STANDARDIZED METHODOLOGY FOR SURVEYS OF RARE PLANTS

Rare plant surveys identify the **spatial distribution of plant species that have been determined to be rare** in a given geographic location. Surveys are required if there is a proposed change to current management strategies or developments that may adversely affect the populations of rare plants, and sufficient information does not already exist to determine if adverse effects are possible. The surveys acquire information necessary to design mitigative procedures. Quantitative vegetation analysis techniques are biased towards dominant species and are not appropriate for the detection of rare species, even though sometimes they result in the discovery of difficult to see species that might be missed by a less direct survey technique, or they can be useful in assessing populations of rare species that are locally common. Documentation of the methods used and the results obtained is necessary for reviewers to be able to judge if adequate effort has been applied to ensure the protection of plant biodiversity.

PLANNING

Advance planning is essential to conduct an acceptable survey and report the findings in useable format. The first step is to identify THE GOAL OF THE SURVEY. Next, determine the **area to be surveyed** and the **timing** and **intensity of the survey** required. Not just the actual area of any construction-site disturbance must be studied, but the area influenced by any installations and the future operations of those installations. Factors such as hydrology and air flow must be considered in addition to disturbance of soil and changes of topography. The inclusion of a large buffer zone within the area surveyed will allow for changes which may be required in the project design during construction and subsequent operation.

Surveys must be timed in order to allow for the recognition of any rare species that might be found in the area, and of sufficient duration to allow thorough coverage of the habitats included.

Qualified botanists must conduct the survey.

The survey must target **all possible rare species**, not just those that may previously have been reported from the area.

In order to understand what is required the field investigator must have a **detailed project proposal** including:

- information on any facilities or installations
- engineering drawings showing not only the location, but the type of facilities
- information on any disturbance caused by construction and subsequent operation of the facilities
- base maps and aerial photographs in appropriate scales

QUALIFIED BOTANISTS

The following characteristics should apply:

- background knowledge in **plant taxonomy**, and experience as a **field botanist**, including knowledge of designing and implementing surveys
- **knowledge of the local flora**, and appropriate field guides for the area being studied
- desire to conduct field surveys and the **physical capability** to work in the terrain involved
- **knowledge of any regulations** that apply with respect to rare species and familiarity with the agencies that uphold those regulations; collecting permits may be required in some areas or for some species

PRE FIELD PREPARATION

Identification of plant communities from aerial photography will not only provide a basis for the design of the field survey, but they will suggest possible communities that require protection and the necessity for the survey to include a community component.

Records of previous sightings of rare species and the presence of habitats where rare species occur, in or near the area can be used to prepare field staff to identify species they might find. The following information should be sought for these species:

- detailed description and illustrations/photographs
- preferred habitat and associated species
- ecological information including phenology
- status within the political jurisdiction where the project falls as well as global status
- data on other known locations

Herbarium specimens, provided that they have been accurately identified, are an excellent source to obtain a search image for rare species, especially if surveys must be conducted at times other than optimal for the recognition of a given species. Visiting locations of known populations is even better.

Information is also available in literature reports of environmental impact assessments, rare plant survey reports and from knowledgeable persons. Summaries of this information may be available from the local conservation data centres, which can also provide lists of rare taxa expected within an area. These lists are dynamic and are continually being added to as more information is reported. Be sure to use a current list to ensure that all status information is up-to-date.

Field investigators should be prepared to identify rare species not on any lists for the area and not previously found nearby - extensions to known ranges often occur during surveys for rare species. It is wise to obtain lists not only for the political jurisdiction within which the project falls, but also from adjacent jurisdictions.

MAPS/AIR PHOTOS

The study area will be determined by the project and the goals of the survey. Maps and air photos will help determine possible side effects of the project, and suggest suitable boundaries for the field study, in addition to displaying similar habitats which could be surveyed to determine populations of rare species outside the project area.

Aerial photographs can be used to delineate preliminary boundaries of plant communities to be checked and described in the field.

SURVEY TYPES

Every species that occurs within the project area must be identified to the point that its status can be determined. For example, if there are no species within the Horsetail family [Equisetaceae] that are ranked rare within the jurisdiction, then identity to the family is adequate for the purposes of a rare survey. If there are species within a genus that are categorized as rare, then each species must be identified. If there is a subspecies or variety that is rare, then the plants must be examined in enough detail to determine if they are of the rare taxon.

A **floristic survey** identifies all species within the project area. This is the best type of survey to ensure that no rare plant goes unidentified.

A **targeted survey** will search only for species which have already been reported in an area. The

time required for this type of survey is less than for a complete floristic inventory, but the chance is that rare species will remain undetected.

SEARCH PATTERNS

Two main techniques have been used: a random meander and a systematic transect. The **random meander** covers areas that appear likely to have rare taxa, based on habitat and the judgement of the investigator. A **systematic search** follows transects as a guide to provide the greatest coverage possible of the area. Greatest coverage occurs with parallel transects spaced equidistant over the area. In very large areas the intensity of the effort can be defined using a □species/effort curve□ where the number of species per unit time is used to determine when sampling will cease. Within each habitat type the number of species will be greatest per unit of time in the first few minutes/meters of the survey and will rapidly decrease (this is **not** including the time used in identification of unfamiliar species) as more of the community is surveyed. When an attempt has been made to search any variations within the community with respect to terrain, bordering communities, etc., and the effort is resulting in no more species being found, then an adequate effort is deemed to have been applied. Although not as desirable as a thorough examination of the entire project area, this technique is defensible.

TIMING

A **series of surveys** that will allow plants to be observed at the optimal time for identification is best. Three survey periods are suggested: 1) Early Season: late May to first week of June, 2) Mid Season: mid- to late July and 3) Late Season: mid-August to mid-September. Please allow for variation in local topography and climate, i.e. when surveys are to take place at the higher altitudes or latitudes in the province, or if the weather has been unusually cold, survey times should be moved back by a week or so. When surveys are to take place at the lower latitudes and elevations, or in open, sandy areas with high radiative heating effects, surveys should take place early in the suggested survey period. Preliminary surveys may determine the best times for return visits to confirm identification of species for which both floral and fruiting characters are required for accurate identification. Relative abundance of species may vary annually with weather conditions and predation, etc., so surveys over more than one year are even more valuable to assess populations of rare plants.

DOCUMENTATION

Voucher specimens should only be collected if the population is sufficient to allow removal of an individual. Scientific research permits are required if voucher specimens are taken of species listed in the Wild Species at Risk regulations (see http://www.environment.gov.sk.ca/Default.aspx?DN=b135c332-9078-4d5f-aff3-84e1aa91cccc for further details.)

Partial collections of a portion of the plant displaying diagnostic characters can be sufficient for verification without destroying the individual plant. All vouchers should be deposited with a **recognized public herbarium** to make them available for study. Standardized data forms are available from the Saskatchewan Conservation Data Centre for reporting rare species; they detail the information required for each rare plant sighting. When collection is not an option, (i.e., not enough individuals , specimens not suitable for preservation in herbarium),

photographs are an acceptable alternative in most cases. Suitable equipment must be used to picture the diagnostic characters, as well as full plant photos; pictures of the habitat are useful to

document the location.
A complete description of the plant characteristics should accompany any records not documented by a voucher.
The **population numbers** are best given by a count of individuals where they are distinct. When individuals cannot be distinguished, then number of clumps or patches, and area covered should be used. When the number of individuals is very large, an estimate of the population can be obtained by taking the average of several counts within a quadrat and multiplying by the area in which the plant occurs. The size and number of quadrats required will vary with the type of distribution.
The **precise location** should be provided, with distance and direction from a permanent landmark where possible; area boundaries of the population should be noted on a map when the population is spread out and cannot be identified by a point location.
Ecological information such as habitat and phenology, predation, disease, etc. can be important in determining mitigative measures as well as the importance of the population within the range of the plant.

REPORTS
Reports must contain **all of the pertinent information** so that reviewers can make an appraisal knowing how the results were obtained. A full description of methods used, dates when surveys were conducted, maps detailing the study area and locations of rare species found, and notes on the populations must be included. A complete list of references used, persons contacted and herbaria visited in preparation for the field study should be included. A full list of species found in the project area should be attached; this, also, can reflect the thoroughness of the study.

A **discussion** of the potential impacts and mitigative measures should be provided. The blanket statement “the development will not adversely affect the population" is not adequate; the reasons why that decision was reached must be detailed. If mitigative measures are undertaken that try to maintain the population within the area of the development, monitoring of the population will provide ecological information useful in future species management.