SUSITNA HYDROELECTRIC PROJECT

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TERRESTRIAL PROGRAM 1983 BROWSE PILOT STUDY

UNIVERSITY OF ALASKA - PALMER

UNDER CONTRACT TO

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TERRESTRIAL PROGRAM 1983 BROWSE PILOT STUDY

Report By University of Alaska - Palmer

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Under Contract to Harza-Ebasco Susitna Joint Venture

> Prepared for Alaska Power Authority

> > Final Report May 1984

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1 - INTRODUCTION

One means of assessing a potential impact of the proposed Susitna Hydroelectric Project on wildlife is to inventory available winter browse for moose (Alces alces gigas) in the vicinity of the impoundment zones. A preliminary study was performed during 1983 to investigate efficient methods of sampling browse in this area. The primary objective of this study was to look at techniques while a secondary objective was to look at sample allocation for sampling units among sites, vegetation types, and geographical areas (impoundment versus non-impoundment).

Previous studies by Steigers et al. (1983) and the Cooperative River Basin Study of the United States Forest Service and the Soil Conservation Service could be used to provide additional information on the sample allocation problem, although the latter data are not included in this report. Steigers et al. (1983) conducted a browse inventory of the middle Susitna River basin during July and August 1982 using 47 Measurements included canopy cover, stem density, twig counts, average dpb, and current annual growth in $1-m^2$ quadrants. Cooperative River Basin Study covers many of the drainages of the Susitna River from Cook Inlet to the glaciers in the Alaska range. Approximately 85 locations were sampled in the middle and upper Susitna basins for timber inventory, ground cover, productivity, stem density, soils, and wildlife habitat information. Two basic approaches were taken to estimate browse/unit area: (1) density times weight per individual and (2) clipped plots. Plots were assumed to be the best technique for sampling density of several species as based on Oldemeyer and Regelin (1980). The sample allocation problem was addressed only sites and vegetation types, not for geographical for

1.1 - Abridged Literature Review

Many studies have been performed to assess efficient methods of sampling browse or other components of woody species. This literature may represent a biased sample of all such studies because most researchers report positive findings. Many dimension analysis studies regress total weight or total current growth against shrub measurements, rather than using total twig weight (browse) as the dependent variable.

A few studies have investigated plot sizes for clipped plots. Parker and Morton (1978) compared contiguous subplots 2x1 m to evaluate plots of size 2 to 10 m^2 . They found 6 m^2 was the best plot size but predicted that over 200 plots may be required to adequately sample moose forage within 20% of the mean 95% of the time across all sites. Twig counts were used for deciduous shrubs, and height times basal diameter was used for balsam fir. Logarithmic transforms of both dependent and independent variables were used for twigs while untransformed data were used for the balsam fir data (r^2 =0.93). Overall dimensions rather than the twig count method were used for balsam fir because of the number of twigs to count.

Barrett and Guthrie (1969) counted browse tips and clipped browse in 484 1-milacre plots on a 0.484-acre area in a 40- to 60-year old mixed oak-pine stand in Virginia. Browse was the current annual terminal growth of all woody species from the ground to 5 ft (1.5 m). Optimum plot size increased with increased hypothetical location time with a two-member crew with plot sizes of 1, 2, 4, and 9 milacres. Simple random sampling was superior to double sampling. A one-man crew was superior to a two-man crew for 1-milacre plots.

Bobek and Dzieciolowski (1972) (cited) studied browse by plot harvest technique in several deciduous forest types. Plots 21 $\rm m^2$ in

size appeared most useful. The effect of site was demonstrated by the variability in sample size requirements for adequate sampling i.e. 5 plots in plantations, 9 in thickets, 14 in timber stands, and 19 in pole-sized stands.

Shafer (1963) used the twig count method of measuring deer browse while Telfer (1969) used twig weight-diameter relations to estimate browse. Many other studies have used similar techniques, however Bobek and Bergstrom (1978) found that twig count methods did not work well when browse was dense as in thickets. Similarly Parker and Morton (1978) used twig counts on deciduous shrubs but used dimension analysis on balsam fir because of the number of twigs. Twig counts used by Steigers et al. (1983) in 1982 were time consuming and were not considered for this study.

Many studies have successfully used shrub dimensions to estimate various components of shrub biomass, including browse. Bobek and Bergstrom (1978) measured height and stem diameter at 5 to 10 cm heights above the ground for pine, spruce, and birch on a young forest plantation in central Sweden. They obtained r^2 values in the range of 0.96 to 0.98. Parker and Morton (1978) obtained an r^2 of 0.93 relating oven dried twig weight to height times diameter for balsam fir in northcentral Newfoundland. Whisenant and Burzloff (1978) obtained r^2 = 0.87 for green weight of mesquite versus the stem area at 60 cm above the ground. The weight of individual trees was not correlated with the density. Ohmann et al. (1976) used stem diameters as the best predictor of weight using both linear and allometric forms of the equation. Their r^2 values were in the 0.11 to 0.60 range. Actual diameters produced better results than diameter classes. Height was only measured in 15-cm increments which may have accounted for its low correlations.

Uresk et al. (1977) found volume and area best to predict live wood weights of 20 big sagebrush plants (r^2 =0.80). Peek (1970) used volume and area as the best predictors also. Ludwig et al. (1975) used area and volume to obtain high r^2 (0.99) values for 10 shrubs of each species. Bentley et al. (1970) used crown volume classes to decompose the variability and obtain r^2 values ranging from 0.93 to 0.96. Many of these studies used logarithmic transformations to stabilize the variances.

Chew and Chew (1965) selected shrubs that were symmetrically shaped while Peek (1970) also commented on the advantages of a symmetrical canopy. Other studies selected nonrandom shrubs across a range of size classes. Observers may have had a conscious or unconscious tendency to select well-formed individuals. This could result in the high correlations found. Also, many researchers do not report low r^2 or all the independent variables that might have been tried unsuccessfully. This brief review is meant only to give a little perspective and not to be a complete synthesis of the literature on browse sampling.

We would like to thank Dr. Wayne L. Regelin of the Alaska Department of Fish and Game (ADF&G) for his input in determining the objectives and methods of this pilot study, and for his assistance in collecting field data. James G. MacCracken and Patrick V. Mayer assisted in planning, collecting field data, and processing laboratory samples. Suzanne Miller, ADF&G, provided statistical consultation. Randal L. Fairbanks and Dr. Roseann Densmore assisted in the planning and implementation of this study. Granville Couey organized logistical support for field operations at Watana Base Camp. Niki T. Wood and Kathleen Wells provided clerical services for preparation of this manuscript.

2 - STUDY AREA

The study area is located in the Susitna River Basin upstream of Gold Creek (Fig. 1). It is bounded on the west by Devil Canyon and on the east by the Maclaren River and extends approximately 16 km on either side of the Susitna River. Elevations range from about 333 m on the river at Devil Canyon to 2085 m at the top of Mt. Watana. The river elevation rises to approximately 800 m at the confluence with the Maclaren River.

Topography of the study area has been strongly influenced by past glacial action and associated creek and river erosion. Generally, the area is a broad U-shaped valley with a relatively narrow V-shaped valley occupied by the Susitna River. Upstream glaciers probably previously extended into the area. Numerous creeks and rivers drain into the Susitna River along its course in the middle Basin. The channel slopes are very steep near Devil Canyon, rising approximately 333 m vertically in about 1 km horizontal distance. The benches above the river channel are approximately 666 - 833 m in elevation and make up a majority of the study area. At the eastern end of the middle Basin, the river channel is relatively less steep and much wider.

Various plant communities are found in the middle Basin study area. McKendrick et al. (1982) mapped 16 vegetation types in the middle Susitna River Basin at Levels III or IV of Viereck and Dyrness (1980). The plant communities are strongly influenced by site topography, soils, and moisture regimes. The steep, well drained river channel slopes are dominated by forest communities such as the mixed birch-spruce forest and open coniferous forests on both sides of the river. The benches above the river contain primarily shrub communities on the drier sites, followed by white spruce (Picea glauca) forests on well-drained slopes,

and black spruce (<u>Picea mariana</u>) forests on the wetter sites. Alpine vegetation types exist at the highest elevations.

3 - METHODS

3.1 - Field

General areas representative of the vegetation types to be sampled were selected from aircraft over-flights and prior familiarity with the vegetation composition. Specific sites were selected based on presence/absence of key plant species considered important as moose browse. Six vegetation types visually classified to Level IV of Viereck et al. (1982) were sampled from August 10-22, 1983. The 6 types were woodland black (Picea mariana) - white spruce (Picea glauca), woodland black spruce, open mixed white spruce-paper birch (Betula papyrifera), open tall willow, open low dwarf birch (Betula glandulosa) - willow (Salix spp.), and open low willow. Seven shrub species were investigated: Alnus sinuata (sitka alder), Betula glandulosa, B. papyrifera, Salix alaxensis (felt leaf willow), S. glauca (glaucous willow), S. lanata (lanate willow), and S. pulchra (diamondleaf willow).

At each site, 2 parallel 50-m line transects were established from a randomly chosen starting point. The transects were spaced approximately 15 m apart and were located within the homogeneous area.

3.1.1 - Stem Density

Ten plots of each of 3 circular plot sizes were sampled with 15 plots located along each transect. The 3 plot sizes used were: $1\,\mathrm{m}^2$ with 56 cm radius, $4\,\mathrm{m}^2$ with 113 cm radius, and $10\,\mathrm{m}^2$ with 178 cm radius. Plot sizes were randomly drawn from the pool of 30 total plots, without replacement, and then randomly assigned to the 15 points along each transect. Plots were spaced far enough apart to prevent overlap. Circular plots were delineated by rotating a rope marked at the

appropriate radius around a metal rod inserted into the ground at each point along the transect measured using a 50-m tape.

All stems of the selected shrub species rooted within the plot were counted. Only stems that exceeded a height of 40 cm were counted for Betula glandulosa. A stem was defined as a lone branch protruding from ground level. A single observer counted stems in the $1-m^2$ and $4-m^2$ plots while a second researcher recorded data. Both observers counted stems in the $10-m^2$ plot.

Stems of each shrub species in each plot were counted separately and in the following sequential order: Betula glandulosa, Salix pulchra, S. glauca, S. lanata, S. alaxensis, Alnus sinuata, and Betula papyrifera. Beginning and ending time to search the plot and count the stems of each species was recorded in the field while elapsed times were calculated later. The total time required to count stems for all species was also calculated for each plot. The elapsed time required to move to the next plot and set it up was calculated at 28 of 30 points; move time was not recorded for the first plot of each transect. Density of shrub stems was not counted at sites 1 and 2.

3.1.2 - Weight Per Individual

At 10-m intervals along each transect, the nearest stem of each selected shrub species within approximately 5 m was selected for measurement and harvest of current annual growth. For <u>Betula glandulosa</u>, only stems that exceeded 40 cm in maximum vertical height were selected for measurement. Stems were measured for basal stem diameter at ground level in millimeters, maximum vertical height in centimeters, maximum depth of the leaf canopy along the longitudinal axis of the stem in centimeters, maximum horizontal length (labelled "width" in Polycorder and printouts) of the leaf canopy in centimeters,

and maximum horizontal width (labelled "right angle" in Polycorder and printouts) of the leaf canopy measured at right angle to the length in centimeters.

Total weight of current annual growth of twigs and leaves from ground level to 250 cm in height was ocularly estimated in grams, or to the nearest tenth gram for small values. Current annual growth twigs and leaves were then clipped and bagged together by height categories. Each stem was divided into the following 3 vertical height categories: ground level - 40 cm, 41 - 80 cm, and 81 - 250 cm. Plant material exceeding 250 cm in height was not measured. Total wet weights to the nearest gram, or tenth of a gram for small values, were obtained from each bagged sample the same day and recorded. Bagged samples were partially dried in the field to prevent spoilage and later oven dried at 60 C for 48 hours. Dried samples were separated in the laboratory into leaf and twig components and then weighed to the nearest tenth of a gram.

Beginning and ending times in seconds were recorded for measuring basal diameter; measuring height, depth, length, and width of the leaf canopy as a single time unit; ocularly estimating total current annual growth; and clipping and bagging current annual growth twigs and leaves. Elapsed time was then calculated for each of these categories and movement to the next consecutive point along the transect and/or search for another shrub.

Measurements for biomass at sites 1 and 2 were identical to those at the remaining sites with the following exceptions: maximum height was measured along the longitudinal axis of the stem rather than vertically; ocular estimates of the current annual growth of twigs and leaves were made for each height category; and twigs and leaves were clipped for each height category and weighed separately in the field.

3.1.3 - Clipped Plots

Up to 10 1-m² circular plots spaced 10 m apart along a line transect were clipped for current annual growth of twigs and leaves at each site. These plots were located independently of any other plots. Current annual growth of shrubs within the vertical projection of the plot boundary was clipped by species from ground level - 250 cm and bagged. Total wet weights to the nearest gram, or tenth gram where appropriate, were obtained for each bagged sample. Bagged samples were partially dried in the field to prevent spoilage, and later dried at 60 C for 48 hours. Dried samples were separated in the laboratory into leaf and twig components and then weighed to the nearest tenth of a gram.

The total elapsed time to clip all species in each plot and the time required to move to the next plot were recorded. Mo plots were clipped at sites 1 and 2.

3.2 - Data Preparation and Analysis

3.2.1 - Stem Density and Plot Size

Files containing density of stems by species and plot size for each site were first edited then concatenated into one file containing all sites. Raw time data were then converted to elapsed time by subtracting the times recorded that occurred prior to and after the stems were counted for each species. The total time elapsed to count all stems from all species was computed, as well as the time required to move between plots. These move times were multiplied by a constant of 3 to simulate the time required to sample 10 plots along 2 transects as if only a single plot size had been used. Twenty-eight move times were recorded at each site; the first plot established on each transect did not have an accompanying move time. These computations were included

with the original density values in a reformatted file for use by programs from statistical packages. This file was then checked for errors, negative times, and missing data through several means: by program control that flagged negative times, by reformatting the raw data into labelled output, and by hand.

Density of stems were analyzed for mean, standard error, variance, and estimated sample size to adequately sample within 20% of the mean with 80% confidence. Density of stems for all 3 plot sizes were converted to a $10-m^2$ basis for purposes of comparison among plot sizes. This area was selected to make the density values easier to discuss. Statistics were calculated for individual shrub species and total stems for all species in each plot with plots averaged for each site, and with sites combined into Level IV vegetation types (Viereck et al. 1982).

Time in seconds to count stems was analyzed for mean, standard error, variance, and estimated sample size to adequately determine the time within 20% of the mean with 80% confidence for each species, move time, and all species combined including move time. Elapsed time to search the plot for each species was averaged regardless of the presence or absence of the species in a given plot. Sites were combined into Level IV vegetation types using a nested analysis of variance. These mean squares can be used to calculate sample sizes although results may be somewhat biased because sites were not randomly located.

Average time required to count the stems of each species was multiplied by the estimated number of plots required to adequately sample the density of stems at each site to derive an estimate of the time that would be required to sample that many plots. This calculation was also performed between total time and the estimated adequate sample size for all species combined. Analysis of variance using a repeated

measures nested design across the 3 plot sizes was conducted to determine if a statistical difference could be detected.

3.2.2 - Weight Per Individual

Raw field data from individual shrub measurements in each site were first edited then concatenated into one file containing all sites. Dry weights of field-collected plant samples were obtained in the laboratory and entered into a data file. Field wet weights of plant samples were edited and entered into a data file. These 3 files were then reformatted and merged into a single file which also contained elapsed times. The merged file was then checked for errors and for unpaired wet and dry weight data under both program control and by hand. Dependent variables of dry twig plus leaf weight and dry twig weight were plotted against individual shrub dimensions and ocular estimates. Appropriate transformations of data were performed in cases where relationships were non-linear. Stepwise regression analysis was used to determine which individual shrub measurements, singly and in combination, were the best estimators of current annual growth. More details on these methods are included in Results because of the stepwise nature of the analysis.

3.2.3 - Clipped Plots

Dry weights of field-collected plant samples were obtained in the laboratory and entered into a data file. Field wet weights of plant samples were edited and entered into a data file. These 2 files were reformatted and merged with the elapsed time to clip plots. Clipped plot data were analyzed for means, standard errors, variance, and the estimated number of clipped plots required to adequately sample the current annual growth within 20% of the mean with 80% confidence. All biomass values were multiplied by a constant of 10 to produce biomass estimates on a $10-m^2$ basis. Total time to clip each plot and move time

between plots were also calculated. Total time was multiplied by the estimated sample size calculated for total biomass of all species to estimate the time required to adequately sample a site. Sites were combined into Level IV vegetation types using nested analysis of variance. These mean squares can then be used to calculate estimated average number of plots within sites and number of sites within vegetation types. Non random selection of sites, however, may limit the usefulness of these estimates.

4 - RESULTS

Seventeen sites were sampled in the study area during August 1983. The sites were visually classified and grouped into Level IV vegetation types described by Viereck et al. (1982) (Table 1). The allocation of effort to each vegetation type, expressed by the number of sites sampled, was based on both the extent of the area in relation to the study area as well as its importance to moose. Importance to moose was assumed to be directly related to the abundance of willows. The locations of the 17 sites are shown in Figure 2.

4.1 - Stem Density and Plot Size

The average number of stems counted for each species in 1-m^2 , 4-m^2 , and 10-m^2 plot sizes are shown in Appendix A. Stem densities were averaged across all plots of each plot size within a site, and then converted to a stems per 10-m^2 basis for comparison among plot sizes. This area was selected to make discussion and comparisons of the 3 plot sizes easier. Standard errors $(s_{\overline{X}})$, variances (s^2) , number of plots (N), and estimated samples size (NHAT) are also shown for each species (Appendix A). Sample sizes were calculated for estimates of the required number of plots to sample density of stems within 20% of the mean with 80% confidence. The average number of stems for all shrub

species combined in each plot was also calculated for each site and vegetation type.

Stem densities were averaged across sites and combined into Level IV vegetation types for each plot size (Appendix A). In addition to the same statistics calculated for individual sites, within site (WITHIN) and between site (BMS) variances were calculated. The number of sites required to adequately sample the density for each shrub species and for the sum of all stems was also calculated (BNHAT). Caution should be used when interpreting these values since the nonrandom location of sites may affect these variances.

A summary of mean stem densities taken from Level IV vegetation types for the 3 plot sizes in Appendix A is shown in Table 2. With a few exceptions, stem density of dominant species numerically decreased as the area of the plot increased, although this was not tested statistically. Lower stem densities in the 10-m² plot size may be due in part to stems missed in counting. Care was necessary with the 10-m^2 plot size to insure that all stems were counted exactly once. persons counting in the $10-m^2$ plot size facilitated this effort. density species (e.g., 1-5 stems/10 m²) occasionally had lower densities in the smaller plot sizes. Examples of these were Betula glandulosa in the open mixed spruce-paper birch vegetation type, Salix pulchra in the woodland black-white spruce type, and Alnus sinuata in the open tall Individual stems of the selected shrub species tended to willow type. be clumped, probably belonging to one parent root system. Smaller plot sizes such as the $1-m^2$ plot can be expected to more frequently miss low density species, particularly if the actual scale of clumping of that species is substantially larger than 1 m². Higher variance can also be

expected under these circumstances (Table 3). Variance decreased with increasing plot size in most cases. But for some low density species variance did not follow a trend with respect to plot size.

Stem density estimates from data collected in 1982 by Steigers et al. (1983) for comparably classified Level IV vegetation types were usually lower than estimates obtained from this study, particularly for abundant species (Table 2). Stem density estimates for 1982 were obtained using a 4-m² circular plot. Density differences were probably a result of selecting particular sites in 1983, rather than the random site selection of 1982. Sites in 1982 were randomly selected from a grid overlaying a vegetation map of the Susitna River Basin. Because only certain vegetation types were to be sampled during 1983, sites were selected for certain species composition in the specified vegetation types. Density estimates were probably biased because of this selection. Between-site variances were large because sites were only classified to Level IV of Viereck et al. (1982). These variances could be reduced by further stratification based on slope, aspect, elevation, or species composition (Level V).

Appendix B summarizes the number of seconds to count and record the number of stems of each shrub species, the time required to move to and establish a subsequent plot, and the total time to count all stems and move to a new plot in $1-m^2$, $4-m^2$, and $10-m^2$ plot sizes. Elapsed time was averaged across sites and combined into Level IV vegetation types for each plot size (Appendix B). Other statistics are also given, as described for Appendix A.

A summary of mean times taken from the Level IV vegetation types for the 3 plot sizes in Appendix B is shown in Table 4. Time to count

stems increased with the size of the plot because more stems were present. One person counted stems in the $1-m^2$ and $4-m^2$ plot sizes while a second person recorded the data. However, 2 persons counted the stems in the $10-m^2$ plot size with one of those persons recording the data. If only one person had counted the stems in a $10-m^2$ plot, approximately twice as much elapsed time would be required relative to one person. Having a second person record data for any plot size saves a little elapsed time, but probably results in more man-hours spent.

Problems encountered with only one person counting in the $10-m^2$ plot were most obvious when many tall, woody stems impeded movements within the plot. With two people, one could count one semi-circle and the second could count the other half. It was difficult to keep track of which stems had been counted in the 10-m² plot. Use of 2 people made movement easier, but it compounded the problem of keeping track of which stems have been counted. Two persons would probably be most efficiently used when counting in the $1-m^2$ and $4-m^2$ plots if each counted separate plots or took other measurements. Two persons counting stems in the 10-m² plot size would finish faster, although more errors may be introduced. For this study, however, elapsed time rather than man-time was used for comparison among the 3 plot sizes. Two persons were always present during the density sampling and both contributed to the extent needed to maximize the efficiency of the team. In a more realistic situation, one would probably be working on a different plot to maximize data obtained in a given period of time.

Average time in minutes required to count stems for an estimated adequate number of plots in $1-m^2$, $4-m^2$, and $10-m^2$ plot sizes was estimated for each species sampled in the 6 Level IV vegetation types (Table 5). These estimates were calculated by multiplying the mean time

in seconds by the within-site estimated sample size, and then dividing by 60 to obtain minutes. Within-site estimated sample size was obtained by taking the sum of the number of sites included in the vegetation type and WNHAT from Appendix A, and then dividing that by the number of sites. No single plot size consistently required less time to sample the estimated adequate number of plots than the other two plot sizes (Table 5). The 1-m² plot size appears to require slightly less time to sample Betula glandulosa in the woodland black-white spruce and woodland black spruce vegetation types, and Salix pulchra in the woodland black spruce and open tall willow vegetation types. The 4-m² plot size appears more efficient for Betula glandulosa in the open mixed spruce-paper birch type, and Salix pulchra and Salix glauca in the woodland black-white spruce type. The 10-m² plot size may work well on low growing Salix pulchra in the open low willow vegetation type (Table When the total time for all stems including move time was calculated, however, the $4-m^2$ or $10-m^2$ plot sizes generally had lower overall time requirements than the $1-m^2$ plot size (Table 5).

Travel time may affect the relative efficiency of the different size plots. It may require less time to count stems in the required number of plots for a $1-m^2$ plot versus a $10-m^2$ plot, but because more $1-m^2$ plots are needed, more time is spent moving between plots. This is evident for the open low dwarf birch-willow type where the $1-m^2$ plot requires approximately the same or less time than the $10-m^2$ plot formost species (Table 5). It was only slightly higher in the one exception. The times to count all species plus move between the plots was almost twice as much for the $1-m^2$ plot as for the $10-m^2$ plot. These numbers are not directly comparable, but they do represent the presented argument.

When average time in minutes required to sample the density of shrub stems for an estimated adequate number of plots at each site was averaged across all 17 sites for each non-zero plot size, the $4-m^2$ plot size had the lowest average time for 5 of the 7 shrub species (Table 6). The $1-m^2$ plot size had the lowest required time for <u>Salix pulchra</u> and <u>Alnus sinuata</u> while the $10-m^2$ plot size had the lowest required time for total elapsed time including move time (Table 6). This probably resulted because fewer $10-m^2$ plots are required, hence fewer move times are added.

To determine if the mean required sampling times were significantly different among the 3 plot sizes, an analysis of variance was conducted using a univariate repeated measures design (Hull and Nie 1981). In this analysis, sites were nested within vegetation types and plot sizes were crossed with sites and vegetation types. The model used was as follows:

Yijk =
$$u + V_i + S_{(i)j} + P_k + V_{ik} + S_{(i)jk}$$

where $V = V_{ik}$ = V_{ik} = V_{ik} + V_{ik} +

Vegetation type (V_i) was tested with the site $(S_{(i)j})$ error term while plot size (P_k) and the interaction of plot size and vegetation type (VP_{ik}) were tested with the site-plot size $(SP_{(i)jk})$ interaction error term. There was no true error term in this model because there was no true replication.

Using this model, mean time to sample an estimated adequate number of plots was significantly different among the 3 plot sizes for <u>Salix pulchra</u>, <u>Salix glauca</u>, and <u>Alnus sinuata</u> (Table 7). Mean time for the $10-m^2$ plot was numerically larger than for either the $1-m^2$ or $4-m^2$ plots

for these 3 species (Table 6), although this was not tested statistically with a mean separation test. The vegetation type - plot size interaction term was also significantly different for Salix glauca, Salix alaxensis, and Alnus sinuata. The mean response of the 3 plot sizes was different among the specific vegetation types. Mean times among the 6 vegetation types were significantly different for Betula glandulosa. This analysis supported the conclusion that the time required to count stems for adequate sample sizes was different among the 3 plot sizes. Statistical evaluation suggested that differences exist for some species. Small sample sizes, and specific selection of particular sites and vegetation types, limited the usefulness of the statistics. Hence, evaluation of plot size based on experience with its use in the field is necessary.

One person could efficiently count stems in the 4-m^2 or smaller plot size. With a radius of 1.13 cm, the 4-m^2 plot approaches the upper limit of the ability of a person to mentally keep track of stems previously counted or those not yet counted. It was easier to use two persons with the 10-m^2 plot but it would be difficult to insure that all stems were counted exactly once with either 1 or 2 obeservers. The 1-m^2 and 4-m^2 plots have small enough radii that an observer can see from the center to the outer boundary without moving their feet. Perimeter judgments were also more easily made by leaning to the end of the rope rather than having to walk to the end of the rope as was the case for the 10-m^2 plot size. Both the 1-m^2 and 4-m^2 plot sizes were faster to set up and use than the 10-m^2 plot size, particularly when maneuvering the rope in tall vegetation such as Salix alaxensis, Alnus sinuata, and Picea spp. The 10-m^2 plot size can be eliminated from further consideration because of potential inaccuracies and difficulty of use.

The 4-m^2 plot size required the least time to adequately sample plots at a site for more shrub species than the 1-m^2 plot size (Table 6). The 4-m^2 plot size also had lower variance of stem density estimates for most dominant species in the vegetation types sampled (Table 3). The 4-m^2 plot was also consistent with density data previously collected from the Susitna River Basin as well as data collected from the nearby Alphabet Hills (Steigers et al. 1983) and U.S.D.A. Institute of Northern Forestry (INF) pre- and post-burn fire inventories. Considering both statistical and practical evaluations of the plot sizes under consideration in this study, we recommend the 4-m^2 plot size as the best of the 3 we tested to use for estimating stem densities in the middle Susitna River Basin. Therefore, only data collected using the 4-m^2 plot size were considered in all subsequent analyses and discussion.

4.1.1 - Allocation of the Density Sample

Although sample sizes in this study were inadequate, we calculated the approximate allocation of sampling effort in terms of relative number of sites within the 6 vegetation types sampled. Using a between-site variance calculated from this study and sample allocation equations from Mendenhall et al. (1977; 64), we estimated the percentage of total sites to sample in a vegetation type to minimize variance for a given cost or to minimize cost for a given variance. For the optimum allocation equation:

$$n_{i} = (n) \frac{\frac{N_{i} s_{i}}{\sqrt{C_{i}}}}{\sum_{i=1}^{L} \frac{N_{i} s_{i}}{\sqrt{C_{i}}}}$$

where N_i = size of the i-th vegetation type = percentage of hectares in each vegetation type in the Watana and Devil Canyon impoundments and construction zones (McKendrick et al. 1982; 102, 106) from Table 8,

s_i = sample variance between sites within vegetation type i =
 between mean squares from vegetation type density estimates
 for total stems of all species combined (Appendix A), and
C_i = the cost at each site = total time per plot including move
 time (Appendix B) multiplied by average number of plots needed
 per site for adequate sampling (Appendix A).

Using the approximate allocation formula which minimizes the cost for a fixed variance, 15% of the effort in terms of the percentage of total sites sampled for density estimates among the 6 vegetation types would be conducted in the woodland black-white spruce type. Similarly, 66% of the sites would be conducted in the woodland black spruce vegetation type, 1% in the open mixed spruce-paper birch type, 0.03% in the open tall willow type, and 18% in the open low dwarf birch-willow type. The open low willow vegetation type was not used in the equation because there was only one site sampled and no between-site variance. Similarly, other vegetation types which were not sampled did not appear in the equation. This exercise was a method to allocate cost given reasonable variance estimates. Validity of the between-site variances computed for the data collected in this study should be weighed against the limited number of sites sampled in each vegetation type.

Given the allocation of the percentage of total cost that should be accomplished within each vegetation type, a maximum cost based on the maximum amount of work that could feasibly be executed out of Watana

Base Camp could be estimated. Assuming the 7 week period from July 16 - August 31, 1984 and a 5-day work week, 34 total work days would be available. Further, assuming 10 2-person work crews that could complete 1 site per day (density plus clipping individual shrubs), up to 340 sites could be sampled for density of shrub stems during that time period. Using the percentage of cost allocated to each vegetation type and 340 sites as the maximum cost, density would be sampled at 51 sites within the woodland black-white spruce vegetation type. Similarly, 222 sites would be sampled in the woodland black spruce type, 4 sites in the open mixed spruce-paper birch type, a minimum of 2 sites in the open tall willow type, and 61 sites in the open low dwarf birch-willow vegetation type.

A number of problems are apparent with the use of the foregoing allocation of cost estimates. As mentioned previously, not all vegetation types considered important for supplying forage for moose are represented in the analysis. A related problem is that for the vegetation types that are included, the area of the middle Susitna River Basin that is the basis for their size or importance (N_1) in the equation is the percentage of the Watana and Devil Canyon impoundments and construction zones occupied by that type. This disregards vegetation adjacent to the impoundments that may be important to moose. A more realistic approach may be to weight certain areas or certain vegetation types based on their locale or vegetative composition. Areas or vegetation types that are of greater importance to moose could be weighted more heavily in the allocation of sites while their converses could be weighted less heavily. Additionally, the fixed variance estimate used in the optimum allocation equation was for total stems of

all species, including <u>Betula glandulosa</u>. If food habits studies document that <u>Betula glandulosa</u> is not a significant food item in moose diets, this species may not be sampled during the full-scale browse inventory. If <u>Betula glandulosa</u> were excluded from the analysis, the between mean squares (BMS) as well as the within site estimated adequate sample size (WNHAT) would probably increase for the vegetation types in which it occurred (Appendix A). Finally, the cost estimates from Appendix B do not include travel time to a site and the time required to set up each transect. Travel time is directly dependent on the location of the site and, on an average, may be similar among most vegetation types. Transect set-up time may be considered a constant among the vegetation types for this exercise although in practice is probably takes longer in the denser and taller vegetation with profuse undergrowth.

4.1.2 - Another Approach for the Density Sample

A more realistic approach to the problems of the preceding allocation of density plots would be to consider other information that would increase the usefulness of the estimates. One way would be to remove Betula glandulosa from consideration as an important forage item for moose. Although moose food habits research from this study area has not yet documented the relative importance of Betula glandulosa in roose diets, other studies such as those in Denali National Park have suggested that this species is a minor component relative to other shruh species (V. Van Ballenberghe, personal communication). Steigers et al. (1983) reported low utilization of Betula glandulosa twigs in 9 of 10 vegetation types in the middle Susitna River Basin. Based on the

results of those studies, the anticipated results of the moose food habits study, as well as personal observation of the utilization of $\underline{Betula\ glandulosa}\ relative$ to other shrub species, \underline{B} . $\underline{glandulosa}\ will$ probably not be sampled in the full-scale browse inventory. Thus it will be deleted from consideration in this section for stem density estimates as well as for the elapsed time to sample density plots.

Another method to provide a more realistic sample size estimate would be to decrease the width of the confidence interval around the mean by decreasing the confidence level from 80% to 67%. For these types of studies, being correct 2 out of 3 times is a realistic level considering the extent of sampling effort, the inherent variation in the variables we have sampled, and the level at which sites were grouped into vegetation types.

The results of deleting <u>Betula glandulosa</u> from the pilot study 4-m² density and elapsed time analysis and using 67% confidence for both are shown for vegetation types in Appendices C and D, respectively. The number of plots required per site and the number of sites required per vegetation type to adequately sample increased substantially for total stems of all species in most types over those shown in Appendix A. This occurred in spite of the decrease in level of confidence from 80% to 67% in vegetation types where <u>Betula glandulosa</u> was a major component of the sampled species composition. As expected, however, these estimates more closely approximated the variability associated with sampling density of the rarer species such as the <u>Salix spp.</u> and <u>Betula papyrifera</u>. Average elapsed time to count all stems and move to the subsequent plot decreased by the number of seconds required to count <u>Betula glandulosa</u> stems (Appendix D).

Allocation of sites to the 5 vegetation types for this pilot study (open low willow type dropped out because there was only 1 site) could be expanded by utilizing modified stem density information from studies conducted in 1982 by Steigers et al. (1983). Although sampling times are not available for the vegetation types sampled in that study, total times to count stems in 4-m^2 plots were probably close to the times required for vegetation types with similar species composition and stem densities sampled in this pilot study. Average stem density for the shrub species sampled in this study, exclusive of <u>Betula glandulosa</u>, for 3 vegetation types not sampled during this pilot study but sampled in 1982 are shown in Appendix E. The vegetation types sampled for density in 1982 using 4-m^2 plots were the open white spruce, open black spruce, and open low dwarf birch types.

A summary from Appendices C, D, and E of number of sites sampled, elapsed time per plot including move time, and number of 4-m^2 plots per site, minutes required to sample a site, and number of sites per vegetation type required to sample total stem density within 20% of the mean with 67% confidence is shown in Table 9. Information from both this pilot study and data modified from Steigers et al. (1983) are given in Table 9. Time to count stems, exclusive of Betula glandulosa, and move to the subsequent plot for the 3 vegetation types sampled during 1982 was estimated from pilot study vegetation types similar in species composition and density.

A modification of Table 8 to reflect the 3 additional vegetation types is shown in Table 10. The Watana and Devil Canyon impoundments and construction zones were retained in Table 10 rather than expanding the area because these zones will receive maximum impact from installation of the dams. Additionally, the area estimates for these

zones were taken from 1:24,000 scale vegetation maps which are the largest scale and most precise vegetation maps currently available for the area.

The use of estimated sample sizes for total stem density rather than sample sizes estimated for individual species may be justified by assuming that, with the exclusion of Betula glandulosa and possible exception of Alnus sinuata, the remaining shrubs we sampled are equally utilized for forage by moose. With few exceptions, every dominant species of Salix is browsed by moose in the middle Susitna River Basin. Steigers et al. (1983; 192) reported up to 33% utilization of available twigs on Alnus sinuata in the study area. Although browsing pressure is localized and a function of the availability of other plant species, we will assume here that total stem density can be used because browsing pressure is relatively constant across all remaining shrub species that we sampled.

Optimum allocation of the cost for sampling density of the 8 vegetation types given in Table 9 can now be undertaken. Using between-site variances from Appendices C and E, the percentage of cost in terms of effort expended to sample density in the 4-m² plots is shown in Table 11. Seventy-three percent of the total effort would be expended in the 3 vegetation types included from Steigers et al. (1983) (Table 11). Using this formula for allocation of effort based on variances calculated from available data, 79% of the total effort would be concentrated in spruce forests and approximately 21% in the shrub types. The open low willow vegetation type was not included in this allocation.

Based on time required to sample an estimated adequate number of plots per site within 20% of the mean with 67% confidence for the 8

vegetation types for which data is available, density estimates could be conducted by 1 person within 2 hours (Table 9). If we assume that individual shrubs would also be clipped at each site, 2-person crews were working at each site, crews could be moved by helicopter or walk to a second site at least once each day, 10 2-person crews worked 5 days per week, and 34 work days were available, then up to 680 sites could be sampled. Narrowing the confidence limit around the mean would decrease the number of sites that could be accomplished if the number of required plots/site increased over that which could be accomplished in ½ day. The time to clip individual shrubs needs to also be considered in the time estimate to accomplish all phases of the work required at each Table 11 shows the allocation of the 680 sites to the 8 vegetation types for which data is available in the middle Susitna River Basin. A minimum of 2 sites are required in each vegetation type considered important to moose.

4.2 - Weight Per Individual

The primary statistical analysis for the weight per individual involved stepwise regression analysis relating dry current growth twig weight or dry twig plus leaf weight to various independent variables. Potential dependent variables included wet weights for twigs and leaves combined for each height category or dry weights for twigs and leaves separately for each height category or combinations. Dry weights were selected to eliminate the effects of variable moisture. Twig weights were emphasized rather than total or leaf weights, since winter browse was the primary area of concern although total dry weights were used in some analyses. Height categories were not considered in the analysis in order to reduce the number of computer runs needed.

Height categories were also ignored in the initial analysis because

of assumptions made in the field. Initial ocular estimates were made for twigs and leaves separately for each height category, and each component was bagged that way in the field. This was extremely time consuming and tedious (particularly in the rain). In the interest of obtaining data on a number of shrubs in a number of sites, we decided to estimate total weight, clip and bag by height category, and separate twigs and leaves after they were dried. We assumed that a percentage of weight could be assigned to each component. the total regression analyses indicated very different results for total dry weight and dry twig weight. Hence, our assumption of constant proportions appeared to be false. This could be further analyzed using the initial data where components were individually estimated and However, this has not been done yet because of the overall poor results of the double sampling.

Dry weight versus ocular estimate was plotted for each observer for each species (Appendix F). There was no indication of nonlinearity so untransformed estimates were used in future analyses. Slopes and intercepts of lines derived from least-squares estimates appeared different for different observers. However, many times the slopes appeared similar (Table 12). To simplify initial regression analysis, runs were made without distinguishing observers for the ocular estimate. A later section will deal with a more detailed analysis of this.

Raw independent variables included basal diameter, height of plant, crown depth, width, right angle, and ocular estimate of total current growth. Dry weight was plotted against each independent variable for the four major species (Betula glandulosa, Salix pulchra, S. glauca, and S. lanata) to determine what mathematical transformations might be appropriate, if any (Appendix G). Most graphs appeared relatively linear

with only slight curvature. Basal diameter, width, and right angle measurements showed some tendencies toward curvature but it was not consistent with all species (Table 13). One objective that we were trying to accomplish was to use the same techniques regardless of species so there would be consistency of measurements for the full-scale inventory.

The original crown dimensions were transformed into simple crown area and crown volume estimates by multiplying width by right angle and this area by height or depth. Stepwise regression analyses were performed for dry twig weight of each species using the original and transformed variables. Ocular estimates were used without regard to observer for these initial runs. Results are summarized in Table 14. Later runs included dummy variables to account for intercept differences among observers, but results were not greatly improved.

Ocular estimates consistently gave the best results or were a close runner-up with few exceptions particularly for the more common species (Table 14). This appears to be the one best measurement that is useful for all species. Results for <u>Betula glandulosa</u> and <u>Salix pulchra</u> were not very good for any variables (Table 14). These species are probably the most abundant and the most time consuming to clip. In other words, where double sampling could be the most benefit it did not seem to help much as evidenced by the clipped to estimated ratios (Table 15). Note that these times are field times only and do not include laboratory or data analysis time.

Residuals were plotted against the predicted values for each species. All plots indicated increasing variance of the residuals with increasing predicted values. This violated the assumption of homogeneity of variances and suggested the usage of logarithmic

transforms or weighted regression analysis (Draper and Smith 1966). The logarithm of dry weight and dry twig weight were used as dependent variables while the original shrub measurements and their logarithmic transformations were used as independent variables in a stepwise regression analysis. Results are summarized in Table 16. The residual plots appeared random but the correlations were smaller than in the original model in most cases. This transformation of the dependent variable (dry weight, dry twig weight) introduced a bias when converting data back to the untransformed data space. This could be corrected using the formula in Baskerville (1972) and others. However, it was never calculated because of the low r^2 . The transformed equations would have been selected for final analysis since they did not violate the assumption of homogeneity of variances even though the model did not appear to be greatly improved. This was at the suggestion of a biometrician (Suzanne Miller, ADF&G).

Regressions using the logarithmic transform were analyzed and were summarized in Table 16. The plots of residuals for all species appeared relatively random; however, the correlations and standard error of estimates were generally not improved with the logarithmic transformation. Betula glandulosa correlations for dry twigs dropped from 0.48 to 0.11, Salix pulchra went from 0.69 to 0.20, S. glauca stayed about the same, S. lanata went from 0.89 to 0.72, Alnus sinuata went from 0.70 to 0.51, and S. glauca, Betula papyrifera, and S. alaxensis remained about the same. Ocular estimate, basal diameter, and depth appeared to be the best variables.

Differences among observers for ocular estimates were further analyzed using covariance analysis for each species separately since the ocular estimate appeared to be the best single variable. The dependent variable was the log of dry twig weight, covariate was ocular estimate of current fresh weight, and groups were observers. Table 17 summarizes the slopes by observer and for all observers for each species while Table 18 summarizes the degrees of freedom and probability levels for testing the hypotheses of equality of adjusted means, significance of covariate (zero slope), and equality of slopes between groups.

Slopes of the covariate were significantly different for observers for Betula glandulosa, Salix alaxensis, and Betula papyrifera (Table 17). The relatively small sample sizes for the last two species should be noted. The slopes for Salix glauca showed a tendency toward inequality among observers while those for S. pulchra and S. lanata appeared to be not significantly different. Comparison of the actual calculated slopes, however, indicated that the slopes were numerically different. Hence, regression estimates would be improved by taking the observers into account. The dummy variable analysis that was actually performed accounted only for different intercepts, not different slopes, into account for observers. This could by why the addition of dummy variables for observers did not improve results, especially since the intercept should have an expected value of zero.

The negative slopes for two observers for <u>Betula glandulosa</u> were interesting and might be an artifact of the ocular estimates being made for total leaves and twigs, rather than just dry twigs (dependent variable). The negative slopes also occurred with untransformed data. This might also account for some of the poor correlations. No good explanation has surfaced yet.

Analysis of covariance results indicated that the dry twig weight clipped generally did not vary among observers except for \underline{Salix} alaxensis and some tendency for \underline{S} . \underline{lanata} and \underline{S} . \underline{glauca} (Table 18). The

covariate of ocular estimate (slope not equal to 0) was very significant in almost all cases while the differences in slopes were significant about half the time. Since inequality of slopes (regression coefficient of ocular estimate for each observer) violated an assumption this actually invalidated the other conclusions of the covariance analysis.

An interesting sidelight of this analysis developed when the "time to ocularly estimate the total fresh weight" rather than "dry twig weight" was used as the dependent variable for the covariate analysis. This assessed whether observers differed in their estimation times and whether the size of the ocular estimate affected the time. A glance at the results indicated that sometimes observers were significantly different in their estimation times, regardless of the size of the estimate (Table 19). At other times observers were not different, but the size of the estimate was significant in affecting estimation time. Sometimes site differences were confounded with the observer for less common species such as Salix alaxensis. The slopes of the regressions were generally statistically constant with respect to observers. analysis was not critical to the computation of biomass; however, when expanded to other measurements besides the ocular estimates, it might indicate some human engineering factors that should be included in training sessions.

4.2.1 - <u>Discussion of Shrub Dimension Data</u>

Overall the results of the double sampling aspects of the study were not as good as one might hope in order to save field time in a future full-scale inventory. Correlations of inexpensive measurements with expensive weights were lowest where costs were highest. Two people in the USFS who have done similar studies were contacted to see if they had any success in double sampling Alaskan shrubs. One reported negligible success in predicting current growth for several shrub

species while the other reported excellent success for the one species, Salix barclayi, that he measured. The second researcher observed that the shrubs he used had a consistent growth form and were generally unbrowsed. He suspected that browsing would alter the growth form and would make prediction equations less precise and less accurate. Most of our shrubs were browsed. Perhaps better fit could be obtained by using shrub characteristics such as degree of browsing or size class or environmental factors such as slope, aspect, or surrounding shrub density as grouping factors.

Each shrub species had its own structural characteristics which affected clipping. Betula glandulosa usually had many short, thin current growth twigs which were tedious to clip. The leaves were attached to small, stiff protrusions that made stripping leaves from twigs difficult. Many branches existed because the shrub is strongly branching. Salix pulchra was similar in having many short twigs but the leaves were easier to strip. These characteristics made those two species time consuming to clip. Salix glauca and S. lanata were similar in having more robust current growth that was easier to clip and strip leaves from twigs. Larger leaves and twigs may have made estimation easier. Salix alaxensis was the most robust of all the willow species with current twigs reaching lengths of over 1 m. Hand clippers could be used efficiently to cut these twigs. For the amount of material on an individual, it was probably the fastest to clip. Alnus sinuata and Betula papyrifera had more widely scattered twigs and leaves than the other species. Betula papyrifera was frequently hedged. These growth factors may have affected the prediction equations and efficiencies.

4.2.2 - Weight Per Individual Times Stem Density

Means of dry weight per individual and dry twig weight per individual were calculated for each species on a vegetation type basis

(Tables 20-25). Means and crude variances for the weight per area were calculated by multiplying the average weight per individual of a species in a site by the average density (4-m² plots) per site and grouping sites by vegetation types. These calculations were crude at best because within-site variances were not taken into account. The variance of the product was obtained by treating the product of weight per individual and density for a site as actual measurements (no variance) as opposed to considering their variance within a site and their covariance. The variance could only be reported where the species was sampled in more than one site per vegetation type. Data from clipped plots are also considered here for comparison, but these data are also very limited by sample size. Hence, comparisons of weight per area are Sometimes means and/or variances were reported for the product but not for clipped plot (Tables 20-25). This occurred because the species might have occurred in clipped plots but individuals were not clipped or vice-versa.

No statistical analyses were used to test differences between the product and the clipped plot weights, so all comparisons are based on numerical and not statistical differences. Clipped plots for <u>Salix pulchra</u> in the woodland black-white spruce type contained an average of 1 g dry twigs/10 m^2 while weight times density indicated 31 g/10 m^2 (Table 20). The estimates for Salix glauca were close, however.

The two techniques produced similar values for <u>Salix pulchra</u> in the woodland black spruce type although the clipped plot variance was much larger (Table 21). <u>Salix lanata</u> dry twig weights were much smaller for the clipped plots than for the weight times density technique. <u>Alnus sinuata</u> had larger dry twig weights (5 g) in the clipped plots than in the weight times density for open mixed spruce-paper birch type (Table 22).

The clipped plot technique resulted in larger weight estimates for Alnus sinuata, Betula papyrifera, and Salix alaxensis in the open tall willow vegetation type, although the latter values were comparables (Table 23). Values for Salix pulchra were smaller. Variances for clipped plots were generally much larger; however, the limitations of the input data may account for a large proportion of the differences.

Clipped plots resulted in larger weight estimates for <u>Salix pulchra</u> and <u>Betula papyrifera</u> in the open low dwarf birch-willow vegetation type while values were smaller for <u>Salix glauca</u> and <u>S. lanata</u> (Table 24). Responses of variance differed: <u>Salix pulchra</u> had larger values for clipped plot, <u>S. glauca</u> variances were about the same, and <u>S. lanata</u> had larger variances for weight times density.

Because of the extremely small sample size (n=19) for the weight times density method and the crude variance calculations, it was not considered reasonable to carry the analysis beyond this point at this time. This study and ensuing discussions with statisticians have revealed many problems with techniques for using a product of 2 random variables with proper sampling designs as well as with later calculations. Considering the small sample sizes in this study, perhaps a future analysis could be performed without regard to vegetation type (although it would still be very limited). Each species at each site would then be represented by a density, twig weight per individual, and clipped plot parameter. Overall means and variances could be calculated and compared.

4.3 - Clipped Plots

Current annual growth twig and leaf biomass for shrubs in clipped plots is shown by site and vegetation type in Appendix H. Means are shown on a grams per $10~\text{m}^2$ basis for comparison with density/clipped

individual estimates. Other statistics are also given, as described for Appendix A. A summary of clipped biomass for vegetation types in Appendix H is shown in Table 26. Betula glandulosa was a dominant component of clipped twig and leaf biomass in the woodland black-white spruce, woodland black spruce, and open low dwarf birch-willow vegetation types. Approximately one third of the total twig and leaf biomass in the open low dwarf birch-willow type was Salix pulchra, whereas 100% of the biomass occurring in the open low willow type was S. pulchra. Approximately 83% and 15% of the twig biomass and 79% and 18% of the leaf biomass was Salix alaxensis and Alnus sinuata, respectively, in the open tall willow vegetation type (Table 26). The open tall willow and open low willow vegetation types had the greatest total twig and leaf biomass of the 6 types sampled, whereas the open mixed spruce-paper birch had the least (Table 26).

The open low willow vegetation type required the longest average time to clip 1-m^2 plots (Table 27). This was partially due to the dense growth of Salix pulchra (Table 26) at the single site in this vegetation type (Table 1). However, this site (3) was also the first site sampled; thus, some time for organization and discussion of techniques was undoubtedly hidden within the clip time for the 6 plots conducted there. Plots in the open low dwarf birch-willow vegetation type required about 7-8 minutes longer to clip than plots in either of the spruce-dominated types (Table 27). This was probably partly because of the dominance of both Betula glandulosa and Salix pulchra in the open low dwarf birch-willow vegetation type and also because this type had an average current growth approximately twice as great as either of the spruce types (Table 27). Although the open tall willow type had the greatest

average twig and leaf biomass, only one vegetation type had a lower average time to clip (Table 27). <u>Salix alaxensis</u> and <u>Alnus sinuata</u>, both predominant within the 2 sites sampled in the open tall willow type, were substantially easier to handle and less time consuming to clip than other shrubs because of their robust growth of new leaders.

The open mixed spruce-paper birch vegetation type required the least time to clip plots (Table 27). The average time to clip 10 plots at site 16 was 117 seconds, but was 0 seconds at site 17. Few of the shrubs we sampled were found in this vegetation type, and then they only occurred in low density (Table 2). Many of the clipped plots in this type were devoid of the shrub species we sampled.

The time required to move 10 m to the subsequent plot, establish it, and prepare to clip it ranged from 2-2.4 minutes at 4 of the vegetation types (Table 27). Move time averaged 1.5 minutes at the 4 sites in the woodland black spruce vegetation type. Only 54 seconds was required in the open mixed spruce-paper birch type (Table 27). A move time of about 2 minutes could be used as a general average for all vegetation types if clipped plots were spaced 10 m apart.

Average time in minutes required to clip an estimated adequate number of plots was obtained for each measured species in the 6 sampled vegetation types (Table 28). Calculations were performed as described for Table 5. All estimated times for individual species in Table 28 are approximations because only the total elapsed time to clip the vegetation in each plot was recorded. The time required to clip twigs and leaves of each species was allocated based on the percentage of total dry weight clipped. Although this is a rather crude approach, it is probably a fairly accurate approximation for most species except Salix alaxensis and Alnus sinuata in the open tall willow vegetation

type. Both of these shrubs growing in this type produced robust leaders that were relatively easily handled and quickly clipped. The allocation of time to clip these 2 species might have been too high had other species that were more time-consuming to clip (e.g. Betula glandulosa and Salix pulchra) made up a substantial proportion of the total biomass (Table 26). However, the only other species clipped within the open tall willow type were minor components of the total biomass (Table 26). Betula glandulosa was the most tedious shrub to clip and required the most time input per unit weight of biomass collected. Thus the time required to clip Betula glandulosa is probably underestimated relative to its percentage of the total biomass clipped.

4.3.1 - Allocation of the Clipped Plot Sample

The approximate allocation of sampling effort in terms of number of sites within the 6 vegetation types sampled could be calculated even though the sample size was very inadequate. Using a between-site variance calculated from this study and Mendenhall et al.'s (1977; 64) sample allocation equation described previously, minimum cost estimates were calculated in terms of a percentage of a maximum number of sites could be allocated to each vegetation type. Using this formula which minimizes cost for a fixed variance, 24% of the effort in terms of the percentage of total sites sampled for clipped plots among the 6 vegetation types sampled would be conducted in the woodland black-white spruce type. Similarly, 56% of the sites would be conducted in the woodland black spruce vegetation type, 8% in the open mixed spruce-paper birch type, 2% in the open tall willow type, and 10% in the open low dwarf birch-willow type.

As previously discussed, the open low willow vegetation type dropped from the equation because there was only a single site. Again

assuming a maximum of 340 sites as described for the 4-m² density plots, 82 sites would be sampled using clipped plots within the woodland black-white spruce vegetation type. Up to 190 sites would be sampled in the woodland black spruce type, 27 sites in the open mixed spruce-paper birch type, 7 sites in the open tall willow type, and 34 sites in the open low dwarf birch-willow type.

4.3.2 - Another Approach for the Clipped Plot Sample

Discussions with project personnel subsequent to collection of pilot study data have revealed the priority of information on winter forage for moose. In this pilot study both twig and leaf current annual growth was clipped. Leaf current annual growth was clipped to determine summer biomass. The time required to clip 1-m² plots could be substantially reduced if leaves were not taken. The elimination of Betula glandulosa as a viable source of forage for moose would also substantially reduce clipping time, especially in vegetation types dominated by this shrub species (e.g. open low dwarf birch type). As previously discussed for the density plots, decreasing the confidence interval around the mean by decreasing the level from 80% to 67% may give more realistic sample size estimates.

The results of deleting <u>Betula glandulosa</u> and the leaf current growth of all shrubs from the clipped plot analysis, and using 67% confidence, are shown for each vegetation type in Appendix I. The interpretation of differences in sample sizes for the two techniques is difficult because of the limited sample size and the adequacy of current sampling. For a reliable interpretation, the paired values of N, NHAT; WN, WNHAT; and BN, BNHAT should have the first number as the larger. In other words, the existing sample size should be at least as large as the estimated sample size, or somewhere near there. If 20 plots were

Parameter (

sampled as for the open mixed birch-spruce type and the estimated sample size was 209, the reliability is questionable (Table H11). Similarly one would not sample 820 sites based on a number calculated from 2 sites. Woddland black spruce and low dwarf birch-willow were the only types with a reasonable estimate of current annual growth within a site (Tables H8, H20). A reasonable number of sites was sampled only in the low dwarf birch-willow vegetation type (5 sites sampled, estimated that 5 sites were needed, Table H20).

However, in the second analysis without <u>Betula glandulosa</u> and leaves, none of the numbers appear acceptable based on estimated sample size, with the possible exception of those for dwarf birch-willow (Appendix 2). It appears that more plots per site will be needed if <u>Betula glandulosa</u> and leaves are not clipped, however, each plot will be sampled much more rapidly. The ubiquitousness of <u>Betula glandulosa</u> apparently reduced variances and increased means so that estimated sample sizes were smaller.

Data collected from 0.5-m^2 clipped plots collected by Steigers et al. (1983) in the middle Susitna River Basin was modified to reflect total twig current annual growth of the shrubs sampled in this pilot study (Appendix J). The same 3 vegetation types included in the density analysis, and summarized in Table 10, were used here for expanding the number of sampled vegetation types. For this analysis, the 0.5-m^2 and 1-m^2 clipped plots from the two years data were not differentiated.

Elapsed time to clip twigs of all species, except <u>Betula glandulosa</u>, was calculated as a percent of total time to clip twigs and leaves (Table 29). A minimum of 30 seconds to clip a plot was established. Elapsed time to clip plots includes move time (Table 29). A summary of Appendices I and J showing plots per site and sites per

vegetation type required to sample twig current annual growth within 20% of the mean with 67% confidence is depicted in Table 29. Time required to sample an adequate number of clipped plots ranged from 22 to 169 minutes among the 9 vegetation types sampled. Sites in 6 vegetation types could be sampled within approximately 1 hour (Table 29). The average time across the 8 vegetation types was 71 minutes. In actuality, it would probably take at least $\frac{1}{2}$ day to sample a site including travel and set-up time.

Optimum allocation of the cost to clip plots in the 8 vegetation types given in Table 29 can be derived. Using between site variances from Appendices H and J, the percentage of cost in terms of effort expended to sample clipped plots is shown in Table 30. Using these variances and excluding <u>Betula glandulosa</u>, 70% of the total effort would be expended in the spruce-dominated forests. Approximately 29% of the effort would be concentrated in the shrub types (Table 30).

Assuming 680 sites were the maximum that could be sampled for clipped plots, as described for 4-m² density plots, approximately 90% of the sites would be allocated to the open white spruce, open black spruce, and open low dwarf birch types (Table 30). These 3 vegetation types were sampled using random placement of sites by Steigers et al. (1983). A combination of between site variation and the planar area dominance of these 3 vegetation types among the types sampled resulted in the allocation of effort shown in Table 30.

5 - DISCUSSION OF DENSITY-WEIGHT PER INDIVIDUAL AND CLIPPED PLOTS

5.1 - Density-Weight Per Individual

The 4-m^2 plot was selected as the overall most efficient size to use for sampling density of the selected shrubs in the middle Susitna River Basin. It was chosen considering both the statistical and

practical implications of the 3 plot sizes investigated, as well as its consistency with previous and related studies. Average time required to count stems in the 4-m^2 plot could be substantially reduced if <u>Betula glandulosa</u> stems were not counted where it occurs as a dominant species. One observer can efficiently count stems and record the information while using the 4-m^2 plot.

A number of problems exist with using density estimates for the intended purpose of combining them with weight per individual to produce weight per area. Stems in a 4-m² plot cannot efficiently be counted by Some knowledge of the heights of species in the height category. density plots is required unless it is assumed that the average distribution of heights within density plots is the same as the distribution of heights of individuals selected to be clipped. number of shrubs of each species required to adequately sample total twig biomass would probably be greatly increased if the variability associated with clipping by height category were introduced. results of this pilot study have shown that maximum height of a clipped individual is poorly related to total current annual growth dry weight of twigs, and even more poorly related to twig dry weight of the 3 height categories we used. Average height of each species within the density plot is a gross measure and is probably no better related to twig biomass than maximum height. Crown shapes of the shrubs of interest in the middle Susitna River Basin have been altered, severely in many cases, by browsing. Plant heights result from the degree of browsing, growth during the summer, and to summer browsing of terminal twigs. Because of site variation, it is necessary to sample weights of individuals in the same area (site) as the density estimates were taken. Within-site variances will not be available if they are not sampled at the same site. These questions of statistical independence have yet to be resolved. Counting stems by basal diameter is time consuming and, as we have shown in this study, basal diameter is poorly related to twig biomass. Basal diameter classes could be a form of stratification, but this was not examined in this study.

Overall average weight by height category of a species multiplied by the average stem density per area of the "average size" individual counted in a 4-m² plot will produce at best only the average weight per area of a height category based on those average-sized individuals. And unless density and weight per individual sample are taken at the same site, this information will be available only on a vegetation type basis. Better methods are available.

Each individual stem for each species requires up to 3 labelled bags for the clipped twigs if the same 3 height categories are used in the main browse inventory. Each bag must be handled individually and it, or its associated number, must go through no fewer than the following 6 steps: 1) weigh and record wet weight (if required in field); 2) clean leaves from twigs; 3) oven dry; 4) weigh and record dry weight; 5) enter data into computer; 6) and data analysis. More laboratory time will be required if the number of bags of samples generated from clipped individuals exceeds those generated by clipped plots. This would occur if the number of clipped individuals of all species required at a site exceeded the number of required clipped plots. This would probably be the case if individuals were clipped by height category. Dry weights of twigs clipped from individual stems were often very small (e.g. below 0.05 g). Variability can be excessive when fluctuations in weight of twigs in height categories range from very small values to relatively larger values. It is also difficult to clip to this fine accuracy and overestimations can be made if values are rounded up.

Density data files must also be merged with individual stem weight data files to multiply the 2 estimates together. This merging is an extra step not required for the clipped plot data. Extra analysis costs should be expected with the density-weight per individual data sets. The files will be larger, take more time to organize, require more manipulations to produce the desired result, and there are still unresolved questions about combining the variances. We have probably spent at least 5 times longer on these data sets, excluding the plot size and double-sampling analysis, than on the clipped plot data.

5.2 - Clipped Plots

Only the $1-m^2$ clipped plot was tested for this pilot study. Steigers et al. (1983) used a $0.5-m^2$ rectangular plot for clipping current annual growth of forbs, graminoids, and shrubs. Although the $0.5-m^2$ plot required less time to clip, the $1-m^2$ plot may be better where only shrubs are of interest. The larger size plot is more important where branching is open and diffuse, and where many of the shrubs of interest are relatively rare in many areas. The pattern of clumping should be investigated before the size of clipped plots is decided.

Plot size and shape may be worth some further consideration. Circular plots were chosen because we could use a rope on a stake to delimit the area. This minimized field equipment that we needed to transport in the helicopter. The rope was frequently pulled hard enough against a sometimes wobbly stake to expand the area slightly. Also the observer had to hold the rope to find the boundary, then clip, then hold

the rope again. Sometimes the rope was even clipped. The rope could also be raised and lowered which affected the radius. Circular plots minimize boundary decisions because a circle provides the smallest perimeter: area ratio. Circles, however, tend to encompass less variability than long, narrow plots under many vegetation patterns, although this is not always true. The size may also affect this.

Rectangular or square plots could be delimited using folding frames, as opposed to fixed frames used by Steigers et al. (1983), but these would introduce errors comparable to pulling on the stake. These shapes increase the boundary decisions but more variability is frequently encountered in one long, narrow plot than one circular plot of the same area. This would reduce the between-plot or within-site variance.

Depending on the scale and type of pattern, a different size plot from 1-m^2 may be beneficial. If the scale of clumping is much larger than $1~\text{m}^2$, 0.5-m^2 plots may not have a much larger variance, but the clipping time would be reduced. A plot sufficiently large to reduce the variance greatly may require an unreasonable time to clip, so no benefits would be gained. Changing the size or shape of the plot may be a consideration, but we know of no studies in the boreal forest regions that have evaluated this.

Average time to clip 1-m² plots would be substantially reduced if Betula glandulosa was excluded from the species of interest and if only twigs were clipped. Leaves would probably still need to be separated from twigs clipped for some species (e.g. Salix pulchra) because the twigs are small and frail and the leaves are tightly attached. This separation will be necessary either in the field or laboratory regardless of whether plot or individual stems are clipped. Two persons

would work more efficiently at clipping $1-m^2$ plots than would only one person, if the vegetation were dense. Generally, one person would probably be more efficient in a $1-m^2$ plot in these vegetation types to reduce interference between people.

Estimates of average weight per area and associated variances for clipped plots are based on sample sizes ranging from 3 to 10 plots per site. Eleven of the 16 sites sampled had less than 10 clipped plots, one site was not sampled. Hence, less information is present in these results than in the density-weight per individual results. Larger sample sizes for all measures would give a better basis for comparing the methods.

A number of problems also exist for the clipped plots. Plots were not clipped by height category in this pilot study. Clipping by height category may increase total clipping time by up to 2 times. Part of this would be due to the time required to establish the height categories in the plot as well as the increased number of bags to be labelled. Similar to the density and weight per individual, adding height categories will also probably increase the estimated sample size. However, with the time saved by not clipping <u>Betula glandulosa</u> or leaves, the time increase required to clip by height categories may be more than offset.

Fewer bags may be required to be dried and weighed if the number of clipped plots to adequately sample a site is less than the number of individual stems for all species required to adequately sample weight per individual.

One of the most important advantages of clipped plots is that weight by species per plot is converted to weight per larger area simply by multiplying by a constant. This also holds true for weight per area

by height category if plots are clipped by height cateogry. Data files are smaller and conversions to biomass per area are very straight forward using data collected from clipped plots. Data file manipulation and analysis to achieve the desired result is minimal. Variances are relatively easy to calculate.

6 - RECOMMENDATIONS

Clipped plots are recommended for use in the main browse inventory based on results of this browse pilot study, our experience in the analysis of these data, our past experience in sampling vegetation in the area, and accepted inventory techniques. We cannot recommend a plot size since no comparisons were made.

If the density x weight per individual method were selected, as might be if there were existing density information or if density were needed for some other purpose, then we recommend the following:

- 1) Use 4-m² circular plots spaced systematic-randomly at least 10 m apart for counting stems. Longer distances between plots would maximize within-site variability and minimize between-site variability. A viable method to relate stems counted in density plots to clipped individuals, but having independent samples short of clipping all individuals (or a random sample thereof) in the density plot, could not be determined. No double-sampling technique we tested held good predictive ability, especially when height category was considered.
- 2) Clip twigs of systematic-randomly chosen individual stems of each species by height category. A large enough sample should be taken to ensure the range of stem sizes has been sampled.

Since a large scale browse inventory is being contemplated for the middle Susitna River Basin, and because this pilot browse study had such low sample size, we examined what techniques were being used in large-scale inventories in the state; in particular the Cooperative River Basin study conducted by the USFS (United States Forest Service) and SCS (Soil Conservation Service). This study was conducted in the Susitna River basin, and is currently being carried out in the Tanana, and will be performed in other major river drainages. The original techniques used in the Susitna portion were based on past experience and an expectation of how much could be accomplished in a day. Techniques being improved as more experience is acquired and better determinations of time and estimated sample size are determined. Although the data have not been published, some are in draft publication form and the data are available to the Susitna Hydroelectric Project based on a Cooperative Agreement written in 1980.

All current growth and browse measurements obtained in the Cooperative River Basin Study were procured in plots. Low vegetation below 4.5 ft (1.5 m) was sampled using 2 ft x 2 ft (0.6 x 0.6 m = 0.37 m²) plots to estimate and clip the current year's growth (twigs plus leaves) for range production. Tall brush information was recorded in 10 ft x 10 ft (3 x 3 m = 9.3 m²) plots and included productivity and browse (at 5 mm diameter) information. The 5-mm diameter was the assumed diameter-at-point-of-browsing. They used ocular estimates to estimate a weight of some unit (e.g. a branch) in the 100-ft² plot, count the number of units, then clip and weigh the one unit to obtain an adjustment factor. They were able to use large plots because they did not clip the entire plot.

Most other environmental assessment sampling procedures with which

we are familiar use plots rather than weight per individual times density. We presume this is for simplicity and reliability of data. Weight per area by clipped plots has only the one source of variation while the product of 2 random variables has 2 sources of variation. This is just considering sampling error, and not the very real errors associated with actual measurements.

Since the Cooperative River Basin study included productivity and browse data collected from approximately 80 randomly located sites, we think these variances should also be examined for allocation of sites to vegetation types. One Susitna Plant Ecology team member assisted in the collection of these data in 1980 as part of a cooperative agreement with the Alaska Power Authority. We believe as much existing information as possible should be used in planning for the full-scale inventory.

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TABLES

TABLE 1. Level IV classification of 17 sites (3-19) sampled for the Browse Pilot study during August 1983 in the middle Susitna River Basin.

Level IV	Site #
Woodland Black-White Spruce	10, 11
Woodland Black Spruce	14, 15, 18, 19
Open Mixed Spruce-Paper Birch	16, 17
Open Tall Willow	8, 9
Open Low Dwarf Birch-Willow	4, 5, 6, 7, 12, 13
Open Low Willow	3

										Leve	1 IV V	egeta	tion	Type ^a	1							
				1982							1982							1982				1982
		WB-WS		WS		<u>w</u> BS			MS-B		<u>0\$-B</u>		Π	M		DB-W		<u>DB-W</u>		LW_		LW
Species	1	4	10	4	1	4	10	1	4	10	4	1	4	10	1	4	10	4	1	4	10	4
Betula glandulosa	70	65	61	28	93	98	75	1	4	2	_				68	56	53	38				
Betula papyrifera		1	1						1	1			2	1		1						
Salix pulchra	1	7	3	2	16	11	17		1	1		21	12	8	27	26	20	5	186	116	94	53
Salix glauca	6	3	2	1										1	2	2	3					
Salix lanata						10	2							1	15	11	7					
Salix alaxensis												49	40	30					4	6		
Alnus sinuata				1					۷ ا	<1		3	7	11								
Total stems	77	74	66	32	109	118	94	1	6	5	0	73	60	51	112	96	83	43	190	123	94	53

^a WB-WS = Woodland Black-White Spruce; WS = Woodland Spruce; WBS = Woodland Black Spruce; MS-B = Open Mixed Spruce-Paper Birch; OS-B = Open Spruce-Paper Birch; TW = Open Tall Willow; DB-W = Open Low Dwarf Birch-Willow; LW = Open Low Willow.

TABLE 3. Within-site variance of stem density estimates in $1-m^2$, $4-m^2$, and $10-m^2$ plot sizes for shrubs in level IV vegetation types in the middle Susitna River Basin.

		Level IV Vegetation Type "																
		WB-WS			WBS			MS-B			T₩			DB-W			LW	
Species	1	4	10	1	4	10	1	4	10	1	4	10	1	4	10	1	4	10
Betula glandulosa	3834	1209	1671	5966	3476	1787	5	80	48				4835	1475	801			
Betula papyrifera		1	1					1	6		21	2	•	4				
Salix <u>pulchra</u>	20	172	52	1178	476	1275		15	2	476	114	69	1686	1108	218	30712	8653	2104
Salix glauca	425	17	15									6	93	45	68			
Salix lanata					352	26						8	1410	484	138			
<u>Salix</u> <u>alaxensis</u>										3915	74 9	496				208	180	ı
Alnus sinuata								5	18	35	110	253					•	
Total stems	3514	1865	1816	6987	4001	2114	5	92	73	4104	1113	339	7850	2300	1051	30655	8324	2104

a WB-WS = Woodland Black-White Spruce; WBS = Woodland Black Spruce; MS-B = Open Mixed Spruce-Paper Birch; TW = Open Tall Willow; DB-W = Open Low Dwarf Birch-Willow; LW = Open Low Willow.

TABLE 4. Average time (seconds) to count stems in 1-m², 4-m², and 10-m² plot sizes for 6 level IV vegetation types in the middle Susitna River Basin. Values for individual species do not include time to move between plots and no values include time to locate and establish the transects.

							1	Level	IV Veg	etatio	п Туре	a						· · · · · · · · · · · · · · · · · · ·
		WB-WS			WBS			MS-B			TW			DB-W			LW	
Species	1	4	10	1	4	10	1	4	10	1	4	10	1	4	10	1	4	10
Betula glandulosa	17	48	64	24	54	69	6	16	10	=		,*	21	52	67			
Betula papyrifera		1	1					1	7		5	16		2				
Salix pulchra	5	16	20	6	13	25		3	4	9	19	22	14	34	44	91	102	131
Salix glauca	2	5	11									12	4	8	17			
Salix lanata					9	5						4	8	10	13			
Salix <u>alaxensis</u>										30	65	67				-5	10	
Alnus <u>sinuata</u>								2	10	5	21	35						
Move time	100	102	80	66	77	94	78	73	101	124	127	127	176	148	158	174	260	251
Total time including move	128	177	250	99	158	197	90	96	137	176	255	313	227	257	303	280	401	420

a WB-WS = Woodland Black-White Spruce; WBS = Woodland Black Spruce; MS-B = Open Mixed Spruce-Paper Birch; TW = Open Tall Willow; DB-W = Open Low Dwarf Birch-Willow; LW = Open Low Willow.

TABLE 5. Average time (minutes) to count stems for an estimated adequate number of plots at each site in 1-m², 4-m², and 10-m² plot sizes for 6 level IV vegetation types in the middle Susitna River Basin. Values for individual species do not include time to move between plots and no values include time to locate and establish the transects.

								Level	IV Veg	etation	Туре	a						
		WB-WS			WBS			MS-B			TW			DB-W			LW	
Species	1	4	10	1	4	10	1	4	10	1	4	10	1	4	10	1	4	10
Betula glandulosa	5	6	11	3	4	5	41	23	44				3	4	3			
Betula papyrifera		7	7					7	10		16	45		14				
Salix pulchra	34	22	42	5	9	19		21	16	4	6	9	4	7	4	56	46	22
Salix glauca	10	4	11									58	8	7	14			
<u>Salix</u> <u>lanata</u>					6 1	5						27	6	5	4			
<u>Salix</u> <u>alaxensis</u>										17	11	14				41	30	
Alnus sinuata								14	46	10	18	26						
Total all species incl. move time	29	24	40	12	11	11	617	86	15 5	50	32	21	20	12	11	163	154	70

a WB-WS = Woodland Black-White Spruce; WBS = Woodland Black Spruce; MS-B = Open Mixed Spruce-Paper Birch; TW = Open Tall Willow; DB-W = Open Low Dwarf Birch-Willow; LW = Open Low Willow.

TABLE 6. Summary of average time in minutes required to sample the density of shrub stems for an estimated adequate number of plots at each site. Means are by species across all sites for each non-zero plot size.

			Plot Size					
Species/Time	# Cases	1-m ²	4-m ²	10-m ²				
Betula glandulosa	39	22	18	20				
Betula papyrifera	10		20	32				
Salix pulchra	41	25	27	37				
Salix glauca	18	18	14	39				
Salix lanata	12	48	21	23				
Salix alaxensis	8	33	23	27				
Alnus sinuata	7	16	30	57				
Move time	51	2	2	2				
Total time including move	50	130	89	67				

TABLE 7. Summary of results of analysis of variance for the time required to sample the density of shrub stems for an estimated adequate number of plots. Sites were nested within vegetation types and plot sizes were crossed with sites and vegetation types.

			Signif	F	
Species	# Sites	# Cases	Vegetation Type	Plot Size	Interaction
Betula glandulosa	13	39	0.01*	0.78	0.26
Betula papyrifera	6	18	0.89	0.22	0.92
Salix pulchra	16	48	0.36	0.01*	0.07
Salix glauca	8	24	0.28	0.03*	0.02*
Salix lanata	5	18	0.29	0.85	0.69
Salix alaxensis	3	9	0.36	0.08	0.05*
Alnus sinuata	3	9	0.48	0.02*	0.04*
Total time	17	51	0.001*	0.51	1.0

^{*} alpha ≤ 0.05

TABLE 8. Comparison of vegetation types between the pilot study and McKendrick et al. (1982).

Percentages of total mapped area in the Watana and Devil Canyon impoundments and construction zones from McKendrick et al. (1982; 102, 106) are also given.

Pilot Vegetation Type	1982 Vegetation Type	Area (ha)	% of total area
Woodland Black-White Spruce	Woodland Spruce-White	1,633	7.22
Woodland Black Spruce	Woodland Spruce-Black	2,743	12.13
Open Mixed Spruce-Paper Birch	Mixed Open Conifer-Deciduous	732	3.24
Open Tall Willow		11 ^a	0.05 ^a
Open Low Dwarf Birch-Willow	Mixed Low Shrub	1,391	6.15
Open Low Willow	Willow Shrub	289 ^b	1.28 ^b
TOTAL AREA	22,609	100.00	

a Estimated percentage derived from the Open Low Willow vegetation type

 $^{^{}m b}$ Reduced by 0.05% which was assigned to the Open Tall Willow vegetation type.

TABLE 9. Average elapsed time/plot including move time in seconds, and number of 4-m² plots/site, minutes/site, and sites/level IV vegetation type required to sample total stem density within 20% of the mean with 67% confidence. Estimates are for selected shrub species in 9 level IV vegetation types in the middle Susitna River Basin. Betula glandulosa has been excluded. Includes data modified from Steigers et al. (1983).

Level IV Vegetation Type	# Sites Sampled	Time/Plot (Seconds)	Plots/ Site	Minutes/ Site	Sites/Vegetation Type
	· · · · · · · · · · · · · · · · · · ·				
Open White Spruce ^a	7	120 ^b	5	10	193
Open Black Spruce ^a	10	110 ^b	5	9	366
Woodland Black-White Spruce	2	129	31	67	237
Woodland Black Spruce	4	104	15	26	223
Open Mixed Spruce-Paper Birch	2	81	94	127	240
Open Tall Willow	2	242	5	20	9
Open Low Dwarf Birch ^a	18	158 ^C	15	40	1,544
Open Low Dwarf Birch-Willow	6	205	5	17	76
Open Low Willow	1	39 8	8	53	d

- b Estimated time based on similarity of species composition and density to the pilot study woodland black spruce vegetation type.
- ^C Estimated time based on similarity of species composition and density to the pilot study open low dwarf birch-willow vegetation type.
- d Only 1 site sampled.

^a Data modified from Steigers et al. (1983).

TABLE 10. Comparison of vegetation types between the 1983 pilot study and 1982 browse inventory (Steigers et al. 1983), and McKendrick et al. (1982). Percentages of total mapped area in the Watana and Devil Canyon impoundments and construction zones from McKendrick et al. (1982; 102, 106) are also given.

Level IV Vegetation Type	1982 Vegetation Type	Area (ha)	% of total area
Woodland Black-White Spruce	Woodland Spruce-White	1,633	7.22
Woodland Black Spruce	Woodland Spruce-Black	2,743	12.13
Open White Spruce	Open Spruce-White	5,166	22.85
Open Black Spruce	Open Spruce-Black	2,615	11.57
Open Mixed Spruce-Paper Birch	Mixed Open Conifer-Deciduous	732	3.24
Open Tall Willow	·	11 ^a	0.05 ^a
Open Low Dwarf Birch	Birch Shrub	3,673	16.25
Open Low Dwarf Birch-Willow	Mixed Low Shrub	1,391	6.15
Open Low Willow	Willow Shrub	289 ^b	1.28 ^b
TOTAL AREA		22,609	100.00

a Estimated percentage derived from the Open Low Willow vegetation type

 $^{^{}m b}$ Reduced by 0.05% which was assigned to the Open Tall Willow vegetation type.

TABLE 11. Percentage of cost to sample density in 4-m² plots, and allocation of 680 maximum sites among 8 level IV vegetation types. <u>Betula glandulosa</u> has been excluded.

Level IV Vegetation Type	% of Cost	Allocation
Open White Spruce	39	264
Open Black Spruce	23	155
Woodland Black-White Spruce	3	20
Woodland Black Spruce	14	94
Open Mixed Spruce-Paper Birch	0.15	2 ^a
Open Tall Willow	0.04	2 ^a
Open Low Dwarf Birch	11	75
Open Low Dwarf Birch-Willow	10	68

 $^{^{\}mathrm{a}}$ Minimum of 2 sites required.

TABLE 12. Summary of plots of dry weight versus ocular estimate by observer for each species.

Betula	glandulosa

					• *			Appro	<u>ximate</u>
<u>Observer</u>	<u>N</u>	Corr.	Res. MS	Std. Dev.	Slope	Inter.	Curvature	Low	<u>High</u>
1	40	0.78	25.35	3.46	1.81	1.24	None	1	32
2	33	0.94	1.13	3.17	0.44	0.29	None	1	29
3	43	0.90	1.80	3.09	0.37	0.50	None	1	28
4	27	0.96	1.72	4.43	0.35	0.65	Nane	1	57

Salix pulchra

								Appro	ximate
<u>Observer</u>	<u>N</u>	Corr.	Res. MS	Std. Dev.	<u>Slope</u>	Inter.	Curvature	Low	<u> High</u>
1	40	0.79	7.40	4.34	0.40	1.10	None	1	30
2	25	0.95	0.94	3.16	0.54	0.29	None	1.5	24.5
3	45	0.83	8.71	5.27	0.41	0.70	None	1	48
4	26	0.89	12.17	7.45	0.84	-2.83	Quad ^a	2	33

Salix glauca

								<u>Appro</u>	ximate
<u>Observer</u>	<u>N</u>	Corr.	Res. MS	Std. Dev.	<u>Slope</u>	Inter.	Curvature	Low	<u> High</u>
1	27	0.90	8.88	6.74	0.38	+0.20	None	2	65
2	15	0.94	7.22	7.50	0.68	- 0.79	None	2	42
3	20	0.93	4.73	5.95	0.39	+0.83	None	2	49
4	15	0.97	1.98	6.04	0.38	-0.02	None	2	56

Salix lanata

								Appr	<u>oximate</u>
<u>Observer</u>	<u>N</u>	Corr.	Res. MS	Std. Dev.	<u>Slope</u>	<u>Inter.</u>	Curvature	Low	<u>High</u>
1	5	0.95	30.58	14.79	0.63	-5.30	Slight quad	8	62
2	15	0.93	3.35	4.73	0.56	+0.43	None	1	31
3	14	0.94	5.10	3.47	0.51	-0.13	None	1	21
4	5	0.98	3.27	7.80	0.55	-3.41	None	12	42

Betula papyrifera

								Appro	ximate
<u>Observer</u>	<u>N</u>	Corr.	Res. MS	Std. Dev.	<u>Slope</u>	<u>Inter.</u>	Curvature	Low	<u> High</u>
1	8	0.97	9.73	12.10	0.55	+2.37	None	4	68
2	5	0 .99 9	1.91	22.51	0.24	+1.79	None	1	230
3	5	0.98	25.33	20.96	0.97	-2.32	None	3	49
4	9	0.98	4.92	10.00	0.41	+0.72	None	3	78

Alnus sinuata

								Appro	<u>ximate</u>
<u>Observer</u>	<u>N</u>	Corr.	Res. MS	Std. Dev.	<u>Slope</u>	<u>Inter.</u>	Curvature	Low	High
1	2	1.00	0.00	5.66	0.76	-0.80	None	2.5	13
2									
3	10	0.97	7.14	11.07	0.91	-5.05	None	8	44
4	2	1.00	0.00	10.82	0.56	1.78	None	15	42

Salix alaxensis

								Appro	<u>ximate</u>
<u>Observer</u>	<u>N</u>	Corr.	Res. MS	Std. Dev.	Slope	<u>Inter.</u>	Curvature	Low	<u> High</u>
1	8	0.98	16.43	21.68	0.36	1.25	None	5	175
2									
3	14	0.84	71.29	15.13	0.21	5.39	None	15	195
4	8	0.98	72.19	43.53	0.46	-2.33	None	12	205

The largest estimated value was about 33 and appeared to be an outlier.

If this were eliminated, the largest value would be about 23, there would be no curvature, correlation would probably be higher, and slope would be smaller.

TABLE 13. Summary of plots of dry weight versus untransformed shrub dimensions and ocular estimates by species for 4 major species.

Betula glandulosa	n=12	4 Std	. Dev. =	= 3.26			
				v./		<u>Approximat</u>	<u>.e</u>
Variable	Corr.	Res. MS	Slope	Inter.	Curvature	Low High	· . <u>!</u>
Basal diameter(mm)	0.80	3.89	0.09	-3.22	quad	30 160	1
Height(cm)	0.73	5.02	0.12	-2.70	none	18 135	,
Depth(cm)	0.68	5.69	0.15	-2.01	попе	13 104	
Width(cm)	0.70	5.49	0.14	-1.02	quad	6.5 104	
Right angle(cm)	0.75	4.73	0.24	91	quad	2 56	i
Ocular estimate(g)	0.91	1.82	0.39	+.54	none	1 58	}
<u>Salix pulchra</u> r	n=136	Std. De	v. = 5.	19		Approximat	:e
Variable	Corr.	Res. MS	Slope	<u>Inter.</u>	Curvature	<u>Low</u> <u>High</u>	<u>.</u>
Basal diameter(mm)	0.70	13.72	0.07	-2.19	quad	16 224	
Height(cm)	0.59	17.65	0.16	-2.88	none	13 105	;
Depth(cm)	0.64	16.04	0.27	-2.25	slight quad	5 58	}
Width(cm)	0.56	18.54	0.17	+0.32	slight quad	5 135	(55)
Right angle(cm)	0.68	14.50	0.40	-2.24	quad	3.4 49	
Ocular estimate(g)	0.81	9.14	0.48	+0.29	none	1 49)

(Table 13 continued.)

Salix glauca	n= 65	Std. Dev	. = 3.26				
		•	A			Appro	oximate
Variable	Corr	. Res. MS	Slope	Inter.	Curvature	Low	High

<u>Variable</u>	Corr.	Res. MS	Slope	<u>Inter.</u>	Curvature	Low	<u> High</u>
Basal diameter(mm)	0.85	11.26	0.11	-4.54	none	25	225
Height(cm)	0.77	16.27	0.20	-5.89	slight quad	26	131
Depth(cm)	0.73	18.30	0.26	-2.09	slight quad	6	89
Width(cm)	0.79	15.01	0.40	-5.45	quad	8	60
Right angle(cm)	0.71	19.61	0.36	-1.18	none	5	70 (50)
Ocular estimate(g)	0.89	8.39	0.38	+0.84	none	2	65

Salix lanata n=39 Std. Dev. = 7.24

		-	٠			Appro	ximate
<u>Variable</u>	Corr.	Res. MS	<u>Slope</u>	<u>Inter.</u>	Curvature	Low	High
Basal diameter(mm)	0.69	28.38	0.09	-5.00	slight quad	53	265
Height(cm)	0.83	16.67	0.28	-9.91	quad	20	116
Depth(cm)	0.87	13.43	0.40	-5.84	none	10	86
Width(cm)	0.64	32.12	0.29	-2.50	none	7	77
Right angle(cm)	0.72	25.69	0.53	-3.87	qua d	4	42
Ocular estimate(g)	0.94	6.73	0.51	-0.20	none	1	65

a All values except one were less than 55.

0.69

2.97

TABLE 14. Stepwise regression summaries by species for total dry weight

(leaves plus twigs) and dry twig weight versus all shrub measurements
including transformations and volumes.

		Retula d	landulosa N=117
Dry weight	t	<u>Becara</u> y	Tandarosa N-117
	-	Standard error	
Step	_r ²	of estimate	Variables Added
0		3.63	
1	0.79	1.68	estimated width
2	0.83	1.50	width
3	0.85	1.43	basal diameter
Dry twigs			
		Standard error	
Step	<u>r²</u>	of estimate	Variables Added
0		0.67	
1	0.33	0.55	estimated weight
2	0.37	0.54	depth ²
3	0.44	0.51	height ²
4	0.48	0.49	height
		<u>Salix</u>	<u>pulchra</u> N=126
Dry weigh	<u>t</u>		
		Standard error	
Step	<u>r²</u>	of estimate	Variables_Added
0		5.24	
1	0.65	3.09	estimated weight
2	0.67	3.04	width

vol. 2=height x width x right angle

_	
11001	ヤレノフへへ
Dry	twids
$\neg \cdot \jmath$	· · · · · · · ·

Step	<u>r²</u>	of estimate	Variables Added
0		1.05	v.
1	0.37	0.84	estimated weight
2	0.40	.82	depth
		Cali	v alauca N=74

Dry weight

Standard error

Step	<u>r²</u>	of estimate	Variables Added
0		6.50	
1	0.80	, 2,96	estimated weight
2	0.89	2.23	basal diameter ²
3	0.90	2.07	vol 1.=depth x width x right angle

Dry twigs

Standard error

Step	<u>r</u> 2	of estimate	Variables Added
0		2.13	
1	0.64	1.29	estimated weight
2	0.73	1.11	basal diameter ²
3	0.78	1.03	depth ²
4	0.82	0.93	height ²
5	0.84	0.87	width

Salix lanata N=38

Dry weight

Sta	nda	rd	er	rnr
Jua	Hua	ı u	C1	

Step	<u>r²</u>	of estimate	Variables Added
0		7.27	· · · · · · · · · · · · · · · · · · ·
1	0.87	2.63	estimated weight
2	0.94	1.87	vol. 1=depth x width x right angle
3	0.95	1.73	depth ²

Dry twigs

Standard error

Step	<u>r²</u>	of estimate	Variables Added
0		2.28	
1	0.82	0.97	estimated weight
2	0.89	0.79	depth ²
3	0.90	0.74	basal diameter ²

Betula papyrifera N=25

Dry weight

Standard error

Step	<u>r</u> 2	of estimate	Variables Added
0		15.41	
1	0.82	6.69	height ²
2	0.89	5.40	estimated weight
3	0.92	4.66	observer 1
4	0.95	3.66	vol. 4=basal diameter ²
5	0.96	3.42	

Dry twigs

Sta	nda	rd	error	
Juu	Hua	ı u	C1 (U1	

Step		of estimate	Variables Added
0		2.35	•
1	0.57	1.57	height

Alnus sinuata N=21

Dry weight

Standard error

Step	<u>r²</u>	of estimate	Variables Added
0 .		51.65	
1	0.97*	8.45	width ²

^{*(}may be an artifact-largest value hit right on)

Dry twig

Standard error

-	Step	<u>r²</u>	of estimate	Variables Added	- Trium
	0		7.87		
	1	0.38	6.34	1/width	
	2	0.54	5.60	1/right angle	
	3	0.70	4.65	1/basal diameter	
	4	0.64	5.01	remove 1/width	

Salix alaxensis N=35

Dry weight

Dry weight			
		Standard error	
Step	<u>r</u> 2	of estimate	Variables Added
0		25.42	
1	0.83	10.50	estimated weight
2	0.89	8.57	vol. 2= height x width x right angle
3	0.91	8.17	width
Dry twigs			
-		Standard error	
Step	<u>r</u> 2	of estimate	Variables Added
0		11.51	
1	0.74	5.96	vol. 2
2	0.85	4.67	width ²
3.	0.87	4.32	estimated weight
4	0.90	3.97	vol 1= depth x width x right angle

TABLE 15. Times to obtain measurements including clipping on each individual of a species and the approximate optimum ratio of estimated individuals to clipped individuals based on ocular estimate as the only measurement. All observers were combined.

Field Times (seconds/individual)						
Species	Ocular Est.	Clip	Diam.	Crown(4) ^a	Move	Approximate n/n'=est./clip
Betula glandulosa	34	170	12	29	69	3/2
Salix pulchra	37	224	9	28	65	3/2
Salix glauca	27	132	7	26	40	5/2
Salix lanata	22	88	12	29	77	5/2
Salix alaxensis	31	245	14	27	319	7/1
Alnus sinuata	29	170	11	40	51	13/2
Betula papyrifera	50	351	10	4 8	97	2/1

^a Crown measurements included height of plant, depth of crown, width, and right angle.

Table 16. Stepwise regression summaries by species for log (dry weight) and log (dry twig weight) versus all shrub measurements, untransformed or logarithmic transforms only.

Betula glandulosa		N=68	
Log (dry)			• • • • • • • • • • • • • • • • • • •
		Standard error	
Step	<u>r</u> 2	of estimate	Variables Added
0		.318	
1	0.73	.166	log (est.)
2	0.79	.147	log (basal diam)
3	0.81	.140	log (width)
log twigs	•		
		Standard error	
Step	<u>r</u> 2	of estimate	Variables Added
0		.332	
1	0.11	.316	depth
Salix pulch	ira	n=31	
log (dry)			
		Standard error	
Step	_r ² _	of estimate	Variables Added
0		. 260	
1	0.60	.168	log (est.)
(rest		of printout not a	vailable)
log (twig)			
		Standard error	
Step	<u>r²</u>	of estimate	Variables Added
0	•	.325	
1	0.20	.296	log (basal diameter)

Salix glauca	n=57
Log (dry)	

Log (dry)			
		Standard error	
Step	_r ² _	of estimate	Variables Added
0		.355	
1	0.82	.151	log (est.)
2	0.85	.139	log (right angle)
3	0.87	.132	basal diameter
4	0.88	.128	log (height)
log (twig)			
		Standard error	

Step	<u>r</u> 2 .	of estimate	Variables Added
0		.432	
1	0.69	.241	log (est.)
2	0.75	.221	basal diameter
3	0.76	.210	depth
4	0.81	.196	log (height)

Salix lanata n=27

log (dry)

Standard e	rror
------------	------

Step	<u>r²</u>	of estimate	Variables Added
0		.317	
1	0.72	.172	log (est.)
2	0.85	.126	log (width)
3	0.89	.114	log (right angle)
6	0.93	.092	all vars.=right angle, est. log

log (twig)

2

0.85

.158

		Standard error	
Step	<u>r</u> 2	of estimate	Variables Added
0		.419	
1	0.64	.256	log (est.)
2	0.72	.230	log (depth)
Salix alax	ensis	n=35	
log (twig)			
		Standard error	
Step	<u>r</u> 2	of estimate	Variables Added
0		.475	
1	0.79	.222	log (right angle)
2	0.85	.192	est.
3	0.87	.180	log (depth)
log (twig)	ı		
		Standard error	
Step	<u>r²</u>	of estimate	Variables Added
0		.578	
1	0.78	.275	log (depth)
2	0.83	.248	log (right angle)
Betula par	yrifera	n=22	
log (dry)		•	
		Standard error	
Step	<u>r²</u>	of estimate	Variables Added
0		.453	
1	0.77	.192	log (est.)

log (basal diameter)

log (twig)

Standard error	Sta	nda 1	rd e	rror
----------------	-----	-------	------	------

		Standard error	
Step	<u>r</u> 2	of estimate	Variables Added
0		.453	e e e e e e e e e e e e e e e e e e e
1	0.56	.309	log (basal diameter)
Alnus sinu	<u>ata</u>	n=20	
log (dry)			
		Standard error	
Step	<u>r</u> 2	of estimate	Variables Added
0		.470	
1	0.81	.210	log (depth)

log (twig)

2 0.87

Standard error

Step	<u>r</u> ²	of estimate	Variables Added	
0		.462		,
1	0.51	.333	log (basal diameter)	

.177 log (width)

Table 17. Comparison of slopes of regression estimates by observer and across all observers for each species. Results were obtained using analysis of covariance with log (dry twig weight) as the dependent variable.

0bserver	1		2			3		4		All	
Species	N	Slope	N	Slope	N	Slope	N	Slope	N	Slope	Prob.
Betula glandulosa '	18	0039	13	.0367	21	0044	16	.0159	68	0.0108	.003
Salix pulchra	25	.0139	11	.0300	22	.0165	15	.0344	73	0.0197	.327
Salix glauca	21	.0262	11	.0388	13	.0183	12	.0202	57	0.0243	.120
Salix lanata	5	.0267	9	.0283	8	.0510	5	.0309	27	0.0295	.559
<u>Salix</u> alaxensis	8	.0107	5	.0067	14	.0032	8	.0089	35	0.0072	.013
Betula papyrifera	7	.0122	4	.0028	4	.0315	7	.0085	22	0.0053	.020
Alnus sinuata	1 -	a	7	a	10	^a	2	a	20	0.0025	a

^a Slopes could not be calculated for all four observers because observer 1 had only one observation. The analysis could be rerun with only three observers.

Table 18. Results of analysis of covariance with log (dry twig weight) as dependent variable, observer as the groups, and ocular estimate as the covariate.

	Equality of	Adj. Means		•	Equality	of Slope
Species	df	Prob.	df	Prob.	df	Prob.
Betula glandulosa	3,63	0.825	1,63	0.008	3,60	0.003
Salix pulchra	3,68	0.980	1,68	0.000	3,65	0.327
Salix glauca	3,52	0.219	1,52	0.000	3,49	0.120
Salix lanata	3,22	0.115	1,22	0.000	3,19	0.559
Salix alaxensis	3,30	0.099	1,30	0.000	3,27	0.013
Betula papyrifera	3,17	0.668	1,17	0.023	3,14	0.020
<u>Alnus</u> <u>sinuata</u>	3,15	0.890	1,15	0.091	a	a

Equality of slopes could not be tested for all four observers because one observer had only one observation. The analysis could be rerun with only three observers.

Table 19. Results of analysis of covariance with time to estimate an individual as the dependent variable, observer as the groups, and ocular estimate as the covariate.

	Equality of	Adj. Means	Zero	\$1ope	Equality	of Slope
Species	df	Prob.	df	Prob.	df	Prob.
Betula glandulosa	3,63	0.903	1,63	0.627	3,60	0.842
Salix pulchra	3,68	0.426	1,68	0.016	3,65	0.995
Salix glauca	3,52	0.012	1,52	0.453	3,49	0.970
<u>Salix</u> <u>lanata</u>	3,22	0.036	1,22	0.061	3,19	0.310
Salix alaxensis	3,30	0.316	1,30	0.006	3,27	0.331
Betula papyrifera	3,17	0.013	1,17	0.002	3,14	0.166
Alnus sinuata	3,15	0.927	1,15	0.024	a	a

^a Equality of slopes could not be tested for all four observers because one observer had only one observation. The analysis could be rerun with only three observers.

Table 20. Summaries of dry weights per individual, densities, and dry weight/area based on weight x density and clipped plots for the woodland black-white spruce vegetation type.

	Dry Wt/Ind. (g/Stem)	Dry twig/Ind. (g/Stem)	Density (Stem/10m ²)			Dry twigxDensity (g/10m ²)		Dry twig Clipped Plots	
Species				Mean	Var.	Mean Var.		(g/10m ²)	
								Mean	Var.
Salix pulchra	5.3	2.4	13	69		31		1	
Salix glauca	2.6	0.6	3	8	10	2	0.2	2	(to ey
Betula papyrifera	10.9	2.3	1	11		2		~ ~	

Table 21. Summaries of dry weights per individual, densities and dry weight/area based in weight x density and clipped plots for the woodland black spruce vegetation type.

Species	Dry Wt/Ind. (g/Stem)	Dry twig/Ind. (g/Stem)	Density (Stem/10m ²)	•		Dry twigxDensity (g/10m ²)		Dry twig Clipped Plots		
						Mean	Mean Var.		(g/10m ²)	
								Mean	Var.	
Salix pulchra	2.5	1.1	10	23	634	11	136	11	2058	
<u>Salix lanata</u>	2.6	0.4	38	99		15		0	0.	

Table 22. Summaries of dry weights per individual, densities, and dry weight/area based on weight x density and clipped plots for the open mixed spruce-paper birch vegetation type.

	Dry Wt/Ind. (g/Stem)	•	Density (Stem/10m ²)	- ·		Dry twigxDensity (g/10m ²)		Dry twig Clipped Plots	
Species				Mean	Var.	Mean	Var.	(g/10m ²)	
								Mean	Var.
Betula papyrifera	4.4	0.2	1	4		0.2			
<u>Alnus sinuata</u>	3.3	1.1	1	3		1.1		5	

Appendix and the state of the s

Table 23. Summaries of dry weights per individual, densities, and dry weight/area based on weight x density and clipped plots for the open tall willow vegetation type.

	Dry Wt/Ind. (g/Stem)	Dry twig/Ind.	Density (Stem/10m ²)	-		Dry twigxDensity (g/10m ²)		Dry twig Clipped Plots	
Species				Mean	Var.	Mean	Var.	(g/10m ²)	
								Mean	ı Var.
Salix pulchra	1.2	0.3	23	28		7	M	3	166
<u>Salix</u> <u>alaxensis</u>	19.3	7.8	41	750	39200	301	5910	393	1342000
Betula papyrifera	1.3	0.3	2	1	3	0.3	0.2	5	296
Alnus sinuata	2.1	0.7	7	20	613	6	50	73	59800

Table 24. Summaries of dry weights per individual, densities, and dry weight/area based on weight x density and clipped plots for the open low dwarf birch-willow vegetation type.

	Dry Wt/Ind. (g/Stem)		Density (Stem/10m ²)	-	xDensity 10m ²)	-	gxDensity Om ²)	Dry twig Clipped Plots		
1				Mean	Var.	Mean	Var.	(g/1	0m ²)	
Species								Mean	Var.	
Salix pulchra	3.2	0.4	26	69	1420	7	17	22	1800	
Salix glauca	9.0	2.0	4	35	743	8	65	2	71	
Salix lanata	21.8	6.1	22	661	848000	190	70200	2	150	
Betula papyrifera	4.8	1.3	2	10		3	~ m	8	809	

The first term of the first te

Table 25. Summaries of dry weights per individual, densities, and dry weight/area based on weight x density and clipped plots for the open low willow vegetation type.

	Dry Wt/Ind. (g/Stem)	Dry twig/Ind. (g/Stem)	Density (Stem/10m ²)	-	Density	Dry twig	gxDensity Om ²)	Dry i	3
Species				Mean	Var.	Mean	Var.	(g/10 Mean	Om ²) Var.
Salix pulchra	3.5	0.5	116	406		58		217	
Salix <u>alaxensis</u>	29.2	11.2	6	175		67			

Table 26. Average current annual growth twig and leaf biomass in grams per 10 m^2 for shrubs in 6 level IV vegetation types. A 1 m^2 circular plot was used.

	,	Level IV Vegetation Type ^a										
	WE	B-WS_	WB	s	MS	5-B	TW		DE	-W	L	.W
Species	Twig	Leaf	Twig	Leaf	Twig	Leaf	Twig	Leaf	Twig	Leaf	Twig	Leaf
Betula glandulosa	22	157	24	123	2	15			36	192		
Betula papyrifera							. 5	14	8	12		
Salix pulchra	1	4	11	25			3	10	22	104	217	655
Salix glauca	2	3							2	8		
<u>Salix lanata</u>			< 0.5	<0.5					2	5		
Salix alaxensis							394	550				
Alnus sinuata					5	31	73	125				
TOTAL	25	164	36	148	7	46	475	699	70	321	217	655

WB-WS = Woodland Black-White Spruce; WBS = Woodland Black Spruce; MS-B = Open Mixed Spruce-Paper Birch;
TW = Open Tall Willow; DB-W = Open Low Dwarf Birch-Willow; LW = Open Low Willow

with the control of the first the control of the co

Table 27. Elapsed time in seconds required for 2 persons to clip current annual growth twigs and leaves from shrub species in 1-m² plots, and then move to and establish a subsequent plot.

	Elapsed Time (seconds)						
Vegetation Type	Clip	Move	Tota1				
Woodland Black-White Spruce	703	138	841				
Woodland Black Spruce	649	92	741				
Open Mixed Spruce-Paper Birch	59	54	113				
Open Tall Willow	504	137	641				
Open Low Dwarf Birch-Willow	1,124	122	1,246				
Open Low Willow	1,800	141	1,941				

TABLE 28. Average time (minutes) to clip an estimated adequate number of 1-m² plots at a site for 6 level IV vegetation types. Plots were clipped by 2 persons. Time required to clip each species was allocated based on percentage of total dry weight clipped.

							Level	IV Ve	getatio	on Typ	e ^a							
	WB-WS		WBS		MS-B		TW		DB-W		LW							
Species	Twig	Lea f	Tota1 ^b	Twig	Leaf	Total	Twig	Leaf	Total	Twig	Leaf	Total	Twig	Leaf	Tota 1	Twig	Leaf	Total
Betula glandulosa	22	117	133	17	94	112	4	43	48				33	92	110			
Betula papyrifera										6	18	24	⁴ 93	139	232			
Salix pulchra	17	57	72	34	48	70				5	14	18	17	55	66	127	180	240
Salix glauca	25	34	57										22	82	102			
Salix lanata				9	2	5							20	49	69			
Salix alaxensis										45	51	88						
Alnus sinuata							16	102	119	30	55	88						
Total all species incl. move time			182			99			168			150			104			324

a WB-WS = Woodland Black-White Spruce; WBS = Woodland Black Spruce; MS-B = Open Mixed Spruce-Paper Birch; TW = Open Tall Willow; DB-W = Open Low Dwarf Birch-Willow; LW = Open Low Willow

b Total = total of twig + leaf using leaf estimated sample size.

TABLE 29. Approximate average elapsed time including move time in seconds for 2 persons to clip current annual growth twigs in 1-m² plots, and number of 1-m² and 0.5-m² plots/site, minutes/site, and number of sites/level IV vegetation type required to sample clipped plots within 20% of the mean with 67% confidence. Estimates are for selected shrub species in 9 level IV vegetation types in the middle Susitna River Basin. Betula glandulosa has been excluded. Includes data modified from Steigers et al. (1983).

	# Sites	Time/Plot ^a	Plots/	Minutes/	Sites/Vegetation
Level IV Vegetation Type	Sampled	(Seconds)	Site	Site	Type
Open White Spruce ^b	7	122 ^c	16 ^d	33	328
Open Black Spruce ^b	10	122 ^c	27 ^d	55	783
Woodland Black-White Spruce	2	168	8	22 -	2
Woodland Black Spruce	4	153	32	82	401
Open Mixed Spruce-Paper Birch	2	89	114	169	501
Open Tall Willow	2	322	10	54	220
Open Low Dwarf Birch ^b	18	172 ^e	23 ^d	66	2,095
Open Low Dwarf Birch-Willow	. 5	218	13	47	9
Open Low Willow	1	589	11	108	f
Open Low Willow	1	589	11	108	 '

- ^a Estimated time based on the percent twig weight of total twig plus leaf weight. A minimum of 30 seconds/plot was used.
- Data modified from Steigers et al. (1983).
- ^C Estimated time based on similarity of species composition to the pilot study woodland black spruce vegetation type.
- d 0.5-m² clipped plot size; 15 plots/site.
- Estimated time based on similarity of species composition to the pilot study open low dwarf birch-willow vegetation type.
- f Only 1 site sampled.

TABLE 30. Percentage of cost to clip plots, and allocation of 680 maximum sites among 8 level IV vegetation types. Betula glandulosa has been excluded.

Level IV Vegetation Type	% of Cost	Allocation
Open White Spruce	46	313
Open Black Spruce	18	121
Woodland Black-White Spruce	0.05	2 ^a
Woodland Black Spruce	6	41
Open Mixed Spruce-Paper Birch	1	7
Open Tall Willow	1	7
Open Low Dwarf Birch	26	175
Open Low Dwarf Birch-Willow	2 .	14

a Minimum of 2 sites required.

FIGURES

FIGURE 1

Location of Susitna River Basin study area in southcentral Alaska.

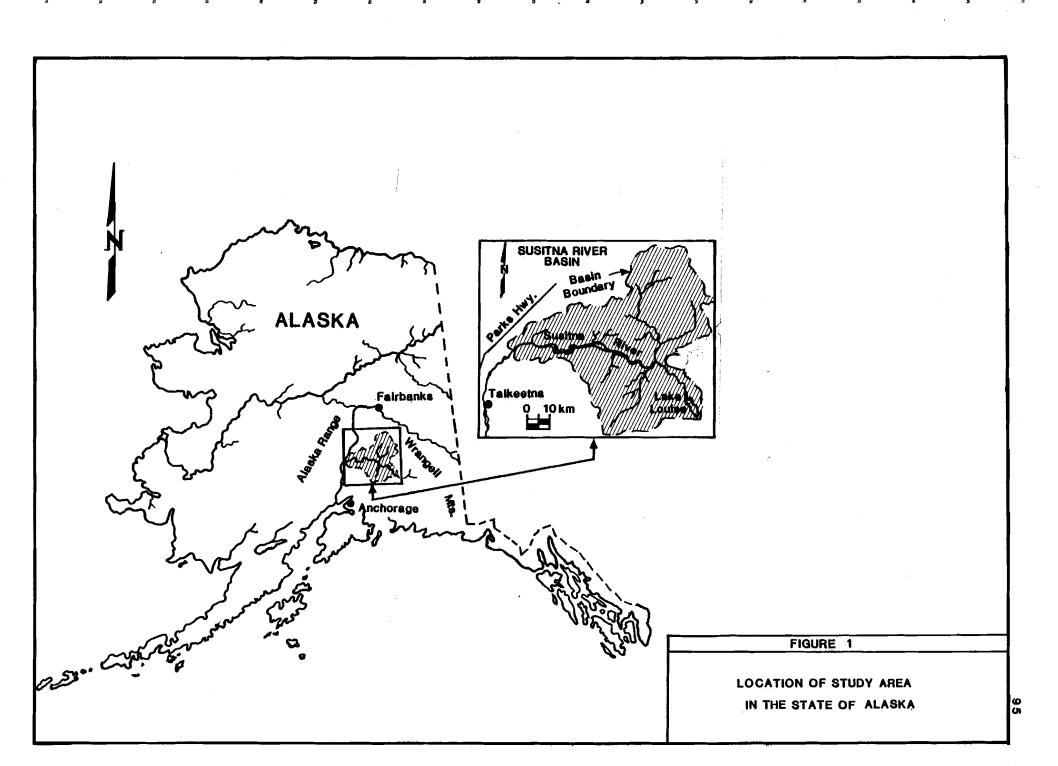
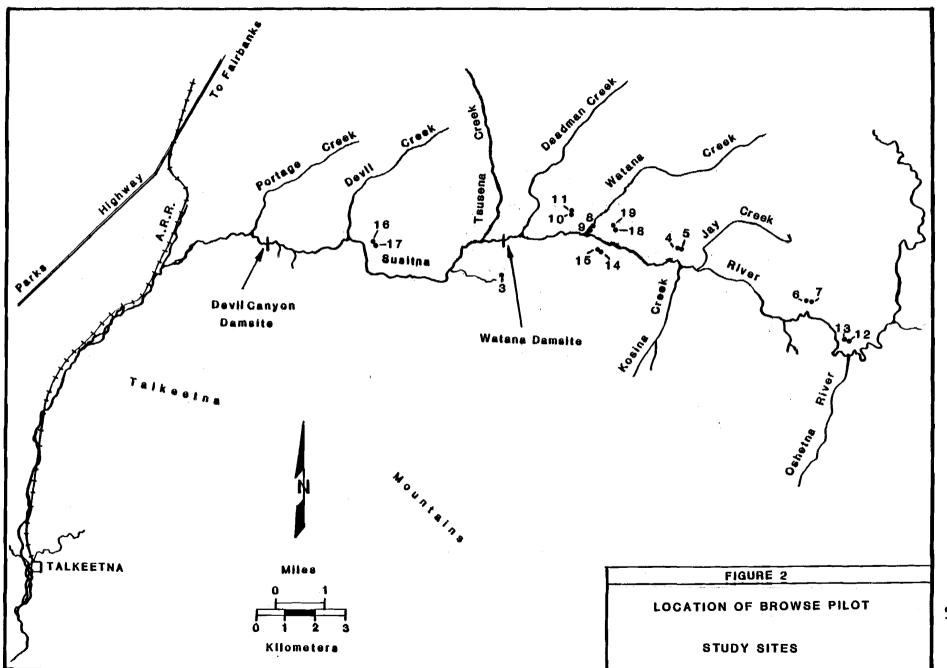


FIGURE 2

Location of 17 sites sampled during the browse pilot study in the middle Susitna River Basin.



APPENDIX A DENSITY STATISTCS-3 PLOT SIZES

Means, standard errors, variances, and estimated sample sizes for $1-m^2$, $4-m^2$, and $10-m^2$ plot size density estimates for shrub species. Density estimates are presented by site, with sites grouped into level IV vegetation types. The within estimated sample size (WNHAT) is the number of plots of the respective size required to sample the density in the vegetation type within 20% of the mean with 80% confidence. These density plots are then evenly allocated to the number of sites sampled in the type.

TABLE A/. MEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (1M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR

SITE 10. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE

DENSITY WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

					<i>a.</i>				
CATEGORY	— (Ŋ ≔	10)	X	5	***************************************	N	TAHAT	WITHIN	
				X					
At 46 AN ME MU ME NA UN THE REE									
BETULA GLAN	ADULOSA		63.	14.1	2001.1	10	21		
SALIX PULCA	IRA		2.	2.0	40.0	10	410		
SALIX GLAU	CA		2.	2.0	40.0	10	410		

OF SELECTED S SITE 11. N I SIZE (NHAT) I	STANDARD ERROISHRUB SPECIES IS THE NUMBER IS THE NUMBER IN 20% OF THE	INDIVIDUAL OF SAMPLIN OF SAMPLIN	LY AND C NG UNITS. NG UNITS	OMBINED FOR THE ESTI REQUIRED TO	R MATED SAMPLE		
CATEGORY (N =	10)	X	5 X	2	N	МНАТ	WITHIN WN WI
BETULA GLAN DULOSA SALIX GLAUCA TOTAL ALL SPECIES		77. 9. 86.	23.8 9.0 22.2	5667.8 810.0 4937.8	10 10 10	40 410 28	

The Court Co

TABLE A3. MEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (1M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR WOODLAND BLACKWHITE SPRUCE TYPE. N IS NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
DENSITY WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

CATEGORY	(N =	20)	X	S_ X	S		N	NHAT	WITHIN	WN	WNHAT	BWS	N= :	2 BN	BNHAT
BETULA GLAN SALIX PULCH SALIX GLAUC TOTAL ALL S	RA A		70. 1. 6. 77.	13.6 1.0 4.6 13.1	3684.2 20.0 415.5 3423.9	,	20 20 20 20 20	31 820 563 24		18 18 18 18	33 820 576 25	<u>.</u>	980.00 20.00 245.00 1805.00) 1	9 820 332 13

TABLE A4. MEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (1M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR

SITE 14. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE

DENSITY WITHIN 20% OF THE MEAN WITH BOX CONFIDENCE.

•				***		2 .	•				
CATEGORY	(N ==	10)		X	5_	5	M	NHAT	WITHIN	. MM	WM
					Х						
**** **** *** *** *** *** ***					M 44 M4 my 40 00 00 00 40 44 44 44 44 44 44 44 44			하면 위한 10m 교회 10% skm			
BETULA GL	ANDULOSA T		24 40 000000 7-10000000000000000000000000000	88.	27.5	7573.3	10	41.			
TOTAL ALL	SPECIES			88.	27.5	7573.3	10	41			

TABLE AS MEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (1M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR

SITE 15. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE

DENSITY WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

	والمستعدد فيتبعض مواد مدادة الموادي والرواواوا
BETULA GLANDULOSA 173. 30.0 9023.3 10 13	
SALIX PULCHRA 19. 13.7 1876.7 10 213 TOTAL ALL SPECIES 192. 32.1 10328.9 10 12	

TABLE A6. MEANS, STO	ANDARD ERROF	RS, AND VA	ARIANCES F	OR STEM CO	UNTS (1M2)		٠	
OF SELECTED SHI SITE 18: N IS SIZE (NHAT) IS	THE NUMBER	OF SAMPLI	ING UNITS.	THE ESTI				A CONTRACTOR OF CONTRACTOR OF THE CONTRACTOR OF
DENSITY WITHIN	20% OF THE	MEAN WITH	1 BOX CONF	IDENCE.			to the second of	
	>			2		·		
CATEGORY (N =	(0)	X	5_ X	5	N	NHAT	WITHIN	WN WN
BETULA GLANDULOSA		47.	16.5	2712.2	10	51	CONTRACT AND ALL STREET AND	
SALIX FULCHRA		27.	13.4	1801.1	10	102		
TOTAL ALL SPECIES		74.	19.6	3826.7	10	29		

the second secon

i

TABLE A7. MEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (1M2)
OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR
SITE 17. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE
SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
DENSITY WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

CATEGORY	(N ==	10)		X	S	2 S	N	ТАНИ	WITHIN	WИ	WNH
					X				** *** * * * * * * * * * * * * * * * *		
BETULA GLAN	IDULOSA			63.	21.3	4556+7	10	48			
SALIX PULCH TOTAL ALL S		TO STATE OF THE ST	. — dan e ni see seen y specimen see in terre . A	19.	10.2	1032.2	10 10	118 38			an our or make the off
								4 ac			

TABLE 18. MEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (1M2)
OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR WOODLAND BLACK
SPRUCE TYPE. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE
SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
DENSITY WITHIN 20% OF THE MEAN WITH BOX CONFIDENCE.

CATEGORY	(N = 40)	x	sx	<u>2</u>	—	МНАТ	WITHIN	WN	₩NHAT	BMS N= -4		BNHAT	
BETULA GLAND SALIX PULCHR TOTAL ALL SP	A	93. 16. 109.	14.1 5.5 14.9	7928.1 1188.1 8829.7	40 40 40	38 185 31	5966.39 1177.50 6986.67	36 1 36	29 83 25	31469.17 1315.83 30946.67	3 3 3	150 205 107	

TABLE A9. MEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (1M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR

SITE 15: N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE

DENSITY WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

CATEGORY	(N ==	10)			X	S	2 S	N	NHAT	WITHIN	таниш иш
mit am ill til til til på åg til de ste de de de	wa so w			h= cu p.		X		s vers dad was wher open mad blike hills mike bein in	al draw least state to the first arm with		
BETULA GLAN	DULOSA				1.	1.0	10.0	10	410		
TOTAL ALL S	PECIES	•	4		1. +	1 • O	10.0	10	410		
		** ** ** **		*** ** ** *** ***	*** *** *** ** **						

TABLE AIO, MEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (1M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR

'SITE'17' N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE

DENSITY WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

CATEGORY (N = 10) X S_ S_ N NHAT WITHIN WN WNHAT

TABLE AM. MEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (1M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR OPEN MIXED SPRUCE-BIRCH TYPE. N IS NUMBER OF SAMPLING UNITS. ESTIMATED SAMPLE SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE DENSITY WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

CATEGORY	(N =	20)	x	S_ X	s 2	N	МНАТ	WITHIN	WN	WNHAT	BMS A	1= 2	BN	BNHAT
BETULA GLAN TOTAL ALL S	DULDSA PECIES		1.	0.5 0.5	5.0 5.0	20 20	820 820	5.00 5.00	18 18	820 820		5.00 5.00	1	820 820

TABLE A/2. MEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (1M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR

SITE 8, N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE

DENSITY WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

				mı		2					
CATEGORY	(N ===================================	9)	· .	; X		5	a se de la campana.	. И	ТАНИ	"WITHIN	ми мин
skid diggs oben sem open 4450 volk 1820 med delle iden.					4u -u	## ## PE WA WA ## #E W			. Mad \$446 April 6666 6500 to m coper		
SALIX ALAXE	NSIS	* #** ********************************		90	30.0	8100.0	agents of the second	·	41		
ALNUS SINUA	TA			6 +	2.9	77.8		ኇ	104		
TOTAL ALL SI	PECIES			96.	28+0	7077.8	•	9	32		

TABLE A/2 MEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (1M2)
OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR
SITE 9. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE
SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
DENSITY WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

						2					
CATEGORY	(N = :	11)		X	S	S	N	NHAT	WITHIN	МИ	WN
4					X				ika dalah interdetak di dinanggan permenjagan permenjangan permenjangan permenjangan permenjangan permenjangan		
SALIX PULCH	IRA			38.	8+8	856.4	11	25			
SALIX ALAXÊ		ngun gwelfy la enw y Afrika y Malay ang tenak (Paullah).		15.	7.2	567.3	11	98	ngangan sa sambara a sa kakasa sa kabu na P	- But the relaxation for	entition in a constitution of
TOTAL ALL S		11 Mar	An oo ee oo oo o	54.	12.5	1725.5	11	25			

TABLE ANY MEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (1M2)
OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR TABLE
WILLOW TYPE, N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE
SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
DENSITY WITHIN 202 OF THE MEAN WITH BOX CONFIDENCE.

news11	F WITHIN 20A	UP THE MEAN WITH		.DENCE.	. — — <u></u>						
CATEGORY	(N = 20)	- x -	\$_ X	s ²	N	NHAT	WITHIN	WN "	TAHMW'	BMS N= 2 BN	танив
SALIX PULCHE SALIX ALAXEN ALNUS SINUAT TOTAL ALL SI	NSIS TA	21. 49. 3. 73.	3.4 16.1 1.4	830.5 5156.8 40.8 4346.1	, 20 20 20 20 20	78 88 268 34	475.76 3915.15 34.57 4104.26	18 18 18 18	45 67 227 32	7216.36 27507.27 152.78 8698.23	1 671 1 470 1 1002 1 68

TABLE A/S HEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (1M2) OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR SITE 121 N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE DENSITY WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE. NW NW NIHTIW TAHK BETULA GLANDULOSA 26. 4426.7 SALIX PULCHRA 17. 11.6 . 1334.4 1.0 190 SALIX LANATA 20.8 25. 4316.7 283 68. TOTAL ALL SPECIES

TABLE A/6 MEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (1M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR

SITE 13. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE

DENSITY WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

CATEGORY (N = 10) X S_ S N NHAT WITHIN WN WNHAT

X

7/14

TABLE A/7 MEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (1M2)
OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR
SITE 41 N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE
SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
DENSITY WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

CATEGORY (N = 9)	, ,	×	S	2 S	N	NHAT	WITHIN	MM	WNHA'
The second secon	agengge styr - de reste str. i garrienning baker ig stilde syspenser		X	Car Chamber & Carlotter Li					
BETULA GLANDULOSA		46.	18.5	3077.8	P	61			
SALIX PULCHRA SALIX LANATA		34.	8.4 7.7	627.8 536.1	9 · · · · 9	22 278	A PART A PART TO THE		#*************************************
TOTAL ALL SPECIES		89.	20.6	3811.1	9	20			

TABLE A/8 MEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (1M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR

SITE 57 N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE

DENSITY WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

CATEGORY	(N ==	10)	X	s_ X	2 8	И	NHAT	WITHIN I	NM NM
	THE STATE OF THE S	**************************************	* be do die de	eth man man min man man man pan ma 	THE ART MAY NOT THE WAY OF THE ART OF THE AR	NO. 100 MAR AND	i and the second of the second		Mile Mann C. C. May are as a

The same was the same was been as the same with

BETULA GLANDULOSA	81.	19.7	3898.9	1.0	25
SALIX PULCHRA	77+	24.6	6045.6	10	42
TOTAL ALL SPECIES	158.	30.0	8995.6	10	15

TABLE A/1 MEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (1M2)
OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR
SITE 6. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE
SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
DENSITY WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

CATEGORY	(N =	10)		x	SX	S .	N	ТАНИ	WITHIN	WN	TAHNW
BETULA GLAN SALIX PULCH				110.	19.4 8.7	3777.8 745.6	10 10	13 87			
SALIX GLAUC			1000 No. original distriction in the	130.	1.0 19.7	10.0	10	410			100 at

TABLE AZO MEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (1M2) OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR SITE 7. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE DENSITY WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE. WITHIN WN (N = 10)CATEGORY NHAT 53. 19.7 3867.8 57 BETULA GLANDULOSA SALIX FULCHRA 10 197 16. 11.1 1226.7 SALIX GLAUCA 12. 7.3 152879 10 SALIX LANATA 53. 18.7 3512.2 10 52 TOTAL ALL SPECIES 134. 30.0 9004.4

TABLE A2/ HEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (IM2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR *OPEN**LOW**LWARF

*BIRCH-WILLOW**, N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE

DENSITY WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

CATEGORY	(N = 59	•	x	s_ x	5 	N	NHAT	WITHIN	WN	WNHAT	6 =N CM4	BN	винат
BETULA GLAN SALIX PULCH		. 46 mm mr me m tip	68. 27.	9.4 6.0	5248.5 2155.3	59 59	47 121	4834.95 1686.27	53 53	44 94	9632.27 7127.59	5 5	86 3 97
SALIX GLAUC SALIX LANAT	A		2. 15.	1.3 5.3	104.5 1677.0	59 7 59	762 324	93.21 1410.36	53	679 272	225.56 4503.10	5 5	1641 869 39
TOTAL ALL S	FECIES		112.	11.8	8177.5	59	27	7849.98	53	26	11649.21	5	

TABLE A22 MEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (1M2)
OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR
SITE 3* N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE
SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
DENSITY WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

CATEGORY	(N =	12)		X	9 X	8 2	eren e samen, e restron demandares	Ņ	NHAT	WITHIN	WN	WNHAT
SALIX PULCH SALIX ALAXE TOTAL ALE S	NSIS	M AME (AND 122 WIN MINE (AND 122 WIN MINE)	7 Het get die aus mit met m	186. 4. 190.	4.2	30772.0 208.3 30654.5	AR 40 de 10 40	12 12 12	37 492 35		 •	

TABLE A23 MEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (1M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR OPEN LOW WILLOW

TYPE. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE

DENSITY WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

CATEGORY (N = 12)	X	5 <u>.</u>	2 5	N	МНАТ	HIHIW	WN	ТАНИИ	BMS N= 1	EN	ENHAT
SALIX PULCHRA	186.	50.6	30772.0	. 12	37	30771.97	11	37	-0.00	0	0
SALIX ALAXENSIS TOTAL ALL SPECIES	190.	4.2 50.5	208.3 30654.5	12	492 35	208.33 30654.55	11 11	492 · · · · · · · · · · · · · · · · · · ·	0.00	0	1

TABLE A24 MEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (4M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR

SITE 10. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE

DENSITY WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

	•	****		2			
CATEGORY $(N = 10)$	aman gasar aguntum pilipa teginya ga asuntutta tataa dalah b	X	5	5	N.	тани	אש אווודש אווודש
			X				
Man were there were green with think when when some query core was dress down down down one west organ			*** *** *** *** *** ***	999 198 MR MR MR MR MA MA MA MA 979	医乳球 保養 銀貨 有關 医阴 医肝 医肝 医伤 化化 化金 医子 医甲 医胃 医尿	PP 100 40 40 40 PB PB 100	
BETULA GLANDULOSA		79.	9.7	936.4	10	7	
SALIX PULCHRA		13.	5.9	344.5	. 10	81	•
SALIX GLAUCA		3 ↔	1.5	21.9	10	100	
TOTAL ALL SPECIES		95.	14.6	2140.9	10	10	
rate then come according the tiple tree tiple three dates with made their great print after their dates and their special after		** ** ** ** ** ** ** **			10.20 Add \$ 20.00 60.00 60.00 60.00 90.00 error core core core	#4 ### ### ### ### ###	

TABLE A25 MEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (4M2) OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR SITE 11. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE DENSITY WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE. N TAHM WHITIN WHE 1481.7 BETULA GLANDUEDSA 2.5 10 BETULA PAPYRIFERA 1. 0.5 410 SALIX GLAUCA 1.1 11.1 73 TOTAL ALL SPECIES

DENSITY WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

			2								
CATEGORY (N = 20)	X	S _	S	И	NHAT	WITHIN	MM	TAHMW	BMS N= 2	ВИ	BNHAT
		X				— a compression — and compress					1 1211
BETULA GLANDULOSA	65.	6.2	1351.7	, 20	14	1209.03	18	12	3920.00	1	39
BETULA PAFYRIFERA	0.	0.3	1,3	20	820	1.25	18	820	1.25	1	820
SALIX FULCHRA	7.	3.2	209.4	20	196	172.26	18	-161	877.81	1	820
SALIX GLAUCA	3.	0.9	15.7	20	86	16,53	18	90	1,25	1	7 🤝
TOTAL ALL SPECIES	74.	10:5	2214.7	· · · · · · · · · · · · · · · ·	17	1865.03	18	14	8507.81	1	64
											1

TABLE A27 MEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (4M2)
OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR
SITE 14. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE
SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
DENSITY WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

 CATEGORY	(N ==	10)	X	S	2 5	to the control of the control of the control of	N	ТАНИ	WITHIN	WN	WNHA
BETULA GLAN	DULOSA	5 MW ppp 4-2 MM PM MM 1	 157.	26.5	7043.7		10	12			
 SALIX PULCH TOTAL ALL S	IRA	,	2. 159.	2.0	40.0		10 10	410	-	ryaniya yerki dabaye i	
** ** ** ** ** ** ** ** ** ** **			 				i				•

TABLE #48 MEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (4M2) OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR

162,

TOTAL ALL SPECIES

SITE 15. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE DENSITY WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

CATEGORY	(N =	10)	x	s <u>'</u> x	s 2	N	NHAT	WITHIN	MN	WNHA
BETULA GLA			 147.	17.8	3166+7 917.3	10	7			

Bridge desired the first transfer to the first transfer transfer to the first transfer transfer to the first transfer t

5.

TABLE A29 MEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (4M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR

SITE 18. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE

DENSITY WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

			***		2				
CATEGORY	(N = 10)		X	5	S		TAHN	"WITHIN"	WNWNHA
		•		X		•			
BETULA GLA	ANDULOSA	n de la secularita de la companya de	457	9.6	916.4	10	19	rymanistis.	and the second of the second o
SALIX FUL	CHRA		9.	3.1	93.1	10	45		
SALIX LANA	ATA	•	38.	11.9	1406.7	10	40		
TOTAL ALL	SPECIES -	at the second of the second of the second	72.	18.8	3527.8	10	18		# P + + + +
								1	

TABLE A30 MEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (4M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR

SITE 19. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE DENSITY WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

CATEGORY (N =	10)	X	\$X	<u>2</u>		NHAT	WITHIN WN	ГАНИШ
BETULA GLANDULOSA SALIX PULCHRA TOTAL ALL SPECIES		43. 17. 60.	16.7 9.2 15.8	2778,9 854,2 2492,3	10 10 10	62 125 29		

TABLE A31 MEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (4M2)
OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR WOODLAND BLACK?
SPRUCE TYPE. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE
SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
DENSITY WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

CATEGORY	(N = 40)	9 X	S	N	ТАНИ	WITHIN	MM	ТАНИW	BMS N= 4	ви	BNHAT
BETULA GLA	ANDULOSA	98.	12.5	6228.1	40	27	3476.42	36	15	39247.71	3	168
SALIX FULC	CHRA	11.	3.4	474.2	40	167	476.16	36	167	450.16	3	158
SALIX LAN	ATA	10.	3,9	602.3	40	274	351.67	36	160	3610.00	- 3	1639
TOTAL ALL	SPECIES	118.	11.9	5672.8	40	17	4001.16	36	12	25731.82	3	76

TABLE A32 MEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (4M2) OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR SITE 16. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE

DENSITY WITHIN 20% OF THE MEAN WITH BOX CONFIDENCE.

	· · · · ·		2				
CATEGORY (N =	10) X		S	И	TAHK	MIHIM	WN THE WNHA
		X				1	
BETULA GLANDULOSA		4.0	160.1	10	86		The second secon
SALIX PULCHRA	2	. 1.8	30.6	10	410		
ALNUS SINUATA	1.	. 1.0	10.0	10	410		
TOTAL ALL SPECTES	12	+ 4+3	182.2	10	57	rest, or represent the first reason of the left of the left	m mili projektivi mekan mempaja milijen ya Nan ya mesalah dan mada hesali ini ini ini ini ini ini ke
PRINTED THE SHE SHE SHE SHE SHE SHE SHE WAS AND AND SHE SHE SHE SHE							

TABLE A33 MEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (4M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR

SITE 17. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE

DENSITY WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

CATEGORY (N = 10) X S S N NHAT WITHIN WN X

BETULA PAPYRIFERA 1. 0.5 2.5 10 410

TOTAL ALL SPECIES 1. 0.5 2.5 10 410

13/

TABLE A34 MEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (4M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR OPEN MIXED SPRUCE-BIRCH TYPE. N IS NUMBER OF SAMPLING UNITS. ESTIMATED SAMPLE SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE

DENSITY WITHIN 20% OF THE MEAN WITH BOX CONFIDENCE.

CATEGORY (N = 20	·) - - - - - - - -	S_ S X		NHAT	within	N WHAT	BNS N= 2 BN	винат
PETULA GLANDULOSA BETULA PAPYRIFERA SALIX PULCHRA	4.	0.3	0.0 20 1.3 20 1.3 20	206 820 820	1.25	18 172 18 820 18 820	382.81 1 1.25 1 15.31 1	820 820 820
ALNUS SINUATA TOTAL ALL SPECIES	1.		20	B20 136	5.00	18 820 18 104	5.00 1 605.00 1	820

S

TABLE A35 MEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (4M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR

SITE 8. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE

DENSITY WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

						2				·	
CATEGORY	(N =	10)		X	S	S	N	ТАНИ	WITHIN	WN	WNH
					X				- to 5 of agent of the street and and a		
DETULA PAPYRI	LFERA			3.	2.1	42.3	10	230			
SALIX PULCHRA				1.	0.8	5.6	10	410	a kamana minana sahara manana mahina a a an di amaha Assarana da manana da manana da manana da manana da manan		
SALIX ALAXENS ALNUS SINUATA				53. 12.	4.3	845.6 189.0	10	57			
TOTAL ALL SPE				48.	10.1	1026.5	10	10	and the second of the second of the second of the second	A	
		· · · · · · · · · · · · · · · · · · ·	** ** ** ** ** ** **	** ** ** ** ** ** ** **				*** *** *** *** *** ***			

TABLE A36 MEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (4M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR

SITE 9. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE

DENSITY WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

	****		2			
CATEGORY (N = 10)	X	5X	S	N	ТАНИ	HAM MA HAM
BETULA PAPYRIFERA	0.	0.3	6.0	10	410	
SALIX FULCHRA	23.	4.7	222.2	10	-18	
SALIX ALAXENSIS	28.	8.1	653.4	10	35	
ALRUS SINUATA	2,	1.8	30.6	10	41.0	A CAMPAGE AND A
TOTAL ALL SPECIES	52.	11.0	1199.2	10	18	(A)
WE NA DO NO TO THE SE AND SE AND SEC OF THE SEC.	igany taoné salta sayan affinis 2006 dada arren bedip meye yenel ereke benez delt		. ME 168 MA MA 468 AP			4

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TABLE A37 HEARS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (4M2)

OF SELECTED SHRUD SPECIES INDIVIDUALLY AND COMBINED FOR TALL

WILLOW TYPE. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE

DENSITY WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

CATEGORY (N = 20)	x	ss_2	N .	AIHTIW TAHM	เ พห	ТАНИШ	BMS" N= " "2"	BN	таниа
BETULA PAPYRIFERA	2.	1.0 22.0	20	401 21.46	18	391		· 1 · · · ·	549
SALIX PULCHRA	12.	3.4 232.4	20	71 113.92	18	35	2365.31	1	717
SALIX ALAXENSIS	40.	6.6 877.8	20	23 749.48	1.8	19	3187.81	1	81
ALNUS SINUATA	7.	2.6 130.3	20	118 109.79	18	99	500.00	1	450
TOTAL ALL SPECIES	۵0,	7.5 1121.6	20	13 1112.85	18	13	1280.00	1	15 类
									LA.

135

TABLE A38 MEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (4M2)
OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR
SITE 12. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE
SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
DENSITY WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

		+,	_		2						
CATEGORY (N	::=	10)	X	5	S		N	TAHK	WITHIN	WŇ	MNH
			 and the second of the second of	X		TOTAL COLUMN A COLUMN			mentana nyaéta sahan		
BETULA GLANDULOS	3A		52.	13.9	1918.3		10	30	•		
SALIX FULCHRA		oran paja grajaj graja distribita di San Ballaga.	 7.	1.7	30.3		10	26		-	
SALIX GLAUCA			4.	2.2	47.5		10	122			
SALIX LANATA			15.	7.7	590.3		10	108			
TOTAL ALL SPECIE	£5		 78.	15.1	2290.3		10	16	Billio an der vider allerationes, dans den ur mescen sans, en gel blich heuseriell er beselve	-	(Pro 1944 raps) (Palain) has par bases
TT NO DO NO DO DO NO DO											

TABLE #39 MEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (4M2)
OF SELECTED SHROB SPECIES INDIVIDUALLY AND COMBINED FOR
SITE 13. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE
SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
DENSITY WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

					AL.				11111 - 111111 A.T.
CATEGORY	(N = 1	1.0)	X	S	S	ν. ν. ν	ТАНИ	WITHIN	таниш иш
				X					•
44 60 40 40 10			~				or 11 m alone Male 2022 19 th 17 m as 11 m		and the same which has a supplication with the
BETULA GLAN	IDULOSA		38.	12.9	1653.4	10	48	the season of th	
BETULA PARY	(RIFERA		2.	1.5	22.5	10	410		
SALIX PULCH	IRA 🛬		6+	2.0	41.9	10	48		
SALIX GLAUC	À	and the day day of the second	4.	4.0	158.4	10	360		The second secon
TOTAL ALL S	FECIES		50.	14.1	1978.9	1.0	34		
	· ···· •• •• •• •• •• •• •• ••			. ,,,,					Ŵ

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TABLE A40 MEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (4M2)
OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR
SITE 4. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE
SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
DENSITY WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

			***		2					
CATEGORY	(N =	11)	X	S_	ន	N	NHAT	WITHIN	MM	WNHi
	THE CONTRACTOR STATEMENTS			X	en gamentan and a second control of the seco					confirm to specimen general regarding
BETULA GLA	NDULOSA		53.	8 . 4	779.3	11	12			,
SALIX PULC	HRA		45.	11.0	1340.6	11	28			
SALIX LANA	TA		6 +	3.3	123.0	11	125	waterday popular popular is great to be a series		THE PARTY OF THE PARTY OF THE
TOTAL ALL	SPECIES		104.	11.7	1503.0	11	6			

TABLE AY MEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (4M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR

SITE 5. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE

DENSITY WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

	CATEGORY	(N ==	10)		X	SX	S S	N	ТАНИ	WITHIN	WN	MNI
,	BETULA GLAN	ADULOSA			80.	11.6	1340.0	 10	9			
	SALIX FULC			* * * * * * * * * * * * * * * * * * * *	55.	20.1	4025.6	10	56			
	SALIX GLAUC TOTAL ALL S		21 Manuary 1 - A 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2		135.	0.5 19.5	2.5 3820.1	 10	410	-		,

TABLE A42 MEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (4M2)
OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR
SITE 6. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE
SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
DENSITY WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

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CATEGORY	(N =	10)	X	SX	S	N	NHAT	WITHIN	WИ	WNH
BETULA GLAN SALIX PULCH	HRA		80. 25.	15.8 7.2	2509.0 519.4	10 10	16 35			
TOTAL ALL S	SPECIEST	TO SHARE PROPERTY SHAPE, SHAPE SHAPE SHAPE TO SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE SHAPE	105.	16.6	2759.0	10		men mengelapan per permenan per benjang pelabahan belah		

TABLE A43 MEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (4M2)
OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR
SITE 7. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE
SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
DENSITY WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

				d ²				*
CATEGORY	(N = 10)	X	S X	S	-N	NHAT	WITHIN	AHAW MW
call cert from from the most stiff till were from	### ### ### ### ### ### ### ### ### ##							
BETULA GLAI	NDULOSA	34.	8.5	725.3	10	26		comment de ter
SALIX PULC	HRA	18.	8 • 1	662.2	10	84		
SALIX GLAU	CA	6+	2.6	68.1	10	85		
SALIX LANA	TA	45.	14.9	2231.7	10	47		
TOTAL ALL	SPECIES	102.	12.4.	1535.3	10	7		

TABLE AXY MEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (4M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR OPEN LOW DWARF BIRCH-WILLOW. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE DENSITY WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

CATEGORY			2				********				*******
CATEGORY (N = 61)	X	S	5	N	ТАНИ	WITHIW	WW	WNHAT	BMS N= 6	ВИ	BNHAT
TO ME WHAT I A LEGISLA MAN A COMMENT AND A C						misirama a rama is					
BETULA GLANDULOSA	56.	5,3	1483.3	01		1474.67	ວຽ	20	3978.70	ວ	23
B ETULA PAPYRIFERA	٥.	0.2	3.7	61	2499	3,68	55	2495	3.76	5	2549
SALIX PULCHRA	26.	4.7	1355.3	61	81	1107.66	55	66	4079.80	5	243
SALIX GLAUCA	2.	0.9	47.0	61	341	45.25	55	329	65.82	5	478
SALIX LANATA	11.	3 . 4	697.9	. 61	241	484.13	55	167	3049.67	5	1052

TOTAL ALL SPECIES 96. 6.8 2807.7 61 13 2299.66 55 11 8395.97 5 3

TABLE A45 MEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (4M2)
OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR
SITE 3. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE
SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
DENSITY WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

CATEGORY	(N =	9)	X	\$_ X	\$ \$	Ŋ	пнат	WITHIN	WN	AHKW
SALIX PULCH SALIX ALAXE		togel Made St. St. Trice with the	116.	31.0	8653.3 179.9	9	27 181			
TOTAL ALL S			 123.	30.4	8324.1	<u></u>	23	A STATE OF THE STA	To graph the plantage of the management of the land	, and also a result require

TABLE A46 MEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (4M2) OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR OPEN LOW WILLOW TYPE. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE DENSITY WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE. BMS N= CATEGORY NHAT WNHAT DNHAT S_ 27 8653.30 SALIX PULCHRA 116. 31.0 8653.3 SALIXTALAXENSIS ٠. ٠ 8 181 8 23 475 181 77.88 TOTAL ALL SPECIES 123. 30.4 23 8324.13

TABLE A47 MEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (10M2)
OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR
SITE 10. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE
SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
DENSITY WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

CATEGORY (N =	10)		X	S	2 _. S	N	ТАНИ	WITHIN	MN	WNF
	a to the compact before places were placed and the compact before the		print a franchism has a manifestal and a	X	THE TANK AND ADDRESS OF THE STATE OF THE STA	ti kanan na maga ya pan ika kanagari pan manahagari sa pan	THE COMMERCIAL PROPERTY OF THE COMMERCIAL PROPERTY.	and the second of the second o	of a silvania control finding.	
BETULA GLANDULOSA			78.	13.5	1819.8	10	13			
SALIX PULCHRA SALIX GLAUCA			5. 2.	3.1 1.6	95.0 24.9	10	163 255			
TOTAL ALL SPECIES		•	84.	15.1	2272.9	10	14			

TABLE A40 MEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (10M2)
OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR
SITE 11. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE
SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
DENSITY WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

			over		2			
CATEGORY	(N = 10)		X	; S	S	N	NHAT	NW NW NIHTIW
				X			a processing specifical records to the processing specifical records to the specifical records t	errent i de la filipe de la la la la decensión de la filipe de la filipe de la filipe de la filipe de la filipe La filipe de la filipe
BETULA GLAN	VDULOSA		44.	12.3	1521.6	1.0	32	,
BETULA FAPY	YRIFERA		1.	0.5	2.5	10	410	en er en
SALIX FULCE	IRA		1.	0.9	8.1	10	410	
SALIX GLAU	CA		2.	0 + 6	4.0	10	29	
TOTAL ALL S	SFECIES	materialisti sistemo suur suudin erme na, veel (v. eese saggermans) in ege	48.	11.7	1359.7	10	25	ment of the last of the second of the second of the last
				44 114 41				

TABLE A49 MEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (10M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR WOODLAND BLACK-,
WHITE SPRUCE TYPE. N IS NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE
SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
DENSITY WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

					To ed de II 1 11						•
CATEGORY (N = 20)	x	S_	2 S	И	ТАНИ	WITHIN	МИ	TAHNW	BMS N= 2	BN	BNHAT
No dec 40 as 18 as -1 as as as 46 as as as as 19 db as 40 as do no as ds 41 db as 45 as	. 45 44 yr 2 44 44 44 44 44 44	X									
BETULA GLANDULOSA	61.	9.7	1872.8	20	21	1670.70	18	1,9	5511.20	1	61
BETULA PAPYRIFERA	0.	0.3	1.3	20	820	1.25	1.6	820	1.25	1.	820
SALIX PULCHRA	3,	1.6	53.0	. 20	259	51.54	18	252	80.00	1	370
SALIX GLAUCA	2.	0.8	13.7	. 20	117	14,47	18	123	0.80	1	7
TOTAL ALL SPECIES	66.	10.2	2067.5	20	20	1816.29	18	17	-6588.45	1	62

TABLE A50 MEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (10M2)
OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR
SITE 14. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE
SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
DENSITY WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

CATEGORY (N = 10)	×	S	2 \$	N	NHAT	WITHIN	MM MNH
of the the sec and the top one on the top and the top at the top at the top on the top at the t	CE TO BE SHE SHE SHE SHE SHE SHE SHE SHE	X			1900 man and date (Act dele-		
BETULA GLANDULOSA	97.	14.6	2127.1	10	1 ()		
SALIX PULCHRA	13.	13.1	1716.1	10	410	•	
TOTAL ALL SPECIES	110.	15.7	2466.3	10	9		
The state of the s	And the second s	errogener mente arreire ett. 1984 i 96. 196 met 2000	The second of th	· . Next represent the second	-4		THE R. P. LEWIS CO., LANSING MICH. SHAPE STREET, SANSAGE

with the same and the same that the same and the same and

TABLE ASI MEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (10M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR

SITE 15. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE

DENSITY WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

CATEGORY	(N =	10)		x	5_ X	S 2	N	ТАНИ	WITHIN	WN	WNH
BETULA GLA		4 MR 400 014 000 000 000	***************************************	121.	19.0	3619.6	1.0	1.1	•		
SALIX PUL(TOTAL ALL			en e	29. 150.	16.2	2620.4 3285.5	10	126	•••		

TABLE A52 MEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (10M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR

SITE 18. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE

DENSITY WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

	·		2	•			
CATEGORY (N = 10)	X	5_	S	М	ТАНИ	WITHIN	_ MMMM
/// /// Art Art 107 107 Art 108 FE FE MIT NI NA AR MA WE WE WE AR AR MIT MIT ME WE WE		X	*** *** *** *** *** *** *** *** ***		- 5500 may some segme neer cases		
BETULA GLANDULOSA	was a second sec	4.9	238.3	10	1.0	energy of the Section	P
SALIX FULCHRA	18.	7.9	620.9	10	76		
SALIX LANATA	8.	3,2	102.0	10	61		
TOTAL ALL SPECIES	59.	11.8	1381.4	10	17		•

TABLE A53 MEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (10M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR

SITE 19. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE

DENSITY WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

CATEGORY (N = 10) X S S N NHAT WITHIN WN WNHO X X

BETULA GLANDULOSA 48. 10.8 1161.5 10 21
SALIX PULCHRA 9. 3.8 141.4 10 81
TOTAL ALL SPECIES 57. 11.5 1321.8 10 17

151

TABLE ASY MEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (10M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR WOODLAND BLACK /
SPRUCE TYPE. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE
SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
DENSITY WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

CATEGORY (N = 40)	x	S X	2 S		нат	WITHIN	WN	WNHAT.	BMS N= 4	BN	ТАНИЯ
BETULA GLANDULOSA	75.	8.6	2954.9	40	22	1786.63	36	1.4	16974.09	3	125
SALIX FULCHRA	17.	5.6	1237.7	40	170	1274.71	36	175	793.00	3	109
SALIX LANATA	2.	1.0	36.8	. 40	350	25.50	36	243	172.23	3	1639
TOTAL ALL SPECIES	94.	9.3	3484.0	40	17	2113.78	36	10	19926.57	3	93

152

TABLE \$\frac{A\sigma5}{5}\$ MEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (10M2)

OF SELECTED SHRUB SFECIES INDIVIDUALLY AND COMBINED FOR

SITE 16. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE DENSITY WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

CATEGORY	(N ≔	10)		X	\$_ X	5	N	NHAT	WITHIN WN	พหา
BETULA GLAN BETULA PAPY				4.	3.1	97.0 4.8	10	262 311		
SALIX FULCH				1.	0.6	3.7	10	239		*, *
ALNUS SINUA TOTAL ALL S			Alle Marie de Carre de Constante de La Arrecta de La Arrec	2.	1.9	35.3 138.8	10	274		na - 40 - A

ンひい

TABLE A56 MEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (10M2)
OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR
SITE 17. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE
SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
DENSITY WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

CATEGORY	(N =	10)	X	SX	S	И	ТАНИ	WITHIN 6	IN WNHAT
DETHI A DADY			 ~	A A		4 ^	4 4 4	and the second s	The state of the s
BETULA PAPY TOTAL ALL S			2.	0.9 0.9	7 • 8 7 • 8	10	111		•
	Commission and the second		 			The second statement of the second statement of the second second			

TABLE AST HEARS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (10M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR OPEN MIXED

SPRUCE-BIRCH TYPE. N IS NUMBER OF SAMPLING UNITS. ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE

DENSITY WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

,	and the second s											
	CATEGORY (N = 20)	x	S	s	N	TAHK	WITHIN	ИW	TAHNW	BMS N= 2	BN	BNHAT
	,	ate === +	. <u>.</u>									
05	BETULA GLANDULOSA	2.	1.6	49.9	20	538	48.49	18	523	76.05	1	820
	BETULA PAPYRIFERA	1.	0.6	6.2	20	163	6.32	16	166	4.05	1	107
	SALIX PULCHRA	0.	0.3	1.9	20	496	1.87	18	478	3.20	1	820
<u>`</u> {	ALNUS SINUATA	1.	1.0	18.1	20	562	17.67	18	546	26.45	i.	820
. /	TOTAL ALL SPECIES	5.	2.0	79.3	20	144	73.32	1.8	134	186.05	1	338

TABLE A 58 MEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (10M2)
OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR
SITE 8. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE
SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
DENSITY WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

			****		2				
CATEGORY	(N ≡ 11	,	X	, X	5	N	NHAT	WITHIN	ТАНИШ
BETULA PARY	RIFERA		1 1	0 · 6	3.7	11	183	Proportion of the Control of the Con	
SALIX PULCH	1RA		1.	0.9	9.1	11	313		
SALIX ALAXE	NSIS		46.	8.2	748.2	11	15	•	•
TALNUS SINUA	1TA		19.	6.4,	451.2	11	52		
TOTAL ALL S	PECIES	the second of th	67.	5.9	387.8	. 11	4		
				44 47 08 00 00 70 70 50					

TABLE A59 MEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (10M2)
OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR
SITE 9. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE
SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
DENSITY WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

CATEGORY	(N ===	9)		X	S X	\$ \$		И	тани	WITHIN	WN	WNH
SALIX PULCH	íra	da es es b	 	16,	4.0	143.4		9	23			
SALIX GLAUC	:A			1.	1.2	13.3		9	261			
SALIX LANAT	A		 	1.	1.4	18.8		ዎ	369	•		
SALIX ALAXE	INSIS		. ,	11.	4 + 5	181.5		9	66			
ALNUS SINUA	ιΤΑ			1.	0.8	5.3		9	216			-
TOTAL ALL S	FECIES	····	 	31.	5.5	276.9	Andrew construction of the second	··· · · · · · · · · · · · · · · · · ·	12	the material of the second of		

TABLE AGO MEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (10M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR TALL

WILLOW TYPE. IN IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE

DENSITY WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

CATEGORY (N = 20)		X	- Additional Control of the Additional Contr		ТАНИ	WITHIN	WN	TAHNW	BMS N= 2	BN	АНИВ
BETULA PAPYRIFERA	1.	0,3	2.2	20	354	2.05	18	336	4.09	1	671
GALIX FULCHRA	8.	2.5	124.8	20	82	68.80	18	46	1133.34	1	744
BALIX GLAUCA	1.	0.6	6.1	20	595	5.90	18	573	10.33	1	1002

1002 10.33 SALÍX LANATA 820 8.35 18 810 8.4 0.6 SALIX ALAXENSIS 34 496.34 18 23 6275.57 281 30. 3.3 800.5 1603.80 1 553 253.00 ALNUS SINUATA 324.1 20 112 18 88 11. 4.0 105 TOTAL ALL SPECIES 667.7 20 11 338.54 18 6592.81 51. 5.8

TABLE A41 MEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (10M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR SITE 12. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE DENSITY WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

CATEGORY	(N =	10)	×	S_	s S	н	NHAT	WITHIN	พพ	ниш
		The first term of the deleter party makes an approximation of the		X				-		
BETULA GLAN	IDULOSA		51.	8 + 2,	667.8	10	1.1			
SALIX FULCE			14.	5.0	246.1	10	51 208	Anna a semblementa de la compania d La compania de la compania del compania de la compania del compania de la compania del la compania de la		
SALIX GLAUC SALIX LANAT			10.	0.2 4.4	0.5 198.0	10	206 85			
TOTAL ALL S		a de la company de la company	75.	7.9	618.8	10	5			

TABLE A62 MEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (10M2) OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR SITE 13. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE DENSITY WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE. NHAT WITHIN WN WNHA CATEGORY BETULA GLANDULOSA 11.6 1356.9 SALIX FULCHRA 1.9 37.3 10 87 SALIX GLAUCA 86 1.4 20.1 10 TOTAL ALL SPECIES 1465.8

160

TABLE A43 MEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (10M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR

SITE 4. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE

DENSITY WITHIN 20% OF THE MEAN WITH BOX CONFIDENCE.

	39.5			2						
CATEGORY (N = 1	10)	X	S X	5		N	ТАНИ	WITHIN	WN	M
BETULA GLANDULOSA		51.	6.2	384.9		10	7	principality of the implicable street agreement or security.		The state of the s
SALIX PULCHRA		50.	8.1	663.8		10	12			
SALIX LANATA		8.	4 - 1	171.4	*	10	100			
TOTAL ALL SPECIES	<u> </u>	109.	10.6	1118.9		1.0	7	Company to the content of the same real sold to		
		4 mm ang ut mm ang ma ma ma								

TABLE A64 MEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (10M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR

SITE 5. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE

DENSITY WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

	**************************************	2		:	
CATEGORY (N = 10)	X 5_	5	И	NHAT	MITHIN NN NHU
	 X			Land, abraco coldato decesso will della della della combin	
BETULA GLANDULOSA	82. 12.8	1650.0	10	10	hann an ind the transmission with the second district (the second days).
SALIX FULCHRA	28. 4.6	211.2	10	11	
TOTAL ALL SPECIES	111. 13/8	1907.6	10	7	

62

TABLE A65 MEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (10M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR SITE 6. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE DENSITY WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

(৸ ≔	40)	X	S	2 S	И	NHAT	WITHIN	таний ий
	The state of the s	and the second section of the second section of the second section is a second section of the second section s	X		***********			Asset Course in Lance for Special Historia
DULOSA	. No on the on se be as the sp	69.	6.0	. 366.0	. 10	4		
RA	ng to the control of the speciment of the substitution of the subs	17.	3.7	136.0	10	19		
A		3.	1.5	22+5	1.0	127.		
PECIES		89.	6 + 2	384+0	10	2		
į	DULDSA RA	DULOSA RA	OULOSA 69. RA 17.	X DULOSA 69. 6.0 RA 17. 3.7 A 3. 1.5	X DULOSA 69. 6.0 366.0 RA 17. 3.7 136.0 A 3. 1.5 22.5	X DULOSA 69. 6.0 366.0 10 RA 17. 3.7 136.0 10 A 3. 1.5 22.5 10	X DULOSA 69. 6.0 366.0 10 4 RA 17. 3.7 136.0 10 19 A 3. 1.5 22.5 10 127	X DULDSA 69. 6.0 366.0 10 4 RA 17. 3.7 136.0 10 19 A 3. 1.5 22.5 10 127

TABLE A66 MEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (10M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR

SITE 7. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE

DENSITY WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

	Mah		2					
CATEGORY $(N = 10)$	Χ	S	S	И	NHAT	WITHIN	MN	rahnw
		Χ					, a s, e nt e 5 met 18	THE NAME OF STREET
BETULA GLANDULOSA	23.	6.2	381.7	10	30			
SALIX PULCHRA	6.	1.1	12.0	10	18		1 1971	
SALIX GLAUCA	12.	6.00	363.6	10	ዎ ዎ			•
SALIX LANATA	25,	6.8	456.6	10	30			
TOTAL ALL SPECIES	. 36	7.0	812.7	10				
the the way are the total the die had are not been any on the fire the total the total the side of	* *** *** *** *** *** *** *** *** *** *** *** *** ***	a datab ditte data tubo Abab mila bysy ugan .	mands active the marcel and man and man extension to the South Amelian and any Activities	?)	N 414 AN AN AN AN AN AND AN			>

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TABLE A67 MEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (10M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR OPEN LOW DWARF
BIRCH-WILLOW. W IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE
SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
DENSITY WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

CATEGORY (N = 60)	, X.	X	2 5	N	TAHN	MIHIN	พพ	МИНАТ	BMS N= 6 B	N BNHAT
BETULA GLANDULOSA	53.	4.3	1096.2	60	17	801.23	54	12	4281.75	5 63
SALIX FULCHRA	20.	2.7	444.8	80	47	217.73	54	23	2897764	300
SALIX GLAUCA	3,	1.2	B1.0	0۵	353	67.76	54	296	223.71	5 975 (
SALIX LANATA	7.	1.9	20B.7	60	1.64	137.66	54	108	975,43	5 764
TOTAL ALL SPECIES	83.	4.9	1465.5	ა	9	1051.30	54	7 7	5938.31	5 36

165

TABLE A48 MEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (10M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR

SITE 3. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE

DENSITY WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

## 111 117 117 TO THE BEI BEI AM AND HE BEI AM AND HE BE											
				-		2					. 1
CATEGORY	(N =	9)	•	Х	S	S	N	NHAT	WITHIN	WN	TAHKW
	a tare a company				X				•		
SALIX FULCHRO				94.	15.3	2104.4	9	10			•
TOTAL ALL SP	ECTES	er bloody com many ny firet y y ny gazar is a -	make same has demonster feature federal same	94.	15.3	2104.4	9	10	The state of the s		d Bloom and Bloom in part and and an analysis of the state of the stat

TABLE A69 MEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (10M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR OPEN LOW WILLOW

TYPE. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE

DENSITY WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

CATEGORY	(N =	9)	<u></u>	S_			ТАНИ	иінтіш	'nи	МИНТ	BMS		ви	винат
SALIX PULCH			94. 94.	15.3 15.3	2104.4 2104.4	9 7	10 10	2104.36 2104.36	8 8	10		0.00	0 ·	1

APPENDIX B

APPENDIX B

TIME TO ESTIMATE DENSITY

Means, standard errors, and variances for $1-m^2$, $4-m^2$, and $10-m^2$ plot size density time estimates. Time to count stems of each shrub species and move between plots is presented by site. Sites are grouped into level IV vegetation types. Estimated sample sizes for times are not used.

TABLE 84 MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (1 M2)
OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR
SITE 10. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE TIME WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

	_		2	i			·
CATEGORY (N = 10)	X	s_ X	S	И	NHAT	WITHIN	TAHNW NW
BETULA GLANDULOSA (SEC)	22.	3,2	104.2	10	9		
BETULA PAFYRIFERA (SEC)	1.	0 . 2	0,3	10	11		
SALIX FULCHRA (SEC)	8.	2.4	58.7	10	35		•
SALIX GLAUCA (SEC)	2.	1.17	12.2	10	104		ELEMENTS OF THE THE PARTY STATES
SALIX LANATA (SEC)	2.	0 + 4	1.3	10	20		•
SALIX ALAXENSIS (SEC)	1.	0.2	0.5	10	82.		
ALNUS SINUATA (SEC)	1.	0.2	0.2	10	20		
MOVE TIME BETWEEN PLOTS (SEC)	57.	12.6	1596.9	10	20		•
TOTAL TIME PER PLOT W MOVE	94.	13.0	1691.2	10			

TABLE 82 MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (1 M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR

SITE 11/ N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE

TIME WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

		•	2			
CATEGORY (N = 10)	X	S_	S	N	NHAT	WITHIN WN WNH:
		X				· · · · · · · · · · · · · · · · · · ·
BETULA GLANDULOSA (SEC)	13.	3.5	125.6	10	33	
BETULA PAPYRIFERA (SEC)	1.	0.2	0.2	10	20	
SALIX FULCHRA (SEC)	2.	0.7	5.0	10	47	
SALIX GLAUCA (SEC)	2.	1.3	18.2	10	187	
SALIX LANATA (SEC)	1.	0.2	0.3	10	46	The state of the s
SALIX ALAXENSIS (SEC)	1	0 + 4	1.4	10	73	•
ALNUS SINUATA (SEC)	1.	0.2	0.3	10	46	•
MOVE TIME BETWEEN PLOTS (SEC)	143.	74.9	56164.5	10	114	· · · · · · · · · · · · · · · · · · ·
TOTAL TIME PER FLOT W MOVE	162.	73.3	53781.3	10		_
						, ,

TABLE B3 MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (1 M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR WOODLAND BLACK—
WHITE SPRUCE TYPE. N IS NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE
SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
TIME WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

~ <u></u> -			2			··			~**		2 BI		BNHAT 32
CATEGORY (N = 20)	X	S _ X	S 		N 	NHAT	WITHIN	WN	WNHAT	BMS N=	2 81	\	
BETULA GLANDULOSA (SEC)	17.	2.6	133.1		20	19	114.89	18	16	460.	80	1	63
BETULA PAPYRIFERA (SEC)	i.	0 + 1	0.3		20	16	0.28	18	15	٥.	80	1	41
SALIX PULCHRA (SEC)	5.	1.4	40.6		20	61	31.85	18	48	198,	45	1	295
SALIX GLAUCA (SEC)	2.	0.8	14.4		20	134	15.20	18	142		20	1	2
SALIX LANATA (SEC)	1.	0,2	1.1		20	39	0.81	18	28	7 .	20	1	244
SALIX ALAXENSIS (SEC)	1.	0.2	1.0	, p.	20	81	0.97	18	81	0	80	1	67
ALNUS SINUATA (SEC)	1.	0.1	0.3		20	29	0.26	18	30		20	1	23
MOVE TIME BETWEEN PLOTS (SEC)	100.	38.3	29270.9		20	121 2	28880.70	18	119	36295	20	1	149
TOTAL TIME PER PLOT W MOVE	128.	37.1	27482.6		20		27736.25	18		22916	45	1	· · · · · · · · · · · · · · · · · · ·

TABLE BY MEANS, STANDARD ERRORS OF SELECTED SHRUB SPECIES I SITE 14. N IS THE NUMBER O SIZE (NHAT) IS THE NUMBER O TIME WITHIN 20% OF THE MEAN							
CATEGORY (N = 10)	X	S	2 S	N	TAHN	WITHIN	WN WNHA
				THE SECOND SECURITY SECURITY SECONDS	e na nathan de kwa naten		
		X	and the second s	er auguset menter entgegen, grad i 1866 betyden blev betyden betyden en med betyden general.	entre transfere de la companya de la constanta	ry = 1 & 1884 No. 8 to 1 May 1984 No. 18 18 18 18 18 18 18 18 18 18 18 18 18	
BETULA GLANDULOSA (SEC)	23.	3.6	129.1	10	11		
BETULA PAPYRIFERA (SEC)	1 .	0.2	0.3	10	17		
SALIX PULCHRA (SEC)	2.	0,5	2.0	10	33		and the state of t
SALIX GLAUCA (SEC)	1.	0.3	0.9	10	76		
SALIX LANATA (SEC)	1.	0.2	0.2	10	20		
SALIX ALAXENSIS (SEC)	1.	0.3	0.8	10	39	Control of the Contro	to the participation with the control and the second and the time of the first
ALNUS SINUATA (SEC)	1.	0.2	0.3	10	46		
MOVE TIME BETWEEN PLOTS (SEC)	58.	10.9	1189.6	10	15		
TOTAL TIME PER PLOT W MOVE	86.	11.5	1319.6	10	same cas, gara		

TABLE 85 MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (1 M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR

SITE 15. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE

TIME WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

			2			•
CATEGORY (N = 10)	X	S_	5	Ŋ	ТАНИ	WITHIN WW WH
÷	·	X			<u> </u>	
BETULA GLANDULOSA (SEC)	25.	1.6	24.9	10	2	
BETULA PAPYRIFERA (SEC)	1.	0.2	0.3	10	31	
SALIX PULCHRA (SEC)	6.	2.7	75.0	10	89	
SALIX GLAUCA (SEC)	1.	0.1	0.2	10	12	
SALIX LANATA (SEC)	0.	0.2	0+3	10	69	·
SALIX ALAXENSIS (SEC)	1.	0.2	0.3	10	31	
ALNUS SINUATA (SEC)	1.	0.2	0.2	10	20	and the same of th
MOVE TIME BETWEEN PLOTS (SEC)	90.	19.7	3892+9	10	20	
TOTAL TIME PER PLOT W MOVE	124.	20.7	4270+2	10		

TABLE 86 MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (1 M2)
OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR
SITE 187 N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE
SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
TIME WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

			2				
CATEGORY (N = 10)	X	5_	8	N	TAHK	WITHIN	HKM KM
		X			NO DE DE DE DE DES DES DES		- managements and a second of the second of
BETULA GLANDULOSA (SEC)	21.	4 + 3	183.8	10	1.8		
BETULA PAPYRIFERA (SEC)	1.	0.1	0.2	10	12		
SALIX PULCHRA (SEC)	12.	3 + 4	114.3	10	36		
SALIX GLAUCA (SEC)	2.	0 + 4	2.0	10	21		
SALIX LANATA (SEC)	1.	0.3	0.8	10	39	Marie de compete de desermante alegar e e de escripci y 1945 - Page 1977 e del	
SALIX ALAXENSIS (SEC)	1.	0.5	2.1	10	72		
ALNUS SINUATA (SEC)	1.	0.1	0.2	10	12		
MOVE TIME BETWEEN PLOTS (SEC)	49.	14.5	2110.4	10	36		
TOTAL TIME PER PLOT W MOVE	87.	15.8	2485.2	10			
	-		14 that may amo and and and and and				7

TABLE 87 MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (1 M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR

SITE 19. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE

TIME WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

CATEGORY	(N = 10)		x	SX	s. 2	N	NHAT	WITHIN	WN	WI
BETULA GLANDUL	.OSA (SEC)		27.	9.3	874.2	10	50			
BETULA PAPYRIA	ERA (SEC)		1.	0.2	0.3	10	46			
SALIX PULCHRA	(SEC)	rie ar volgegene form de primer en volgegene gegene en volgegene en volgegene en volgegene en volgegene en volge	6.	2.7	71.7	10	85	ود به خواه و بود در از و در از در استوری بهیست ۱۹۰۰ و و و و و	M. C	
SALIX GLAUCA	SEC)		1.	0.2	0.3	10	31		•	
SALIX LANATA	(SEC)		1.	0.2	0.3	10	46			
SALIX ALAXENS	S (SEC)		1.	0.1	0.2	10	12			
ALNUS SINUATA	(SEC)		0.	0 . 2	0.2	10	107			

	BETWEEN PLOT		6. 7.7	7 590.0	10	6
TOTAL TIM	E PER PLOT W	MOVE 10	4.	194.9	10	

2/5

TABLE 88 MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (1 M2)
OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR WOODLAND BLACKS
SPRUCE TYPE. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE
SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
TIME WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

CATEGORY (N = 40)	×	8_	2 \$	N	NHAT	WITHIN	WN	WNHAT	BMS N= 4	BN	BNHAT
		X									
BETULA GLANDULOSA (SEC)	24,	2.7	285.3	40	21	303.00	36	22	72,96	3	6
BETULA PAPYRIFERA (SEC)	1,	~ ~ 0.1 ~	0.3	40	23	0.26	36	22	0.33	3 -	28
BALIX PULCHRA (SEC)	6.	1 . 4	73.4	40	78	65.74	36	70	164,76	3	175
SALIX GLAUCA (SEC)	1.	0.2	1.i	40	43	0.84	36	33	4,29	3	168
GALIX LANATA (SEC)	1.	0.1	0.4	40	42	0,39	36	41	0.49	3	52
BALIX ALAXENSIS (SEC)	1.	0.1	0.8	40	46	0.83	36	47	0,43	3	25
ALNUS SINUATA (SEC)	1.	0.1	0.3	40	32	0.23	36	29	0.49	3	61
MOVE TIME BETWEEN PLOTS (SEC)	66.	7.1	2030.4	40	20	1945.72	36	19	3046.43	3	29
TOTAL TIME PER PLOT W MOVE	99.	7.3	2149.8	40		2067.49	36		3137.27	3	

THE CLU NOW ALL CLAY ALL CONTROL OF THE SERVICE OF THE CLAY AND THE SERVICE OF THE SE

TABLE 89 MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (1 M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR

SITE 16. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE

TIME WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

	i,	•••		2	· ·		
CATEGORY (N = 10)		X	s_ X	S	N	МНАТ	WITHIN WN W
BETULA GLANDULOSA (SEC) BETULA PAPYRIFERA (SEC)		9,	2.4	57.4 8.8	10	30	
SALIX FULCHRA (SEC)	File to recommendate to the graph of the file of the state of the stat	1.	0.7	0.3	10	31	and the state of t
SALIX GLAUCA (SEC) SALIX LANATA (SEC)		1 • 1 •	0.2	0,3 0,5	10 10	31 12	
GALIX ALAXENSIS (SEC) ALNUS SINUATA (SEC)		1.	0.4 0.5	1.7 2.5	10	57 35	
MOVE TIME BETWEEN PLOTS	(SEC)	104.	60.7	36810.4	10	140	

TOTAL TIME PER PLOT W MOVE

120.

62.5 39079.

1.0

TABLE BIQ MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (1 M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR

SITE 17. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE

TIME WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

				-		2					
CATEGORY	(N =	10)		X	S_	S	N	ТАНИ	WITHIN	WN	WNHA
	The same of the course of Maddalan	THE PERSON NAMED IN COLUMN		, yayardaraa waxa aha waxa waxa ayaanda aha waxaa	X				age from the stage of the stage		The second secon
BETULA GLAN	NDULOSA	(SEC)		3,	0,8	5.7	10	30			
BETULA PAPY	YRIFERA	(SEC)		1.	0.3	1.0	10	51		-	
SALIX PULC	HRA (SEC	;)		1.	0.2	0.3	10	31			
SALIX GLAU	CA (SEC)			1.	0 + 1	0.1	10	6			
SALIX LANAT	TA (SEC)	PROPERTY AND ADDRESS OF THE PARTY AND ADDRESS		1.	0.2	0.5	10	39	Committee of the commit		THE MANAGEMENT OF THE PARTY OF
SALIX ALAXE	ENSIS (S	(EC)	1. 1. 5.	1.	0.2	0.3	10	46			
ALNUS SINUA			• • •	1.	0.1	0.2	10	1.2			
MOVE TIME I	BETWEEN	PLOTS	(SEC)	53.	11.6	1336.1	10	20			····
TOTAL TIME				60.	11.7	1366.5	10				

TABLE BY MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (1 M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR OPEN MIXED SPRUCE-BIRCH TYPE, N IS NUMBER OF SAMPLING UNITS. ESTIMATED SAMPLE SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE TIME WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

CATEGORY (N = 20)	X	s_ X	S		N	NHAT	WITHIN	WN	WNHAT	BMS N=	2	BN	BNHAT	
BETULA GLANDULOSA (SEC)	6.	1.4	39.7		20	48	31.58	18	38	186	.05	1	223	
BETULA PAPYRIFERA (SEC)	1.	0.5	4.9		20	103	4,88	18	102	5	.00	1	105	٠.
SALIX PULCHRA (SEC)	1.	0.1	0.3		20	29	0.27	18	31	-0	.00	1	0	i
SALIX GLAUCA (SEC)	1.	0.1	0.2		20	15	0.18	18	14	0	. 45 🗀	1	33	
SALIX LANATA (SEC)	1.	0.2	0.5		20	22	0.46	18	19	1	. 80	1	74	
SALIX ALAXENSIS (SEC)	1.	0.2	1.0	1	20	65	0.97	18	62	1	.80	1	116	
ALNUS SINUATA (SEC)	1.	0.3	1.5		20	39	1.32	18	35	4	.05	1	107	
MOVE TIME BETWEEN PLOTS (SEC)	78.	30.6	18745.8		20	125	19073.25	18	127	12852	• 45	1	86	
TOTAL TIME PER PLOT W MOVE	90.	31.7	20093.1		20		20222.72	18		17760	.80	1		

۸.

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR SITE 8. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE TIME WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

TABLE $\mathcal{B}12$ MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (1.M2)

CATEGORY (N = 9) X S_ S N NHAT WITHIN WN WNH

	BETULA GLANDULOSA (SEC)	1.	0.3	0.9	9	26	
	BETULA PAPYRIFERA (SEC)	3.	1.0	9.5	ዎ	36	
	SALIX PULCHRA (SEC)	1.	0.1	0.2	9	14	
••••	SALIX GLAUCA (SEC)	1.	0.1	0.1	9	6	
	SALIX LANATA (SEC)	1.	0.2	0.3	9	11	e je e P
	SALIX ALAXENSIS (SEC)	47.	13.0	1510.9	9	29	
	ALNUS SINUATA (SEC)	9.	2.3	46.9	9	23	
	MOVE TIME BETWEEN PLOTS (S	SEC) 90.	16.5	2451.3	9	13	
	TOTAL TIME PER PLOT W MOVE	154.	14.7	1940.5	9		
					- 4" (a)		

TABLE 8/3 MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (1 M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR

SITE 9. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE

TIME WITHIN 20% OF THE MEAN WITH BOX CONFIDENCE.

9	CATEGORY (N=11) X SX SX N NH	AT
1.	BETULA PAPYRIFERA (SEC) 1. 0.3 0.8 11 3	3
0	- SALIX PULCHRA (SEC) - 自由自己的 15. 自由自己的 2.3 自由自己的 4 自己的 11 自己的 1 1 自己的 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1
	SALIX GLAUCA (SEC) 2. 2. 1.0	у
_ i / i	SALIX LANATA (SEC) 3. 0.9 9.1 11 5	የ
@ :	SALIX ALAXENSIS (SEC) 16. 4.0 176.9 11 3	2
	ALNUS SINUATA (SEC) 2. 0.3 1.0 11 1 AND) <u>B</u>
6	MOVE TIME BETWEEN FLOTS (SEC) 152. 37.4 15388.9 11 2 TOTAL TIME PER PLOT W MOVE 194. 39.8 17437.2 11	
		. —

TABLE BY MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (1 M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR TACK
WILLOW TYPE. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE
SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
TIME WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

	_		. 2	·*							.*
CATEGORY (N = 20)	X	5 X	5	N	NHAT	WITHIN	WN	WNHAT	BMS N= 2	BN	BNHAT
BETULA GLANDULOSA (SEC)	3.	1.3	33.4	20	195	33.40	18	195	33.36	1	195
BETULA PAPYRIFERA (SEC)	2.	0.5	5.8	20	57	4.67	18	46	26.95	1	263
SALIX PULCHRA (SEC)	9.	2.1	86.6	20	47	33.65	18	19	1040.01	1	557
SALIX GLAUCA (SEC)	2.	0.2	1.1	20	17	0.62	18	10	9.48	1	143
SALIX LANATA (SEC)	2.	0.5	5.5	20	66	5.15	18	62	11.82	1	142
SALIX ALAXENSIS (SEC)	30.	7.0	983.7	20	46	769.75	18	36	4834.77	1	225
ALNUS SINUATA (SEC)	5.	1.3	34.6	20	54	21.40	18	34	271.36	1	420
MOVE TIME BETWEEN PLOTS (SEC)	124.	22.5	10110.6	20	27	9638.81	18	26	18602.41	1	50
TOTAL TIME PER PLOT W MOVE	176.	22.8	10418.3	20		10549.78	18	••	8052.55	1	

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR SITE 12. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE TIME WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE. CATEGORY (N = 10)WNF WN NHAT WITHIN BETULA GLANDULOSA (SEC) 17. 10 63 6.7 444.0 BETULA PAPYRIFERA (SEC) 3. 1.6 24.8 10 106 SALIX PULCHRA (SEC) 5.0 248.5 10 135 9. SALIX GLAUCA (SEC) 2. 175 1.4 20.6 10 SALIX LANATA (SEC) 8. 4.9 245.0 10 153 SALIX ALAXENSIS (SEC) 2.2 46.5 10 99 ALNUS SINUATA (SEC) 2. 12 0.3 0.7 10 MOVE TIME BETWEEN PLOTS (SEC) 62. 12.1 1462.5 10 16 107. 17.1

TABLE BIS MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (1 M2)

TABLE \$16 MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (1 M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR

SITE 13. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE

TIME WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

And the same of th

	5000	2			
CATEGORY (N = 10)	X	S_ S	N	ТАНИ	WITHIN WW WHAT
BETULA GLANDULOSA (SEC)	19.	4.0 162.3	10	18	
BETULA PAPYRIFERA (SEC) SALIX PULCHRA (SEC)	1 • 2 •	0.1 0.2 0.4 2.0	10	12 17	
SALIX GLAUCA (SEC) SALIX LANATA (SEC)	1.	0.3 1.1 0.2 0.2	10 10	28 20	
SALIX ALAXENSIS (SEC) ALNUS SINUATA (SEC)	1.	0.1 0.2 0.3	10	12 46 -	The second section of the second section secti
MOVE TIME BETWEEN PLOTS (SEC) TOTAL TIME PER PLOT W MOVE	184. 210.	41.8 17456.1 41.2 16944.7	10 10	22	

TABLE 847 MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (1 M2)
OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR
SITE 4: N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE
SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
TIME WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

•			2				
CATEGORY (N = 9)	. X	S_	S	N	NHAT	WITHIN	таниш иш
		X				to the second second section of the second s	
BETULA GLANDULOSA (SEC)	21.	2.2	45.2	9	5		<u> </u>
BETULA PAPYRIFERA (SEC)	1.	0.3	0.8	\$	16		
SALIX PULCHRA (SEC)	25.	3.8	128.0	9	9		
SALIX GLAUCA (SEC)	6.	2.3	45.8	ዎ	59		
SALIX LANATA (SEC)	20.	17.0	2613.4	9	271	THE RESIDENCE OF THE PROPERTY.	and the second s
SALIX ALAXENSIS (SEC)	2.	0.7	3.9	9	52		
ALNUS SINUATA (SEC)	1.	0.2	0.3	. 9	37		
MOVE TIME BETWEEN PLOTS (SEC	85.	12.0	1295.5	9	8.		enemakan kepangan di arabamanan dipangan dan sebagai pangan pangan pengan pengangan sebagai pen
TOTAL TIME PER PLOT W MOVE	160.	22.7	4649.2	9			_
سع عدد الله الله الله الله الله الله الله ال							00

TABLE \$48 MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (1 M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR

SITE 5. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE

TIME WITHIN 20% OF THE MEAN WITH 80%, CONFIDENCE.

CATEGORY	(N = 10)		X	S_ X	\$ \$	N .	ТАНИ	WITHIN	MM MM
BETULA GLAN	IDULOSA (SEC)		23.	2.7	72.8	10	<u>ن</u> د د د د د د د د د د د د د د د د د د د		
BETULA PARY	'RIFERA (SEC)	1.00	1.	0 . 2	0 • 4	10	26		
SALIX FULCH	IRA (SEC)	- agreement op 2 is in the mile of the thing below by	23.	5.5	305.8	10	24	The second secon	Charles of Parties (Market of the such question (Charles on property)
SALIX GLAUC	CA (SEC)		2.	0.6	3.6	10	58		
SALIX LANAT	A (SEC)		1.	0.2	0.3	10	46		
SALIX ALAXE	NSIS (SEC)		1.	0.2	0.2	10	20		
ALNUS SINUA	TA (SEC)		1.	0.2	0.3	10	11		
• • •	 List of the observation was not week to be be because of the beautiful points. 	ekusarteen mis mesentisias ermona susaida sementi apere	Territoria de la companya de la descripción de la companya de la c	er maken i i i sementere i amende i juga en el distanti contrat	Name and the State of the State	C pr 4 vertil meksings # Sensor from 2 ##2 509236200000 000000000000000000000000000000			·

MOVE '	TIME	BETWE	EEN P	LOTS	(SEC)	475.	314.6	989917.6	10	181
TOTAL	TIME	FER	FLOT	WMC) VE	525.	313.1	980120.9	10	

*,,,2

TABLE 819 MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (1 M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR

SITE 6. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE

TIME WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

	***		2			
CATEGORY (N = 10)	X	S_	S	N. T. S.	ТАНИ	WITHIN WN WNHA
AA La de	Lath Addil dags major was own signs Allen town A	X				
BETULA GLANDULOSA (SEC)	33.	4.6	209.2	10	8	The state of the s
BETULA PAPYRIFERA (SEC)	2.	0.4	1.6	10	30	
SALIX PULCHRA (SEC)	16.	1.9	37.8	10	. 7	
SALIX GLAUCA (SEC)	5.	2.1	45.4	10	78	Control of the contro
SALIX LANATA (SEC)	2.	0.4	4.0	10	57	·
SALIX ALAXENSIS (SEC)	1.	0.4	1.7	10	50	
ALNUS SINUATA (SEC)	3.	1.7	29.8	10	181	
MOVE TIME BETWEEN PLOTS (SEC)	72.	15.4	2370.0	10	19	
TOTAL TIME PER PLOT W MOVE	133.	12.5	1554.3	10		

TABLE 820 MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (1 M2)
OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR
SITE 7. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE
SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
TIME WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

- 2

CATEGORY	(N =	10)		X	9_	S	N	ТАНИ	WITHIN	WN	WNH.
* * *	The state of the s			A gett Appeller (Charles to	X	The administration of the second seco	And the second s	Committee the artistance is marked for destinating a fine or 1, 12 and 1990.	3) Links of the Control of April 10		A
BETULA GLAN	INULOSA	(SEC)	14.	3.3	111.8	10	23			
BETULA PARY	RIFERA	(SEC)	1.	0 . 2	0.2	10	20			
SALIX PULCH	RA (SEC	١)		10.	3.3	111.2	10	47			
SALIX GLAUC	A (SEC))	1. 54	9.	2+6	65.2	10	37			
SALIX LANAT	A (SEC)	,		15.	3.5	122.0	10	22	manufact programming a new recovered true as, globates for	and the second second	
SALIX, ALAXE	NSIS (F	SEC)		2.	0 . 6	3.3	10	28			
ALNUS SINUA	TA (SEC	١)		1.	0.1	0.1	10	6			
MOVE TIME B	ETWEEN	PLOT	S (SEC)	169.	38.3	14690.1	10	22			
TOTAL TIME	PER PLC	1 W TL	MOVE	221.	40,5	16393.3	10				00
	,						May topic bland black depth draw street state street source street in	AND THE OTHER SCEN PAGE SHEET SHEET SHEET SHEET			00

TABLE β 2/ MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (1 M2) OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR OPEN LOW DWARF, BIRCH-WILLOW. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE TIME WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

	_		2	•							
CATEGORY (N = 59)	X	s_x	S	N .	NHAT	WITHIN	WN	ТАНИМ	BMS N= 6	BN	BNHAT
BETULA GLANDULOSA (SEC)	21.	1.8	197.1	59	18	176.66	53	17	413,46	- 5	38
BETULA PAPYRIFERA (SEC)	1.	0,3	5.0	59	107	4.73	53	101	8,22	5	175
SALIX PULCHRA (SEC)	14.	1.8	194.6	59	41	139.08	53	29	782,79	5	164
SALIX GLAUCA (SEC)	4	0.8	34.4	59	88	29.99	53	77	81.52	5	207
SALIX LANATA (SEC)	8.	2.8	475.0	59	346	457,56	53	333	659,57	5	480
SALIX ALAXENSIS (SEC)	2.	0.4	10.2	59	123	9.41	53	113	18,95	5	228
ALNUS SINUATA (SEC)	17	0.3	5.4	59	149	5.35	~53 [~]	148	6.16	5	170
MOVE TIME BETWEEN PLOTS (SEC)	176.	55.3	180181.3	59	2391	74404.35	53	232	241416.68	5	321 🥳
TOTAL TIME PER PLOT W MOVE	227.	55.0	178736.7	59		73556.93	53		233642.15	5	

TABLE \$22 MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (1 M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR

SITE 3. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE

TIME WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

CATEGORY	(N = 1	2)	x	S	2 S	N	NHAT	WITHIN	MM MMI
BETULA GLAN	DULOSA (S	EC)	6,	3.4	140.8	12	141		
BETULA PAPY			1.	0.2	0.5	12	23		• .
SALIX PULCH	RA (SEC)	n er den ig i kræd hyfotogrædt folkk om klynd den æ	91.	33.9	13829.4	12	69	a characteristic manifest the second definition of	par mana kiris na arab Émarpoparendere
SALIX GLAUCA	A (SEC)		2.	0,+3	1.2	12	17		
SALIX LANATA	A (SEC)		1.	0.1	0.2	12	23		
SALIX ALAXEI	NSIS (SEC)	5.	3.0	106.3	12	181		
ALNUS SINUAT	TA (SEC)		1.	0.1	0.2	12	15		
MOVE TIME BE	ETWEEN PL	OTS (SEC)	174.	41.2	20343.0	12	28		
TOTAL TIME F	PER PLOT	W MOVE	280.	56.7	38564.9	12		e mangan sa	75

OF SELECTED SHRUB SPECIES TYPE. N IS THE NUMBER OF SIZE (NHAT) IS THE NUMBER TIME WITHIN 20% OF THE ME	F SAMPLING R OF SAMPL	UNITS. ING UNITS	THE ESTIMAT REQUIRED T	ED SAMPLE							
ATEGORY (N = 12)	X	S_ X	2 S	N	NHAT	WITHIN	WN	WNHAT	BMS N= 1	BN	BNHAT
ETULA GLANDULOSA (SEC)	6.	3.4	140.8	12	141	140.81	11	141	-0.00	0	0
ETULA PAPYRIFERA (SEC) ALIX PULCHRA (SEC)	6. 1. 91. 2.	0.2 33.9	140.8 0.5 13829.4 1.2	12 (12	23 69	0.55 13829.42	11 11 11 11	141 23 69 17	-0.00 0. -0.00 0.00	0 0 0 0	0 1 0 1
BETULA GLANDULOSA (SEC) BETULA PAPYRIFERA (SEC) SALIX PULCHRA (SEC) SALIX GLAUCA (SEC) SALIX LANATA (SEC) SALIX ALAXENSIS (SEC)		0.2 33.9 0.3	0.5 13829.4	12	23	0.55 13829.42 1.15 0.24 106.27	1 I 1 I	23 69	0.	0 0 0 0	0 1 0 1

TABLE 824 MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (4M2)
OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR
SITE 10. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE
SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE

TIME WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

	CATEGORY	(N =	10)			x	S_ X	3	N	ТАНИ	WITHIN	MN	ТАНИШ
	BETULA GLAN BETULA PAPY			, , , , , , , , , , , , , , , , , , ,	entin Servic Corner Corner	59. 1.	3.8 0.3	145.4	10	2 41			
-	SALIX PULCH SALIX GLAUC	A (SEC)	,	er annessen er Effert for he feldenseren		29. 7.	6.6 3.1	431.2 95.4	10 10	21 78	and the second of the second o		
	SALIX LANAT SALIX ALAXE ALNUS SINUA	NSIS (S	SEC)	-		3. 2.	0.7	10.8 5.3	10 10	76 20			
	MOVE TIME B	ETWEEN	FLOTS			97. 199.	33·1 38·7	10924.4	10	48			
						ين نيبغ ښنو کين رب			AN THE STEEL S	AND THE WAR AND THE PART OF TH			192

TABLE 825 MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (4M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR

SITE 11. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE

TIME WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

			2			
CATEGORY (N = 10)	X	S_X	S .	N	ТАНИ	WITHIN WN WHAT
BETULA GLANDULOSA (SEC)	38.	6.7	445.6	10	13	and the second of the second o
BETULA PAPYRIFERA (SEC)	2.	0.9	8 + 4	10	107	
SALIX FULCHRA (SEC)	4 .	1.2	13.8	10	42	
SALIX GLAUCA (SEC)	3	1.1	12.4	10	57	9
SALIX LANATA (SEC)	1.	0 - 3 ,.	0 • 8	10	55	4
SALIX ALAXENSIS (SEC)	1.	0.2	0.3	10	17	
ALNUS SINUATA (SEC)	1.	0.2	0.5	10	39	• 100
MOVE TIME BETWEEN PLOTS (SEC)	107.	18.2	3327.6	10	12	
TOTAL TIME PER PLOT W MOVE	156.	22.5	5048.0	10		

TABLE 826 MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (4M2)
OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR WOODLAND BLACKWHITE SPRUCE TYPE. N IS NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE
SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
TIME WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

CATEGORY (N = 20)	X	5_ X			N	NHAT	WITHIN	WN	WNHAT	BMS N=	2	BN	BNHAT	
BETULA GLANDULOSA (SEC)	48,	4.5	400.5		20	8	295.50	18	6	2289.	80	1	41	
BETULA PAPYRIFERA (SEC)	1.	0.5	4.7		20	92	4.81	18	94	2.	45	1	48	
SALIX PULCHRA (SEC)	16.	4.4	380.6		20	58	222.50	18	34	32257	80	1_	492	
SALIX GLAUCA (SEC)	5.	1.7	55.5		20	90	53.94	18	87	84.	05	1	135	
SALIX LANATA (SEC)	2.	0.6	6.6	1	20	84	5.84	18	74	20.	00	1	. 253	
SALIX ALAXENSIS (SEC)	1,	0.4	2.9	1	20	70	2.83	18	69	3.	20	1	78	
ALNUS SINUATA (SEC)	1.	0.1	0.3		20	28	0.34	18	29	-0.	00	1.	0	
MOVE TIME BETWEEN PLOTS (SEC)	102.	18.4	6778.3		20	27	7126.00	18	28	520.	20	1	3	
TOTAL TIME PER PLOT W MOVE	177.	22.3	9969.5		20		10014.53	19		9159.	20	1		-

TABLE B27 MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (4M2)
OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR
SITE 14. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE
SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
TIME WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

CATEGORY (N = 10) X S_ S N NHAT WITHIN WN WNHA

BETULA GLANDULOSA (SEC)	79.	8 . 4	708.5	10	5
BETULA PAPYRIFERA (SEC)	1.	0.8	5.8	10	141
SALIX FULCHRA (SEC)	6+	3.4	115.6	10	151
SALIX GLAUCA (SEC)	. 1.	0.3	0.7	10	57
SALIX LANATA (SEC)	1.	0.2	0.4	10	19
SALIX ALAXENSIS (SEC)	1.	0.2	0.3	10	17
ALNUS SINUATA (SEC)	1.	0.2	0 • 4	10	26
MOVE TIME BETWEEN PLOTS (SEC)	36.	7 + 4	552.0	10	18
TOTAL TIME PER PLOT W MOVE	125.	15.0	2237.8	10	

TABLE \$28 MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (4M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR

SITE 15. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE

TIME WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

CATEGORY (N = 10)	x	S_ X	2 \$	N	ТАНИ	WITHIN	4MW MW
BETULA GLANDULOSA (SEC)	63.	6.6	432.0	10	5		
BETULA PAPYRIFERA (SEC)	1.	0+2	0.5	10	39		•
SALIX FULCHRA (SEC)	12.	4.9	244.7	10	74	a contract contract	
SALIX GLAUCA (SEC)	1.	0+2	0.2	10	20		
SALIX LANATA (SEC)	1.	0.2	0.3	10	46		
SALIX ALAXENSIS (SEC)	1.	0.2	0.3	10	31		
ALNUS SINUATA (SEC)	1.	0.2	0.2	10	- 20		
MOVE TIME BETWEEN PLOTS (SEC)	125.	23.4	5473.6	10	15		
TOTAL TIME PER PLOT W MOVE	203.	21.7	4704.7	10			

TABLE \$29 MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (4M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR

SITE 18. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE

TIME WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

4	-		i.			
CATEGORY (N = 10)	Χ	\$	S	N	ТАНИ	WITHIN WN WHA
					ne spage spare arts are spare made spare	
BETULA GLANDULOSA (SEC)	43.	5.3	278.5	10	7	and the manufacture of the control o
BETULA PAPYRIFERA (SEC)	1.	0.2	0.3	10	31	
SALIX FULCHRA (SEC)	24.	4.8	229.9	10	17	
SALIX GLAUCA (SEC)	3.	0.5	2.5	10	16	The second section is the second section of the second section of the second section of the second section of the second section secti
SALIX LANATA (SEC)	34.	10.4	1072.3	10	38	
SALIX ALAXENSIS (SEC)	3.	8 + 0	6.9	10	32	
ALNUS SINUATA (SEC)	1.	0.1	0.1	10	6	
MOVE TIME BETWEEN PLOTS (SEC)	73.	12.5	1566.1	10	1.3	
TOTAL TIME PER PLOT W MOVE	181.	15.3	2344.7	10		in the second se
	* ** ** ** ** ** ** ** **					\sim 1

TABLE \$30 MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (4M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR

SITE 19. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE

TIME WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

·			2					
CATEGORY (N = 10)	X	S	S	N	NHAT	WITHIN	MM	WNHi
		X					NIEMEN CONTRACT	* Well Mad Michigan III is sent year some
BETULA GLANDULOSA (SEC)	31.	5.7	325.3	10	14			
BETULA PAPYRIFERA (SEC)	1.	0.2	0+4	10	26	ada kananan araban mengangan penganan 190 Saha Angaba kang sahara sagaman pe		
SALIX PULCHRA (SEC)	11.	2.9	83.5	10	30			
SALIX GLAUCA (SEC)	1.	0.3	8 • 0	1.0	39			
SALIX LANATA (SEC)	1.	0.2	0+3	10	46	kaft Mulden erannaga yar eri sah sama - m - 11 - 18		
SALIX ALAXENSIS (SEC)	1.	0.2	0.3	10	31			
ALNUS SINUATA (SEC)	1.	0+7	4.2	10	103			
MOVE TIME BETWEEN PLOTS (SEC)	74+	13.6	1851.6	10	14			
								
				•			`	2
TOTAL TIME PER PLOT W MOVE	121.	15.7	2469+2	10				$\tilde{\varphi}$

The first term of the

TABLE \$31 MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (4M2)

OF SELECTED SHRUD SPECIES INDIVIDUALLY AND COMBINED FOR WOODLAND BLACK
SPRUCE TYPE. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE
SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
TIME WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

CATEGORY (N = 40)	x	5_ X	2 S	. и	ТАНИ	WITHIN	WN	TAHNW	BMS N= 4	BN	тания	
BETULA GLANDULOSA (SEC)	54.	4.3	748.4	40	11	436.09	36	7	4495.57		64	
BETULA PAPYRIFERA (SEC)	1.	0.2	i .7	40	95	1.73	36	98	0.97	3	55	
SALIX PULCHRA (SEC)	13.	2.2	201.6	. 40	49	168,42	36	41	600.33	3	146	
SALÍX GLÁUCA (SEC)	1.	0.2	1.6	40	45	1.04	36	29	8.49	3	232	
GALIX LANATA (SEC)	9.	3.4	466.6	40	231	268.32	36	133	2845,40	3	. 1408	
SALIX ALAXENSIS (SEC)	1.	0.3	2.8	40	72	1.94	36	49	13.43	3	339	
LNUS SINUATĂ (SEC)	1.	0.2	1.2	40	58	1.24	36	60	0.69	3	34	
MOVE TIME BETWEEN PLOTS (SEC)	77.	9.0	3216.9	40	23	2360.83	36	17	13490.03	3	93	
TOTAL TIME PER PLOT W HOVE	158.	10.0	3998.8	40		2939.08	36		16715.07	3		

TABLE \$32 MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (4M2)
OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR
SITE 16. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE
SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
TIME WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

Control Contro

CATEGORY (N = 10)	X	S_ X	2 S	N	ТАНИ	WITHIN	WN	MNHA.
BETULA GLANDULOSA (SEC)	28.	4 + 1	165.8	10	9			:
BETULA PAPYRIFERA (SEC)	1.	0 + 1	0.2	10	12			
SALIX PULCHRA (SEC)	5.	2.7	74.0	10	144	e and the second of the second		
SALIX GLAUCA (SEC)	1.	0.2	0 + 5	10	19			
SALIX LANATA (SEC)	1.	0.3	0 + 9	10	37			
SALIX ALAXENSIS (SEC)	1.	0.3	0.8	10	55			
ALNUS SINUATA (SEC)	3 ₊	2.1	45.7	10	239			
MOVE TIME BETWEEN PLOTS (SEC)	74.	16.7	2798.5	10	22			
TOTAL TIME PER PLOT W MOVE	112.	17.3	3002.7	10				

TABLE 833 MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (4M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR

SITE 17. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE

TIME WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

	***		2			
CATEGORY (N = 10)	X	S	S	N	ТАНИ	WITHIN WN WHAY
BETULA GLANDULOSA (SEC)	4 +	1 + 6	24.1	10	65	
BETULA PAPYRIFERA (SEC)	2.	0.7	5.6	1. O	103	
SALIX PULCHRA (SEC)	1.	0.2	0.3	10	46	
SALIX GLAUCA (SEC)	1.	0.1	0.2	10	12	
SALIX LANATA (SEC)	1.	0.2	0.3	10	46	
SALIX ALAXENSIS (SEC)	1.	0.2	0.3	10	31	
ALNUS SINUATA (SEC)	1	0.2	0.2	10	20	1
MOVE TIME BETWEEN PLOTS (SEC)	72.	7.3	532.0	10	5	
TOTAL TIME PER PLOT W MOVE	81.	8 + 8	459.4	10		in the second of the second of the second

TABLE 834 MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (4M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR OPEN MIXED SPRUCE-BIRCH TYPE. N IS NUMBER OF SAMPLING UNITS. ESTIMATED SAMPLE SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE TIME WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

2

CATEGORY (N = 20)	X	, S _ Y	S	N	лнат.	WITHIN	WN	WNHAT	BMS N= 2	BN	BNHAT
·								territory gar ed			
BETULA GLANDULDSA (SEC)	16,	3.5	239.0	20	40	94.94	18	16	2832.20	1	465
BETULA FAFYRIFERA (SEC)	1.	0.4	2,9	20	89	2.89	18	90	2.45	1	76
SALIX FULCHRA (SEC)	3.	1.4	39.6	20	250	37.16	18	235	84.05	i	530
SALIX GLAUCA (SEC)	1.	0.1	0.4	. 20	17	0.36	18	17	0.45	1	21
SALIX LANATA (SEC)	i.	0.2	0.6	20	46	0.58	18	43	1,25	i	92
SALIX ALAXENSIS (SEC)	i.	0.2	0.5	20	45	0.56	18	- 47	0.20	i_	. 17
ALNUS SINUATA (SEC)	2.	1.1	22.9	20	307	22,98	18	308	22.05	1	295
MOVE TIME BETWEEN PLOTS (SEC)	73,	8.9	1578.2	20	13	1665.25	18	13	11.25	1	1
TOTAL TIME PER PLOT W MOVE	96.	9.8	1906.0	20		1731.03	18		5056.20	i	

The last the

TABLE \$35 MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (4M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR

SITE 8. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE

TIME WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

CATEGORY (N = 10) X S_ S N NHAT WITHIN WN WNHAT

X

4517.8

3439.1

476.2

3980.4

160.3

18.0

0.8

0.2

21.3

1.3

0.3

0.1

18.5

6.9

20.0

24.

10.

2.

1.

99.

37.

112.

322

72

39

15

 \mathcal{N}

185

10

10

10

10

10

10

BETULA GLANDULOSA (SEC)

BETULA PARYRIFERA (SEC)

SALIX PULCHRA (SEC)

SALIX GLAUCA (SEC)

SALIX LANATA (SEC)

ALNUS SINUATA (SEC)

SALIX ALAXENSIS (SEC)

MOVE TIME RETWEEN PLOTS (SEC)

TOTAL TIME PER PLOT W MOVE

TABLE 836 MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (4M2)
OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR
SITE 9. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE
SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
TIME WITHIN 20% OF THE HEAN WITH 80% CONFIDENCE.

			2			
CATEGORY (N = 10)	Χ	5_ X	S	N	ТАНИ	WITHIN WN WHA
	- PO RO PO NO NO NO PO PO PO					
BETULA GLANDULOSA (SEC)	2.	1.2	14.8	10	126	The second secon
BETULA FAFYRIFERA (SEC)	1.	0.3	0.7	10	28	
SALIX PULCHRA (SEC)	35.	6.7	450.6	10	15	
SALIX GLAUCA (SEC)	5.	1,5	23.2	10	37	
SALIX LANATA (SEC)	1.	0.3,	1.2	10	25	
SALIX ALAXENSIS (SEC)	32.	8.4	708.8	10	29	
ALNUS SINUATA (SEC)	5.	2.7	73.1	10	134	
MOVE TIME BETWEEN PLOTS (SEC)	143.	9.1	832.5	10	2	
TOTAL TIME PER PLOT W MOVE	224.	18.1	3262+4	10		
						, , , , , , , , , , , , , , , , , , ,

TABLE 837 MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (4M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR TALL

WILLOW TYPE. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE

TIME WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

CATEGORY (N = 20)	X	s. X	s 2	N	тани	WITHIN	WN	WNHAT	BMS N= 2	BN	BNHAT
RETULA GLANDULOSA (SEC)	13.	10.7	2272.1	20	543	2266.31	18	541	2376.20	1	568
BETULA PAPYRIFERA (SEC)	5.	2.2	95.7	20	140	80.47	18	118	. 369.80	1	540
SALIX PULCHRA (SEC)	19.	5.1	512.0	20	61	234.31	18	28	5511.20	1	653
SALIX GLAUCA (SEC)	3.	0.9	16.0	, 1 20	73	11.99	18	55	88.20	1	402
SALIX LANATA (SEC)	1.	0.2	0.6	20	16	0.67	18	17	0.20	1	5
SALIX ALAXENSIS (SEC)	65.	12.5	3142.6	20	31	2073.92	18	20	22378705	1	215
ALNUS SINUATA (SEC)	21.	5.2	539.9	20	51	274.68	18	26	5313.80	1	494
MOVE TIME BETWEEN PLOTS (SEC)	127.	11.2	2521.4	20.	7	2406.45	18	7	4590.45	1	12
TOTAL TIME PER PLOT W MOVE	255.	25.1	12619.8	20		12253.11	18		19220.00	1	

TABLE \$38 MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (4M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR

SITE 12. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE

TIME WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

		-	* - m	2					ļ
CATEGORY	(N = 10)	X	S_	· S	И	TAHN	WITHIN	WN	HNM
			X						# mm - m - M - M - F
BETULA GLANI	OULOSA (SEC)	52.	8 • 8	777 . B	10	12			
BETULA PAPYI	RIFERA (SEC)	3.	1.8	32.2	10	129			
SALIX PULCHE	RA (SEC)	27.	8.1	656.B	10	37	ř.		·
SALIX GLAUCA	A (SEC)	6.	1.7	29.6	10	34			ļ
SALIX LANATA	A (SEC)	17.	6.5	419.3	10	59			
SALIX ALAXEN	NSIS (SEC)	1.	0 + 3	1.0	10	51			I
ALNUS SINUAT	ra (SEC)	1.	0.2	0.3	10	17			ļ
MOVE TIME BE	ETWEEN PLOTS (SEC)	65.	9.6	915.6	10	9			
TOTAL TIME F	PER PLOT W MOVE	173.	17.1	2936+2	10				ļ
	IN NOT THE REAL THE THE SEC OF THE SEC OF THE SEC OF THE SEC OF								

TABLE B39 MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (4M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR SITE 13. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE TIME WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

CATEGORY (N = 10)	X	5_ X	2 S	N	NHAT	WITHIN	MH	WNHA
BETULA GLANDULOSA (SEC)	33.	5.9	350.8	10	14			
BETULA PAPYRIFERA (SEC)	2.	1.2	14.6	10	124			
SALIX FULCHRA (SEC)	9.	2.2	47.5	10	23	y grant come conserve with a second		
SALIX GLAUCA (SEC)	- 5.	2.4	57.0	10	90			
SALIX LANATA (SEC)	1.	0.73	1.2	10	41			
SALIX ALAXENSIS (SEC)	0.	0.2	0.3	10	69	, age can make a tradition of the forest or the		
ALNUS SINUATA (SEC)	1.	0.1	0.1	10	~ 6			
MOVE TIME BETWEEN PLOTS (SEC)	194.	75.0	56313.6	10	62			
TOTAL TIME PER PLOT W MOVE	246.	74.5	55442.5	10			* · · · · · · · · · · · · · · · · · · ·	N

TABLE $\mathcal{B}40$ MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (4M2) OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR SITE 4. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE TIME WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

	•	<u> </u>			
X	s_x	S	N	ТАНИ	WITHIN WN "
52.	6.9	525.9	11		
4.	2.0	45.9	11	124	
50.	6 + 6	474.3	· 11	8	
14,	4.9	266.8	11	58	makes and the control of the second of the s
2.	1.2	17.2	11	213	
1.	0 4	1 . 9	11	37	
1.	0.5	3.1	11	107	graphic manner is before the first of the design of the de
189.	79 + 1	68854.4	11	" 80	
312.	77.7	66457.0	11		\sim
	4, 50, 14, 2, 1, 1,	4. 2.0 50. 6.6 14. 4.9 2. 1.2 1. 0.4 1. 0.5 189. 79.1	4. 2.0 45.9 50. 6.6 474.3 14. 4.9 266.8 2. 1.2 17.2 1. 0.4 1.9 1. 0.5 3.1 189. 79.1 68854.4	4. 2.0 45.9 11 50. 6.6 474.3 11 14. 4.9 266.8 11 2. 1.2 17.2 11 1. 0.4 1.9 11 1. 0.5 3.1 11 189. 79.1 68854.4 11	X 52. 6.9 525.9 11 9 4. 2.0 45.9 11 124 50. 6.6 474.3 11 8 14. 4.9 266.8 11 58 2. 1.2 17.2 11 213 1. 0.4 1.9 11 37 1. 0.5 3.1 11 107 189. 79.1 68854.4 11 80

TABLE 84/ MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (4M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR

SITE 5. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE

TIME WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

CATEGORY	(N = 10)	x	S_	2 S	N	ТАНИ	WITHIN	иN	WH
	A A CONTRACT OF		X	er nenn i des i i i de inside inside	- And an open and a second				
BETULA GLAN	DULOSA (SEC)	62.	10.3	1061.7	10	12			
BETULA PARY	RIFERA (SEC)	1.	0.2	0.3	10	11			
SALIX PULCH	RA (SEC)	50.	12.0	1437.7	10	24			
SALIX GLAUC	CA (SEC)	2.	0.6	3.6	10	58			
SALIX LANAT	A (SEC)	1.	0.2	0.4	10	26	Traped a company of the first of		
SALIX ALAXE	NBIS (SEC)	1.	0.2	0 + 3	10	31			
ALNUS SINUA	TA (SEC)	1.	0.2	0.3	10	31		•	
MOVE TIME B	ETWEEN PLOTS (SEC)	111.	14.8	2200.9	10	8		X.	
TOTAL TIME	PER PLOT W MOVE	227.	28.0	7843.9	10			.0	
*** *** *** *** *** *** *** *** ***				-				2)

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
TIME WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

CATEGORY (N = 10) X S_ S N NHAT WITHIN WN WNHA

TABLE B42 MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (4M2) OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR

SITE 6. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE

			and column states groups groups proper match parties would color stated and	T 17 00 0000 DOT 600 DES THE STEE SEE SEE SEE SEE		
en e	The state of the s	** - * * **		a service of material remaining	- are alone - 1145 - 11 5 1	e conseque e prosper et e
		1			•	•
BETULA GLANDULOSA (SEC)	75.	8.0	635.5	10	5	
BETULA PAPYRIFERA (SEC)	1.	0.3	1 . 1	1. O	3.1	
SALIX FULCHRA (SEC)	44.	7.7	596.1	10	13	
SALIX GLAUCA (SEC)	10.	3 + 3	108.5	10	50	
SALIX LANATA (SEC)	4.	2.8	78.7	10	175	
SALIX ALAXENSIS (SEC)	2.	1.1	12.2	10	104	
ALNUS SINUATA (SEC)	1.	0.1	0+2	10	12	
MOVE TIME BETWEEN PLOTS (SEC)	189.	110.0	120928.9	10	140	
TOTAL TIME PER PLOT W MÖVE	325.	111.0	123273.8	10		λ
一年 新生 化环 化石 化石 化环 化环 化环 医甲 化二 化甲 医神 四枝 四枝 日本 日本 医血 化二 电电 化二 电子 化液 化液 化液 化液 化液 化二 化丁二				,		~

Alice while said said fast was the ball that the last the ball that the

TABLE 843 MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (4M2)
OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR
SITE 7. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE
SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
TIME WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

			2			
CATEGORY (N = 10)	X	\$_ X	S	N	ТАНИ	WITHIN WN WN
BETULA GLANDULOSA (SEC)	39.	5.5	306.0	10		The contract of the contract o
BETULA PAPYRIFERA (SEC)	1.	0.1	0.2	10	10	
SALIX FULCHRA (SEC)	25.	5.2	266.7	10	18	
SALIX GLAUCA (SEC)	11.	2.6	68.0	10	23	Name & 1999 and 1999
SALIX LANATA (SEC)	36.	7.5	558.9	10	. 19	
SALIX ALAXENSIS (SEC)	1.	0.3	0.7	10	15	
ALNUS SINUATA (SEC)	1.	0.1	0.1	10	6	A CONTRACTOR OF THE PROPERTY O
MOVE TIME BETWEEN PLOTS (SEC)	139.	27.1	7355.6	10	1 &	
TOTAL TIME PER PLOT W MOVE	253.	25.6	6561.B	10		

TABLE \$44 MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (4M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR OPEN LOW DWARF
BIRCH-WILLOW. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE
SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
TIME WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

CATEGORY (N = 61)	X	\$_ X	s 2	N	ТАНИ	WITHIN	₩ N	ТАНИ	BMS N= 6	BN	ENHAT
BETULA GLANDULOSA (SEC)	52.	3.5	749,4	61	12	408.08	55	10	2304.26	5	35
BETULA PAPYRIFERA (SEC)	2.	0.5	16.2	61	147	16.27	55	147	15,67	5	142
SALIX FULCHRA (SEC)	34.	3.5	756.0	61	27	577.91	55	21	2715.21	-	95
SALIX GLAUCA (SEC)	8.	1.3	101.4	. 61	66	92.14	55	60	203.85	i 5	133
SALIX LANATA (SEC)	10.	2.3	323.6	61	134	176.33	55	73	1944.13	5	799
SALIX ALAXENSIS (SEC)	1.	0.2	2.8	61	86	2.70	55	82	4.39	5	133
ALNUS SINUATA (SEC)	1.	0,1	0.7	61	38	0.72	55	40	0.27	5	15
MOVE TIME BETWEEN PLOTS (SEC)	148.	26.2	41955.5	61	79	43235.92	55	81	27870.67	5	52
TOTAL TIME PER PLOT W MOVE	257.	26.6	43174.5	61		44165.34	55		32274.81	5	

AND THE RESIDENCE OF THE PARTY OF THE PARTY

TABLE B45 MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (4M2) OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR SITE 3. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE TIME WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

	+-		2					
CATEGORY $(N = 9)$	X	8_	S	Ν	TAHK	WITHIN	WN	MNI
		X				Marriado da American Albaria - Esta de Calemania mistra de la		
BETULA GLANDULOSA (SEC)	3.	1.1	10.0	9	58		*	
BETULA PAPYRIFERA (SEC)	1.	0.2	0.4		1.3			
SALIX PULCHRA (SEC)	102.	22.6	4604.6	9	19			
SALIX GLAUCA (SEC)	22.	17.2	2662.5	9	219			
SALIX LANATA (SEC)	1.	0.4	1.5	9	62			
The second of th	and the second of the application of a	. -	and the second s	and the second s		A CONTRACTOR OF THE STATE OF	ay project the projection	to the fig. of the
	4.8		475 4	n	 	A CONTRACTOR OF THE PROPERTY O		1.45/4.5
SALIX ALAXENSIS (SEC)	10.	4.5	178.4	ሃ	70			
ALNUS SINUATA (SEC)	1.	0.4	1.8	9	35			
MOVE TIME BETWEEN PLOTS (SEC)	260.	129.1	150057.0	9	91	er i kan y sellen freggeligte mennessen, men i i i i i i i i i i i i i i i i i i i	λ,	
TOTAL TIME PER PLOT W MOVE	401.	149.2	200246.7	9			17	
						,	ω	

TABLE 846 MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (4M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR OPEN LOW WILLOW TYPE. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE TIME WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

CATEGORY (N = 9)	-	\$_ X	s ²	N	ТАНИ	WITHIN	. MM	WNHAT	BMS N= 1	BN	ТАНИЕ
DETIL A DI AUDUI DOA (APP.)						4.0.00					
BETULA GLANDULOSA (SEC)	4 •	1 • 1	10.0	<u> </u>	58	10.00	8	58	0.	Ŏ	Ţ
BETULA PAFYRIFERA (SEC)	1,	0.2	0 • 4	9	13	0.44	8	13	-0.00	0	O
SALIX PULCHRA (SEC)	102.	22.6	4604.6	9	19	4604.61	8	19	0.00	0	1
SALIX GLAUCA (SEC)	22.	17.2	2662.5	9	219	2662.50	8	219	0.	o	1
SALIX LANATA (SEC)	1.	0.4	1.5	['] 9	62	1,50	8	62	0.	0	· 1
SALIX ALAXENSIS (SEC)	10.	4.5	178.4	9	70	178.44	8	70	-0.00	0	0 }:
ALNUS SINUATA (SEC)	1.	0,4	1.8	9	35	1.78	8	35	-0,00	0	-0
MOVE TIME BETWEEN PLOTS (SEC)	260.	129.1	150057.0	9	9115	50057.00	8	91	0.	0	1
TOTAL TIME PER PLOT W MOVE	401.	149.2	200246.7	9	2,0	0246.70	8		-0.01	0	

TABLE 847 MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (10M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR

SITE 10. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE

TIME WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

				2					
CATEGORY	(N = 10)	X	S	S	N	TAHN	WITHIN	WN	TAHMW
	- tiu cu an		X			-		-	
BETULA GLAM	NDULOSA (SEC)	84.	11.2	1245.6	10	8			
BETULA PAP	YRIFERA (SEC)	1.	0.4	1 + 4	10	73			
SALIX FULC	HRA (SEC)	36.	8.2	675.1	10	22			
SALIX GLAU	CA (SEC)	13.	5.1	259.4	. 10	67			
SALIX LANA	TA (SEC)	(140, no s	136.3	185721.8	10	391	THE RESERVE OF THE PROPERTY OF THE PERSON OF		A CHARLES AND AND A THE ABOVE THE ABOVE THE
SALIX ALAX	ENSIS (SEC)	2.	0.7	4 + 9	10	51			
ALNUS SINU	ATA (SEC)	2.	0 • 4	1.8	10	30.			
	BETWEEN PLOTS (SEC	46.	5.8	341.6	10	7			
TOTAL TIME	PER PLOT W MOVE	322.	137.4	188708.2	i 0				N
									15

TABLE 848 MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (10M2) OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR SITE 11. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE TIME WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE. CATEGORY S... WITHIN WN (N = 10)N TAHK WNHAT BETULA GLANDULOSA (SEC) BETULA PAPYRIFERA (SEC) 10 SALIX PULCHRA (SEC) 10 SALIX GLAUCA (SEC) 2.6 31 10. 68.9 10 SALIX LANATA (SEC) 0.5 SALIX ALAXENSIS (SEC) 20 0.2 0.2 10 ALNUS SINUATA (SEC) 1. 10 17 0.20.3 MOVE TIME BETWEEN PLOTS (SEC) 376.9 114. TOTAL TIME PER PLOT W MOVE

TABLE 849 MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (10M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR WOODLAND BLACKWHITE SPRUCE TYPE. N IS NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE
SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
TIME WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

CATEGORY (N = 20)	×	S	2 \$	N	NHAT	WITHIN	MM	WNHAT	BMS N= 2	BN	BNHAT
		Χ									
BETULA GLANDULOSA (SEC)	64.	8.1	1315.6	20	14	941.9B	18	10	8040.05	1	80
BETULA PAPYRIFERA (SEC)	1.	0.4	3,4	20	106	3.52	18	109	1.25	1	39
SALIX PULCHRA (SEC)	20.	5.4	574.2	20	57	340.92	18	34	4774.05	1	473
SALIX GLAUCA (SEC)	11.	2.8	157.9	20	53	164.16	18	- 55	45.00	1	15
SALIX LANATA (SEC)	707/10 5	km 168.2	92999.8	20	769	92861.14	18	768	95496.20		790
SALIX ALAXENSIS (SEC)	1.	0.4	2.9	20	65	2.56	18	'58	8.45	1	190
ALNUS SINUATA (SEC)	1.	0.2	1.1	20	31	1.07	18	29	2.45	. 1	65 .
MOVE TIME BETWEEN PLOTS (SEC)	80.	8.8	1560.B	20	·· · · · · · · · · · · · · · · · · · ·	359.25	18	3	23188.05	1	150
TOTAL TIME PER PLOT W MOVE	250.	69.0	95256.7	20		94660.01	18		105996.80	1	

TABLE \$50 MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (10M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR

SITE 14. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE

TIME WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

CATEGORY (N = 10)	x	s_ X	s 2	<i>N</i>	ТАНИ	TAHNW NW NIHTIW
BETULA GLANDULOSA (SEC) BETULA FAFYRIFERA (SEC)	92.	7.2	520.8	10	3	The state of the s
SALIX PULCHRA (SEC)	16.	11.8	1388.5	10	234	
SALIX GLAUCA (SEC) SALIX LANATA (SEC)	1.	0.3,	1.1	10	28 192	- CONTRACTOR OF THE PROPERTY O
SALIX ALAXENSIS (SEC)	1.	0.2	0.3	10	31.	
ALNUS SINUATA (SEC) MOVE TIME BETWEEN PLOTS (SEC)	1. 49.	0 • 3 4 • 4 ·	0.8 193.6	10 10	55 4	
TOTAL TIME PER PLOT W MOVE	161.	14.9	2216.5	10		

manus material transfer to the bound of the

TABLE 85/ MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (10M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR

SITE 15. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE

TIME WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

243.

TOTAL TIME PER PLOT W MOVE

		No. 2017 Str. 2019 And May 1464 Will	The second secon			
			2			
CATEGORY (N = 10)	X	S_	S	N	ТАНИ	AHNW NW NIHTIW
		X			**************************************	and a contract of the contract
BETULA GLANDULOSA (SEC)	85.	5.7	320.1	10	2	
BETULA PAPYRIFERA (SEC)	1.	0.2	0.2	10	20	and the second s
SALIX PULCHRA (SEC)	24.	10.6	1129.0	10	80	
SALIX GLAUCA (SEC)	1.	0.2	0.3	10	31	•
SALIX LANATA (SEC)	1.	0.2	0.3	10	46	
SALIX ALAXENSIS (SEC)	1.	0.1	0.2	10	12	
The state of the s		organization control to a community	المسجيلة للعد السيادات التي السعيد	The second secon		والمراجع والمراجع والمراجع والمستوال والمستواجع والمستواجع والمستواجع والمستواجع والمستواء والمستواء
ALNUS SINUATA (SEC)	1.	0.2	0.4	10	26	
MOVE TIME BETWEEN PLOTS (SEC)	130.	20.1	4028.1	10	10	N

10

TABLE 852 MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (10M2)
OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR
SITE 18. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE
SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
TIME WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

	***	• • • • • • • • • • • • • • • • • • • •	2					
CATEGORY (N = 10)	X	S_	S	N	NHAT	WITHIN	MM N	ואוי
		X						
BETULA GLANDULOSA (SEC)	57.	3.6	128.2	10	2			
BETULA PAPYRIFERA (SEC)	1.	0 + 1	0.2	10	12			
SALIX PULCHRA (SEC)	44.	7.9	620.4	10	14	*		
SALIX GLAUCA (SEC)	6.	2.2	48.3	10	66			
SALIX LANATA (SEC)	17.	7 . 1	505.9	10	73			
SALIX ALAXENSIS (SEC)	3.	1.6	25.7	10	103	The second secon	and the second s	
ALNUS SINUATA (SEC)	1.	0.5	2.9	10	62			
MOVE TIME BETWEEN PLOTS (SEC)	68.	5.5	302.4	10	3			
TOTAL TIME PER PLOT W MOVE	197.	14.5	2101.8	10	,			
							\sim	

TABLE \$53 MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (10M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR

SITE 19. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE

TIME WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

			2			
CATEGORY (N = 10)	X	\$_ X	S	N	ТАНИ	WITHIN WAT WAL
	the continue of the sequent was the first the continue of the	• • • • • • • • • • • • • • • • • • •		approach com con con con con that the con con con the the	, 	and the second s
BETULA GLANDULOSA (SEC)	40.	6.2	381.6	10	10	
BETULA PAPYRIFERA (SEC)	1.	0.2	0.3	10	31	
SALIX PULCHRA (SEC)	15.	3.6	131.3	10	23	
SALIX GLAUCA (SEC)	1.	0.2	0.3	10	31	
SALIX LANATA (SEC)	1.	0.1	0.2	10	12	
SALIX ALAXENSIS (SEC)	O.	0.2	0.3	10	.69	
ALNUS SINUATA (SEC)	1,	0.2	0.3	10	31	
MOVE TIME BETWEEN PLOTS	(SEC) 130.	29.5	8687.6	10	22	N.
TOTAL TIME PER PLOT W MO	VE 188.	27+3	7428.7	10		N
						_

TABLE \$54 MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (10M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR WOODLAND BLACK SPRUCE TYPE. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE TIME WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

CATEGORY (N = 40)	x .	s_ x	s s		N	NHAT	WITHIN	WN	WNHAT	BWS N=	BN -	вина	
BETULA GLANDULOSA (SEC)	69.	4.4	761.5		40	7	337.67	36	3	5847.6	3 3	51	. %
BETULA PAPYRIFERA (SEC)	1.	0.1	0.2		40	15	0.19	36	15	0.1	7 3	13	
SALIX PULCHRA (SEC)	25.	4.7	893.9		40	60	817.32	36	55	1813.3		122	
SALIX GLAUCA (SEC)	2.	0.6	15.8	+	40	162	12.48	36	128	55.5	3 3	569	
SALIX LANATA (SEC)	5.	2.0	148.0		40	299	127.75	36	228	651.1	3 3	1158	
SALIX ALAXENSIS (SEC)	1.	0.4	7.4		40	195	6.61	36	174	17.1	7	3 451	
ALNUS SINUATA (SEC)	1.	0.2	1.1		40	57	1.11	36	57	1.2	0 :	5 61	
MOVE TIME BETWEEN PLOTS (SEC)	94.	10.5	4409.3		40	21	3303.42	36	16	17679.2	2 ;	3 82	
TOTAL TIME FER FLOT W MOVE	197.	10.9	4769.7		40	• •••	4209.05	36		11497.6	3	3	***************************************

TABLE 855 MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (10M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR

SITE 16. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE

TIME WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

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CATEGORY (N = 10)	X	8_	S	N	NHAT	WITHIN	ми мина
		X				mage transport agreement for a service of the servi	AND ARROW AND THE PERSON ARROWS AND ADMINISTRATION ADMINISTRATION AND ADMINISTRATION AND ADMINISTRATION ADMINISTRATION AND ADMINISTRATION AND ADMINISTRATION ADMINISTRATION ADMINISTRATION AND ADMINISTRATION AND ADMINISTRATION AND ADMINISTRATI
BETULA GLANDULOSA (SEC)	18.	6.0	365.3	10	46		
BETULA PAPYRIFERA (SEC)	7.	4.0	158.7	10	133		
SALIX FULCHRA (SEC)	8.	4.2	174.7	10	128		
SALIX GLAUCA (SEC)	5.	3.4	114.8	10	196		
SALIX LANATA (SEC)	1.	0.3	0.8	10	26	Control was a series of the series of the series of	The second secon
SALIX ALAXENSIS (SEC)	1.	0.2	0.6	10	1 8		
ALNUS SINUATA (SEC)	20.	8.1	651+6	10	69		
MOVE TIME BETWEEN PLOTS (SEC	119.	38.6	14700.4	10	44		Λ.
TOTAL TIME PER PLOT W MOVE	178.	48+8	23789.2	10	,		12
an the the site with this that that the total place age was you may prove may see that this was seen upon any seen	پينو پندو چون چينو سات سبت ماه کاره در پردو پهرو در						W

TABLE 856 MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (10M2)
OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR
SITE 17. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE
SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
TIME WITHIN 20% OF THE MEAN WITH BO% CONFIDENCE.

CATEGORY	(N = 10)	X	S_ X	\$ \$	N	NHAT	WITHIN	WN	WNI
BETULA GLAN	VDULOSA (SEC)	3.	1.1	12.2	10	69			
BETULA PAPY	YRIFERA (SEC)	7.	2.9	82.4	10	73			
SALIX PULCE	HRA (SEC)	0.	0.2	0.3	10	69	TO THE ROOM OF LAND TO A SECURE SERVICE CONTRACTOR	Control and Community	
SALIX GLAU	CA (SEC)	1.	0.2	0 + 2	10	20			
SALIX LANAT	TA (SEC)	1.	0.2	0.3	10	31			
SALIX ALAXE	ENSIS (SEC)	1.	0.2	0.4	10	26	What commend the same and the second to the		
ALNUS SINUA	ATA (SEC)	1.	0.2	0.2	10	. 20			
MOVE TIME E	BETWEEN PLOTS (SEC)	82.	11.4	1288+4	10				
TOTAL TIME	PER PLOT W MOVE	95.	12,4	1533.9	10		· · · · · · · · · · · · · · · · · · ·	λ	7
	ك كانته المال ا						•	Λ.	د

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TABLE 857 MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (10M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR OPEN MIXED SPRUCE-BIRCH TYPE. N IS NUMBER OF SAMPLING UNITS. ESTIMATED SAMPLE SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE TIME WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

CATEGORY (N = 20)	x	\$_ X	2 S	N	ТАНИ	WITHIN	ыN	WNHAT	BMS N=	2 BN	BNHAT	
BETULA GLANDULDSA (SEC)	10.	3.5	242.1	20	91	188.76	18	71	1201.2	5 1	451	8.
BETULA PAPYRIFERA (SEC)	7.	2.4	114.2	20	99	120.53	18	104	0.2	-	1	1, 4
SALIX PULCHRA (SEC)	4.	2.2	96.2	20	253	87.49	18	230	252.0	5 1	662	, ;
SALIX GLAUCA (SEC)	3.	1.7	59.1	20	309	57.50	18	301	88.2	0 1	461	
SALIX LANATA (SEC)	1.	0.2	0.6	20	32	0.52	18	30	1.2	5 1	71	41
SALIX ALAXENSIS (SEC)	1.	0.2	0.5	20	22	0.51	18	21	0.8	0 1	33	· 3 **
ALNUS SINUATA (SEC)	10.	4.5	403.7	20	159	325.90	18	127	1805.0	0 1	711	
MOVE TIME BETWEEN PLOTS (SEC)	101.	20.0	8020.9	20	33	8094.40	18	33	6697 · B	01	28	
TOTAL TIME PER PLOT W MOVE	137.	26.3	13829.9	20		12661.52	18		34861.2	5 1		

TABLE 858 MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (10M2)
OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR
SITE 8. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE
SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
TIME WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

CATEGORY (N = 11)	_ X	S	2 S	N	NHAT	WITHIN	ТАНИШ ИШ
	AND THE CONTRACT OF THE PARTY O	X	347		ENGLES CONTROL OF CONTROL OF THE CON	77 99 1 1 0 66 1 5	
BETULA GLANDULOSA (SEC)	47.7 n. sk	25.3	7054.6	11	133		
BETULA PAPYRIFERA (SEC)	24.	10.0	1092.8	11	77	P. STANDARD METERS IN THE STANDARD STANDARD	
SALIX PULCHRA (SEC)	11.	5.2	301.6	11	98		
SALIX GLAUCA (SEC)	1.	0.3	0.7	11	35		
SALIX LANATA (SEC)	2.	1.3	18.2	11	157	Compression of the control of the co	
SALIX ALAXENSIS (SEC)	99.	9.8	1055.0	11	5		•
ALNUS SINUATA (SEC)	55.	7.1	553.6	11	. 8		
MOVE TIME BETWEEN PLOTS (SEC)	101.	18.4	3732.9	11	15		λ
TOTAL TIME PER PLOT W MOVE	341.	45.1	22352.4	11			1,2
							6

as had because the second to t

TABLE 859 MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (10M2)
OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR
SITE 9. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE
SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
TIME WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

TOTAL TIME PER PLOT W MOVE

CATEGORY (N = 9)	x	S	S 5	N	ТАНИ	WITHIN	WИ	ШNI
BETULA GLANDULOSA (SEC)	13. 60 9 Kmi	12.1	1317.2	9	309	engage on the content of the Profession of		
BETULA PAPYRIFERA (SEC)	6 +	3.6	119.4	9	141			,
SALIX FULCHRA (SEC)	35.	6.1	333+0	9	12	many the contract of the second		** ** ** ***
SALIX GLAUCA (SEC)	24.	10.2	944.0	9	65			
SALIX LANATA (SEC)	6.	4 - 1	153.6	9	169			
SALIX ALAXENSIS (SEC)	27.	6.7	406.9	9	24			
ALNUS SINUATA (SEC)	9.	4.0	142.8	9	66			
-		w= .		- ·		••	22	٠ د
MOVE TIME BETWEEN PLOTS (SEC)	158.	30.3	8254.8	9	14		7	

TABLE B40 MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (10M2) OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR TALL WILLOW TYPE. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE TIME WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

CATEGORY (N = 20)	x		2 S	, N	пнат	WITHIN	พห	WNHAT	BMS N= 2	BN	BNHAT
BETULA GLANDULOSA (SEC)	32 · ^' >Km²	15.1	4560.0	20	187	4504.65	18	185	5556.81	1	228
BETULA PAFYRIFERA (SEC)	16.	6.0	712.6	20	115	660.14	18	107	1656.42	1	267
SALIX PULCHRA (SEC)	22.	4.7	441.5	20	39	315.57	18	28	2709.02	1	234
SALIX GLAUCA (SEC)	12.	5.2	542.2	20	168	419.95	18	131	2741.87	1	850 💛
SALIX LANATA (SEC)	4.	2.0	78.3	20	206	78.36	18	206	76.42	1	201
SALIX ALAXENSIS (SEC)	67.	10.2	2085.5	20	20	766.98	18	8	25819.44	1	240
ALNUS SINUATA (SEC)	35.	6.7	892.2	20	31	371.01	18	13	10272.78	1	354
MOVE TIME BETWEEN PLOTS (SEC)	127.	17.7	6283.2	20	16	5742.60	18	15	16014.22	1	41
TOTAL TIME PER PLOT W MOVE	313.	28.6	16404.8	20		16264.62	18		18928.72	1	

TABLE 841 MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (10M2)
OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR
SITE 12. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE
SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
TIME WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

	***	•	2	:			
CATEGORY (N = 10)	X	S X	S	N	NHAT	WITHIN	WM WI
BETULA GLANDULOSA (SEC)	73,	6.9	480.7	10	4		
BETULA PAPYRIFERA (SEC)	3.	1.2	15.3	10	80		
SALIX FULCHRA (SEC)	38.	7.5	555.3	10	16		
SALIX GLAUCA (SEC)	11.	3.3	111.8	10	41	and the second second second second	
SALIX LANATA (SEC)	27.	6 • 8	467.0	. 10	27	•	
SALIX ALAXENSIS (SEC)	4.	1.3	15.8	10	34		
ALNUS SINUATA (SEC)	1.	0,4	1.3	10	37		
MOVE TIME BETWEEN PLOTS (SEC)	61.	11.1	1240.4	10	14	ود المراجعة	en de la colonia

TOTAL TIME PER PLOT W MOVE 219. 15.1 2280.5 1

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TABLE 842 MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (10M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR

SITE 13. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE.

TIME WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

	**		2							
CATEGORY (N = 10)	X	S_	S	N	NHAT	WITHIN	WW	MNH		
		X			1 TH Ma ap 00 00 00 00 00					
BETULA GLANDULOSA (SEC)	46.	7.6	576.7	10	12					
BETULA PAPYRIFERA (SEC)	1.	0.2	0.3	10	17					
SALIX FULCHRA (SEC)	15.	3.8	148.2	10	27					
SALIX GLAUCA (SEC)	8+	2.7	72.1	10	48			•		
SALIX LANATA (SEC)	2.	0.6	3.8	10	62					
SALIX ALAXENSIS (SEC)	1.	0.2	0.5	10	39					
ALNUS SINUATA (SEC)	1.	0.2	0.3	10	46					
MOVE TIME BETWEEN PLOTS (SEC)	132.	26.4	6956.0	10	17	* ***	* * * * * * * * * * * * * * * * * * * *			
TOTAL TIME PER PLOT W MOVE	204.	33.1	10925.3	10						
بة فعن القط الفط عليه عليه الفط مصا الجب يعني ويء بعم وجن عبي عبد للفط الفط وبن عبد عبد عبد بعب عبد عبد عبد الفلا ف										

THE REPORT OF THE PARTY OF THE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
TIME WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

CATEGORY (N = 10) X S_ S N NHAT WITHIN WN WNHAT

TABLE B63 MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (10M2) OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR

SITE 4. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE

BETULA GLANDULOSA (SEC) 6.2 384.8 79. 10 BETULA PAPYRIFERA (SEC) 1. 0.2 0.2 10 SALIX PULCHRA (SEC) 84. 6.3 397.4 82 SALIX GLAUCA (SEC) 46. 4253.3 10 20.6 65" SALIX LANATA (SEC) 3. 1.1 13.2 SALIX ALAXENSIS (SEC) 0.7 33 5.4 10 ALNUS SINUATA (SEC) 1. 0.3 10 31 1.1 MOVE TIME BETWEEN PLOTS (SEC) 231. 113.1 127970.9 TOTAL TIME PER PLOT W MOVE 448.

TABLE 864 MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (10M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR

SITE 5. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE

TIME WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

			2			
CATEGORY (N = 10)	X	S_ X	S	N	ТАНИ	WITHIN WN WHAN
BETULA GLANDULOSA (SEC)	72.	6.9	481.4	10		in the second se
BETULA PAPYRIFERA (SEC)	2.	0.4	2+0	1.0	25	
SALIX PULCHRA (SEC)	48+	4+6	213.8	10	4	
SALIX GLAUCA (SEC)	2,	0.3	O+9	10	18	
SALIX LANATA (SEC)	1.	0.2	0.3	10	17	
SALIX ALAXENSIS (SEC)	1	0 + 1	0.1	10	6	
ALNUS SINUATA (SEC)	1.	0.1	0.2	10	10	and the second s
MOVE TIME BETWEEN PLOTS (SEC)	142.	30.7	9440.4	10	20	•
TOTAL TIME PER PLOT W MOVE	268.	27.9	7800.7	10		

TABLE \$65 MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (10M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR

SITE 6. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE

TIME WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

CATEGORY (N = 10)	_ v	c	2	N	ТАНИ	WITHIN WN	WNHAT	
CHILDON! (K - 107		X		- Marie and Company of the Company o				
BETULA GLANDULOSA (SEC)	94.	8.5	724.4	10	4			
BETULA PAPYRIFERA (SEC)	1.	0 . 4	1.3	10	55	THE RESIDENCE OF THE PARTY OF T		
SALIX PULCHRA (SEC)	52.	7.0	487.4	10	8			
SALIX GLAUCA (SEC)	8.	2.7	74.2	10	45			
SALIX LANATA (SEC)	5.	2.4	58.0	10	96	* · · · · · · · · · · · · · · · · · · ·		
SALIX ALAXENSIS (SEC)	1.	0.5	2.3	10	48			
ALNUS SINUATA (SEC)	2,	0.5	2.5	10	40			
MOVE TIME BETWEEN PLOTS (SEC)	131.	38.3	14640 + 1	10	35			
TOTAL TIME PER PLOT W MOVE	294.	39.6	15649.3	10				

TABLE 866 MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (10M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR

SITE 7. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE

TIME WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

CATEGORY	(N = 10)	x	S X	\$ \$	И	NHAT	WITHIN	WИ	ниш
BETULA GLAN	NDULOSA (SEC)	39.	7.2	518.5	10	15		1100/1000	
	YRIFERA (SEC)	1.	0.3	0.7	10	28			
SALIX FULCH		28.	2.6	68.7	10	4			
SALIX GLAUC		26.	10.6	1128.2	10	88			
SALIX LANAT	TA (SEC)	38.	5.3	280.4	10	8			
SALIX ALAXE	ENSIS (SEC)	1.	0.2	0 + 6	10	18			
ALNUS SINUA	ATA (SEC)	1.	0.1	0+1	10	6			
-			a saare saare ee saare ee				• · · · · · · · · · · · · · · · · · · ·		ست مصنی مست من و
MOVE TIME B	BETWEEN PLOTS (SEC)	251.	80.8	65326.4	10	43			
	PER PLOT W MOVE	384.	86.1	74190.7	10	5 2 1 100mg - 1 100mg - 2	** * *	λ	<u> </u>

TABLE 867 MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (10M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR OPEN LOW DWARF

BIRCH-WILLOW. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE TIME WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

CATEGORY (N = 60)	X	s_	9 9	N	ИНАТ	WITHIN	W N	WNHAT	BMS N= 6	BN	BNHAT	· · · · · · · · · · · · · · · · · · ·
BETULA GLANDULOSA (SEC)	67.	3.8	852.3	60	8	528.08	54	5	4354.35	5	. 40	
BETULA PAPYRIFERA (SEC)	1.	0.2	3.5	60	67	3.30	54	63	5.35	5	102	
SALIX PULCHRA (SEC)	44.	3.6	757.4	60	17	311.82	54	7	5569.12	5	118	
SALIX GLAUCA (SEC)	17.	4.3	1094.8	60	159	940.10	54	137	2765.20	5	402	
SALIX LANATA (SEC)	13.	2.4	339.0	80	··· 89	137.13	54	36	2518.75	5-	656	
SALIX ALAXENSIS (SEC)	2.	0.3	5 • 4	. 60	64	4.11	54	49	19.83	5	234	
ALNUS SINUATA (SEC)	1.	0.1	0.9	60	35	0.91	54	33	1.35	5	49	\$10
MOVE TIME BETWEEN PLOTS (SEC) 158.	25.4	38647.6		64	37595.70	54	62	50008.32	5	82	
TOTAL TIME PER PLOT W MOVE	303.	28.3	48165.6	60		44142.17	54		91618.75	5		

TABLE 848 MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (10M2) OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR SITE 3. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE TIME WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

	•		2			
CATEGORY (N = 9)	Χ	S_X	S	И	TAHN	WITHIN WN
Per ten fine fine and may take the take the fine fine fine the fine of the fine fine fine fine the fine fine fine fine fine fine fine fin	,, the see are see 100 to 100			# 10 April 100g (100g (100g (100g April 100g (100g April 100g (100g April 100g)		
BETULA GLANDULOSA (SEC)	13.	11.6	1216.8	· • • • • • • • • • • • • • • • • • • •	295	The second secon
BETULA PAPYRIFERA (SEC)	8 +	6 + 4	366.5	7	211	
SALIX PULCHRA (SEC)	131.	24.3	5300.5	9	13	•
SALIX GLAUCA (SEC)	8.	5.0	224.6	ф	148	CALLED FORE COMMISSION FOR CONTRACT MARKET
SALIX LANATA (SEC)	2 +	0.9	7.7	9	64	•
SALIX ALAXENSIS (SEC)	5.	3.5	111.3	9	-183	
ALNUS SINUATA (SEC)	1.	0.3	0+8	9	31	
MOVE TIME BETWEEN PLOTS (SEC)	251.	105.5	100167.3	9	65	$\widetilde{\omega}$
TOTAL TIME PER PLOT W MOVE	420.	93.3	78247 . 9	9		2

TABLE \$69 MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (10M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR OPEN LOW WILLOW TYPE, N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE TIME WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

CATEGORY (N = 9)	x	8_ X	s	N	NHAT	WITHIN	₩N	TAHMW	BMS N=	1 BN	BNHAT
BETULA GLANDULOSA (SEC)	13,	11.6	1216.8	9	295	1216.75	. 8	295	0.	Q	· 1
BETULA PAPYRIFERA (SEC)	8.	6.4	366.5	9	211	366.53	8	211	0.0	0 0	1
SALIX PULCHRA (SEC)	131.	24.3	5300.5	9	13	5300.50	8	13	0.	Φ	i
SALIX GLAUCA (SEC)	8.	5.0	224.6	, 9	148	224.61	8	148	0.0	0 0	i
SALIX LANATA (SEC)	2.	0.9	7.7	ን ዎ	64	7.69	8	64	0.0	0 0	1
BALIX ALAXENSIS (SEC)	5.	3.5	111.3	9	183	111.25	8	183	0.		1
ALNUS SINUATA (SEC)	1.	0.3	0 + 8	9	31	0.75	8	31	0.	0	i
10VE TIME BETWEEN PLOTS (SEC)	251.	105.5	100167.3	9	651	00167.25	8	65	0 +	٥	1
OTAL TIME PER PLOT W MOVE	420.	93.3	78267.9	9		78267.86	8		-0.0	0 0	
, 			~~~~~~~~~								2,5

APPENDIX C

APPENDIX C

DENSITY STATISTICS WITHOUT Betula glandulosa

Means, standard errors, variances, and estimated sample sizes for 4-m^2 plot size density estimates for selected shrub species. Betula glandulosa has been excluded from the analysis. Density estimates are presented by level IV vegetation type. The within estimated sample size (WHNAT) is the total number of 4-m^2 plots required to sample the density in the vegetation type within 20% of the mean with 67% confidence. These density plot are then evenly allocated to the number of sites sampled in the type.

TABLE CI. HEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (4M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR WOODLAND BLACKWHITE SPRUCE TYPE. N IS NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE
SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
DENSITY WITHIN 20% OF THE MEAN WITH 67% CONFIDENCE.

CATEGORY	(H =	20)	X	S_ X	2 S	N	NHAT	WITHIN	WN	ТАНИШ	BMS N= 2	ви	ТАНИЯ
BETULA PAPYR	IFERA		0.	Ε.0	1.3	, 20	501	1.25	18	501	1.25	1	501
SALIX PULCHR			7.	3.2	209.4	20	120	172.26	18	99	877.81	1.	501
SALIX GLAUCA			3,	0.9	15.7	20	52	16.53	18	- 55	1.25	1	S
TOTAL ALL SPI	ÉČTÉS		10.	3.6	252.8	20	69	218.09	18	59	877.81	T	237

TABLE C2 MEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (4M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR WOODLAND BLACK SPRUCE TYPE. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE DENSITY WITHIN 20% OF THE MEAN WITH 67% CONFIDENCE.

CATEGORY (R = 40)	Х	S_ X	2 8	N	ИНАТ	иінтій	.MM.	₩МНАТ"	BM5 N= 4	ви	ТАНИЯ Т	
SALIX PULCHRA	11.	3.4	474.2	40	102	473.16	36	102	450.16	3	97	
SALIX LANATA	10.	3.9	602.3	40	167	.351.67	36	98	3610.00	3	1001	
TOTAL ALL SPECIES	20.	5.3	1103.3	40	67	889.84	36	54	3664.32	3	223	

TABLE C3 MEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (4M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR OPEN MIXED

SPRUCE-RIRCH TYPE. N IS NUMBER OF SAMPLING UNITS. ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE

DENSITY WITHIN 20% OF THE MEAN WITH 67% CONFIDENCE.

CATEGORY (N = 20)	x	S_ X	- · · s · · · · · · · · · · · · · · · ·	 		п мнат	"WITHIN"	าพ	ТАНИ	виѕ	, N =2	BN	танив	
BETULA PAPYRIFERA	0.	0.3	1.3		20	501	1.25	18	501		1.25	1	501	
SALIX PULCHRA	1.	0.9	15.3	ş.	20	501	15.31	18	501		15.31	1.	501	17
ALNUS SINUATA	1,	0.5	5.0		20	501	5.00	18	501		5.00	1	50 i	
TOTAL ALL SPECIES	2.	1.0	17.9		20	189	19.62	18	188		25.31	1	240 7	1
هن هند من من جو جو جو جو من مند مند مند مند مند مند مند مند مند				74 AS BU SE SE SÉ					,		*.		H.	1

TABLE C4 HEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (4M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR TALL

WILLOW TYPE. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE

DENSITY WITHIN 20% OF THE MEAN WITH 67% CONFIDENCE.

CATEGORY (N = 20)	X	S_ X	5	И	тани	WIHTIW	ИИ	TAHMW	BMS N= 2	BH .	BNHAT
BCTULA PAPYRIFERA SALIX FULCHRA	2 · 12 ·	1.0	22.0 232.4	20 20	245 43	21.46 113.92	18 18	239 22	31.25 2365.31	- 1. 1	348 438
SALIX ALAXENSIS	40.	6.6	877.8	20	14	749.48	18	1.2	3187.81	1	49
ALNUS SÍNUATA TOTAL ALL SPECIES	7. 60.	2.6 7.5	130.3 1121.6	20 20	72 6	109.79	18 18	61 8	7500.00 1280.00	1	275

TABLE C5 MEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (4M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR OPEN LOW DWARF

BIRCH-WILLOW. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE

DENSITY WITHIN 20% OF THE MEAN WITH 67% CONFIDENCE.

*.	N-	i.	2								· · · · · · · · · · · · · · · · · · ·	
CATEGORY (N = 61)	X	S_	5	N	ТАНИ	MIHIN	MN	WHAT	BMS N= 6	BN	вина	T
		X ·	ah 84 -4 84 28 28 mm an 60 mm 60 mm an 84 84							j.		
BETULA PAPYRIFERA	0.	0.2	3.7	61	1526	3.68	55	1523	3.76	5	1558	3 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
SALIX FULCHRA	26.	4.7	1355.3	61	50	1107.66	55	41	4079.80	5	149	1
SALIX GLAUCA	2.	0.9	47.0	61	208	45.25	55	201	45,82	5	292	2.美數數
SALIX LAHATA	11.	3.4	697.9	61	147	484.13		102	3049+67	5	642	2.10
TOTAL ALL SPECIES	.40.	5.3	1682.0	61	27.	1401.16	55	23	4771.48	5	1176	

TABLE C6 MEANS, STANDARD ERRORS, AND VARIANCES FOR STEM COUNTS (4M2)
OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR OPEN LOW WILLOW
TYPE. M IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE
SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
DENSITY WITHIN 20% OF THE MEAN WITH 67% CONFIDENCE.

			2						,			1
CATEGORY (N = 9)	X	S	S	N	ТАНИ	WITHIN	พห	ТАНИ₩	BMS N= 1	BN	TAHME	-
100	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	X			e au hit his all apr au ter air i'i'							֓֞֞֜֞֓֓֓֓֓֓֓֓֓֓֓֓֓֡֓֓֓֡֓֓֡֓֓֡֓֡֡֡֡֡
SALIX PULCHRA	116.	31.0	8653.3	9	16	8653.30	8	16	0.00	0	1	1
SALIX ALAXENSIS	6.	4.5	179.9	9	111	179.86	8	111	-(),()()	0	0 -	
TOTAL ALL SPECIES	123.	30.4	8324,1	9	1.4	8324.13	8	14	0.00	0	1	
								- 9				

APPENDIX D

APPENDIX D

TIME TO ESTIMATE DENSITY WITHOUT Betula glandulosa

Means, standard errors, and variances for 4-m² plot size density time estimates. Time to count stems of each selected shrub species and move time between plots is presented by level IV vegetation type. <u>Betula glandulosa</u> has been excluded from the analysis. Estimated sample sizes for times are not used.

TABLE Dt Means, Standard Errors, and Variances for times (4M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR WOODLAND BLACKWHITE SPRUCE TYPE. N IS NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE
SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
TIME WITHIN 20% OF THE MEAN WITH 47% CONFIDENCE.

and the second s				2										7.0
CATEGORY ()	l = 20)	×	S_	ຣື	И	тани	WITHIN	ผม	₩МНАТ	BMS N≔	2 B	N	ТАНИВ	72
gar par die die der der der der der ann de der de gebe			X											L
BETULA PAPYRIFE	RA (SEC)	1.	0.5	4.7	20	53	4.81	18	58	2.4	5	1	30	ş.
SALIX PULCHRA (SEC)	16,	4.4	380.6	20	36	222.50	18	21	3225.8	0	1.	300	•
É SÁLIX GLAUCA (S	EC)	5.	1.7	55.5	20	55	53.94	18	53	84.0	5	1	83	113
SALIX LANATA (9	SEC)	2.	0.6	5.6	20	51	5.84	18	46	20.0	0	1.	155	11. 21.1
SALIX ALAXENSIS	(SEC)	1.	0.4	2.9	20	43	2.83	18	42	3.2	0	1.	48	
ALNUS SINUATA (SEC)	1.	0.1	0.3	20	17	0.34	1.83	13	-0.0	Q.	1	0	
MOVE TIME BETWE	EN PLOTS (SEC)	102.	18.4	6778.3	20	17	7124.00	18	18	520.2	0	1	2	
TOTAL TIME PER	PLOT W MOVE	129.	20.6	8505.5	20	13	8850.79	18	14	2289.8	0.0	1	4	- 23
							-	•						ा सम्बद्धाः

TABLE 02 MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (4M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR WOODLAND BLACK SPRUCE TYPE. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE TIME WITHIN 20% OF THE MEAN WITH 67% CONFIDENCE.

	_		2										
CATEGORY (N = 40)	Х	S	ន	И	ТАНИ	иінтій	иH	WNHAT	BMS N=	4	BN	ТАНИЯ	
	FT TO ME A	X		 	. YN 40 4h ac								
BETULA PAPYRIFERA (SEC)	1.	0.2	1.7	40	58	1.73	36	0.6	. 0.	97	3	34	
SALIX FULCHRA (SEC)	13,	2.2	201.6	40	30	138,42	36	25	600.	33	3	89	
SALIX GLAUCA (SEC)	1	0 + 2	1.6	40	27 ″	1.04	36	18	8.	49	3	142	1
SALIX LANATA (SEC)	9.	3.4	466.6	40	141	268.32	36	82	2845.	40	3	860	345
SALIX ALAXENSIS (SEC)	1.	0.3	2.8	40	44	1.94	36	30	13.	43	3	207.	- 15h
ALNUS SINUATA (SEC)	1.	0.2	1.2	40	36	1.24	36	37	0.	69	3	21	
MOVE TIME BETWEEN PLOTS (SEC)	77.	9.0	3216.9	40	14	2360.83	36	10	13490.	03	3	57	
TOTAL TIME PER PLOT W HOVE	104.	10.3	4216.8	40	10	2890.73	36	7	20129.	17	3	47	

TABLE **93** MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (4M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR OPEN MIXED SPRUCE-DIRCH TYPE. N IS NUMBER OF SAMPLING UNITS. ESTIMATED SAMPLE SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE TIME WITHIN 20% OF THE MEAN WITH 67% CONFIDENCE.

CATEGORY (N = 20)	X	3_ X	3	,	ТАНИ	WIHIN	มห	WNHAT	BMS	N≈ 2	BN	винат	
BETULA PAPYRIFORA (SEC)	1.,	0.4	2.9	20	55	2.89	18	55		2.45	1	47.	
SALIX PULCHRA (SEC)	3.	1.4	39.6	20	153	37.16	18	143		84.05	1.	324	
SALIX GLAUCA (SEC)	1.	0.1	() , 4	20	11	0.35	18	1.1		·····································	1	13	3.
SALIX LANATA (SEC)	1, ,	0.2	0 • చ	20	28	0.58	18	26.		1.25	1	56	3.
SALIX ALAXENSIS (SEC)	1.	0.2	0.5	. 20	28	0,56	1.8	29		0.20	1.	11	6.
ALNUS SINUATA (SEC)	2.	1.1	22.9	20	188	22.98	18	188		22705	· · · 1	180	
MOVE TIME BETWEEN PLOTS (SE	C) 73.	8.9	1578.2	20	8	1665,25	13	8		11.25	1	1.	- 1
TOTAL TIME PER PLOT W HOVE	81.	8.5	1455.6	20	6	1519.71	18	ઇ		320.00	1	2	\perp

TABLE DY MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (4M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR TALL

WILLOW TYPE. N IS THE NUMBER OF BAMPLING UNITS. THE ESTIMATED SAMPLE SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE TIME WITHIN 20% OF THE HEAN WITH 67% CONFIDENCE.

CATEGORY (N = 20)	X	S_	2 S		N	ТАНИ	MITHIN	WN	ТАНИШ	BMS N= 2	2 BN	ТАНИЯ
		X .								- Annual Marian committee and Marian		
BETULA PAPYRIFERA (SEC)	5.	2.2	95.7		20	8.6	80.47	18	72	349.80	1	330
SACIX PULCHRA (SEC)	19.	5 + 1	512.0		20	38	234.31	18	17	5511.20	1	399
SALIX GLAUCA (SEC)	3.	0.9	16.0		20	45	11.99	18	34	88.20	1	245
BALIX LANATA (SEC)	1.	0.2	0.6		20	10	0.67	18	10	0.20	1.	3
SALIX ALAXENSIS (SEC)	65.	12.5	3142+6		20	19	2073.92	18	13	22378.05	1	131
ALNUS SINUATA (SEC)	21.	5.2	539.9	2	20	31	274+68	18	16	5313.80	1	302
en e												
NOVE TIME BETWEEN PLOTS (SEC)	127.	11.2	2521.4		20	.4	2406.45	18	4	4590.45	1	8
OTAL TIME PER PLOT W MOVE	242.	18.5	6856.2		20	3	6788.20	18	3	8080.21	1	4
												•

TABLE 05 MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (4M2)

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR OPEN LOW DWARF BIRCH-WILLOW. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE TIME WITHIN 20% OF THE MEAN WITH 67% CONFIDENCE.

ATEGORY" (N = 61)	x	S_ X	ຣົ	И	ТАНИ	иіній	ผห	TAHKW	BMS N≈ 6	BH	ТАНИВ
ETULA PAPYRIFERA (SEC)	2.	0.5	16.2	61	70	16.27	55	90	15.67	5	87
ALIX PULCHRA (SEC)	34.	3.5	756.0	61	1.7	577.91	55	13	2715,21	5	58
ALIX GLAUCA (SEC)	8.	1.3	101.4	61	41	92.14	55	37	203.85	5	81
ALIX LAHATA (SEC)	10.	2.3	323.6	51	82	176,33	55	45	1944.13	- 5	468
ALIX ALAXENSIS (SEC)	1.	0.2	2.8	61	53	. 2.70	55	50	4.39	5	81
LNUS SINUATA (SEC)	1.	0.1	0,7	61	23	0.72	55	24	0.27	5	9
OVE TIME BETWEEN PLOTS (SEC)	148.	26.2	41955.5	61	48	43235.92	55	50	27870,67	5	32
OTAL TIME PER PLOT W MOVE	205.	26.3	42100.5	61	26	43338.22	55	26	28485.35	5	17

TABLE D6 MEANS, STANDARD ERRORS, AND VARIANCES FOR TIMES (4M2)

OF SELECTED SHRUD SPECIES INDIVIDUALLY AND COMBINED FOR OPEN LOW WILLOW TYPE. N IS THE NUMBER OF SAMPLING UNITS. THE ESTIMATED SAMPLE SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE TIME WITHIN 20% OF THE MEAN WITH 67% CONFIDENCE.

CÁTEGORY (N = 9)	X	S _X	2 S	N	NHAT	NIHIIW	иш	₩МНАТ	BMS N= 1	BN	ВИНАТ
PETULA PAPYRIFERA (SEC) SALIX PULCHRA (SEC)	1.	0.2	0.4	9	8	0.44	8	8	-0.00		
BHCIX PULCHNH (SEC)	102.	22.6	4604.6	y	12	4604.61	8	12	0+00		
								······································			
SALIX GLAUCA (SEC)	22.	17.2	2662.5	9	134	2442.50	8	134	0.	0	1
SALIX LANATA (SEC)	1.	0.4	1.5	9	38	1.50	8	38	0,	0	1
SALIX ALAXENSIS (SEC)	10.	4.5	178.4	9	43	178.44	8	431	0-400	0	0 64
ALNUS SINUATA (SEC)	1. •	0 . 4	1.8	. 9	22	1.78	8	22	-0.00	0	0
MOVE TIME BETWEEN PLOTS (SEC)	260.	129.1	150057.0		561	50057700 🗀	(3)	56	0.	0	
TOTAL TIME PER PLOT W HOVE	398.	148.3	197896.9	9	321	97896.86	8	- 32	-0.00	0	0 75

APPENDIX E

APPENDIX E DENSITY STATISTICS, 4m² PLOTS, FROM 1982

Means, standard errors, variances, and estimated sample sizes for 4-m^2 plot size density estimates for selected shrub species. Modified from data collected in 1982 by Steigers et al. (1983). Betula glandulosa and other shrubs not sampled in the pilot study are excluded. Density estimates are presented by level IV vegetation type. The within estimated sample size (WNHAT) is the total number of 4-m^2 plots required to sample the density in the vegetation type within 20% of the mean with 67% confidence. These density plots are then evenly allocated to the number of sites sampled in the type.

							, <u></u>				134
X	S_	2 S	N	тани	WITHIN	พพ	UNHAT	BMS N= 7	' BN	BNIIAT	
	X							<u></u>			
9.	1.4	220.2	105	76	100.47	98	35	2175.24	6	745	(30)
5. 5.	1.2 1.6	159.9 260.5	105 105	184 297	126.63 202.20	98 98	146 230				
2	0.9	79.9	105	456	77.81	98	444				-15
20.	2.4	604.0	105	38	452.32	98	29 -	3080.83	6	193	A:
	7. 5. 5. 2.	X S ₋ X 9. 1.4 5. 1.2 5. 1.6 2. 0.9	5. 1.2 159.9 5. 1.6 260.5 2. 0.9 79.9	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	2 X S ₋ S N NHAT X -9, 1.4 220.2 105 76 5, 1.2 159.9 105 184 5, 1.6 260.5 105 297 2, 0.9 79.9 105 456	X S_ S N NHAT WITHIN X X 9. 1.4 220.2 105 76 100.47 5. 1.2 157.9 105 184 126.63 5. 1.6 260.5 105 297 202.20 2. 0.9 79.9 105 456 77.81	X S_ S N NHAT WITHIN WN X X 9. 1.4 220.2 105 74 100.47 98 5. 1.2 159.9 105 184 126.63 98 5. 1.6 260.5 105 297 202.20 98 2. 0.9 79.9 105 456 77.81 98 20. 2.4 604.0 105 38 452.32 98	X S_ S N NHAT WITHIN WN WNHAT Y. 1.4 220.2 105 76 100.47 98 35 5. 1.2 159.9 105 184 126.63 98 146 5. 1.6 260.5 105 297 202.20 98 230 2. 0.9 79.9 105 456 77.81 98 444 20. 2.4 604.0 105 38 452.32 98 29	X S_ S N NHAT WITHIN WN WNHAT BMS N= 7 Y 9. 1.4 220.2 105 76 100.47 98 35 21.75.24 5. 1.2 159.9 105 184 126.63 98 146 702.64 5. 1.6 260.5 105 297 202.20 98 230 1213.39 2. 0.9 79.9 105 456 77.81 98 444 114.70 20. 2.4 604.0 105 38 452.32 98 29 3080.83	X S_ S N NHAT WITHIN WN WNHAT BMS N= 7 BN N NHAT WITHIN WN WNHAT BMS N= 7 BN 19. 1.4 220.2 105 76 100.47 98 35 2175.24 6 5. 1.2 159.9 105 184 126.63 98 146 702.64 6 5. 1.6 260.5 105 297 202.20 98 230 1213.39 6 2. 0.9 79.9 105 456 77.81 98 444 114.70 6 20. 2.4 604.0 105 38 452.32 98 29 3080.83 6	X S_ S N NHAT WITHIN WN WNHAT BMS N= 7 BN BNHAT Y 9. 1.4 220.2 105 76 100.47 98 35 2175.24 6 745 5. 1.2 159.9 105 184 126.63 98 146 702.64 6 807 5. 1.6 260.5 105 297 202.20 98 230 1213.39 6 1379 2. 0.9 79.9 105 456 77.81 98 444 114.70 6 654 20. 2.4 604.0 105 38 452.32 98 29 3080.83 6 193

Table E2	
11270 DPEN BLACK SPRUCE	
CATEGORY (N = 150) \overline{X} S S N NHAT WITHIN WN WNHAT B	MS N= 10 BN ABNHAT
SALIX PULCHRA STEMS/10 M2 12. 1.6 365.2 150 67 269.10 140 49 SALIX GLAUCA STEMS/10 M2 1. 0.6 63.0 150 843 51.33 140 688	1859.83 9 338 243.96 9 3266
SALIX LANATA STEMS/10 M2 0.3 17.3 150 2702 16,86 140 2634 17.3 150 571 144.57 140 509 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10	24.00 9.43751 439.54 9.41548 3820.19 9.366

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able E3										
3210 DWARF BIRCH	20 Hd 30 Hd No. 40 de de bo, co. 80 .			THE PERSON AND CO. THE PERSON NO. 1972 B	***********					
CATEGORY (N = 257)	X	c.	2	N	NHAT	uithin (TAHNW NL	ุ่มหรุ่ง≈ 18	BN	винат
		 X				yv II 111.111		ACTIVE IN A SE		A-131/11
ALIX PULCHRA STEMS/10 M2	4,	1.0	246,0	257	348	206.62 23	39 270	1101.10	17	1437
SALIX GLAUCA STEMS/10 M2 FOTAL ALL STEMS/10 M2	1 . 5 .	0 . 5 1 . 2	57.6 365.5	257 257	1837		39 1796 39 244	76.56 1709.84	17 17	2443 1544

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Because Because

APPENDIX F

APPENDIX F GRAPHS OF DRY WEIGHT VS OCULAR ESTIMATES

Plots of dry weight against ocular estimates for each observer for each shrub species to determine requirements for mathematical transformations.

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OBSERVER #1
  12.0
                                        B
  10.5
                                                  В
  9.00
                     В
  6.00
                       B
                         B
  4,50
                В
               B B
              B
  1.50
            B B
          -BB B ----
          BBB B
  0.00
       27.5
       0.00
                                         20.0
                                                  25.0
                                                      30.0
    40
  =-.7838 --
                                - ETWT-
   MEAN
         ST.DEV.
                  REGRESSION LINE
                                   RES.MS.
   7-7350--8-0033--X= 1.8133*Y+-1.2433--25.349
         3.4595 Y= .33882*X+ .95921
                                   4.7366
VARIABLE---11-ETWT------VS. VARIABLE---22 DWT-----GROUP=BEGL ---, SYMBOL=B
```

VARIABLE	-11-ETWT VS. VARIABLE-	-21 WWT	GROUP=BEGL	, SYMBOL=	259
PAGE 7	BMDP6D OCULAR EST. REGRES	BSION			20 /
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MEAN X 10.65 Y 5.357	60 8.5170 X= 1.5422*Y+	2,3875 28,5	22	Sapr	
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28,200	22.095	X= 1.41	35*Y+ 10.44	6 68+2	52			
12.560	0 14.789	Y= .633	27*X-5.2981	30.5	77			
	-1-1	USUA	RIABLE22-	DWT	GROUP=	5ALA	YMBOL=L	

BMDBAD OCHLAR EST. REGRESSION

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PAGE
        BMDP6D OCULAR EST. REGRESSION
         TABLE
  60.0
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  45.0 ---
D
  37.5
   30.0 +
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   7.50
        AA AA
       12.50 37.50 62.50 87.50 112.5 137.5 162.5
              25.00 50.00 75.00 100.0 125.0 150.0
                                                                175
CDR≈ .9849
                                  ETWT
  MEAN —— ST.DEV. REGRESSION LINE —— RES.MS. 45.688 58.962 X= 2.6782*Y-1.9843 121.52
                                  16.434
           21.683 Y= .36220*X+ 1.2520
VARIABLE 11 ETWT
                VS. VARIABLE 22 DWT GROUP=SAAL
                                                    , SYMBOL=A
        BMDP&D OCULAR EST. REGRESSION
```

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· TABLE F7.
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            -3.750 ----5.250 ---6.750 --- 8.250 ---9.750 --- 11.25 -- 12-75
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                                7.500
                                        9.000
                                                10.50
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    2
= M
                                ETWT
COR= 1.000
                                RES.MS.
   MEAN
         ST.DEV.
                  REGRESSION LINE
  -7.7500--7.4246-X=-1.3125*Y+-1.0562--0.0000
                Y= .76190*X-.80476
                                  0.0000
   5.1000
          5.6569
GROUP=ALSI ---- SYMBOL=I
```

PAGE

1 6

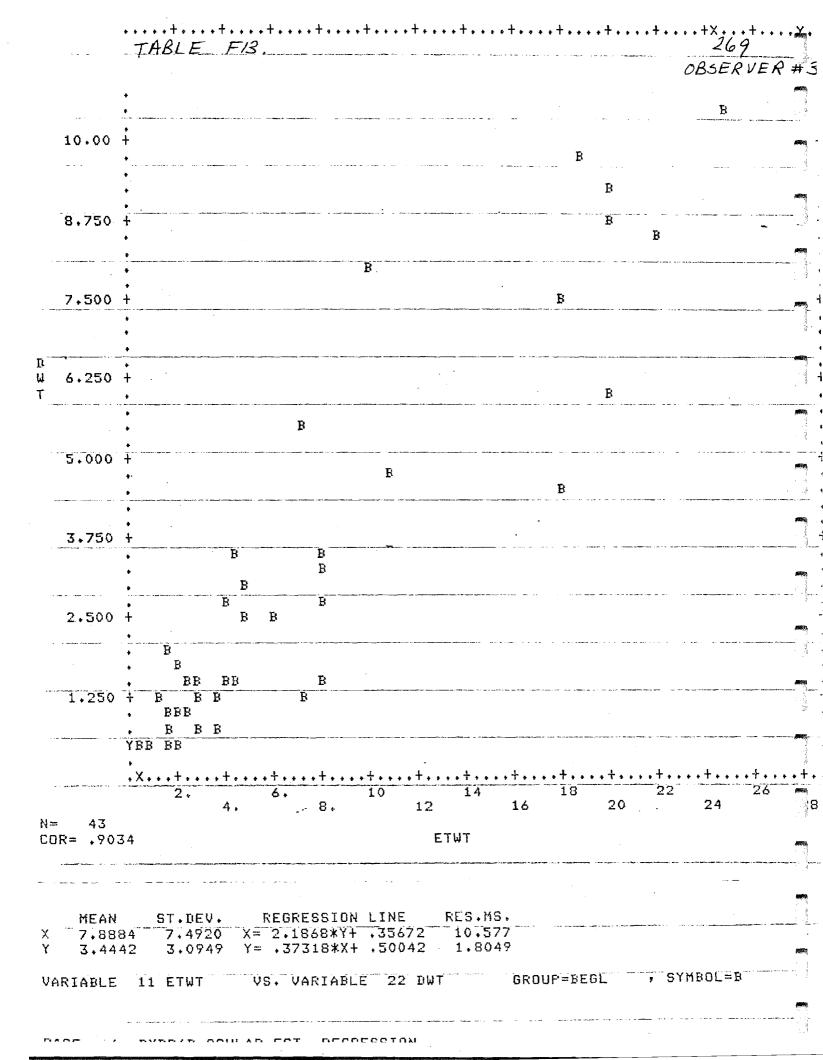
RMTPAT OCULAR EST. REGRESSION

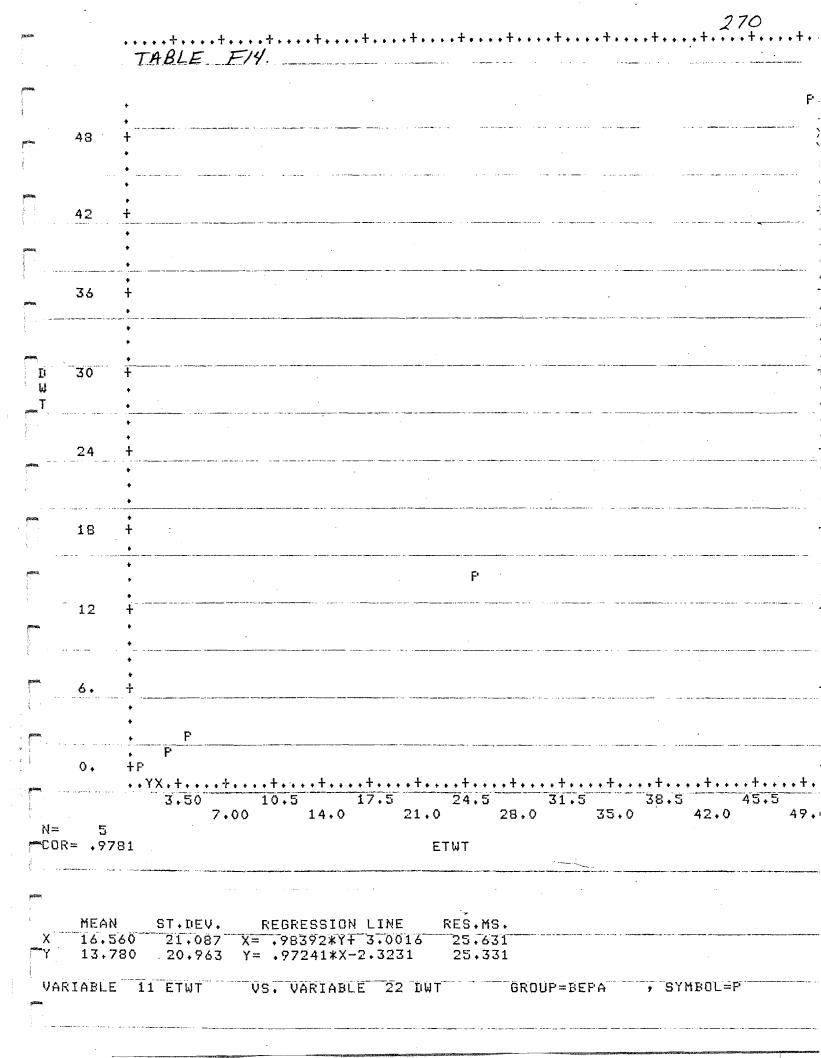
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5 BMDP6D DCULAR EST, REGRESSION
AGE
                                                    264
      · TABLE F8.
                                                  OBSERVER # 2
  14.00 +
  10.50 +
                               B
  8,750 +
  7.000 +
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  5.250
  3.500 +
            B B
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              BB
  1.750 +
        BBBB
         BBB B
         BB
  0.000 Y
      .50 12.5 17.5 22.5 27.5
10.0 15.0 20.0 25.0
           5.00
                                                   30.0
N= 33
COR= .9439
                              ETWT
                REGRESSION LINE RES.MS.
  MEAN
        ST.DEV.
         6.7377 X= 2.0064*Y+ .01856
3.1697 Y= .44406*X+ .29373
                               5,1091
                               1.1307
VARIABLE 11 ETWT
                VS. VARIABLE 22 DWT
                                   GROUP=BEGL
                                               , SYMBOL=B
```

```
PAGE 13 BMDP4D OCULAR EST. REGRESSION
       .+...+...+...+.
       · TABLE F9.
 60.0
  52.5
 45.0
 37.5
  30.0
  22.5
  15.0
  7.50
        17.50 52.50 87.50 122.5 157.5 192.5 2 0.000 35.00 70.00 105.0 140.0 175.0 210.0
     5
N≖
                                  ETWT
COR= .9986
         ST.DEV. REGRESSION LINE RES.MS.
   MEAN
   70.900 92.499
                                  32.312
                X= 4.1035*Y-7.1487
          22.509 \text{ Y} = .24300 \text{ X} + 1.7910 \quad 1.9135
   19.020
                                       GROUP=BEFA
                                                    , SYMBOL=P
                 VS. VARIABLE 22 DWT
VARIABLE 11 ETWT
```

```
PAGE
     9 BMDP6D OCULAR EST. REGRESSION
       · TABLE FII.
  28.0
  24.5
  21.0
  17.5
  14.0
10.5
  7.00
                              G
                GG
                    G
  3.50
                G
                        12
N=
   15
                                ETWT
COR= .9385
                REGRESSION LINE RES.MS.
   MEAN
         ST.DEV.
         10.356
                X = 1.2955 * Y + 2.4301
                                 13.767
          7.5019 Y= .67987*X-.79309
                                  7.2246
   7.2067
                                      GROUP≃SAGL
                                                  , SYMBOL=G
                 VS. VARIABLE 22 DWT
VARIABLE 11 ETWT
```

```
PAGE 11 BMDP6D OCULAR EST. REGRESSION
     ·TABLE F12.
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  14
  12
  10
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  8.
                  L
         L
      50 7.50 12.5 17.5 22.5 27.5 32.5
5.00 10.0 15.0 20.0 25.0 30.0 35.0
                          ETWT.
OR= .9280
              REGRESSION LINE
                           RES.MS.
       ST.DEV.
        7.7953 X= 1.5286*Y+ .42789
  4.8533 4.7327 Y= .56343*X+ .43227 3.3466
HARIABLE 11 ETWT
             VS. VARIABLE 22 DWT
                                GROUP=SALA
                                         SYMBOL=L
```





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BMDP6D OCULAR EST. REGRESSION
PAGE
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         TABLE F15.
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                     12
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                                           32
                          16
                                   24
N= 45
COR= .8329
                                   ETWT
         ST.DEV. REGRESSION LINE
                                   RES.MS.
   MEAN
                  X= 1.6838*Yf 2.0888 35.585
          10.657
           5.2719 Y= .41205*X+ .70365
   5.1089
                                    8.7082
VARIABLE 11 ETWT VS. VARIABLE 22 DWT GROUP=SAPU , SYMBOL=S
      8 BMDP6D OCULAR EST. REGRESSION
PAGE
```

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BMDP&D OCULAR EST. REGRESSION
PAGE
        TABLE F16.
    24
    21
    18
    12
                        G
                           G
    9.
               G
    6.
                  G
    3.
                GG
           GG
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    0.
         31.5
                           17.5
                                   24.5
                                                    38.5
                   10.5
                               21.0
                                       28.0
               7.00
                       14.0
                                                                 49.0
 N=
     20
COR= .9346
                                   ETWT
                    REGRESSION LINE
                                   RES.MS.
          ST.DEV.
                                    27.038
                  X = 2.2349*Y+ .00135
           14.232
                  Y= .39086*X+ .82783
                                    4.7287
    6.5500
           5.9517
                   VS. VARIABLE 22 DWT
                                         GROUP=SAGL
VARIABLE 11 ETWT
                                                     , SYMBOL=G
```

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PAGE 11 BMDP6D OCULAR EST. REGRESSION
       ·TABLE FIT.
  10.00 +
 8.750
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                           L L
  2.500 +
       1.50 4.50 7.50 10.5 13.5 16.5
3.00 6.00 9.00 12.0 15.0 18.
             3.00
N= 14
COR= .9410
                               ETWT
                 REGRESSION LINE RES.MS.
         ST.DEV.
   MEAN
         6.4136 X= 1.7398*Y+ 1.1422 5.1036
                                1.4930
          3.4689 Y= .50896*X-.12895
VARIABLE 11 ETWT VS. VARIABLE 22 DWT GROUP=SALA , SYMBOL=L
```

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274
  48
  42
  36
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  18
                     A
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  12
          Α
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      75.
                                      135
                                              165
             30.
                    60.
                                   120
                                           150
                                                   180
                                                          210
   14
COR= .8442
                              ETWT
                REGRESSION LINE
        ST.DEV.
                              RES.MS.
        59.681 X= 3.3295*Y-1.2888
15.132 Y= .21403*X+ 5.3935
                               1103.9
                                71,286
RIABLE 11 ETWT VS. VARIABLE 22 DWT GROUP=SAAL , SYMBOL=A
```

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PAGE 15 BMDP4D OCULAR EST. REGRESSION
       ..+...+...+...+...
       ·TABLE F19.
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                12
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N=
   10
COR= .9738
                               ETUT
                 REGRESSION LINE
                               RES.MS.
   MEAN
         ST.DEV.
   21.000 11.785 X= 1.0364*Y+ 6.3250 8.0880
Χ
                                7.1405
          11.073 Y= .91496*X-5.0542
VARIABLE 11 ETWT VS. VARIABLE 22 DWT GROUP=ALSI , SYMBOL=I
```

```
TABLE F20.
   20.0
                                                                          OBSERVER #
   17.5
   15.0
                                       \mathbf{B}
   12.5
   10.0
   7.50
                        BB
                               В
                                       B
                               B
   5.00
                    В
                        B
                   \mathbf{B}
   2.50
                BB
              BB
             BB B
             BB
   0.00
     27
COR= .9570
                                             ETWT
                                              RES.MS.
    MEAN
             ST. DEV.
                         REGRESSION LINE
             12.284 \quad X = 2.6512 * Y - .91108
                                               13.193
              4.4342 Y= .34547*X+ .65134 1.7191
VARIABLE
         11 ETWT
                        VS. VARIABLE 22 DWT
                                                      GROUP=BEGL
                                                                      , SYMBOL=B
PAGE 6 BMDP&D OCULAR EST. REGRESSION
```

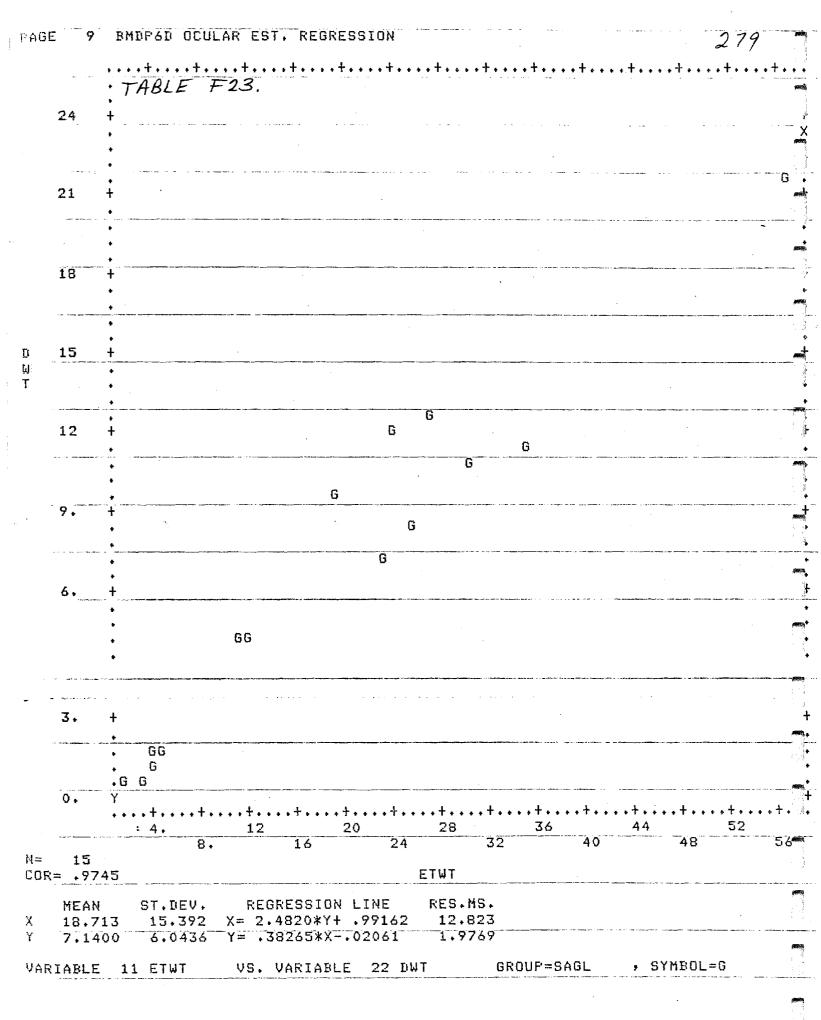
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PAGE
   13 BMDF6D OCULAR EST. REGRESSION
       TABLE F21.
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   28
   24
   20
   12
                        F
N≔⊸
COR= .9782
                                 ETWT
                   REGRESSION LINE
                                  RES.MS.
         ST.BEV.
   MEAN
   20.589
          24.132
                 X = 2.3610 \times Y - .81713
                                  28,680
   9.0667 9.9986
                Y = .40531 * X + .72189 4.9235
VARIABLE 11 ETWT
                 VS. VARIABLE 22 DWT
                                        GROUP=BEPA
```

```
7 BMDP6D OCULAR EST. REGRESSION
PAGE
       · TABLE F22.
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   35
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   20
   10
   5.
             SSS SS
           SS · S S
          SSS
   0.

    2.5
    17.5
    22.5
    27.5

    15.0
    20.0
    25.0
    30.0

    26
COR= .8884
          ST.DEV.
                   REGRESSION LINE
                                  RES.MS.
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12 BMDP6D OCULAR EST. REGRESSION

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VARIABLE 11 ETWT VS. VARIABLE 22 DWT GROUP SAAL . SYMBOL = A

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BAGE 15 BHDP6D OCULAR EST. REGRESSION

BMDP6D OCULAR EST. REGRESSION

APPENDIX G

APPENDIX G GRAPHS OF DRY WEIGHT VS SHRUB DIMENSIONS

Graphs of dry weight against each independent variable for <u>Betula glandulosa</u>, <u>Salix pulchra</u>, <u>Salix glauca</u>, and <u>Salix lanata</u> to determine requirements for mathematical transformations.

VARIABLE 6 BBIA VS. VARIABLE 22 DWT GROUP=WWBS , SYMBOL=W VARIABLE 6 BDIA VS. VARIABLE 22 DWT GROUP=WBS , SYMBOL=B UARIABLE 4 BBIA US HABIABLE 22 DWT GROUP=DM . SYMBOL=M

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VS. VARIABLE

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VS. VARIABLE

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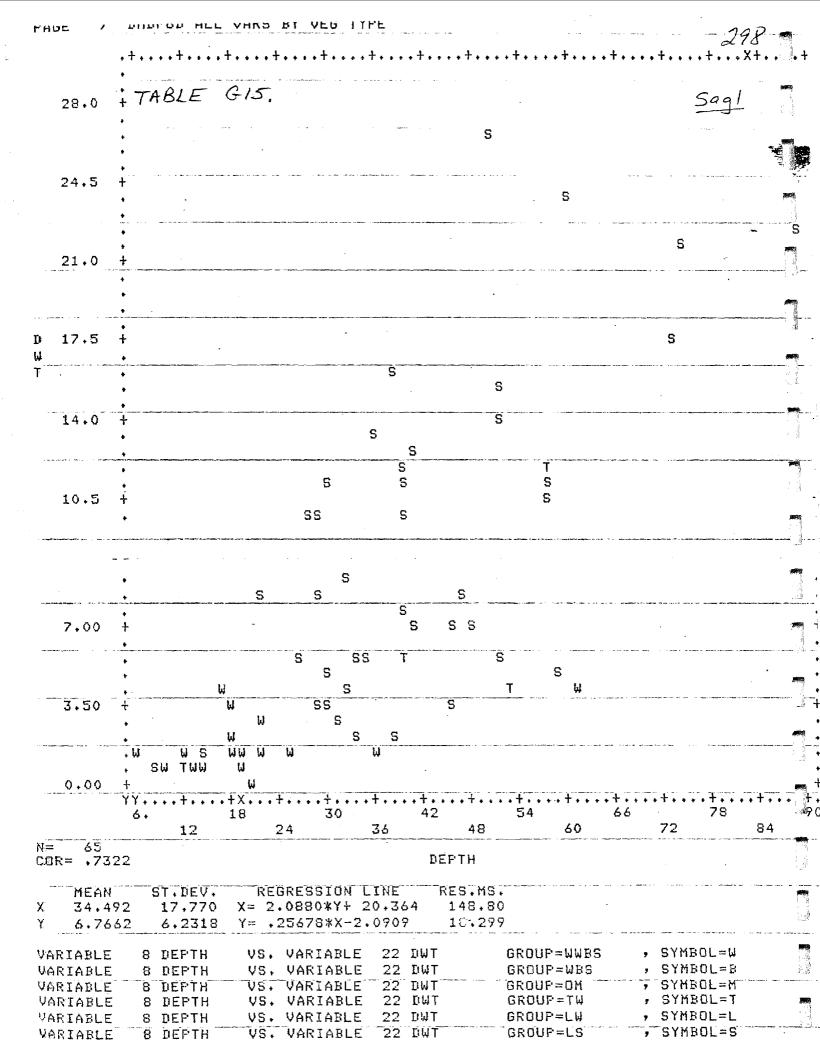
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#### APPENDIX H

# APPENDIX H CLIPPED PLOT STATISTICS

Means, standard errors, variances, and estimated sample sizes for dry weight current annual growth of shrub species. Twigs and leaves were clipped from  $1\text{-m}^2$  plots. Dry weight estimates are presented by site, with sites grouped into level IV vegetation types. The within estimated sample size (WNHAT) is the number of  $1\text{-m}^2$  plots required to be clipped in the vegetation type within 20% of the mean with 80% confidence. These clipped plots are then evenly allocated to the number of sites sampled in the type.

TABLE #U MEANS, STANDARD ERRORS, AND VARIANCES FOR DRY WEIGHTS
OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR
SITE 10. N IS THE NUMBER OF SAMPLING UNITS (1M2). ESTIMATED SAMPLE
SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
CURRENT ANNUAL GROWTH WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

CATEGORY	(N =	10)	· <b>X</b>	5	S	N	NHAT	WITHIN	WN	иин
				X				•		
BETULA GLANDI	JLOSA	TWIGS ¢G/10M2	16.	3.2	101.9	10	1.7			
 BETULA GLAND	ULOSA	LEAVES (G/10M	112.	17.1	2913.5	10	10			
SALIX PULCHRA	A TWIC	3S (G/10M2)	2.	1.9	35.3	10	274	•		
 SALIX FULCHR	A LEA	VES (G/10M2)	6.	5.0	253.2	1.0	279			•
SALIX GLAUCA	TWIGS	3 (G/10M2)	1.	0+6	3.6	10	410	and the second s		,
SALIX GLAUCA	LEAVE	ES (G/10M2)	2.	1.6	25.6	10	410	•		
 TOTAL TWIGS	AND LE	EAVES 46/10M2	139.	24.9	6189.2	10	1.4	•		
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TABLE #4 MEANS, STANDARD ERRORS, AND VARIANCES FOR DRY WEIGHTS

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR

SITE 11. N IS THE NUMBER OF SAMPLING UNITS (1M2). ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE CURRENT ANNUAL GROWTH WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

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CATEGORY	(Ŋ ≔ 6)	X	S_	S	И	NHAT	WITHIN	WN WNHA
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	ULOSA TWIGS(G/1		11.3	770.4	۵	చేచే ్		
BETULA GLAND	ULOSA LEAVES(G/	10M 233.	69.9	29283.2	6	23		
SALIX GLAUCA	TWIGS (G/10M2)	3.	3 . 3	88.7	ద	246	•	
SALIX GLAUCA	LEAVES (G/10M2	6.	6.0	216.0	6.	.246		•
TOTAL TWIGS	AND LEAVES (G/1	OM2 273.	88.0	46492.3	6	26	and the second analysis and an exercise and an	The second section of the sect
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TABLE #3 MEANS, STANDARD ERRORS, AND VARIANCES FOR DRY WEIGHTS

OF SELECTED SHRUR SPECIES INDIVIDUALLY AND COMBINED FOR WOODLAND BLACK-WHITE SPRUCE TYPE. N IS NUMBER OF SAMPLING UNITS (1M2). ESTIMATED SAMPLE SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE CURRENT ANNUAL GROWTH WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

CATEGORY (N = 16)	<b>χ</b>	S_X	S .		N	ТАНИ	WITHIN	WN	WNHAT	EMS 1	<b>!</b> ≒ 2	BN	ВИНАТ	۱ نگ
BETULA GLANDULOSA TWIGS(G/10M2	22.	4 + 8	373.4	· *	16	33	340.64	1 4	30	8	332.54	1	73	
BETULA GLANDULOSA LEAVES(G/10M	157.	30.8	15181.5	- *	16	26	12331726	1.4	21	557	185,40	1	<del>92</del> -	46
SALIX PULCHRA TWIGS (G/10M2)	1.	11.2	22.5		16	447	22.72	14	451		19.84	1	394	-4
SALIX PULCHRA LEAVES (G/10M2)	4.	3.2	161.2		16	455	162.78	14	459	1	139.54	1 .	394	17
SALIX GLAUCA TWIGS (6/10M2)	2.	1.3	26.3		1.6	408	26.12	14	406 .		28.02	1	435	
SALIX GLAUCA LEAVES (G/10M2)	.3.	2.4	92.2		16	358	93.60	14	363		72,60	1	282	
TOTAL TWIGS AND LEAVES (G/10M2	189.	38.5	23755.9		16	28	20583.13	14	24	681	75.11	1	79	

TABLE #4. MEANS, STANDARD ERRORS, AND VARIANCES FOR DRY WEIGHTS
OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR
SITE 14. N IS THE NUMBER OF SAMPLING UNITS (1M2). ESTIMATED SAMPLE
SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
CURRENT ANNUAL GROWTH WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

CATEGORY (N = 8)	X	8_ X	2 8	N	NHAT	WITHIN	WN	16
BETULA GLANDULOSA TWIGS(G/10M2 BETULA GLANDULOSA LEAVES(G/10M	41. 172.	14.0 61.2	1570.0 29919.4	8	39 42			
SALIX PULCHRA TWIGS (6/10M2)	5.		180.5	8	328	e company of the second		,
SALIX FULCHRA LEAVES (G/10M2) TOTAL TWIGS AND LEAVES (G/10M2)	224.	6+6 78+2	351.1 48880.5	ម 8	328 40			

TABLE #5. MEANS, STANDARD ERRORS, AND VARIANCES FOR DRY WEIGHTS
OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR
SITE 15. N IS THE NUMBER OF SAMPLING UNITS (1M2). ESTIMATED SAMPLE
SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
CURRENT ANNUAL GROWTH WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

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CATEGORY	(N =	9)	X	S	ន		И	ТАНИ	WITHIN WN	WN
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BETULA GLAN	DUL OSA	TWIGS(G/1	OM2 52.	10.4	971.4		c)	15		
BETULA GLAN				57.4	29655.0		9	32		
SALIX FULCH			· ·	15.9	2285.9	1	9	82		
SALIX FULCH				26.4	6265.0		. 9	64		
TOTAL TWIGS	AND LE	AVES (G/1	)M2 345.	59.8	32156.7		9	- 12		

TABLE #4 MEANS, STANDARD ERRORS, AND VARIANCES FOR DRY WEIGHTS

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR

SITE 18. N IS THE NUMBER OF SAMPLING UNITS (1M2). ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE

CURRENT ANNUAL GROWTH WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

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	CATEGORY	(N =	10)	X	S_ X	8	N ,	инат ,	WITHIN WN WNI
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	BETULA GLAN	DULOSA	TWIGS(G/10M2	4.	1.4	18.8	10	<u>,</u> 46	
	BETULA GLAN	DULOSA	LEAVES (G/10M	66.	23.8	5680.9	10	54	
	SALIX PULCH	RA TWI	3S (G/10M2)	2.	0.8	848	10	87	
-	SALIX PULCH	RA LEA	VES (G/10M2)	10.	4.6	210.5	10	92	the state of the s
	SALIX LANAT			0.	0.2	0 + 4	10	410	
	SALIX LANAT	A LEAVI	ES (G/10M2)	1.	0.7	5.4	10	113	
_	TOTAL TWIGS	AND LE	AVES (6/10M2	83.	26.1	6819.0	10	41	and the section of the contractions and the section of the section
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TABLE #7 MEANS, STANDARD ERRORS, AND VARIANCES FOR DRY WEIGHTS
OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR
SITE 19. N IS THE NUMBER OF SAMPLING UNITS (1M2). ESTIMATED SAMPLE
SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
CURRENT ANNUAL GROWTH WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

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 CATEGORY	(N =	10)	X	S	S	И	тани	מע אוודוש	ГАНИО
 BETULA GLA	NDULOSA	TWIGS(G/10M2	7.	4+0	162.2	10	129	and the second s	
BETULA GLA	NDULOSA	LEAVES(G/10M	76.	28.9	8340.9	10	60		
SALIX PULCE	HRA TWIC	65 (G/10M2)	6 +	3.7"	133.4	10	181	•	
SALIX PULC	HRA LEAV	/ES (G/10M2)	20.	9.9	989.1	10	102	The control of the co	
TOTAL TWIG	S AND LE	EAVES (G/10M2	108.	36.2	13139.5	10	46		
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TABLE #8. MEANS, STANDARD ERRORS, AND VARIANCES FOR DRY WEIGHTS

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR WOODLAND BLACK
SPRUCE TYPE. N IS THE NUMBER OF SAMPLING UNITS (1M2). ESTIMATED SAMPLE
SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
CURRENT ANNUAL GROWTH WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

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CATEGORY	(N = 37)	X	S	8	И	TAHK	WITHIN	МИ	TAHNW	EMS N= 4	BN	BNHAT
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BETULA GLA	NDULOSA TWIGS(G/10M2	24.	5,2	1,008.9	 37	70	417.88	33	43	5310.38	3	365 😘
BETULA GLA	NDULOSA LEAVES(G/10M	123.	22.8	19292.0	37	53	17359.77	33	48	40546.90	3	111
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									· · · · · · · · · · · · · · · · · · ·	- ++++++++++++++++++++++++++++++++++++	——	18684
SALIX PULC	HRA TWIGS (G/10M2)	11.	4.5	749.6	37	243	84.026	33	205	2058.11	٠ 3	667
SALIX PULC	HRA LEAVES (G/10M2)	25.	7.9	2281.2	37	151	1920.42	33	127	6249.31	3	412
SALIX LANA	TA TWIGS (G/10M2)	٥.	0.1	0.1	37	1516	0.11	33	1530	0.10	3	1364
SALIX LANA	TA LEAVES (G/10M2)	0.	0.2	1.7	37	499	1.47	33	420	4.77	3	1364 灣語
TOTAL TWIG	S AND LEAVES (G/10H2	184.	29.8	32888.8	 37	4.0	23607.38	33	29	134784.67	3	164
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TABLE #9 HEANS, STANDARD ERRORS, AND VARIANCES FOR DRY WEIGHTS
OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR
SITE 16. N IS THE NUMBER OF SAMPLING UNITS (1M2). ESTIMATED SAMPLE
SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
CURRENT ANNUAL GROWTH WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

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BETULA GLANDULOSA TWIGS(G/10M2	5.	2.7	72.8	1.0	125		
BETULÁ GLANDULOSĂ LEAVES(G/10M)	29.	18.5	3418.9	10	1.67	the control of the co	
ALNUS SINUATA TWIGS (G/10M2)	10.	<u>გ.</u> გ	476.0	1.0	184		
ALNUS SINUATA LEAVES (G/10M2)	62.	42.7	18273.6	10	193		
TOTAL TWIGS AND LEAVES (G/10M2	107.	49.3	24256.0	1.0	88	artina - Islama a mantan minum islama islama islama antan managara - Afrika islamba is	The second section is

SITE 17. N IS THE NUMBER OF SAMPLING UNITS (1M2). ESTIMATED SAMPLE
SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
CURRENT ANNUAL GROWTH WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

CATEGORY (N = 10) X S S N NHAT WITHIN WN W

TABLE HIP MEANS, STANDARD ERRORS, AND VARIANCES FOR DRY WEIGHTS OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR

CATEGORY (N = 10) X S. S N NHAT WITHIN WN W

3/2

TABLE HU MEANS, STANDARD ERRORS, AND VARIANCES FOR DRY WEIGHTS
OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR OPEN MIXED
SPRUCE-BIRCH TYPE, N IS NUMBER OF SAMPLING UNITS (1M2). ESTIMATED SAMPLE
SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
CURRENT ANNUAL GROWTH WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

				many as a contract of the cont							
CATEGORY (N = 20)	x	s_ x	2 \$	и	ТАНИ	WITHIN	WN	WNHAT	BMS N= 2	BN	BNHAT
							-		,		<b>被数</b>
BETULA GLANDULOSA TWIGS(G/10M2	2.	1.4	40.8	20	279	36.38	18	249	120.05	1	820
BETULA GLANDULOSA LEAVES(G/10H	15.	9.6	1840.8	20	359	1709.44	18	334	4205.00	1	820
ALNUS SINUATA TWIGS (G/10M2)	5	3.6	253.4	20	392	238.01	18	368	530.45	I	820
ALNUS SINUATA LEAVES (G/10M2)	31.	22.0	9680.6	20	408	9134,80	18	385	19468.BO	1	B20
TOTAL TWIGS AND LEAVES (G/10M2	53.	26.9	14480.1	20	209	12128.02	18	175	56817.80	1	820
											3 40

TABLE #12 MEANS, STANDARD ERRORS, AND VARIANCES FOR DRY WEIGHTS

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR

SITE 8. N IS THE NUMBER OF SAMPLING UNITS (1M2). ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE

CURRENT ANNUAL GROWTH WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

1989.

TOTAL TWIGS AND LEAVES (G/10M2

WITHIN NHAT MM WNHA ()) == CATEGORY 407.3 183 10. 7.6 BETULA PAPYRIFERA TWIGS (G/10M 26. 186 20.9 3054.7 BETULA PAPYRIFERA LEAVES (G/10 17 690, 165.7 192243.6 SALIX ALAXENSIS TWIGS (G/10M2) 198.4 275589.0 SALIX ALAXENSIS LEAVES (G/10M2 895. 136, 62.3 ALNUS SINUATA TWIGS (G/10M2) 27198.0 65 110.3 85111.1 ALNUS SINUATA LEAVES (G/10M2) 232.

464.1 1508023.8

TABLE #13 MEANS, STANDARD ERRORS, AND VARIANCES FOR DRY WEIGHTS
OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR
SITE 9. N IS THE NUMBER OF SAMPLING UNITS (1M2). ESTIMATED SAMPLE
SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
CURRENT ANNUAL GROWTH WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

CATEGORY	(N =	6)	x	\$_ X	2 S	N	ТАНИ	WITHIN	MM	ниш
SALIX PULCH	RA TWIGS	G/10M2	) 7	6.6	260.2	<u>^</u> 6	208	•		
SALIX PULCH	RA LEAVE	ES (G/10M:	2) 21	17.7	1871.5	. 6	180			
SALIX ALAXE	NSIS TWI	GS (G/10)	12) 48	27.0	4368.8	6	85			
SALIX ALAXE	NSIS LEA	AVES (G/1	OM2 149	84 + 2	42549.1	6	80			
TOTAL TWIGS	AND LEA	VES (G/10	DM2 222	103.8	64697.1	. 6	54			
							B -4 45 45 -4			

TABLE #14 HEARS, STANDARD ERRORS, AND VARIANCES FOR DRY WEIGHTS
OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR TALL

The side of the same was the

WILLOW TYPE. N IS THE NUMBER OF SAMPLING UNITS (1M2). ESTIMATED SAMPLE SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE CURRENT ANNUAL GROWTH WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

CATEGOR	RY (N =	13)	x	SX	s s	en en err	N		тани	WITHIN	WN	TAHNW	виз	И=	2	BN	TAHNE
BETULA	PARYRIFERA	TWIGS (G/10		4,2	228.3		13		353	222.16	11	.343		295.	98	. 1	457
BETULA	PAPYRIFERA	LEAVES (G/1	14.	11.5	1709.3	*	13		358	1666.18	11	349		2184.	00	1	457 🎋
SALIX F	PÜLCHRA TWI	GS (G/10M2)	3.	3.1	122.2		13	-	458	118.26	11	443		165.	74	i	622
SALIX R	PULCHRA LEA	VES (G/10M2)	10.	8.3	894.8		13		403	850.67	1.1	382		1379	90	1	622 🎆
SALIX (	ALAXENSIS T	WIGS (6/10M2	2) 393.	127.0	209750.5		13		561	06845.97	11	29	134	1700.	33	1	356
SALIX 6	ALAXENSIS L	EAVES (G/10)	12 550.	153.3	305555.4		13		421	69661.78	11	23	180	0385.	73	1	244
ALNUS S	SINUATA TWI	6S (6/10M2)	73,	37.8	18578.7		13		142	14835.27	11	114	5	9756.	31	1	457
ALNUS 9	SINUATA LEA	VES (6/16M2)	125.	66.2	57028.8		13		150	46424.26	11	122	17	3678,	84	. 1	457
TOTAL	म्मान्य ५४५ ।	6.90 E. (B.V.L.)	12 1174.	353.1	1621132.3		13		498	51966,20	11	26	***	****	**	1	300

TABLE HS MEANS, STANDARD ERRORS, AND VARIANCES FOR DRY WEIGHTS
OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR
SITE 12. N IS THE NUMBER OF SAMPLING UNITS (1M2). ESTIMATED SAMPLE
SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
CURRENT ANNUAL GROWTH WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

	A CONTROL OF THE CONT		***************************************	· · · · · · · · · · · · · · · · · · ·	•			Marines and Marines and the Marines Page 1
CATEGORY	(N = 4)	X	5_	ຣື	И	TAHN	WITHIN	TAHNW NW
			X .					· · · · · · · · · · · · · · · · · · ·
BETULA GLAN	DULOSA TWIGS(G/10M	2 66.	59.5	14140.3	4	132		
BETULA GLAN	DULOSA LEAVES(G/10	M 273.	183.8	135201.0	4	75		
TSALIX FULCH	RA TWIGS (G/10M2)	18.	4.9	94.9	4	1.2	A PARAMETER STATE OF THE PARAMETER STATE OF THE STATE OF	The same and the same of the s
SALIX PULCH	IRA LEAVES (G/10M2)	93.	32.6,	4248+9	4	21		
SALIX GLAUC	A TWIGS (G/10M2)	1	0.5	1.0	4	164		
∷ SALIX GLAUC	A LEAVES (G/10M2)	2.	2.3	20.3	4	164	the second of th	
SALIX LANAT	A TWIGS (G/10M2)	13.	13.3	702.3	4	164		
BALIX LAWAT	A LEAVES (G/10M2)	37.	37.0	5476.0	4	164		
TOTAL TWIGS	AND LEAVES (G/10M	2 503.	213.2	181783.6	4	30		$\omega$
		,						$\sim$

TABLE HLG MEANS, STANDARD ERRORS, AND VARIANCES FOR DRY WEIGHTS
OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR
SITE 13. N IS THE NUMBER OF SAMPLING UNITS (1M2). ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE CURRENT ANNUAL GROWTH WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

			100	, a	2			
CATEGORY	(N =	9)	Χ	5_	S	Й	ТАНИ	AHMW WW WIHTIW
		•	<b></b>	X				
BETULA GLAM	NDULOSA	TWIGS(G/10M2	33.	10.2	939.7	9	36	A COMMITTED A COMMITTED AND A
BETULA GLAI	NDULOSA	LEAVES(G/10M	207.	48.6	21276.4	9	21	
BETULA PAP	YRIFERA	TWIGS (G/10M	23.	23+2	4853+4	۶.	~ 369	į
BETULA PAP'	YRIFERA	LEAVES (G/10	35.	35.1	11095.1	9	369	
SALIX PULC	HRA TWIC	SS (G/10M2)	∙ 3•	2.2	43.9	9	174	
SALIX PULC	HRA LEAV	/ES (G/10M2)	22.	14.7	1956.7	9	163	,
SALIX GLAUC	CA TWIGS	G (G/10M2)	7.	7.0	441.0	9.	369	er en
SALIX GLAUG	CA LEAVE	S (6/10M2)	22.	21.9	4335.8	9	353	
TOTAL TWIGS	S AND LE	AVES (G/10M2	353.	98.8	87933.6	9	29	

TABLE HA7 MEANS, STANDARD ERRORS, AND VARIANCES FOR DRY WEIGHTS
OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR
SITE 4. N IS THE NUMBER OF SAMPLING UNITS (1M2). ESTIMATED SAMPLE
SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
CURRENT ANNUAL GROWTH WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

CATEGORY (N = 7)	$\bar{x}$	S_	2 8	И	ТАНИ	HAM MM MIHIM
		X				
BETULA GLANDULOSA TWIGS(G/10M2	24.	7.9	434.9	7	32	
BETULA GLANDULOSA LEAVES (G/10M	95.	2549	4712+7	7	22	•
SALIX FULCHRA TWIGS (G/10M2)	37.	13.8	1335.5	<b>"7</b> .	41	
SALIX FULCHRA LEAVES (G/10M2)	217.	73.0	37352.1	. 7	33	
TOTAL TWIGS AND LEAVES (G/10M2	373.	69.6	33924.2	7	1.1	
· 저 하루 역부 교육 교육 6/7 No. 20. 100 May 100 MP 제품 보통 보는 100 No. 1			#A An He !!! !			· (x)

TABLE #18 MEANS, STANDARD ERRORS, AND VARIANCES FOR DRY WEIGHTS

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR

SITE 5. N IS THE NUMBER OF SAMPLING UNITS (1M2). ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE

CURRENT ANNUAL GROWTH WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

CATEGORY	(1) =	4)	· · · · · · · · · · · · · · · · · · ·	s_x	S S	N ,	ТАНИ	WITHIN	таниш иш
DETULA GLAN	DULOSA	TWIGS(G/10M2	17.	8.3	278.3	4	39		
		LEAVES(G/10M	189.	87.6	30848.9	4	36		
SALIX PULCH	RA TWIG	S (G/10M2)	21.	8 + 8	308.7	4	29		
SALIX PULCH	RA LEAV	ES (G/10M2)	152.	61.9	15351.0	4	28		
TOTAL TUTOS	AND LE	AVES (G/10M2	379.	79.8	25495.0	4	. 8		W
		all the tree tree type good staff tool like on the week staff do			do their dies deep gave are tree den som con min was		Major plays Major Major Paralle Major		S.

TABLE #19 MEANS, STANDARD ERRORS, AND VARIANCES FOR DRY WEIGHTS
OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR
SITE 6. N IS THE NUMBER OF SAMPLING UNITS (1M2). ESTIMATED SAMPLE
SIZE (THAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
CURRENT ANNUAL GROWTH WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

		1 11 11 11 11 11 11 11 11 11 11 11 11 1	tite or to the second for		2	21 × 22 × 1		AND A THE PERSON OF THE PERSON	
CATEGORY	(N ==	3)	X	S_	s	И	ТАНИ	WITHIN	ниш иш
			-	X	om hay 228 188 189 pm too too one con the may 470		•		res destriction of the
BETULA GLAN	ADULOSA	TWIGS(G/10M2	55.	39.4	4663.0	3	64		
BETULA GLAN	ADULOSA	LEAVES(G/10M	276.	162/8	79521.3	3	43		
SALIX PULCE	RA TWIG	S (G/10M2)	50.	41.7	5206.3	3	85		
SALIX FULCE	TRA LEAV	ES (G/10M2)	35.	18.7	1051.0	3	"3 &		
TOTAL TWIGS	AND LE	AVES (G/10M2	416.	149.1	66652.0	3	16		

Sol

TABLE #70 HEANS, STANDARD ERRORS, AND VARIANCES FOR DRY WEIGHTS
OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR OPEN LOW DWARF
BIRCH-WILLOW. N IS THE NUMBER OF SAMPLING UNITS (1M2). ESTIMATED SAMPLE
SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
CURRENT ANNUAL GROWTH WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

All Address of the Ad			2	1									
CATEGORY (N = 27)	X	S	S		И	ТАНИ	WITHIN	WN	TAHMW	BMS N=	5	BN	BNHAT 🥞
		ж. х		remarkant to a									187
BETULA GLANDULOSA TWIGS(G/10M2	36.	10.0	2692.0		 27	87	2850.41	22	92	1820	84	4	59
BETULA GLANDULOSA LEAVES(G/10M	193.	37.2	37326.6		27	42	38894.51	22	43	28703	.34	` 4	32
BETULA PAPYRIFERA TWIGS (G/10M	8.	7.7	1617.8		27	1106	1764.89	22	1207	808	91	4	553
BETULA PAPYRIFERA LEAVES (G/10	12.	11.7	3698.4		27	1106	4034.59	22	1207	1849	19	4	553 Y
SALIX PULCHRA TWIGS (G/10M2)	22.	6.2	1045.2		27	89	908.54	22	77	1796	78	4	152
SALIX PULCHRA LEAVES (G/10M2)	104.	26.0	18239.8		27	70	13666.73	22	52	43391	.81	A 4	165
SALIX GLAUCA TWIGS (G/10M2)	2.	2.3	146.8		27	1039	160.50	22	1135	. 71	38	4	505
SALIX GLAUCA LEAVES (G/10M2)	8.	7.3	1448.2	1"	27 -	972	1579.41	22	1060	726	. 28	4	488
SALIX LANATA TWIGS (8/10M2)	2.	2.0	104.0		27	1103	95.76	22	1018	149	55	4	1590
SALIX LANATA LEAVES (G/10H2)	5.	5.5	811.3		27	1106	746.73	22	1018	1166	. 19	4	1590
TOTAL TWIGS AND LEAVES (G/10H2	391.	49.6	66551.0		27	18	75553.00	22	21	17040	00	4	U 5 5
										•			
	,	i i kifta a k		Altha i	i ,	•						15. 18.8	
		A MARIE OF THE STATE OF THE STA	Mr.			er en er	A to the same		·	1.1	火煮		

TABLE #2/ MEANS, STANDARD ERRORS, AND VARIANCES FOR DRY WEIGHTS
OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR
SITE 3. N IS THE NUMBER OF SAMPLING UNITS (1M2). ESTIMATED SAMPLE
SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
CURRENT ANNUAL GROWTH WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE.

CATEGORY	(N = 6)	X	S_		И	тани	WITHIN	МИ	WNHA
	S. I promite a management of the contract of t		X						
	RA TWIGS (G/10M2)	217.	56.3	19034.2	6	17			
SALIX PULCH	RA LEAVES (G/10M2)	655.	117.6	83025.1	6	8	A CA CAMPAGNA CONTRACTOR OF THE CONTRACTOR OF TH		
TOTAL TWIGS	AND LEAVES (G/10M2	872.	170.4	174207.1	6	10			

w L TABLE #22 HEARS, STANDARD ERRORS, AND VARIANCES FOR DRY WEIGHTS OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR OPEN LOW WILLOW TYPE. N IS THE NUMBER OF SAMPLING UNITS (1M2). ESTIMATED SAMPLE SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE CURRENT ANNUAL GROWTH WITHIN 20% OF THE MEAN WITH 80% CONFIDENCE. "NU NIHTIU" CATEGORY · (i) 0.00 17 217. 56.3 19034.2 17 19034.17 SALIX FULCHRA TWIGS (6/10M2) 5 B ٥. 8 83025,10 SALIX FULCHRA LEAVES (G/10M2) 655. 117.6 83025.1 0.02 10 10174207.07 174207.1 TOTAL TWIGS AND LEAVES (G/10M2

#### APPENDIX I

## APPENDIX I CLIPPED PLOT STATISTICS WITHOUT Betula glandulosa

Means, standard errors, variances, and estimated sample sizes for dry weight current annual twig growth of selected shrub species. Betula glandulosa and leaves of other shrub species have been excluded from the analysis. Twigs were clipped from  $1-m^2$  plots. Dry weight estimates are presented by level IV vegetation type. The within estimated sample size (WNHAT) is the number of  $1-m^2$  plots required to be clipped in the vegetation type within 20% of the mean with 67% confidence. These clipped plots are then evenly allocated to the number of sites sampled in the type.

TABLE **I. MEANS, STANDARD ERRORS, AND VARIANCES FOR DRY WEIGHTS

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR WOODLAND BLACKWHITE SPRUCE TYPE, N IS NUMBER OF SAMPLING UNITS (1M2). ESTIMATED SAMPLE
SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
CAG WITHIN 20% OF THE MEAN WITH 67% CONFIDENCE.

CATEGORY	(N = 16)	<b>&gt;</b>	<b>(</b>	S_ X	S		И	ТАНИ	MIHHIM	MM	TAHNW	BMS	N= 2	BN	BNHAT
SALIX PULC	RA TWIGS (G/	/10M2)	1.	1.2	22.5	<b></b>	16	273	22.72	14	275		19.84	1	241
	A TWIGS (G/	– ,	2.	1.3	26.3	1.	16	249	26.12	14	248		28.02	<u> </u>	266
TOTAL TWIGS	ALL SPECIES	6 (G/10M	3.	1.7	46.2		16	124	49.45	14	132		0.70	1	· 2

TABLE F? HEANS, STANDARD ERRORS, AND VARIANCES FOR DRY WEIGHTS
OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR WOODLAND BLACK
SPRUCE TYPE. N IS THE NUMBER OF SAMPLING UNITS (1M2). ESTIMATED SAMPLE
SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
CAG WITHIN 20% OF THE MEAN WITH 67% CONFIDENCE.

								~						·Y
CATEGORY	(N = 37)	x	s_X	s	И	МНАТ	WITHIN	หห	ТАНИШ	внѕ	N=	4	BN	ТАНИВ
	A TWIGS (6/10H2		4.5	749.6	 37	149	630.68	33	125	2	2058.1		3	408
	TWIGS (G/10M2) ALT SPECIES (G/	10M	0 · 1 4 · 5	0.1 748.5	 <b>3</b> 7 <b>3</b> 7	926 147	0.11 630.57	33	934	2	0 • 1 20 45,78		3	833 401
					 				••					

TABLE 13 MEANS, STANDARD ERRORS, AND VARIANCES FOR DRY WEIGHTS

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR OPEN MIXED

SPRUCE-BIRCH TYPE, N IS NUMBER OF SAMPLING UNITS (1M2), ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE

CAG WITHIN 20% OF THE MEAN WITH 67% CONFIDENCE.

CATEGORY (N = 20)	X	S_ X	2 S	N	мнат	WITHIN	WN	WNHAT	BHS	N= :	2 BN	ВИНАТ
ALNUS SINUATA TWIGS (G/10M2) TOTAL TWIGS ALL SPECIES (G/10M	5. 5.	3.6	253.4 253.4	2 <b>0</b> 20	239 239	238.01	18 18	225 225		530 · 45		501 501
TOTAL TWIGG ALL GREATES (6710A						230+VI	16			- :	, .	501

TABLE 34 MEANS, STANDARD ERRORS, AND VARIANCES FOR DRY WEIGHTS

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR TALL
WILLOW TYPE. N IS THE NUMBER OF SAMPLING UNITS (1M2). ESTIMATED SAMPLE
SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
CAG WITHIN 20% OF THE MEAN WITH 67% CONFIDENCE.

CATEGORY	(N =	13)		X	5_ X	2 S	:	N 	NHAT	WIHIN	WИ	WNHAT ·	BMS N=	2	BN	ТАНИЯ	$\bigg]$
BETULA PAP	YRIFERA	TWIGS	76710H	5.	4.2	228.3		13	215	222.18	11	210	295.	98	1	279	个
SALIX PULC	HRA TWI	GS (G/:	LOM2)	3.	3.1	122.2		13	280	118.26	11	271	165.	94	1	380	
SALIX ALAX	ENSIS TO	JIGS (	3/10M2)	393.	127.0	209750.5		13	3410	06845.97	11	18	1341700.3	33	1	218	-
ALNUS SINU	ATA TWI	GS (G/:	LON2)	73.	37.8	18578.7	* *	13	87	14835,27	11	70	59756	31	1	279	1
TOTAL TWIG	S ALL SE	ECIES	(G/10M	475.	153.5	306264.9		13	3415	54115.71	11	18	1979906.0	03	1	220	1.
*			~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~							<del>-</del>							

TABLE 15 HEANS, STANDARD ERRORS, AND VARIANCES FOR DRY WEIGHTS

OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR OPEN LOW DWARF
BIRCH-WILLOW. N IS THE NUMBER OF SAMPLING UNITS (1M2). ESTIMATED SAMPLE

SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
CAG WITHIN 20% OF THE MEAN WITH 67% CONFIDENCE.

SALIX PULCHRA TWIGS (G/10M2) 22. 6.2 1045.2 27 54 908.54 22 47 1796.78 4 54 54 54 55 55 56 57 57 57 57 57 57 57 57 57 57 57 57 57	CATEGORY (N = 2	7)	S X	2 S	И	NHAT	WITHIN	wN	TAHNW	BMS	N=	5 BN	ТАНИЗ	N.
SAUTX GLAUCA TWIGS (G/10M2) 2. 2.3 146.8 27 634 160.50 22 693 71.38 4			7.7		27							-	338	3
CALTY LANATA THIRE (6/1689) 2: 2.0 104.0 27 475 95.74 27 479 149.55 A									• •				- 308	3.6
TOTAL TWIGS ALL SPECIES (G/10M 34, 9.3 2353.6 27 51 2710.99 22 59 387.92 4	SALIX LANATA TWIGS (		2.0	104.0	27	675	95.76	22	622		149.5		971	1 / A

TABLE I MEANS, STANDARD ERRORS, AND VARIANCES FOR DRY WEIGHTS
OF SELECTED SHRUB SPECIES INDIVIDUALLY AND COMBINED FOR OPEN LOW WILLOW
TYPE. N IS THE NUMBER OF SAMPLING UNITS (1M2). ESTIMATED SAMPLE
SIZE (NHAT) IS THE NUMBER OF SAMPLING UNITS REQUIRED TO SAMPLE THE
CAG WITHIN 20% OF THE MEAN WITH 67% CONFIDENCE.

CATEGORY (N = 6)	X	s	2 5	и	ТАНИ	WITHIN	พห	ТАНИ	BMS N=	1 BN	ТАНИЯ
SALIX PULCHRA TUIGS (G/10M2) TOTAL TWIGS ALL SPECIES (G/10M	217. 217.	56.3 56.3	19034.2 19034.2	 6 5	11	19034.17 19034.17	5 5	11		0000	1

### APPENDIX J

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Table J1		dd gp 115 au es bd En 4v				***	•			
11260 OPEN WHITE SPRU	ICE									· · · · · · · · · · · · · · · · · · ·
CATEGORY (N = 105	i)	<b>∵</b>	9	. Z	Ń	тани	NITHIN	TAHMW MW	EMS N= 7	BN BNHAT
		Δ	X		:		NA III.		The state of the s	
SALIX PULCHRA TWIG (G	/10H2)	Q.	2.2	497 <b>.</b> 2	105	146	237.28	98 70	4741.68	6 1385
SALIX GLAUCA TWIG (G/			217 3323		105			78 423	1289.73	6 729
BALIX LANATA TWIG (G/				18.2				20 T T T T T T T T T T T T T T T T T T T	34,29	6 126254
BETULA PAPYRIFERA TWI				877 · 8 · · · · ·				98 7415	**************************************	67 67 13/4 D
WIDTAL ALL SPECIES (G/	'10MP) ASS	30. Man. 18.4		166.0	→ 105; (105 % N	2460 367 1165	165.34	98 2450 (%) 98 103	177.19	A 20/37 A 28
	7.74						Mr. The		A CONTRACTOR	THE PROPERTY OF
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A Charles and a second	n de Alexandra estado de la composição de la co	Telling Contract	Manager T	tage will be a series of the series	WANTED STATE OF THE STATE OF TH	· VIII in a language su mili		Cate of the second seco	APPLICATION OF THE PROPERTY OF	
が <b>大者・ 南原</b> (1779年)		TENERAL PROPERTY.		CALL MARKET	<b>罗斯罗罗斯</b>		1.20 TO THE STATE OF	<b>"在小型"的"</b> "		
		*	March 18 1				VIII 4 1 1 1 1 1	Contract of the part of the co		

Table J2
11270 OPEN BLACK SPRUCE

CATEGORY	(N = 150)	X ,	5_ X	S S	N	NHAT	WITHIN	WN	TAHNW .	BMS N=	10	BN	ВИНАТ
SALIX FULCHR	(A TWIG (G/10M2)	11.	2.6	1007.8	150	210	797.06	140	166	4285	.82	9	891 . 5
SALIX GLAUCA	TWIG (G/10M2)	1.	0.8	92.8	150	3751	92.83	140	3751	. 92	.83	' <b>9</b>	3751
	A TWIG (G/10M2)	7	4.7	. 3366.1	150	1516	3148.99	140	1418	6743	.63	9	3036
TOTAL ALL SP	ECIES (G/10M2)	19.	5.3	4279.2	150	290	3812.12	140	_259	11544	•21	9	783

	e .		**						Ši.		
Table II	## ** ** ** ** ** ** ** ** ** ** ** ** *		- AP 4- AL 44 14 AP		- 4L all are 62 we also see 46 are 14						
11260 OPEN WH	ITE SPRUCE						<del></del>	<del></del>			5 m 1 m 2 m 2 m 2 m 2 m 2 m 2 m 2 m 2 m 2
CATEGORY	(N = 105)	X	<b>g</b>	2	N	NHAT	WITHIN	WN WNHAT	BMS:N=		N BNHAT ER
و بلد بيد مدد وي ريد سب هند شب ويل شند مدد ويد ايدو		ور سند بادر پین مان شد جد وی بید کار بادر داد	X			Ang dead distribution (1911)					
	TWIG (G/10M2)	9.	2.2	497.2	105	146	237,28	98 70	4741	.68	6 1385
SALIX BLAUCA BALIX LANATA ALNUS SINUATA	TWIB (G/10M2) 🚁		2.7 20.4************************************	·18 • 2 - + ja. · . j.	105 105 105	1395		78 423 98 1319 98 415 8	1287 34 8418		6 729 4 4 12625 6 1374
	FERA TWIG (G/10	M2 1.		146.0	105	2460	165.34 3733.42	98 2450 98 103			6 2625 6 12328
	in the second se	Tank di sa Silan		La and the real		10.00	w Azw csas		MA 15'80 CO		
				Harris American						V. W.	
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			Taristry is	*******	事的表表	47,47,417	ingget with a spirit	能够被	# F. W. 2. (**)	7 <i>(</i> 4 - 7.7)	

Table J2
11270 OPEN BLACK SPRUCE

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CATEGORY (N = 150)	x .	5 _ ·	s ²	N	NHAT	WITHIN	WN	WNHAT	BMS N=	10	BN	ВИНАТ
		^_					<del></del>					
SALIX PULCHRA TWIG (G/10M2)	11,	2.6	1007.8	150	210	797.06	140	166	4285	.82	9	891
SALIX GLAUCA TWIG (G/10M2)	1.	0.8	92.8	150	3751	92.83		3751	. 92	2.83	9	3751
ALNUS SINUATA TWIG (6/10M2)	7.	4.7	3366.1	150	1516	3148.99	140	1418	6743	. 63	9	3036
TOTAL ALL SPECIES (G/10M2)	· 19. 等级	5.3	4279.2	150	290	3812.12	140	259	11544	.21	9	783
			*****************			*			the Section	Sylva i	4.5	14. La # ###
												- Author
2		All Land	Control of the Control		2.0		,	100 N	100			

# APPENDIX J MODIFIED 1982 CLIPPED PLOT STATISTICS

Means, standard errors, variances, and estimated sample sizes for dry weight current annual twig growth of selected shrub species. Modified from data collected in 1982 by Steigers et al. (1983). Betula glandulosa and leaves of shrub species have been excluded from the analysis. Twigs were clipped from  $0.5\text{-m}^2$  plots. Dry weight estimates are presented by level IV vegetation type. The within estimated sample size (WNHAT) is the number of  $0.5\text{-m}^2$  plots required to be clipped in the vegetation type within 20% of the mean with 67% confidence. These clipped plots are then evenly allocated to the number of sites sampled in the type.

23210 DWARF BIRCH													
CATEGORY (N = 270)	x	\$_ X	s ²		и	ТАНИ	WITHIN	ми	ТАНИШ	:N 2H4	= 18	BN	ВИНАТ
SALIX PULCHRA TWIG (G/10M2) SALIX GLAUCA TWIG (G/10M2)	13.	3,4 0,1	3544.7	27 27		512 6751	2811.36 1.05		404 6751	147	31.47 1.05	17 17	2113 6751
TOTAL ALL SPECIES (G/10M2)	13.	3.6	3566.1	27		507	2812.27	252	400	1474	98.01	17	2095
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