

Wrangell Island Project

Resource Report

Timber Economics

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for:
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Introduction

This report provides an analysis of the project's timber available for harvest and the financial efficiency of implementing the proposed action and action alternatives. This report utilizes existing information from field surveys, spatial GIS data, financial analysis models, monitoring results, scientific literature, and other sources.

The analysis tiers to the effects identified in the analyses conducted for the 1997 Forest Plan Revision FEIS, 2003 Forest Plan SEIS, 2008 Forest Plan Amendment FEIS and the 2016 Forest Plan Amendment FEIS. It concentrates on the potential economic effects associated with old-growth timber harvest, new road and landing construction and road reconstruction. Young growth timber harvest was considered to be included as part of the analysis but there is only an incidental amount of young-growth acres having trees mature enough to provide a commercial product in the current market. Timber harvest volumes, indicated value, costs and net stumpage values used in this analysis are current estimates and useful for comparing relative differences between alternatives and are not meant to reflect absolute values.

The purpose of this project is to respond to the goals and objectives identified by the Tongass Land and Resource Management Plan (Forest Plan) to guide timber management to support the local and regional economies of Southeast Alaska, while moving the national forest system (NFS) land on Wrangell Island towards the desired future condition for all resources.

The underlying need for this project comes from the Forest Service's obligation, subject to applicable law, to seek to provide a supply of timber from the Tongass National Forest (Forest) that meets market demand annually and for the planning cycle, and to restore and improve Forest resources to a condition where they provide increased benefits to society. Appendix A of the Wrangell Island Project EIS provides detailed information about how the Tongass timber program is structured.

Regulatory Framework

Management activities on National Forest System (NFS) lands are required to comply with the Tongass Land and Resource Management Plan (Forest Plan) and Federal and State laws. Relevant standards and regulations intended to protect timber economic impacts are addressed in the following subsections.

Other Laws, Policies, and Relevant Direction

- Forest Service Manual (FSM), Chapter 2400 Timber Management: FSM 2400 provides guidance regarding timber management practices in National Forest System (NFS) lands and sets out the legal guidelines and policies for the management of timber for commercial harvest on NFS lands.
- FSH, Region 10 Supplement 2409.15-2009-1, Section 29 - Export Administration
- FSH, Region 10 Supplement 2409.18-2013-1 Sale Program Development – Gate System: This Region 10 supplement to the FSH sets out the standards and protocols for completing an economic analysis of timber sale National Environmental Policy Act (NEPA) projects using the R10 NEPA Financial Analysis Spreadsheet Tool – (FASTR).
- FSH Region 10 Supplement 2409.22 Timber Appraisal Handbook: This supplemental handbook defines standards and methodologies for determining the economic value of a timber

sale. Specific to this project, the following subsections of the Timber Appraisal Handbook are relevant:

- FSH, Region 10 Supplement 2409.22-2013-1 Residual Value Appraisals: This supplement provides guidance and methodology for using the Residual Value Appraisal System for timber sale appraisal. Residual Value Appraisal determines the value of a timber sale at the time it is expected to be sold on the open market.
- FSH, Region 10 Supplement 2409.22-2013-2 Logging Costs: This supplement provides methodology for determining logging costs on the Tongass.
- FSH, Region 10 Supplement 2409.22-2002-1 Special Appraisals: This supplement provides guidance for determining the costs and values associated with timber sale configurations with unique circumstances or conditions.
- FSM, Region 10 Supplement 2400-2013-2 Commercial Timber Sales: This supplement to FSM 2400 provides Region 10-specific guidance related to commercial timber harvest.
- Forest Service Manual, Region 10 Supplement 2400-2002-1 Timber Resource Management Planning: This supplement provides Region 10 specific guidance related to the management of Tongass lands for timber production.

Methodology

Logging Systems and Transportation Analysis and Alternative Development

The Logging System and Transportation Analysis (LSTA) for the Wrangell Island Project Area was started from the Forest level LSTA completed in 2006. Analysis of the original LSTA was done using topographic maps, black and white digital orthophoto quads, and 1998 color stereo photos with a 1:40,000 scale and available GIS data based on past inventories. Areas containing suitable timber (described in the Forest Plan, Appendix A) were divided into blocks or potential units comprised of one or more logging settings. The Forest level LSTA development was not field verified and included roads to areas that had not been previously harvested. After field verification, many of these road locations are found to be infeasible, either physically or economically.

At the onset of the Wrangell Island analysis, the Forest Service inter-disciplinary team (IDT) reviewed the LSTA and made modifications based upon their local knowledge of the project area. Field surveys were conducted from 2009 to 2012 to verify and collect information on the project area. This included vegetative plot data and all other resource inventories pertinent to completing the EIS. Preliminary field verification of road locations was also completed during this time. The logging system and transportation analysis was updated to reflect field data collected. The logging system designations for each unit were updated and adjustments were reviewed by the IDT. This LSTA provided the basis for the unit pool for the Wrangell Island Project. This unit pool provided the units and roads considered during the proposed action and alternative development.

The reinstatement of the 2001 Roadless Rule on the Tongass National Forest after the 2011 decision on *Organized Village of Kake v. USDA*, No. 1:09-cv-00023 required adjustment to the preliminary alternatives. The decision not to consider any amendments to modify OGRs or designation of Visual Priority routes further affected those units considered for inclusion in the alternatives. The final adjustment needed was to remove units from VCU 4790 since it was identified in the Forest Plan as a T77 VCU watershed, (Appendix A, 2016) where old-growth timber is not suitable for harvest.

Financial Efficiency Analysis

The Financial Analysis Spreadsheet Tool - RV (FASTR) version October 10, 2015 was used to compare alternatives for the Wrangell Island Project. FASTR is used at Gate 1 (project initiation) and Gate 2 (NEPA analysis) for any timber sale requiring an EIS or EA. The FASTR model meets the requirements for Gate 2 efficiency analyses by providing a relative comparison of anticipated project costs and revenues for a range of NEPA alternatives. Indicators of timber sale viability (likelihood of receiving bids) and Forest Service financial efficiency include Total Indicated Advertised Value, Indicated Advertised Rate \$/MBF, Total Timber Jobs & Direct Income, and estimated Forest Service costs to prepare the project area, are shown in the "NEPA summary" output page of FASTR. However, final volume estimates and costs are determined at Gate 4 (advertisement) when final cruise data and other site-specific conditions are entered in the Official R10 RV-FM Appraisal spreadsheet.

Timber volume estimates used in the Wrangell Island financial analysis are based on site-specific stand examination information collected from plots in the units, walk thru stand examinations conducted by the silviculturist, or adjacent unit comparisons when plots or walk thru exams in the proposed unit were not conducted. Cruise statistics of data collected from previous timber sales within the project area was used in addition to stand exams to determine species composition. (For more information regarding volume estimates in the analysis area, see the Silviculture Resource Report.) These volume estimates are estimates and are a best guess at this time, upon implementation a regular cruise will be conducted and a more refined volume determined in order for appraisal. FASTR outputs are useful to gauge current economic conditions for a timber sale. While they do not provide a complete picture of actual costs and values at the time of offering, they do provide the planner with an economical range of project components and a relative comparison for alternatives. FASTR does not take into consideration the greater diversity and flexibility of an alternative, or the ability to respond to future market conditions based on the greater number of units and volume made available. Also FAST-R is completed using all the units and roads in the alternative and does not make assumptions about multiple offerings that may occur during implementation. Timber from this project may be split into several contracts or combined with timber from other projects. More information about FASTR and the method of analysis is located in the project record.

Analysis Area

Proposed units in each alternative NFS lands on Wrangell Island is the analysis area for determining timber volume and for running the financial efficiency analysis since these lands are where the Forest Service can offer timber. Although timber from other land ownerships within the area may influence the value of the timber to some purchasers or units from other projects may be included in an offering, this is not incorporated into this analysis.

Also, this analysis is limited to a snapshot in time based on available information and does not speculate on timber market fluctuations. At the time of the appraisal, the value of the timber or costs may increase or decrease. For cumulative effects analysis, the analysis area is considered to be the Tongass National Forest for the timber program, which combines the timber volume from various projects into the Tongass timber program. Contracts are usually not restricted to bidders from a distinct geographic area and can include bidders outside of Southeast Alaska, including bidders from the rest of the United States. In addition to the timber managed by the Forest Service, the State of Alaska (Division of Forestry (DOF), Alaska Mental Health Trust Authority (AMHTA), the University of Alaska), and Alaska Native Corporations also support the Southeast Alaska timber industry.

Overview of Issues Addressed

The purposes of the Project for this resource are: to respond to the goals and objectives identified by the Forest Plan that guide timber management to support local and regional economies; to move the Project Area toward the desired conditions indicated in the Forest Plan for the development LUDs.

The primary goals of the Project are to:

- Manage the timber resource for production of sawtimber and other wood products from suitable lands made available for timber harvest, on an even-flow, long-term sustained yield basis, and in an economically efficient manner.
- Provide for the continuation of timber uses and resources by the timber industry and Alaska residents.

The primary objective of the Project is to:

- Seek to provide a timber supply sufficient to meet the annual market demand for Tongass National Forest timber and the market demand for the planning cycle.

Significant Issues

Issue 1: Timber Supply and Timber Sale Economics

Issue statement: Both the timber supply and timber sale economics produced from National Forest System lands on Wrangell Island affect the stability of Southeast Alaska's forest products industry and the ability of the industry to contribute to the local and regional economies during the transition to a sustainable supply of young-growth.

Loss of this industry's business would negatively impact the ability to maintain the economic health of local communities. Timber purchasers and affected communities are concerned about the quantity and quality of the timber offered for sale from the Tongass National Forest, the cost of road construction, as well as the logging costs associated with the proposed logging systems and silvicultural prescriptions. If proposed timber harvest is not designed to be economically viable across fluctuating market conditions, there is a concern that the forest products industry in Southeast Alaska may not remain viable.

Units of Measure

- ◆ Total volume of sawlog and utility (mmbf)
- ◆ Total net volume of sawlog (mmbf)
- ◆ Net sawlog volume by species (mmbf)
- ◆ Acres of harvest by logging system
- ◆ Acres by harvest prescription
- ◆ Cost for logging, haul, and roads per harvest volume (\$/net mbf)
- ◆ Indicated advertised value (\$/net mbf)
- ◆ Number of annualized jobs supported by export policy compared to number of annualized jobs supported by domestic processing

Affected Environment

Existing Condition

The affected area for timber supply and timber sale economics is Southeast Alaska. This is the area in which the forest products industry is a part of the economy.

About 74,000 people live in towns, communities, and villages located on islands and coastal lands of Southeast Alaska (State of Alaska, Department of Labor and Workforce Development, 2013). The Southeast Alaska region accounts for about 12 percent of the State's population and 6 percent of the land base. Federal lands comprise about 95 percent of Southeast Alaska, 80 percent within the Tongass National Forest. Most Southeast Alaska communities are island based, with very few road connections. These communities are mostly within or adjacent to the Tongass National Forest, and depend primarily on the Forest to provide natural resources associated with fishing, timber, mining, and tourism for employment. Appropriate management of the forest's natural resources is, therefore, critically important for local communities and the overall regional economy. Although timber resources no longer provide the number of jobs that they did during the long-term contract and afterwards when the Silver Bay sawmill was running, however, loss of even a small number of jobs can force families to leave, destabilizing entire communities (Alexander et. al, 2010).

Timber harvest has occurred in VCUs 4750, 4760, 4770, 4780, 4790, and 4800. Past timber management activities on Wrangell Island began in the early to mid-1950s using clearcut cable-yarding methods. Larger-scale clearcut logging began in the late 1970s and continued through about 1995, resulting in approximately 7,490 acres of clearcut harvest on NFS lands on Wrangell Island. Approximately 74% of the harvesting on NFS lands on Wrangell Island occurred in the

1980s and 1990s. (For more detailed information regarding past harvest in the analysis area, see the Silviculture and Vegetation Resource Report.) Currently, only minor harvest activities are occurring on either private or NFS lands on Wrangell Island.

Forest Products Industry in Southeast Alaska

The forest products industry has been an important part of the economy of Southeast Alaska since settlement, with sharp growth in the 1950s due to the start of the pulp mills. Based on forest products employment data for the period 2002 through 2014, total timber industry employment in Southeast Alaska dropped from 512 jobs to 214.

Table 1. Forest Products Industry Employment in Southeast Alaska 2002 through 2014

Year ¹	Tongass Logging ²	Tongass Sawmill ²	Tongass-related Employment	Other Logging	Other Sawmill	Total Other Employment	Total Industry Employment
2002	63	110	173	299	40	339	512
2003	108	91	199	298	64	362	561
2004	82	95	177	220	53	273	450
2005	88	96	184	263	52	315	499
2006	81	77	158	217	46	263	421
2007	44	70	114	225	63	288	402
2008	52	70	122	118	24	142	265
2009	48	39	87	110	19	129	216
2010	61	46	107	133	7	140	247
2011	62	47	109	150	3	153	262
2012	39	47	86	147	11	158	244
2013	75	48	123	106	14	120	243
2014	87	60	147	95	7	102	249
Average	68	69	137	183	31	214	352

Notes:

1 Reported in calendar years.

2 Tongass-related employment estimates are based on the ratio of Tongass timber harvest to total timber harvest in Southeast Alaska.

Source: Forest Plan Amendment FEIS (2016), p 3-485

According to the Southeast Conference (2012), Southeast Alaska experienced an increase in total timber industry employment during 2011, with 422 jobs in sawmilling, logging, logging support and wood product manufacturing jobs. This accounts for 1 percent of jobs and wages in the region (Southeast Conference, 2012).

Currently, the timber industry in Southeast Alaska is based predominantly on the harvest and processing of old growth timber. The conversion to an industry based on the harvest of young growth timber is a national issue with direction from the U.S. Forest Service (Washington Office) and the U.S. Department of Agriculture (USDA). In July, 2013, USDA Secretary Tom Vilsack outlined a series of actions to expedite a transition away from old growth harvest on the Tongass (USDA Office of Communications, 2013). Among these actions are:

- Working with USDA's Rural Development mission to facilitate retooling of the forest industry so that second growth timber can be harvested and processed economically.
- Supporting research into second growth management and market development.

Options for the local utilization of young growth sawtimber and biomass are also being considered by local timber operators and the Tongass National Forest (e.g., SCS, 2012; Parrent, 2013). However, conversion to an industry based on young growth will require retooling of the current infrastructure (Alexander et. al, 2010), a potentially enormous financial investment by the private industry. Attracting investment to build mills capable of efficiently processing smaller material will require a guaranteed steady supply of raw material, labor, and proximity to markets (Daniels et al., 2016). Therefore, providing investors an assurance of a steady supply of timber during this transition period will be critical. As noted by the USDA (USDA News Release No. 0140.13), large sales that contain significant volumes of old growth timber play a central role in transitioning the Tongass National Forest to management of young growth timber

Forest Products Employment in the Wrangell Vicinity

This project will likely provide timber to Wrangell, the nearby community of Petersburg and the communities of Ketchikan, and those on Prince of Wales Island. Viking Lumber Company, located in Klawock on Prince of Wales Island, is the only medium-sized mill operating in Southeast Alaska at this time. The Silver Bay Logging Mill, once located on Wrangell Island, closed and dismantled their milling capability in 2010.

Alcan Forest Products LLP is a purchaser of timber sales on the Tongass and can competitively bid on any sized sale the Tongass currently offers. Currently they have two sales on nearby Zarembo Island with approximately 10 MMBF of volume remaining to be logged. They do not have a processing facility on the Tongass but must follow the regional export policy, selling logs that cannot be exported to a processing facility in the state.

There are a number of small mills on Wrangell, Mitkof, and Prince of Wales islands that could benefit from the project. One such is Mike Allen Enterprises which currently employs three people. The business saws dimensional and rough cut lumber produces music wood bolts; custom orders and provides firewood to the community of Wrangell. Another is DJ Enterprises which operates a small mill that produces rough cut lumber, shingles and shakes and other custom value added orders. The project's geographic location has made it feasible in the past for mills on Mitkof and Prince of Wales islands to purchase small sales from the project area or serve as a third party to logging or cutting operations to a larger mill. Small mills located on Prince of Wales Island, could possibly purchase small sales from the project area or utilize surplus material made available from a larger mill in their vicinity. There has been interest in the past to develop and operate a mid-size mill on Mitkof Island. Establishing a mill on Mitkof would likely increase employment opportunities in the region. (Clayton 2013, Petersburg Pilot) A reliable and available source of timber, provided in part by the Wrangell EIS project, could aid in the development of mill infrastructure such as this in other areas in the region as well.

Payments to the State of Alaska

From FY 2001 through 2008, under the Secure Rural Schools and Community Self Determination Act of 2000 ("Payments to States" legislation), affected Alaska boroughs and communities chose to receive a payment amount based on the average of the highest three payments made to the state during the 14-year period between 1986 and 1999. As a result, the State of Alaska received payments of approximately \$9 million per year during the 2001 through 2007 time period, primarily for schools and roads (Title I), with provisions for special project funding to boroughs who convened citizen Resource Advisory Committees (RACs) with Title II funding.

On October 2, 2013, the “Congress passed a one year reauthorization of the Secure Rural Schools and Community Self Determination act as part of HR 527 Helium Stewardship Act”. The reauthorization of the act will provide funds over the next year to counties and boroughs nationwide. More information is available at <http://www.fs.fed.us/srs/>. The Secure Rural Schools Act was reauthorized April 16, 2015 for two years. Without Congressional reauthorization of the Secure Rural Schools and Community Self Determination Act (SRS Act), the Forest Service must revert to making payments to States under the 1908 Act, commonly called the 25% payments, for the 2017 payment year.

Environmental Consequences

Past, Current and Reasonably Foreseeable Future Timber Harvest in the Project area

Timber harvest has occurred in VCUs 4750, 4760, 4770, 4780, 4790, and 4800, and on State lands in the Pats Creek drainage and just south of Earl West. Past timber management activities on Wrangell Island began in the early to mid-1950s using clearcut cable-yarding methods. Larger-scale clearcut logging began in the late 1970s and continued through about 1995, resulting in approximately 7,490 acres of clearcut harvest on NFS lands on Wrangell Island. Approximately 82% of the harvesting on NFS lands on Wrangell Island occurred in the 1980s and 1990s. (For more detailed information regarding past harvest in the analysis area, see the Silviculture and Vegetation Resource Report.) Currently, only minor harvest activities are occurring on either private or NFS lands on Wrangell Island. One small sale, the Backline Cable Timber Sale, finished in 2015. A second sale, Backline Helicopter was partially harvested before the contract defaulted. Mental Health Trust Authority (April 2014) finished harvesting 58 acres adjacent to the institute property. As far as the reasonably foreseeable future projects, the Alaska Department of Natural Resources has planned harvest of 12.5 mmbf on 700 acres in the Earl West area of Wrangell Island in 2019.

Suitable Timber Supply

The total acres of NFS land on Wrangell Island are 112,936 of which 72,188 acres are within inventoried roadless areas or 64% of the acres. The amount of timber that can be removed by this project is determined by the number of suitable acres available for harvest. (Forest Plan, Appendix A). Limiting factors for suitable are: non-development LUDs, portions of the development LUDS are currently located within the 2001 Inventoried Roadless Areas (2001 IRA) and VCUs identified as T77 watersheds and The Nature Conservancy/ Audubon conservation areas. In addition, standards and guidelines can only be met by using an uneven aged system which decreases the timber supply that can be harvested and may reduce the positive value of the contract.

On Wrangell Island, there are 34,955 acres of suitable old growth using the criteria in the Forest Plan Appendix A on National Forest System lands. There are also 6,805 acres of suitable young growth on NFS lands using that criteria also. No young growth was included in the project alternatives since it is not considered to be of commercial value at this time. On other ownerships, there are 3,286 acres of young growth.

Factors Affecting Timber Sale Economics

There are several factors that enhance the economic potential of the Wrangell Island project area, and may in turn affect the timber supply to the forest products industry. These factors include an existing road system, Marine Access Facility (MAF) infrastructure, conventional logging systems, quality timber for helicopter logging, and the proximity to communities and businesses for labor and support services. The amount of timber volume will have an effect on employment as shown in Table 10 and Table 11, which displays the support to estimated direct employment that will result from logging and milling the volume associated with the proposed project.

Road Access, Rock Quarries, Marine Access Facility and Export Facilities

The Wrangell Island project will use the existing road system and existing MAF's. Approximately 97 miles of NFS roads and associated rock quarries exist in the project area. All the action alternatives will require additional road segments. Where feasible, existing rock pits would be used to provide material for road construction. Some new road construction, however, would require the development of new rock pits to provide material to access timber. There are two existing MAF's found on Wrangell Island for the purposes of the analysis it was assumed that Pats MAF would be used to transfer logs to the water. In addition, Earl West Cove has an existing MAF that could be used if a purchaser deemed it prudent. The old Silver Bay Mill site could also be a possibility for the transfer of logs provided permissions were requested and received by the purchaser from the owner of the site and the required permits were in place. Table 3 shows the amount of proposed roads by alternative within the project area.

More information about existing and new roads, rock pits and MAF's can be found in the transportation resource report.

Approved export facilities can be used to load logs on barges and ships for out of state and overseas shipment. Logs from the Wrangell Island project could be transferred to these barges and ships at these points if not taken directly to an Alaskan mill. Approved export sites include Tolstoi Bay, Viking Mill in Klawock, Ward Cove, Leask Cove, Coon Cove, Soda Bay, Kake and Hoonah (FSH 2409.15-2013-1). For the purpose of the comparison of these alternatives Klawock was used for both domestic and export volume analysis.

Table 2. Proposed Miles of Road by Alternative

	Alternatives				
	1	2	3	4	5
Proposed New NFS Road	0.0	16.8	15.4	15.9	12.7
Proposed New Temporary Road	0.0	9.9	8.9	10.3	6.6
Total	0.0	26.7	24.3	26.2	19.3

Source: Tongass GIS 2017

Silvicultural Prescriptions

All action alternatives propose even-aged and uneven-aged management. Choice of a silvicultural system will directly affect sale economics. Implementation of uneven-aged management has

higher logging costs and affects larger areas than would be needed for the same harvest volume under an even-aged system. Therefore, compared to uneven-aged management, even-aged management is a more effective for sustainably growing and producing high quality timber on a limited land base. Uneven-aged systems generally do not result in increased total yields over time, nor do they substantially improve quality of timber for future harvest entries (Stocker, 2003). These systems are employed where mitigations are required for other resource concerns such as slope instability, or where conservation measures are necessary for visual resources or specific wildlife habitats. Uneven-aged systems are also employed where they are the most economically practical, such as where high-cost helicopter yarding is utilized due to infeasibility of road construction. Refer to the Silviculture Resource Report for information on prescriptions.

Logging Systems

All action alternatives include the use of ground-based cable, shovel yarding systems and helicopter. Cable and shovel are referred to collectively as conventional systems and are generally less costly than helicopter yarding. Conventional systems require road access and are most efficient using even-aged harvesting methods. Harvest methods other than even aged methods require additional time needed in moving equipment and cables that add extra costs to an operator. In areas where there is restricted road access or the use of conventional logging systems is prohibited, helicopter is the assigned yarding system. Careful planning of where helicopter is used is necessary, as economics and long term timber yield are affected negatively by its use. So considering this it should be used only where it is a necessity for resource reasons and Forest Plan standards and guidelines constraints. Table 3 displays the acres by yarding system for each alternative

Shovel yarding is the least costly yarding method and is best suited for slopes less than 25% and yarding distances less than 400-500 feet. This is the process of moving logs from stump to landing by repeated swinging of logs by a hydraulic, track-based log loader. Depending on slope and ground conditions, shovel yarding on steeper ground or over longer distances may be possible. The average cost of shovel yarding/MBF across all alternatives for the Wrangell island project is estimated to be \$94/MBF.

Cable yarding is best suited for steeper slopes and allows longer yarding distances. This is the process of moving logs, partially suspended, from stump to landing using a cable skyline. This method is limited in that a clear path is required to the landing. Cable yarding costs increase substantially with increased retention because the tower must be moved more often. This method is generally more costly than shovel yarding, but may require less road construction. Cable yarding cost per MBF across all alternatives is estimated to be \$231 for Short Span (less than 1300 feet) to \$277/MBF for Long Span (more than 1300 feet).

Helicopter yarding is the most costly yarding method and is used in Southeast Alaska to access harvest units where road construction costs are prohibitively high, when Forest Plan constraints dictate it and where resource concerns make it the only option. This is the process of moving logs, fully suspended, from stump to landing using a helicopter. This yarding method causes the least amount of ground disturbance and minimizes the need for newly constructed roads. Yarding distance, turn time (the time it takes the helicopter to make a round trip from the landing to the unit and return), and the value of timber yarded influence the economics of helicopter yarding. This method is the most flexible in the selection of trees to be harvested making it more suitable for partial-cut harvest prescriptions. Although helicopter yarding costs increase with increased remaining crown closure, that increase is not as pronounced as that for conventional systems and can be offset by using uneven-aged or two-aged management prescriptions to increase the overall

pond log value of the timber yarded. The estimated average cost per MBF across all alternatives for a helicopter system is \$416/MBF.

Table 3. Total Acres by Logging System and Silvicultural Prescription

Yarding System – Harvest Method	Total Acres by Alternative				
	1	2	3	4	5
Cable – Even Aged Clearcut (0% retention)	0	930	901	942	497
Percent of harvest		20	34	31	14
Cable – Even Aged Clearcut With Reserves (15% retention)	0	68	68	68	68
Percent of harvest		1	2	2	2
Cable—Uneven Aged (66% retention)	0	0	0	0	11
Percent of harvest		0	0	0	1
Shovel – Even Aged Clearcut (0% retention)	0	410	368	410	240
Percent of harvest		9	14	14	7
Shovel—Uneven Aged (66% retention)	0	118	43	133	103
Percent of harvest		2	2	5	3
Helicopter – Uneven Aged single tree selection and/or group selection (66% retention)	0	3241	1268	1439	2521
Percent of harvest		68	48	48	73
Total	0	4767	2648	2992	3440

Source: Tongass GIS 2015

Tow Costs

Transportation of logs accounts for a large percentage of costs a purchaser incurs during the life of a timber sale in Southeast Alaska, and tow costs represent the large percentage of transportation costs on the Wrangell Island Project. For the Project, tow costs were assessed for one scenario towing 100 percent of timber volume to the Viking Mill in Klawock for domestic processing and allowable export. The estimated one-way tow distance to Klawock from the Pats LTF is about 130 miles. The average estimated towing cost for all action alternatives is \$80/MBF (Net Sawlog) towing all volume to Klawock.

Landings

Optimum landing design represents a balance between a minimum size that will allow for safe operation of all equipment with additional space for handling and storage of logs, while minimizing construction costs and potential environmental impacts. During implementation of an offering from the Wrangell Island EIS, landing size, location, and construction specifications must be agreed upon by the Forest Service timber sale administrator, and the timber purchaser.

Landings are also located, designed, and constructed to minimize soil erosion and water quality degradation (Region 10 BMP 13.10; FSH 2509.22).

For an alternative, landings will service multiple units where feasible, which will minimize construction costs and potential environmental impacts, and will improve economic feasibility. Therefore actual acres of landings by Action Alternative may be fewer than shown in Table 4. Approximate Landing Acres by Alternative (below). It is impossible to show anything other than just paper planned landings at this time. So number displayed will vary accordingly dependent on multiple factors including but not limited to final road and unit locations, terrain and unit feasibility.

Typical yarder landings vary in size from a wide spot in the road for small mobile yarders, to about 0.1-0.2 acres for a large (90-foot) tower yarder and are usually adjacent to a cable unit. In general, most all yarder landings in a Wrangell offering will need to accommodate a medium (50 to 70-foot) tower yarder, and will likely be less than 0.1 acres in size. In shovel yarding harvest units, it is likely that those roads which access the harvest units will be used as continuous landings, thereby eliminating additional landing construction costs.

Two types of landings are associated with helicopter logging: log landings and service landings. Log landings are used for laying down turns of logs, processing and storing logs, and loading log trucks. A minimum of a 100-foot by 200-foot which is about 0.5 acre provides a drop zone, a safety zone, and a decking area. These landings are usually not within the unit but are on a nearby road system. The shortest helicopter turn-times, which is the time it take the helicopter to go from the landing, pick up a load of logs and return to the landing and deliver the logs, are the most economical and therefore the location of these landings will be determined during the contract administration. Service landings provide a safe landing zone for the helicopter, in addition to trailers, a pad, a fuel truck, and a lift truck to fuel and perform minor maintenance.

Table 4. Approximate Landing Acres by Alternative shows estimated acres of landings by action alternative that are potentially necessary to facilitate yarding. Some landings may be used for multiple units, which would minimize construction costs and potential environmental impacts, and improve economic feasibility. Therefore actual numbers of landings by action alternative may be fewer than shown in Table 4. Approximate Landing Acres by Alternative.

Table 4. Approximate Landing Acres by Alternative

Landing Size	Approximate Number of Landings and Acres by Alternative				
	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Number of Large Landings (0.5 acres)	0	76	50	71	67
Number of Small Landings (0.1 acres)	0	91	109	89	58

Total Acres for Landings	0	47.1	35.9	44.4	39.3

Financial Efficiency Analysis

One method to compare the effects of the different alternatives is through a financial efficiency analysis which is a comparison of those costs and benefits that can be quantified in terms of actual dollars spent or received within the project area. This type of analysis does not account for non-market benefits, opportunity costs, individual values, or other values, benefits, and costs that are not easily quantifiable. This is not to imply that such values are not significant or important, but to recognize that non-market values are difficult to represent by appropriate dollar figures. Therefore, financial efficiency should not be viewed as a complete answer but as one tool decision makers can use to gain information about resources, alternatives, and trade-offs between costs and benefits.

Although individual harvest units may or may not be economical to harvest by themselves, the management of less productive land or land containing a high percentage of defective timber will help to increase future timber yields. The harvest of units with higher value can help compensate for less economical harvest units.

The Alaska Region appraises timber sales using the residual value (RV) method to calculate fair market value for timber sold. Revenues (final product selling values) used in the RV appraisal are determined from a sample of timber purchaser's records. Revenues are brought back to Alaska mills (subtracting freight from point of sale) and are converted to log scale (\$/MBF). Operational cost or the cost of logging and transportation (\$/MBF) are subtracted to estimate value on the stump. An amount for normal profit and risk is subtracted to determine the stumpage value. The remainder is the indicated advertised rate or amount per MBF the Forest Service thinks it can sell from the project. Indicated advertised rates will vary widely over time depending on market conditions present at the time of actual offer. Indicated advertised rates will also vary by project depending on timber species, amount of volume offered, and the grade of the timber available at the time of actual sale offer. Estimates of indicated advertised values are displayed in Table .

The Financial Analysis Spreadsheet Tool - RV (FASTR) version October 15, 2015 was used to compare alternatives for the Wrangell Island Project. FASTR was developed by a team of specialists (appraisal, sale preparation, and economics) from the Regional Office and Tongass National Forest Supervisors Office. It was designed to be a simple program that would: 1) meet the minimum requirements for Gate 2 efficiency analyses; 2) require minimum data input and training; 3) be developed and maintained locally to reduce costs; and 4) produce defensible and comparable results to the R10 Residual Value timber sale appraisal. This program uses the same logging costs and manufacturing costs developed for the Alaska Region timber sale appraisal program. Costs reflect production studies and data collected from timber sale purchasers in Southeast Alaska. FASTR's main purpose is to evaluate timber sale viability, likelihood of receiving bids and Forest Service financial efficiency (Benefit/Cost). Timber volume estimates used in the Wrangell EIS financial analysis are based on a combination of collected data including silviculture stand exams, walk-thru exams and adjacent exams from areas nearby. FASTR outputs are useful to gauge current economic conditions for a timber sale. While they do not provide a complete picture of actual costs and values at the time of offering, they do provide

the planner with an economical range of project components and a relative comparison for alternatives. FASTR does not take into consideration the greater diversity and flexibility of an alternative, as well as the ability to respond to future market conditions based on the greater number of units and volume made available. More information about FASTR, the individual FASTR analysis runs by alternative and the method of analysis are located in the project record.

Indicated advertised rates are not to be confused with minimum rates or base rates. In this analysis, minimum rates and base rates are identical in the FASTR spreadsheet tool. Minimum rates are established by the Regional Office as the lowest rates for which the Forest Service may sell timber (FSM 2400, Chapter 2430, Sec 2431.31b). A sale is considered deficit if the Indicated Advertised rate is lower than the average base rate (FSH 2409.18, Chapter 40 Sec 45.43). Currently, all alternatives as designed are considered negative. Alternative 3 is the most positive followed by 2, 4 and then 5.

One value used in comparing the economics of the project is Pond Log Value. Pond log value is the final selling value of the finished products minus the manufacturing cost and allowances for profit and risk of a reasonable estimate of fair market value of delivered logs for the approved markets. Simply, pond log value is the price a buyer would pay for a delivered log at the mill site. Pond Log values are directly affected by species composition inputs into the FASTR spreadsheet tool. Species composition inputs and the percentage those species are found in the stand were estimated by using an average of silvicultural examinations and two of the most recent cruises on Wrangell Island. Because species composition percentages represent a project area-level estimate, and not a unit by unit level, species composition values, and consequently pond log values, remain constant across all action alternatives for this analysis. Pond log value, however, will in all probability change at the actual time of sale appraisal depending on the number of harvest units in the sale, the harvest prescriptions and yarding systems, and a more accurate volume estimate will be determined through cruise information for that sale.

These FASTR outputs are useful to gauge current economic conditions for a timber sale and provide a relative comparison between alternatives. They are not meant to serve as an actual appraisal of the project area or provide actual costs and values at the time of offering since these fluctuate with timber markets. Forest Service administrative costs play no part in the calculation of appraised value.

Pond Log values and indicated advertised values are represented in Table 5. Timber Financial Efficiency Analysis, below. Indicated advertised values are calculated for net sawlog. The difference in indicated advertised values among the action alternatives can be attributed to multiple factors, including:

- volume per acre harvested
- quality of timber
- silvicultural prescriptions
- yarding systems
- amount of road construction and reconstruction
- haul/tow distances.

Table 5. Timber Financial Efficiency Analysis

Volume – Net Sawlog (MBF)	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Sitka Spruce	0	11,195	7,961	8,463	7,631
Hemlock	0	26,460	18,818	20,003	18,037
Western Red Cedar	0	4,071	2,895	3,077	2,775
Alaska Yellow Cedar	0	9,159	6,514	6,924	6,244
Total Net Sawlog Volume (MBF)	0	50,885	36,188	38,468	34,687
Net Utility Volume (MBF)¹	0	6,411	4,560	4,847	4,371
Pond Log Value \$/MBF³	\$0	\$564	\$564	\$564	\$564
Stump to Mill Cost \$/MBF	\$0	\$535	\$530	\$537	\$568
Indicated Advertised Value (millions)²	\$0	(\$3,014,021)	(\$1,990,268)	(\$2,367,324)	(\$3,216,799)
Indicated Rate \$/MBF²	\$0.00	(\$59.23)	(\$54.21)	(\$61.36)	(\$92.74)

Source: N. Stearns FASTR (October 2015)

¹ Utility volume includes Sitka Spruce and Hemlock. As of February 13, 2017 letter of direction, utility volume will not be appraised for sale. Whether this will be the case, when offers are made for this project is unknown.

²() indicates negative value

³ FASTR Version October 15, 2015

The harvest volumes, indicated value, costs and net stumpage values used in this document are current estimates and useful for comparing relative differences between alternatives and are not meant to reflect absolute values. Merchantable timber within units and any road right-of-way located on NFS lands will be cruised to determine the quantity, quality and value of timber for the contract under which that volume of timber is offered. The final sale appraisal will include current quarter selling values, current cost information and a normal profit and risk allowance to determine the minimum advertised stumpage value at the time of offering. Sales with volumes under 500 MBF do not require an appraisal and can be advertised using established standard rates.

Timber Volume Calculations

Net volumes by alternative were calculated using FASTR. Information needed by the FASTR model to generate volume estimates, such as species composition percentages, predicted net MBF/acre removed, predicted Gross MBF per 32 foot log, and estimated utility volumes, were calculated from stand examinations and cruise statistics data from recent Wrangell Island cruises. Stand exams consisted of both plots taken in individual settings, ocular walk thru examinations and adjacent settings estimates if the two previous weren't present in a unit. It is necessary to stress that the volumes are estimates and in some cases for individual unit's volumes maybe less or maybe more which will be determined after timber sale cruise is conducted. These fluctuations are normal as units are changed for further resource concerns, operability issues and economics of individual units further refined. Species composition percentages were calculated using a

combination of stand exams and two of the most recent cruises in the area and averaging them. The Percentage of defect used to go from gross to net volume was based on a local average for all species on the Wrangell district, 40 % woods defect was used. Volumes for the alternatives are displayed in thousand board feet (MBF) in Table6. Estimated Total Net Sawlog and Utility Volume. Estimated Utility volume/Acre information was calculated from Tongass wide cruise averages. More information on the FASTR model and method of analysis can be found in the project record.

Table6. Estimated Total Net Sawlog and Utility Volume

Estimated Volume (MBF)	Alternatives				
	1	2	3	4	5
Sawlog Old Growth	0	50,885	36,188	38,468	34,687
Utility	0	6,411	4,560	4,847	4,371
Total (MBF)	0	50,885	36,188	38,468	34,687

Source: N. Stearns FASTR (October 2015)

Forest Service Costs

The financial efficiency analysis used in this EIS is one tool decision-makers use when making comparisons between alternatives. Table 7 summarizes the estimated administrative expenditures associated with the project.

The Forest Service is not mandated to make money by offering timber for sale. The timber program is not unusual in costing more to operate than the government receives in revenues from the program. Many programs on the Tongass NF generate little to no revenue, including subsistence, heritage, inventory, monitoring, land management planning, geology, fish and wildlife management, trail improvements, and fire protection.

The Forest Service is directed to sell commercial timber sales at not less than appraised rates. The Alaska Region implements this direction through established appraisal methodologies. Forest Service administrative costs play no part in the calculation of appraised value.

Average Forest Service costs, derived from the Alaska Region's budget allocation, are used in the costs analysis. These include costs for environmental analysis and documentation (NEPA), sale preparation, sale administration and engineering support.

Sale preparation costs include unit layout, cruising, appraisal, and contract development. Sale administration consists of administering the timber sale contract from the time the sale is awarded until the sale is completed. Normally, costs are associated with office documentation, timber sale accounting, and site visits to the sale area, which is generally adjacent to a new or existing road system. Engineering support consists of planning and timber sale contract administration activities associated with new facility and road construction, use of existing facilities and road maintenance.

Average Forest Service costs are \$20.78/MBF for projected sale preparation cost, \$12.18/MBF for projected sale administration cost, and \$22.67/MBF for projected engineering support cost. An average cost of \$47.97/MBF for environmental analysis and documentation (NEPA) is used by FASTR at the project proposal stage (Gate 1) to provide the responsible official with a relative estimate of projected costs associated with performing NEPA (Gate 2) for a proposed project. At the Gate 1 level, these estimates are helpful to the responsible official in determining feasibility of the project, and if the project merits funding. The Gate 1 stage, however, is not considered NEPA, but rather the foundation of project development. Because the Wrangell Island project is in the Gate 2 NEPA phase, costs estimates at the Gate 1 phase are considered “sunk” or have already been spent; therefore, these costs are not represented in the FASTR outputs at the Gate 2 level or in Table 8. The Forest Service cost estimate to perform NEPA under the current Alternative 2 unit configuration is approximately 3.2 million dollars. More information on the Forest Service gate system, or steps that must be completed to prepare a timber sale for offer, can be found in Appendix A of this FEIS

The cost per MBF best indicates the Forest Service’s cost of moving the area towards its desired condition and are useful estimates to compare relative differences among alternatives. Sale preparation costs increase significantly when implementing partial harvest units, as compared to clearcut harvest units. Accessibility to the units is another major cost factor; helicopter logging units tend to cost more to access during implementation.- All of these factors could cause the cost estimates in Table 7. Estimated Forest Service Costs to be higher or lower than regional averages.

Table 7. Estimated Forest Service Costs

Forest Service Costs ¹	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Sale preparation	\$0	\$2,440,936	\$1,735,955	\$799,363	\$720,804
Sale administration	\$0	\$1,057,383	\$751,994	\$468,539	\$422,492
Engineering support	\$0	\$619,775	\$440,774	\$872,067	\$786,363
Total project costs	\$0	\$4,118,094	\$2,928,723	\$2,139,969	\$1,929,659

Source: N Stearns FASTR (October 2015)

¹ An average cost of \$47.97/MBF for environmental analysis and documentation (NEPA) is used by FASTR at the project proposal stage (Gate 1) to provide the responsible official with a relative estimate of projected costs associated with performing NEPA (Gate 2) for a proposed project. At the Gate 1 level, these estimates are helpful to the responsible official in determining feasibility of the project, and if the project merits funding. The Gate 1 stage, however, is not considered NEPA, but rather the foundation of project development. Because the Wrangell Island project is in the Gate 2 NEPA phase, costs estimates at the Gate 1 phase are considered “sunk” or have already been spent; therefore, these costs are not represented in the FASTR outputs at the Gate 2. More information on the Forest Service gate system, or steps that must be completed to prepare a timber sale for offer, can be found in Appendix A of this FEIS

Opportunities to Improve Economics

There are many factors that can increase the cost of timber harvest. These costs may carry significant economic risk for potential purchasers as well as the ability of the Forest Service to offer timber sales. Road construction, helicopter yarding, silvicultural prescriptions other than clearcutting, setting size and other factors may increase costs. Those increased costs will then affect the timber value for the alternatives. The value of the timber offered must be sufficient to cover this cost and offer a potential for profit to purchasers. Because markets fluctuate, volume made available from the Wrangell Island project would allow the Forest Service to respond to these conditions when packaging timber sales. The costs used in the current FASTR model incorporate the same costs used in the Alaska Region’s appraisal program. Those costs reflect

actual cost data collected from timber sale purchasers in Southeast Alaska, as well as production studies. At times, certain situations and sales may have higher or lower costs than the regional averages, based on site specific circumstances. Advantages of the project area include: developed MAF's, an existing road system connected to a community, nearby towns such as Petersburg or towns located on Prince of Wales and an experienced and available workforce.

Under current R10 Export Policy for hemlock and spruce, a timber purchaser may request approval to ship unprocessed timber outside of Alaska to the most advantageous markets in the lower 48, including foreign markets. The 2008 economic downturn in the United States (U.S.) led to historic low levels in U.S. housing starts, and subsequently a precipitous drop in U.S. lumber values (Roos et al. 2010). Despite the economic downturn, a decline in the value of the U.S. dollar relative to other currencies resulted in good values for export logs in the Asian market. Thus, log exports to Asian markets have been a major factor in the ability of forest products firms to remain economically viable during difficult economic times by taking advantage of these markets (Roos et al. 2010).

As mentioned in a previous section of the report there is recent interest to possibly open a mill in the Petersburg area, if this were to come to fruition it would significantly reduce transportation cost of all the domestic volume from a potential sale coming from the Wrangell Island project. Up until about 2003, export ships came to Wrangell to pick up export volume for transport overseas. Currently for Timber Sale appraisal purposes Wrangell isn't approved for valuation and sale packaging purposes. This doesn't preclude a potential purchaser to request the site to be used for export. If this occurs, it would cut the water haul costs to an approved export site and correspondingly economics would greatly increase quite possibly to the positive side.

In some years, public works funds are available to pay for all or portions of NFS road construction or reconstruction costs for roads that will be used in long-term administration of the Tongass National Forest. Availability of this funding would greatly affect the economic bottom line of a Project.

Projected Employment and Income

All action alternatives would have direct and indirect impacts to the economies of Southeast Alaska communities. Direct impacts are employment and income directly generated by the Project. Table 8 below shows the employment multipliers for jobs supported with timber harvested and processed through the export policy and for 100% domestic processing [with the exception of Alaska yellow-cedar which is determined to be a surplus species by the Secretary of Agriculture (FSM 2455.1) and analyzed as 100% exported.]

Table 8 Employment Multipliers

Project generated jobs and income in Alaska ¹	2012 Multipliers per MMBF net sawlog	
	Current Export Policy ³	100% h-ss-wrc domestic processing ⁴
Local Jobs in logging per MMBF net saw	2.26	2.26
Local jobs in sawmilling per MMBF net saw	2.68	2.68
SE Alaska jobs in Transportation and other services ² related to Dom. Mfg. per MMBF net saw	0.62	0.62
SE Alaska jobs in Transportation and other services ² related to export per MMBF net saw	1.53	1.53

Source: FASTR Version October 10, 2015

¹ Employment Coefficients for period 2007-2010 Source Susan J. Alexander Alaska Region Economist (August 9, 2012)

² Transportation and other services include towing, independent trucking, stevedoring, scaling, quality control, and marketing.

³ Current export policy allows 100% Alaska Yellow Cedar export plus "Western Hemlock-Sitka Spruce export" (equal to 50% total sale net sawlog volume)

⁴ Assumes Western Hemlock-Sitka Spruce-Western Red Cedar = 100% Alaska domestic processing; Alaska Yellow Cedar = 100% export.

Direct employment and income from logging, sawmilling, transportation and other services are estimated by converting harvested timber volume (MMBF net sawlog) to local annualized jobs and income (Employment Coefficients and Indirect Effects, for NEPA Planning: 2012 Update. Source: Alexander, 2012). Table 9 below shows projected Alaskan employment and income generated from logging, sawmilling, and transportation and other services utilizing current R10 Export Policy. Table 10 below provides the same analysis assuming 100% Domestic Processing is utilized. Indirect economic impacts include indirect and induced employment and income. These are a result from employment and wages generated from spending in support of timber operations and from spending by employees on services present in local economies. However, although the use of indirect employment coefficients is applicable at large scales, such as regional or statewide assessments, they are not useful at small local scales, and are in fact misleading. Therefore no calculations of indirect effects have been conducted for this project.

Table 9. Employment Supported by this project Under the Current Export policy

Alternative	1	2	3	4	5
Logging jobs ¹	0	115	82	87	78
Sawmilling jobs ¹	0	44	31	33	30
SE Alaska jobs in Transportation & other Services Jobs ²	0	10	7	8	7
SE Alaska jobs in transportation & other services related to export ²	0	53	38	40	36
Total Jobs supported	0	222	158	168	151
Direct Income	0	\$11,316,438	\$8,048,070	\$8,555,031	\$7,714,267

Notes:

¹ Current export policy allows 100% Alaska yellow-cedar export plus hemlock /spruce export equal to 50% total sale net Sawlog volume. Based on total net sawtimber volume

² Transportation and other services include towing, independent trucking, stevedoring, scaling, quality control and marketing. Based on total net sawtimber volume. Some of these jobs pertain only to log export such as stevedoring. Other transportation jobs apply to both export and domestic processing such as log hauling to a mill, LTF or export site. Source: N Stearns FASTR (October 2015)

Table 10. Employment Supported by this project Under Domestic Processing

Alternative	1	2	3	4	5
Logging jobs	0	115	82	87	78
Sawmilling Jobs	0	112	80	85	76
SE Alaska jobs in transportation & other services related to Alaska dom. Mfg	0	26	18	20	18
SE Alaska jobs in transportation & other services related to export ²	0	14	10	11	10
Total Jobs supported	0	267	190	202	182
Direct Income	0	\$11,153,964	\$7,932,533	\$8,432,257	\$7,603,611

Notes:

¹ Assumes 100% Alaska domestic processing of hemlock /spruce /western redcedar; 100% export of Alaska yellow-cedar Based on net sawtimber volume.

² Transportation and other services include towing, independent trucking, stevedoring, scaling, quality control, and marketing. Based on net sawtimber volume. Some of these jobs pertain only to log export such as stevedoring. Other transportation jobs apply to both export and domestic processing such as log hauling to a mill, LTF or export site. Source: N Stearns FASTR (October 2015)

Opportunities for Small Sales

The timber volume associated with the smaller units along the existing road system or after the construction of new road may be considered for small sale opportunities. This may have a slight positive effect to the overall economics of the project as volume from small sales would likely be processed locally. Though logging cost remain the same for a small operator as for a larger operator, cost associated with transporting timber could be reduced due to shorter hauls to a closer mills. Reduced haul costs could increase the potential indicated bid value for the volume harvested through small sales. Local processing reduces cost associated with transporting timber to a larger mill farther away. Potential small sales, however, will not change the project's estimated total volume, number of jobs, direct income, or logging systems by harvest method. Timber offered from the project area in small sales must be of sufficient volume and quality to cover costs and appraise positive. When more expensive logging systems are used and when extensive road construction is required it takes more volume to amortize the costs. So it is important to strategically offer small sales for instance where there is already access and volume offered uses the least cost harvesting methods.

Direct and Indirect Effects of the Alternatives

The analysis done for this project shows all action alternatives has being deficit. However, as previously explained, the alternatives are analyzed as a whole and could be repackaged as part of an alternative or with volume from another project to become a positive offer. Also it is not possible to predict future markets. Three of the action alternatives (Alternatives 2, 3, and 4) have relatively similar financial efficiency and Alternative 5 is roughly a third more deficit than the others. See Table 12

The amount of volume supplied to the Tongass timber program ranges from a low of 38 mmbf for Alternative 5 to 58 mmbf for Alternative 2. More details are discussed below.

Alternative 1 – No Action

The no action alternative is required by CEQ Section 1502.14(d) to provide a baseline for comparing alternatives. It also responds to concerns and comments that there should be no harvest timber or road construction, though this would not meet the purpose and need.

Alternative 2 – Proposed Action

The Proposed Action would supply the most timber volume (about 51 MMBF net sawlog) and direct annualized jobs (222 to 267) to meet the purpose and need for this project. This alternative has the second highest indicated advertised rate (negative \$59.23 per MBF net sawlog for export and negative \$220.64 per MBF net sawlog for domestic) relative to the other action alternatives.

This alternative has the second highest proportion (68 percent) of unit acres utilizing the most expensive yarding system, helicopter (\$406 per MBF net sawlog) for partial harvest. In proportion to total volume, this alternative exhibits the lowest road cost per net MBF and constructs the most miles of new roads for all alternatives.

This alternative is similar to Alternatives 3 and 4 in terms of the acres of shovel and cable yarding proposed. This alternative increases opportunity for partial harvest using helicopter over all the others; however, some cases may be better-suited for shovel or cable yarding.

Alternative 3

This alternative would supply the third greatest volume of timber (about 36 MMBF net sawlog) and direct annualized jobs (158 to 190) to meet the purpose and need for this project. This alternative has the highest indicated advertised rate (negative \$55.00 per MBF net sawlog for export and negative \$216.41 per MBF net sawlog for domestic) relative to the other action alternatives.

This alternative has one of the middle proportions (48 percent) of unit acres utilizing the most expensive yarding system, helicopter (\$413 per MBF net sawlog) for partial harvesting. In proportion to total volume, this alternative exhibits the second highest road cost per net MBF and constructs the second fewest miles of new roads for all action alternatives.

This alternative is similar to Alternatives 2 and 4 in terms of the amount of shovel and cable yarding proposed. This alternative reduces costs thereby increasing economics.

Alternative 4

This alternative would supply the second greatest volume of timber (about 39 MMBF net sawlog) and direct annualized jobs (168 to 202) to meet the purpose and need for this project. This alternative has the third highest indicated advertised rate (negative \$61.54 per MBF net sawlog for export and negative \$222.95 per MBF net sawlog for domestic) relative to the other action alternatives.

This alternative has one of the middle proportions (48 percent) of unit acres utilizing the most expensive yarding system, helicopter (\$427 per MBF net sawlog) for partial harvesting. In proportion to total volume, this alternative exhibits the highest road cost per net MBF and constructs the second most miles of new roads for all action alternatives.

This alternative is similar to Alternatives 2 and 3 in terms of the amount of shovel and cable yarding proposed. This alternative strives to increase supply using helicopter yarding within units that are only suitable for helicopter.

Alternative 5

This alternative would supply the least volume of timber (about 35 MMBF net sawlog) and direct annualized jobs (151 to 182) to meet the purpose and need for this project. This alternative has the most negative indicated advertised rate (negative \$92.74 per MBF net sawlog for export and negative \$254.15 per MBF net sawlog for domestic) relative to the other action alternatives.

This alternative has the highest proportion (73 percent) of unit acres utilizing the most expensive yarding system, helicopter (\$429 per MBF net sawlog) for partial harvesting. In proportion to total volume, this alternative exhibits the second highest road cost per net MBF and constructs the fewest miles of new roads for all action alternatives.

This alternative has the most helicopter harvest of all alternatives. In addition, it reduces the amount of shovel and cable harvest from the other three action alternatives.

Cumulative Effects

Indirect and cumulative effects are based on the ability of this project to contribute to the orderly flow of timber to large and small timber purchasers, mill operators, and value-added wood product industries in Southeast Alaska that are dependent upon the Forest's timber resources.

Economic effects are analyzed in the 1997 Forest Plan FEIS, 2003 Forest Plan SEIS, and 2008 Forest Plan Amendment FEIS and most recently in the analysis for the 2016 Forest Plan Amendment FEIS. Alternatives 2 through 5 would contribute to the timber-related economy of Southeast Alaska. Alternative 1 would not contribute to the timber-related economy and timber from other areas on the Tongass or other ownerships would have to be used to provide a supply. Past timber sales have contributed to the development of an existing road infrastructure which would be used for each action alternative.

Past timber harvest has occurred in VCUs 4750, 4760, 4770, 4780, 4790, and 4800, and on State lands in the Pats Creek drainage and just south of Earl West. Past timber management activities on Wrangell Island began in the early to mid-1950s using clearcut cable-yarding methods. Larger-scale clearcut logging began in the late 1970s and continued through about 1995, resulting in approximately 7,490 acres of clearcut harvest on NFS lands on Wrangell Island. Past harvest on Wrangell Island which are now non-National Forest lands is 3,286 acres.

There is no reasonably foreseeable timber harvest on Wrangell Island's National Forest System lands. The young growth stands on Wrangell Island do not meet commercial requisites and therefore are not considered as reasonably foreseeable. Reasonably foreseeable timber harvest on non-National Forest lands includes the State's Earl West Timber sale of 12.5 MMBF scheduled for 2019. This additional timber could help attract a purchaser for the Wrangell Island project, since a larger amount of wood could be offered between the two sales.

This project contains a significant supply of old-growth "bridge" timber that could support local jobs and facilitate the industry transition to a sustainable wood product industry based on young-growth management on the Forest and throughout Southeast Alaska. To support this, the Forest Service is currently working to implement other large timber projects in Southeast Alaska. Other ongoing bridge timber projects include the Big Thorne Project on Prince of Wales Island with an estimated 133.9 MMBF of old-growth timber most of which is under contract- and approximately 71 mmbf has been already harvested and also 15 MMBF of young-growth timber. Another bridge timber project includes the Saddle Lakes Timber Sale near Ketchikan. This project is currently being reanalyzed to account for the AMHTA land exchange within the Saddle Lakes project area. In addition, the Kosciusko Vegetation Management and Watershed Improvement project authorized the harvest of approximately 29.9 MMBF of young-growth timber to begin the transition to predominately young growth management.

Table 11. Alternative Comparison

Measure	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Acres of Uneven Aged Harvest	0	3,359	1,311	1,572	2,635
Acres of Even Aged Harvest	0	1,408	1,337	1,420	805
Total Acres	0	4,767	2,648	2,992	3,440
Logging Systems					
Cable	0	998	969	1,010	576
Shovel	0	528	411	543	343
Helicopter	0	3,241	1,268	1,439	2,521
Total Acres	0	4,767	2,648	2,992	3,440
Timber Volume by species					
Sitka Spruce Volume (MBF)	0	11,195	7,961	8,463	7,631
Hemlock Volume (MBF)	0	26,460	18,818	20,003	18,037
Western Red Cedar Volume (MBF)	0	4,071	2,895	3,077	2,775
Alaska Yellow Cedar Volume (MBF)	0	9,159	6,514	6,924	6,244
Total Net Sawlog Volume (MBF)	0	50,885	36,188	38,468	34,687
Utility Volume (MBF)	0	6,411	4,560	4,847	4,371
Total Net Volume (MBF)	0	57,296	40,748	43,315	39,058
Road Construction					
NFS Road Construction (miles)	0.0	16.8	15.4	15.9	12.7
Temporary Road Construction (miles)	0.0	9.9	8.9	10.3	6.6
Total Miles	0.0	26.7	24.3	26.2	19.3
Costs					
Logging Cost (\$/ net MBF) Stump to Truck	\$0	\$325.55	\$298.66	\$303.96	\$352.30
e	0	\$534.68	\$530.44	\$536.99	\$568.18
NFS Road Construction/Reconditioning Cost (\$/net MBF)	0	\$61.63	\$72.23	\$70.89	\$69.93
Indicated Advertised Rate Current Export Policy ² \$/MBF	0	(\$59.23)	(\$55.00)	(\$61.54)	(\$92.74)
Indicated Advertised Rate 100% Domestic Processing ^{3,4} \$/MBF		(\$220.64)	(\$216.41)	(\$222.95)	(\$254.15)
e					
Total Jobs Estimated under Current Region 10 Policy (includes export and domestic processing)	0	222	158	168	151
100% Domestic Processing	0	267	190	202	182

¹Stump to Mill costs includes cost of Specified road construction/reconstruction. Viking Lumber in Klawock, Alaska was used as the appraisal point for both domestic processing and export point. The estimated one-way tow distance to Klawock from the Pats LTF is about 130 miles.

²Assumes 100% Alaska domestic processing of hemlock /spruce /western red cedar; 100% export of Alaska yellow-cedar.

³Current export policy allows 100% Alaska yellow-cedar export plus hemlock /spruce export equal to 50% total sale net Sawlog volume.

⁴ Indicated Advertised Rate: Pond Log Value minus stump to truck costs and other associated costs (camp, lodging, P&R margin, etc.). () indicates a negative value, only positive appraised contracts could be offered.

Source: N Stearns FASTR (October 2015), Tongass GIS 2017

All Economic Analysis assumes Standard Profit and Risk (14 %)

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