

Soil and Water Question 2a Appendix

Best Management Practices Implementation and Effectiveness Monitoring Thorne Bay Ranger District Timber Trip Report – Slake Timber Sale August 28 and 29, 2012

Summarized by Carol Seitz Warmuth

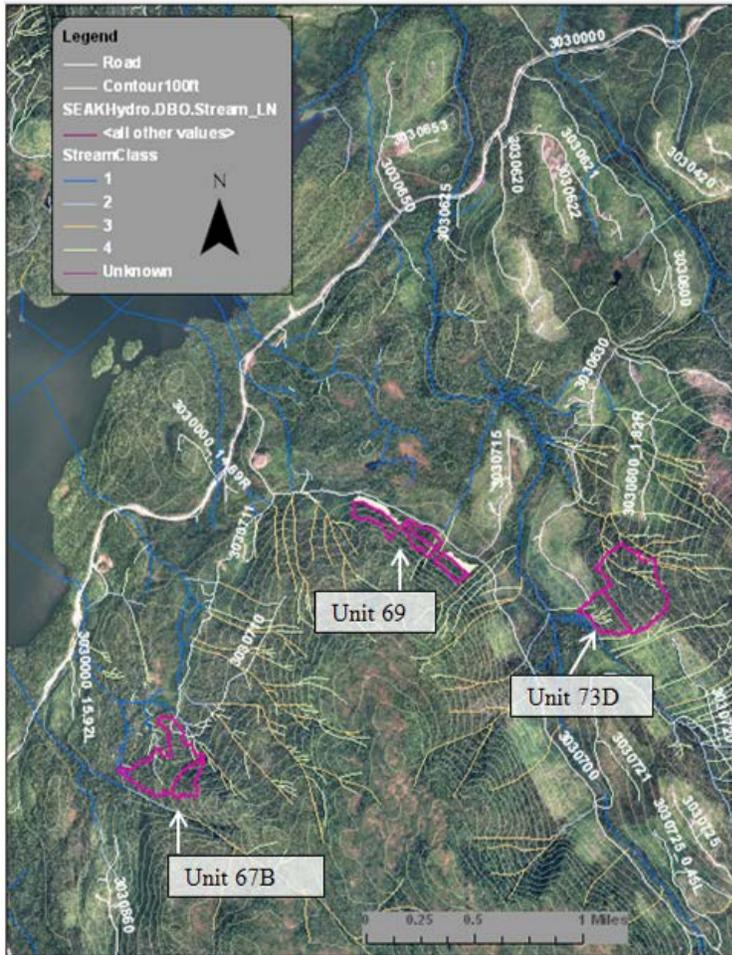
This interdisciplinary trip was conducted on the Thorne Bay Ranger District in August 2012. The intent of the BMP review was primarily to provide quality control to the BMP implementation and effectiveness monitoring effort on the Forest. Participants on the interdisciplinary trip included: Jim Bauers (POW Timber Sale Administrator), Dennis Landwehr (Tongass Soil Scientist Program Manager) Kent Nicholson – unit 69 (TBRD District Ranger), Stan McCoy – unit 69 (POW TMA), Becki Saari (POW Soil Scientist), Jerrod McCormick (Timber Sale Inspector), Quentin Smith – road 3030720 (Tongass Roads Engineering Program Manager), and Carol Seitz Warmuth (Tongass Monitoring and Inventory Coordinator).

The Interdisciplinary Team (IDT) monitored three units, one specified roads 3030720 and two temporary roads as part of the bmp implementation and effectiveness monitoring. These units included Slake Timber Sale road 3030720, units 573-69, 573-67B & 573-73D.

Background

The Slake Timber sale is covered under the Logjam EIS. The Record of Decision for the Logjam EIS was signed 6/11/ 2009. These units were planned before the 2008 Forest Plan Amendment so the units were reviewed and found consistent with the standards and guidelines of the 2008 Forest Plan Amendment. This EIS has incorporated direction from the 2008 Decision on the Tongass Land Management Plan responding to the Tongass Adaptive Management Strategy. These units were harvested under the 2008 Tongass Forest Plan Record of Decision. The 2008 Standards and Guidelines apply to all units. Units within this sale are clear cut, cut tree mark or leave tree mark designated. The logging systems are shovel, skyline cable, and helicopter systems although only shovel and cable units were reviewed by the IDT. Erosion control plans were completed for this timber sale and signed by the operator. Spill prevention, control and countermeasure plans were developed for this timber sale and copies submitted for IDT monitoring review. The timber was hauled to Klawock, AK.

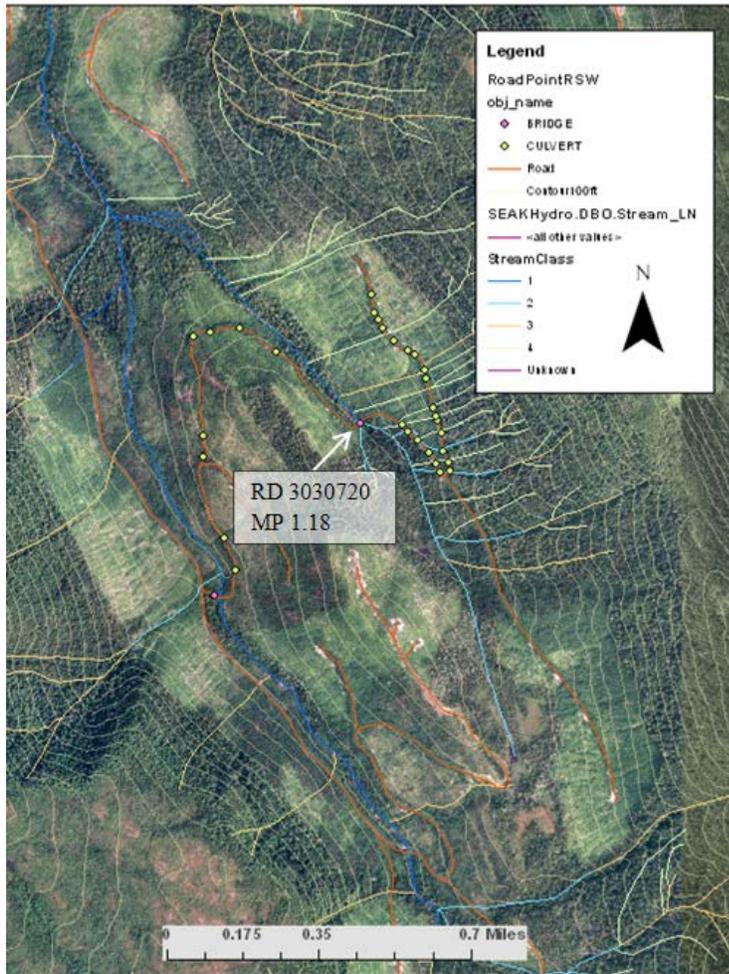
Figure 1. Map of units 67B, 69, and 73D



Change analyses were completed for the Slake Timber Sale. The change analysis focused on changes relative to the environmental effects of key issues identified by the (IDT). In the Slake Timber Sale there, were minor changes made during the implementation on the stream mapping. Reasonable Assurance of Wind firm (RAW) zones were reviewed in the units and implemented using leave tree marked timber and making the boundaries more sinuous. In the Slake Timber Sale, ten of the thirty-nine units had RAW buffers. Changes were also documented relative to the temporary and specified road stream crossings on the Slake Timber Sale. The road locations were adjusted to minimize stream crossings and a few additional crossings were identified.

This monitoring utilized pilot National BMP monitoring forms as well as the June 2011 Tongass Unit and Road Implementation Monitoring forms. The national forms completed for this effort were the Best Management Practices Evaluation: Veg A. Ground based Mechanical Harvest form, and Veg B. Cable and Aerial Yarding, Road B. Completed Road and/ or Water Body Crossing Construction or Reconstruction form. The Tongass BMP Monitoring forms for Road BMP Implementation and Unit Implementation were also completed to track implementation of specific Region 10 BMPs.

Figure 2. Map of road 3030720





Picture 1. Unit 73D

The units and road monitored were located in T68S, R80E, Copper River Meridian in central Prince of Wales Island roughly eight to ten miles northeast of Naukati, Alaska and roughly four to six miles southwest of Coffman Cove. These units and road are located in the central portion of Prince of Wales Island, between Naukati and Coffman Cove south of Sweetwater Lake in VCU 573. The road and units are in the Sweetwater Lake watershed; HUC 190103010300 and 190103010301.

Monitoring Results

Road 3030720

Road 3030720 is accessed off the FDR 3030700 road roughly two miles from the initiation near Sweetwater Lake. FDR 3030700 is accessed off FDR 3030 roughly five miles north of the junction of FDR 30 and FDR 3030 near Hatchery Lake on the central portion of Prince of Wales Island. The road traverses northward then switchbacks in long sections southward and northward to access unit 75 then unit 73 for a length of two miles. The road will be closed for vehicle traffic but will be maintained as an off highway vehicle (OHV) trail. The road will be closed to vehicle traffic to reduce road maintenance costs and wildlife habitat.

The road was open and still being used for timber harvest but will be closed to vehicle traffic and maintained as an OHV trail when the harvest is complete. The road was constructed this year with a road operational level of 2 for high clearance vehicle traffic with a Road Management Objective 1 (closed and stored with a six foot wide road corridor kept open for OHV traffic). The Forest had on file a hazardous communication / waste mitigation plan and the contract had a Spill Prevention Countermeasure and Control (SPCC) plan to address any petroleum spills. The road was monitored since it accessed unit 73 which was selected for monitoring and the road crossed class I, II, III and IV streams. The class I and II stream structures as well as the culverts will be removed upon completion of the timber sale. The road is scheduled to be closed in five years.



Picture 2. Beginning of 3030720 Road

The segment monitored through the national bmp protocol was focused on a bridge that crossed a class II stream at MP 1.18. The length of connected road surface approaches are 2,640 feet in both directions and the length of road in the aquatic management zone is roughly 270 feet. The connected road ditches were measured at 170 feet on the left and 235 feet on the right.



Picture 3. Road 3030720 bridge crossing



Picture 4. Upstream reach of stream at bridge crossing monitored

This road was reconstructed and opened for the timber sale but was constructed roughly 20 years ago. Culverts and cross drains were in place but a few culvert structures and the two bridges were replaced to provide for water transport and minimize maintenance. A need for a few additional cross drains was noted during the monitoring review. An erosion control plan was developed for the contract and required seeding of bared soils to prevent erosion although there was no germination requirement in the contract. The seed had germinated on some of the road cut and fill slopes. A few of the over-steep cut slopes were raveling and vegetation had not established. There was timing in the contract on installation of bridges that crossed a class I stream as well as a class II stream.

This road had been reconstructed by excavating the trees that had re-established on the road surface over the past 20 years. These trees were side cast along the road corridor and some of the class III and IV stream channels were blocked with tree debris. The streams appear to be flowing under the tree debris and contained in the channels. The road running surface was in overall moderate to good condition; however, there was evidence of rilling and sediment transport from the road to the streams. Some water was noted ponded on the road and along the base of a rock buttress wall. The road was in active use for the timber sale and will be graded as part of the timber sale operation. Road grading will contour the running surface and eliminate the berms on the edge of the roads.



Picture 5. Tree debris blocking class IV stream

Project inspection included field observation during construction particularly when class I and II streams were crossed. There were no spills or leaks of equipment relative to the SPCC plan reported and no sign of contamination noted. The road had been maintained to standard although reconstruction was recently initiated. The overall road prism was in moderate condition with the exception of the tree debris blocking the stream channels and the ponded water in the ditches in a few places.

Effectiveness monitoring completed by the IDT noted that road is providing access to the units. There is minor erosion evidenced on the road surface, slumps in the cut slopes in the ditches, and head cutting at

the crossing. There is some diversion potential from the tree debris in the class III and IV channels along the road. The crossing monitored is a bridge that provides access across a class II stream. The re-vegetation standard was met on the banks of the stream crossing; the bank was grass seeded and grass and natural vegetation is growing on the stream banks. There was evidence of down cutting in the ditch along the road that flowed to the bridge. No sediment or deposition was noted in the stream; the stream has turbulent fast moving water in a bedrock controlled channel.



Picture 6. Road running surface that needs to be shaped and graded.

Corrective actions recommended for this road construction implementation included removal of the tree debris that is blocking the channels and grading of the road. The ditch along the approach to the bridge at MP 1.18 showed some erosion evidenced by down cutting. This ditch should have been lined with rock to minimize erosion. There was some unstable silt- sand soil shown in the road cuts that were excavated to over steep slope gradients. Slope stability, in these isolated areas, is a concern since the soil slopes are raveling. There was a rock buttress wall constructed to minimize erosion and limit slope stability along the road. The water ponded at the base of the wall needs to be drained to limit slope stability problems from water. There is a potential that water could pipe up behind the rock buttress wall and saturate the underlying soils and decrease the stability of the road cut. During post haul maintenance, the sale administrator should re-excavate the ditches in the sections where ponding is apparent and grade the road to contour and crown the surface to limit the potential for water ponding. This road should be monitored for slumps in the cut slopes and culverts that are plugged from eroded soils.

The engineers and sale administrator were going to follow up immediately after the review and develop a plan to remove the tree debris that was blocking the stream channels along the road.

Unit 69

Unit 69 is comprised of three segments and is adjacent to unit 69A which was defined as an individual unit since it was prescribed for helicopter yarding. The unit was accessed by FDR 3030700 and two temporary spurs were developed to access the 2 eastern portions of the unit. The original (69 + 69A) unit was identified as 41 acres and the final acres were 42.2 since areas were dropped for the slope break and RAW stream buffers ,and a three acre area, needed for guideline cables, was added to the unit. The planned and final acreage for unit 69 was 32 acres. The upslope portion of the unit was deleted due to slope stability problems in response to soils concerns and the unit was shifted downslope from its original location. The unit is located roughly 1.25 to 1.5 miles east- southeast of Sweetwater Lake. The streams that traverse the unit are tributaries of the Sweetwater Lake system. The streams shown in the unit flow in high gradient side slope channels, classified as class III and IV channels. The lower portions of the unit show a shallow 20 to 32 percent slope gradient but some sections of the upper portions of the unit range from 30 to 52 percent slope gradient to 50 to 75+ percent slope gradient. Partial suspension was required in the unit and the lower portions of the unit were laid out for shovel yarding and the upper portions laid out for cable settings. There was a change that was described in the change analysis to switch the upper section in the eastern most portion of the unit from cable to shovel yarding. The entire area in the first portion of the unit was shovel yarded to the temporary road. The upper portion of the second and third sections of the unit was cable yarded and the lower part was shovel yarded as planned.



Picture 7. Unit 69 shows steeper slopes shovel yarded in first segment



Picture 8. Class III stream monitored in second segment

The IDT walked two of the class III/ IV (B protection) streams as well as one of the class IV (C protection) streams and found the BMPs were implemented. Orange and white flagging designated the class B protection that included slope break buffers (as feasible), directional felling and full suspension in yarding timber across the streams. The C protection required directional felling (when feasible), trees felled to bridge stream (if necessary), partial suspension across the stream and tree debris introduced to be removed.

The unit was split into distinct segments so that the B Protection streams were protected with slope break buffers and RAW buffers. Stream 1 was a class III stream with a RAW buffer and located on the far northwest end of the unit. This stream showed blow down and unstable soils that were identified before the unit was laid out and yarded. Stream 1.1 was a class IV stream with class B protection that traversed in a channel that is a tributary to Stream 1 and is outside the unit. Stream 2 is a class IV stream with B protection due to the high gradient and scour noted in the stream channel. This stream is located between the third and second segment of the unit. Stream 3 was a class IV stream with C protection. The IDT walked this stream and found the stream course was protected; no erosion from yarding was noted along the channel and the stream channel was maintained. Streams 4, 5 and 6 were located adjacent in the same area between the second and first section of the unit. Stream 4 was a class III stream that was prescribed a slope break buffer plus a 30 to 80 feet reasonable assurance of windfirm (RAW) zone. The channel was deeply incised in the upper reaches and showed blown down timber. Stream 5 and 6 were class IV orange and white protected streams. Two sections of Stream 5 and 6 were walked by the IDT and no impact to the stream from logging was noted. No sediment transport to the streams was noted as these channels are buffered and the duff and moss was retained on the ground. Stream 7 was a class IV, C protection stream located within the first section of the unit. Stream 8 was a deeply incised class III stream with B protection and a 30 to 80 foot RAW buffer was recommended and implemented. This stream was reviewed by the IDT and the group found the channel buffer with the RAW intact. There was no noted impact to the channel or stream from logging.



Picture 9. Class IV stream monitored in third section

Ground based, shovel yarding was monitored in the three unit segments. The yarding system was designated on the sale area map with the addition that included the cable settings and the change to shovel yarding on the upper portion of the first segment. The ground disturbance was within the 3 percent estimated in the NEPA document. There were a few small areas where water rills and sheet erosion noted. The rills and sheet wash was shown in two shovel ruts; however, the erosion extended for less than twenty feet length. The erosion did not extend to the stream management zone. The shovel yarder was operated on ground that exceeded 40 percent slope gradient that occurred in the upper portion of the first segment. If this section was planned for shovel yarding, then the tree felling possibly could have been done to minimize utilization of the yarder on steep sideslopes. Planning should have been made to use side slope approaches and the trees felled so they could have been reached with leads. There was no noted erosion in the class IV streams and minor impact from the shovel operation.



Picture 10. Shovel yarded area in section 1

The change analysis described the rationale for modification to the unit boundary to reflect soil deletion areas and updated stream locations as well as to adjust the boundary for logical settings and to minimize isolation of timber. The change of the upper portion of segment 1 to shovel yarding from cable yarding was completed to assure logging feasibility, improve timber sale economics and complete logical settings. Additional acreage was removed from harvest to provide for RAW buffers. The shovel and cable yarding met the soil and wetland protection measures as described in BMP 13.5 and 13.9. Puncture and slash were used to minimize rutting although additional slash would have further minimized the compaction and rutting of the soils.



Picture 11. Steeper cable yarded area in the upper part of section 3

Cable yarding was monitored in two of the segments designated on the sale area map. The aerial extent of the disturbance is within the three percent estimated in the NEPA document and partial suspension was achieved in 95 percent of the unit. The unit was shifted downslope and part of the planned unit in the higher gradients was dropped due to soil slope stability issues. The backline of the unit was designed with the soil scientist. Supplemental erosion control included application of seed and slash. The harvest areas were designated on the sale area map as well as marked on the ground. There was an area in the southwest corner where the logs were not lifted off the ground; the backline could have been adjusted to improve the lift and minimize soil disturbance. There were minor soil ruts and disturbance noted at the landing where the suspension was not achieved in an area roughly forty by three feet. There were a few yarding corridors where partial suspension was not achieved. In the short ruts, minor water rilling and sheet erosion was noted; however, the rills were isolated and do not transport water or sediment to the streams. Otherwise within the unit, partial suspension was achieved in the cable yarding. Two class IV streams were shown within the second segment. There was no noted bank damage or erosion in the class IV streams that were managed with C protection. Class IV and III streams were buffered from the unit between segment 1 and 2 as well as between segments 2 and 3. No impact was noted relative to the buffered class IV and Class III streams managed with B protection. Trees were standing in the buffer as designated; although, some trees had blown down in the buffers prior to planning and layout. There was a thick layer of moss and duff shown on the ground that minimizes erosion potential.

Unit 67B

Unit 67 is comprised of four segments with 67A shown on the opposite side of a stream buffer from 67D; unit segments 67D and 67B are grouped together, and 67C shown further downslope from a steep ridge. Unit 67B was subdivided into two parts the western segment was 33.9 acres and designed for shovel yarding with leave trees marked (LTM) and the eastern part was 9.3 acres and was designed for a cable logging system with LTM. The change analysis documents that there was a shift of twelve acres from

helicopter to shovel following field review of unit 67B. The timber review showed that it was feasible to shovel yard the eastern portion of unit 67B. The LTM trees are along the north boundary and designated in a three acre area. Approximately twelve acres were dropped to implement the stream buffers and to satisfy the silviculture prescription.

Unit 67B is accessed by 3030710 and approximately 0.47 miles of temporary road. The unit was planned for shovel logging in the central, north, south, and western sections and cable logging in 3 settings in the eastern section. The eastern segment was yarded to the temporary road that bisects the central eastern portion of the unit.



Picture 12. Unit 67B; from upper part of unit



Picture 13. Class II stream; buffered with A protection (upper part of unit)

There are three stream systems in the vicinity of these units that are tributaries of Sweetwater Lake. Two stream systems border unit 67B; these class I streams show process group moderate gradient mixed control (MM) in the valley bottom closer to Sweetwater Lake that transition to class II streams with high gradient contained channels then to class III streams. Further upslope, these streams have class III and IV reaches and tributaries. Stream 1 is shown north of the unit. The smaller streams shown and mapped in the east side of unit 67B are tributaries of Stream 1 which is a class I stream that traverses northwestward from the unit downslope in a HC channel to a low gradient MM channel beyond the unit. Stream 2 is a class I stream traverses a channel at the base of the steep slopes on the south side of the unit. Stream 2 flows in a HC channel near the southwest portion of the unit and transitions to a MM channel west of the unit.



Picture 14. Class II buffered stream

Stream 1 is a class I stream adjacent to unit 67B with TTRA buffers (A protection) with a 120 foot buffer and 40 to 80 feet RAW. Significant tributaries to Stream 1 that are buffered from the unit include Stream 1.2 and Stream 1.3. Stream 1.2 is a class I stream near the confluence with stream 1 and was buffered with a 120 foot buffer and 40 to 60 feet RAW due to a moderate risk of blown down timber due to moist soils. This stream traverses in a channel west of the unit with a tributary 1.2R that traverses west-southeastward into the unit. The initial 1.2R stream reach is buffered with a 120 feet buffer + 40 to 60 feet RAW then transitions to a class IV stream with C protection. Stream 1.3 traverses southward from stream 1 into the central portion of the unit. Stream 1.3 is a class I stream with a MM channel that transitions to a class II stream with a HC channel type then at approximately 400 feet elevation transitions to a class IV channel. The class I reach was prescribed a 120 feet buffer with a 40 to 60 feet RAW and the class II reach was prescribed a 100 feet buffer with a 40 to 60 feet RAW. The class IV reach was prescribed class C protection. A couple additional class IV streams were mapped in the north western section of unit 67B and one class IV stream was mapped in the north eastern portion of the unit. These class IV streams were prescribed class C protection. In summary, there are three streams buffered from the unit with class A protection, one stream with class B protection on the northwest portion of the unit, and six streams within the unit that are prescribed with C protection.



Picture 15. Class IV Stream in lower section of Unit 67B

The IDT walked the upper length of Stream 1.2 and two reaches of Stream 1.3 as well as the class IV stream shown in the northwestern part of the unit. Monitoring Stream 1.2 included walking the class IV reach and found no impact to the stream banks from yarding and no sediment transport from the yarding. The IDT walked the upper reach of Stream 1.3 through the transition of the class IV reach to the class II reach. The monitoring showed the buffer was implemented and intact. The stream channel bank through the class IV reach showed minimal impact except the one reach where two cable logging corridors traversed through the channel. There was no noted sediment in the class II reach of Stream 1.3. Minor soil and bank disturbance on the class IV reach through the cable logging corridor; however, the remaining sections of the reach showed the bank was protected. The class IV stream reaches monitored by the IDT in the shovel yarded portion of the unit included the upper reaches of Stream 1.2 and middle-upper reach of Stream 1.3 as well as one other class IV stream. There was minimal soil disturbance in these reaches and no impact to soil and water resources was noted. The banks on these reaches were intact and the tree debris from logging was removed.



Picture 16. Cable yarded portion of unit 67B; upper unit

Reviewing the cable yarded portion of unit 67B, this portion of the unit was accessed by temporary road 3030710-2. This road had been modified as documented in the change analysis to improve the landing locations and drop a stream crossing. The sale administrator had required the operator to lay puncheon across the class IV streams to cross the channels. The tree debris was effective in protecting the channels and was removed after yarding. Corrective action recommended by the group was focused on location of the landing. The landing was recommended to be located on the ridge to achieve better suspension, although suspension was achieved in roughly 98 percent of the unit. Monitoring showed the minor disturbed areas in the unit, where soil was bared, were seeded. Slash was placed on the disturbed areas to minimize erosion potential. The temporary road was used as a landing for the helicopter yarding and was still in use at the time of the review. The temporary road will be seeded, drainage structures pulled and closed upon completion of the timber sale.

The shovel portion of unit was yarded to the temp road 3030710-1 and 3030710-2. There was a minor amount of forested wetland shown in isolated inclusions in the unit. The impact to the wetland was minimized through limiting operation of the shovel in the wet areas. There was no evidence of erosion or impact to the soil and water resources noted in the aquatic management zone of streams 1.2 and 1.3. The vegetation was treated in the class IV channels; however, the impact to the streams was minimal. The channels were maintained; no impact to the soil and water resources was noted. Overall, the shovel yarding was effective in achieving partial suspension and protecting the soil and water resources. The temporary road will be seeded, drainage structures pulled and closed upon completion of the timber sale. The IDT concluded that the unit showed implementation and effectiveness of BMPs.

Unit 73D

Unit 73 is comprised of four segments that separate the helicopter and cable/ ground based logging systems; 73A, 73B, 73C, and 73D. The unit boundaries were adjusted for updated stream locations, areas deleted due to unstable soils, and timber setting requirements. There were five acres deleted to provide

for stream buffers on class III streams and 6 acres dropped or deferred to implement stream buffers and remove inaccessible blown down timber. In total, the boundary changes and the addition of the buffers contributed to a change of 9.5 in the 160 acre unit. Unit 73D was selected for monitoring by the IDT. The unit was accessed by FDR 3030720, 3030630 and two temporary spurs. Unit 73D is the southern part of the unit and consists of 66.7 acres. There was approximately 34 acres that was changed from cable to shovel in the lower portion of unit 73D. Adjacent to the NE boundary, an area of unstable soil is shown. An area of blown down trees is located outside the southern edge of the unit.



Picture 17. Unit 73D from base of unit

The unit is located roughly two miles east-southeast of Sweetwater Lake. The streams that traverse the unit are tributaries of Trumpeter Creek and the Sweetwater Lake system. The streams shown in the unit flow in high gradient side slope channels, classified as class III and IV channels. The lower portions of the unit show a shallow 20 to 32 percent slope gradient but some sections of the upper portions of the unit range from 30 to 52 percent slope gradient to 50 to 75+ percent slope gradient. Partial suspension was required in the unit and the lower portion of the unit was laid out for shovel yarding and the upper portions laid out for cable settings. The area in the upper portion of the unit was cable yarded to the temporary road off the 3030720 road using three settings. The timber was uphill yarded to the landings. The lower portion of the unit was shovel yarded to the temporary road off the 3030630 road.



Picture 18. Unit 73D and road 3030630

The IDT walked two of the class III/ IV (B protection) streams as well as one of the class IV (C protection) streams and found the BMPs were implemented. Orange and white flagging designated the class B protection that included slope break buffers (as feasible), directional felling and full suspension in yarding timber across the streams. The C protection required directional felling (when feasible), trees felled to bridge stream (if necessary), partial suspension across the stream and tree debris introduced to be removed.

The streams shown in the unit are tributaries of class I Stream 4 which flows in a MM channel to Trumpeter Creek and Sweet Water Lake. The stream system shown in the upper portion of the unit includes Stream 4.4L that is a class III stream that flows in a HC channel and is a tributary to Stream 4. There is a barrier falls that lies outside the unit boundary so no fish are shown in this stream. Three tributaries traverse the upper portion of the unit and these tributaries are class IV streams that flow in HC channels and were prescribed C protection. The stream system in the lower portion of the unit that was shovel yarded consists of seven class IV streams that are tributaries of Streams 4.6 L, 4.61L, and 4.6.1L.1L that are tributaries of Stream 4. Stream 4.6L, 4.6.1L, and 4.6.1L.1L are class I streams that flow through MC- MM channels to Stream 4. Stream 5 that is a class IV stream that flows in a HC channel and is tributary to Stream 4. Streams 4.6L, 4.6L.1L and 4.6.1L.1L are buffered from the unit. Stream 4.6L showed a 100 feet buffer with an 80 feet wide RAW as prescribed. Streams 4.6.1L and 4.6.1L.1L showed a 120 feet buffer with a 60 to 80 feet RAW as prescribed. These streams traverse in channels downslope and west of the unit. The 60 to 80 feet RAW was prescribed because of the large amount of blown down timber in the stream upstream of the unit.



Picture 19. Class III stream

Reviewing the unit, the IDT found the stream protection BMPs and Riparian area designation and protection was implemented. The IDT noted that some of the mapped class IV streams were not identified in layout of the unit. One 300 foot long section of the class III stream buffer of Stream 4.4L had blown down. The stream protection measures were implemented on the class III streams. Trees were left with leave tree mark (LTM) designations along the channels and split yarding was implemented so there was no yarding across the channels. The slope break buffers were shown to be 25-60 feet in width.



Picture 20. Upper part of unit 73D; cable yarded area

The IDT found minor disturbance in the cable yarded portion of the unit. The unit boundaries were designated on the sale area map and on the ground. The class III streams were well marked on the ground. There was no bank damage or impact noted along the stream channels from logging. The IDT noted that roughly eighty percent of the slope break buffer on the class III stream had blown down. Inspection the aquatic management zones showed no evidence of sediment transport or erosion in the streams, channels and buffers. The temporary road is not closed out yet since the road is in use for landings for the helicopter operation. Upon completion of the unit and timber sale, the temporary road will be closed, culverts removed and the cut slopes seeded. Adaptive management recommendations follow to conduct more analysis and prediction of wind to develop improved site specific buffer designs.



Picture 21. Unit 73D showing temporary roads from 3030720; 3030720-1

Monitoring the downslope shovel yarded portion of the unit was conducted by the IDT. The IDT found that this unit was effectively yarded and there was no noted impact to the streams from the timber harvest. The streams were designated on the sale area map; however, a couple of the class IV streams were not marked on the ground. The erosion control measures were fully implemented on the ground. Slash was used to minimize impact to soils from the yarder and minimize erosion as directed in the contract and erosion control plan. There was no noted incidence of equipment leaks or petroleum spills in the unit. Good housekeeping measures were implemented. The units selected for monitoring were in some of the most difficult terrain with the combination of steep slopes, unstable soils, blown down timber and high density of streams. The layout and sale administration people have demonstrated that it is possible to effectively implement the BMPs on complex landscapes and irregular terrains.

Conclusions

Overall, the timber planning, layout and sale administrators have fully implemented the Best Management Practices. The BMPs were effective in providing protection for soil and water resources. The terrain of the Logjam area, particularly reviewed in the units the IDT monitored in the Slake Timber Sale was some of the most complex terrain on the Tongass where timber has been harvested. The timber layout, cutting and yarding of this sale shows that it is possible to implement the BMPs in steep terrain that is dissected by numerous streams. The stream classification in these units was relatively conservative, due to concerns to protect Logjam Creek. The stream protection measures were implemented and shown to be effective. Some of logging systems in these units were changed from cable to shovel. This change presented challenges for the contract administration that were successfully met and the unit was harvested with minimal impact to soil and water resources. Shovel yarding was used on slopes that exceeded twenty-five percent slope, some exceeded forty percent slope. This yarding was successful, although there were a few ruts noted in the units. The potential anticipated soils disturbance in the units was three percent due to the steep slopes but the actual soil disturbance was significantly less. Shovel yarding on slopes that exceeded twenty-five percent should be completed only after careful analysis of the slope

stability and operator's experience. There was a significant amount of blown down timber in the units and some of the class III stream buffers had blown down. There were RAW buffers added to the class I and II stream buffers. Additional analysis of wind and unit configuration is necessary to improve buffer design in areas that show potential susceptibility to wind.

Road reconstruction and temporary road construction was completed to harvest the timber in these units. The road reconstruction involved removal of alders that had grown on the running surface of the road. Focus on ensuring the streams are protected and flow is maintained in the channels is important. Contract specifications that require maintenance of the stream channels and buffers are necessary.