
CITY OF SITKA
FINAL STUDY PLAN
BLUE LAKE PROJECT EXPANSION
TIMBER INVENTORY SPECIFICATION

BLUE LAKE DAM - INUNDATION to 425' ELEVATION
5 X 5 CHAIN GRID (1 PLOT PER 2.5 ACRES)

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INVENTORY FIELD INSTRUCTION CONTENT

TIMBER TO BE CRUISED

- 1) Species to be cruised include Sitka spruce, western redcedar, hemlock, Alaska yellow- cedar, red alder and lodgepole pine.
- 2) Diameter breast height (DBH) classes greater than or equal to 8" DBH cruised with fixed Basal Area Factor (BAF) sweep at DBH, a per stand goal of 5-6 trees per plot.
- 3) The Forest Service would like the timber to be cruised to include all species down to a 4" diameter in order to estimate the amount of firewood that could be available. The data needed is for trees with a DBH of 4.0" to 7.6" is diameter and total tree height. To accomplish this, 1/10th acre (37.24' radius) fixed circular plots will be placed to coincide with the variable plot center. This data will be expanded to a cubic foot volume for the timbered areas.

TYPE OF CRUISE

The timber cruise layout is shown on Map 1 at the back of this report. The map is in geographic information system (GIS) format using Alaska State Plane Projection, Zone 1, North American Datum (NAD) 1983. The (82) plots have been randomly selected by a gross plot rectangular overlay clipped to the (14) delineated timber stands. Total timbered area is estimated at 197.20 acres to a 425' elevation per the stand table below as GIS mapped.

TABLE 1

<u>STAND NO.</u>	<u>ACRES</u>
1	11.62
2	9.10
3	11.51
4	3.30
5	30.38
6	10.38
7	37.00
8	21.58
9	0.60
10	6.83
11	8.51
12	0.93
13	7.47
14	<u>37.99</u>
	<u>197.20</u>

NOTE: These acreage estimates were created by GIS and are not to be considered land survey acres.

The cruise is a variable plot cruise utilizing a fixed square sampling on a 5 chain x 5 chain grid, 330 feet by 330 feet (See Attached Map). Measure plots will be alternated) with a tree count plot in between each measure plot on transect. All plots falling within Riparian Management Zones will be measured plots. Coordinates for each individual plot are shown on Table 2, following on pages 6 and 7.

Measure Plots - Spaced prism plots using the same BAF within polygon. The sight and form point shall be diameter breast height (DBH) 4½' above ground. Form factor to be taken at 32'. Diameters taken in 1" diameter classes. Merchantable and total height to be recorded on each measure tree.

Tree Count Plots - Spaced prism plots in between measure plots, same BAF within polygon as measure plot, sight at diameter breast height (DBH) record number of trees by specie. Every live tree tallied 8" DBH and over. Snags and standing live cull counted if at least 16" DBH and 32' tall. They will be designated on plot card as Dead or Live Cull.

SAMPLING PROCEDURE

Merchantability - A merchantable log will have a net-scaled content of at least one third of the gross volume or 50% of gross scale in firm chips for utility logs. The minimum tree will have at least one 16' by 6" diameter log.

Every live tree will be tallied 8" DBH and over using 1" diameter classes (i.e., 7.6" – 8.5" = 8" DBH class). Trees without a merchantable log will have DBH and height recorded.

Dead Snags or live cull with merchantable content will be recorded if at least 16" DBH and 32' tall. On plot cards they will be coded as a snag or live cull. Dead snags which fall below minimum merchantable specifications are not cruised (Live culls are cruised and counted).

Downed or dead merchantable timber counted in or out with DBH based on where currently is located in reference to plot center.

Diameters - Measured, with diameter tape (when possible) at DBH of all trees of sawtimber size on every plot and record to one-tenth inch in D4H column.

No Tally Plots - Record 0 trees for no tally plot .

Heights and Top diameters - Height in 32-foot (32'8") logs. Trees less than 24"DBH – Merchantable height to a 6" top.

Trees greater than or equal to 25"DBH – Merchantable height to 50% diameter outside bark (DOB) at 16 feet, ($\pm 40\%$ DBH).

Form heights shall be measured on a minimum of (6) per species across diameter.

Scale Rule - Scribner 32' Long Log scale.

Grading - Grade and external defect by individual log. Graded in fixed 32 foot log lengths using preferred lengths. Grading by Puget Sound Log Scaling and Grading Bureau Rules.

Grade Codes: 0	Peeler/Select
1	1 Sawlog
2	2 Sawlog
3	3 Sawlog
6	Special Mill
8	Utility/Pulp
8C	Cull
9	Missing

GPS location for all plots - It is recognized that not all plots will be able to receive satellite information, and cruisers shall not lose a significant amount of time waiting for satellite signals to register. It is hoped however that to the extent reasonable beginning and ending points of the sample plot line be referenced with GPS, and accurately located on a map or aerial photo. Plot locations will be marked with Red glow heavy-duty ribbon on plot center and at eye level.

NOTE: All plots have been assigned a GPS latitude and longitude coordinate that should aid the timber cruiser in finding the locale. ONLY attempt to obtain GPS readings in wide-open areas and along the beaches as a check to your location as you cruise. Do not waste time trying to obtain a reading in heavy timber.

Timber cruiser shall indicate on field map the direction and bearing of run between plots in order taken.

Timber Types Sampled - Forest types will be mapped as encountered on the ground and identified on photos. Final maps will reflect the field type calls. No pre-mapping of types will be made. Type call to be placed at the top of cruise card, this call will be used to help sort plot by type for the volume extension. Type call applies to the area represented by the plot and not just to the trees specific to the plot as follows:

WH - Hemlock (nearly pure)

HS - Hemlock (51%+)/spruce

SH - Spruce (51%+)/hemlock

CH - Cedar/hemlock mix

SS - Spruce (nearly pure)

MKG - Muskeg

NC - Non-commercial (mixed scrub timber, rock pits, etc.)

≡ Three Bar-Timber stands of 15 MBF net to the acre or better.

Coding example: WH≡

= Two Bar-Low volume timber stands estimated at less than 15 MBF net to the acre. Coding example: SH=

RMZ - Riparian Management Zone with timber type influenced by proximity to flowing streams in accordance with Alaska Forest Practice Regulations. Coding example: RMZ/SS=

Timber cruisers must be given explicit definitions for RMZ and A, B & C watercourses.

Plot Recording – Timber cruisers shall be instructed to use new cruise cards when crossing section lines and Unit boundaries. Timber cruisers shall be instructed to label their cards with the Unit number.

Plot numbering is by map designation. Plot centers are to be marked by a flag at center with blue and yellow ribbon. Information is to be written on

center flags identifying the unique plot number and stand number. Flags are to be placed intervisibly along plot line.

Statistical Accuracy – Accuracy will be based upon the entire inventoried property. The maximum sampling error will be no greater than $\pm 20\%$ at the 95 percent confidence level (two standard errors or $t = 2$). For statistical purposes it may be necessary to add additional plots to some of the smallest units.

Biomass – Biomass sampling and evaluation will not be a part of the timber inventory.

TABLE 2**CRUISE PLOT COORDINATES****LAT/LONG: Alaska State Plane Projection, Zone 1, NAD 83**

PLOT NO.	POINT_X	POINT_Y	LAT	LONG
1	2375433.50	1908428.93	57.06344007	-135.19375899
2	2374443.50	1908428.93	57.06257748	-135.19040675
3	2374773.50	1908428.93	57.06259767	-135.18874921
4	2375103.50	1908428.93	57.06263798	-135.18543412
5	2375763.50	1908428.93	57.06356114	-135.18381349
6	2376093.50	1908428.93	57.06635054	-135.17729339
7	2376423.50	1908428.93	57.06727360	-135.17567240
8	2377083.50	1908428.93	57.06819663	-135.17405132
9	2377413.50	1908428.93	57.06821661	-135.17239352
10	2376753.50	1908428.93	57.06737334	-135.16738357
11	2377743.50	1908428.93	57.07120306	-135.14929230
12	2378073.50	1908428.93	57.07122270	-135.14763434
13	2378733.50	1908428.93	57.07214538	-135.14601239
14	2378403.50	1908428.93	57.07134010	-135.13768657
15	2379063.50	1908428.93	57.07226265	-135.13606436
16	2379393.50	1908428.93	57.07228212	-135.13440635
17	2379723.50	1908428.93	57.07230156	-135.13274834
18	2380053.50	1908428.93	57.07232099	-135.13109032
19	2380383.50	1908428.93	57.07324345	-135.12946791
20	2380713.50	1908428.93	57.07326283	-135.12780985
21	2381043.50	1908428.93	57.07416589	-135.12784542
22	2381373.50	1908428.93	57.07510764	-135.12456469
23	2381703.50	1908428.93	57.07603002	-135.12294200
24	2382033.50	1908428.93	57.07695238	-135.12131922
25	2382363.50	1908428.93	57.07697165	-135.11966098
26	2382693.50	1908428.93	57.07787471	-135.11969635
27	2383023.50	1908428.93	57.07789396	-135.11803808
28	2383353.50	1908428.93	57.07791319	-135.11637981
29	2383683.50	1908428.93	57.07793240	-135.11472153
30	2384013.50	1908428.93	57.07797075	-135.11140497
31	2384343.50	1908428.93	57.07879703	-135.11807341
32	2384673.50	1908428.93	57.07881626	-135.11641510
33	2385003.50	1908428.93	57.07883547	-135.11475678
34	2385333.50	1908428.93	57.07885465	-135.11309846
35	2385663.50	1908428.93	57.07966156	-135.12142545
36	2385993.50	1908428.93	57.07971932	-135.11645039
37	2386323.50	1908428.93	57.07973853	-135.11479203
38	2386653.50	1908428.93	57.07975772	-135.11313367
39	2386983.50	1908428.93	57.07977688	-135.11147531
40	2387313.50	1908428.93	57.07981514	-135.10815858
41	2387643.50	1908428.93	57.08002401	-135.08991644

PLOT NO.	POINT_X	POINT_Y	LAT	LONG
42	2387973.50	1908428.93	57.08006170	-135.08659966
43	2388303.50	1908428.93	57.08008051	-135.08494127
44	2388633.50	1908428.93	57.08009930	-135.08328287
45	2388963.50	1908428.93	57.08056463	-135.12146087
46	2389293.50	1908428.93	57.08069909	-135.10985208
47	2389623.50	1908428.93	57.08071821	-135.10819367
48	2389953.50	1908428.93	57.08073731	-135.10653527
49	2390283.50	1908428.93	57.08075638	-135.10487686
50	2390613.50	1908428.93	57.08077544	-135.10321845
51	2390943.50	1908428.93	57.08088930	-135.09326794
52	2391273.50	1908428.93	57.08090821	-135.09160951
53	2391603.50	1908428.93	57.08092708	-135.08995108
54	2391933.50	1908428.93	57.08094594	-135.08829266
55	2392263.50	1908428.93	57.08096477	-135.08663423
56	2392593.50	1908428.93	57.08098359	-135.08497579
57	2392923.50	1908428.93	57.08148696	-135.11983785
58	2393253.50	1908428.93	57.08150622	-135.11817942
59	2393583.50	1908428.93	57.08152545	-135.11652098
60	2393913.50	1908428.93	57.08167851	-135.10325342
61	2394243.50	1908428.93	57.08169754	-135.10159497
62	2394573.50	1908428.93	57.08181128	-135.09164420
63	2394903.50	1908428.93	57.08183016	-135.08998573
64	2395233.50	1908428.93	57.08184901	-135.08832727
65	2395563.50	1908428.93	57.08186785	-135.08666879
66	2395893.50	1908428.93	57.08237075	-135.12153171
67	2396223.50	1908428.93	57.08239003	-135.11987323
68	2396553.50	1908428.93	57.08240928	-135.11821476
69	2396883.50	1908428.93	57.08242851	-135.11655628
70	2397213.50	1908428.93	57.08271435	-135.09167889
71	2397543.50	1908428.93	57.08273323	-135.09002039
72	2397873.50	1908428.93	57.08275209	-135.08836188
73	2398203.50	1908428.93	57.08277092	-135.08670337
74	2398533.50	1908428.93	57.08323519	-135.12488415
75	2398863.50	1908428.93	57.08325451	-135.12322564
76	2399193.50	1908428.93	57.08327381	-135.12156713
77	2399523.50	1908428.93	57.08329309	-135.11990861
78	2399853.50	1908428.93	57.08361742	-135.09171359
79	2400183.50	1908428.93	57.08406075	-135.13155383
80	2400513.50	1908428.93	57.08408016	-135.12989529
81	2400843.50	1908428.93	57.08409954	-135.12823675
82	2401173.50	1908428.93	57.08411891	-135.12657820

INVENTORY REPORTING

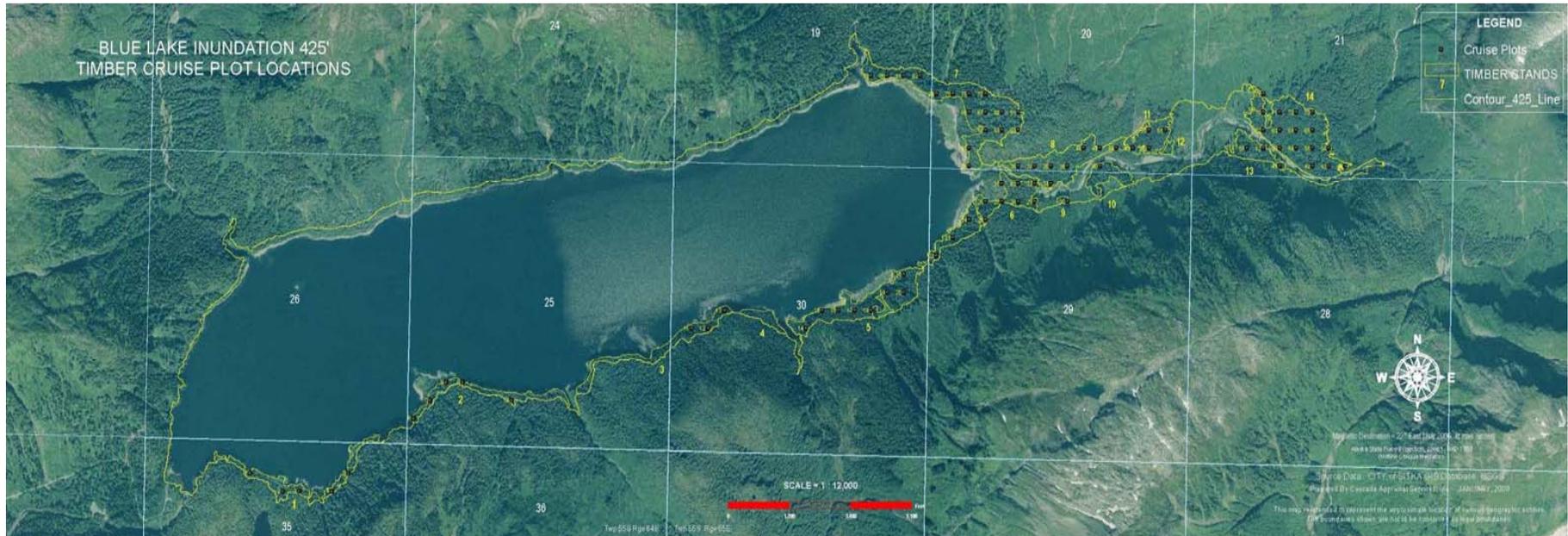
The field work and final inventory report will be to current U. S. Forest Service - Region 10 standards. The inventory report shall present gross and estimated recoverable net volumes by species for the entire property. The report shall present tree numbers by species and quality estimated by species expressed in percentages of the total net volume.

Inventory data will be processed as outlined in the U. S. Forest Service - Alaska Region Coastal Alaska Timber Cruising Field Guide for Scribner Cruising in 32 Foot Log Lengths (March 2007) . The data will be processed in a computerized inventory program using FS Cruiser.

The report shall describe the inventory procedures and be accompanied by maps showing the major timber types within timber stand unit. The report shall also include any information additional to that listed above which the parties to the inventory decide is necessary to the appraisal.

All information will be provided in a digital format acceptable to City of Sitka and USFS. Contractor will supply paper copies of field plot data cards and field plot location maps for check cruising. The final report will be in narrative format with tables and maps.

Cascade Appraisal Services, Inc. is a diversified organization combining traditional forestry services with a wide variety of industrial appraisal capabilities. Incorporated in 1977, Cascade Appraisal as a company has provided services to clients over the past 30 years. Clients include numerous major forest products companies, law firms, public agencies, accountants, private landowners, and investors. The company principal, Ray E. Granvall Jr., has 38 years of forest products experience both in timber and timber land projects and industrial forest product plants nationwide and an additional 7 years in logging operations. Experience in Alaska has been extensive including acquisition of timber and/or conservation rights by the Exxon Trustee Council. Cascade Appraisal Services, Inc. has its own computer network, library, mapping, photogrammetric, and drafting facilities.



Map 1. Cruise Plots for Blue Lake Expansion Timber Inventory