 Feb 70	22	Offshore	40	14.0	0		0.0
18 Mar 70	23	Offshore	40	14.0	0		0.0
22 Apr 70	24	Offshore	40	14.0	0		0.0
22 Apr 70	25	Offshore	40	14.0	0		0.0
12 May 70	26	Nearshore	17	0.4	0		0.0
19 May 70	27	Offshore	40	14.0	0		0.0
19 May 70	28	Offshore	40	14.0	0		0.0
26 May 70	29	Offshore	40	14.0	2	2	0.1
2 Jun 70	30	Nearshore	17	0.4	5	2, 3	0.8
2 Jun 70	31	Nearshore	40	0.4	5	2, 3	0.4
2 Jun 70	32	Nearshore	40	0.4	0		0.0
2 Jun 70	34	Offshore	40	14.0	0		0.0
2 Jun 70	33	Offshore	40	14.0	4	4	0.3
2 Jun 70	35	Nearshore	40	0.4	0		0.0
2 Jun 70	36	Nearshore	40	0.4	0		0.0
30 Jun 70	38	Nearshore	17	0.4	0		0.0
30 Jun 70	39	Offshore	40	14.0	0		0.0
30 Jun 70	40	Offshore	40	14.0	0		0.0
30 Jun 70	42	Nearshore	17	0.4	0		0.0
7 Jul 70	43	Offshore	40	14.0	2	2	0.1
18 Jul 70	44	Nearshore	17	0.4	5	1, 4	0.8
18 Jul 70	45	Offshore	40	14.0	4	2, 2	0.3
16 Oct 70	46	Nearshore	17	0.4	2	2	0.3
16 Oct 70	47	Offshore	40	14.0	0		0.0
16 Oct 70	48	Nearshore	17	0.4	0		0.0
17 Nov 70	49	Nearshore	17	0.4	0		0.0
17 Nov 70	50	Offshore	40	14.0	0		0.0
11 Feb 71	61	Nearshore	17	0.4	2	2	0.3
18 Mar 71	62	Nearshore	17	0.4	0		0.0
22 Apr 71	63	Nearshore	17	0.4	0		0.0
26 May 71	64	Nearshore	17	0.4	11	1, 1, 1, 2, 2, 2, 2	1.8
29 May 71	65	Nearshore	17	0.4	2	2	0.3
9 Mar 71	51	Nearshore	17	0.4	1	1	0.2
19 Mar 71	52	Offshore	40	14.0	0		0.0
21 Apr 71	53	Offshore	40	14.0	2	2	0.1
23 Apr 71	54	Nearshore	17	0.4	2	2	0.3
10 May 71	57	Offshore	40	14.0	2	2	0.1
14 Jun 71	59	Nearshore	17	0.4	2	2	0.3
14 Jun 71	70	Offshore	40	14.0	0		0.0
21 Jun 71	71	Offshore	40	14.0	4	2, 2	0.3
22 Jun 71	73	Nearshore	17	0.4	6	2, 2, 2	1.0
27 Jun 71	76	Nearshore	8	0.4	2	2	0.7
28 Jun 71	78	Offshore	60	21.0	2	2	0.1
5 Jul 71	79	Nearshore	17	0.4	0		0.0
5 Jul 71	80	Nearshore	17	0.4	0		0.0
12 Jul 71	83	Offshore	60	21.0	0		0.0



APPENDIX 3. Continued.

Date	Transect no.	Transect location	No. 0.4 km segments	Greatest distance offshore (km)	No. birds	Group sizes	Birds km
2 Aug 71	85	Offshore	40	14.0	1	1	0.1
2 Aug 71	86	Nearshore	17	0.4	0		0.0
20 Sep 71	87	Nearshore	17	0.4	6	2, 2, 2	1.0
20 Sep 71	88	Offshore	60	21.0	0		0.0
27 Sep 71	89	Nearshore	17	0.4	4	2, 2	0.7
27 Sep 71	90	Offshore	40	14.0	1	1	0.1
Total			805 km		112		0.1

\* Nearshore transects ran parallel to shore 0.4 km off Yaquina Head.

APPENDIX 4. Beached Marbled Murrelets in Oregon, 1920-1987.

Location	Date	No. birds	Notes	Source
<b>Clatsop County</b>				
Cannon Beach	26 Oct 1975	1	basic plumage	D. Fix (pers. comm.)
Sunset Beach	13 Jan 1980	1		S. Heint 1988, H. Nehls (pers. comm.)
Clatsop Beach	23 Nov 1983	1	Blue Magpie (?)	H. Nehls (pers. comm.)
<b>Tillamook County</b>				
Netarts	20 Dec 1920	1	male	A. Walker (Bayer 1989)
Sears Beach	10 Nov 1937	3		Bayer and Ferris 1987
Three Rocks Beach	25 Nov 1937	1		Bayer and Ferris 1987
Bay Ocean Spit	18 Oct 1975	1		H. Nehls (pers. comm.)
Nehalem Bay State Park	17 Oct 1979	2		J. Annear (fide R. Lowe)
Sand Lake	28 Dec 1982	1		H. J. Janosik (Bayer 1989)
Bay Ocean Spit	26 Nov 1983	1	Blue Magpie (?)	H. Nehls (pers. comm.)
Nehalem Bay State Park	28 Sep 1987	1	adult in partial winter plumage	R. Lowe (pers. comm.)
<b>Lincoln County</b>				
Depoe Bay	26 Jul 1942	1	juvenile	J. C. Braly (Bayer 1989)
Newport	5 Jan 1970	1	female	E. Forsman (Bayer 1989)
Thiel to Henderson Cr.	17 Feb 1978	1		B. Loeffel (pers. comm.)
Gleneden Beach	16 Oct 1979	1		J. Annear (fide R. Lowe)
Thiel to Beaver Cr.	5 Oct 1980	1		B. Loeffel (pers. comm.)
Thiel to Henderson Cr.	13 Aug 1982	1		B. Loeffel (pers. comm.)
Thiel to Beaver Cr.	4 Sep 1982	1		B. Loeffel (pers. comm.)
Thiel to Henderson Cr.	16 Apr 1983	1		B. Loeffel (pers. comm.)
Thiel to Beaver Cr.	16 Jul 1983	1		B. Loeffel (pers. comm.)
South Beach	22 Nov 1983	2	oiled, Blue Magpie spill	R. and J. Krabbe (pers. comm.)
Seal Rock to Alsea Bay	25 Aug 1986	1	winter plumage; oiled feathers	R. Lowe (pers. comm.)
Seal Rock to Alsea Bay	2 Sep 1986	1	breeding plumage	R. Lowe (pers. comm.)
Thiel to Beaver Cr.	27 Feb 1987	1		B. Loeffel (pers. comm.)
<b>Lane County</b>				
Near Mercer	1 Jun 1938	1	female	F. Worthington (Bayer 1989)
<b>Coos County</b>				
Coos Bay	5 Sep 1971	1	female	G. Slack, C. Roberts (Bayer 1989)
<b>Curry County</b>				
Euchre Creek	26 Aug 1977	1		F. and A. Parker (pers. comm.)

\* From beached bird surveys conducted weekly along a 4.6 mile stretch of beach between 1 January 1978 to 31 December 1987.

APPENDIX 5. Inland observations of Marbled Murrelets in Oregon, 1958-1987.

Location	Date	No. birds	Notes	Source
<b>Tillamook County</b>				
Cape Lookout	Spring 1979	2	flying west over parking lot	R. Gerig (pers. comm.)
<b>Lincoln County</b>				
Yachats River	1 Feb 1985	2	flying west, 0710*	M. McAllister (pers. comm.)
Gwynn Creek	1 May 1985	2	calling loudly over creek, 0600	Nelson 1986
Gwynn Creek	2 May 1985	2	0618	Nelson 1986
Gwynn Creek	17 May 1985	10	flying west to ocean, 0604-0614	Nelson 1986
Yachats River	2 Jun 1985	2	circling above old-growth trees to north of road	Marshall 1988
Gwynn Creek	4 Jun 1985	3	0525-0532	Nelson 1986
Cape Creek	8 Jun 1985	6	flew east and west up-creek, 1 pair circled 0507-0615	M. McAllister (pers. comm.)
Cape Creek	9 Jun 1985	3	1 pair circled near big spruce tree	M. McAllister (pers. comm.)
Cape Creek	10 Jun 1985	8	flying through trees on north side of creek, 0509-0535	M. McAllister (pers. comm.)
Cape Creek	11 Jun 1985	3	flying through trees on north side of creek, 0445-0510	M. McAllister (pers. comm.)
Gwynn Creek	21 Jun 1985	9	0458-0528	Nelson 1986
Cape Creek	7 Sep 1985	3	circled	M. McAllister (pers. comm.)
Yachats River	31 Dec 1985	3	flying west, 0810	M. McAllister (pers. comm.)
Gwynn Creek	23 May 1986	3	0530	Nelson 1986
Gwynn Creek	13 Jun 1986	3	0525	Nelson 1986
Scits Ridge	9 Aug 1987	4	circled, flew west, 0730	A. Contreras and R. Hoyer (pers. comm.)
School Fork	22 Nov 1987	7	flying east and west, 0635-0650	M. McAllister (pers. comm.)
<b>Benton County</b>				
N. Fk. Rock Creek 1	28 Apr 1986	7	0556-0620	Nelson 1986
N. Fk. Rock Creek 1	27 May 1986	3	2 calling from treetop until 0720, 0554-0720	Nelson 1986
N. Fk. Rock Creek 2	28 May 1986	3	0523-0534	Nelson 1986
N. Fk. Rock Creek 1	2 Jun 1986	2	0525	Nelson 1986
Rock Creek	2 Jun 1986	3	flying west, 0520-0530	Nelson 1986
N. Fk. Rock Creek 2	3 Jun 1986	2	0530-0532	Nelson 1986
Honey Grove	5 Jun 1986	2	circled through canopy, then flew west, 0515	Nelson 1986
N. Fk. Rock Creek 2	6 Jun 1986	3	circling over stand, 1 flew north, 2 west	Nelson 1986
N. Fk. Rock Creek 2	12 Jun 1986	4	0524	Nelson 1986
N. Fk. Rock Creek 2	19 Jun 1986	1	0523	Nelson 1986
N. Fk. Rock Creek 1	23 Jun 1986	2	0502-0521	Nelson 1986
N. Fk. Rock Creek 2	26 Jun 1986	3	0525	Nelson 1986
N. Fk. Rock Creek 2	30 Jun 1986	2	0523	Nelson 1986
N. Fk. Rock Creek 2	3 Jul 1986	2	0520	Nelson 1986
<b>Lane County</b>				
Cummins Creek	15 Jul 1984	25+	flying west, @ 200 m elev.	J. Anderson (pers. comm.)
Cummins Creek	16 Jul 1984	25+	flying west, @ 200 m elev.	J. Anderson (pers. comm.)
Cummins Creek	17 Jul 1984	25+	flying west, @ 200 m elev.	J. Anderson (pers. comm.)



## APPENDIX 5. Continued.

Location	Date	No. birds	Notes	Source
Cummins Creek	18 Jul 1984	25+	flying west, @ 200 m elev.	J. Anderson (pers. comm.)
Cummins Creek	19 Jul 1984	25+	flying west, @ 200 m elev.	J. Anderson (pers. comm.)
Cummins Creek	20 Jul 1984	25+	flying west, @ 200 m elev.	J. Anderson (pers. comm.)
Cummins Creek	21 Jul 1984	25+	flying west, @ 200 m elev.	J. Anderson (pers. comm.)
Cummins Creek	22 Jul 1984	25+	flying west, @ 200 m elev.	J. Anderson (pers. comm.)
Cummins Creek	23 Jul 1984	25+	flying west, @ 200 m elev.	J. Anderson (pers. comm.)
Cummins Creek	24 Jul 1984	25+	flying west, @ 200 m elev.	J. Anderson (pers. comm.)
Cummins Creek	25 Jul 1984	25+	flying west, @ 200 m elev.	J. Anderson (pers. comm.)
Cummins Creek	26 Jul 1984	25+	flying west, @ 200 m elev.	J. Anderson (pers. comm.)
Cummins Creek	27 Jul 1984	25+	flying west, @ 200 m elev.	J. Anderson (pers. comm.)
Cummins Creek	28 Jul 1984	25+	flying west, @ 200 m elev.	J. Anderson (pers. comm.)
Cummins Creek	29 Jul 1984	25+	flying west, @ 200 m elev.	J. Anderson (pers. comm.)
Cummins Creek	30 Jul 1984	25+	flying west, @ 200 m elev.	J. Anderson (pers. comm.)
Cummins Creek	31 Jul 1984	25+	flying west, @ 200 m elev.	J. Anderson (pers. comm.)
Cummins Creek	2 May 1985	1	0622-0640	Nelson 1986
Cummins Creek	4 Jun 1985	5	circled through canopy, then flew west, 0600-0609	Nelson 1986
Cummins Creek	24 Jun 1985	4	0531	Nelson 1986
Cummins Creek	7 May 1986	7	0630-0640	Nelson 1986
Prairie Peak	12 May 1986	2	flying est, 0542	Nelson 1986
Prairie Peak	20 Jun 1986	1	flying west, 0558	Nelson 1986
Cummins Creek	23 May 1986	1	0550	Nelson 1986
Cummins Creek	30 May 1986	3	0544	Nelson 1986
Cummins Creek	13 Jun 1986	2	0525	Nelson 1986
Cummins Creek	24 Jun 1986	3	0528	Nelson 1986
Douglas County				
Remmy Creek	17 Jul 1986	2	0540-0605	Varoujean and Williams 1987
Remmy Creek	18 Jul 1986	36	0553-0641	Varoujean and Williams 1987
Remmy Creek	19 Jul 1986	6	0534-0546	Varoujean and Williams 1987
Remmy Creek	21 Jul 1986	6	0530-0625	Varoujean and Williams 1987
Remmy Creek	25 Jul 1986	7	0632-0644	Varoujean and Williams 1987
Remmy Creek	2 Aug 1986	28	0552-0627	Varoujean and Williams 1987
Remmy Creek	4 Aug 1986	6	0534-0545	Varoujean and Williams 1987
Remmy Creek	6 Aug 1986	27	0544-0617	Varoujean and Williams 1987
Remmy Creek	8 Aug 1986	1	0624	Varoujean and Williams 1987
Remmy Creek	10 Aug 1986	7	0603-0617	Varoujean and Williams 1987
Remmy Creek	8 Jul 1987	6	0529-0542	Varoujean and Williams 1987
Remmy Creek	14 Jul 1987	1	0530-0550	Varoujean and Williams 1987
Remmy Creek	20 Jul 1987	3	1 probable juvenile, 0518-0555	Varoujean and Williams 1987
Curry County				
Chetco River	Summer 1958	4-10+	daily, flying east up river drainage at dusk	A. Thoresen (pers. comm.)

\* All times in Pacific Daylight Time (PDT).