

Chapter 24

Monospecific and Mixed Species Foraging Associations of Marbled Murrelets

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Abstract: Marbled Murrelets (*Brachyramphus marmoratus*) vary in the frequency with which they are associated with mixed species foraging flocks of seabirds. When foraging in the exposed waters of the outer coasts, murrelets are almost invariably found in pairs or small monospecific flocks. In protected waters, they are frequently associated with other species. The reasons for these differences are unknown. An increase in the number of gulls foraging in association with murrelets could be detrimental to the murrelets if it resulted in an increased rate of kleptoparasitism.

Marbled Murrelets (*Brachyramphus marmoratus*) occupy a variety of foraging habitats and vary in their propensity to forage in the company of other seabirds. In this brief review, I contrast two types of habitats used by foraging murrelets, and discuss the likelihood that murrelets will be accompanied by foragers of other seabird species. Because marbled murrelets may be subject to kleptoparasitism in these mixed species flocks, it is possible that changes in the relative abundance of the species in these flocks could impact the foraging success and ability of murrelets to provision young.

Habitats Used

Marbled Murrelets occur in nearshore (usually less than 2 km from shore) waters from central California to Alaska. Within this range, murrelets are found in two different habitats: along the open “outer” coasts, and in the protected inshore waters of bays, sounds, and inlets. In California, Oregon, the outer coast of Washington, and parts of the west coast of Vancouver Island, murrelets use coastal waters at the edge of the open ocean. These coasts are occasionally intersected by rivers with their associated offshore plumes, or headlands that may set up eddies or fronts in their vicinity. However, for the most part, these waters are lacking in obvious features that should result in predictable, small-scale concentrations of prey. In contrast, in the more protected bays, sounds and inlets of British Columbia, Alaska, and Puget Sound, there are often strong tidal currents that interact with bathymetric features to create eddies, rips and others features where prey predictably concentrate. In addition, these waters are often nursery areas for young schooling fish that forage in quiet bays as well as in association with tidal features such as rips and eddies.

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Foraging Associations

The foraging behavior of Marbled Murrelets, particularly the propensity to be associated with mixed species foraging flocks, appears to differ between exposed and sheltered waters. Although quantitative data are lacking, murrelets are usually found in pairs, or occasionally in small monospecific flocks along the exposed ocean coast (Ainley and others, this volume; Strachan and others, this volume); I observed this to be also true of the Xantus’ Murrelet (*Synthliboramphus hypoleuca*) in the waters near the Channel Islands of the Southern California Bight. It is not known why these two species of birds prefer to forage as pairs in the open ocean. Xantus’ Murrelets specialize on young-of-the-year northern anchovies (*Engraulax mordans*) (Hunt, unpublished data) and marbled murrelets take these as well as other species of small, schooling fish (Burkett, this volume). Cooperative foraging may be more efficient when hunting for these fish, but many species of seabirds forage as singletons when taking the same fish species. In central California, murrelets were also occasionally found in small (up to 25 individuals) flocks, with some of these flocks being in the vicinity of river mouths (Ralph and Miller, pers. comm). None was accompanied by other species of seabirds. Likewise, near Barkley Sound on the west coast of Vancouver Island, Porter and Sealy (1981) reported that outside the sound, murrelets did not participate in any of seven mixed species foraging flocks. Sealy (1973b) found marbled murrelets in about 4 percent of mixed species flocks off Langara Island, British Columbia, but most birds along the outside of the west coasts of Vancouver Island and the Queen Charlotte Islands were thought to forage singly or in monospecific pairs (Carter 1984; Carter and Sealy 1990; Sealy 1973b, 1975c). Chilton and Sealy (1987) suggested that the low frequency of murrelet participation in mixed species foraging flocks was a means of avoiding competition with larger, more aggressive species of seabirds.

Despite the potential for competition with other species of seabirds and kleptoparasitism from gulls in protected waters from Washington to Alaska, Marbled Murrelets frequently forage in mixed species flocks (Piatt, pers. comm.; Hunt, pers. obs.; Burger, pers. comm.). For example, in the protected waters within Barkley Sound, Porter and Sealy (1981) found murrelets present in 7 of 27 mixed species feeding flocks. Recently, Mahon and others (1992) documented the role of Marbled Murrelets in foraging flocks in the protected inlets of the Strait of Georgia, British Columbia. They found that the number of feeding flocks observed in an area was positively correlated with the number of murrelets present. They observed that in 100 of

the 127 mixed species foraging flocks, Marbled Murrelets and Glaucous-winged Gulls (*Larus glaucescens*) were the only participants. Other species that accompanied murrelets included Bonaparte's Gulls (*Larus philadelphia*), Common Mergansers (*Mergus merganser*), Pigeon Guillemots (*Ceppus columba*), and Pelagic Cormorants (*Phalacrocorax pelagicus*). Mahon and others (1992) observed the initiation of 27 flocks. In each case, the flocks began after Marbled Murrelets drove a school of sand lance (*Ammodytes hexapterus*) to the surface, where the fish "thrashed briefly in a tightly packed 'boil.'" Gulls and, if the boil of small fish jumping from the water's surface lasted sufficient time, other birds were then attracted to this food resource. The feeding flocks observed by Mahon and others (1992) had on average 7.7 murrelets and 5.9 Glaucous-winged Gulls, with a positive correlation between the numbers of murrelets and gulls in the flocks. Flock duration varied between 1 and 79 minutes and was also positively correlated with the number of murrelets present. I have seen Marbled Murrelets in mixed species foraging flocks in the San Juan Islands of Puget Sound. There, murrelets foraged on young of the year herring (*Clupea harengus*), and started foraging flocks when they forced dense schools (balls) of herring to the surface. Thus, these mixed-species feeding flocks are similar to the Type I feeding flocks described by Hoffmann and others (1981). Within these flocks, the murrelets acted as catalysts, even though their foraging did not appear to be as conspicuous as that of species considered catalysts by Hoffmann and others. In the San Juan Islands, I have seen Marbled Murrelets join mixed species foraging flocks that contained not only gulls (Glaucous-winged, Mew [*L. canus*], and Heermann's [*L. hermanni*]) but also harbor seals (*Phoca vitulina*), Rhinoceros Auklets (*Cerorhinca monocerata*), and Common Murres (*Uria aalge*). Both in the cases where murrelets were catalysts, and when they joined flocks, they foraged beneath the surface and probably served to drive small, highly clumped schools of fish to the surface.

The variability in associations between foraging Marbled Murrelets and other seabirds noted above and elsewhere (Carter and Sealy 1987a, Hoffman and others 1981) demonstrates the plasticity in both the behavior of murrelets and in the frequency

with which other species take advantage of the foraging behavior of the murrelets. Reasons for the differences in the frequency that foraging murrelets are associated with other bird species on exposed outer coast waters, when compared with more sheltered inside waters, is not known. It may be that interspecific competition with other alcids is more intense along the outer coast of Vancouver Island than in sheltered waters (see Chilton and Sealy 1987; Mahon and others 1992; Piatt 1990), but this cannot explain the lack of mixed species flocking farther south where large alcids are scarce. Alternatively, differences in the roughness, clarity, or depth of water may influence the ability of surface foragers to take advantage of the murrelet foraging. Additionally, the size, distribution or behavior of fish aggregations may differ in the two habitats. It would be useful to explore why these mixed species foraging flocks occur in one habitat, but not in the other, and their importance to murrelet foraging success.

Although it would seem reasonable to assume that murrelets benefit from joining mixed species foraging flocks in those instances when they choose to join, it is not known whether murrelets benefit from being joined by other species. Gulls sometimes attempt to steal fish from murrelets when they surface with a fish in their bill (G. Hunt pers. obs.) and larger alcids may interfere with their foraging (Chilton and Sealy 1987, Piatt 1990). Alternatively, the presence of surface-foraging gulls may aid the murrelets by driving fish from their protective balls where they may be less vulnerable to underwater predators (Girsa and Danilov 1976, Götmark and others 1986, Grover and Olla 1983). Clearly the gulls benefit from the activities of the murrelets in driving fish to the surface and holding them there (Grover and Olla 1983; Hoffman and others 1981).

From the point of view of murrelet conservation, it would be useful to know the costs and benefits to Marbled Murrelets of being joined by gulls. Gulls apparently forage with murrelets in those areas where murrelet populations are most dense. If gull populations are artificially increased by the wasteful habits of people, and the gulls suppress murrelet capture or retention of fish, then it would be useful to investigate how this indirect anthropogenically caused pressure on murrelets could be relieved.