

THE PACIFIC LUMBER COMPANY (PALCO)
PRESCRIPTIONS
BASED ON WATERSHED ANALYSIS FOR
ELK RIVER AND SALMON CREEK (ERSC), CALIFORNIA

August 12, 2005

6.3.3.7 Hillslope Management

The hillslope management mass-wasting strategy applies to all portions of PALCO's ownership in the Elk River and Salmon Creek (ERSC) Watershed Unit, including the Riparian Management Zones (RMZs). The prescriptions in the RMZs for mass-wasting will not be less restrictive than the riparian prescription developed as part of watershed analysis, as appropriate and applicable to this Plan. The hillslope management prescriptions may be modified as a result of watershed analysis revisitation. An illustrative summary of the Very High Hazard Mass Wasting Prescriptions is provided in Table 1 below.

1. PALCO shall use the ERSC "Hillslope Management Checklist" located at the end of this section for identifying areas at very high risk of mass-wasting to which the appropriate mass-wasting prescription will be applied when constructing or reconstructing roads or harvesting timber. If a very high mass-wasting prescription is not indicated, the registered professional forester (RPF) shall determine the appropriate prescription to be applied to the area consistent with the California Forest Practice Rules (FPRs).
2. PALCO has developed an office and field based training course to educate RPFs on the general geology, geologic processes, specific slope stability issues, and identification of unstable conditions on PALCO lands. The training includes education on proper use of the ERSC Hillslope Management Checklist and the information contained in California Geological Survey (CGS) Notes 45 and 50. PALCO will provide additional training as needed prior to implementation of the ERSC prescriptions. Only RPFs that have taken this training can develop Timber Harvest Plans (THPs) using these new prescriptions.
3. Where geologic review is recommended from the ERSC checklist below, it shall be conducted by a California Licensed Geologist (CLG) and completed consistent with the standards and practice of geology in the State of California (e.g., CGS Note 45).
4. Non-THP related road stormproofing activities required by the HCP Section 6.3.3.2 (as revised August 11, 2004) are not restricted by these hillslope prescriptions. In addition, where an existing and approved stormproofing plan exists, road stormproofing, road closure, and road decommissioning of existing roads and road sites on mass-wasting features identified in this section can be conducted without additional geologic review or wildlife agency approval.
5. Mass-Wasting Very High Hazard Prescriptions:

1. Inner Gorge:

1. Inner Gorges on Class I Watercourses –

1. **Harvest** – No timber harvest is permitted from the watercourse transition line, or edge of CMZ if present, to the break-in-slope (a break-in-slope is defined as a slope less than 50 percent for a distance of 100 feet or more) or 400 feet (slope distance), whichever is less.

If harvesting is proposed on inner gorge slopes beyond 400 feet (slope distance) from the watercourse, then an on-site geologic

assessment shall be conducted by a CLG working with the RPF to develop an appropriate prescription that is not likely to increase risk to aquatic resources. The geologic assessment will be consistent with the standards and practice of geology in the State of California (e.g., CGS Note 45). Other appropriate reference documents may be used as necessary and determined by the CLG. Prescription development shall include input from a fisheries biologist on potential biological impacts if a landslide were to occur. If a CLG does not evaluate the area for hazards and risk to the resources, harvest shall not be permitted within the inner gorge.

If harvest is proposed, then the inner gorge shall be flagged on the ground under the guidance of the CLG prior to THP pre-harvest inspection.

2. **Roads** - If road construction or reconstruction is proposed, a CLG shall evaluate the proposal and report on site-specific geologic conditions consistent with the standards and practice of geology in the State of California. (e.g., CGS Note 45). Road construction and reconstruction projects do not require wildlife agency pre-approval for construction or reconstruction to commence. However, the Wildlife Agencies reserve the right to deny any road-related project provided the agencies assist in the cooperative development of feasible alternatives.

2. Inner Gorges on Class II or III watercourses -

1. **Harvest** - No timber harvest is permitted unless an on-site geologic assessment is conducted by a CLG working with the RPF, and an appropriate site-specific prescription is developed that is not likely to increase risk to aquatic resources. The geologic assessment shall be consistent with the standards and practice of geology in the State of California (e.g., CGS Note 45). Other appropriate reference documents may be used as necessary and determined by the CLG.

The final prescription developed shall include a minimum post-harvest 50 percent conifer canopy closure, leaving a well-distributed, multi-storied stand composed of a diversity of species and structure similar to that found before the start of operations. Prescription development shall include input from a fisheries biologist on potential biological impacts if nearby Class I waters could be impacted by a landslide.

If harvest is proposed, then the inner gorge shall be flagged on the ground under the guidance of the CLG prior to THP Pre-Harvest Inspection (PHI).

2. **Roads** - If road construction or reconstruction is proposed, a CLG shall evaluate the proposal and report on site specific geologic conditions consistent with the standards and practices of geology in the State of California (e.g., CGS Note 45). Road construction and reconstruction projects do not require wildlife agency pre-approval for construction or reconstruction to commence. However, the Wildlife Agencies reserve the right to deny any road-related project providing the agencies assist in the cooperative development of feasible alternatives.

2. Headwall Swales-

1. **Harvest** – The headwall swale itself plus a 25-foot buffer around the perimeter of the headwall swale, determined by a CLG, shall constitute the prescription area.

No timber harvest is permitted unless an on-site geologic assessment is conducted by a CLG working with the RPF, and an appropriate site-specific prescription is developed with due consideration of risk to aquatic resources. The geologic assessment will be consistent with the standards and practice of geology in the State of California (e.g., CGS Note 45).

Headwall swales shall include a minimum post-harvest 50 % conifer canopy closure, leaving a well-distributed, multi-storied stand composed of a diversity of species and structure similar to that found before the start of operations. Prescription development shall include input from a fisheries biologist on potential biological impacts if nearby Class I waters could be impacted by a landslide.

The headwall swale and 25-foot buffer shall be flagged on the ground prior to PHI of the THP.

2. **Roads** - If road construction or reconstruction is proposed, a CLG shall evaluate the proposal and report on site-specific geologic conditions consistent with the standards and practices of geology in the State of California (e.g., CGS Note 45). Road construction and reconstruction projects do not require wildlife agency pre-approval for construction or reconstruction to commence. However, the wildlife agencies reserve the right to deny any road-related project provided they assist in the cooperative development of feasible alternatives.

3. Other Very High Hazard Mass Wasting Areas -

1. **Harvest** - No timber harvest is permitted on other identified very high hazard areas (including slopes greater than 60 percent unless an on-site geologic assessment is conducted by a CLG. The CLG, working with the RPF, shall develop an appropriate prescription that will not increase risk to aquatic resources. Where appropriate, prescription development may include input from a fisheries biologist on potential biological impacts if a landslide were to occur. The geologic assessment shall be consistent with the standards and practice of geology in the State of California (e.g., CGS Note 45). Additional appropriate reference documents may be used as necessary and determined by the CLG.
2. **Roads** - If road construction or reconstruction is proposed, a CLG shall evaluate the proposal and report on site-specific geologic conditions consistent with the standards and practices of geology in the State of California (e.g., CGS Note 45). Road construction and reconstruction projects do not require wildlife agency pre-approval for construction or reconstruction to commence. However, the wildlife agencies reserve the right to deny any road-related project providing the agencies assist in the cooperative development of feasible alternatives. Road stormproofing activities required by the HCP are not restricted under this prescription.

4. Earthwork Associated Very High Hazard Mass Wasting Prescription

1. **Harvest**- If the RPF observes earthwork exhibiting characteristics identified in the ERSC Hillslope Management Checklist Item #3, then the following applies:
 1. No timber harvest is permitted below the identified earthwork to the watercourse transition line or CMZ boundary, unless a CLG performs field reconnaissance and makes a determination of either (a) or (b) below:
 - (a). Unstable conditions do not exist within the area of concern, in which case the RPF may develop harvest prescriptions per the FPRs and the HCP.
 - (b). Potential unstable conditions exist within the area of concern, in which case the CLG delineates the area(s) of concern and either:

- (i). No harvest is applied to the areas identified by the CLG, or,
- (ii). The CLG prepares a detailed geologic assessment for the area of concern that is consistent with the standards and practice of geology in the State of California (e.g., CGS Note 45). Based on this assessment, the CLG shall make one of the following determinations:
 - (a) Upon further review, the CLG concludes the area of concern is not a very high hazard mass wasting area, and the RPF may develop harvest prescriptions per the California Forest Practice Rules and the HCP.
 - (b) A very high hazard mass wasting area affected by earthwork exists, however the condition can be stabilized by inclusion of recommended earthwork mitigation into the THP (e.g., removal of unstable fill, correction of irregular drainage, etc.). If the RPF agrees to include the recommended corrective action in the THP, the CLG shall make recommendations regarding timber harvest based on anticipated post-corrective-action site conditions. Corrective earthwork mitigation shall occur prior to or concurrent with timber harvest on the area of concern.
 - (c) A very high hazard mass wasting area affected by earthwork exists and the condition cannot, or will not, be effectively stabilized by additional earthwork mitigation. In this case, the CLG shall develop harvest recommendations which include at minimum post-harvest 50 percent conifer canopy closure, left in a well-distributed, multi-storied stand composed of a diversity of species and structure similar to that found before the start of operations.
 - (d) A very high hazard mass wasting area exists, but is not affected (e.g., further destabilized) by the earthwork, in which case the CLG shall develop timber harvest recommendations in consultation with the RPF as per the standard Mass Wasting Very High Hazard Prescriptions.

2. **Roads** – If the RPF observes earthwork exhibiting characteristics identified in the ERSC Hillslope Management Checklist Item #3, then no road construction or reconstruction shall be permitted in the identified area unless a CLG evaluates the proposal and reports on site-specific geologic conditions consistent with the standards and practices of geology in the State of California (e.g., CGS Note 45), and the CLG concludes this work will not increase the likelihood of mass wasting. Road construction and reconstruction projects do not require wildlife agency pre-approval for construction or reconstruction to commence. However, the wildlife agencies reserve the right to deny any road-related project providing the agencies assist in the cooperative development of feasible alternatives. Road stormproofing activities required by the HCP are not restricted under this prescription.

Table 1: Illustrative Summary of ERSC Mass Wasting Very High Hazard Prescriptions

Feature	Area Included	Harvest Prescription	Road Prescription
Inner Gorge (Class I)	Inner Gorge Slopes (see definition) from watercourse transition line (or CMZ if present) to break-in-slope or 400 feet (whichever is less)	-No timber harvest	<p>If no CLG evaluation¹:</p> <ul style="list-style-type: none"> -No road Construction or reconstruction. <p>If CLG evaluation:</p> <ul style="list-style-type: none"> -Subject to CLG recommendations and approval; and -Subject to wildlife agency denial -Subject to HCP Sec 6.3.3.3.
	Inner Gorge Slopes exceeding 400 feet from watercourse transition line (or CMZ if present) with no break-in-slope: 400 feet to break-in-slope	<p>If no CLG evaluation:</p> <ul style="list-style-type: none"> -No harvest <p>If CLG evaluation:</p> <ul style="list-style-type: none"> -Harvest prescriptions based on CLG recommendation 	<p>If no CLG evaluation:</p> <ul style="list-style-type: none"> -No road construction or reconstruction <p>If CLG evaluation:</p> <ul style="list-style-type: none"> -Subject to CLG recommendations and approval; and -Subject to wildlife agency denial -Subject to HCP Sec 6.3.3.3.
Inner Gorge (Class II and Class III)	Inner Gorge Slopes (see definition) from watercourse transition line, or CMZ if present, to break-in-slope	<p>If no CLG evaluation:</p> <ul style="list-style-type: none"> -No harvest <p>If CLG evaluation:</p> <ul style="list-style-type: none"> -Harvest prescriptions based on CLG recommendation with a required minimum retention of 50 % conifer canopy closure, leaving a well-distributed, multi-storied stand composed of a diversity of species and structure similar to that found before the start of operations 	<p>If no CLG evaluation:</p> <ul style="list-style-type: none"> -No road construction or reconstruction <p>If CLG evaluation:</p> <ul style="list-style-type: none"> -Subject to CLG recommendations and approval; and -Subject to wildlife agency denial -Subject to HCP Sec 6.3.3.3.

¹ CLG evaluation to include field reconnaissance

Feature	Area Included	Harvest Prescription	Road Prescription
Headwall Swale	Headwall Swale (see definition) plus a 25-foot buffer around the perimeter of the feature	<p>If no CLG evaluation: -No harvest</p> <p>If CLG evaluation: -Harvest prescriptions based on CLG recommendation with a required minimum retention of 50 % conifer canopy closure, leaving a well-distributed, multi-storied stand composed of a diversity of species and structure similar to that found before the start of operations</p>	<p>If no CLG evaluation: -No road construction or deconstruction</p> <p>If CLG evaluation: -Subject to CLG recommendations and approval; and -Subject to wildlife agency denial -Subject to HCP Sec 6.3.3.3.</p>
Other Very High Hazard Features (From Checklist)	Identified "very high risk" unstable area	<p>If no CLG evaluation: -No harvest</p> <p>If CLG evaluation: -Harvest prescriptions based on CLG recommendation</p>	<p>If no CLG evaluation: -No road construction or reconstruction</p> <p>If CLG evaluation: -Subject to CLG recommendations and approval; and -Subject to wildlife agency denial -Subject to HCP Sec 6.3.3.3.</p>
"Earthwork" Associated Very High Hazard Feature (see Hillslope Checklist Item #3)	See Earthwork-Associated Very High Hazard Prescription	<p>See Earthwork-Associated Very High Hazard Prescription</p> <p>Minimum floor for Earthwork affected unstable area: -Harvest prescription based on CLG recommendation with a required minimum retention of 50 % conifer canopy closure, leaving a well-distributed, multi-storied stand composed of a diversity of species and structure similar to that found before the start of operations.</p>	<p>If no CLG evaluation: -No road construction or reconstruction</p> <p>If CLG indicates potentially unstable areas: -Subject to CLG recommendations and approval; and -Subject to wildlife agency denial -Subject to HCP Sec 6.3.3.3.</p>

The Hillslope Management Checklist for the Elk River and Salmon Creek (ERSC) Watershed Analysis Unit

*Modified from the CALIFORNIA LICENSED FORESTERS ASSOCIATION
GUIDE TO DETERMINING THE NEED FOR INPUT FROM A
LICENSED GEOLOGIST DURING THP PREPARATION*

In order to identify areas of very high risk of mass-wasting, the following questions should be addressed by the RPF during THP preparation.

1. *Are there unstable areas located within or adjacent to the proposed THP area?*
 - A. *Were active features indicated on the maps available for the watershed? The RPF will review ERSC Watershed Analysis (WA) maps and appropriate CGS maps, aerial photos, and previous THPs in the area to identify areas of concern. Areas identified as shallow landslides or active deep-seated landslides on these maps will receive the very high prescription.*
 - B. *Were unstable areas observed in the field?*
 - i. *Is an inner gorge (as defined in ERSC WA prescriptions), present? If the answer is yes, the appropriate Inner Gorge Very High Prescription is to be applied. If the answer is no, proceed with the evaluation.*
 - ii. *Is a headwall swale (as defined in ERSC WA prescriptions) present? If the answer is yes, the appropriate Headwall Swale Very High Prescription is to be applied. If the answer is no, proceed with the evaluation.*
 - iii. *If the area being reviewed is not underlain by previously mapped deep-seated mass-wasting features, then the RPF should look for indicators of unstable areas that may include:*
 - *Hillslopes greater than 60 percent*
 - *Loose, unconsolidated soils*
 - *U-shaped swales*
 - *Irregular topography*
 - *Scarps*
 - *Benches*
 - *Hummocky ground*
 - *Surface cracks*
 - *Vegetative indicators*
 - *Leaning trees*
 - *Hydrophytes*
 - *Isolated patches of homogeneous vegetation*
 - *Disorganized drainage*
 - *Sag ponds*
 - *Seeps*
 - *Diverted watercourse*
 - *Road cut-bank failure*
 - *Road or landing fill failure*

If any of the features listed above is observed, consider part C and answer question 2.

- iv. *If the area being reviewed is underlain by previously mapped deep-seated mass-wasting features, then the RPF should look for indicators of unstable areas that may include:*

- *Hillslopes greater than 60 percent*
- *Ground cracks*
- *Sharp, fresh, or unvegetated scarps or grabens*
- *Debris slides or debris flows on the surface of the deep-seated feature*
- *Recent rock fall or rock slides on the surface of the deep-seated feature*
- *Fresh/recent ground, road, or landing displacement*
- *Ponded or disrupted drainage (e.g., displaced stream channels, sag ponds, hydrophytes)*
- *Displaced/stressed/missing forest cover, frequent leaning and/or recurved (bent) trees*
- *Steep toes of deep-seated landslides or earthflows along stream edges or stream escarpments*

If any of the features listed above is observed, consider part C and answer question 2.

- C. *If unstable areas were identified in the THP area as listed in iii & iv above, proposed timber operations on, adjacent to, upslope, or downslope of these features may have the potential to affect slope stability through:*

- *Displacement of soil*
- *Division or concentration of drainage*
- *Reduction in interception or transpiration, and/or*
- *Reduction in root strength*

Examples of timber operations that may produce these effects are:

- *Timber cutting*
- *Construction, reconstruction, and maintenance of:*
 - *Roads*
 - *Stream watercourse crossings*
 - *Skid trails*
 - *Beds for felling of trees (layouts)*
 - *Fire breaks*
- *Mechanical site preparation*
- *Prescribed burning*

2. *Do the proposed timber operations have a reasonable potential to affect slope stability, and a potential for materials from landslides or unstable areas to affect public safety, water quality, fish habitat or other environmental resources? If the answer is yes, the area will receive the appropriate Very High Prescription. If the answer is no, the RPF determines the appropriate prescription to be applied to the area consistent with the California Forest Practice Rules.*
3. *Are there areas of earthwork from previous land management activities within 300 feet of a watercourse on slopes greater than 30 percent exhibiting any of the following characteristics?*

- *Skid trail convergence areas (e.g., where two or more skid trails converge).*
- *Disruption of natural drainage patterns resulting in emergent groundwater and/or wet convergent slopes.*
- *Roads, landings, or skid trails exhibiting signs of potential instability (e.g., cutbank or fill failure, gullies, oversteepened slopes, etc.).*

If the answer is yes, follow the Earthwork Associated Very High Hazard Mass Wasting prescription methodology

Definitions for this section:

Averaging Slope – A technique for averaging slopes using a 100 foot by 100 foot square block (e.g., 100 feet along streams by 100 feet upslope).

Break-in-slope – For the purposes of the ERSC Riparian and Mass-wasting prescriptions, a break-in-slope is defined as a reduction in slope to less than 50 % for at least 100 feet.

Earthwork – Past or proposed alteration of terrain by ground-based heavy equipment (e.g., tractors, bulldozers, and excavators) including but not limited to constructed roads, skid trails, and landings.

Headwall Swale – A concave slope, with convergent slopes of 50 % or greater, which is connected to Class I, II, or III waters via a continuous linear depression. (A linear depression interrupted by an active to dormant young landslide deposit is considered continuous for this definition. Concave, convergent slopes are teardrop-shaped depressions in the hillside that lead directly to a Class I, II or III watercourse.)

Inner Gorge - A geomorphic feature formed by coalescing scars originating from landsliding and erosional processes caused by stream erosion. The feature is identified as that area beginning adjacent to the active or historic stream channel having a side slope greater than 65 percent (or in some cases less than 65 percent) and extending up to the break-in-slope.

6.3.4.1.2 Class I RMZs

All fish bearing (or restorable) Class I waters in Elk River and Salmon Creek Watershed Analysis Unit (ERSC) will have a Riparian Management Zone (RMZ). The RMZ shall be divided into two bands, an inner band and an outer band, with the following exception: Watershed Analysis found the Lower North Fork Elk River to be lacking in large conifers and therefore a more restrictive single band 150-foot no-harvest RMZ prescription combined with a Riparian Forest Enhancement Program shall be implemented along that stretch of Class I watercourse (See Map 1 at end of section). Both RMZ prescriptions are summarized in the Table 2 below.

Class I RMZ prescriptions may be modified as a result of watershed analysis re-visitation.

1. Prescriptions for the Entire Class I RMZ: 0 to 150 feet (Both General and Lower North Fork Elk River – Conifer-Depleted Zone)

1. The RMZ width shall be measured as slope distance from the watercourse transition line or, if present, the outer channel migration zone (CMZ) edge on each side of the watercourse.
2. No sanitation salvage, exemption harvest, or emergency timber operations (as defined and allowed in the FPRs) shall occur in the RMZ, except as per prior agreement with the wildlife agencies.
3. All portions of downed wood (i.e., LWD), except as defined as slash in the FPRs, will be retained. Slash will be retained at those sites where it will contribute to soil stabilization and sediment filtration. Exceptions may be proposed in a THP and approved by the wildlife agencies.
4. Trees felled during current harvesting operations and THP-approved road construction are not considered downed wood for purposes of retention.
5. Felled hazard trees or snags not associated with a THP are considered downed wood and are to be retained in the general vicinity.
6. Trees that fall naturally onto roads, landings, or harvest units within the RMZ are considered downed wood and are to be retained in the general vicinity.
7. All non-hazard snags will be retained, as per the snag policy in the HCP.
8. The EEZ for all Class I watercourses will be 150 feet for timber operations, except for existing roads and permitted new road construction and equipment crossings.
9. Full suspension yarding will be used when feasible. Full suspension yarding is not feasible on flat ground, in other sites with limited deflection, where an adjacent landowner will not provide permission to secure a cable, or where a full suspension yarding system would jeopardize the safety of field personnel. For the purposes of this prescription, the expanded definition of feasibility according to the FPRs does not apply as an additional determination beyond that described above. For these conditions, yarding will be conducted in a manner that avoids ground disturbance that might deliver sediment to waters to the maximum extent practicable. Where ground disturbance occurs, PALCO will treat the site as per HCP 6.3.3.8 (revised August 11, 2004).
10. Trees not marked for harvest may be felled within the RMZ to provide safety clearance for cable yarding corridors. Such felling will be done only as needed to ensure worker safety. In such cases, to the extent possible given site conditions and the FPRs, trees will be felled toward the waters to provide LWD and will be identified in THPs as an in lieu practice (14 CCR 916.1). Regardless, trees felled within the RMZ for safety purposes will be retained as downed wood.
11. Trees not marked for harvest which are damaged in the cable yarding corridors must be retained in place, either standing or as downed wood.
12. There will be a maximum of one entry every 20 years.

13. If any area within the RMZ is subject to mass-wasting prescriptions, then the more restrictive of the RMZ and mass-wasting prescriptions applies for that area.
14. Site preparation will be conducted according to HCP Section 6.3.4.2 (as revised August 19, 2003).
15. The boundary of the inner and outer RMZ bands shall be clearly identified on the ground by the RPF who prepared the THP, or a supervised designee, with paint, flagging, or other suitable means prior to the PHI.
16. Exclusive of the 18 largest trees per acre on each side of the Class I watercourses, any additional trees left for outer band canopy retention (or inner band if there is limited harvest) shall include those with the highest probability of recruitment to watercourses.

2. Prescriptions Unique to Class I Inner Band: 0 to 50 feet (General Only)

1. Pursuant to HCP Section 6.3.2.2, 0 to 30 feet is no harvest. Thirty to 50 feet is no harvest unless otherwise approved by the wildlife agencies. This restriction includes sanitation salvage, exemption harvest, or emergency timber operations. For the purpose of adding LWD to the stream, or for the release of riparian stands for LWD recruitment, felling trees from within the inner band will be allowed when approved by the wildlife agencies. Trees felled for these purposes are considered downed wood.
2. Road segments within the first 30 feet of the inner band must be mitigated by extending the inner band on the opposite side of the waters from the existing road an equivalent distance of that portion of the road prism within the inner band. In the case of RMZ road crossings, the first 50 feet of road extending inland from the watercourse transition line is exempt from this mitigation.

3. Prescriptions Unique to Areas within 0 to 100 feet of Class I Watercourses

1. The 18 largest conifer trees per acre (measured as 435 feet of watercourse length and within 100 feet of the watercourse and lake transition line) shall be retained on each side of the watercourse per each harvest entry as per HCP Section 6.3.2.2 Item 7.

4. Prescriptions Unique to the Class I Outer Band: 50 to 150 feet (General Only)

1. A base mark below the cut line of residual or harvest trees within the outer band shall be placed in advance of the PHI by the RPF or supervised designee.
2. At least 50 % conifer overstory and 50 % understory canopy covering the ground shall be retained post-harvest.

5. Prescriptions unique to the Lower North Fork Elk (Conifer-Depleted Zone)
RMZ: 0 to 150 feet

1. Unless otherwise approved by the wildlife agencies, no timber harvest shall occur within the entire RMZ. This restriction includes sanitation salvage, exemption harvest, or emergency timber operations. For the purpose of adding LWD to the stream, or for the release of riparian stands for LWD recruitment, felling trees from within the RMZ will be allowed when approved by the wildlife agencies on a THP-by-THP, or special project basis. Trees felled for these purposes are considered downed wood.
2. Road segments within the first 30 feet of the RMZ nearest the watercourse must be mitigated by extending the RMZ on the opposite side of the waters a distance equivalent to the road width. In the case of RMZ road crossings, the first 50 feet of road extending inland from the watercourse transition line is exempt from this mitigation.
3. Riparian Enhancement Plan: PALCO shall work with the wildlife agencies to develop a riparian enhancement plan along the lower eight miles of North Fork Elk River (see Map 1). This plan shall be finalized within six months of establishment of the ERSC Watershed Analysis Prescriptions.

Table 2: Illustrative Summary of Elk River and Salmon Creek Class I Watercourse Riparian Management Zone (RMZ) Prescriptions (Additional enforceable RMZ prescriptions contained in the narrative text.)

Watercourse Type	Total RMZ Width	Prescriptions	Total EEZ
Class I (General) ¹	150 feet	Inner Band (0 to 50 feet): No harvest Outer Band (50 to 150 feet): -Retain a minimum of 50 % post-harvest conifer canopy -No harvest of pre-existing down wood	150 feet
Class I (Lower North Fork Elk River – Conifer-Depleted Zone) ²	150 feet	0 to 150 feet: -No harvest -Riparian Enhancement Plan	150 feet

¹ Class I retain 18 largest conifers within 100 feet as per HCP 6.3.2.2.

² Refer to map of Lower North Fork Elk – conifer-depleted reach for location.

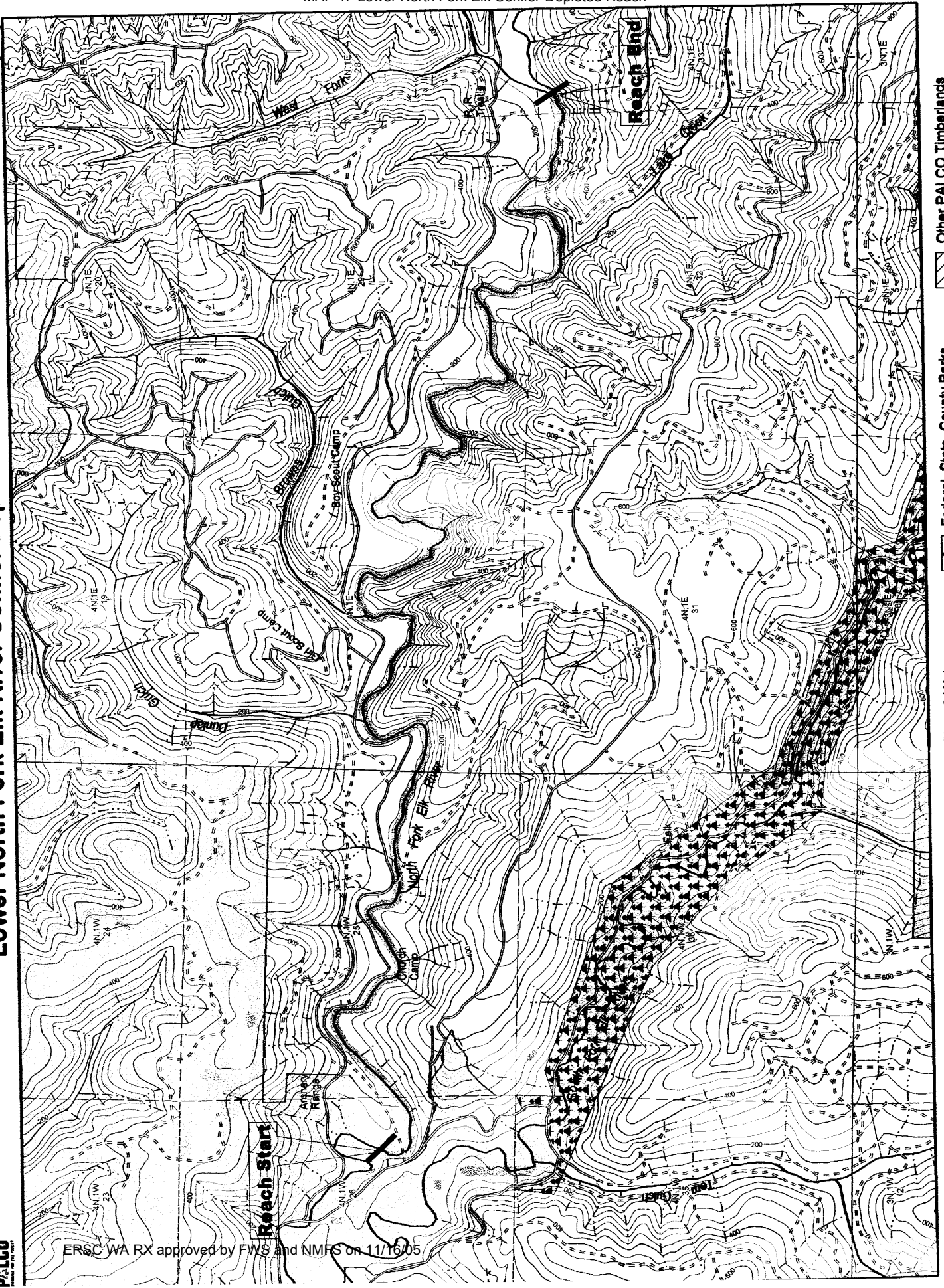
MAP 1. Lower North Fork Elk Conifer-Depleted Reach

Lower North Fork Elk River Conifer Depleted Reach

1 inch equals 2,000 feet

PALCO
PACIFIC ALUMINUM COMPANY

ERSC WA RX approved by FWS and NMFS on 11/16/05



6.3.4.1.3 Class II RMZs

All Class II waters will have a RMZ. The RMZ shall be divided into two bands, an inner band and an outer band. The width of the outer band shall be stream side-slope dependent, with the exception of a specific Class II reach of Corrigan Creek that has been identified by Watershed Analysis as capable of transporting large woody debris (LWD) directly to Class I waters. To increase opportunities for LWD recruitment, this specific Class II reach shall be provided a fixed 150-foot RMZ (See Map 2 at end of section). Both the general RMZ and Corrigan Creek LWD Transport Zone prescriptions are summarized in Table 3 below.

For Class II seeps and springs containing southern torrent salamander habitat, the ERSC Class II RMZ prescriptions apply. For Class II seeps and springs not containing southern torrent salamander habitat, and for Class II waters situated within the prism of a road or landing, the prescriptions in the January 2004 Adaptive Management modifications to HCP sections 6.3.4.1.3 d, e, and f shall apply.

Class II RMZ prescriptions may be modified as a result of watershed analysis re-visitation.

1. Prescriptions for the Entire Class II RMZ

1. The RMZ width shall be measured in slope distance from the watercourse transition line (HCP definition) or if present, the CMZ edge on each side of the watercourse.
2. No sanitation salvage, exemption harvest, or emergency timber operations (as defined and allowed in the FPRs) shall occur in the RMZ, except as per prior agreement with the wildlife agencies.
3. All portions of downed wood (e.g., LWD), except as defined as slash in the FPRs, will be retained. Slash will be retained at those sites where it will contribute to soil stabilization and sediment filtration. Exceptions may be proposed in a THP and approved by the wildlife agencies.
4. Trees felled during current harvesting operations and THP-approved road construction are not considered downed wood for purposes of retention.
5. Felled hazard trees or snags not associated with a THP are considered downed wood and are to be retained near the location of the removal.
6. Trees that fall naturally onto roads, landings, or harvest units within the RMZ are considered downed wood and are to be retained near the location of the removal.
7. All non-hazard snags will be retained, as per the snag policy in the HCP.
8. The RMZ is an EEZ for timber operations, except for roads and permitted equipment crossings.
9. Full suspension yarding will be used when feasible. Full suspension yarding is not feasible on flat ground, in other sites with limited deflection, where an adjacent landowner will not provide permission to secure a cable, or where a full suspension yarding system would jeopardize the safety of field personnel. For the purposes of this prescription, the expanded definition of feasibility according to

the FPRs does not apply as an additional determination beyond that described above. For these conditions, yarding will be conducted in a manner that avoids ground disturbance that might deliver sediment to waters to the maximum extent practicable. Where ground disturbance occurs, PALCO will treat the site as per HCP Section 6.3.3.8 (revised August 11, 2004).

10. Trees not marked for harvest may be felled within the RMZ to provide safety clearance for cable yarding corridors. Such felling will be done only as needed to ensure worker safety. In such cases, to the extent possible given site conditions and the FPRs, trees will be felled toward the waters to provide LWD and will be identified in THPs as an in-lieu practice (14 CCR 916.1). Regardless, trees felled within the RMZ for safety purposes will be retained as downed wood.
11. Trees not marked for harvest which are damaged in the cable yarding corridors must be retained in place, either standing or as downed wood.
12. There will be a maximum of one entry every 20 years.
13. If any area within the RMZ is subject to mass-wasting prescriptions, then the more restrictive of the RMZ and mass-wasting prescriptions applies for that area.
14. Site preparation will be conducted according to HCP Section 6.3.4.2 (revised August 19, 2003).

2. Prescriptions Unique to Class II Inner Band: 0 to 30 feet (General and Corrigan Creek LWD Transport Zone)

1. Unless otherwise approved by the wildlife agencies, timber harvest will not occur within the inner band. This restriction includes sanitation salvage, exemption harvest, or emergency timber operations. For the purpose of adding LWD to the stream, or for the release of riparian stands for LWD to enhance development of trees capable of providing key-piece-sized LWD and future LWD recruitment, felling trees from within the 10 to 30 foot portion of the inner band will be allowed when approved by the wildlife agencies on a THP-by-THP basis in accordance with HCP Section 6.3.2.2 Item 7. Trees felled for these purposes are considered downed wood.
2. Road segments within the no-harvest band must be mitigated by extending the no-harvest band on the opposite side of the waters from the existing road an equivalent distance of that portion of the road prism within the no-harvest band. In the case of RMZ road crossings, the first 300 feet of road extending inland from the watercourse transition line is exempt from this mitigation.

3. Prescriptions Unique to Class II Outer Band (General Only)

1. The Class II outer band shall be slope-dependent. For watercourse side slopes averaging less than 50 percent, the outer band width shall extend out 75 feet from the watercourse transition line or, if present the outer edge of the CMZ. For watercourse side slopes averaging 50 percent or greater, the outer band shall extend out 100 feet from the watercourse transition line or, if present, the edge of the CMZ.

2. The RMZ shall be clearly identified on the ground by the RPF who prepared the THP, or a supervised designee, with paint, flagging, or other suitable means prior to the PHI.
3. Silviculture method shall consist of single-tree selection harvest only.
4. A minimum of 60 percent conifer canopy closure shall be retained post-harvest, leaving a well-distributed, multi-storied stand composed of a diversity of species and structure similar to that found before the start of operations.
5. A base mark below the cut line of residual or harvest trees within the outer band shall be placed in advance of the PHI by the RPF or supervised designee.
6. Trees left for outer band canopy shall include those with the highest probability of recruitment to watercourses.

4. Prescriptions Unique to Class II Outer Band (Corrigan Creek - LWD Transport Zone Only)

1. The Corrigan Creek Class II LWD Transport Zone outer band shall extend 150 feet from the watercourse transition line, or if present, edge of CMZ.
2. The RMZ shall be clearly identified on the ground by the RPF who prepared the THP, or a supervised designee, with paint, flagging, or other suitable means prior to the PHI.
3. Silviculture methods shall consist of single-tree selection harvest only.
4. A minimum of 50 percent conifer canopy closure will be retained post-harvest, leaving a well-distributed, multi-storied stand composed of a diversity of species and structure similar to that found before the start of operations.
5. A base mark below the cut line of residual or harvest trees within the outer band shall be placed in advance of the PHI by the RPF or supervised designee.
6. Trees left for outer band canopy shall include those with the highest probability of recruitment to watercourses.

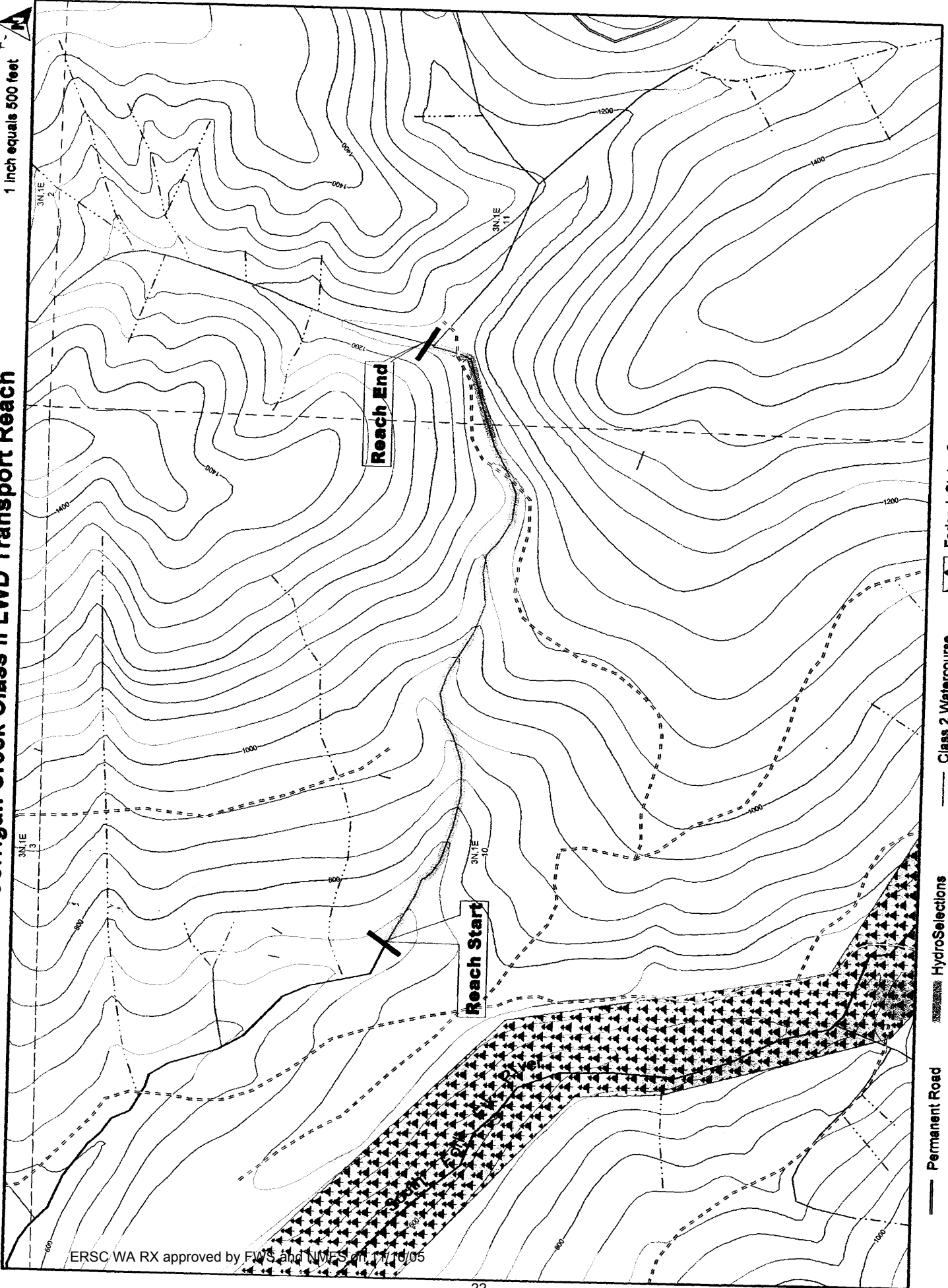
Table 3: Illustrative Summary of Primary Class II RMZ Prescriptions (Additional enforceable prescriptions contained in narrative text.)

Watercourse Type	Total RMZ Width	Prescription	Total EEZ
Class II (General)	<p>Where stream side slopes average less than 50 %: Total RMZ width shall be 75 feet</p> <p>Where stream side slopes average equal or greater than 50 % Total RMZ width shall be 100 feet</p>	<p>Inner band (0-30 feet): No timber harvest</p> <p>Outer band (30-75 or 30-100 feet):</p> <ul style="list-style-type: none"> -Selection harvest only -Retain a minimum of 60 % post-harvest conifer canopy closure leaving a well-distributed, multi-storied stand composed of a diversity of species and structure similar to that found before the start of operations -No removal of downed wood -See revised HCP 6.3.4.1.3 for seeps and springs 	<p>Slope Dependent:</p> <p>Slopes <50 % = 75 feet;</p> <p>Slopes 50 % or greater = 100 feet</p>
Class II (Corrigan Creek - LWD Transport Zone)	150 feet	<p>Inner band (0-30 feet): No timber harvest</p> <p>Outer band (30-150 feet):</p> <ul style="list-style-type: none"> -Selection harvest only -Retain a minimum of 50 % post-harvest conifer canopy closure, leaving a well-distributed, multi-storied stand composed of a diversity of species and structure similar to that found before the start of operations -No removal of downed wood 	150 feet

Corrigan Creek Class II LWD Transport Reach

PALCO
PACIFIC ALUMINUM COMPANY

1 inch equals 500 feet



ERSC WA RX approved by FWS and NMFS on 7/16/05

6.3.4.1.4 Class III RMZs

All Class III watercourses will have a RMZ. The RMZ shall be 0 to 50 feet (slope distance) for slopes less than 50 percent and 0 to 100 feet for slopes 50 percent and greater, measured from the watercourse transition line, with the following exception: a special prescription shall be implemented for Class III watercourses with mass-wasting associated LWD transport potential. Both RMZ prescriptions are summarized in Table 4 below.

Class III RMZ prescriptions may be modified as a result of watershed analysis revisitation.

1. Prescriptions for All Class III RMZs (including Class III LWD Transport Zones)

1. If any area within the RMZ is subject to mass-wasting prescriptions, then the more restrictive of the RMZ and mass-wasting prescriptions applies for that area.
2. With the exception of Class III LWD Transport Zones, the RMZ width shall be dependent upon adjacent watercourse side-slopes. For slopes less than 50 percent, the RMZ shall be 0 to 50 feet. For slopes 50 percent or greater, the RMZ shall be 0 to 100 feet.
3. All RMZ requirements stop at the hydrologic divide.
4. The RMZ is an EEZ for timber operations, except for roads and permitted equipment crossings. All proposed watercourse crossings shall be flagged on the ground prior to the PHI and shown on the THP map for the purposes of evaluating potential sediment delivery to watercourses.
5. Retain all trees a) situated within the bank-full channel, and b) those trees that have boles-in-contact with the bank-full channel. Bole-in-contact with the bank-full channel means that the vertical line of the bole overlaps with the bank-full channel.
6. Retain all trees less than or equal to eight inches dbh within 15 feet (slope distance) of the bank-full edge of the channel with the exception of trees felled to provide safety clearance for cable yarding corridors or worker safety. In such cases, to the extent possible given site conditions and the FPRs, trees will be felled toward the waters to provide LWD and will be identified in THPs as an in-lieu practice (14 CCR 916.1). Regardless, trees felled within the RMZ for safety purposes will be retained as downed wood.
7. Some Class III channels are located at the base of small, steep, erosional features immediately adjacent to the channel. These features may or may not be vegetated. In these situations, retain trees within 10 feet (slope distance) from the bank-full edge of the channel that are in the portion of the topographic cross section extending from the bank-full width up to the first break-in-slope (including those trees whose bole is in contact with the break-in-slope). Bole-in-contact with the break-in-slope means that the vertical line of the bole overlaps with the break-in-slope. Break-in-slope for the Class III prescription is defined as any change in the slope (no minimum distance is required).

8. Skid trails shall be stabilized as per the FPRs, per an approved THP in accordance with the Class I and II watercourse standard.
9. All downed wood and debris shall be retained within the EEZs, except for cases of emergency as per agreement with the wildlife agencies.
10. All downed wood and debris in the channel shall be retained.
11. Trees felled during current harvesting operations and THP-approved road construction are not considered downed wood for purposes of retention.
12. Felled hazard trees or snags not associated with a THP are considered downed wood and are to be retained in the nearest safe location.
13. Trees that fall naturally onto roads, landings, or harvest units within the EEZs shall be treated as downed wood and are to be retained in the nearest safe location.
14. Full suspension yarding will be used when feasible. Full suspension yarding is not feasible on flat ground, in other sites with limited deflection, where an adjacent landowner will not provide permission to secure a cable, or where a full suspension yarding system would jeopardize the safety of field personnel. For the purposes of this prescription, the expanded definition of feasibility according to the FPRs does not apply as an additional determination beyond that described above. For these conditions, yarding will be conducted in a manner that avoids ground disturbance that might deliver sediment to waters to the maximum extent practicable. Where ground disturbance occurs, PALCO will treat the site as per HCP Section 6.3.3.8 (revised August 11, 2004).
15. Trees designated for retention may be felled within the RMZ only to provide safety clearance for cable yarding corridors or worker safety. In such cases, to the extent possible given site conditions and the FPRs, trees will be felled toward the waters to provide LWD and will be identified in THPs as an in lieu practice (14 CCR 916.1). Regardless, trees felled within the RMZ for safety purposes will be retained as downed wood.
16. Trees designated for retention which are damaged in the cable yarding corridors or site preparation, must be retained in place, either standing or as downed wood.
17. To the extent feasible, directionally fell harvest trees away from Class III watercourses.
18. Retain all ground cover vegetation, other sub-merchantable vegetation, and slash that provide sediment filter strip function post harvest within RMZs.
19. Site preparation will be conducted according to HCP Section 6.3.4.2 (revised August 19, 2003).

2. Prescriptions unique to Class III Large Woody Debris (LWD) Transport Zones:

Class III LWD Transport Zones are defined as Class III watercourses, or reaches thereof, that have all of the following three characteristics:

1. Delivers directly to a Class I watercourse
2. Has a channel gradient greater than 50 percent
3. Has a Very High Hazard Mass Wasting Area (e.g., headwall swale, other very high hazard mass wasting area) above or adjacent to the Class III channel.

The Class III LWD Transport Zone prescription (as detailed below) shall apply to the entire segment of the Class III watercourse located below the Very High Hazard Mass Wasting Feature.

Prescription for Class III LWD Transport Zone:

1. No timber harvest shall occur in the Class III channel or within ten (10) feet of the edge of the bank-full channel on each side of the Class III watercourse.
2. The EEZ for ground based equipment shall be 100 feet or to the hydrological divide, whichever is of lesser distance.

Measurement for stream gradient will begin at the edge of the Class I watercourse transition line, or if present, the floodplain valley wall. Stream gradient measurements shall be taken upslope from the Class I watercourse in 100-foot increments until the stream gradient is less than 50 percent for a 100-foot length.

Table 4: Illustrative Summary of Primary Class III RMZ Prescriptions (Additional enforceable prescriptions contained in narrative text.)

Watercourse Type	Total RMZ Width	Outer Band	
Class III (General)	<p>Where watercourse side slopes average less than 50%: Total RMZ width shall be 50 feet</p> <p>Where watercourse side slopes average 50 % or greater: Total RMZ width shall be 100 feet</p>	<p>-Retain all trees within or in contact with bank-full channel</p> <p>-Retain all trees less than 8 inches (dbh.) within 15 feet of edge of bank-full channel to extent feasible</p> <p>-Retain all downed wood within RMZ</p> <p>-All Class III RMZ prescriptions end at the hydrologic divide</p>	<p>Slopes < 50 %= 50 feet; Slopes 50 % or greater = 100 feet</p> <p>Or</p> <p>Hydrologic divide</p>
Class III (LWD Transport) ¹	100 feet	<p>-No harvest in or within 10 feet of bank-full channel downslope of identified unstable feature as described below</p> <p>-Retain all downed wood within RMZ</p> <p>-All Class III prescriptions end at the hydrologic divide</p>	<p>100 feet</p> <p>Or</p> <p>Hydrologic divide</p>

¹ Class III watercourse with gradient 50 percent or greater that leads continuously to a Class I water and is below an unstable feature. Measurement of stream gradient to begin at the outer edge of the Class I watercourse transition line, or if present, the floodplain valley wall extending up the Class III drainage in 100 foot increments until the gradient drops below 50 percent.

6.3.4.3 Disturbance Index

1. The disturbance index and its elements may be modified subject to approval by the wildlife agencies.
2. The disturbance index will be calculated at the sub-basin scale.
3. The disturbance index shall be calculated on an annual basis and updated by March 1 of each year for the activities conducted in the previous calendar year. With submittal of each THP in the Elk River and Salmon Creek Watershed Analysis Unit, PALCO shall calculate and present the most recent disturbance index in the relevant sub-basin.
4. In sub-basins where the disturbance index is equal to or greater than 150 percent above the estimate of background level, PALCO shall conduct sediment mitigation activities sufficient to result in a net decrease of the index value for the year.
5. In sub-basins where the disturbance index is less than 150 percent above background levels, PALCO may conduct covered activities in the subject THP with the limitation that such operations will not result in a net increase in the disturbance index above 150 percent over background threshold for the year.
6. In all sub-basins where timber operations are conducted, PALCO shall ensure, in addition to other road related measures in the HCP, that the surface of hydrologically connected road segments shall be treated (e.g., with rock, chipseal or pavement) to avoid any visible increase in turbidity in waters receiving runoff from the road surface of appurtenant road segments.
7. Within each sub-basin, stormproofing, road decommissioning, and updated road surface erosion estimates shall also be calculated and included in the disturbance index on an annual basis.
8. Upon delivery of the annually revised disturbance index estimates to the wildlife agencies, a meeting shall be convened within 60 days between PALCO and the wildlife agencies to review the disturbance index and to set priorities for the coming year. In particular, this meeting will be used to assign stormproofing efforts, if needed, and to address any unexpected increases in the disturbance index in sub-basins where such index values exceed 150 percent above background.

6.3.5 Aquatic Monitoring

Below is an outline of activities to be conducted in the Elk River and Salmon Creek (ERSC) Watershed Analysis Unit in addition to monitoring described in the HCP.

PALCO and the wildlife agencies may agree to modify the specifics of this monitoring plan in the development of the detailed work plan.

1. ERSC Watershed Riparian Enhancement Plan Monitoring

Objective: Monitor effectiveness of Lower North Fork Elk River Riparian Enhancement Plan (REP) prescriptions to ensure treatments successfully convert designated areas within the conifer-depleted zone to a conifer-dominant forest type over time. PALCO shall work with the wildlife agencies to develop a riparian enhancement plan along the lower eight miles of North Fork Elk River (see item 6.3.4.1.2.5.3 of these prescriptions). This plan shall be finalized within six months of establishment of the ERSC Watershed Analysis Prescriptions.

Methods: Monitoring methods shall be developed as part of the REP and amended into the ERSC Watershed Analysis Prescriptions.

2. ERSC Watershed Reconnaissance - Level Forensic Landslide Monitoring

Objective: Document and assess mass wasting events within the ERSC watersheds. :

- 1) achieve greater understanding of contributing factors to their occurrence, such as geology, slope, landform, distance from watercourse, association with management activities
- 2) to record location and timing of occurrence, size of mass wasting event, and if applicable, estimated volume of sediment delivered to watercourse.

Methods:

- A watershed-wide reconnaissance level investigation for mass wasting events utilizing PALCO's Watershed Operating Protocol 08 shall be conducted if either of the following "triggering events" occurs within or near the ERSC watersheds: (1) greater than 3 inches of rainfall within 24 hours; (2) a significant earthquake. Determining if an earthquake is a "triggering event" shall be based upon earthquake magnitude and distance of epicenter from the watershed referencing Figure 2., Graph A of Keefer (1984).
- The results of this investigation including collected data and summary tables shall be provided the wildlife agencies in a written report within one year of the triggering event.

3. ERSC Watershed Analysis THP-Related Inventory of Headwall Swales

Objective: Determine an estimate of the area (acreage) associated with THP-related headwall swales (as defined by the ERSC prescriptions), and the mass wasting hazard they represent, particularly relative to slope gradient. Over time, collected information can be used by PALCO and the wildlife agencies to modify the headwall swale definition and/or prescriptions, if warranted and agreed upon.

Methods: During THP preparation, headwall swale areas meeting the definition provided for by the ERSC watershed analysis prescriptions, shall be visited and

characterized by a California Licensed Geologist. Observations made by the geologist during their site visit shall be recorded and archived along with a THP map showing the location and legal description (township, range, and section) of each identified headwall swale. The following information shall be collected (see data collection form below):

- THP name and ERSC sub-basin in which the headwall swale feature is located
- Approximate area (acreage) of each identified headwall swale
- Average slope for each headwall swale in ten percent slope classes (e.g., 50-59%, 60-69%, 70-79%, etc.).
- Estimate of mass wasting hazard (low – high – extreme) including observations and rationale used to determine the hazard rating.

PALCO shall maintain and update this inventory of THP-related headwall swales in the ERSC watersheds through 2009 and shall provide a copy upon request to the wildlife agencies.

ERSC Watershed Inventory of THP-related Headwall Swales (2005 -)

THP Name	Sub-Basin	ID Number	Size (Acres)	Slope Class	Hazard Rating
Observations:					
Observations:					
Observations:					
Observations:					
Observations:					
Observations:					

THP Name	Input THP Name
Sub-Basin	Use 2005 ERSC Watershed Analysis Sub-basins
ID Number	For each individual THP, numerically identify each headwall swale receiving protection under the Watershed Analysis Prescriptions (e.g. one, two, three, etc.)
Size (acres)	Provide an estimate of area for each headwall swale
Slope Class	Use ten percent slope classes (e.g. 50-59%, 60-69%, 70-79%, etc.)
Hazard Rating	Low - No signs of instability; High - signs of existing or potential instability; Extreme - Actively failing or has failed
Observations	Provide observations leading to determination of hazard rating
Map Location	Provide a map for each THP showing location and legal description of identified headwall swales

Reference
Keefer 1984.