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ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT

ENVIRONMENTAL STUDIES PROCEDURES MANUAL

SUBTASK 7.12
PLANT ECOLOGY

Terrestrial
Environmental
Specialists, Inc.

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PROCEDURES MANUAL

SUBTASK 7.12
PLANT ECOLOGY

Submitted by

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and

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to

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I. INTRODUCTION

This manual describes the procedures which will be used in the vegetation mapping, habitat evaluation, succession study, and vegetation impact evaluation conducted by the University of Alaska Agricultural Experiment Station (AES) during Phase I (pre-license application) of the Plant Ecology Studies on the Susitna Hydroelectric Project. The purpose of this manual is to ensure uniformity of techniques and priorities throughout the study. Since methods and procedures for studies planned for 1981 are dependent to a certain extent on the field studies during 1980, this manual will concentrate on the procedures of the initial efforts. All procedures are covered, although some in more detail than others.

Certain efforts, scheduled under the vegetation studies of the Susitna Project, will be aided by additional work planned for the Upper Susitna Basin by the Forest Service in cooperation with the Soil Conservation Service. The procedures that are to be utilized by these agencies are presented in their preliminary field procedures manual (USFS 1979).

II. TECHNICAL PROCEDURES

LITERATURE REVIEW

Comprehensive searches of the scientific literature will be made to generate a bibliographic and actual data base of the Susitna region and of similar types of vegetation in other areas of Alaska and adjacent Canada. These studies will consist of literature searches in standard bibliographic sources (e.g. Biological Abstracts, Wildlife Review), data collation from literature on methods and other studies of Alaskan vegetation, government reports, and vegetation impact studies in other northern regions.

Methods used in quantitative ecological studies of boreal forest or taiga in other regions will be included in the searches. Literature dealing with the effect of water level changes on riparian vegetation will also be reviewed.

The data base review will also include a review of pertinent on-going or proposed research. This information may be used to supplement or support findings of the proposed plant ecology studies and may perhaps require a redirection of efforts.

Part of the data base review will also include coordination with personnel involved in other aspects of the Susitna Hydroelectric Project. Input will be requested from other associated disciplines concerning schedules, methods, and types of data being collected. Vegetation information or data will be disseminated to personnel in associated disciplines when it is available. It is anticipated that data exchange will take place with personnel in the hydrological and faunal studies.

VEGETATION COVER/HABITAT MAPPING

LANDSAT imagery and high altitude (U2) photography will be used to map vegetation/habitat types in the Susitna River Basin. On the basis of

recent experience of staff of the Alaska Agricultural Experiment Station, in conjunction with the River Basin Cooperative Survey, this type of photography has proved adequate to delineate the vegetation types occurring in the area. The vegetation is primarily boreal forest types and upland tundra.

Vegetation cover/habitat maps will be produced at various scales. The entire Upper Susitna Basin will be mapped at a scale of either 1:120,000 or 1:250,000. LANDSAT imagery, as well as U2 photography, will be used as a basis for this mapping. Much of this area has already been mapped for the Denali Planning Unit Remote Sensing Project. It is anticipated that these existing maps will be incorporated into the Susitna mapping effort, with any areas that are not currently mapped being covered under the proposed mapping effort. The existing vegetation maps will, however, be modified so that the classification scheme will more appropriately match that envisioned for the proposed mapping effort.

Vegetation cover/habitat maps, to a scale of 1:63,360, will be produced for an area 10 to 12 miles on either side of the Susitna River from the Devils Canyon Dam site to the confluence of the Maclaren River. Imagery enlarged to a scale of 1:63,360 will be utilized for this mapping effort. This area will be mapped primarily for use by personnel involved in the faunal studies, especially the big game studies. USGS topographic maps, which are available for this area at the 1:63,360 scale, will be useful in field orientation when used in conjunction with the cover maps. If possible, the cover maps will be printed over their corresponding topographic maps for use by field personnel.

The impoundment area and the downstream floodplain from Devils Canyon to Talkeetna will be mapped at a scale of 1:25,000, since these will be the primary areas of direct impact. This will allow smaller areas of vegetation to be delineated. However, mapping at the 1:25,000 scale will not necessarily include finer levels of classification (i.e. no new vegetation types in addition to those delineated in the 1:63,360 scale maps will be added in the 1:25,000 scale mapping). Some selected moose habitat areas upstream and downstream will also be mapped at this scale for use in the moose habitat and successional studies. This mapping effort is detailed in later sections. The photography to be utilized for the 1:25,000 mapping will be enlarged from existing color infrared (CIR) obtained from NASA U2 flights. This scale was selected because the U.S. Geological Survey is mapping Alaska at this scale. Also, an enlarged scale of this nature has been requested by the Alaska Department of Fish and Game for use in the big game studies.

The two remaining areas for which vegetation cover/habitat maps will be produced will be the downstream floodplain below Talkeetna and the selected transmission line and access road corridors. Much of the downstream floodplain has already been mapped by the Soil Conservation Service as a part of the Susitna River Basin Comprehensive Study, and their mapping will be incorporated in the proposed mapping effort. The downstream floodplain is being investigated primarily because potential changes in flow may result in changes in successional trends, which may affect the potential of this area as key habitat for important wildlife species, such as moose. Additional mapping and studies specific to successional trends are discussed in greater detail in the sections entitled Moose Habitat Evaluation and Succession Studies.

The classification system to be utilized for the mapping is the system developed by Viereck and Dyrness (1980). The mapping will be to the third and fourth level of this system. It is anticipated that this system will be modified to increase its applicability and usefulness for faunal studies. An attempt will be made to factor in parameters, such as physiognomy (overall growth form), that will help attain this goal. Several such parameters have been identified by the U.S. Fish and Wildlife Service during the River Basin Survey. Personnel involved in this study will be contacted for their input into the proposed classification scheme.

Preparation of the vegetation cover/habitat maps will begin in early 1980 with the acquisition of LANDSAT and presently available CIR aerial imagery. These photographs will enable delineation of vegetation types in the Susitna River Valley. The delineation will be preliminary and require extensive field verification. The initial mapping will attempt to delineate the wetland areas. This will be done to aid in the compliance with Section 404 of the Clean Water Act prior to surface disturbing activity.

The actual delineation of wetlands will depend on the definition of wetland which is used. One definition includes any land which has gleyed soils present. This definition would include most of the land in Alaska, since most soils in the state are saturated with water at least seasonally or are in other ways deficient in oxygen at times. Other definitions are tied more directly with specific vegetation types or associations, or specific plant species which are characteristically associated with high water table or inundation. The easiest method to delineate wetlands is on the basis of vegetation cover alone. If individual species are used as indicators of wetlands, care will be taken to insure that only those species truly characteristic of wet areas are used. The actual approach to be used will depend to a great extent on the concensus of opinion held by the land management agencies having jurisdiction over these or comparable lands. The problem will not be resolved until a clearer definition of wetlands is agreed upon by the federal land management agencies.

For the above reasons, the initial approach will be to categorize the wetlands encountered in the Susitna Basin. This will involve classification of wetlands according to ways in which they may be unsuited to disturbance. For example, some may represent prime or sensitive wildlife habitat, while others may be unsuitable for supporting structures or roads. Still others may pose serious watershed or erosion hazards. These possibilities and others will be considered and noted in the survey and mapping efforts.

Field verification will, in large part, be accomplished through cooperation with the Forest Service (FS) and Soil Conservation Service (SCS). These two agencies will be conducting a vegetation inventory of the entire Upper Susitna River Basin. They have recently completed a similar inventory of the Lower Susitna, and are willing to provide the AES with these data as well. Where their distribution of sample plots is insufficient for mapping purposes, AES personnel will obtain additional plot data. All inventory data which have been or will be collected by the FS, SCS or AES have followed or will follow the Field Procedures Manual (USFS 1979). This manual describes the methods to be used for collection of data on species composition and productivity in both understory and overstory, as well as elevation, slope, aspect, and some soil characteristics. The Field Procedures Manual was developed jointly by FS, SCS, and AES personnel.

AES personnel responsible for mapping will attend the Forest Service's training session, June 9-13, 1980, to learn the procedures covered in the manual. Additionally, one AES person will assist the FS and SCS in all of their plot sampling of the Upper Susitna Basin. A concerted effort, such as this, will be beneficial to all three organizations since it will eliminate duplication of effort. More importantly, however, it will allow ready cross-referencing to Upper Susitna data with ongoing classification-mapping efforts in other regions in Alaska.

QUALITATIVE ASSESSMENT

Phase I of the study requires descriptions of all major plant communities which occur in the river basin. This will be accomplished with "walk throughs" or reconnaissance-level surveys of each vegetation type. Reconnaissance techniques are most applicable here, because they allow good coverage of different vegetation types over a large area in a relatively short sampling period. Walk throughs will be located in areas visually judged to have homogeneous vegetation representative of the vegetation types identified on aerial photography. During the walk throughs, dominant species composition, species abundance, estimated heights, and percent cover will be recorded. Important environmental characteristics such as edaphic, geologic, or topographic factors and their apparent relationship with vegetation patterns will be noted. Tables of species and estimated abundance will be constructed. Additionally, the structure and layers of each major plant community will be described. A sample data form and procedures for completing this form are presented in Section III-Data Procedures.

IDENTIFICATION AND NOMENCLATURE

For the purposes of identifying plant species, two or three reputable keys or floras will be used. The major publications of this nature for Alaska include Hulten (1968), Viereck and Little (1972), Argus (1973) and Welsh (1974). Specimens of species that are difficult to identify will be sent to personnel at the Herbarium of the University Museum in Fairbanks. Willow specimens will be sent to Dr. George Argus in Ottawa, Ontario. Nomenclature in the reports will, in general, follow Hulten (1968) for herbaceous species, and Viereck and Little (1972) and Argus (1973) for woody species.

MOOSE HABITAT EVALUATIONS

Impact prediction for several animal species will be dependent, to a certain extent, on the vegetation cover/habitat maps. This is especially true for important big game species such as moose. However, the total acreage of habitat, especially key winter habitat, is not the only factor involved. Information on total available browse, browse quality, utilization, community trends, and other factors is necessary for the prediction of impact on moose, and must be obtained from literature and quantitative vegetation sampling methods.

Phase I of the habitat study will be limited primarily to the production of vegetation cover/habitat maps that will provide acreage, location, and distribution information on habitat types for use in faunal studies. The selection of areas to be mapped, map scales, and classification scheme has resulted from input of the personnel involved in the faunal studies. The quantitative information required for more detailed impact predictions will be obtained during the Phase II (post-license application) effort.

SUCCESSION STUDY

The succession studies will be directed primarily towards identifying the interrelationships between the existing river characteristics and the perpetuation of key moose habitat in the flood plain of the Susitna River. Certain vegetation cover/habitat types, especially willow and balsam poplar types, found on the flood plain of the Susitna River provide important winter moose habitat. These types are thought to be maintained by certain river characteristics, such as annual or catastrophic flooding. The proposed project will alter the flow regimes of the river and may, therefore, cause changes in the types of vegetation that will eventually dominate that area. This may, in turn, either increase or decrease the capacity of the area for important wildlife species, such as moose.

The area of most concern for the succession studies will be the downstream flood plain below Talkeetna. The purpose of the succession studies will be to attempt to establish historical trends in succession for this area and to identify causal factors in sufficient detail to permit a knowledgeable prediction of the magnitude of the downstream impacts.

The approach to be used for the succession studies will be to gather information from specific literature surveys; interpret existing current and historical aerial photographs for changes in vegetation over time; relate the vegetation changes to hydrological changes, topography, soils, and perhaps other physical factors; and collect information on age and community structure for selected habitats of various ages.

Specific searches will be performed for pertinent published literature and ongoing research on succession. Literature on selected important species will be collected and reviewed. For these species information on root systems, ability to withstand flooding, shade tolerance, ability to pioneer areas, etc., will be important in the succession studies. Part of the literature review will also include the identification of types and sources of available historical aerial photographs and hydrological information pertinent to the succession study. This will be coordinated with efforts planned by other groups (under Subtasks 2.08 and 3.01) to avoid duplication of effort.

The vegetation mapping effort for the succession studies will involve the production of vegetation cover/habitat maps from current and past aerial photographs, a comparison of vegetation changes over time, and an investigation of the relationships of these changes with hydrological changes and other physical factors, such as topography and edaphic conditions. The vegetation cover/habitat type mapping will be performed on selected historical aerial photographs. Information on the type, age, coverage, and other factors related to the historical aerial photographs will be reviewed in conjunction with the available photographs. The current aerial photographs on the 1:25,000 scale will be used for the impoundment areas.

The vegetation mapping for the succession studies will not be performed for the entire flood plain area, but only in selected sampling areas. It is anticipated that selected areas in bands running across the flood plain perpendicular to the long axis of the river will be mapped between Talkeetna and the mouth of the Yentna River. The number and location of these bands will be based on a number of biological and physical factors, including moose utilization, vegetation types, soils, hydrological sampling locations, and river characteristics.

Once the mapping in these selected bands is completed for the current and historical aerial photographs, a comparison of the changes that have occurred over time will be made. These maps will be analyzed with past hydrological information, such as flood flow records and other information on physical factors to see if correlations exist among the different factors involved.

The succession studies will require a certain amount of field sampling. The sampling will include determination of age of communities, observational information, and determination of species composition and structure of the communities. The ages of various woody components of the communities will be used to date major periods of plant establishment, die-offs, or catastrophic sequences relative to historical flow regimes.

Community age information will be obtained by counting the number of annual rings on cores of the dominant woody vegetation. The additional sampling methods to be utilized for this portion of the study will be selected during the first year following literature reviews and input from personnel involved in faunal studies. The field sampling will be performed primarily during the 1981 field season. Areas to be sampled will be selected in the impoundment area and the downstream flood plain. In the downstream flood plain the sampling areas will probably be within the selected bands that will be mapped as part of the mapping effort.

Particular attention will be given to the structure and pattern of vegetation on islands or bars which are apparently stable and have reached a late stage of plant succession. If possible, oblique aerial photographs will be taken in 1981 during a period coinciding with river flow which equals the average flow predicted for dam operation during periods important to plant succession. This would aid in the determination of flood plain areas that would no longer be subjected to flooding. This, in conjunction with data on soils, topography, and plant distribution in late successional stands, will be useful for predicting acreage of various components of moose habitat which would be available when flood plain equilibrium is reached after completion of the dam.

Data gathered from the succession studies will be used in the preliminary impact prediction of the proposed action. Information on flow regimes and predicted changes in hydrological characteristics downstream will be utilized in an attempt to answer the downstream impact question. This effort will be performed in the latter part of 1981 when succession information is available and flow regimes from the project have been defined.

CORRIDOR SELECTION

The selection process for the transmission and access road corridors is detailed in Subtasks 7.09 and 7.14, respectively. The plant ecology studies will provide input into these subtasks. In the initial route selection analysis, the alternative routes will be evaluated on a superficial basis for major vegetation constraints (e.g. stations of proposed endangered species, unique habitats, etc.). Once the primary routes have been selected for these facilities, they will be cover mapped as detailed in the Vegetation Cover/Habitat Mapping section. This mapping effort is anticipated to be performed in the latter part of 1981.

ENDANGERED OR THREATENED SPECIES SURVEYS

Presently there are 36 plant taxa listed for Alaska as rare, threatened, or endangered (Murray, 1980). On the basis of existing habitats and range for these plants, probably only 5 are likely to occur in the Upper Susitna River Basin. These are Smelowskia pyriformis, Papaver alboroseum, Smelowskia borealis var. villosa, Taraxacum carneocoloratum, and Erigeron hultenii. Three of these species have been considered by the U.S. Department of Interior for possible inclusion in the Endangered Species Act of 1973. Probable habitats of all of these species will be searched and attempts made to find specimens.

IMPACT ASSESSMENT

All identified potential impacts of the proposed project on vegetation will be discussed in the reports. The level of detail of impact predictions and discussion will vary depending upon the area under consideration. For the impoundment areas, and access road and transmission line rights-of-way, accurate values of the total acreage of each vegetation type to be affected (inundated or traversed) by the proposed facilities can be determined. These values will be presented in tabular form both as actual acreage and as a percent of total acreage impacted. These data can be compared to the total existing acreage of each vegetation type and the percent that each type represents of the entire study area, which will also be presented in tabular format.

In the downstream area, plant ecology information will be used in conjunction with various physical data to aid in predicting changes. Depending upon the accuracy with which the botany personnel feel they can predict vegetation changes, a map indicating type and extent of changes may be produced. Supplementary field information required for predicting impacts will be acquired during the 1981 field season.

INPUT REQUIRED FROM OTHER SOURCES

The need for data exchange and coordination with other groups has been mentioned in several previous sections. A more thorough review of input required is presented in this section. The information needed falls into the following categories: hydrology, aerial photography, wildlife populations and habitat, and proposed facilities.

Hydrology

Hydrological information is needed for the downstream area, especially the area from the confluence with the Chulitna to the confluence with the Yentna. Information is needed on historical, baseline, and projected flows for the downstream area. Historically, the dates, duration, and frequency of peak flows that exceed that projected for the Susitna project will be useful.

During the course of the baseline studies a determination of the flows at various key times will be needed. Projected changes in flows after the project is completed and the effects on the hydrological system downstream will be required. This information is expected to be supplied by R&M and Acres.

Aerial Photography

For the purposes of most of the vegetation/habitat mapping, existing aerial photographs will be utilized. However, the new photographs to be taken of the impoundment area, downstream area, and access and transmission routes (Subtask 2.08) would be quite helpful for the mapping effort. Acres will notify TES when any new photographs are taken and/or available. Plant ecology personnel should be given an opportunity to review new photographs and determine their usefulness to the plant ecology studies. If deemed useful, copies should be provided to the plant ecology team. In addition, the plant ecology group will need the list of available photographs that is being developed under Subtask 2.08 or any related effort by other project team members. Information or availability of historical as well as current aerial photography is desired.

Wildlife Information

Wildlife information needed for the vegetation studies concerns big game (especially moose) populations and habitat, and all other wildlife habitat information collected. A copy of the procedures manuals and all reports produced by ADF&G will be needed. The plant ecology group is especially interested in moose population densities, habitat preference by season, and the condition of moose subpopulations. Results of the habitat studies for birds and non-game mammals and any other habitat information will provide useful information to the plant ecology group. This information will come primarily from ADF&G and other members of the environmental team.

Proposed Facilities and Actions

For the purposes of impact predictions and also for part of the vegetation/habitat mapping, the location and specifications of proposed facilities will be required. The location of proposed alternative routes for access roads and transmission lines is needed as soon as they are available. Selected primary routes for both the access roads and transmission lines should be defined by summer 1981 for cover mapping purposes. In addition, the locations and specifications of borrow areas, temporary haul roads, and any other ancillary facilities will be needed for vegetation mapping and impact predictions.

Concerning the impoundments, basic information such as the location of all structures, full pool elevation, seasonal and diurnal water fluctuations, and flow regimes will be required for impact assessment. Since summer 1981 is the latest that vegetation work can be performed in the field, nearly all the information detailed in this section should be available prior to this field season (i.e. by May 1981). This information will probably be supplied primarily by Acres.

III. DATA PROCEDURES

During the initial stages of the plant ecology studies, data forms will be used primarily in the qualitative assessment effort. This data form is presented in Table 1. It is divided into the following three sections: 1) botanical characteristics, 2) physical characteristics, and 3) wildlife habitat information.

Table 1. Qualitative assessment form, plant ecology studies.

Community Type:_____ Date:_____

Location:_____ Initials:_____

Botanical Characteristics: Ave. Hgt.:_____ m

Ground (All herbaceous plants, woody plants <0.5 m tall) Percent Cover_____

Species & Characters[a] - Woody:_____

Species & Characters - Herbaceous:_____

Shrub (≥0.5 m tall and <2.5 cm dbh) Percent Cover ____ Ave. Hgt._____ m

Species & Characters:_____

Understory (2.5 cm to <10 cm dbh) Percent Cover_____ Ave. Hgt._____ m

Species & Characters:_____

Overstory (dbh ≥10 cm) Percent Cover_____ Ave. Hgt._____ m

Species & Characters:_____

Past Disturbance:_____

Successional Comments:_____

Mosaics/Unique Features:_____

General Comments:_____

a. Characters include cover classes of: AA-95 to 100%, A-75 to 94%, B-50 to 74%, C-25 to 49%, D-6 to 24%, DD-0 to 5%; and importance classes of : 1-Dominant, 2-Abundant, 3-Frequent, 4-Solitary to Sparse. Record as letter-number. Ex. #A-1.

Table 1. Qualitative assessment form, plant ecology studies (Cont'd.)

Community Type:_____ Date:_____

Location:_____ Initials:_____

Physical Characteristics:

Elevation_____ Slope_____ Aspect_____

Landform_____ Position_____

Soils:_____

Comments:_____

Wildlife Habitat:

Available Browse (Stems >40 cm hgt., <13 cm CBH/4 sq. m. plot):

Species and Number:_____

Browse Utilization:

Species and number stems browsed:_____

Browse Vigor[b]

Species and rating:_____

Pellet groups/12.6 sq.m.plot:

Comments:_____

b. Vigor: 1 (Healthy: strong CAG, no sign of hedging), 2 (moderate amount of hedging and breaking), 3 (numerous hedged and/or dead plants).

BOTANICAL CHARACTERISTICS

The objective of this portion of the qualitative assessment is to collect data that will permit the preparation of a description of each community. Included in the description will be a species list, a description of community structure (dominant species by layers), general information on succession and unique features, and comments.

Definitions of Vegetation Layers

Botanical descriptions are commonly done by growth forms (trees, shrubs, etc.). For this assessment, the vegetation will be described in layers or strata. In order to standardize the assessment for all community types, consistent definitions for each vegetation layer will be utilized. The layers and corresponding definitions are as follows:

Ground Layer - This stratum includes all herbaceous plants. It also includes all woody vegetation below 0.5 m in height. For convenience in data reduction, woody species will be listed together and the herbaceous species will be listed together.

Shrub Layer - All woody vegetation greater than or equal to 0.5 m in height and less than 2.5 cm diameter breast height (dbh). The dbh is the diameter 1.4 meters from the base.

Understory Layer - All woody vegetation from 2.5 cm dbh to less than 10.0 cm dbh.

Overstory Layer - All woody vegetation 10.0 cm dbh and greater.

Data Collected by Layer

The information to be collected for each layer includes: percent cover for the entire layer, average height for the entire layer, species list, and an estimate of cover and relative importance for each species.

The percent cover for the entire layer is an estimate of the total percent of available space (on a horizontal plane) occupied by aerial portions of plants in that layer. Since it is an estimate, it is usually given as a range of percentages (e.g. 60-80%).

Average height is estimated for each layer. It is usually given in a range of meters (e.g. 10-12 meters).

Each species that is found in a layer will be listed. It is important to list all species regardless of their importance in other layers. To save space a species acronym consisting of the first two letters of the genus followed by the first two letters of the species will be used (e.g. Populus balsamifera = POBA). A master list of all species will be maintained to avoid possible duplication of an acronym.

For each species listed an estimate of percent cover and relative importance will be made. Standard categories or classes will be utilized for percent cover and relative importance. The categories for percent cover are: AA - 95 to 100%, A - 75 to 94%, B - 50 to 74%,

C - 25 to 49%, D - 6 to 24%, and DD - 0 to 5%. The relative importance categories are: 1 - dominant, 2 - abundant, 3 - frequent, and 4 - solitary to sparse. The percent cover class and relative importance class will be recorded in parentheses after the species acronym. For example, if Populus balsamifera was estimated to be in the 75 to 94% class and was also the dominant species in that layer it would be recorded as POBA (A-1).

Relative importance classes are used in conjunction with actual cover classes to provide a means of describing the community. The two classes may not be directly related, because relative importance is dependent upon the total number of species that occupy a given stratum. For example, if there is only one species in the ground layer and it is in cover class D (6 to 24%), it would be the dominant species and thus be in importance class 1 (dominant).

General Information

General information will be collected on past disturbance, succession, and mosaics/unique features, and general botanical comments will be made. The past disturbance category would include evidence of any of the following: snow damage, fire, flooding, wildlife disturbance, and man's disturbance. The time frame of the disturbance or its periodicity will also be recorded if known.

There are several different types of information that can be noted under succession. Any information relative to what the community was in the past, what it will be in the future, and how long it will take to change is important. The tree species found in the shrub and ground layers will provide information on woody communities. In a forest community, if the same tree species dominates the overstory and lower layers, it probably indicates that the community is stable (possibly climax). Different dominant tree species in the ground layer and the overstory may indicate that a different forest type is developing. Much of this type of information relates to the actual species under consideration. Issues such as whether shade-intolerant species are dying out or being overtaken by different species, and whether species that invade an area following fire or flooding are present, will be investigated. Age information will also be collected through the use of increment cores from the dominant woody vegetation or indicator species.

Any mosaics or unique features in a community will be recorded. Some communities may be homogeneous throughout, while other communities may frequently include small scattered patches of a different community type. Unique features would include anything unusual included in the community such as small ponds, wetlands, or a colony of a unique species. General comments would include any information that will supplement or clarify the botanical description.

PHYSICAL CHARACTERISTICS

The objective of this portion of the qualitative assessment is to collect data that will describe characteristics of the physical environment which may be closely associated with the occurrence of a particular vegetation/wildlife habitat type. The physical characteristics portion of the data form is presented on the second page of Table 1.

One person on the survey team is assigned to record the physical variables at each site where the vegetation is described. Elevation is determined from topographic maps or the altimeter of the helicopter. Degree of slope typical of the site is measured with an ABNEY level. Aspect is determined with the use of a compass and recorded in degrees. Position generally refers to elevational location of the site with respect to the land form on which it occurs (e.g. canyon site; mid, upper or lower level; mountain top; etc).

At least one soil pit will be dug at each site, and the horizons of each described in terms of depth, texture, color, wetness, and structure. Texture and color will be described in common soil classification terms. Wetness will be recorded as saturated, wet, moist, or dry. The pits will be dug to a depth of at least 30 cm or until frost or rock is encountered. Parent material will be identified in each case. In addition, core samples of approximately 20 cm depth will be taken from 5 to 8 locations within the site. The samples will be placed in a common plastic bag, labelled, and sealed for later texture and chemical analysis. They will be stored in a cool place.

WILDLIFE HABITAT

The focus of this part of the qualitative assessment is the description of ungulate habitat values for each community/habitat type. Secondarily, this study will record the presence or sign of other wildlife species, such as birds, small mammals, and bears.

The data form for wildlife habitat information is presented on the second page of Table 1. Available browse, browse utilization, browse vigor, pellet groups, and comments relative to wildlife habitat are recorded on the form.

Available browse refers to stems of any browsed species which are greater than 40 cm in height, but less than 13 cm circumference breast height (CBH). These criteria are similar to those used on the Kenai Moose Refuge (Wayne Regelin pers. comm.) and proposed in the USF&WS Criteria Handbook (USF&WS 1980). Available browse will be described for each species in terms of the number of stems originating at or below the ground surface within a 4 square meter plot. At least 6 plots will be randomly located and assessed at each site. At the same time available browse information is collected, the number of stems within the above restrictions which have been browsed will also be recorded. Snowshoe hare browse will be differentiated if possible.

After the 4 square meter plot measurements have been recorded, a 2 m radius plot (centering on the first established corner of the 4 square meter plot) will be checked for moose, caribou, ptarmigan, bear or other fecal groups, and the number of each recorded. Only those fecal groups that have been deposited within the past two years will be recorded.

Finally, the structure and health of each browsed species will be described for the site in general. The browse vigor is described using the following classes: 1) healthy: strong current annual growth (CAG), no sign of hedging, 2) moderate: moderate amount of hedging and breaking, and 3) poor: numerous hedged and/or dead plants.

IV. QUALITY CONTROL

VEGETATION COVER/HABITAT MAPPING

Mapping accuracy will be checked in one to three ways. Low altitude fly-overs will be used whenever possible to obtain 35mm color photographs of selected areas. The area covered by each color photograph will be recorded by locating the center point of each frame on mylar-covered (1:120,000 scale) prints of the controlled aerial photos. The direction of camera projection will be indicated by drawing an arrow through the "center points". When possible, on-ground 35mm color photographs will be taken of typical vegetation within the area covered by the low-altitude photograph. A third form of vegetation documentation will involve use of field plot data collected by FS, SCS and AES personnel, and qualitative assessments conducted by AES personnel. Any of all or the above information will be used to verify species composition of areas on the CIR imagery used in actual map preparation. If questionable areas remain, on-ground checks of those specific areas will be made.

QUALITATIVE ASSESSMENTS

Since the qualitative assessments require a certain number of subjective judgements, all personnel conducting walk-throughs will be required to "train" together periodically to ensure that vegetation characteristics (dominant species composition, browse availability, utilization, etc.) are being designated to the proper class or category. This training will also ensure that plant species identification is accurate. Field personnel will be required to report classification problems to the project leader. They will also collect questionable plant specimens in plastic bags for identification at the field camp. Species that cannot be identified will be placed in a plant press for later identification at the herbarium.

All field plot data will be referenced to location on USGS topographic maps (1:63,360 scale), and the initials of each field person involved in the plot survey will be placed at the top of the data sheet. Data sheets and plot location maps will be copied as soon as possible and filed according to geographic location.

V. SCHEDULE

Table 2 outlines the activity schedule that will be followed during Phase I. This schedule will be reviewed and modified if necessary in early 1981.

VI. PERSONNEL

Table 3 lists the names, positions, and expertise of individuals working on the plant ecology portion of the Susitna study. Assigned tasks are also indicated.

Table 2. Activity schedule for Phase I of the Plant Ecology Studies.

ACTIVITY	1980 M	J	J	A	S	O	N	D	1981 J	F	M	A	M	J	J	A	S	O	N	D	1982 J	F	M
Acquisition of photos and interpretation equipment	X																						
Crew orientation and field preparation		X																					
Study of photos and planning of over-flights and reconnaissance surveys		X																					
Submit Procedures Manual		X																					
Ground check mapping criteria and do qualitative assessments. Map representative areas at 1:120,000 and 1:63,360 scale		X	X	X																			
Revise mapping criteria and develop legends			X	X																			
Map impoundment area (1:25,000 scale)				X																			
Assess downstream areas and develop sampling procedures for succession				X	X																		
Perform overflights to check and modify mapping				X	X																		
Report preparation and submission of semi-annual report to TES			X	X																			
Data analysis, report preparation, and development of a working copy of vegetation/habitat cover maps at all scales					X	X	X	X	X														

Table 2. Activity schedule for Phase I of the Plant Ecology Studies. (Cont'd.)

ACTIVITY	1980 M	J	J	A	S	O	N	D	1981 J	F	M	A	M	J	J	A	S	O	N	D	1982 J	F	M
Submit Annual Report to TES										X													
Determine plot locations (sample allocation) and procedures for 1981 studies									X	X													
Develop vegetative cover/habitat maps for variously aged aerial photographs of portions of lower Susitna flood plain										X	X												
Survey-in permanent plots for succession study and age mature trees											X	X											
Concentrated literature search for information pertinent to plant succession in region and develop historical perspective of extent and severity of alluvial disturbance on Susitna flood plain												X	X										
Sample succession plots														X	X								
Final field check of vegetation mapping, cover map proposed access road and transmission line routes															X	X							
Data analysis and report preparation for second semi-annual report, and submit to TES															X	X							
Prepare description of plant succession, predict vegetation cover for various times following alteration of river flow, and predict impact on moose habitat																	X	X	X	X			

Table 2. Activity schedule for Phase I of the Plant Ecology Studies. (Cont'd.)

ACTIVITY	1980 M	J	J	A	S	O	N	D	1981 J	F	M	A	M	J	J	A	S	O	N	D	1982 J	F	M
Data analysis and report preparation including baseline description, impact and mitigation for project																	X	X	X	X	X		
Submit Draft Phase I Report to TES																					X		
Respond to comments and submit Final Phase I Report to TES																						X	X

Table 3. Personnel descriptions, qualifications, and assigned tasks for the Plant Ecology Studies.

NAME/POSITION	EXPERTISE	TASK
Joseph M. McMullen Group Leader	Experience in Botany and Plant Ecology	Overall coordination and direction on all aspects of study.
Jay D. McKendrick, PhD. Principal Investigator	Experience in Range Science and Plant Ecology	Project Coordinator and Advisor. Assist with field mapping.
William B. Collins, PhD. Project Leader	Experience in Range Science, Animal Nutrition and Behavior. Range-Wildlife Habitat Research is specialty.	Field Team Leader. Aerial photo interpretation, vegetation surveys, mapping.
Peter C. Scorup Research Assistant	Experience in Range Science. Several years experience in mapping of Alaska vegetation. Member of AIMCTF Committee on Vegetation Description and Classification.	Advisor on aerial photo interpretation and mapping.
Dot Helm, PhD. Laboratory Technician	B.S. and M.S. in Mathematics, M.S. and PhD. in Range Science. Vegetation Sampling Research is speciality.	Aerial photo interpretation, mapping reconnaissance surveys, data interpretation and analysis.
David Laneville	8 years experience in Civil and Mechanical Drafting. Certified Engineering Technician.	Cartography.

VII. LITERATURE CITED

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