

APPENDIX C

NUMBERS OF PIGEON GUILLEMOTS AND MARBLED MURRELETS

All of the marine waters east of Cape Flattery have been systematically surveyed for the presence of marine birds during the summer breeding period. Marine waters of the Strait of Juan de Fuca, San Juan Islands, Georgia Strait, and the northeastern bays were surveyed during June of 1978 and 1979, using a variety of platforms of observation, such as a small airplane, a small boat, the Washington State Ferry, and land sites (see Manuwal et al. 1979b and Wahl et al. 1981 for details of sites, transect routes, and census methods). The results of these surveys for Pigeon Guillemots and Marbled Murrelets are summarized in Appendix Table 1.

The marine waters of Puget Sound (waters south of Admiralty Inlet) and Hood Canal were first systematically surveyed in summer 1982. During this survey, the entire marine shoreline was sampled from a small boat, a small airplane, and, in some cases, from shore (see Wahl and Speich 1984 for details). All open waters were also sampled. The numbers of Pigeon Guillemots and Marbled Murrelets observed are listed in Appendix Table 2.

As pointed out in the Species Accounts, these surveys are only samples; actual numbers of breeding individuals of each species are likely larger.

Censuses are sensitive to a variety of factors. Environmental conditions such as sun glare and glare area, water surface condition, and tidal stage all affect the detectability of birds during censuses. The activity patterns of the species determine their presence on the water surface during surveys. Pigeon Guillemots often loaf on shore beaches, rocks, logs, and cliff ledges, making detection difficult, especially from aircraft. Censuses made during feeding periods likely will fail to detect birds beneath the water surface. Birds may also dive to avoid the approaching boat or aircraft and go undetected. During the incubation period, the incubating adult in the nest would of course also go unobserved.

There have been no systematic surveys along the outer coast of Washington, sensitive to Pigeon Guillemots and Marbled Murrelets, which would allow quantification of their numbers. Numerous pelagic trips out of Westport over the continental slope have shown the species to be rare in deep waters (Wahl, pers. obs.). Pigeon Guillemots are found all along the coast where suitable nesting habitat is found. These observations are recorded in the colony-site tables in this catalog. Apparently, few if any birds nest along the long stretches of

beaches south of Pt. Grenville, except as observed in the rocks of the jetties at the entrance to Grays Harbor and the cliffs of Cape Disappointment. Marbled Murrelets have been observed along the entire nearshore area of the outer coast. Birds are often seen in the entrance channels of Grays Harbor and Willapa Bay. Birds have been observed in the shallow coastal waters north of the Grays Harbor entrance. During surveys

of the north coastal islands between Pt. Grenville and Cape Flattery, during the summers of 1978 and 1979, Marbled Murrelets were often observed. However, these observations were from a Zodiac and were incidental to colony surveys. Marbled Murrelets appear to stay in shallow waters, and within 1 or 2 miles of shore. Comments on numbers are found in the Species Accounts.

Table 1. Projected totals of Pigeon Guillemots and Marbled Murrelets by MESA^a study area subregions, summer of 1978 and 1979.

Subregion			Projected totals ^d		
Number ^b	Area ^c (km ²)	Name	Catalog map area	Pigeon Guillemot	Marbled Murrelet
0101	840.8	Swiftsure Bank ^e	155	0	0
0201	1883.7	Strait of Juan de Fuca (Outer) ^e	155	0	0
0203	5.4	Cape Flattery	155	10	1
0204	4.5	Neah Bay	155	2	4
0205	12.9	Neah Bay to Clallam Bay	155	20	25
0206	3.2	Clallam Bay	155	2	15
0207	20.8	Clallam Bay to Crescent Bay	155/156	80	4
0208	1.1	Crescent Bay	156	15	4
0209	9.0	Crescent Bay to Ediz Hook	156	120	20
0301	1630.8	Strait of Juan de Fuca (Inner) ^e	156	50	10
0302	0.4	Ediz Hook	156	(+) ^g	(+)
0303	10.4	Port Angeles	156	10	0
0304	24.0	Voice of America	156	150	150
0305	4.0	Dungeness Spit	156	15	25
0306	12.0	Dungeness Bay/Harbor	156	40	(+)
0307	21.4	Jamestown	156	90	0
0308	13.8	Sequim Bay	156	15	1
0309	4.8	Miller Peninsula	156	90	30
0310	3.1	Protection Island	156	560	0
0311	37.1	Discovery Bay ^f	156	30	1
0312	10.7	Quimper Peninsula	156	60	3
0313	21.0	Whidbey Island	156	30	10
0314	0.3	Smith Island	156	20	0
0315	5.6	Deception Pass	156	15	10
0316	8.9	Lopez Island (south shore)	156	170	30
0317	3.5	San Juan Island (south shore)	156	2	3
0401	40.9	Admiralty Inlet ^f	156	35	10
0501	73.9	Bellingham Channel ^f	156	80	10
0502	10.2	Guesnes Channel	156	30	20
0503	11.5	Fidalgo Bay	156	3	2

(continued)

Table 1. Continued

Subregion			Projected totals ^d		
Number ^b	Area ^c (km ²)	Name	Catalog map area	Pigeon Guillemot	Marbled Murrelet
0504	80.0	Padilla Bay ^f	156	20	30
0505	66.0	Samish Bay ^f	156	20	60
0506	158.0	Bellingham Bay ^f	156	30	25
0507	16.1	Hale Passage	156	20	260
0601	25.0	Lummi Bay ^f	156	(?)	(+)
0602	14.1	Cherry Point	156	30	20
0603	19.0	Birch Bay ^f	156	30	1
0604	9.5	Semiahmoo Spit	156	1	10
0605	12.8	Drayton Harbor	156	1	5
0606	157.0	Boundary Bay ^f	156	40	340
0607	34.4	San Juan Islands - Northern Tier ^f	156	130	30
0608	288.3	Georgia Strait ^e	156	60	320
0701	16.3	Pt. Roberts	156	10	170
0702	6.1	Tsuwvassem Bay	156	0	2
0703	364.5	Georgia Strait ^e	156	10	110
0801	338.7	Northern Haro Strait ^f	156	150	110
0802	224.4	Southern Haro Strait ^f	156	30	0
0901	123.2	Southern Rosario Strait ^f	156	50	40
0902	83.1	Central Rosario Strait ^f	156	30	2
0903	92.2	Northern Rosario Strait ^f	156	40	10
1001	103.6	President Channel ^f	156	50	10
1002	50.0	Northern Areas ^f	156	5	2
1101	13.7	Speiden Channel ^f	156	20	0
1102	36.1	Northern San Juan Channel ^f	156	1	2
1103	48.5	Southern San Juan Channel ^f	156	4	0
1104	2.5	Wusp Pass	156	3	2
1105	8.8	Upright Channel ^e	156	0	3
1106	32.9	Harney Channel ^f	156	10	10
1107	2.5	Obstruction Pass	156	2	2
1108	0.9	Thatcher Pass	156	1	(+)
1201	6.0	Mosquito/Roche Complex	156	40	0

(continued)

Table 1. Concluded

Subregion			Projected totals ^d		
Number ^b	Area ^c (km ²)	Name	Catalog map area	Pigeon Guillemot	Marbled Murrelet
1202	1.5	Friday Harbor	156	0	0
1203	15.0	Griffin Bay ^f	156	0	15
1205	1.9	Fisherman Bay	156	0	0
1206	4.6	Swifts/Shoal Bays	156	10	5
1207	2.0	Deer Harbor	156	10	2
1208	9.1	West Sound	156	2	0
1209	29.6	East Sound ^f	156	1	0
1210	23.9	Lopez Sound	156	<u>20</u>	<u>5</u>
TOTALS				2,605	1,991

NOTES:

- a. Refers to Marine Ecosystem Analysis Program, National Oceanic and Atmospheric Administration, Seattle, Washington. For full details of this extensive project see Wahl et al. 1981.
- b. These are MESA subregion numbers. Many numbers were assigned during the MESA project. The numbering system was then subsequently extended to cover all marine waters of Washington (Wahl and Speich 1980). Subregion boundaries, although arbitrary, generally follow natural geographic and oceanographic features. Subregion boundaries and numbers are shown in maps on pages 502-507.
- c. The surface area, km², of the subregion.
- d. These are projected totals based on the mean density calculated from all censuses in the subregions in June of 1978 and 1979. The mean density was extended to the Subregion Area to obtain the projected totals. For full details see Wahl et al. (1981).
- e. This subregion consists entirely of offshore waters, greater than 20 m deep. See Wahl et al. (1981) for full details. If no comments are made, the subregion consists entirely or primarily of nearshore waters less than 20 m deep.
- f. This subregion contains nearshore waters and significant proportions of offshore waters. See Appendix A in Wahl et al. 1981 for full details.
- g. Number present indeterminate but probably small.

Table 2. Numbers of Pigeon Guillemots and Marbled Murrelets observed during censuses of Puget Sound nearshore waters, Summer 1982. All nearshore areas were surveyed 100% except for Admiralty Inlet (0401) with only 20% of the nearshore area surveyed and Penn Cove/Crescent Harbor (1402) with only 75% of the nearshore area surveyed.

Subregion Number ^a	Name	Catalog map area	Survey type ^b	Numbers observed	
				Pigeon Guillemot	Marbled Murrelet
0401	Admiralty Inlet	156	B	7	3
0402	Southern Admiralty Inlet	156/175	A/B	43	20
0403	Port Townsend	156	B	71	159
0404	Oak Bay	156/175	B	21	49
0405	Killisut Harbor		B	118	0
1401	Skagit Bay	156	A	6	2
1402	Penn Cove/Crescent Harbor	156	S	88	0
1403	Saratoga Passage	156	A	9	21
1404	Holmes Harbor	156	A	1	4
1405	Port Susan	156	A	5	2
1406	Possession Sound	156/175	A	8	24
1501	Hood Canal Entrance	175	A	28	26
1502	Port Ludlow	175	B	3	1
1503	Port Gamble	175	A	0	0
1504	Northern Hood Canal	175	A	3	10
1505	Central Hood Canal	175	A	0	2
1506	Dabob Bay	175	A	6	17
1507	Quilcene Bay	175	A	0	2
1508	Southern Hood Canal	175	A	2	8
1509	Anna's Bay	175	A	0	18
1510	Great Bend	175	A	3	3
1601	Northern Puget Sound	175	A	10	1
1602	Northcentral Puget Sound	175	A/B	32	4
1603	Central Puget Sound	175	B	15	12
1604	Elliott Bay	175	B	4	0
1605	East Passage	175	A	0	1
1606	Colvos Passage	175	A	1	0
1607	Commencement Bay	175	B	10	0
1635	Dalco Passage	175	B	2	0
1608	The Narrows	175	B	3	2

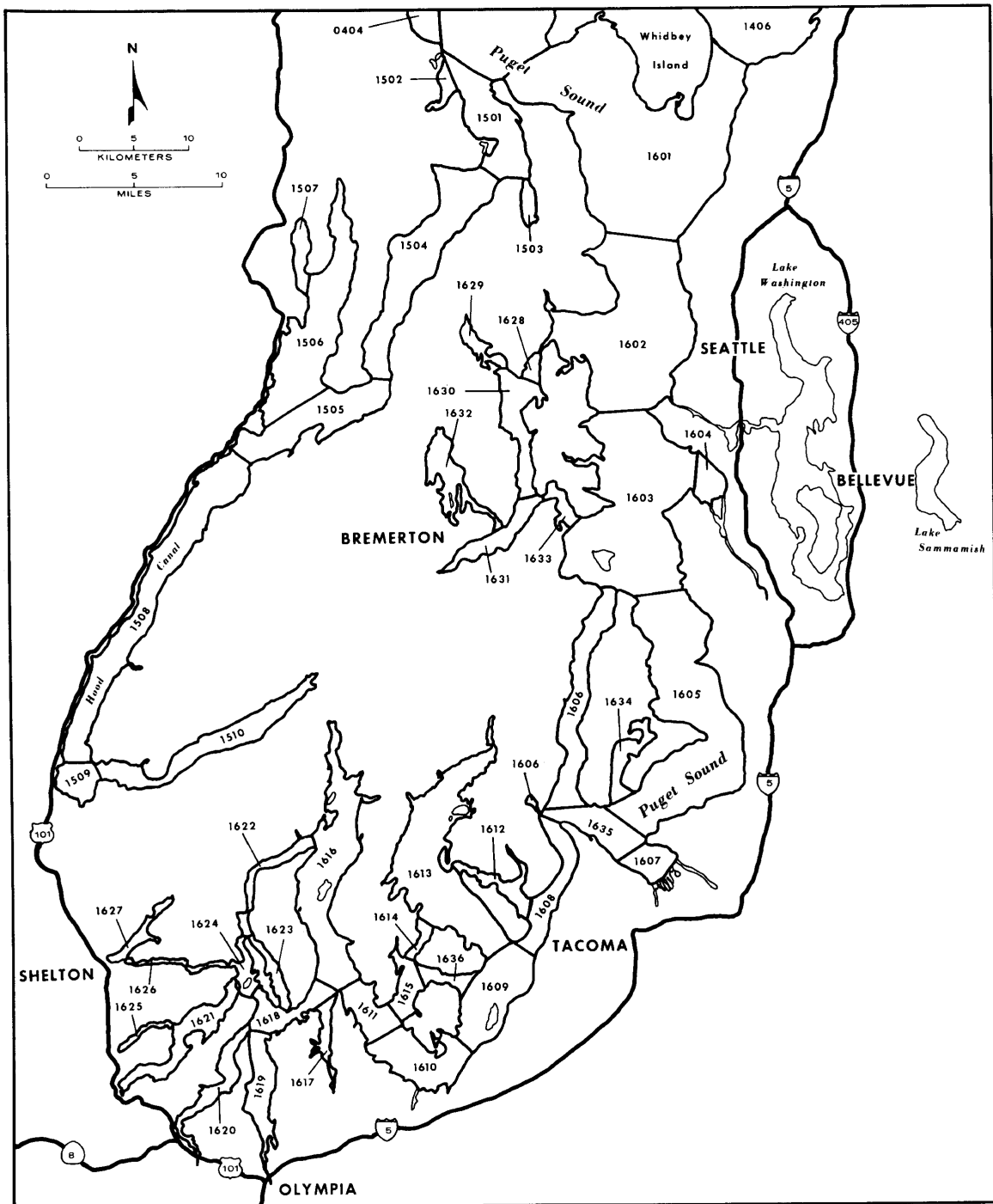
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Table 2. Concluded

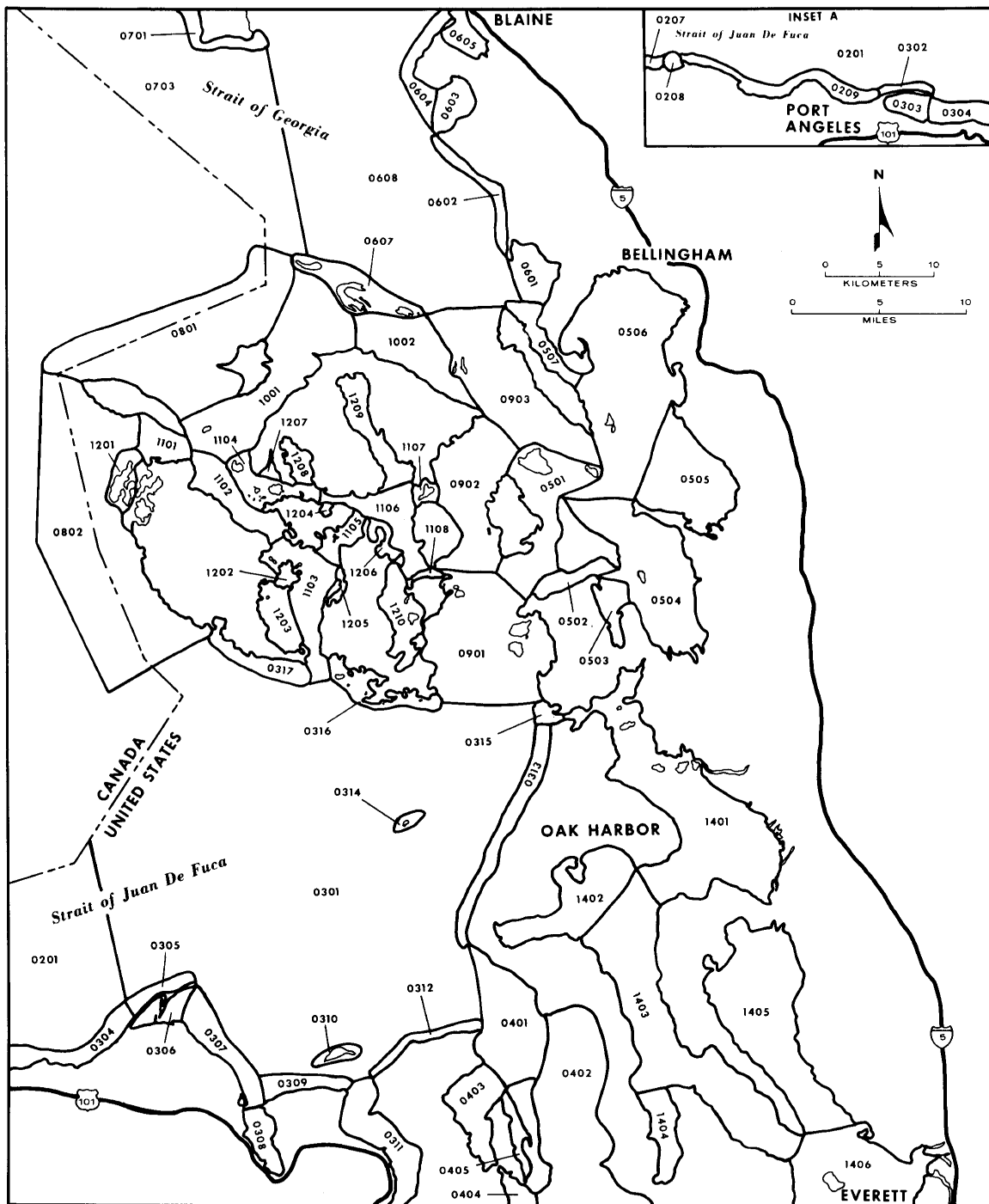
Subregion Number ^a	Name	Catalog map area	Survey type ^b	Numbers observed	
				Pigeon Guillemot	Marbled Murrelet
1609	Steilacoom	175	B	6	3
1610	Nisqually Reach	175	B	28	12
1611	Treble Point/ Johnson Point	175	B	35	2
1612	Hale Passage	175	B	11	0
1613	Carr Inlet	175	B	105	4
1614	Pitt Passage	175	B	18	0
1636	Balch Passage	175	B	8	0
1615	Drayton Passage	175	B	9	4
1616	Case Inlet	175	B	93	5
1617	Henderson Inlet	175	B	12	0
1618	Dana Passage	175	B	9	
1619	Budd Inlet	175	B	36	0
1620	Eld Inlet	175	B	21	0
1621	Totten Inlet	175	B	44	0
1622	Pickering Passage	175	B	8	0
1623	Peale Passage	175	B	11	0
1624	Squaxin	175	B	19	0
1625	Skookum Inlet	175	B	8	0
1626	Hammersley Inlet	175	B	49	0
1627	Oakland Bay	175	B	1	0
1628	Agate Passage	175	B	27	0
1629	Liberty Bay	175	B	20	0
1630	Port Orchard	175	B	46	4
1631	Sinclair Inlet	175	B	8	0
1632	Dyes Inlet	175	B	18	0
1633	Rich Passage	175	B	1	1
1634	Quartermaster Harbor	175	S	<u>3</u>	<u>1</u>
TOTALS				1,153	429

- a. These are MESA subregion numbers. Many numbers were assigned during the MESA project. The numbering system was then subsequently extended to cover all marine waters of Washington (Wahl and Speich 1980). Subregion boundaries, although arbitrary, generally follow natural geographic and oceanographic features. Subregion boundaries and numbers are shown in maps on pages 501-506.
- b. Survey type (observation platform) codes: A = airplane; B = small boat (and Washington State Ferry); and S = shoreline.

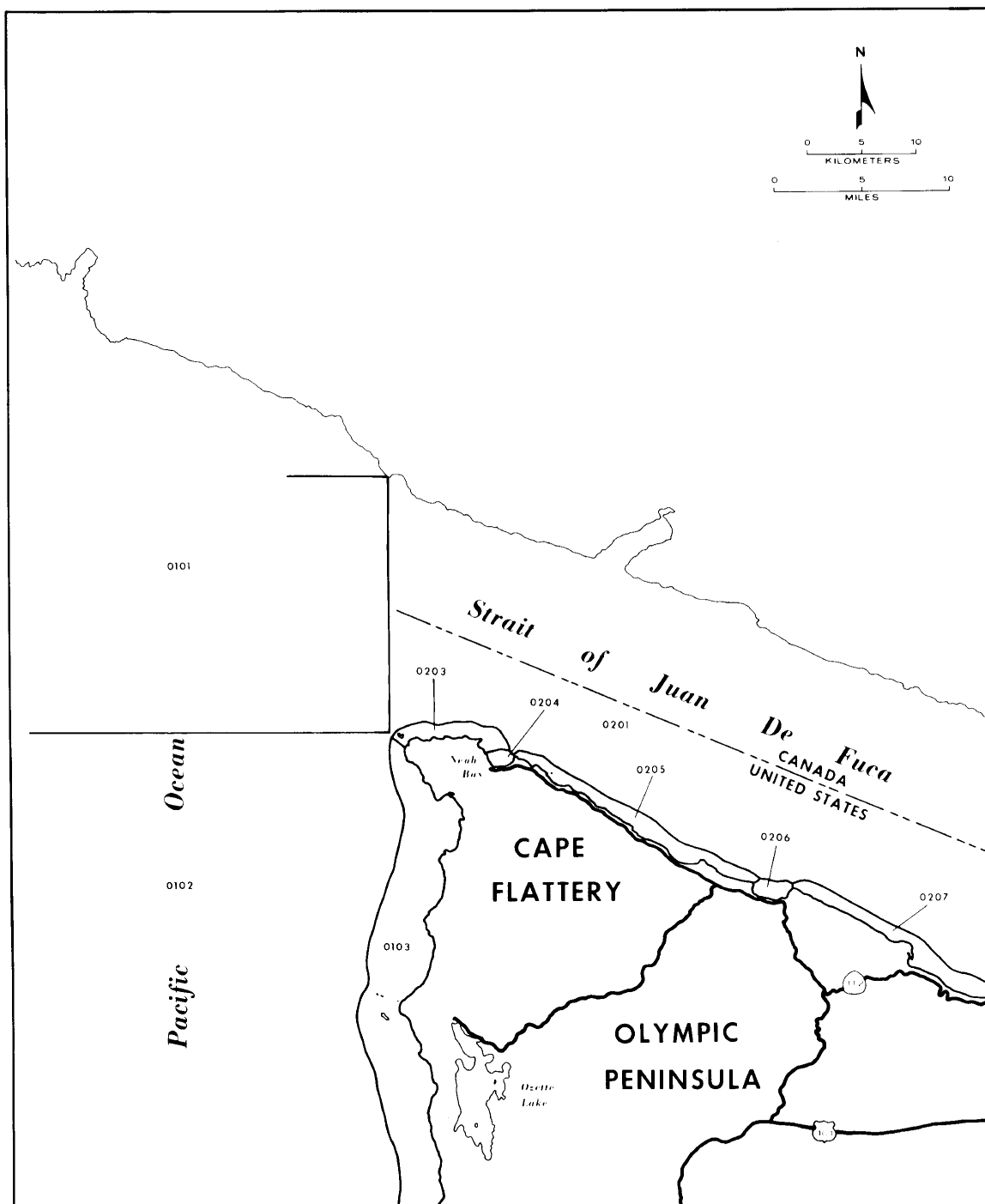
175 SEATTLE



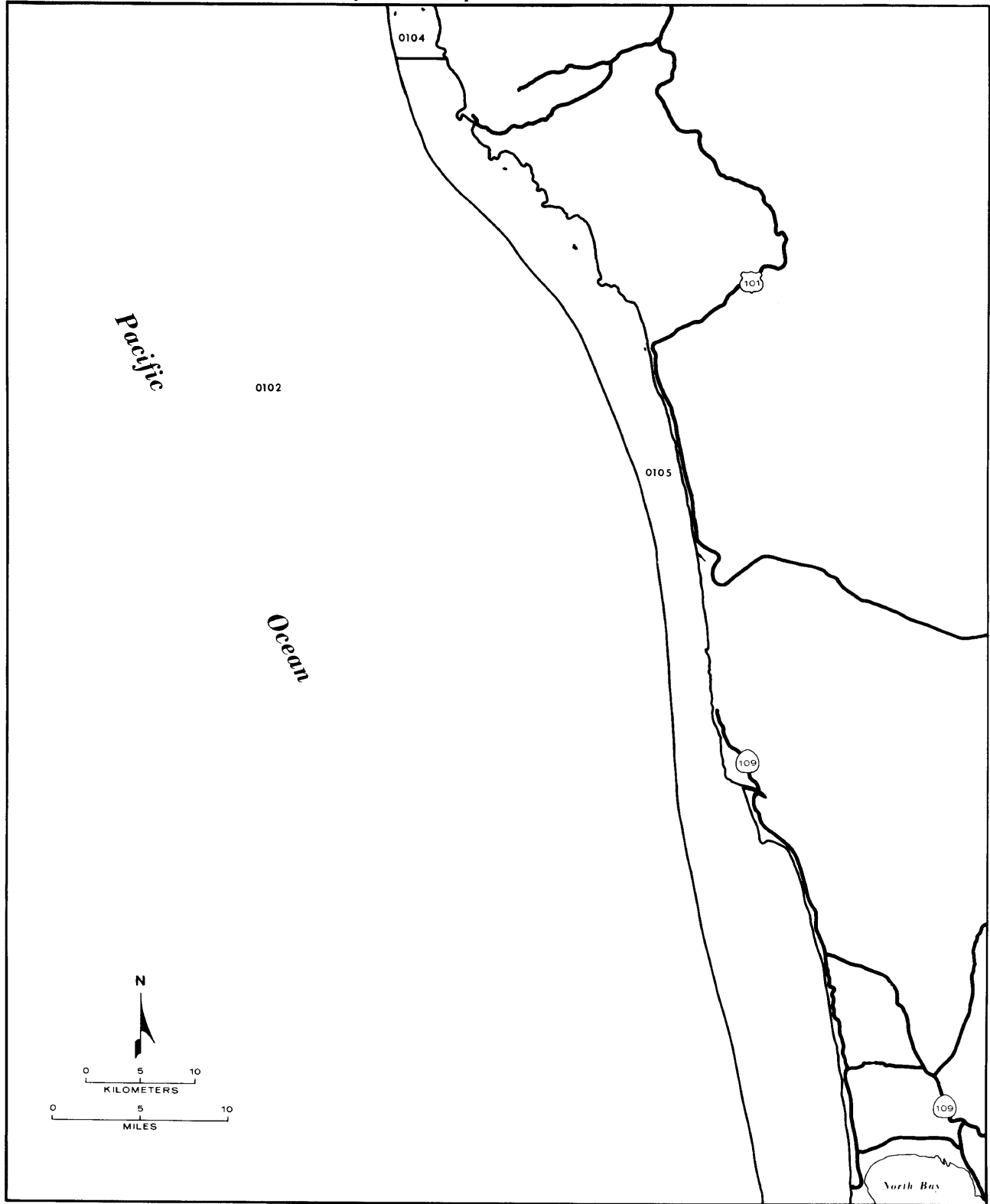
156 VICTORIA



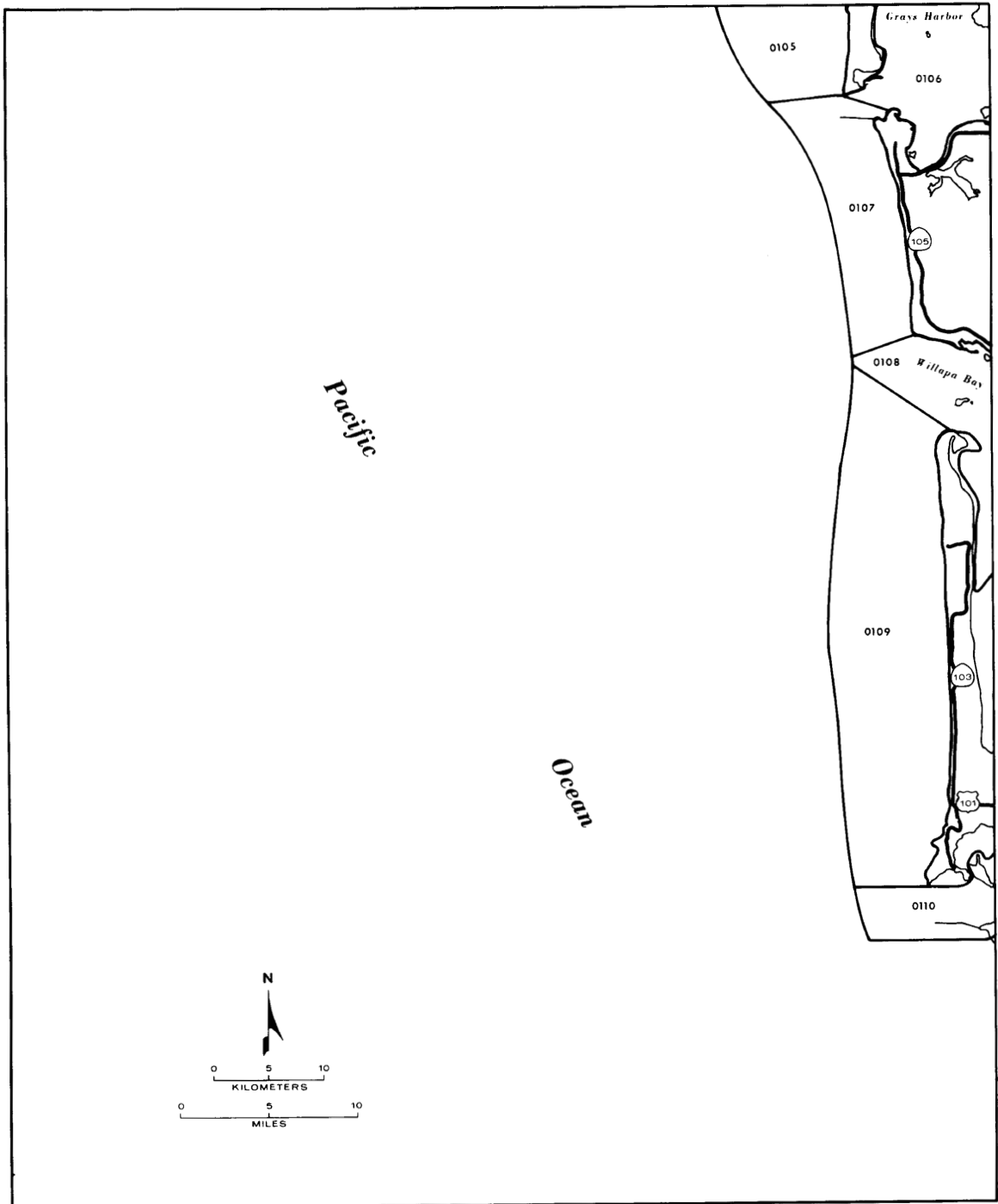
155 CAPE FLATTERY



174 (NORTH) COPALIS BEACH



174 (SOUTH) COPALIS BEACH



195 HOQUIAM

