PROCEDURES FOR CONDUCTING AN INTEGRATED TIMBER OPERABILITY ANALYSIS FOR THE TONGASS NATIONAL FOREST

Revised
February 6, 2006

PREFACE

This February 6, 2006 revision of the Procedures for Conducting an Integrated Timber Operability Analysis for the Tongass National Forest incorporates updates and revisions from earlier versions, based on comments received at the pilot study review meeting, the LSTA training session, and based on experience gained during the initial weeks of the production phase. With the exception of editorial type changes, this preface summarizes the changes and updates and identifies their locations within the document. Because some people may not have received the December 16, 2005 version of the procedures and the most recent version they may have seen is the November 28, 2005 version, changes are summarized relative to both earlier editions.

Changes Made After the November 28, 2005 Version, but Before the December 16, 2005 Version

Page 6: The discussion of the processing of the Slope/MMI GIS layer was revised.

Page 7: The discussion on the hydric soils layer was deleted. Footnotes were added to Table 1 to clarify when partial harvest or roading requirements may be different because of smaller setting sizes.

Page 8: A new final paragraph was added to Section 3.2 to describe the need for producing hard copy maps at the beginning of the analysis.

Page 10: A new code – "H" – was added to the road concern field. A new second field with two new codes – "A" and "U" – was added. A new third field and a new code – "F" – were added for field-verified roads. The description of the fourth field for notes was expanded.

Page 11: Limited expansion was made to the list of guides and additional rules-of-thumb.

Page 12: A bullet was added to discuss avoidance of wildlife buffers by roads. A discussion was added regarding the importance of field-verified and NEPA-approved roads.

Page 14: The use of the risk factor codes was clarified. A fourth field was added for risk intensity codes and a 1, 2, or 3 is to be added, based on the percentage of area affected by the risk factor. The "I" code for isolated settings was deleted as a risk factor code and given its own field (fifth field). A sixth field and a new code – "F" – were added for field-verified settings.

Page 15: A seventh field for miscellaneous codes was added and two codes, "H" and "M," were described. The discussion on defining new settings in relation to the suitable and existing LSTAs was expanded.

Page 16: The discussion of the importance of recently collected, field-verified, and NEPA-cleared information was expanded.

Page 18: The section on Quality Assurance and Control was expanded.

Page 19: Minor date changes were made in the schedule for three milestones.

Changes Made After the December 16, 2005 Version

Page 6: The minimum size of polygons to be dropped from the suitable land area on the basis of slope mapping was increased from 1 acre to 5 acres.

Page 8: A fourth paragraph was added to Section 3.2.

Page 10: A new code – "N" – was added to the second road field to designate NEPA-approved roads.

Page 14: The “S” risk factor code for settings was clarified, based on the change in what is being mapped as suitable. The discussion of the use of the “F” code for field-verified was expanded.

Page 15: A paragraph was added regarding how to deal with field-verified LSTAs that expand upon or delete areas mapped as suitable.

Page 17: Definition was added to high-value deer winter range for the purpose of identifying young growth for treatment outside the suitable base. A one-paragraph section (Section 3.7) was added to describe the summary of notes and observations that each analyst should write down at the completion of each analysis area.

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Tables

1.0 Introduction

The Tongass National Forest is initiating an adjustment and update of the Forest Plan. Various analyses need to be conducted to provide an informed and consistent basis for future Forest Plan work. One of the key analysis support items, that needs to be determined as early in the process as possible, is the approximate size and distribution of the harvestable supply of timber that is available under the Forest Plan. This item requires the development of an integrated timber operability analysis. One of the key products of this analysis will be a complete and consistent planning-level Logging System and Transportation Analysis (LSTA) with uniform coding for the lands potentially suitable for timber production. In addition, the degree of operability of the LSTA (including level of falldown)[1/] will be assessed because economic conditions and resource standards and guidelines are likely to have a significant effect on LSTA operability over the next 10 years. Therefore, this document addresses the procedures to be followed for developing a preliminary Tongass National Forest LSTA, and defines the procedures in such a way that the LSTA information produced can also directly contribute to the integrated timber operability analysis. The results will be used as the basis for many analyses in other phases of the Forest Plan adjustment and update efforts.

The new LSTA cover will be created by updating and consolidating all existing LSTAs into a single GIS coverage for all suitable timber resource lands within the approximately 3.6 million acres of Development LUDs. In many areas of the Forest, LSTAs will need to be "developed from scratch" because, either no previous LSTAs have been created for the area, or the ones that do exist are too out-of-date to be salvageable. Economic and resource risk flags, and other coding related to operability issues, will be added to road arcs and setting polygons so that LSTA operability can be assessed.

Young-growth stands on suitable timber resource lands (or regulated lands) and older young growth on unregulated lands will also be included. In the unregulated areas, thinning may be useful to meet resource objectives and provide timber outputs at the same time.

This document describes the procedures to be followed during LSTA development, and provides general guidance for the operability analysis. Detailed procedures for the operability analysis will be developed during LSTA development. The procedures presented in this document are based on the procedure development workshop held on November 8-10, 2005.

This draft has been refined based on input received during its initial review. It will be revised again following the completion and review of pilot studies.

2.0 General Approach

The integrated timber operability analysis involves four tasks. The first three relate to LSTA development and the fourth task represents the operability analysis, based on the LSTA. The first task is called LSTA Initiation and will include initiation, collection of data, discovery, detailed procedure development, production of draft LSTAs for three or four small pilot areas, Forest Service review and comment on the draft LSTAs for the pilot areas, revision of the detailed procedures, and preparation of a detailed cost estimate for the production of a near-final draft LSTA. This task will provide the detailed procedures, which will have been pilot-tested, so that the next task, LSTA Production, can

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[1/] The term, operability, is defined here in a broad sense to include the partitioning of the suitable land base into various economic increments, as well as the potential falldown (or difference between planned and actual harvest) associated with future implementation.

proceed more smoothly and will require less revision. LSTA Production will result in the development of a near-final draft LSTA for the entire Tongass. The third task, LSTA Finalization and Adjustment, will include the fine-tuning of the Tongass-wide LSTA based on Forest Service review of the draft prepared during LSTA Production. It is anticipated that the draft prepared in the second task will be near-final because of the detailed procedures reviews, the reviews of the pilot areas, and other quality assurance and control procedures conducted during the first task. However, it should be noted that this LSTA will be a "paper plan" and will not be based on any new ground verification. As such, it will be useful for forest planning, but will need to be modified based on ground verification and other site-specific information during project planning. The fourth task, Operability Analysis, will be initiated following completion of the LSTA Production task, but will not be completed until after LSTA Finalization and Adjustment.

2.1 LSTA Initiation

This task will include initiation, collection of data, discovery, detailed procedure development, production of draft LSTAs for three or four small pilot areas, Forest Service review and comment on the draft LSTAs for the pilot areas, revision of the detailed procedures, and preparation of a detailed cost estimate for the production of a near-final draft LSTA. These subtasks will overlap to a high degree and are described in the following sections.

2.1.1 Initiation, Data Collection, and Review

This subtask begins with kickoff meetings and conference calls and the establishment of subcontracts so that a sufficient number of supporting staff will be available to conduct the work within the necessary timeframes. The major effort in this subtask involves coordinating with the appropriate Forest Service Timber and GIS staff to obtain electronic or paper copies (for those areas with no electronic copies) of the best available LSTAs (including project-specific LSTAs) for each area of the Forest. It also includes collection of available metadata associated with these LSTAs; collecting and verifying that Tetra Tech has the latest GIS resource coverages for roads, managed stands, existing vegetation, streams, soils, karst, and other resources that will be required for LSTA updating and development; the development of the suitable timber resource land coverage and visual coverages, based on these layers; and collection of available roads analyses, access travel management plans, and relevant NEPA documents that Tetra Tech does not already have, so that these can be appropriately considered during LSTA development.

This subtask also includes the important step of reviewing the existing LSTAs to determine: how they are coded, how consistent they are with the current Forest Plan, how complete they are, and how much adjustment they will require due to recent harvest and road construction. During this step, three or four small pilot areas will be selected for updating.

2.1.2 Detailed Procedure Development

This step will include preparation of detailed procedures (including guidelines and "rules-of-thumb") for updating or developing LSTAs across the Forest with uniform coding. Consideration will be given to the size of the editing effort that would be required for various procedural options, including the updating of LSTA polygon and road coding. Coding will be consistent with operability classifications and will incorporate some level of risk assessment so that operability (including falldown) can be assessed. This step will be important because many areas will be worked on at the same time during the production task, and consistency is critical. A procedure development workshop with Tetra Tech team and Forest Service staff was conducted on November 8-10, 2005, to discuss the procedures first. Then this draft document was prepared and is being submitted for Forest Service review/comment.

Revision will occur prior to the development of the LSTAs for the small pilot areas. Final revision will occur as a result of experience gained on the pilot areas and based on Forest Service input on the pilot areas. One of the purposes of the pilot studies will be to test the practicality of the draft procedures.

2.1.3 LSTA Production for Small Pilot Areas

This step will include the production of draft LSTAs for three or four small pilot areas, following the procedures developed in the previous step. One of these pilot areas will be selected from within the portion of the former Ketchikan Area where Tetra Tech developed a uniform Area-wide LSTA in 1994-95, but which has not been recently updated. This area may also represent one of the areas where existing road locations have been updated with GPS, so that the effects of adjusting road locations on the effort associated with LSTA editing can be assessed. In addition, a pilot area may be selected from areas with no previous LSTA, areas in the northern half of the Forest, and/or areas with more recent LSTAs. When these draft LSTAs are developed, the Forest Service will review them at the Tetra Tech office; this review meeting is tentatively scheduled for December 8, 2005. Based on this review meeting, the detailed procedures for LSTA development will be finalized. A detailed cost estimate will be developed for LSTA production, based on the pilot studies and the revised procedures. The pilot area LSTAs will be revised to reflect Forest Service comments during the LSTA production phase along with the larger analysis area they are included within.

2.2 LSTA Production

This task is the production phase for the remaining LSTAs. Draft LSTAs will be prepared according to the finalized procedures developed in the latter part of LSTA initiation. Therefore, the draft LSTAs produced will already address most Forest Service comments that would have been generated in the absence of detailed procedures and pilot LSTA reviews.

The Tetra Tech team includes a variety of logging engineers, foresters, and other specialists with extensive experience on the Tongass, particularly in certain project areas or Ranger Districts of the Forest. Also, the level of effort required to develop the Forest-wide LSTA varies substantially among areas, depending on the quality of the existing LSTAs. In order to assign the work in a manner that will take full advantage of the experience and capabilities on the team, the first subtask in the LSTA production task is the review, scheduling, and assignment of analysis areas. This subtask may involve some level of GIS processing and updating of existing LSTAs relative to the current Forest Plan, prior to detailed review by the final analysts. The project areas will be divided into logical LSTA analysis areas, primarily based upon roadsheds, to allow for a clean breakout of the work to the engineering staff. The details of this subtask will be developed during the pilot area LSTA development.

At the same time, a training program will be conducted for all interpreters who work on the project to review the procedures and the Forest Plan so that consistency can be achieved. This training is scheduled for December 19, 2005.

The staff selected to work on the LSTA will be those contractor staff with the most Tongass National Forest experience available. To the extent possible, staff will be assigned to work on portions of the Tongass where they have the most experience.

In addition, to the extent that the schedule allows, input from appropriate Forest Service staff relative to unique problems and decisions that need to be made will be sought during this production phase. The Forest Service will provide Tetra Tech a list of key Ranger District contacts for each LSTA area so there can be a direct link between the analysts conducting the work and the Ranger District staff with local knowledge of each area.

As a result of the up-front efforts to refine procedures, develop and review the pilot areas, use of experienced staff, and QA/QC efforts during the process, the products of LSTA Production will be a near-final LSTA.

2.3 LSTA Finalization and Adjustment

LSTA Finalization and Adjustment will include the final review and revision of the LSTAs. It is anticipated that the extent of revisions required in this task will be minimal, because of the up-front review process conducted during the LSTA Initiation task. As in the case of the reviews of the draft pilot area LSTAs, the reviews of the near-final LSTA will take place during a meeting or meetings at the Tetra Tech office. These will be scheduled during the review periods identified in the schedule. Final revisions will be made following the meeting(s).

In addition, there is a potential for needing to adjust the LSTA to cover new areas that are currently inside Non-Development LUDs, in order to fully assess all alternatives. This could occur as a result of adjustments to Small OGR boundaries in Phase 2 of the Forest Plan Adjustment and Update process, or as a result of an alternative being developed that adjusts other LUD boundaries. If large areas of new LSTAs are required, the LSTA work conducted in the 1980s in preparation for the Forest Plan Revision will be obtained and considered. This early work covered all forested lands.

2.4 Operability Analysis

The development of a preliminary LSTA is an office exercise that uses the best information available in GIS, topographic mapping, photography, and from other sources to develop the most economically efficient system of roads and settings that is consistent with the Forest Plan. However, there are a large number of factors that result in less suitable land being economically operable and less suitable land actually being available for harvest than is planned.

During LSTA development, a variety of risk flags and other codes will be attached to the LSTA information so that there is an improved basis for determining operability and estimating falldown. In addition, there are other factors that can be more easily applied on a landscape scale that result in refining the definition of economically marginal settings (during the current planning cycle), falldown due to cumulative effects (e.g., goshawk and marten standards and guidelines, cumulative visual effects), and similar factors that will affect the amount of suitable timber resource land that is available during the planning cycle.

This task will involve an analysis of the results of the LSTA and its associated risk and economic factors, along with other Forest Plan factors, to produce an estimate of the forest land that is actually available for timber management during the planning cycle. This process will begin when the LSTA Production Phase is completed. Experience on previous timber sale projects and Forest Service expert opinion will be used to refine the analysis. Detailed procedures for this task will be developed during the LSTA Initiation and Production tasks.

3.0 Specific Procedures

This section describes the specific procedures that will be followed for LSTA development. Initially, it represents the procedures that will be followed during the pilot area LSTA development. After completion of the pilot areas and the receipt of comments on them, these procedures will be revised and then followed for the LSTA Production task.

3.1 Preparation of Base Layers and Reference Materials

The first step in developing LSTAs will be the preparation of topographic, photographic, and GIS base layers to be used as the basis for LSTA development in an electronic format that is compatible with the hardware/software being used by the analysts (e.g., ArcView or other). In addition, some of the areas will have existing LSTAs in paper formats. Further, some of the areas will have other reference materials that will assist the analyst in building on information that has previously been developed. Each of the base layer items and reference materials to be gathered and prepared is described below:

3.1.1 Topographic Base Layers

For each area, a determination will be made as to which topographic base layers represent the best available layer for LSTA development. The options for developing topography from lowest quality to highest quality include: 60-m DEMs (based on the 100-ft. contours), 20-m DEMs (based on the 100-ft. contours), SRTM (Shuttle Radar Topography Mission) data, DEMs (based on the 40-ft. contours), and LIDAR coverage. The best layer will be prepared for use by the analysts developing or updating each LSTA.

3.1.2 Photographic Base Layers

For each area, two categories of photographic base layers will be provided – orthophotography and aerial stereo pairs in digital format. The best sources of each category of photography will be provided to the analysts. As holes in the coverage are identified, they will be reported back to the Forest Service.

3.1.3 GIS Base Layers

A number of GIS layers will be provided to the analysts as base layers, including some that need to be derived from combinations of layers. These include:

- Land Status Layer – This layer should provide the latest shoreline and private/state land boundaries.
- Existing Roads Layers – This provides the latest existing roads layer, including GPS'd road locations. These are roads in the INFRA database. In addition, other road layers will be included (as necessary) so that the full extent of state and private roads is shown. Finally, an all-roads layer that shows past temporary or other unauthorized road routes will be provided. Decommissioned road layers will also be sought and displayed.
- LTF/Marine Access Points Layers – These layers will be provided to show existing LTFs, sites that have been previously identified as candidates for LTFs, and other marine access points. They will only be provided for those areas that are not already fully developed in terms of LTFs and marine access points.
- Stream Layer – The GIS stream layer should be included with a distinction made among stream classes.

- Suitable Timber Resource Land Layer – Produce an updated suitable timber resource land layer. This GIS layer will represent the full extent of lands to be subdivided into settings. It is recognized that it represents only an estimate of the actual suitable land, but is the best estimate available. It is developed based on the method described in Appendix A of the Forest Plan. The process uses the following layers: land status, existing vegetation, soils (CLU), slope (created as described below), karst vulnerability, LUD, beach buffers, eagle buffers, and riparian management area. It is important to check that each layer used in the development of the suitable timber resource land layer represents the most updated version.

- Adopted VQO Layer – The adopted Visual Quality Objective layer will be produced based on LUD and Distance Zone (from the Visuals coverage). It will show the adopted VQOs (i.e., Retention, Partial Retention, Modification, and Maximum Modification). Recognizing that the Distance Zone map has not been updated recently, the existing layer will be reviewed and updated (at least approximately) where major Visual Priority Travel Routes and Use Areas are not accounted for. This layer will be provided as a reference during road routing and will be used in conjunction with the VAC layer (below) to produce the Approximate Unit Size layer.

- VAC Layer – An approximate Visual Absorption Capability (VAC) layer will be produced at least for areas with low VAC and especially in Retention and Partial Retention areas. The approximate VAC layer will be based on slope and variety class (to the extent that time allows). This layer will be provided as a reference during road routing and will be used in conjunction with the adopted VQO layer (above) to produce the Approximate Unit Size layer.

- Approximate Unit Size Layer – For selected areas, an approximate unit size layer will be produced to be used as a general guide (since the Forest Plan is written in terms of unit sizes, rather than setting sizes), based on the estimated adopted VQO layer and the estimated VAC layer. The layer will be generated to the level of precision that time allows and will be based on the crosswalk defined in Table 1. The most important areas to be identified will be those with approximate unit sizes of less than 40 acres.

- LUD Layer – This layer will also be provided as a base so that LUDs adjacent to Development LUDs can be identified relative to routing roads. This layer should include the linear Transportation and Utility System (TUS) LUD, which shows planned road and transmission line corridors, so the analyst can be aware of these during the routing of new roads.

- Beach and Estuary Fringe Layer – This layer will also be provided as a base so that road routing can avoid this area unless no feasible alternative exists.

- Slope/MMI Layer – A slope polygon layer will be generated from the best available information for each analysis area. Generally, LIDAR will be the first choice, where it is available. DEMs based on the digital 40-ft. contour coverages will be used as the second choice, where LIDAR is not available. Third choice will be the SRTM data, which covers the entire Tongass (unless it is determined that the Tongass 20-m DEMs can produce better slope polygons). The first step where the slope polygons will be used is in the development of the suitable layer, described above. The >72% slope and the MMI 4 polygons from the CLU layer will be removed from the suitable land, during the suitable layer development. In developing the >72% slope cover, slope polygons will be smoothed and polygons less than 5 acres in size will be deleted. A slope coverage showing polygons for slopes <35% and slopes >67% will be provided to the analysts for use during LSTA development. The <35% slope polygons will provide a general limit to the areas where ground-based logging systems can be used, and the >67% slope polygons will provide a general depiction of areas where roading should be avoided, unless other alternatives are not feasible.

- Managed Stands Layer – This layer will be provided, along with the year of harvest for each polygon, so that the LSTA development can address the older young growth (see below).
- NEPA-Cleared Units Layer – This layer identifies those units that have been identified in a NEPA decision document and are cleared for implementation. These unit boundaries will be maintained and not modified by the analyst in the development or refinement of an LSTA in areas surrounding these units.
- Existing LSTAs – The existing LSTA coverages (some areas, particularly in the Ketchikan, Thorne Bay, and Craig Ranger Districts, have more than one) will be provided for use during LSTA development.

Table 1. Approximate Unit Sizes and Typical Regeneration Methods by LUD, Distance Zone, Adopted VQO, and VAC as Prescribed by the Forest Plan

LUD	Distance Zone as Seen from Visual Priority Travel Routes and Use Areas	Adopted VQO	Visual Absorption Capability	Approximate Harvest Unit Sizes (in acres)[1/]
Scenic Viewshed	Foreground	Retention	Low	<2[2/]
			Intermediate	5-15[2/]
			High	15-30
	Middleground or Background	Partial Retention	Low	2-10[2/]
			Intermediate	10-40[3/]
			High	40-60
	Not Seen	Maximum Modification	Low	50-75
			Intermediate	80-100
			High	80-100
Modified Landscape	Foreground	Partial Retention	Low	2-10[2/]
			Intermediate	10-40[3/]
			High	40-60
	Middleground or Background	Modification	Low	15-40[3/]
			Intermediate	40-60
			High	60-100
	Not Seen	Maximum Modification	Low	50-75
			Intermediate	80-100
			High	80-100
Timber Production	Foreground	Modification	Low	15-40[3/]
			Intermediate	40-60
			High	60-100
	Middleground, Background, or Not Seen	Maximum Modification	Low	50-75
			Intermediate	80-100
			High	80-100

[1/] All unit sizes are typically for clearcuts except for the following:
- Unit Sizes of <2 acres are for single tree or group selection
- Unit sizes of 5-15 acres are for single tree selection or clearcut
- Unit sizes of 2-10 acres are for group selection or clearcut

Note that unit sizes represent maximum setting sizes, since units consist of one or more settings.

[2/] Note that in these areas, some type of partial harvest is likely to be required; helicopter harvest may be necessary in the most visually sensitive areas.

[3/] Note that in these areas, roading requirements may be different because of the smaller setting sizes.

3.1.4 Paper Copies of LSTAs

In addition to the above base layers, a number of areas will have paper LSTAs available; in some areas, paper copies will be the only format available. Although these are largely for the older LSTAs which will likely be obsolete, they will be provided for general reference by the analysts. They may be particularly useful as a general reference for road routing.

3.1.5 Other Reference Materials

Some of the areas have recently been studied in a number of ways and documentation has been developed. Examples of these reference materials include relevant Access Travel Management (ATM) Plans, Roads Analysis Procedure (RAP) documents, Gate 1 Position Statements, and possibly some recent NEPA documents, along with the Southeast Alaska Transportation Plan and road and utility routes identified by the Southeast Conference. These reference sources will be collected and provided to the analysts for background and other information during LSTA development.

3.2 Review and Setup of Base Layers and Reference Materials

After the analyst receives the package of information described in Section 3.1, the first step will be to load and setup the electronic information to ensure compatibility with hardware and software. If there is an incompatibility or other problem, it should be addressed as soon as possible. Next, the available covers should be reviewed along with any other reference materials that are provided for a given areas.

The plan is to conduct "heads-up" digitizing of all roads and settings for the LSTA using the base layers as guides on the computer monitor. All mapping should be spatially consistent with the GIS base layers, especially the suitable timber resource land and the existing roads. Topographic and photographic layers should be used for reference and to assist in mapping, but the new mapping must be consistent with the GIS layers. Corrections are not being made to the base layers at this time; however, areas in need of correction should be identified in the road or setting notes, as appropriate (see below).

Before beginning, it will be important to plot a copy of a large-scale map or series of maps for each area that shows (at a minimum) the suitable layer, contour lines, slope categories, young growth, existing roads, and the best existing LSTA settings and roads. If possible, it is best to use the orthophotos or LIDAR photo as a base map (in this case the slope categories and existing LSTA may need to be left off). This map or series of maps will provide an overview of the area and it is important to have this full landscape reference map to refer to during the "heads-up" digitizing.

Before beginning on the production phase, the entire Tongass study area will be divided into approximately 40-50 analysis areas, based on "roadsheds" and the boundaries of past LSTAs. Each analyst who is working on the project will be assigned to work on one or more of these areas at a time.

3.3 Ranger District Staff Consultation

Following review and setup of base layers and reference materials, the analyst should consult with the appropriate Ranger District staff who have local familiarity. The purpose of this consultation will be to identify any historical information or local knowledge that should be considered in LSTA development. Examples might include local knowledge or experience regarding the viability of candidate LTF sites and regarding the locations of critical road control points and their feasibility. This could be especially valuable in terms of identifying feasible ideas for accessing relatively isolated tracts of suitable timber resource land.

Another situation that local knowledge may identify is the fact that resource information (e.g., streams, steep slopes) has been updated in a local area and this update is not in the resource layers being used. In this situation, the analyst will bring the situation to the attention of the lead GIS analyst, and the analyst will work with the Ranger District staff to update the base layers. The lead GIS analyst will keep track of these changes and ensure they are reported to the Tongass librarians.

Specific individuals will be identified for this consultation within each district. Arrangements will be made to have the assigned Ranger District staff travel to the analyst site near the beginning of the effort to consult in person and permit the examination of base layers together with the analyst.

3.4 Mapping Roads

GIS coverages for existing roads have been updated and many existing roads have been GPS'd, so the existing roads coverage should be used as the starting point for new road routing. Where existing roads do not exist, the best candidate LTF sites should be used as the starting point.

After evaluating the existing roads, consider the existing LSTAs, particularly if they were completed in the mid-1990s or more recently (1997 or more recent, is best). Use the existing LSTA road routes unless they do not make sense relative to other requirements of this procedure. Generally, if the road routing was done in the mid-1990s or more recently and the network accesses all suitable timber without violating current LUD or Forest-wide Standards and Guidelines, then it is probably fine. Where available, check the NEPA-cleared or laid-out road information; these routes should always be the preferred routes for new roads. Also, consult current NEPA and RAP to see what road routes are planned. Use all available information, including LANDSAT imagery (where available) on private lands to determine the locations of adjacent private roads.

Aerial photos should be used along with topographic mapping and other base layers to avoid slide areas, V-notches, and other areas of concern and to identify the most likely and most efficient road network. For this analysis, topographic maps will be the primary basis of establishing road grades with aerial photos being used more extensively to evaluate V-notches and stream crossings. Generally, the least cost construction solutions should be preferred, unless there are good reasons to favor higher cost solutions (see below). The maximum road grades to be used are 20 percent favorable and 15 percent adverse. If at all possible, the roads grades should be kept below 16 percent favorable and 12 percent adverse. Road locations should be avoided on cross slopes greater than 67 percent, in unstable areas, and in slide-prone areas, per the Forest Plan (Soil & Water Forest-wide Standards & Guidelines); however, exceptions can be made with incorporation of additional mitigation measures. Desired road grades should be checked periodically during routing. Alignment and grades are a greater concern for collector type roads than along local type roads.

The major access roads should be located first, if they do not already exist. In areas with no existing development, the priority should be to locate roads along tractor/cable setting boundaries (e.g., where the slope changes to >35%) in order to maximize ground yarding opportunities. Where possible, roads should be placed in locations that provide direct access to landings, while at the same time provide for efficient timber hauling. The local roads are then located off of the major access roads to selected landing locations that provide the most efficient combination of roading and logging costs. Landing locations for uphill yarding are preferred if it is cost effective to develop roads up to them, and if guyline anchors appear to be available. If roading is not physically feasible to access suitable timber, then helicopter logging should be specified for these areas.

When areas of suitable timber are roadable, but do not have a ratio of approximately 40 acres of suitable timber per mile of road, they should be designated for helicopter yarding. If an area is marginal, in terms of this rule-of-thumb, then err on the side of roading. Therefore, go ahead and road

the area, specify it for conventional yarding, and give the setting an isolated attribute in the risk field (see Section 3.5). The 40 acres of suitable timber per mile of road is a "rule-of-thumb" and is intended to approximate one million board feet of timber per mile of road. A detailed analysis of these areas should be done on a project level when these units are considered for harvest to evaluate the cost of roading compared to the additional cost of helicopter logging. It is expected that the majority of the settings with the isolated attribute should be helicopter logged (if economically viable) unless other multiple use values are attached to the roads.

There will be four attribute fields available for use with roads. The first will be a field to identify road segments with concerns such as expensive or critical road segments. The following codes should be used for these road concerns:

- C = Critical road segment, doubtful feasibility
- E = Expensive road segment due to long bridges, costly construction due to steep slopes, multiple drainage structures, etc.
- L = Longer road segment used to avoid Old-growth Habitat or Beach and Estuary Fringe
- V = Visual concerns resulted in modification of roading
- R = Existing road or road route requiring major reconstruction
- H = Use this code for roads where a recent project analysis identified the area for helicopter harvest, instead of roading, apparently for economic or visual reasons. If the recent project analysis included field verification, then make sure the third field also has the "F" code.

The second field will be used to designate roads that represent unauthorized roads, alternative road routes, and NEPA-approved roads, as described below:

- A = Use this code to designate all roads that represent a roading alternative (e.g., a road route that is mapped as an alternate, but is not required to log an area). It is important to capture any roads in this category with this code, so that future analyses using the LSTA do not count more road-miles than are necessary to log an area. The preferred route should not be given this code (only alternate routes). So this field should be blank for the vast majority of roads mapped.
- U = Unauthorized road route; this code is used to identify road segments that are not on the authorized existing roads layer, but exist on the all-roads layer or on aerial photos or orthophotos.
- N = NEPA-approved road route; this code is used to identify a road route that has been identified in a decision document (e.g., a Record of Decision) and is NEPA-approved

The third field will be used to identify those roads that have been field-verified, as described below:

- F = Use this code to identify any road segments that are known to have been field-verified by Ranger District or contractor staff. Otherwise, leave this field blank.

The fourth road attribute field will be a notes field to allow the analyst to make comments if needed, to explain road routing decisions that will be important for future engineers or interdisciplinary team members to understand. Notes should be recorded in the notes field of the subject road segment, in the following situations:

- to describe critical road control points that appear doubtful or very difficult to build

- to identify expensive road segments, e.g., long bridges, high cost steep slopes, segments with multiple drainage structures
- to document crossings of private and state lands or roads that connect to private or state lands
- to document the reasons why Old-growth Habitat LUDs and Beach and Estuary Fringe areas were crossed, as well as to note where roads were routed longer to avoid Old-growth Habitat LUDs or Beach and Estuary Fringe areas
- to document that road routes were significantly modified because of visual concerns

Four additional codes will be assigned using GIS, after completion of the analysis. These are as follows:

- O = Road segment passes through an Old-growth Habitat area
- B = Road segment passes through the Beach and Estuary Fringe
- P = Road segment passes through non-NFS lands
- N = Road segment dependent on new LTF

The following guides and additional rules-of-thumb should be followed for the mapping of roads:

- Generally push roads in as far as possible, but stop extending roads when the acreage of suitable timber per mile of road drops below 40 acres; however, err on the side of too much road rather than too little and attach the isolated code to settings if the ratio is below 40 acres per mile.
- Use the most economical route (consistent with other guidelines and rules-of-thumb in these procedures), even though it crosses adjacent private lands and uses adjacent private LTFs; document this in the notes.
- Overlay Southeast Alaska Transportation Plan routes, Southeast Conference routes, and other routes identified in other similar plans and give strong consideration to these in routing new roads. Also consider the potential availability of future road connections and LTFs that are identified in the state's 5-year timber plans.
- Road locations should be avoided on cross slopes greater than 67 percent, in unstable areas, in slide-prone areas, and in high vulnerability karst lands per the Forest Plan (Soil & Water and Karst & Cave Resources Forest-wide Standards & Guidelines); however, exceptions can be made with incorporation of additional mitigation measures. A slope layer, depicting areas with >67% slope, will be provided to the analysts for making the slope determination.
- Avoid routing new roads across wetlands soils unless there is no practicable, environmentally-preferred alternative (e.g., it generally does not make sense to build considerably longer roads in order to avoid crossing wetland areas, unless they are high-value wetlands) (Wetlands Forest-wide Standards & Guidelines).
- New roads are generally considered inconsistent with the Old-growth Habitat LUD and should be routed to avoid crossing these LUDs, unless no feasible alternative exists (Old-growth Habitat LUD Standards & Guidelines); however, there are many instances where Old-growth Habitat LUDs must be crossed because alternate routes are not reasonable. Consider rerouting existing roads that occur within Beach and Estuary Fringe and that require major reconstruction.

- New LSTA roads are discouraged in the Beach and Estuary Fringe unless no feasible alternative exists (Beach and Estuary Fringe Forest-wide Standards & Guidelines); consider rerouting existing roads that occur within Beach and Estuary Fringe and that require major reconstruction
- New LSTA roads should not be routed through Wilderness, Remote Recreation, Research Natural Area, Municipal Watershed, and Wild River LUDs (LUD Standards & Guidelines)
- Consider the adopted VQO and the VAC of an area when routing a road through it and give special consideration to areas in Foreground or Middleground along a Visual Priority Travel Route and Use Area.
- Roads should not be routed through 100+ acre goshawk nest buffers, unless there is no reasonable alternative. Similarly, roads should not be routed through the 1,200-foot forested buffer around known active wolf dens, unless there are no feasible alternatives, and no roads should be routed within 600 feet of a den, even if no feasible alternatives exist. Finally, avoid routing roads within the 600-foot raptor and murrelet nest buffers, unless no feasible alternatives exist. Note that road routing may need to be adjusted after the draft LSTA is developed, in order to maintain nest and den site confidentiality.

Where available, check the NEPA-cleared or final flagged and GPS'ed road route information; these road routes should always be the preferred routes for new roads. There may also be hard copy road card maps, project area maps, or DEIS maps provided by the Districts, which represent the results of recent field verification, and which may not yet be NEPA-cleared. It is important to capture this information in our LSTA. The field-verified road routes should be given great weight and the appropriate risk codes should be added to road segments when this information is provided by the Districts. It is important to consult with the Ranger District representative, at least by phone, at the beginning and during the analysis of each area.

3.5 Mapping Settings and Logging Systems

Logical setting boundaries should be delineated around all suitable timber resource land patches that are 5 acres or larger in size (minimum mapping polygon size). Boundaries are controlled by topography, feasible roading, streams, suspension requirements, and feasible yarding distances. Do not add in timber polygons that are not in the GIS suitable layer. These polygons may have been removed for suitability reasons, based on existing GIS coverages, and may need to be added back to the timber base at the project level. Class I to III streams that are shown on the stream base layer and topographic maps should be given either split yarding or full suspension protection.

Settings are to be designed in an attempt to display the most economical balance between roading cost and logging system cost. The suite of available logging systems to be used along with their codes are as follows:

- Ground-based, including Shovel, EYD < 800 ft. (Code = G)
- Short-span Skyline, EYD same as R-10 appraisal system, <1,300 ft. (Code = S)
- Long-span Skyline, EYD same as R-10 appraisal system, 1,300 ft. to 2,000 ft. (Code = L)
- Helicopter (Code = H)

In addition, a second field is to be filled in for skyline settings to identify uphill (U) or downhill (D) yarding, and for helicopter settings to identify three yarding distance categories. In addition, a "B" is added to the yarding category field if the logs are to be flown directly to a barge on saltwater. Therefore, the full suite of options for logging system and yarding category codes are listed in Table 2.

Table 2. Logging Systems and Yarding Categories and their Codes for Use in LSTA Production

Logging System/Yarding Category	Logging System Code	Yarding Category Code
Ground-based	G	
Short-span Skyline – Uphill Yarding	S	U
Short-span Skyline – Downhill Yarding	S	D
Long-span Skyline – Uphill Yarding	L	U
Long-span Skyline – Downhill Yarding	L	D
Helicopter - < ¾ mile EYD	H	1*
Helicopter – ¾ to 2 miles EYD	H	2*
Helicopter > 2 miles EYD	H	3*
*B is also added to this field for helicopter settings if the logs are to be flown directly to a barge on saltwater.		

The preferred logging system is ground-based, because it is lowest cost, and this should be used whenever slopes are not too steep. The maximum slope threshold for ground-based logging systems is assumed to equal 35 percent. A slope layer, depicting areas with <35% slope, will be provided to the analysts for making this determination. The maximum external yarding distance for ground-based systems is assumed to be 800 feet; however, this can be exceeded in small areas with some type of swing capability, in order to reduce roading. Short-span skyline should be considered next and, as identified in Section 3.4, uphill yarding is preferred, unless it results in higher road costs which are not justifiable given visual or other concerns. Long, downhill settings should be carefully considered and should generally be avoided. Helicopter logging is to be specified only where cable logging is not feasible, such as along steeper upper slopes; where visual concerns indicate the need because of small unit sizes and selective harvest (see Table 1); and where timber is very isolated and roading clearly does not make sense.

Settings are generally defined as an area which can be logged from one yarder set-up or landing. The exceptions to this rule are running skyline units (included under Short-span skyline) and helicopter units. It is likely that a harvest unit would be made up of two or more settings. However, the running skyline units are generally designed to have continuous roadside landings. The settings where running skyline is the likely short-span skyline method, will be designed to be an area that would logically be harvested together in a single entry. The maximum size of any cable setting or running skyline unit will be 100 acres or less (depending on visuals), with the average expected to be 40 acres or less. The settings in helicopter logging areas will often be larger. Setting breaks will be placed where logs would be flown to different landings and where the yarding distance category thresholds (i.e., ¾ mile and 2 miles) are exceeded. Settings are to be mapped, but landings should not be digitized.

In addition to the two fields identified as the logging system and the yarding category fields (see Table 2), a third field for risk factor codes, will be assigned to appropriate settings. This field is to be filled in with the appropriate code(s), if the analyst identifies one or more of the following risk factors associated with a given setting (note that two or more risk codes can be added to the field):

Risk Factor Codes

- L = Areas which appear to have low merchantable timber volume (less than 8,000 BF per acre).
- S = Areas which appear on the aerial photos or detailed topography to have a history of slides or to have a slope gradient of 72 percent or more. Settings should be given this code when portions of the area are covered by >67% slope polygons and in settings where small patches of land (<5 acres in size), with slopes >72% or MMI 4 soils, are inside the setting.
- K = Areas which appear to have karst characteristics (only if obvious).
- V = Areas with steep V-notch streams that will probably require expanded buffers.
- E = Areas with streams that are apparent on the aerial photos, but are not in GIS, and that will result in isolating timber, additional buffers, and/or making logging very difficult or not feasible
- R = This code can be used for a variety of risk factors associated with riparian management areas, such as settings that may be significantly reduced due to expanded riparian buffers, the presence of alluvial fans not included in buffers, narrow strips of timber along streams or buffers, unstable slopes adjacent to streams, low lying areas along class 1 or 2 streams where additional small feeder streams are likely to be found.
- A = Avalanche prone areas and areas near tree line that appear likely to have regeneration problems if clearcut.
- B = Areas with visible patches of blowdown or burned areas that exceed 5 acres.

A fourth field is for risk intensity. In this field, the likely cumulative effect of the identified risk factors for each setting, is identified with a 1, 2, or 3, as indicated below. If there are no identified risk factors, then this field should be blank. If there are risk factors, then this field must receive a 1, 2, or 3.

Risk Intensity Codes

- 1 = Minor effect on setting (e.g., 1% – 10% of setting area or volume likely to not be suitable for be removed in the future due to identified risk factor(s))
- 2 = Intermediate effect on setting (e.g., 10% – 30% likely to be removed in the future due to identified risk factor(s))
- 3 = Major effect on setting (e.g., more than about 30% likely to be removed in the future due to identified risk factor(s))

A fifth field is to identify those settings that have been identified for ground-based or skyline yarding, but which are so isolated that the economics of roading will probably make it a helicopter setting, if it is harvested at all.

- I = Timber is isolated and identified as a ground-based or skyline setting, but the economics of roading suggest that helicopter yarding is more likely, if it is even harvested.

A sixth field will be used to identify those settings that are known to have been field-verified, as described below:

- F = Use this code to identify any settings that are known to have been field-verified by Ranger District or contractor staff. Otherwise, leave this field blank. It is especially important to

fill in this field when areas outside the suitable base are included in settings and when areas inside the suitable base are excluded.

In addition, a seventh field is used for miscellaneous codes. It is used to identify settings that are converted to helicopter yarding strictly because of standards and guidelines, and polygons of suitable young growth that are created because of incorrect mapping, as described below:

- H = Use this code in the seventh field if a setting (5 acres or larger) is required to be helicopter logged because of: being isolated by a stream, beach or estuary fringe, or unstable slope; because of visual concerns; or because of other standards and guidelines. These settings can also have a risk factor code. Otherwise, leave this field blank.
- M = Polygons of suitable young growth that are created because of incorrect mapping (e.g., a shift) of the managed stands layer or are not shown at all on the layer.

Finally, a notes field should be filled in when it is important to document something about a setting, so that the current reasoning is captured for future users. For example, if a GIS base layer mapping problem is identified, it should be noted in the setting notes. However, mapping should be conducted relative to the existing base layers. For example, do not try to correct a vegetation mapping error by mapping a setting following the timber boundary shown on the photograph – use the GIS-produced suitable timber resource land layer. In addition, add a note here if the stream layer or the soil layer was obviously updated based on ground verification.

If a field-verified LSTA purposely excludes some mapped suitable ground for a known reason (e.g., low-volume timber, steep slopes), the polygon excluded should be captured as a separate polygon to be harvested within the current LSTA, and the field-verified code (F in the 6th field) should be recorded, the appropriate risk factor code should be given (3rd field), and a risk intensity code of 3 (4th field) should be assigned. Polygons assigned a combination of "F" for field-verified and "3" for risk intensity will be identified later during the analysis stage as polygons with a high likelihood of representing falldown. On the other hand, some field-verified LSTA settings may include expanded areas that are not currently mapped as suitable. If these expanded areas are from a recent LSTA or are NEPA-approved, then it can be assumed that these areas have actually been ground-verified to be suitable. In this case, they can be included in an expanded setting, as long as the setting is assigned an "F" for field-verified. The portions of the setting that are outside the mapped suitable base and are being brought into the suitable base can be identified later using GIS.

Additional codes will be assigned using GIS, after completion of the analysis. These will be defined in the future, but will include codes that refine the definition of economically marginal units due to amount of road construction and volume/value of timber. They will also help define units at risk because of expensive roading requirements or roads that pass through Old-growth Habitat Areas or Beach and Estuary Fringe. In addition, they will include an economic factor for settings that occur in biogeographic provinces or VCUs where special marten or goshawk prescription restrictions apply.

Before starting out defining new settings, consider the existing LSTAs, particularly if they were completed in the mid-1990s or more recently (1997 or more recent, is best). Use the suitable layer boundaries so that the setting boundaries correspond exactly with the suitable boundaries. There should be no slivers. If the existing LSTA setting boundaries correspond closely with the suitable boundaries, then the existing LSTA layer can be used as a starting point. Otherwise, use the suitable boundaries. Generally, if the setting boundaries were delineated in the mid-1990s or more recently and the LSTA includes all suitable timber without violating current Forest Plan Standards and Guidelines, then it is probably fine, in general. However, the suitable layer still should be used as the starting point, with the LSTA setting divisions added to that from the existing LSTA.

Where available, check the NEPA-cleared or as-laid-out unit information; these unit boundaries should always be the preferred boundaries for new settings. There may also be hard copy unit card maps, project area maps, or DEIS maps provided by the Districts, which represent the results of recent field verification, and which may not yet be NEPA-cleared. It is important to capture this information in our LSTA. The field-verified unit boundaries should be given great weight in the mapping of settings and the appropriate risk codes should be added to all settings when this information is provided by the Districts. It is important to consult with the Ranger District representative, at least by phone, at the beginning and during the analysis of each area.

In areas within the Ketchikan, Thorne Bay, and Craig Ranger Districts, the uniform Ketchikan Area LSTA was developed using similar procedures in 1994-95. These areas need to updated to the new standards and guidelines (e.g., wider riparian buffers, wider beach and estuary fringe, LUD changes), but the majority of these LSTAs are probably salvageable. The following conversions need to be made to the coding and the settings:

- Shovel needs to be converted to ground-based and the slope break needs to be increased from 20% to 35%
- Running skyline units need to be split into uphill and downhill settings and changed to short-span skyline. In addition, slopes less than 35% should be evaluated for ground-based yarding opportunities.
- Live skyline, standing skyline, and highlead – uphill settings need to be converted to short skyline – uphill.
- Slackline and highlead downhill settings need to be converted to short skyline – downhill.
- Need to look hard at visually sensitive areas and beach and estuary fringe roads to make sure they are treated the same
- Multi-span skyline areas need to be reviewed and re-categorized under the new system
- A visual scan and spot-checking of all settings will need to be completed to identify cable settings with an EYD greater than 1,300 feet. These settings will be attributed with the long –span skyline logging system.

3.6 Young Growth LSTA Mapping

In order to begin considering the young growth stands that will soon be contributing to the programmed harvest the following additional LSTA work will be conducted. In addition, there are young growth stands that are tentatively suitable, but are not included in the suitable base because they are in Old-growth Habitat Area LUDs or inside the Beach and Estuary Fringe, and thinning is indicated as a means of enhancing deer winter range or otherwise enhance older forest characteristics.

3.6.1 Suitable Young Growth

Young growth stands within the suitable base, which were harvested in 1970 or earlier, will soon be candidates for commercial thinning, if they are not already. As such, they will be addressed in the LSTA as follows:

- Areas with <35% slope will be mapped for thinning using ground-based logging systems out to an external yarding distance of 500 feet

- Areas downhill from roads will be mapped for thinning using short-span skyline – uphill or long-span skyline – uphill logging systems, as appropriate. This will include multi-span logging system settings.
- All other areas will be mapped for thinning by helicopter
- Do not route new roads for accessing suitable young growth
- However, if an existing road route needs to be used that is not in the existing roads layer, it will be given an R flag for reconstruction.

3.6.2 Young Growth in Old-growth Habitat Areas and Beach and Estuary Fringe

Young growth stands that are tentatively suitable, but are not included in the suitable base because they are in Old-growth Habitat Area LUDs or inside the Beach and Estuary Fringe, are being considered for thinning as a means of enhancing deer winter range or otherwise enhancing older forest characteristics. Thus, the LSTA will consider a group of "high priority" stands, which will be defined as follows:

- Areas that were harvested in 1970 or earlier
- Areas within broadly identified high value winter range (defined in this exercise as all areas within the beach fringe and other areas < 800 ft. with south, southeast, or southwest facing exposures) and with a low natural abundance of productive old growth or where a high proportion of the productive old growth forest has previously been harvested
- Areas where there are few opportunities to treat older young growth in the suitable base

In these areas, look for older young-growth stands that are near roads (and that would require only short spurs to access from land) or areas where beach access may be relatively easy. Consider low-impact logging systems that may be feasible for use in these areas. This process will be fleshed out in more detail during the pilot studies.

3.7 Summary Documentation for Each Analysis Area

During the course of working on an analysis area, each analyst will keep notes or a journal on the sources of information used. For example, the analyst should record which LSTAs were used, which NEPA documents or field-verified data were considered, who was consulted from the Forest Service, and any other unique data or factors considered in developing the LSTA. In addition, the notes should identify special circumstances encountered in the analysis area (e.g., important roads that are at high risk of not being built) and the reasons for decisions made by the analyst in designing the LSTA. Basically, information should be recorded that the analyst believes will be important to pass on to future analysts working on the area. Upon completion of each analysis area, the analyst shall compile these notes into a general writeup (using MS Word) that summarizes the notes and that will remain with the LSTA in the future. The analyst's name, company, and city of business, and the date should be recorded as well.

3.8 Quality Assurance and Control

Quality assurance (QA) and quality control (QC) will be incorporated into the LSTA development process in a number of ways and at a number of levels. First, the primary use of analysts with high levels of experience on the Tongass and working with the Forest Plan will provide a higher level of quality throughout the process. Second, the development and updating, as required, of these written procedures, will serve to produce consistency in the methods followed by each analyst. Third, the

implementation of the draft procedures during small pilot studies has identified improvements and other details that need to be defined in the final procedures. Fourth, holding a training session for analysts to go over the finalized procedures prior to implementing them on a production scale will ensure that they are understood by all analysts and ensure the consistency of their application. Fifth, a checklist of coding fields and important steps will be prepared and provided to each analyst so that compliance with procedures can be easily and regularly referenced.

When a planning area is being completed, each analyst should again plot an overview map, as described in the last paragraph of Section 3.2, except that the map will contain the new LSTA, instead of the suitable base and the previously existing LSTA. This map should be reviewed for completeness of coding. The checklist of coding fields should be reviewed again to make sure that the codes are consistently and appropriately applied. This is very important to achieving a consistent product across the entire Forest.

During production, the senior logging engineer will provide overall supervision and regularly check in with all analysts working on the project. These regular check-ins will provide a means of controlling quality during the production phase. In addition, local Ranger District engineering or forestry staff will be identified to observe the work being conducted during the process and provide input to improve product quality. After completion of each analysis area, the senior logging engineer will conduct a final engineering QA review of each analysis area, discussing his observations with the analyst, and having adjustments made, as required, to ensure consistency and quality. Finally, a senior resource specialist (with expertise in the Forest Plan and in LSTA work) will conduct a final overall QA review of each analysis area to ensure consistency with the Forest Plan and relative to the documentation of risk flags. Based on this final internal review, adjustments will be made as required, and the near-final draft LSTAs for each analysis area will be made available for a Forest Service review. Comments from final Forest Service reviews will be delivered at a meeting at Tetra Tech's offices. A compliance checklist will be developed to achieve consistency in the Forest Service review. This formal review will provide comments for final adjustment of the LSTAs during the LSTA Finalization and Adjustment task.

4.0 Schedule

This section presents the current schedule for key tasks and subtasks and important milestone dates. As can be noted, the schedule is tight, especially during the initial months when many events need to take place prior to initiating the LSTA production phase in mid-December 2005. Under the schedule, near-final draft LSTAs for the Tongass would be submitted for review in three batches beginning in mid-February 2006. The schedule allows for completion of the near-final draft LSTA for the entire Tongass National Forest by the end of March 2006, so analyses that draft numbers can begin being generated to support other work items in Phases 2 and 3, as identified in the Study Plan for the Adjustment and Update of the Tongass Forest Plan. The final LSTA that incorporates Forest Service comments will be completed by the beginning of May 2006.

MILESTONE	DATES
▪ Preparation of Draft Procedures	November 16, 2005
▪ Forest Service Comments on Draft Procedures	November 18, 2005
▪ Initiate Pilot Area LSTAs	November 21, 2005
▪ Complete Draft Pilot Area LSTAs	December 7, 2005
▪ Conduct Review of Draft Pilot Area LSTAs	December 8, 2005
▪ Finalize Procedures	December 14, 2005
▪ Develop Cost Estimate for LSTA Production	December 15, 2005
▪ Conduct Analyst Training on Procedures	December 19, 2005
▪ Initiate LSTA Work on a Production Scale	December 16, 2005
▪ Near-final Draft LSTA Submittal – Submittal 1	February 17, 2006
▪ Forest Service Comments on 1st Submittal	March 1, 2006
▪ Near-final Draft LSTA Submittal – Submittal 2	March 10, 2006
▪ Forest Service Comments on 2nd Submittal	March 22, 2006
▪ Near-final Draft LSTA Submittal – Submittal 3	March 31, 2006
▪ Forest Service Comments on 3rd Submittal	April 12, 2006
▪ Develop Cost Estimate for LSTA Finalization	April 17, 2006
▪ Final LSTA for Tongass National Forest	May 1, 2006