Briefing:

Forest Practices Effectiveness Monitoring

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DEPARTMENT OF NATURAL RESOURCES -- DIVISION OF FORESTRY

Background. The Alaska Forest Resources and Practices Act (FRPA, AS 41.17) is designed to protect fish habitat and water quality during forestry operations. FRPA and the best management practices (BMPs) in its regulations (11 AAC 95) govern timber harvesting, reforestation, and road design, construction, maintenance, and closure. Current best management practices (BMPs) to protect fish habitat and water quality were adopted in 1990, with updates for coastal Alaska (Region I) in 1999, for interior Alaska (Region III) in 2003, and for southcentral Alaska (Region II) in 2006.

The Act requires compliance monitoring and effectiveness monitoring to ensure that resource protection goals are met. Compliance monitoring assesses whether timber operations are properly implementing FRPA and its regulations. Effectiveness monitoring evaluates whether the BMPs successfully protect water quality and fish habitat when they are implemented properly.

Effectiveness monitoring activities and results in Southeast Alaska. Since 1990, forest landowners and state agencies have conducted five projects to evaluate the effectiveness of the forest practices BMPs in protecting fish habitat and water quality in Southeast Alaska. These projects include studies on

- Windthrow and large wood recruitment to streams (Martin and Grotefendt, 2007),
- Long-term trends and conditions in fish habitat and effectiveness of buffer strips (Martin, 2010), and
- Water quality and fish habitat response to experimental buffering of Michael Creek (Milner, 1996; Rinella, 2003; Martin Environmental, 2004).

Dr. Douglas Martin reported that "contemporary BMPs have minimized the adverse effects of forest practices," (Martin, 2013). He summarized key findings of the Southeast Alaska studies as follows (D.J. Martin, pers. comm., Oct. 1, 2013).

- Collective evidence to date indicates that the current BMPs are maintaining fish habitat over the near term (< 10 years) and the long-term outlook is optimistic. Neither an experimental buffer study nor a 20-year trend-monitoring project observed any distinct changes (trends positive or negative) in fish habitat over the period of study nor is there any indication of significant habitat degradation that could be related to timber harvest. There is strong evidence that post-harvest windthrow increased tree losses in buffers, mostly on the outer edge of buffer strips and that windthrow increased the input of large woody debris to streams at some locations. Increased large wood recruitment has indirectly contributed to the formation of new pool habitat in some streams as a result of beaver dam construction on down trees. Because fish habitat is strongly associated with large wood, increased recruitment after logging is expected eventually to increase pool composition and overall habitat complexity over time as channel-spanning trees break and fall into the active channel.
- Windthrow has not significantly diminished the future potential supply of large wood in most

riparian areas (Martin and Grotefendt. 2007), but the combined effects of selective harvesting and windthrow remains a concern for some areas. The lower treatment reach at the Michael Creek Experimental Buffer Study had a cumulative loss of 41% of the riparian stand (harvest -12% plus windthrow -29%); a level exceeded only 1% of the time based on the buffer strip windthrow frequency distribution of Martin and Grotefendt (2007). The high mortality was partly due to wind exposure at this location that may have occurred regardless of the variation harvest. However, additional windthrow mortality may be attributed to tree harvest in the outer zone which thinned the stand and increased the vulnerability to windthrow. In a large survey of windthrow in coastal British Columbia, Rollerson and McGourlick (2001) found that the distance windthrow penetrates into riparian areas is significantly greater in thinned areas and that retained residual stands experience substantially higher percentages of windthrow than non-thinned stands. These findings indicate that the effectiveness of the riparian BMPs to maintain future supplies of large wood depends on several factors including site-specific conditions, riparian stand retention, and harvest unit configurations that reduce windthrow vulnerability.

- Selective harvesting in an experimental buffer on Michael Creek did not cause any detectable effect on benthic macroinvertebrate communities (Milner, 1996) and Rinella (2003).
- The collective effect of BMPs for riparian areas and slope stability standards is that leave areas are often larger than the minimum no-cut buffers, which increases overall FRPA effectiveness.

Other effectiveness monitoring work in Alaska. In southcentral Alaska, the Aquatic Restoration and Research Institute completed a report on FRPA effectiveness monitoring in the Willer-Kash area in May 2016. The study evaluated whether FRPA and its regulations effectively protect fish habitat and water quality. Pre-harvest data was collected on four Type IIC streams (small anadromous streams) in 2006-2008, followed by small-scale harvest activity. The harvest and road construction within the Willer-Kash Harvest Area was comparable to the level of harvest on other state and Matanuska-Susitna Borough lands in the Susitna River and Little Susitna River watersheds. The study found no indication of changes in water quality, physical habitats, or the biotic community that could be attributed to timber harvest related activities. If the extent of harvesting and road building increases, reevaluation of FRPA effectiveness is recommended.

Cook Inletkeeper studied stream temperature changes in four Kenai Peninsula watersheds. Their research results showed no obvious relationship between the percent of the watershed logged and stream temperature. Forest practices generally kept logging away from riparian vegetation and prevented a significant change in canopy cover. However, little is known about the effects of removing expanses of upland vegetation on stream flows (Mauger, S., 2006).

In addition to the studies targeted at evaluating FRPA effectiveness, there is extensive research on the relationship of forest management to water quality and fish habitat. The Division of Forestry compiled literature relevant to evaluation of FRPA effectiveness in an extensive annotated bibliography (Ott, Ambourn, Keirn, and Arians. 2005). The bibliography includes published papers and unpublished reports.

The Division of Forestry periodically convenes meetings of state and federal agency personnel, landowners, and researchers to review and prioritize FRPA effectiveness monitoring work. Completion of proposed studies depends on funding availability.

Summary. Effectiveness monitoring studies to evaluate current BMPs under the Alaska Forest Resources and Practices Act document that the BMPs are protecting fish habitat and water quality from adverse impacts of forest operations in Southeast Alaska where the majority of harvesting has occurred. Additional monitoring is needed in southcentral and interior Alaska. The Division of Forestry continues to work with other agencies, landowners, and researchers, to prioritize monitoring needs.

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