FRPA EFFECTIVENESS MONITORING WITHIN THE WILLER-KASH STATE FOREST HARVEST AREA:

PROJECT SUMMARY FOR THE FRPA EFFECTIVENESS MONITORING WORKING GROUP

Pre-harvest data have been collected for two years from four streams within the Willer-Kash State Harvest Area. The effectiveness of the FRPA and regulations at protecting water quality and fish habitat will be evaluated through comparisons between pre- and post-harvest data. Stream characteristics measured included the following physical, chemical, and biological parameters:

- Water Temperature and Pressure—data loggers recording hourly values.
- Discharge—direct measures and calculated from corrected pressure values.
- Channel Morphometry—determined from cross-sectional measures within representative reaches.
- Substratum size and Embeddedness—Wolman pebble counts
- Large Woody Debris—counts and ranking of pieces and debris dams with 100-m sampling reaches.
- Riparian Coarse Wood—counts of pieces by size and species within 30 x 100-m sampling area.
- Solar Radiation—direct measure of photosynthetically active radiation at the stream surface.
- Nutrients and Water Chemistry—biweekly or monthly measures of pH, specific conductance, turbidity, dissolved oxygen, nitrate and ammonia nitrogen, total and total dissolved phosphorus, and dissolved organic carbon.
- Benthic organic matter and periphyton—measures of the organic matter in the stream bed and abundance of chlorophyll-a.
- Macroinvertebrates—measures of the macroinvertebrate community using ASCI methods.
- Juvenile salmon—average catch per trap for 24-hour sets of 10 minnow traps.

The four streams drain Willow Mountain and flow into Willow or Little Willow Creeks. The streams are of similar size (4 to 5-m wide), depth (w:d ratios 15 to 22), and slope (1.5 to 2.5%). Maximum stream bank heights are just over 1 m. Stream substrate is small to medium sized gravel with 10 to 15% fines (<2mm). Water temperatures are cool, generally less than 13°C and are not well correlated with air temperatures. Discharge during spring runoff is near 20 cfs, decreased to below 10 cfs during summer, and then increased to over 50 cfs during fall storms. Discharge was estimated to exceed 100 cfs during extreme flows in August of 2006. Between 30 and 50 pieces of coarse wood were counted within the riparian. Less than 15 pieces of large wood and less than 5 debris dams were counted within each stream reach. On average, 60% of available solar radiation reaches the stream surface.

The pre-harvest streams are saturated with dissolved oxygen; pH is near neutral but becomes more acidic during breakup and following storm events. Specific conductivity is near 50 μS/cm and nutrient concentrations are low with total inorganic nitrogen generally below 0.2 mg/L and total phosphorus below 0.05 mg/L. Streams are clear with low dissolved carbon and low turbidity. Maximum turbidity measured was near 5 NTU and occurred during high flows in September of 2006.

Benthic organic matter and periphyton chlorophyll-*a* are similar to values obtained in other similar-sized regional streams. Macroinvertebrate Alaska Stream Condition Index scores ranged from 54 to 80 and ranked water quality as "Good" to "Excellent." Adult coho salmon were observed in all streams. Coho and Chinook salmon, Dolly Varden and rainbow trout were captured in baited minnow traps. Average 24 hour catch per trap ranged from 5 to 10 anadromous salmon.

Measures were generally consistent within each stream from 2006 to 2007. The greatest changes were observed at WK1 where there were increases in fine gravel, large woody debris, and channel width following the extreme flows in the fall of 2006. Juvenile fish sampling methods were modified by increasing the number of traps and soak time. Currently, we are soaking 10 traps within each site for 24 hours to obtain catch/trap/24 hours. The only sampling problems encountered were the removal of temperature loggers and damage to some fish traps by wildlife.

We are currently scheduled to conduct additional water sampling during spring breakup at two sites in 2008. At a minimum, we recommend additional temperature data collection and juvenile fish sampling at the road accessible sites. Fish sampling should be conducted in the spring and fall. Fish sampling would provide information on the variability of fish capture rates using standardized methods and additional information on overwintering survival and rearing distribution. Full implementation of the sampling plan is necessary upon initiation of timber harvest. Implementation of the sampling plan to obtain another season of pre-harvest data would further assess natural annual variability. We would also recommend obtaining pre-harvest data at additional sampling locations within the Mat-Su Borough scheduled for harvest within the five-year plan.