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EVALUATING AND MINIMIZING THE EFFECTS OF IMPACT PILE DRIVING ON THE MARBLED MURRELET (*BRACHYRAMPHUS MARMORATUS*), A THREATENED SEABIRD

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Abstract

The purpose of this paper is to describe the methods used to evaluate the potential adverse effects of underwater sound from impact pile driving on the marbled murrelet (a seabird that is federally listed as threatened), and to introduce measures that have successfully minimized adverse effects. The U.S. Fish and Wildlife Service has evaluated the effects of pile driving on the marbled murrelet through several recent Endangered Species Act consultations. Over the past few years, there has been increased attention to the potential for impact pile driving to adversely affect fish species. When foraging, marbled murrelets dive in pursuit of prey and can be exposed to the same elevated sound pressure levels that adversely affect fish. Exposure to these sounds could result in mortality, injury, and/or modification of normal behaviors.

Marbled murrelets forage in the marine waters throughout Puget Sound. Recent transportation projects that have occurred in Puget Sound include replacement of the Hood Canal Floating Bridge and multiple Washington State Ferry terminal-maintenance and preservation projects. These projects typically use 36-inch and 24-inch hollow steel piles. Impact installation of these piles can produce sound pressure levels of 210 dB peak. Physical injury, including death, may occur in aquatic organisms at sound-pressure levels above 180 dB peak. Sound-pressure levels above 153 dBrms are expected to cause temporary behavioral changes that may negatively affect foraging efficiency.

These projects were evaluated by determining the area where sound pressure was expected to exceed the above levels and then estimating the potential for marbled murrelets to be exposed to those sound-pressure levels. When exposure was likely to occur, the U.S. Fish and Wildlife Service anticipated adverse effects in the form of harm (physical injury) and harassment (modification of normal behavior patterns). Minimization measures focused on reducing that potential exposure. Sound-attenuation devices (bubble curtains) were used to reduce the extent of the geographic area where adverse effects could occur. A hazing program was used to move murrelets out of the area where physical injury was expected.

We present the analysis used to evaluate adverse effects to marbled murrelets from pile driving, discuss the method used to estimate the extent of effects, and introduce measures to minimize adverse effects. Finally, we recommend future research needed to better understand and to reduce further these impacts.

Biographical Sketch: Emily Teachout is a fish and wildlife biologist with the U.S. Fish and Wildlife Service in Lacey, Washington, and is a member of her office's Transportation Planning Branch. As a transportation liaison, Emily reviews transportation projects through the National Environmental Policy Act, Endangered Species Act, Fish and Wildlife Coordination Act, and other regulations. Emily provides technical expertise on the conservation of bull trout, marbled murrelets, Northern spotted owls, bald eagles, and other sensitive species. As her office's lead on evaluating potential impacts of underwater sound on aquatic species, Emily develops risk assessments, effect analyses, and policy guidance on pile installation related to ferry operations and bridge projects.