

**FSH 2509.22 – SOIL AND WATER CONSERVATION HANDBOOK  
CHAPTER 10 – WATER QUALITY MANAGEMENT FOR  
NATIONAL FOREST SYSTEM LANDS IN ALASKA**

**REFERENCES**

Identifies the Forest Service Manual and Handbooks, contract or permit provision, Code of Federal Regulation, policy statement, and/or other references where the practice is further documented. The reference listings are not all inclusive.

**12 – WATERSHED MANAGEMENT**

Watershed management is the art and science of conserving soil and water resources and projecting water-related beneficial uses. The management objective is to "secure favorable conditions of water flow"; that is, to maintain or enhance watershed conditions favorable for optimum water quality, water yield and timing, and soil productivity. To secure both favorable conditions of water flow and quality requires maintaining the dynamic equilibrium of the stream channel system within its natural range of variation. This in turn will maintain healthy aquatic habitats. Watershed management includes the improvement of soil and water resources on National Forest System lands damaged by catastrophic events or degraded by past use.

Generally, water quality management is focused on the protection of surface waters from both point and nonpoint source pollution. However, in karst areas, surface flow may instantly become underground flow as it enters a sinkhole. In this situation there is little or no opportunity to filter out nonpoint source pollutants from the surface runoff. Therefore, karst features may need to be treated similar to live stream courses, with buffers and/or other protection measures.

The practices listed in this section are applicable to most resource functions. They should be applied to all management activities that have the potential to adversely affect water quality and/or the designated beneficial uses as defined in Alaska Water Quality Criteria (11 AAC 70.020).

**12.1 – PRACTICE: Cumulative Watershed Effects Analysis**

1. **OBJECTIVE.** To determine the Cumulative Watershed Effects (CWE) on the beneficial uses of water caused by multiple land management activities, distributed over both time and space.

2. **EXPLANATION.** This is an administrative and preventive practice. BMPs are designed and applied to protect water quality. The scope and scale of the BMPs can vary from an individual protective measure at one location to a procedure for deciding what, when, and where management activities are to occur over a large land area. BMPs are applied individually at a site to deal with specific situations. BMPs can be applied in a series, or in conjunction with other practices. Examples could be a number of water bars along a road segment or ditch lining and cross-drain culverts

Cumulative Watershed Effects analyses procedures are tools to assist in deciding the appropriate amount, timing, and placement of various activities in a watershed to achieve water quality objectives. Natural watershed sensitivity, and land disturbance history and recovery are factors

**FSH 2509.22 – SOIL AND WATER CONSERVATION HANDBOOK  
CHAPTER 10 – WATER QUALITY MANAGEMENT FOR  
NATIONAL FOREST SYSTEM LANDS IN ALASKA**

that should be evaluated in the CWE analysis. Data from long-term monitoring and research studies of watershed, riparian, and aquatic habitat conditions will be needed to refine and validate CWE models.

Using roads as an example, there may be a limit to the amount of road that should be built in a given watershed to avoid the concentration and acceleration of runoff and sediment farther downstream which may result in channel changes and mobilization of additional sediments. Past, present, or reasonably foreseeable future actions in a watershed are evaluated relative to natural or undisturbed conditions. Cumulative Watershed Effects are changes in beneficial water uses caused by the accumulation of individual impacts. To avoid adverse CWE, recovery should occur before the impact of the next individual practice.

Watersheds will be managed to avoid significant adverse CWE on the soil and water resource and to produce water of quality and quantity sufficient to maintain beneficial uses in compliance with State Water Quality Standards. Examples of potential cumulative effects are:

1. Reduced natural woody debris input to stream channels that may cause alterations in channel morphology and reductions in fish habitat.
  2. Excess sediment production that may reduce fish habitat and other beneficial uses.
  3. Water temperature and nutrient changes that may affect beneficial uses.
  4. Disturbed soils that may cause increased soil erosion and sedimentation.
  5. Changes in water yield and peak flow that may upset stream channel equilibrium.
  6. Changes to the hydrology of karst areas.
3. IMPLEMENTATION. As part of the NEPA process, the Forest Service will consider the potential CWE of multiple land management activities within a watershed that may exceed the stream's capacity to maintain its equilibrium and/or to recover to near-natural conditions before the next management disturbance. Cumulative Watershed Effects screening and/or analysis is required of projects involving significant vegetation removal, or soil disturbing activities to ensure that the project, considered with other activities, will not increase sediment or water yields beyond acceptable limits. An acceptable analysis includes such components as: watershed condition, watershed sensitivity, threshold-of-concern criteria, and mechanisms for quantifying existing and proposed alternative management activities. The Forest Service will also coordinate and cooperate with State and private landowners in assessing cumulative effects in multiple ownership watersheds.
4. REFERENCES. 40 CFR 1508.7; Section 208(b)(2)(f) of the CWA; Section 6217(g) of the Coastal Zone Act Reauthorization Amendments of 1990; Cumulative Silvicultural Impacts on Watersheds, USDA Forest Service, Mar 1988, Silver Fire Recovery Process Paper, Siskiyou National Forest; Washington Forest Practice Board, Oct. 1992, Standard Methodology for

**FSH 2509.22 – SOIL AND WATER CONSERVATION HANDBOOK  
CHAPTER 10 – WATER QUALITY MANAGEMENT FOR  
NATIONAL FOREST SYSTEM LANDS IN ALASKA**

Conducting Watershed Analysis; USDA Forest Service, Report to Congress, Anadromous Fish Habitat Assessment, Jan. 1995, R10-MB-279; FEMAT Report, 1993.

## **12.2 – PRACTICE: Rehabilitation After Mass Wasting**

1. **OBJECTIVE.** To identify actions to be taken where mass wasting threatens water quality.

2. **EXPLANATION.** This is a corrective practice. Mass wasting is a natural event that may occur with or without management disturbance. When a mass wasting event threatens water quality a prompt assessment of the risk of impairing the designated beneficial uses is needed. Opportunities to minimize or mitigate the adverse effects will be identified.

When mass wasting is visually observed in the field and enters flowing surface water or is expected to exceed water quality standards, the ADEC will be informed as soon as possible. The Forest Service Line Officer, or designated representative, should contact ADEC, Division of Air and Water Quality, directly with information on the location, size, and prognosis of events, and describe corrective actions being taken. Where practicable, and after taking personal safety into account, surface and subsurface flows should be diverted away from the slide and dispersed onto stable vegetated areas.

3. **IMPLEMENTATION.** Appropriate actions are needed to protect public safety followed by assessment, rehabilitation, and monitoring. (See BMPs 14.5, 14.7 and 14.8) When mass wasting is triggered by operations, the Forest Service will take effective and appropriate actions to stabilize the slide path and all associated exposed soils. A wide range of methods is available including bioengineering and nonstructural measures.

When mass wasting results in debris and sediments entering surface waters, an assessment of the methods and feasibility of rehabilitation actions should be done quickly (See BMP 19.5). Following the assessment, which should consider both onsite and downstream impacts, a decision on the most effective and feasible way to protect and restore water quality and aquatic habitat will be made in consultation with ADEC.

4. **REFERENCES.** 11 AAC 95.330; FSM 2522; FSM 2534.

## **12.3 – PRACTICE: Watershed Rehabilitation Planning and Implementation.**

1. **OBJECTIVE.** To identify degraded watershed conditions, to plan and prioritize watershed rehabilitation projects, and to minimize soil erosion and improve water quality.

2. **EXPLANATION.** This is an on going administrative and corrective practice. Factors considered in the evaluation of soil and water resource problems and subsequent improvement opportunities are: predicted changes in water quality and its associated effects on on-site and downstream beneficial uses, soil productivity, threat to life and property, direct and indirect economic returns, and social and scenic benefits. Watershed improvement includes both structural and nonstructural measures. Structural measures such as water bars and check dams

**FSH 2509.22 – SOIL AND WATER CONSERVATION HANDBOOK  
CHAPTER 10 – WATER QUALITY MANAGEMENT FOR  
NATIONAL FOREST SYSTEM LANDS IN ALASKA**

require long-term inspection, and maintenance. Bioengineering and nonstructural measures such as land shaping and revegetation are self-maintaining once vegetation is established (See BMP 12.17).

Before major watershed rehabilitation or stream channel manipulation projects are initiated, a watershed assessment including a cumulative watershed-level analysis, should be conducted. It is essential to understand the runoff and geomorphic processes that exist within a watershed and also the equilibriums that exist within the various reaches of the channel system before undertaking rehabilitation and/or enhancement projects. For example, some project designs and techniques will work well in channel types with armored banks or low sediment transport rates, yet be total failures or cause additional damage if constructed in channel types with alluvial banks and/or high sediment yields.

3. IMPLEMENTATION. This practice is typically implemented through the development and maintenance of a comprehensive soil and water resource improvement inventory, the approval of cost effective plans, and the funding of the plan and subsequent improvement actions.

Watershed rehabilitation and/or enhancement projects will be planned and prioritized on a watershed basis. It may be necessary to construct both in-channel and hill-slope projects to rehabilitate a degraded watershed or stream channel. These projects should be designed and phased to complement each other. The NEPA process will be followed in the planning and implementation of improvement measures. The actual implementation work may be done by Forest Service crews or contract. Effectiveness of improvement measures will be monitored and evaluated.

4. REFERENCES. FSM 2522; Ecosystem Analysis at the Watershed Scale, Version 2.2, August 1992; 11 AAC 95.330.

## **12.4 – PRACTICE: Floodplain Identification, Evaluation, and Protection.**

1. OBJECTIVE. To identify floodplain values and, where practicable, avoid adverse impacts to soil and water resources associated with the occupancy and modification of floodplains.

2. EXPLANATION. This is an administrative and preventive practice. A flood hazard analysis and evaluation will be made prior to acquisition or exchange of land within floodplains. A floodplain analysis and evaluation will be made when sites within floodplains are considered for structures or development. Environmental quality, ecological effects, and individual safety and health are considered. Flood frequencies, watershed conditions, climatic and environmental factors associated with past flood events, flood flow quantities, and specific flood boundaries are all evaluated.

3. IMPLEMENTATION. The Regional Forester is responsible for ensuring consideration of floodplain hazards and values in all NEPA planning processes. The Forest Supervisor, through use of technical staffs, is responsible for:

**FSH 2509.22 – SOIL AND WATER CONSERVATION HANDBOOK  
CHAPTER 10 – WATER QUALITY MANAGEMENT FOR  
NATIONAL FOREST SYSTEM LANDS IN ALASKA**

- a. Determining if proposed facilities are within the 100-year floodplain (or the 500-year floodplain for "critical" actions).
  - b. Notifying the public at the earliest possible time of any plan or proposal to undertake, support, or allow an action resulting in occupancy, modification, or development in a floodplain, and involving affected and interested public in the decision-making process.
  - c. Identifying and evaluating practicable alternatives to locating a proposed action in a floodplain, including alternative sites outside the floodplain.
  - d. Modifying plans, activities, and designs to minimize impairment of the natural functions and values of the floodplain (where off-floodplain alternatives are not practicable).
  - e. Requiring flood hazard evaluations prior to issuance of special-use permits.
  - f. Ensuring that floodplain hazards, management considerations, and appropriate restrictions are included in authorizing documents.
4. **REFERENCES.** E.O. 11988, Floodplain Management; FSM 2527; Maxwell, J. and LaFayette, R., 1986. Identification of Streamside Riparian Areas of the Tongass NF, Martin et. al. 1988. Guidelines for Making Floodplain and Wetland Evaluations for Land Exchanges. USDA, Forest Service, Southwestern Region Hydrology Note No. 19a.

## **12.5 – PRACTICE: Wetland Identification, Evaluation, and Protection**

1. **OBJECTIVE.** To identify wetland functions and value, and provide appropriate protection measures designed to avoid adverse hydrologic impacts.
2. **EXPLANATION.** This is an administrative and preventive practice. Peat lands (muskegs) are considered wetlands by all Federal and State Agencies. The Forest Service responsibility for protection of wetlands is directed by 33 CFR 323.3(b) and Section 404(b)(1) of the Clean Water Act. The U.S. Army Corps of Engineers (COE) regulates dredge and fills on all waters of the U.S., including wetlands. The construction or maintenance of forest roads is exempt (Silviculture Road Exemption) from these permits where such roads are constructed and maintained in accordance with the following 33 CFR Best Management Practices.
  - a. Permanent roads (for farming or forestry activities), temporary access roads (for mining, forestry, or farm purposes) and skid trails (for logging) in waters of the U.S. shall be held to the minimum feasible number, width and total length consistent with the purpose of specific farming, silviculture or mining operations, and local topographic and climatic conditions.

**FSH 2509.22 – SOIL AND WATER CONSERVATION HANDBOOK  
CHAPTER 10 – WATER QUALITY MANAGEMENT FOR  
NATIONAL FOREST SYSTEM LANDS IN ALASKA**

- b. All roads, temporary or permanent, shall be located sufficiently far from streams or other water bodies (except for portions of such roads which must cross water bodies) to minimize discharges of dredged or fill materials into waters of the U.S..
- c. The road fill shall be bridged, culverted, or otherwise designed to prevent the restriction of flood flows.
- d. The fill shall be properly stabilized and maintained during and following construction to prevent erosion.
- e. Discharges of dredged or fill material into waters of the United States to construct a road fill shall be made in a manner that minimizes the encroachment of trucks, tractors, bulldozers, or other heavy equipment within waters of the United States (including adjacent wetlands) that lie outside the lateral boundaries of the fill itself.
- f. In designing, constructing, and maintaining roads, vegetative disturbance in waters of the U.S. shall be kept to a minimum.
- g. The design, construction and maintenance of the road crossing shall not disrupt the migration or other movement of those species of aquatic life inhabiting the water body.
- h. Borrow material shall be taken from upland sources whenever feasible.
- i. The discharge shall not take, or jeopardize the continued existence of, a threatened or endangered species as defined under the Endangered Species Act, or adversely modify or destroy the critical habitat of such species.
- j. Discharges into breeding and nesting areas for migratory waterfowl, spawning areas, and wetlands shall be avoided if practical alternatives exist.
- k. The discharge shall not be located in the proximity of a public water supply intake.
- l. The discharge shall not occur in areas of concentrated shellfish production.
- m. The discharge shall not occur in a component of the National Wild and Scenic River System.
- n. The discharge of material shall consist of suitable material free of toxic pollutants in toxic amounts.
- o. All temporary fills shall be removed in their entirety and the area restored to its original elevation.

**FSH 2509.22 – SOIL AND WATER CONSERVATION HANDBOOK  
CHAPTER 10 – WATER QUALITY MANAGEMENT FOR  
NATIONAL FOREST SYSTEM LANDS IN ALASKA**

The 33 CFR Best Management Practices assure that flow and circulation patterns and chemical and biological characteristics of waters of the United States are not impaired. In addition, they assure the reach of waters of the United States, including wetlands is not be reduced, and that any adverse effect on the aquatic environment is otherwise minimized.

The COE guidelines state that no discharge of dredged or fill material shall be permitted in wetlands if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem. Practicable means available and capable of being done after taking into consideration costs, existing technology, and logistics in light of overall project purposes (40 CFR 230.3(g)). This would apply as long as the alternative does not have other significant adverse environmental consequences. The COE presumes that practicable alternatives exist to filling wetlands unless clearly demonstrated otherwise. The Forest Services must determine that there are no practicable alternatives and document the alternatives considered and environmental values protected.

Executive Order 11990 establishes a sequencing policy of avoidance, minimization and possible mitigation. If avoidance of wetlands is not possible, then the decision must include minimization. If the impacts can not be minimized, then mitigation and/or creation is considered. Projects, including non-exempt roads used for recreation or general purposes, may cross wetlands only with COE authorization. The authorization may be in the form of a Nationwide Permit, General Permit or Individual Permit. The COE will rely on Forest Service Environmental Analysis for relevant documentation, or will perform the analysis themselves. Road construction techniques used to cross wetlands must have minimal effects on wetland hydrology, chemistry or biology, and meet all 33 CFR Best Management Practices. Road construction across wetlands should exclude road-side ditches and fills that disrupt shallow ground water drainage patterns and create altered wetness conditions. Providing adequate cross drainage is an important consideration for maintaining natural surface runoff patterns.

3. IMPLEMENTATION. A Wetland Determination (delineation and classification) will be made prior to non-exempt land disturbing activities using the COE 1987 Wetlands Delineation Manual. In addition, an evaluation or assessment will be conducted to consider factors relevant to the activity's effect on the hydrologic function, biological significance and scarcity of the wetland involved. The impact to the adjacent area selected to serve as an alternative will also be considered in a similar manner.

Within timber harvest areas, the unauthorized operation of vehicular or skidding equipment on wetlands designated on sale area maps and marked on the ground is prohibited. Vehicular or skidding equipment shall not be used on wetlands except where roads, landings, and tractor roads are authorized.

Timber Sale Contract provisions address constraints for minimizing wetland impacts. Damage to wetlands, caused by unauthorized Purchaser's operations, shall be repaired by the Purchaser in a timely and agreed upon manner. Trees felled into peatlands or other nonforested (noncommercial) wetlands, shall be removed by suspension cable or other low impact yarding systems.

**FSH 2509.22 – SOIL AND WATER CONSERVATION HANDBOOK  
CHAPTER 10 – WATER QUALITY MANAGEMENT FOR  
NATIONAL FOREST SYSTEM LANDS IN ALASKA**

These Wetland BMPs are intended to assure that flow and circulation patterns, and the physical, chemical, and biological characteristics of the waters of the United States, including wetlands, are not impaired. Utilize applicable BMPs in all management activities which could affect water quality. The Forest Service must show any options to filling wetlands and that reasonable protection for wetland resources is provided.

4. REFERENCES. E.O. 11990, 33CFR 232, Protection of Wetlands; FSM 2527; R-10 Supp to 5460.1; FSH 2409.15, FSH 2409.23; Timber Sale Contract Provision B(T)6.61, C(T)6.61#; Maxwell, J. and LaFayette, R., 1986. Guidelines for Making Floodplain and Wetland Evaluations for Land Exchanges. USFS, SW Region Hydrology Note No. 19a; DeMeo, T.E. and W. David Loggy, 1989, Development of Wetland Mapping Procedures for Forest Planning in Southeast Alaska, in Proceedings of Watershed 89, USFS, R10-MB-77 March 1989, pages 57-72; Cowardin, L.M. et al. 1992. Classification of Wetlands and Deep Water Habitat of the United States, USDI, Fish and Wildlife Service Pub. No. FWS/OBS - 79/31; Corps of Engineers Wetlands Delineation Manual, January 1987.

## **12.6 – PRACTICE: Riparian Area Designation and Protection**

1. OBJECTIVE. To identify riparian areas and their associated management objectives.
2. EXPLANATION. This is an administrative and preventive practice. Riparian areas require closely managed activity. Riparian areas (1) serve to store sediment; (2) contribute to the maintenance of desired water temperature; (3) provide aquatic and riparian ecosystem habitats for fish, wildlife, and recreation; (4) protect channels and stream banks; (5) stabilize the floodplain; and (6) provide a long-term source of large organic debris to the stream channel system.

Identification and designation of riparian areas are needed to determine the extent and distribution of highly valued and sensitive riparian resources. The boundaries of riparian areas are controlled by topographic and geomorphic characteristics, biological and hydrological dynamics, as well as management requirements and objectives. Riparian areas are managed for the primary purposes of protecting or enhancing water quality and fish habitat.

Riparian areas are normally managed within land allocations referred to as management areas within Forest Land Management Plans. Management areas have specific management goals, objectives, standards, and guidelines that comprise the management prescription for the land area (FSH 1909.12). Riparian areas are included within Aquatic Habitat Management Units (AHMU) as defined in the Region 10 - Aquatic Habitat Management Handbook (FSH 2090.21). The AHMU includes all Class I, II, and III streams and may extend beyond the riparian area. The AHMU has a variable width, but as a minimum, the AHMU includes streamside buffers in which commercial timber harvesting is prohibited under the Tongass Timber Reform Act (see BMP 12.6a), and should include the riparian area as defined by NFMA (36 CFR 219.27e).

**FSH 2509.22 – SOIL AND WATER CONSERVATION HANDBOOK  
CHAPTER 10 – WATER QUALITY MANAGEMENT FOR  
NATIONAL FOREST SYSTEM LANDS IN ALASKA**

"Riparian Areas. Special attention shall be given to land and vegetation for approximately 100 feet from the edges of all perennial streams, lakes, and other bodies of water. This area shall correspond to at least the recognizable area dominated by the riparian vegetation. No management practices causing detrimental changes in water temperature or chemical composition, blockages of water courses, or deposits of sediment shall be permitted within these areas which seriously and adversely affect water conditions or fish habitat.

Topography, vegetation type, soil, climatic conditions, management objectives, and other factors shall be considered in determining what management practices may be performed within these areas or the constraints to be placed upon their performance."

Riparian areas represent the interface between terrestrial and aquatic ecosystems and include, riverine, lacustrine and contiguous palustrine wetlands that have a direct hydrologic connection. The following minimum considerations are Forest Service policy.

1. Manage riparian areas in relation to various legal mandates, including, those associated with floodplains, wetlands, water quality, dredged and fill material, endangered species, wild and scenic rivers, and cultural resources.
2. Manage riparian areas under the principles of multiple-use, giving preferential consideration to riparian dependent resources when conflicts among land use activities occur.
3. Delineate and evaluate riparian areas prior to implementing any project activity. Determine geographic boundaries of riparian areas by onsite characteristics of water, soil, and vegetation.
4. Give special attention to adjacent terrestrial areas to assure adequate protection for the riparian dependent resources.
5. Manage riparian areas to provide for long-term conservation, productivity, biological diversity, and ecosystem integrity.

Timber management activities, guided by integrated silvicultural prescriptions, may be implemented within riparian areas if they have a neutral or beneficial impact on water quality and riparian resources. Prescriptions may include clear-cutting when consistent with the achievement of water quality and riparian dependent resource objectives. Commercial timber harvest is prohibited within TTRA buffers (see BMP 12.6a).

3. IMPLEMENTATION. Water quality and riparian area requirements are identified in the environmental analysis by the interdisciplinary team. The environmental analysis will ensure that planned timber harvest or other management activities within riparian areas are compatible with water quality and riparian dependent resource management objectives. The silvicultural (Integrated Resource Management) prescription is a vehicle for documentation of these coordinated activities.

**FSH 2509.22 – SOIL AND WATER CONSERVATION HANDBOOK  
CHAPTER 10 – WATER QUALITY MANAGEMENT FOR  
NATIONAL FOREST SYSTEM LANDS IN ALASKA**

Timber Sale Contracts include site-specific requirements for the protection of water quality and the riparian dependent resources. The environmental analysis identifies monitoring and evaluation needs in the Timber Sale Contract.

Timber harvest and other management activities within riparian areas will be deferred, or adjusted, where proposed activities would result in unacceptable water quality conditions such as: detrimental changes in stream temperature and nutrient loadings, significant reduction in large woody debris recruitment, blockage of water courses, long-term erosion and/or deposition of management-induced sediment.

4. REFERENCES. FSM 2405.13, 2453.2, 2526, and 2471; NEPA; NFMA; Timber Sale Contract Provisions B(T)6.5, C(T)6.5, and C(T)5.421; FSH 2409.15, and FSH 2409.18; "Identification of Streamside Riparian Areas of the Tongass National Forest", Martin et al, 1988; Aquatic Habitat Management Unit Handbook FSH 2609.24.); CFR 219.27 (e); Riparian Management Requirements Decision Memo (File 1920, dated Jan. 18, 1989.); FSH 1909.12; Tongass Timber Reform Act of 1990 (Public Law 101-626); Sec. 103, Alaska Forest Practices Act, May 1990; and 36 CFR 228.8.

### **12.6a – PRACTICE: Buffer Design and Layout**

1. OBJECTIVE. To design streamside buffers to meet objectives defined during the implementation of BMP 12.6.

2. EXPLANATION. This is an administrative and preventive practice. The use of streamside leave areas or buffers has shown to be an effective technique for protecting stream courses from nonpoint source pollutants, maintaining stream temperature, and maintaining aquatic and riparian habitats.

The Tongass Timber Reform Act of 1990 established riparian buffers in which commercial timber harvest is prohibited adjacent to all Class I and those Class II streams, which flow directly into a Class I stream, within the Tongass National Forest. TTRA buffers extend a minimum of 100-foot horizontal distance from the edge of the active channel (bank full).

Timber Sale Contract Provision C(T)6.51 states:

**Prior to any operations allowed by Section 103 of the Tongass Timber Reform Act within a buffer of 100 feet, a Stream course Protection Plan will be developed for that buffer. This plan will incorporate provisions for implementing Section 103 of the Tongass Timber Reform Act and will specify which timber, if any, may be removed within the buffer and become Included Timber.**

**Except as provided in C(T)6.42# or Stream course Protection Plan developed here, there will be no yarding corridors, tailholds, temporary road crossings, or logging activity within the buffer...**

**FSH 2509.22 – SOIL AND WATER CONSERVATION HANDBOOK  
CHAPTER 10 – WATER QUALITY MANAGEMENT FOR  
NATIONAL FOREST SYSTEM LANDS IN ALASKA**

The TTRA also requires protection for streams not covered by TTRA buffers.

**The secretary shall use best management practices, as defined in the Region 10 Soil and Water Conservation Handbook (FSH 2509.22), January 1990, to assure the protection of riparian habitat on streams or portions of streams not protected by such buffer zones.**

Thus, stream buffers on the Chugach National Forest and non-TTRA buffers on the Tongass National Forest are managed using the guidance found in this Handbook, particularly BMPs 12.6, 12.6a, and 13.16. Class III stream buffers may be necessary when yarding problems or sideslope mass wasting hazards exist.

Buffers may need to be wider than the minimum specified in TTRA to meet riparian management objectives (see BMP 12.6) on certain streams. Wider buffers may be appropriate for areas with high windthrow hazard, or on complex floodplains with multiple stream courses, wetlands, or off-channel rearing habitat. Karst or limestone landscapes may have special buffer needs. It is important to prevent the introduction of sediment and debris into sinkholes which may impair the water quality of underground streams, resurgent streams and karst aquatic ecosystems.

In general, road location and design should avoid impacting stream buffers. Avoid yarding corridors where more than a few standing trees in the buffer would be felled or damaged during yarding. When supported by NEPA analysis, roads, yarding corridors, and tailholds are allowed to enter or cross buffers to access adjacent lands. The Stream course Protection Plan required for most roads crossing TTRA buffers is site-specific and addresses those BMPs relating to bridge and culvert design criteria, erosion controls, excavation controls, and control of in-channel operations (for example; BMPs 14.5, 14.9, and 14.11 to 14.17).

3. IMPLEMENTATION. Water quality and riparian area requirements are identified in the NEPA document by the interdisciplinary team. The NEPA document will ensure that planned timber harvest or other management activities within riparian areas are compatible with water quality and riparian dependent resource management objectives.

The timber sale IDT is responsible for designating streams that require buffers and providing general buffer design criteria and documentation on unit cards. It is critical that adequate ground-truthing of riparian harvest units be conducted to identify all streams prior to unit release. As necessary, layout personnel and contract inspectors will consult with fishery and hydrology specialists to refine buffer design and address concerns such as windthrow hazard or off-channel fish rearing habitats.

When appropriate, location and design engineers will consult with resource specialists to develop a site-specific stream course protection plan that will be included in the road design folder. The COR will work with the purchaser to ensure plan provisions are implemented.

**FSH 2509.22 – SOIL AND WATER CONSERVATION HANDBOOK  
CHAPTER 10 – WATER QUALITY MANAGEMENT FOR  
NATIONAL FOREST SYSTEM LANDS IN ALASKA**

4. REFERENCES. FSM 2405.13, 2453.2, 2526, and 2471; FSM 2526; Timber Sale Contract Provisions B(T)6.5, C(T)5.412, C(T)6.42#, and C(T)6.51; FSH 2409.15, and FSH 2409.18; Aquatic Habitat Management Unit Handbook 2090.21 (still FSH 2609.24.); CFR 219.27 (e); Riparian Management Requirements Decision Memo (File 1920, dated Jan. 18, 1989.); FSH 1909.12; Tongass Timber Reform Act of 1990 (Public Law 101-626); Sec. 103, Alaska Forest Practices Act, May 1990; and 36 CFR 228.8.

## **12.8 – PRACTICE: Oil Pollution Prevention and Servicing/Refueling Operations**

1. OBJECTIVE. To prevent contamination of surface and subsurface soil and water resources from spills of petroleum products.

2. EXPLANATION. This is an administrative and preventive practice. Oil delivery and storage facilities will be located, designed, constructed, and maintained in a manner that minimizes the potential for contamination of surface and subsurface soil and water resources from leaking gravity flow lines, pressurized pipelines and storage tanks.

Above ground tanks should be constructed so that a secondary means of containment is provided for the entire contents of the largest single tank plus sufficient freeboard to allow for precipitation (40 CFR 112, Section 112.7(e)(2)(ii)).

All buried tanks will be of double wall construction. Underground storage tanks must equal or exceed the limits listed in 40 CFR 280 for design, installation, leak detection, and monitoring of both new and existing underground tanks.

During the servicing or refueling of logging, road construction, and other equipment, petroleum products may be spilled and potentially enter a water course. This risk is minimized by locating service and refueling sites well away from wetlands and stream channels. Minor oil spills can be prevented by using good housekeeping techniques including:

- a. Collecting used oil, oil filters, and grease tubes.
- b. Requiring equipment operators carry absorbent pads.
- c. Provide containment and cleanup for portable fuel tanks (including hose and nozzle).
- d. Following approved disposal methods for waste products.
- e. Repairing equipment leaks promptly.

3. IMPLEMENTATION. The IDT or Contracting Officer will designate the location, size, and allowable uses of service and refueling areas. The operator will develop Spill Prevention Control and Countermeasure (SPCC) plans (40 CFR 112) as needed by specific site conditions. The Contracting Officer and/or designated representatives, through the course of

**FSH 2509.22 – SOIL AND WATER CONSERVATION HANDBOOK  
CHAPTER 10 – WATER QUALITY MANAGEMENT FOR  
NATIONAL FOREST SYSTEM LANDS IN ALASKA**

their normal inspections, monitor the implementation of this BMP including compliance with SPCC plans.

4. REFERENCES. FSM 7442; 40 CFR 112, 280 and 300.72 (a) (1); 1984 RCRA Amendment Subtitle I; Timber Sale Contract Provisions B(T)6.34, and C(T)6.341; 1985 Forest Service Specifications, EM-7720-100 R and EM 7720-100B; Standard Specification 203; Alaska Region Special Project Specifications for the Construction of Roads, Bridges and other Drainage Structures; FSH 2409.15). Std H clauses for Public Works Contracts in R-10; Alaska regulations for oil and hazardous substances pollution control and underground storage tank (18 AAC 78)

### **12.9 – PRACTICE: Oil and Hazardous Substances Pollution Contingency Planning**

1. OBJECTIVE. To prevent the contamination of waters from accidental spills of oil and hazardous substances (including pesticides) at sites where a Spill Prevention Control and Countermeasure (SPCC) plan or hazardous substances contingency plan is required.

2. EXPLANATION. This is an administrative, preventive, and corrective practice. SPCC plans are commonly required at remote camps and at some administrative sites. The SPCC plan is a document that directs appropriate measures to prevent petroleum products from entering the navigable waters of the United States. SPCC plans are required if the total, above or below ground container, exceeds the limits listed in 40 CFR 112. SPCC plans have to be signed by a registered Engineer, and must be posted on the site.

SPCC plans are required for both Forest Service-owned and special-use permitted facilities. Timber sale operators and other contractors are included in this requirement (see BMP 15.4) if quantities exceed the limits listed in 40 CFR 112.

A hazardous substances contingency plan requires a predetermined organization and set of actions to be implemented immediately in the event of a release of hazardous substances.. Factors considered for each release are: the specific substance spilled, the quantity, its toxicity, proximity of spill to waters, and the hazard to life, property, and the environment.

These plans tier to the National Contingency Plan (NCP, 40 CFR 300), to the Alaska Regional Response Plan (ARRP), and to Area and local plans. The purpose of contingency plans is to provide the organizational structure and procedures for preparing and responding to discharges of oil and releases of hazardous substances, as authorized by the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and by Section 311 of the Clean Water Act (CWA), as amended.

3. IMPLEMENTATION. Each Forest is responsible for designating a Hazardous Materials Coordinator and keeping a current list of names and telephone numbers of agencies and individuals to notify regarding response and clean-up of spills. Individual Forests maintain an inventory of response and containment materials to use during the clean up of a spill. Disposal sites will be coordinated with EPA, State, and local officials responsible for safe and legal disposal.

**FSH 2509.22 – SOIL AND WATER CONSERVATION HANDBOOK  
CHAPTER 10 – WATER QUALITY MANAGEMENT FOR  
NATIONAL FOREST SYSTEM LANDS IN ALASKA**

When the Forest Service is in charge of a facility or operation, the "person-in-charge" is responsible for all reporting of any discharge or releases of oil or hazardous substances. State law requires any discharge to water, of oil, or a hazardous substance be immediately reported to the ADEC (AS 46.03.755 and 18 AAC 75). If a "Reportable Quantity" (RQ) of a hazardous substance is released, it may also be necessary to immediately notify the National Response Center (NRC). The Regional Office Federal Facilities Compliance Coordinator/CERCLA Coordinator should be contacted immediately, and will work with the Forest personnel in determining whether there has been a RQ release. If a RQ release has occurred, the NRC will be notified by the Regional CERCLA Coordinator. If the spill is from a third party operation and impacts National Forest System lands, the Forest Service will respond and report the spill if the third party fails to take appropriate action. Assignment of an appropriately trained (29 CFR 1910.120) Forest Service investigator to the incident should be considered. The Forest Service will generally provide first responder support services and turn its incident command role over to the authorized Federal On-Scene Coordinator, or other authorized State or local authorities after their arrival at the spill site.

4. REFERENCES. FSM 2130, 2150, 2532, 6740, and 7443; FSH 6709.11; 40 CFR 300; 40 CFR 112; Alaska Regional Response Plan (Federal); Alaska Oil and Hazardous Substances Pollution Contingency Plan (State); Timber Sale Contract Provision C(T)6.341; CERCLA, RCRA. Std H clauses for public works contracts in R-10, 18 AAC 75.400 to 18 AAC 75.495, 81 AAC 62 Hazardous Wastes.

### **12.10 - PRACTICE: Control of Activities Under Special Use Permit**

1. OBJECTIVE. To ensure water resource protection measures are incorporated within special-use permits.

2. EXPLANATION. This is an administrative practice. Many activities and uses take place on National Forest lands that are not directly related to Forest Service management activities. Some examples are: hydropower plants, water diversions and water transmission systems, electronic sites, highway and railroad rights-of-way, waste water treatment and disposal, solid waste disposal, and power transmission lines. There are other uses that are recognized Forest Service land management activities that are achieved through permits to a public or private agency, group, or individual. Examples of these types of uses are: organization camps, recreation residences, ski areas, and fish camps.

Forest Service management objectives and authority may be limited on lands withdrawn for Federal Energy Regulatory Commission (FERC) purposes. Forest Service Handbook 2709.15 provides guidance in dealing with FERC projects. When the FERC license is renewed, the Forest Service makes a complete re-evaluation of water quality and quantity needs, values, and effects, and updates the management controls within which the permittee must comply.

**FSH 2509.22 – SOIL AND WATER CONSERVATION HANDBOOK  
CHAPTER 10 – WATER QUALITY MANAGEMENT FOR  
NATIONAL FOREST SYSTEM LANDS IN ALASKA**

3. IMPLEMENTATION. The special-use permit under which these agencies, groups, or individuals operate details the conditions that they must meet to continue operating. The permittees are required to conform to all applicable State and local regulations governing water quality pollution control, and sanitation. Failure on the part of the permittee to meet the conditions of the special-use permit may result in the permit being revoked.

4. REFERENCES. FSM 2700; FSH 2709.15.

### **12.13 – PRACTICE: Administrative Site Planning and Management**

1. OBJECTIVE. To consider water pollution and other adverse environmental and health impacts in the location, design, and management of administrative sites.

2. EXPLANATION. This is an administrative practice. Several types of facilities may be located on Forest Service land to facilitate the administration of various programs. These may include work centers, fire depots, and nursery offices. Some facilities include living quarters with wastewater systems. Most include potable water systems. Water quality and potential health impacts should be a major factor in determining the size, type, and location of new or expanded facilities.

3. IMPLEMENTATION. New or expanded administrative facilities should not be located within floodplains, wetlands, or riparian areas. Individual facilities should be located to minimize sediment production and the movement of potential pollutants (oil, gas, etc.) into surface and ground waters. All potable water and sewage treatment systems will meet all Federal, State, and local standards. Regional Forest Service programs that guide operation and qualified sanitary personnel will implement maintenance of wastewater facilities.

4. REFERENCES. FSM 7420, 7430, 7440, and 7460; Alaska regulations for solid waste management (18 AAC 60), wastewater disposal (18 AAC 72), oil and hazardous substance pollution control (18 AAC 75), and drinking water (18 AAC 80).

### **12.14 – PRACTICE: Planning, Design, and Management Utility Corridors.**

1. OBJECTIVE. To ensure water resource protection measures are incorporated into the construction and maintenance of utility corridors.

2. EXPLANATION. This is an administrative practice. Power lines and pipelines are constructed on National Forest System land by both public and private agencies under either an easement or special-use permit. Water quality impacts should be addressed at three levels.

a. Utility Corridor Planning. Corridor location can affect the degree of water quality impacts through such factors as number of stream or avalanche path crossings required, steepness of slopes, or amount of riparian area disturbed. The location of new utility corridors along existing roadway corridors is highly desirable from the standpoint of maintaining water quality.

**FSH 2509.22 – SOIL AND WATER CONSERVATION HANDBOOK  
CHAPTER 10 – WATER QUALITY MANAGEMENT FOR  
NATIONAL FOREST SYSTEM LANDS IN ALASKA**

- b. Project Design. Specific impacts at the project level include service road location and standards, type of construction equipment (wheeled, tracked, helicopter), size and location of footings and guy anchors, and revegetation requirements.
- c. Right-of-Way-Management. Long-term management of transmission corridors may involve proposals for vegetative manipulation.
3. IMPLEMENTATION. Water quality protective practices should be incorporated into the appropriate documents; for example, easement and permit clauses, project plans for construction and design, and the right-of-way management plan for ongoing maintenance of vegetation along the corridor. Other BMPs relevant to utility corridors include:

- Section 14 Appropriate transportation practices
- Practice 12.4 Floodplain identification, evaluation, and protection
- Practice 12.5 Wetland identification, evaluation, and protection
- Practice 12.8 Servicing and refueling operations
- Practice 12.9 Hazardous substance spills
- Practice 12.10 Special-use permits
- Practice 12.17 Revegetation of disturbed areas
- Practice 15.2-5 Use of pesticides (herbicides)

Easements and permits require the project proponent to comply with all Federal, State, and local regulations regarding water quality, pollution control, and sanitation.

4. REFERENCES. FSH 2709.15; FSM 2770; and Federal Power Act, Sec. 4.

**12.15 – PRACTICE: Management of Sanitary Facilities and Sanitary Guidelines for Temporary Camps and Primitive Developments**

1. OBJECTIVE. To comply with regulations for the disposal of sewage at administrative sites, facilities under special-use permit, temporary camps, and primitive developments of all types.
2. EXPLANATION. This is an administrative and preventive practice. Toilet facilities are provided at many administrative sites, facilities under special-use permit, recreation sites, remote locations, and at work camps. The type and number depends on site utilization and the capacity of a given site. Sanitation facilities varying from pit toilets to treatment plants will be planned, located, designed, constructed, operated, inspected, and maintained to protect public health while minimizing the possibility of soil and water contamination.

**FSH 2509.22 – SOIL AND WATER CONSERVATION HANDBOOK  
CHAPTER 10 – WATER QUALITY MANAGEMENT FOR  
NATIONAL FOREST SYSTEM LANDS IN ALASKA**

Water quality and health can be adversely affected by temporary camps if care is not taken to properly plan, locate, and design wastewater facilities. Despite occasional urgent needs to develop a site, human health and water quality will be primary considerations.

3. IMPLEMENTATION. The location, design, inspection, operation, and maintenance will, at a minimum, meet State standards and Forest Service manual direction. Obtain required permits from the Alaska Department of Environmental Conservation and EPA.

Latrines, vaults, or pit toilets for camps and cabins will be located a minimum of 100 feet from all perennial lakes and streams. Planning will be completed for each site. Requirements to protect water quality through the installation and maintenance of proper sanitation and water supplies will be incorporated into special-use permits for facilities.

4. REFERENCES. FSH 6709.11, Chapters 7-9; FSM 2330, 7420, 7430, 7440, and 7460; FSH 7409.11; Timber Sale Contract Provisions C(T)6.203, C(T)6.0, and C(T)6.2; State of Alaska (18 AAC 72) Wastewater Regulations.

### **12.16 – PRACTICE: Control of Solid Waste Disposal**

1. OBJECTIVE. To protect surface and subsurface soil and water resources from harmful nutrients, bacteria, and chemicals through proper disposal of solid waste and use of alternative construction materials.

2. EXPLANATION. This is an administrative, preventive, and corrective practice. Only those solid wastes disposal sites in full compliance with 40 CFR Part 258 will be allowed on National Forest System lands.

The users of National Forest System lands are required to cooperate in the proper disposal of solid waste. Users are encouraged to burn their combustible trash in fireplaces or stoves. Receptacles are provided for unburnable garbage and trash at some developed recreation sites. Those who use dispersed and wilderness areas are encouraged to "pack it in and pack it out." Logging camp operators and special use permittees must collect and dispose of their solid waste at approved facilities or incinerators.

Final disposal of solid wastes on National Forest System lands is discouraged and will not be allowed if other options are available. If allowed, the established conditions must meet appropriate EPA, State, and local regulations, including long term monitoring. People littering the National Forest with solid wastes are subject to legal actions.

Some materials and process by-products that could be solid wastes can be used as alternative construction materials, reclamation materials, or can be cycled back into the natural biological system. Bark, sawdust, chips, and other wood products fall into this grouping as do recycled tire products used in road construction. Use these materials where possible using the following guidelines.

**FSH 2509.22 – SOIL AND WATER CONSERVATION HANDBOOK  
CHAPTER 10 – WATER QUALITY MANAGEMENT FOR  
NATIONAL FOREST SYSTEM LANDS IN ALASKA**

Sites where alternative construction materials can be used include spur roads and landings that will not be used again, closed quarries, landslide areas, and locations close to the source of alternative construction materials.

The Alaska Department of Environmental Conservation treats wood and bark waste as a solid waste unless used as a light weight fill material or for reclamation purposes. ADEC has specific regulations regarding the disposal of small volumes of wood, and offers a general permit under 18 AAC 60.230. Large accumulations of bark and woody material can result in leachates and low pH. Internal heating in the piles (composting) occurs, and spontaneous combustion may also take place. Decomposition of bark and woody material uses considerable nitrogen. If composting processes are desired, addition of crushed limestone for pH control, and a very slow release nitrogen source will accelerate the process.

Disposal of hazardous substances of any kind are prohibited on National Forest lands.

3. IMPLEMENTATION. Solid waste disposal success depends on public support and people not using the National Forest for dumping. The public education effort is a continuing process accomplished through the use of signs, printed information, environmental education programs, mass media, and personal contact. A joint policy statement with the State of Alaska for the Tongass NF regarding solid waste and bears and an anti-litter effort for solid waste disposal from marine vessels assist.

RCRA Subtitle D regulations for solid waste disposal (40 CFR 241) are mandatory for Federal facilities. Regulations (40 CFR parts 257 and 258) establish criteria for classification of solid waste disposal facilities and municipal solid waste landfills (MSWL). Part 258, sets minimum Nationwide standards for the location, design, operation, and closure of MSWL. These standards apply to the owners and operators of all new and existing MSWL units, with various requirements and effective dates that depend upon specifics of the site. The regulations encompass a majority of the landfills located on National Forest System lands. All active solid waste landfills on National Forest System lands, including special-use permitted facilities, timber sale operators and other contractors are required to meet these regulations. Part 258 restricts the establishment of any new landfills and makes significant requirements in landfill design, construction, operation, closure, monitoring, financial assurance, and post-closure requirements.

Wood and bark waste will be disposed of in accordance with a disposal and monitoring plan developed after a thorough analysis of effects upon site productivity and water quality. Wood and bark waste will not be deposited within riparian areas unless used as a mulch on bare soils, and the spreading depth should not exceed 6 inches unless limestone and a nitrogen source is included in the application. If deposited within rock pits the depth should not exceed 4 feet unless limestone and nitrogen are added to assist in the composting. Temporary roads, landings, and other such impacted areas could be reclaimed with 1 to 2 feet of material that is mixed into the road bed or other compacted surface by ripping or other deep mixing techniques. Monitoring of selected sites may be required to determine the short and long term effects on water quality and soil productivity.

**FSH 2509.22 – SOIL AND WATER CONSERVATION HANDBOOK  
CHAPTER 10 – WATER QUALITY MANAGEMENT FOR  
NATIONAL FOREST SYSTEM LANDS IN ALASKA**

Before placement, assure the proposal will be reviewed by appropriate technical specialists. Placement will address any surface water sources flowing into the site and potential ground water contamination. The District Ranger will approve this activity.

4. REFERENCES. FSM 2332, 2333, and 7460; 40 CFR 241, 257, and 258; Timber Sale Contract Provisions C(T)6.203 and C(T)6.21#; Alaska Code 18 AAC 60.

**12.17 – PRACTICE: Revegetation of Disturbed Areas.**

1. OBJECTIVE. Provide ground cover to minimize soil erosion.

2. EXPLANATION. This is an administrative, preventive, and corrective practice. This practice is used to stabilize the surface of disturbed or barren areas by establishing vegetation. Other management objectives for the area such as wildlife browse, timber production, fire hazard reduction, and aesthetics may also be considered when selecting species for revegetation. Grass or browse species may be seeded between recently planted trees for erosion prevention, wildlife habitat enhancement, or other management needs. The factors evaluated are soil fertility, slope, aspect, land type characteristics, soil, water holding capacity, climatic factors, species competition, vegetation species characteristics, and project objectives. Also, if non-native species are used for revegetation, their ability to compete with and/or displace native species should be considered.

Site-specific erosion control plans for harvesting activities, road construction, and other ground disturbing activities will be developed by the contractor or permittee and the Contracting Officer. Resource staffs will be consulted.

Purchaser shall take appropriate measures normally used to establish an adequate cover of grass or other vegetation, or take other agreed stabilization measures acceptable to the Forest Service (such as mulching, chipping, or slashing). These other measures are usually appropriate when operations take place outside optimum time period for seeding, or as short term measures where the risk of immediate erosion is high.

Erosion control plans should address the allowable extent of bare areas, seeding prescriptions (timing, rates, and species), and fertilization needs. Topography, soil type, risk of erosion, sedimentation, and contractor or permittee performance are considered when developing or modifying the erosion control plan. (See BMP 14.5 Road and Trail Erosion Control Plan.)

a. Seeding should be done when weather and other site conditions are favorable. Seeding and/or other appropriate erosion control measures should be completed in a timely manner. Seeded areas should be checked for adequate germination within 2 weeks. Reapplication of seed should be done as soon as practicable on sites with poor seed take. Generally, hydro seeding produces better results than hand broadcast seeding, especially on steep slopes. However, hand broadcast seeding may be more appropriate to allow timely revegetation of bared areas.

**FSH 2509.22 – SOIL AND WATER CONSERVATION HANDBOOK  
CHAPTER 10 – WATER QUALITY MANAGEMENT FOR  
NATIONAL FOREST SYSTEM LANDS IN ALASKA**

- b. Grass seeding has limited success in preventing surface erosion from slopes exceeding the angle of repose. (See BMP 14.5 Road and Trail Erosion Control Plan; BMP 14.8 Measures to Minimize Surface Erosion; and BMP 14.12 Control of Excavation and Side cast Material).
- c. Perennial grass, forb, shrub, and tree species can be utilized for initial cover. Perennials should be planted from May 15 to August 15 for best results. Fertilization, mulching, hydro seeding, erosion netting or fabrics and/or bioengineering techniques may be required to ensure success. Recommended grass and legume seed mixtures and fertilizer depend on soil and climatic conditions. Quick growing annuals should be considered after August 15 to establish a quick cover crop prior to winter.
- d. Hydro seeding has been used successfully in Southeast Alaska on ground disturbances associated with road construction. Experience indicates that hydro seeding should be considered whenever practicable. This demonstrated success might be applicable to other ground disturbing situations.

Also, the type and amount of disturbance and the purpose of revegetation influence the recommendation. Suggested guides for the Alaska Region are A Revegetation Guide for Alaska, 1983, and A Handbook for Forest Roadside Erosion Control in British Columbia, 1980.

3. IMPLEMENTATION: Guidelines for erosion control plans will be developed in the environmental analysis. It is the responsibility of the individual administering the contract or permit to assure that the provisions of the approved erosion control plan and associated specifications (for example, seeding and mulching), and other contract permit control documents are implemented. Projects are subsequently monitored to assess the revegetation effectiveness, and need for follow-up action.

4. REFERENCES. FSM 2522, 2405, 2472, and 7721, Timber Sale Contract Provisions B(T)6.6 and C(T)6.6; R-10 SPS 625 193, and R10-SA SPS 204 293. A Revegetation Guide for Alaska, Alaska Rural Development Council Pub. No. 2 (1983). A Handbook for Forest Roadside Erosion Control in British Columbia, Ministry of Forests B.C., Land Mgmt Rpt #4, ISBN 0-7719-8276-3, January 1980.

## **13 - TIMBER MANAGEMENT**

Timber harvesting and reforestation are the culmination of several years of timber resource assessment and detailed project planning. The site disturbing activities consist of felling, bucking, skidding, yarding, loading and hauling, site preparation, tree planting, and other silvicultural activities associated with stand establishment and maintenance.

Timber sale planning generally starts 5 to 10 years before the proposed timber sale is sold. Each harvest proposal is considered by an interdisciplinary team (IDT), which conducts an environmental analysis. Based on the analysis, the NEPA document is prepared displaying the estimated effects of the proposed timber sale, which is tiered to the Forest plan. Harvest unit design, post-harvest activities, and monitoring for all resource values are integrated and