

Study Title:

A Preliminary Summary of the Exxon Valdez Damage
Assessment Studies on the Marbled Murrelet. (Not
a full report)

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Bird Study No. 6 (1989)
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Summary of NRDA Studies on the Marbled Murrelet

This interim summary is not intended as a report, but is an outline of the results, preliminary conclusions and recommendations of the NRDA studies on the marbled murrelet from 1989 to 1991. A full report integrating all reports and information of relevance to murrelets will be made available.

INTRODUCTION

The marbled murrelet (Brachyramphus marmoratus) is a nearshore diving seabird which is highly vulnerable to oil spills and is one of the most abundant birds in the EVOS zone. The EVOS zone is one of the world population centers for murrelets, second only to southeast Alaska in abundance (Mendenhall 1988). Proportionally more murrelets were killed relative to their numbers at risk (Piatt et al. 1989). In Prince William Sound, marbled murrelets comprised 12% of all seabird carcasses retrieved after the oil spill.

In 1989 Bird Study Number 6 was implemented to assess injury to marbled murrelets from the oil spill. A preliminary draft report was provided in 1989. In 1990, shoreline censuses and transects in the Naked Island area were continued as a supplement to Bird Study 2 (Boat Surveys). The preliminary results of this study were presented in 'Assessment of Injury to Nearshore Alcids from the Exxon Valdez Oil Spill: Effects on Marbled Murrelets and Pigeon Guillemots, 30 November, 1990'. This report was also presented as Appendix A in the 1990 Bird Study 2 report.

The 1989 NRDA Bird Study 6 utilized pre-oiling data available for the Naked Island area from 1978 to 1981. For murrelets, data consisted primarily of complete shoreline counts of Naked, Storey and Peak Islands, plus murrelet counts made on five transects on the west side of Naked Island. In addition, historic data consisted of land-based counts of murrelets in three bays, observations of juvenile murrelets and 16 adult murrelets collected in 1978.

In 1989, in addition to the original census methods, we tracked daily and seasonal variability in at-sea counts, the effects of human disturbance, established alternate study sites and collected specimens for contaminate data. Alternate study sites were Eaglek Bay, north Knight Island and Kachemak Bay. Most of the data from these sites has yet to be analyzed. The specific objectives and methods of the NRDA marbled murrelet studies are presented in the 1989 and 1990 preliminary reports.

In 1991 a restoration study was begun on marbled murrelet use of upland habitats on Naked Island, PWS. While there, the restoration team conducted the shoreline census of the Naked Island area. In addition, we initiated a stratified random sampling project to estimate the local marbled murrelet population at-sea.

RESULTS

Naked Island Transects and Shoreline Census

Declines in murrelet counts on transects in Cabin Bay were only significant early in the summer of 1989 and corresponded with intense human activity. The high murrelet counts in Cabin Bay in 1990 may have been a localized phenomenon. Feeding flock activity was concentrated in the area of the transects throughout that summer. No transects were done in 1991.

For Naked Island overall, shoreline surveys showed significant declines in marbled murrelets in 1989, but not in 1990. The 1991 count was only 60% of the 1990 count, making the three-year post-oil mean significantly lower than the three-year pre-oil mean. On Storey Island, the mean for 1989 and 1990 was significantly higher than pre-oil years, but 1991 counts were down 60% from that high. The 1991 counts were also down on Peak Island (only 36% of 1990 counts) and Smith Island (33% of 1990 counts). Thus, a decline in murrelet numbers was observed throughout the study area in 1991.

There was no significant difference in murrelet counts between oiled or unoiled shoreline sections on Naked Island. It is unlikely that an oiling effect could be detected on such a fine scale. In PWS an estimated two-thirds of murrelets occupy waters beyond 200m from shore, and murrelets are highly mobile in foraging. There was however a shift in murrelet activity in 1989 from the southwest area of Naked Island north to Liljegren Passage and Storey Island. The pattern of distribution coincided with human disturbance, which may have been an important factor. This was true on a small scale in the Naked Island area and on a larger scale throughout the 1989 study sites. The lack of boat and airplane activity at Naked Island in 1990 was suggested as an explanation for the increase observed that year. However, as there was little human activity in 1991, this does not explain the decline observed during the 1991 shoreline census.

Petroleum Hydrocarbon Contamination and Body Weights

Marbled murrelets did show petroleum hydrocarbon contamination in the liver, consistent with the degree of oiling at each collection site. Murrelets from unoiled Eaglek Bay showed no contamination (N=10). At lightly oiled Naked Island, two of eight birds had been exposed. At heavily oiled Eleanor Island, six of ten birds had been exposed. No hydrocarbon analysis is available for the murrelets collected in 1978.

Birds which appear healthy may have lower body weight if stressed by lack of food or subject to systemic ailments. It may be possible to compare pre and post oil spill body weights of murrelets collected throughout the spill zone. For example, the mean body weight of the 24 adult murrelets collected in 1989 was significantly lower than that of the 14 murrelets collected at Naked Island in 1978. However, in this case the sampling dates were not similar, and natural seasonal changes may account for some of this difference.

Other sources of mortality

A study of incidental take in the Prince William Sound gillnet fishery was initiated in 1991 (Pat Gould, pers. comm.). Marbled murrelets were the second most frequently caught seabird after murre. By extrapolation, an estimated 378 Brachyramphus murrelets, or .005 percent of the PWS population, were taken in salmon gillnets in 1991. This loss is in itself trivial, but could represent one among many environmental pressures with a cumulative negative effect.

Marbled murrelets lay one egg, and there is circumstantial evidence that their reproductive success is low. This could have implications for the recovery of the murrelet population in the spill zone. The evidence is based on a small sample size of nests from throughout its range and on observations of juveniles at-sea from late July through August. (Observations made at Naked Island pre and post oil spill will be included in the final report). During the 1991 restoration study, none of the four discovered marbled murrelet nests were successful. Corvid predation is believed to be responsible. Additionally, an

adult male murrelet with a brood patch was killed while in the trees by a sharp-shinned hawk. Peregrin falcons, which nest on Naked Island, are also known to prey heavily on murrelets on the south Kenai Peninsula (Jeff Hughes, pers. comm.). Bald eagles were observed to make attempts on murrelets at-sea.

Boat Survey Evidence of a Decline in Murrelets

For Prince William Sound as a whole, murrelets have declined significantly since pre-oil spill surveys in 1972 and 1973 (Laing 1991). The July 1973 estimate of Brachyramphus murrelets was 304,432 birds, compared to July estimates of 107,232 in 1989, 81,398 in 1990 and 105,952 in 1991. There was no significantly greater decline in the oiled areas in summer surveys. The winter murrelet population of Prince William Sound may have been more directly impacted by the oil spill. March estimates of murrelets are usually between 22% and 32% of the July population estimates. The greater decline of murrelets in oiled areas during March counts approached significance. A more precise description of population changes within the spill zone may be available once habitat features are incorporated into the analysis. Murrelet counts along the south Kenai Peninsula and in Kodiak also appear to be lower than pre-spill counts, although data has not been analyzed yet.

CONCLUSIONS AND RECOMMENDATIONS

The marbled murrelet population has declined dramatically in Prince William Sound since surveys done in 1972 and 1973. Counts in the Naked Island area are also lower than counts made from 1978-1980. The length of time between pre-oil surveys and post-oil surveys makes it difficult to determine the contribution of the Exxon Valdez oil spill to this decline. It is known, however, that proportionally more murrelets were killed in the spill zone than their numbers at risk at the time of the spill. In addition, apparently healthy murrelets collected in oiled areas had internal contamination by petroleum hydrocarbons, whereas murrelets collected in unoiled areas did not. As an important part of the avifauna throughout the spill zone, the murrelet population should be monitored and impediments to a natural recovery avoided where possible.

Based on these preliminary results, the following recommendations are made. This should not be considered a definitive list as final data analysis may alter conclusions or provide more suggestions.

1. The marbled murrelet population should be monitored by conducting boat surveys in Prince William Sound, the Kenai Peninsula and the Kodiak Archipelago. This may track the length of recovery period, or in the event of continued decline, indicate a need for more intensive restoration efforts. It will also elucidate distributional patterns on a large scale and help to identify marine areas critical to murrelets.
2. A method of estimating relative annual murrelet reproductive success should be developed. A suggested method would be to record juvenile murrelets during boat surveys. This may require re-adjustment of survey dates to coincide with peak murrelet fledging in late July/early August. Alternatively, specific sites could be censused at appropriate times to provide indices. Ideally, if it were determined that the March population of murrelets in PWS is comprised primarily of juveniles, that survey may serve as an indicator of reproductive success and survival from the previous summer. The age structure of birds present in March could be determined by analysis of carcasses retrieved during the EVOS.

3. The demographics of the murrelet population needs to be determined. The use of bone cross-sections for ageing should be explored. Breeding status of the birds killed during the oil spill will affect recovery rates.
4. Data collected during the NRDA studies should be completely analyzed and synthesized with other available information. This will provide information relevant to murrelet at-sea surveys, management to minimize human disturbance, food requirements and murrelet distribution relative to bathymetric features.
5. As a first step, restoration efforts should focus on identifying breeding and foraging habitats which by their acquisition or proper management would benefit murrelet reproduction.
6. The murrelet is one of the many species affected by EVOS that depend on forage fish, of which we have little knowledge - sandlance, capelin, juvenile pollock and juvenile herring. The prey base, and its potential for unintended manipulation by humans, may be a key factor in recovery or continued decline of many seabirds and marine mammals. A comprehensive study of forage fish and invertebrates should be initiated as soon as possible.