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USDA Forest Service
Region 10

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Tongass National Forest Timber Sale Procedures

*Using Information About Market
Demand to Schedule FY 2001 Timber
Offerings*

October 2000

Responding to the Market Demand for Tongass Timber – FY 2001

Introduction

In 1990, Section 101 of the Tongass Timber Reform Act revised the process used to determine the amount of timber to be made available to dependent industry from the Tongass National Forest. Specifically, the method changed from an annual fixed volume based on the capability of the forest to sustain timber harvest to a process where the volume offered will be based on that needed to meet projected market demand, consistent with providing for all multiple use objectives. The Tongass Timber Reform Act (TTRA) states that:

Subject to appropriations, other applicable law, and the requirements of the National Forest Management Act (P.L. 94-588); except as provided in subsection 9d) of this section, the Secretary shall, to the extent consistent with providing for the multiple use and sustained yield of all renewable forest resources, seek to provide a supply of timber from the Tongass National Forest which (1) meets the annual market demand for timber from such forest and (2) meets the market demand from such forest for each planning cycle.

Both the 1997 Record of Decision and the 1999 Modified Record of Decision for the Tongass Land and Resource Management Plan Revision committed the Forest Service to base annual timber sale offerings on procedures developed for the purpose of implementing the “seek to meet market demand” language of the Tongass Timber Reform Act. In April 2000, the procedures were published in *Responding to the Market Demand for Tongass Timber* (Forest Service, Alaska Region R10-MB-413).

The procedures address the uncertainty associated with forecasting market conditions considering the transformation of the timber industry and the inability of the Forest Service to quickly respond to market fluctuations due to the time it takes to prepare timber for sale. The basic approach developed is to allow the industry to accumulate an adequate “volume under contract” (VUC), then monitor industry behavior and adjust timber program levels to keep pace with the harvest activity. The procedures rely on systematic monitoring of key economic indicators and stumpage market conditions to test assumptions about the relationships among the performance of the timber industry, economic conditions, and the Tongass timber sale program. It is anticipated that, as more knowledge is gained, some hypotheses may be modified, the predictive model may be refined, and/or changes may be made to the overall management strategy. Thus, the approach used in the procedures embodies the essence of adaptive management: a continual cycle of hypothesis – feedback – adjustment.

Tongass Timber Sale Procedures – Setting the FY 2001 Program

Forest Service Sale Preparation Handbook (FSH 2409.18) provides implementation direction to use the procedures described in *Responding to the Market Demand for Tongass Timber* in developing the annual timber sale schedule for the Tongass National Forest (R-10 Supplement 2409.18-2000-1). As stated in the FSH:

Timber Program Scheduling. Before issuing the six- and twelve-month timber sale schedules, use the procedures described in Region 10 Report number R10-MB-413, April 2000, titled “Responding to the Market Demand for Tongass Timber: Using Adaptive Management to Implement Sec. 101 of the 1990 Tongass Timber Reform Act.”

The procedures will be applied annually to determine possible market demand scenarios and updated quarterly thereafter. These quarterly companion documents to the above report will be posted on the Tongass National Forest web page. Table 10, page 29 of the report, will be used for posting the information.

Although this is the second report prepared to estimate timber demand incorporating the procedures, the draft document for FY 2000 was published too late to be implemented for the FY 2000 timber sale

program. FY 2001 will be the first year the annual timber sale schedule is developed consistent with timber demand expectations formulated in the procedures.

Development of Timber Sale Requirements to Meet Market Demand for FY 2001

The general approach is to consider the timber requirements of the region's sawmills at different levels of operation and under different assumptions about market conditions and technical processing capability. These assumptions provide a basis for estimating the volume of timber likely to be processed by the industry as a whole in any given year. Timber inventory requirements are acknowledged and estimated in a related calculation. The volume of timber likely to be purchased is equal to the volume needed to make up any inventory shortfall in addition to the volume likely to be harvested in the coming year. The predictive model is shown on page 4 and illustrates the data and results of this analysis for FY 2001. Each step in the process is described in more detail below. Data sources for specific elements of the model are included in the Tables section of this document.

Volume of Timber Processed Locally. The first step in the calculations adjusts mill capacity estimates (Model Item A and Table 1) by the percent of volume expected to come from the Tongass National Forest (Model Item B). The resulting volume is adjusted by the utilization rate assumed for each of three market scenarios (Model Item C and Table 1). This provides an estimate of the volume of logs, from the Tongass, likely to be processed into lumber by sawmills in Southeast Alaska under the different scenarios. These figures are then adjusted upward to account for species and grades of timber that are harvested but not processed into lumber locally (Model Item D and Table 2). Given this set of assumptions, the timber supply expected to be consumed in FY 2001 ranges from 130 million board feet (MMBF) in a "Low" market, 155 MMBF in a "Medium" market, to 203 MMBF in a "High" market (Model Item E).

Inventory Requirements. The second step provides an estimate of the volume of uncut timber inventory to carry under different market conditions. As described on pages 19-20 of *Responding to the Market Demand for Tongass Timber*, target inventory levels depends upon the volume expected to be processed each year (Model Item E) and the amount of time needed to replenish inventory (Model Item G and Table 3). The relationship is summarized in *Responding to the Market Demand for Tongass Timber* (Equation 2., page 20) and by the timber inventory requirements (Model Item I) for FY 2001 in the model. Because the volume of timber expected to be processed varies by scenario, timber inventory requirements also vary. Given the assumptions listed for each scenario, the desirable level of uncut timber inventory is estimated to range from 330 MMBF in a "Low" market, 392 MMBF in a "Medium" market, and 513 MMBF in a "High" market scenario (Model Item I).

Harvest Projections. The next step in the process is to incorporate the harvest estimates for FY 2001 (Model Item K and Table 4) that were developed by the Pacific Northwest (PNW) Forest and Range Experiment Station for fiscal years 1998 through 2007 (page 9 of *Responding to the Market Demand for Tongass Timber*).

Range of Expected Timber Purchases. By subtracting the volume under contract at the beginning of the fiscal year (Model Item J and Table 5) from the required inventory (Model Item I), the projected inventory shortfall (Model Item L) can be calculated. The low range of expected timber purchases (Model Item M) is considered to be replacement for the volume harvested; the high range (Model Item N) is the volume harvested plus the inventory shortfall so that the inventory requirement is met at the end of the year.

It is possible that the starting volume under contract exceeds the required inventory resulting in a negative inventory shortfall. In which case, the low range of expected timber purchases is the volume harvested less the inventory shortfall so that the resulting inventory requirement is the same as the volume under contract at the end of the year. The high range of expected timber purchases is a replacement of the projected timber harvest.

As shown in the model, under the "Low" market scenario, the starting volume under contract is 2 MMBF higher than the desirable level. As a result, FY 2001 timber sale purchases are expected to range from roughly 102 MMBF (the volume needed to replace the projected harvest net of the inventory surplus) to 105 MMBF (volume needed to replace volume harvested). Since there is a positive inventory shortfall for

the “Medium” and “High” market scenarios, the range is between the volume harvested and the volume harvested plus the inventory shortfall (129-189 MMBF and 158-339 MMBF respectively).

Timber Elements Developed to Meet Pipeline Objectives for FY 2001

In addition to seeking to meet annual timber demand objectives required by TTRA and the Forest Plan, the FY 1999 – 2001 Department of the Interior and Related Agencies Appropriations Bills have had direction for the Tongass to exceed annual timber purchaser requirements in order to reach and maintain a three year timber supply. In FY 2001, the Bill states that:

Tongass timber pipeline.—The Committee has provided an additional \$5,000,000 above the normal allocation for the Alaska Region to prepare and make available timber sales to establish a three year timber supply for operators on the Tongass National Forest. Sales are to be prepared which have a high probability of being sold in order to facilitate a reliable Federal timber supply and transition to value added processing for the forest products industry in Southeast Alaska. Bill language has been included which permits these funds to be used for purposes authorized in either the National Forest System or Capital Improvement and Maintenance appropriations in order to maximize accomplishments.

While the funding level has been different for each fiscal year, the direction to make enough timber available so that a three-year timber supply can be maintained has remained consistent. The intent of the timber supply is to give the timber manufactures in Southeast Alaska enough volume to maintain a viable inventory for financial integrity and to respond to market changes at their discretion, especially value-added processing opportunities.

Three-year Timber Supply. The annual timber supply needs from the Tongass National Forest is considered synonymous with the annual timber consumption (Model Item E). To estimate the three-year timber supply, the annual consumption is multiplied by three years (Model Item O). The three-year supply ranges from 391 MMBF in a “Low” market, 464 MMBF in a “Medium” market, and 608 MMBF in a “High” market scenario.

Timber Pipeline. The Tongass timber pipeline was established as a process to “ramp-up” to the three-year supply over a period of years. It is estimated that all of the pipeline volume that started between FY 1999 – FY 2001 will be made available, on an annual basis, by the end of FY 2004. Since the program has been on going, much of the volume needed to meet the inventory requirements will come from this program. The additional average annual volume needed to meet the three-year timber supply by FY 2004 (Model Item P and Table 6) is the difference between the three-year timber supply and the timber inventory requirement (Item O – Item I), spread evenly over a four-year period.

Total Timber Sale Requirement. By taking the median between the low and high range of the volume expected to be purchased, and combining it with the average annual pipeline volume, the total volume anticipate for purchase is estimated (Model Item Q). This ranges from 119 MMBF in a “Low” market, 177 MMBF in a “Medium” market, and 272 MMBF in a “High” market scenario.

Timber Sale Offer Objectives for FY 2001

The measure of meeting the TTRA “seek to meet” and the appropriations bill “three-year timber supply” is volume sold from the Tongass National Forest. To meet these objectives, a sufficient amount of volume must be offered to account for any fall-down between the volume offered and the volume sold. The final step in projecting the amount of volume to be purchased is to evaluate the anticipated volume that needs to be offered.

Timber Sale Fall-down. Historically, there has been a difference between the volume offered and the volume sold from National Forest timber sales. The reluctance of purchasers to buy timber sales tends to increase as markets decrease and/or logging cost increase (Model Item R).

Projected Offer Objectives. In an effort to project the amount of volume that needs to be offered in FY 2001 for each of the market scenarios, the total timber sale projection (Model Item Q) is increased to account for fall-down (Model Item R) to provide a rough estimate of the volume to be offered for each market scenario to meet timber sale objectives (Model Item S).

Results. The Forest Service has control of the amount of timber offered during the fiscal year. The willingness of timber purchasers to buy the timber offered is based on complex management decisions that include replenishing volume harvested so that an adequate amount of volume under contract is maintained to provide a steady flow of timber to meet manufacturing objectives. The low and high range of expected timber purchases for each market scenarios (Model Item M and N) illustrates annual demand. In addition to volume estimated to meet annual timber inventory requirements, industry has requested, and Congress has provided direction, that the Forest Service increase the annual offerings so that a three-year timber supply can be maintained. To “ramp-up” to a three-year timber supply over the next several years requires industry to be willing to purchase additional volume than needed to maintain the annual inventory requirements (Model Item Q). As shown in the table below, the volume predicted to be offered to meet the annual timber inventory requirements, and the additional average pipeline volume to satisfy a three-year timber supply, including an estimated fall-down between volume offered and sold, ranges from 142 MMBF in a “Low” market, 203 MMBF in a “Medium” market, and 299 MMBF in a “High” market scenario for FY 2001 (See Chart 1).

Predicting Likely Timber Purchases and Offer Levels for FY 2001

Model Item	Notation	Market Scenarios		
		Low	Medium	High
Demand				
A. Installed and operable mill capacity (MMBF, log scale)	a	251	251	251
B. Share of industry raw material provided by the Tongass	b	90%	90%	90%
C. Industry rate of capacity utilization	c	30%	43%	66%
D. Percent usable wood in average timber sale	d	52%	63%	73%
E. Annual Tongass timber consumption (MMBF, theoretical)	$e=((a*b)*c)/d$	130	155	203
F. Standard deviation of lead time (years)	f	0.59	0.59	0.59
G. Average lead time (years)	g	1.17	1.17	1.17
H. Value of t-statistic (one-tailed test for 99% at infinity)	h	2.326	2.326	2.326
I. Timber inventory requirements (MMBF)	$i=(e*g)+((e*h)*f)$	330	392	513
J. Starting Volume Under Contract (Sep. 30, 2000)	j	332	332	332
K. Projected harvest (MMBF), FY2001 from PNW	k	105	129	158
L. Projected inventory shortfall (MMBF)	$l=i-j$	-2	60	181
M. Low range of expected timber purchases (MMBF), FY01	$m=if\ l < 0, k+l, \text{ else } k$	102	129	158
N. High range of expected timber purchases (MMBF), FY01	$n=if\ l < 0, k, \text{ else } k+l$	105	189	339
Pipeline				
O. Three year timber supply (MMBF, theoretical)	$o=e*3$	391	464	608
P. Average pipeline vol. to meet timber supply in four years (MMBF)	$p=(o-i)/4$	15	18	24
Q. Total sell to meet timber supply objective (MMBF), FY01	$q=median(m:n)+p$	119	177	272
Offer				
R. Fall-down between volume offered and volume sold	r	20%	15%	10%
S. Required offered to meet timber supply objectives (MMBF), FY01	$s=q+(q*r)$	142	203	299

Setting the Timber Offer Level for FY 2001

As shown in the prediction model above, different assumptions about markets and industry configuration yield different outcomes. For any given year, all values within the full range displayed in the model are not equally likely.

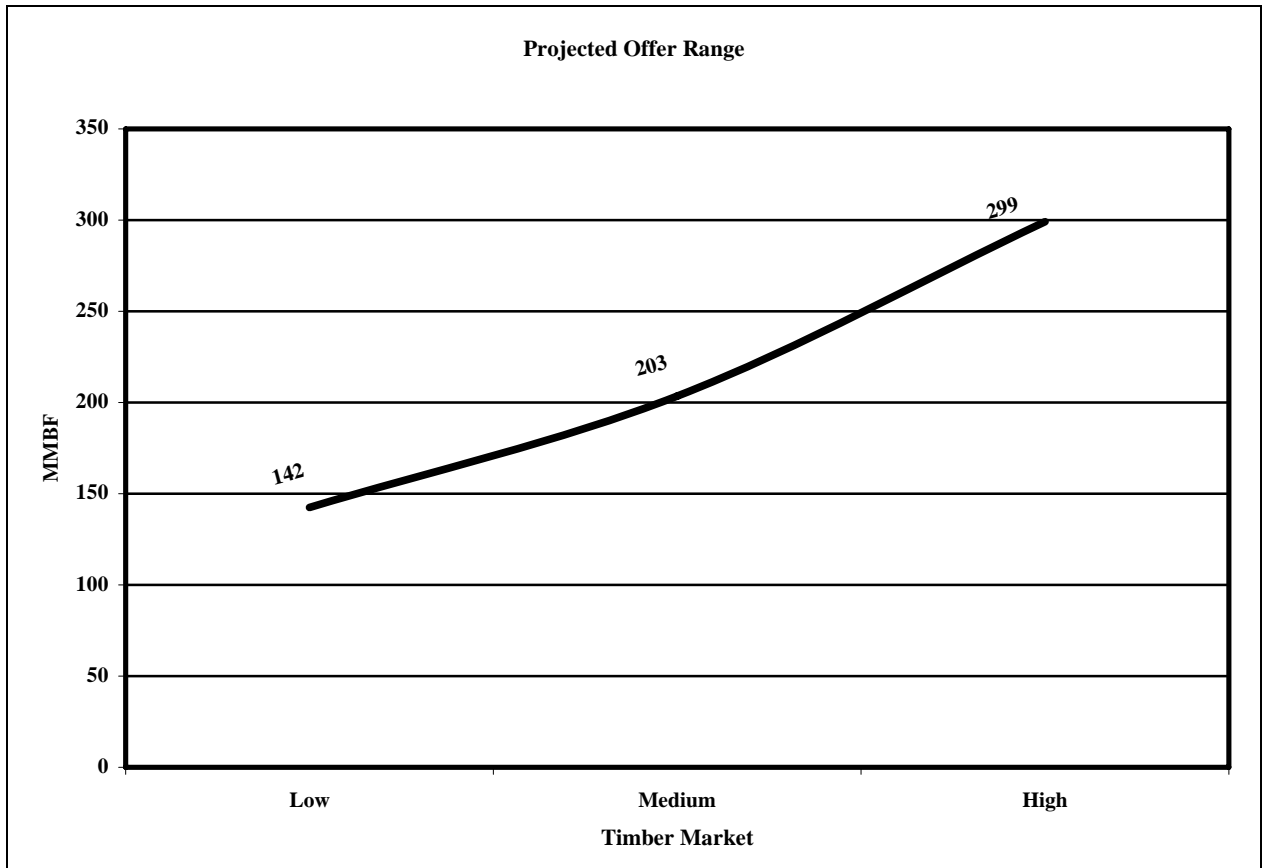
Current information suggests relatively poor timber market conditions, low capacity utilization rates in Alaska's mills and increasing harvest costs associated with the Revised Tongass Land Management Plan. Even with the addition of the new Gateway Forest Products Veneer Mill, timber inventory is substantial compared to the recent past, partly as a result of volume purchased by Gateway with no harvest as of the start of FY 2001. Industry, as a whole, has an adequate supply of timber under contract to satisfy the projected harvest level in FY 2001 for all scenarios. Decisions about the FY 2001 offer level, therefore, are not likely to constrain FY 2001 industry operations but can have an effect on the industry's ability to meet market demand for products in future years. Given these considerations, it would be reasonable to set the initial FY 2001 offer level near the "Low" scenario (around 140 MMBF). If the actual harvest level is equal to the projected harvest for the "Low" scenario (105 MMBF), the industry will be able to maintain inventory and meet timber pipeline objectives. If harvest levels are higher or lower than projected, the difference will be reflected in the ending inventory. As was done in the model for FY 2001, surplus or deficit inventory is automatically factored into the offer level for future years.

In choosing the offer level, it is important to anticipate the consequences of a "wrong" decision. In terms of short-term economic consequences, over-supplying the market is less damaging than under-supplying it. If more timber is offered than purchased in a given year, the unsold volume is still available for purchasing off-the-shelf or to be re-offered at a minimal investment. However, a significant shortfall in the supply of timber available for harvest in a given year can be financially devastating to the industry.

As displayed in the model, planning the annual timber program requires more than just pure economic factors. To account for delays in timber sale preparation, administrative appeals, and/or litigation, sufficient contingency volume must be included in the annual timber sale program to account for realistic fall-downs. Budget and organizational constraints limit the extent to which the Forest Service can respond to economic cycles and the associated fluctuations in timber demand. All of these factors must be considered in evaluating the annual market demand for timber and setting annual timber offerings.

In the final analysis, planning the annual timber sale program is an exercise in professional judgment. The purpose of this paper is to clearly identify the extent to which economic indicators contribute to the decision making process. The procedures described here will allow the decision-maker to make an informed judgment about the volume of timber to offer based on demand projections, including additional volume to account for fall-down between the volume offered, but not sold (either offer but not sold or planned but not offered because of timber sale preparation delays or appeals/litigation), and the volume purchased.

Chart 1. Projected Range of Volume to be Offered in FY 2001 (MMBF)



Tables

- Table 1. An Estimate of Mill Capacity and Utilization for FY 2001
- Table 2. Timber Utilization in Southeast Alaska Sawmills
- Table 3. Lead Time for Selected Tongass National Forest Timber Sales
- Table 4. Projected Tongass National Forest Timber Harvest
- Table 5. Volume Under Contract at the end of FY 2000
- Table 6. Estimate of Pipeline Volume to Meet Three Year Timber Supply by FY 2004

Predicting Likely Timber Purchases and Offer Levels for FY 2001
 October 20, 2000

Elements	Notation	Low	Medium	High
Demand				
A. Installed and operable mill capacity (MMBF, log scale)	a	251	251	251
B. Share of industry raw material provided by the Tongass	b	90%	90%	90%
C. Industry rate of capacity utilization	c	30%	43%	66%
D. Percent usable wood in average NF timber sale	d	52%	63%	73%
E. Annual Tongass timber consumption (MMBF, theoretical)	$e = ((a*b)*c)/d$	130	155	203
F. Standard deviation of lead time (years)	f	0.59	0.59	0.59
G. Average lead time (years)	g	1.17	1.17	1.17
H. Value of t-statistic (one-tailed test for 99% at infinity)	h	2.33	2.33	2.33
I. Timber inventory requirements (MMBF)	$i = (e*g) + ((e*h)*f)$	330	392	513
J. Starting Volume Under Contract (Sep. 30, 2000)	j	332	332	332
K. Projected harvest (MMBF), FY2001 from PNW	k	105	129	158
L. Projected inventory shortfall (MMBF)	$l = i - j$	-2	60	181
M. Low range of expected timber purchases (MMBF), FY01	$m = \text{if } l < 0, k + l, \text{ else } k$	102	129	158
N. High range of expected timber purchases (MMBF), FY01	$n = \text{if } l < 0, k, \text{ else } k + l$	105	189	339
Pipeline				
O. Three year timber supply (MMBF, theoretical)	$o = e * 3$	391	464	608
P. Average pipeline vol. to meet timber supply in four years (MMBF)	$p = (o - i) / 4$	15	18	24
Q. Total sell to meet timber VUC objective (MMBF), FY01	$q = \text{median}(m:n) + p$	119	177	272
Offer				
R. Fall-down between volume offered and volume sold	r	20%	15%	10%
S. Required offered to meet VUC sell objectives (MMBF), FY01	$s = q + (q*r)$	142	203	299

Table 1 - An Estimate of Mill Capacity and Utilization for FY 2001 (Model Item A and C)

Name of Mill CY 1999 Analysis	Sawlog Capacity (MMBF l.s.)
Gateway Veneer Plant	50
Gateway Sawmill - Ward Cove	50
Silver Bay, Wrangell Sawmill	40
Viking Lumber Company	35
Pacific Log and Lumber	35
Icy Straits Lumber	8
Metlakata Forest Products	5
The Mill, Inc.	6
Small Sawmills	22
Total	251

Sawlog Utilization

Market Scenario	Low	Average	High
Analysis Period ⁽¹⁾	CY 99	CY 81-97	CY 91-93
Sawmill Capacity ⁽²⁾	251	295	268
Sawlog Consumption (l.s.) ⁽³⁾	76	127	176
Lumber Output (l.t.) ⁽⁴⁾	90	155	215
Overrun (l.t./l.s.) ⁽⁵⁾	1.18	1.22	1.22
Percent Sawlog Utilization (l.s.) ⁽⁶⁾	30%	43%	66%

(1) Analysis Period - Low Market represents CY99 based on recent cost studies. Average (Medium) and High Market is based on market cycles consistent with those scenarios derived from annual averages calculated from Responding to Market Demand for Tongass Timber, Table 4 (R10-MB-413, April 2000).

(2) Mill Capacity - Theoretical capacity of a mill to saw lumber, usually based on 2 shifts for 250 days per year.

(3) Sawlog Consumption - Round log volume, measured in log scale (l.s.), actually sawn.

(4) Lumber Output - Lumber volume, measured in lumber tally (l.t.), actually sawn.

(5) Overrun - Ratio of the excess lumber volume sawn from the measured logs (l.t. / l.s.).

(6) Sawlog Capacity Utilization - The proportion of capacity that is actually utilized.

Table 2. Timber Utilization in Southeast Alaska Sawmills (Model Item D)

Species/Grade	Use by SE Alaska Ind.	Percent of Timber Sale Volume Market Scenarios		
		Low	Med.	High
Alaska Yellow Cedar	Exported in Round Log	8%	8%	8%
Western Red Cedar ⁽¹⁾	Exported in Round Log	4%	4%	4%
Small/Low Grade Sawtimber ⁽²⁾	Chipped or Exported	21%	10%	0%
Utility ⁽³⁾	Chip,Export,Wood Residue	14%	14%	14%
Higher Grade Sawtimber	Sawn Locally	52%	63%	73%
Total		100%	100%	100%

Worksheet

Volume Sold From FY98 - FY00 Cut and Sold Report (Volume in MBF)

Species	Expected Use	FY98	FY99	FY00	Annual	
					Avg	Percent
Yellow Cedar	100% Exported	2,608	3,313	13,906	6,609	8.2%
Sitka Spruce/W. Hemlock	(1/3 chip log, 2/3 sawn)	17,799	47,383	114,850	55,244	68.8%
Red Cedar	(1/2 exported, 1/2 sawn)	1,386	3,390	15,968	6,915	8.6%
Utility	100% chip,export,left in woods	1,792	7,275	25,458	11,508	14.3%
Total		23,585	61,361	170,182	80,276	100.0%

Several assumptions used in the original estimate of useable wood published in *Responding to the Market Demand for Tongass Timber*, April 2000 (Table 6, page 18) have changed. The following is an explanation of those changes:

- (1) In the original calculation, it was assumed that all western red cedar would be processed locally (no export). Based on export records, only about 50% is sawn locally, the remaining (50%) is exported. This will not change in FY01.
- (2) In the original calculations, the percent of small, low-grade sawlogs not sawn (exported or chipped) was estimated at 32% (Low), 13% (Medium), and 0% (High). Based on anticipated increased utilization capabilities of the Gateway Veneer Mill to manufacture small sawlogs locally, these estimates have been updated.
- (3) All utility volume will be sold but, with optional removal in some of the new contracts, a portion of the volume will be left in the woods as wood residue.

Table 3. Lead Time for Selected Tongass National Forest Timber Sales (Model Item G)

Purchaser	Sale Name	Sale Qty. (MBF)	Spec. Roads (Miles)	Bid Date (MM/YY)	Award Date (MM/YY)
Silver Bay Logging	South Mckenzie	12,627	12.0	07/96	08/96
Viking Lumber Company	Shamrock	24,284	20.8	10/96	03/97
Age Cedar Products	Heceta Sawfly Salvage	11,647	4.4	12/96	03/97
Whitestone SE Logging Co.	Humpback/Gallagher	21,319	4.9	04/97	04/97
Rayonier, Inc.	A.T.C.	8,544	0.0	06/97	06/97
Rayonier, Inc.	Rowan Settlement	11,496	20.9	08/97	08/97
Viking Lumber Co., Inc.	North Thorne	2,276	1.6	10/98	11/98
Silver Bay Logging, Inc.	Nemo Loop	6,572	3.0	01/99	01/99
Viking Lumber Co., Inc.	Crane	8,751	20.4	05/99	07/99
Silver Bay Logging	Scattered	5,612	0.0	12/99	12/99

Average Lead Time:

Variance:

Standard Deviation:

Table 4. Volume Under Contract at the end of FY 2000 (Model Item J)

U.S. Forest Service, Remaining Timber Sales Volumes (MBF) By Purchaser As of September 30, 2000

Bid Date yyymmdd	Term yyymmdd	Purchaser	Sale Name	Current Qty Est (MBF)	Volume Cut (MBF)	Remaining Vol (MBF)
Tongass National Forest						
Petersburg S.O.						
000829	011031	Luthier Tone Woods	Deer Run Salvage	119.03	0.00	119.03
990520	030331	Pacific Log & Lumber Ltd	Todahl Backline	7,868.14	0.00	7,868.14
990630	040331	Pacific Log & Lumber Ltd	Rowan Mountain	20,231.09	0.00	20,231.09
970513	030731	Silver Bay Logging	King George	24,796.90	2,780.91	22,015.99
971028	020731	Silver Bay Logging	South Lindy	10,573.00	0.00	10,573.00
981110	010331	Silver Bay Logging	South Lindy One	1,575.09	0.00	1,575.09
990112	020930	Silver Bay Logging	Nemo Loop	7,864.95	7,805.70	59.25
991027	040331	Silver Bay Logging	Crystal	7,016.54	0.00	7,016.54
991214	020331	Silver Bay Logging	Scattered	5,612.02	4,844.84	767.18
000222	020331	Silver Bay Logging	Goose	1,162.88	808.02	354.86
000418	020331	Silver Bay Logging	South Central	940.88	0.00	940.88
000705	030331	Silver Bay Logging	East Fork	2,186.83	0.00	2,186.83
000711	040331	Silver Bay Logging	Canal Hoya	16,127.01	0.00	16,127.01
990727	020331	The Mill, Inc	Wedge	643.95	0.00	643.95
951031	030331	Viking Lumber Company	Bohemia	35,694.30	26,662.30	9,032.00
961029	030331	Viking Lumber Company	Shamrock	24,283.82	12,270.82	12,013.00
990520	040331	Viking Lumber Company	Crane	8,894.60	7,834.74	1,059.86
991026	040331	Viking Lumber Company	Fourleaf	21,766.90	0.00	21,766.90
Sitka S.O.						
*****	000930	Larry Chuderewicz	Permit	6.29	0.00	6.29
940929	020815	Silver Bay Logging	Saook	23,348.00	0.00	23,348.00
970410	030815	Whitestone SE Logging Co.	Humpback/Gallagher	21,322.03	8,686.06	12,635.97
Ketchikan S.O.						
970820	020405	Age Cedar Products	Junction Timber	154.00	0.00	154.00
970917	021015	Age Cedar Products	Ridge Timber	629.00	0.00	629.00
000628	021231	Beaver Creek Logging	Relief III	256.77	0.00	256.77
000725	021031	Beaver Creek Logging	Buster Bay	290.80	39.27	251.53
000905	011031	Brent Cole	Cape Lynch String SV	34.00	0.00	34.00
000609	001031	Chris Cook	TNB Microsale #6	6.84	0.00	6.84
990413	020331	Gateway Forest Products	Longline	5,170.09	0.00	5,170.09
990527	030331	Gateway Forest Products	Dumpy ATC	19,657.39	0.00	19,657.39
990706	030331	Gateway Forest Products	Cable Drop	11,917.66	0.00	11,917.66
990707	031031	Gateway Forest Products	Big Bob	7,099.01	0.00	7,099.01
990707	031031	Gateway Forest Products	Rio Beaver	5,519.51	0.00	5,519.51
000113	030731	Gateway Forest Products	North	7,688.37	0.00	7,688.37
000315	030331	Gateway Forest Products	Buckdance	10,714.41	0.00	10,714.41
000324	041031	Gateway Forest Products	Madder	25,882.27	0.00	25,882.27
990526	010630	Gateway Forest Products	Brand X	2,051.84	0.00	2,051.84

991216	030630	Gateway Forest Products	Orion Timber Sale	12,189.31	0.00	12,189.31
			Steak & Shake			
000606	010630	H & L Salvage, Inc	Cedar	8.00	0.00	8.00
000714	001031	H & L Salvage, Inc	TNB Microsale #10	7.20	0.00	7.20
000911	010630	Jack Akerill	Microsale #17	12.00	0.00	12.00
000701	001031	Jack Harrison	Microsale #9	9.69	7.27	2.42
000719	011031	Jack Harrison	East Fork Cedar Sal	37.50	0.00	37.50
000719	011031	Jack Harrison	Rat Tail Salvage	9.00	0.00	9.00
*****	001031	Jan David Petersen	Permit	230.16	0.00	230.16
			Red Rush Cedar			
000606	010630	Jerry Jones	Salv	10.29	5.14	5.15
000915	010630	Jerry Jones	TNB Microsale #11	4.50	0.00	4.50
000615	001031	Larry Trumble	TNB Microsale #8	17.10	12.82	4.28
990611	010430	Little Bit Logging	Rush Fast	782.79	542.97	239.82
			New Age			
990705	010930	Mining/Excavation	Wolf Pup	1,192.77	0.00	1,192.77
			Heceta Sawfly			
961217	010630	Pacific Log & Lumber Ltd	Salvag	11,996.80	6,935.63	5,061.17
970820	020821	Pacific Log & Lumber Ltd	Alder Creek Timber	2,183.00	0.00	2,183.00
990817	001130	Porter Lumber	Upper Tux Salvage	173.88	111.90	61.98
000628	021231	Porter Lumber	Ahtun Point Salv III	68.15	0.00	68.15
991026	021031	Ronger Grant	Log Jam	1,190.95	0.00	1,190.95
*****	001130	Russ Station	Permit	4.90	0.00	4.90
971015	011031	Seley Family Ltd Ptshp	Abandon	278.00	0.00	278.00
980923	991031	Seley Family Ltd Ptshp	Picasso Timber Sale	614.01	376.41	237.60
970722	021031	Silver Bay Logging	Upper Carroll Sale	30,072.00	0.00	30,072.00
981026	010331	Viking Lumber Company	North Thorne	2,275.61	2,253.16	22.45
990908	020930	Viking Lumber Company	Naukati Blowdown	884.89	0.00	884.89
990920	010930	Viking Lumber Company	Chusini Salvage	435.03	0.00	435.03
991012	040331	Viking Lumber Company	South Arm	10,094.01	0.00	10,094.01
990827	010731	W R Jones & Son Lumber	Whereabouts	194.36	0.00	194.36
TOTAL				414,082.11	81,977.96	332,104.15

Table 5. Projected Tongass National Forest Timber Harvest (Model Item K)
(million board feet, sawlog + utility volume)

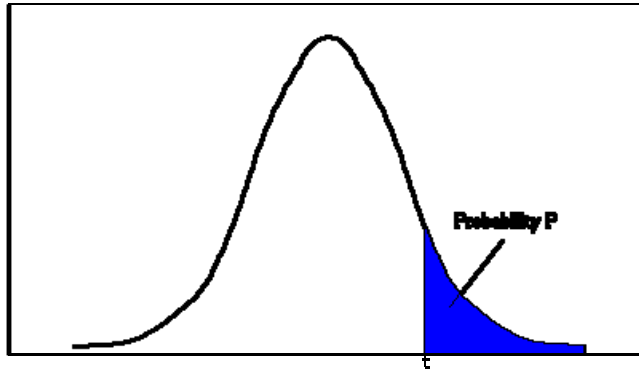
Fiscal Year	Market Scenarios			Actual
	Low	Med	High	
1998	77.3	86.0	112.2	119.8
1999	86.4	99.3	127.9	145.8
2000	95.5	115.9	142.7	146.8
2001	104.6	129.0	157.7	
2002	113.7	134.9	173.1	
2003	122.8	140.8	188.9	
2004	131.9	146.5	205.0	
2005	131.9	152.2	221.4	
2006	131.9	157.8	238.2	
2007	132.0	163.4	255.3	
Average	112.8	132.6	182.2	137.5

**Source: Timber Products Output and Timber Harvests in Alaska:
Projection for 1997 - 2010, Gen. Tech. Rep. PNW-GTR-409,
Portland, OR, USDA Forest Service, PNW Research Station.
Actual from annual Cut and Sold Reports.**

Table 6. Estimate of Pipeline Volume to Meet Three Year Supply by Fiscal Year 2004
(Measured by Volume Under Contract (VUC) for Three Years Tongass Timber Consumption)

Fiscal Year	2001	2002	2003	2004	→
Low					
a. Start VUC	332	342	358	373	391
b. Est. Harvest	105	114	123	132	132
c. Vol. Purchased w/o Pipeline	100	114	123	135	132
d. Ending VUC before Pipeline	327	342	358	376	391
e. Pipeline Ramp-Up	15	15	15	15	0
f. Total Ending VUC	342	358	373	391	391
Medium					
a. Start VUC	332	380	418	445	463
b. Est. Harvest	129	135	141	147	155
c. Vol. Purchased w/o Pipeline	159	155	150	147	155
d. Ending VUC before Pipeline	362	400	427	445	463
e. Pipeline Ramp-Up	18	18	18	18	0
f. Total Ending VUC	380	418	445	463	463
High					
a. Start VUC	332	446	522	581	605
b. Est. Harvest	158	173	189	205	225
c. Vol. Purchased w/o Pipeline	248	225	225	205	225
d. Ending VUC before Pipeline	422	498	558	581	605
e. Pipeline Ramp-Up	24	24	24	24	0
f. Total Ending VUC	446	522	581	605	605

Model Item H - t Distribution for One-tailed Test



t distribution critical values												
df	p for one-tailed test											
	0.250	0.200	0.150	0.100	0.050	0.025	0.020	0.010	0.005	0.003	0.001	0.001
1	1.000	1.376	1.963	3.078	6.314	12.71	15.89	31.82	63.66	127.0	318.3	636.600
2	0.816	1.061	1.386	1.886	2.920	4.303	4.849	6.965	9.925	14.09	22.33	31.600
3	0.765	0.978	1.250	1.638	2.353	3.182	3.482	4.541	5.841	7.453	10.21	12.920
4	0.741	0.941	1.190	1.533	2.132	2.776	2.999	3.747	4.604	5.598	7.173	8.610
5	0.727	0.920	1.156	1.476	2.015	2.571	2.757	3.365	4.032	4.773	5.893	6.869
6	0.718	0.906	1.134	1.440	1.943	2.447	2.612	3.143	3.707	4.317	5.208	5.959
7	0.711	0.896	1.119	1.415	1.895	2.365	2.517	2.998	3.499	4.029	4.785	5.408
8	0.706	0.889	1.108	1.397	1.860	2.306	2.449	2.896	3.355	3.833	4.501	5.041
9	0.703	0.883	1.100	1.383	1.833	2.262	2.398	2.821	3.250	3.690	4.297	4.781
10	0.700	0.879	1.093	1.372	1.812	2.228	2.359	2.764	3.169	3.581	4.144	4.587
11	0.697	0.876	1.088	1.363	1.796	2.201	2.328	2.718	3.106	3.497	4.025	4.437
12	0.695	0.873	1.083	1.356	1.782	2.179	2.303	2.681	3.055	3.428	3.930	4.318
13	0.694	0.870	1.079	1.350	1.771	2.160	2.282	2.650	3.012	3.372	3.852	4.221
14	0.692	0.868	1.076	1.345	1.761	2.145	2.264	2.624	2.977	3.326	3.787	4.140
15	0.691	0.866	1.074	1.341	1.753	2.131	2.249	2.602	2.947	3.286	3.733	4.073
16	0.690	0.865	1.071	1.337	1.746	2.120	2.235	2.583	2.921	3.252	3.686	4.015
17	0.689	0.863	1.069	1.333	1.740	2.110	2.224	2.567	2.898	3.222	3.646	3.965
18	0.688	0.862	1.067	1.330	1.734	2.101	2.214	2.552	2.878	3.197	3.611	3.922
19	0.688	0.861	1.066	1.328	1.729	2.093	2.205	2.539	2.861	3.174	3.579	3.883
20	0.687	0.860	1.064	1.325	1.725	2.086	2.197	2.528	2.845	3.153	3.552	3.850
21	.663.	0.859	1.063	1.323	1.721	2.080	2.189	2.518	2.831	3.135	3.527	3.819
22	0.686	0.858	1.061	1.321	1.717	2.074	2.183	2.508	2.819	3.119	3.505	3.792
23	0.685	0.858	1.060	1.319	1.714	2.069	2.177	2.500	2.807	3.104	3.485	3.768
24	0.685	0.857	1.059	1.318	1.711	2.064	2.172	2.492	2.797	3.091	3.467	3.745
25	0.684	0.856	1.058	1.316	1.708	2.060	2.167	2.485	2.787	3.078	3.450	3.725
26	0.684	0.856	1.058	1.315	1.706	2.056	2.162	2.479	2.779	3.067	3.435	3.707
27	0.684	0.855	1.057	1.314	1.703	2.052	2.150	2.473	2.771	3.057	3.421	3.690
28	0.683	0.855	1.056	1.313	1.701	2.048	2.154	2.467	2.763	3.047	3.408	3.674
29	0.683	0.854	1.055	1.311	1.699	2.045	2.150	2.462	2.756	3.038	3.396	3.659
30	0.683	0.854	1.055	1.310	1.697	2.042	2.147	2.457	2.750	3.030	3.385	3.646
40	0.681	0.851	1.050	1.303	1.684	2.021	2.123	2.423	2.704	2.971	3.307	3.551
50	0.679	0.849	1.047	1.295	1.676	2.009	2.109	2.403	2.678	2.937	3.261	3.496
60	0.679	0.848	1.045	1.296	1.671	2.000	2.099	2.390	2.660	2.915	3.232	3.460
80	0.678	0.846	1.043	1.292	1.664	1.990	2.088	2.374	2.639	2.887	3.195	3.416
100	0.677	0.845	1.042	1.290	1.660	1.984	2.081	2.364	2.626	2.871	3.174	3.390
1000	0.675	0.842	1.037	1.282	1.646	1.962	2.056	2.330	2.581	2.813	3.098	3.300
inf.	0.674	0.841	1.036	1.282	1.640	1.960	2.054	2.326	2.576	2.807	3.091	3.291