Haynes Lease

Ref. No.: 298

B.C. GRASSLANDS PROJECT - 1983

The lack of a provincial budget in B.C. during the early months of the 1983-84 fiscal year prevented me from travelling to my grassland study sites before mid-August. The planned documentation of plant communities at Okanagan sites (Chopaka, Osoyoos, Vernon), best done in May and June, had to be postponed. This botanical work, to be done with the help of Provincial Museum botanists Bob Ogilvie and Adolf Ceska, will be attempted in May 1984.

Present work centres on the Asilidae (Robber Flies) of the B.C. Interior grasslands. A moderate amount of collecting was undertaken at the Osoyoos and Chopaka sites in September. At Chopaka the genus *Mallophorina* was collected in Canada for the first time.

The genus *Efferia* is a dominant one in the grasslands of southern Canada. Because it is the most diverse genus in the grasslands of B.C., I am concentrating my efforts on it. I am especially interested to see if various species show a preference for different plant associations or soil types. Since Wilcox (Proc. Calif. Acad. Sciences 34:85-234, 1966) in his monograph on the genus considered virtually no Canadian material, I plan to analyse the genus in all Canadian grasslands. There are seven species in B.C. and eleven in Canada.

Associated with the sage-dominated clayey soil at Chopaka are only two species of *Efferia*, both widespread taxa - *E. benedicti* and *E. harveyi*. The flight period of the former is mostly complete by the end of July while that of the latter begins about mid-August. Both are extremely abundant at this site. *E. harveyi* females were still ovipositing on 23 October, although no other asilids were present.

In the sandy, more acid soil of the extreme southern Okanagan, represented by the Osoyoos site and dominated by Antelope Brush (*Purshia tridentata*), the most interesting species are *Efferia albibarbis* and *E.* n.sp. *E. albibarbis* is found in B.C. only here; its only other locality in Canada is Point Pelee, Ontario. The new species, found in large numbers for the first time this year, is most closely related to *E. coulei*, a spring species common in cooler grassland sites dominated by bunchgrass (*Agropyron spicatum*) and rabbitbrush (*Chrysothamnus nauseosus*). *E. coulei* is common as far as north as the Chilcotin Region in central B.C.

The three most common species on the Great Plains are the closely-related *E. bicaudata*, *E. frewingi* and *E. helenae*. *E. frewingi* also is the only species abundant in the East Kootenay area of B.C.

Many other robber fly species have been collected on B.C. grasslands. These species are included in a growing annotated list of the Asilidae of B.C. that will summarize the taxonomy, distribution and ecology of the fauna.

Robert A. Cannings
Curator of Entomology
B.C. Provincial Museum

Biological Survey Grasslands Subcommittee:

GRASSLAND CLASSIFICATION IN B. C. AND SITE PROPOSALS FOR ARTHROPOD RESEARCH -- A PROGRESS REPORT

See page 7

R. A. Cannings

Outline

Entomological work on British Columbia grasslands is dependent on an acceptable classification of the grassland types in the province. A British Columbia Forest Service conference in June, 1982 discussed the topic, although no final agreement on a classification was reached. For entomological purposes, a classification of "Lower", "Middle" and "Upper" Grasslands has been adopted for faunistic comparisons. Sites in each of these types have been chosen. Present work by Rob Cannings stresses the differences in robber fly (Diptera: Asilidae) communities in these grassland types. Descriptions of the vegetation at the sites will be attempted in 1983.

Rob Cannings is in the early stages of organizing arthropod faunistic studies on British Columbia grasslands. Most work to date has been directed toward choosing appropriate sites for this work. The basic plan is to study and compare arthropod faunas of different types of British Columbia grasslands.

Grassland in British Columbia is discontinuous and diverse; classification is difficult. A conference organized by the British Columbia Forest Service to discuss the classification problems of British Columbia grasslands was held at Kamloops, June 2-4, 1982. Cannings attended and made the aims of the Biological Survey known. The meetings

were very successful in bringing together scientists from various disciplines and in airing some of the difficulties inherent in classifying British Columbia's complex grassland communities. Participants included geologists, pedologists, climatologists, botanists, range managers and one entomologist. Cannings chaired a discussion group on research needs in grassland classification and stressed the need for interdisciplinary cooperation (such as is embodied in the Biological Survey) and the acute shortage of protected research areas such as ecological reserves. A published proceedings of the conference is in preparation.

Below is an overview of the main classification scheme discussed. It is taken from a preliminary draft for the revised University of British Columbia Forestry Handbook written by Alison Nicholson and Evelyn Hamilton, British Columbia Forest Service.

> Grasslands are areas which primarily support grasses and grass-like plants. In North America, extensive, continuous areas of grasslands occur east of the Rocky Mountains, whereas to the west grasslands occupy smaller areas interrupted by mountain ranges. The northern, discontinuous limits of grasslands west of the Rockies are the major, southern, interior valleys of British Columbia including: the Kettle Valley; the Okanagan Valley from the U. S. border to Vernon; the Similkameen River Valley from the U. S. border to Princeton; the Thompson River Valley; the Nicola River Valley and adjacent plateau areas; and the middle Fraser River and Lower Chilcotin River Valleys from Riske Creek to Lillooet. Smaller grasslands occur in southeastern B. C. in the Kootenay and Columbia River Valleys. B. C.'s grasslands are dominated by bunchgrass and semi-desert shrubs and underlain by Chernozemic soils.
>
> Climatically grasslands are characterized by warm-to-hot, dry summers and cold winters with relatively little snowfall. June is typically the wettest month while March and April are the driest. Comprehensive climatic data representative of the elevational and latitudinal range of grasslands are lacking. In fact,

only the southern valley bottoms are adequately monitored. Characteristically, however, in grassland areas as elsewhere in B. C. temperatures drop and precipitation becomes greater with increasing elevation.

Grassland vegetation is relatively diverse reflecting minor chages in topography, aspect, and drainage. Community patterns are, however, poorly understood due to dramatic alterations in vegetative composition caused by overgrazing. In general, with increased grazing unpalatable or inconspicuous vascular species increase in abundance while bunchgrasses decline. By careful study of relatively undisturbed, relic grasslands, fenced exclosures, successional trends and historical evidence, and by extrapolation and conjecture, three dominant climax grassland types can be identified within a matrix of temperature, precipitation, altitude, and latitude.

The hottest and driest "Lower Grasslands" occur primarily on glacio-fluvial and glacio-lacustrine terraces and fluvial fans in the valley bottoms. Soils are typically calcareous Brown Chernozems although Dark Brown Chernozems also occur. Undisturbed sites are characterized by widely spaced Agropyron spicatum bunches and a dense crust of lichen species (e.g., Candelariella terrigena, Cladonia spp., Diploschistes scruposus, and Endocarpon pusillum). Scattered Artemisia tridentata is also diagnostic, often dominating the shrub layer of overgrazed sites. Vascular and bryophyte species diversity is generally low. Artemisia frigida, Poa sandbergii, Lomatium macrocarpum, Opuntia fragilis, Stipa comata, Tragopogon dubius, and the mosses Bryum caespiticium, Ceratadon purpureus, and Tortula ruralis are commonly present although not abundant. The moss species tend to increase in abundance on overgrazed sites, while lichen cover declines. Extreme overgrazing results in invasion by annuals such as Bromus tectorum and Centaurea spp.

A "Middle Grassland" occupies a less arid band above the Lower Grassland. Soils are mainly Dark Brown Chernozems developed from morainal till. Agropyron spicatum dominates the Middle Grassland. Its closer spacing and the absence of Artemisia tridentata distinguish the Middle Grasslands from those of lower elevations. Koeleria macrantha and Poa sandbergii are secondary grasses and Artemisia frigida and Chrysothamnus nauseosus are common shrubs. The diversity and abundance

of forbs increase somewhat from the Lower Grasslands. Achillea millefolium, Antennaria spp., Artemisia campestris, Crepis atrabarba, and Lomatium macrocarpum become more common as does Festuca scabrella in the south, and Linum perenne in the north. Lichens and mosses, although not as abundant as at lower elevations, remain common.

Above the middle grasslands and extending onto the plateaus are the Upper Grasslands, charaterized by a cooler moister climate, Dark Gray and Black Chernozemic soils developed from morainal deposits, and a relatively diverse and highly productive flora. Upper Grassland vegetation consists of dense bunches of Agropyron spicatum and numerous forbs such as Achillea millefolium, Allium cernuum, Antennaria spp., Astragalus miser and Zigadenus venenosus. The grasses Koelaria macrantha and Poa sandbergii are normally abundant. Shrubs are scarce although Artemisia frigida becomes prominent with overgrazing. Moss and lichen abundance and diversity are relatively low. Distinct differences in species composition exist between Upper Grasslands of the Fraser and Chilcotin River areas and those to the south. In the south Agropyron spicatum is codominant with Festuca scabrella and, in the extreme, F. idahoensis. Neither of these Festuca species occurs in the north. Similarly Lupinus sericeus, often a prominent species in the south, is absent in the Fraser and Chilcotin areas. On the other hand Tragopogon pratensis and Potentilla pensylvanica are common in the north but not in the south. Furthermore the northern Upper Grasslands are distinguished by extensive domination by Stipa richardsonii and Festuca saximontana of open sites adjacent to forested lands. Here, Geum triflorum, Koeleria macrantha, Penstemon procerus, and Solidago spathulata are usually present and abundant and associated with a wide variety of other species such as Anemone multifida, Astragalus agrestis, Cerastium arvense, Danthonia intermedia, Galium boreale, Geranium viscosissimum, Poa pratensis, and Stipa occidentalis

Within any one of these three main climax grasslands drier and wetter sites occur. In the Lower Grasslands coarser soils are characteristically dom ated by Stipa comata and Sporobolus cryptandrus. Pinus ponderosa and Pseudotsuga menziesii often grow on steep, rocky slopes, on the coarser textured soils of outwash plains and colluvial fans, or in moist draws. Drier sites within the Middle Grasslands often resemble the lichen - bunchgrass dominated communities of the Lower Grassland,

while Stipa comata is dominant on Middle Grassland sites which feature sandier, nutrient-poor soils. Moister sites support communities dominated by Poa pratensis and, in the north, Stipa spartea. Drier sites in the Upper Grasslands tend to resemble the less dense bunchgrass communities of the Middle Grasslands. Small, moist depressions support Poa pratensis, Stipa richardsonii and a variety of forbs. In the south, north aspects tend to be dominated be Festuca scabrella (or Festuca idahoensis). At the higher elevations of the Middle Grasslands and in the Upper Grasslands, Populus tremuloides clumps become common on finer soils within moist depressions. In addition patches of Pseudotsuga menziesii occur on some moister sites in the Upper Grasslands. The landscape of the Upper Grasslands therefore is parkland in appearance indicating its transitional nature from forest to grassland.

As new information becomes available it is sometimes necessary to review the position of certain landscape types within the biogeoclimatic framework. Such is the situation concerning grasslands. At present, most grassland areas are included in the Ponderosa Pine - Bunch Grass (PPBG) and interior Douglas Fir (IDF) Zones. Their relationships within these zones, however, are not clear. Confusion or disagreement regarding grassland classification is generally related to disturbance (particularly overgrazing and fire) and to scale (i.e., the limited areal extent of B. C.'s grasslands).

Currently, various alternatives for classifying grasslands within the biogeoclimatic framework are being investigated. These include recognition of: 1) the Middle and Lower Grasslands as climatic climax and a subzone of the PPBG zone; 2) the Middle and Lower Grasslands as climatic climax and different enough from the PPBG zone to warrant inclusion in a separate grassland zone; 3) the Upper Grasslands as an edaphic or topoedaphic climax condition within the IDF zone; 4) the Upper Grasslands as climatic climax and a subzone of the IDF zone; 5) the Upper Grasslands as climatic climax and different enough from the IDF zone to warrant inclusion in a separate grassland zone which may or may not include the Middle and Lower Grasslands.

Certain scientists believe that for good reason the Artemesia tridentata dominated sections of the Lower Grasslands should be given separate status. The Upper Grasslands of the Cariboo - Chilcotin also

are considered by some to be distinct enough to warrant separation from the Upper Grasslands of more southern areas. In addition, the grasslands along the banks of the Peace River contain distinctive eastern elements suggesting the creation of another B. C. grassland type separate from the main Palouse Grasslands of the southern valleys and plateaus.

Cannings' present idea is to find a typical (and preferably protected) site in each of the grassland types and gather data on soils, vegetation and climate to compliment entomological data. A certain amount of general collecting will be undertaken, but detailed studies on a small number of taxonomic groups will stressed. Cannings now is studying differences in the populations of Asilidae in different grassland habitats. This group approach to collecting and comparison of faunas among grassland types makes the research more manageable and has the best chance of producing early results. Preliminary collecting shows many groups offer promising research possibilities. Syntheses of collection results and other research data ultimately will produce useful comparisons of insect communities in the various grasslands of B. C. and can be applied to the study of Canadian grasslands as a whole.

STUDY SITES

The initial choices for study sites are outlined below. Detailed vegetation descriptions of these sites will be undertaken in 1983 with the help of B. C. Provincial Museum botanists. Comparisons of the three grassland types can be made in either an elevational or latitudinal context.

I. Elevational Series

On the Lac du Bois range at Kamloops a convenient grassland series from Lower to Middle to Upper Grassland has been studied for some

time (van Ryswyk et al, 1966). Sites here, from 350 to 950m a.s.l. have been examined with respect to their climate, soil profiles and plant communities. A certain amount of general insect collecting has been done in this locality by G. J. Spencer and G. G. E. Scudder over the last 50 years. Studies in the changes of insect communities with changes in elevation and vegetation could be fruitful.

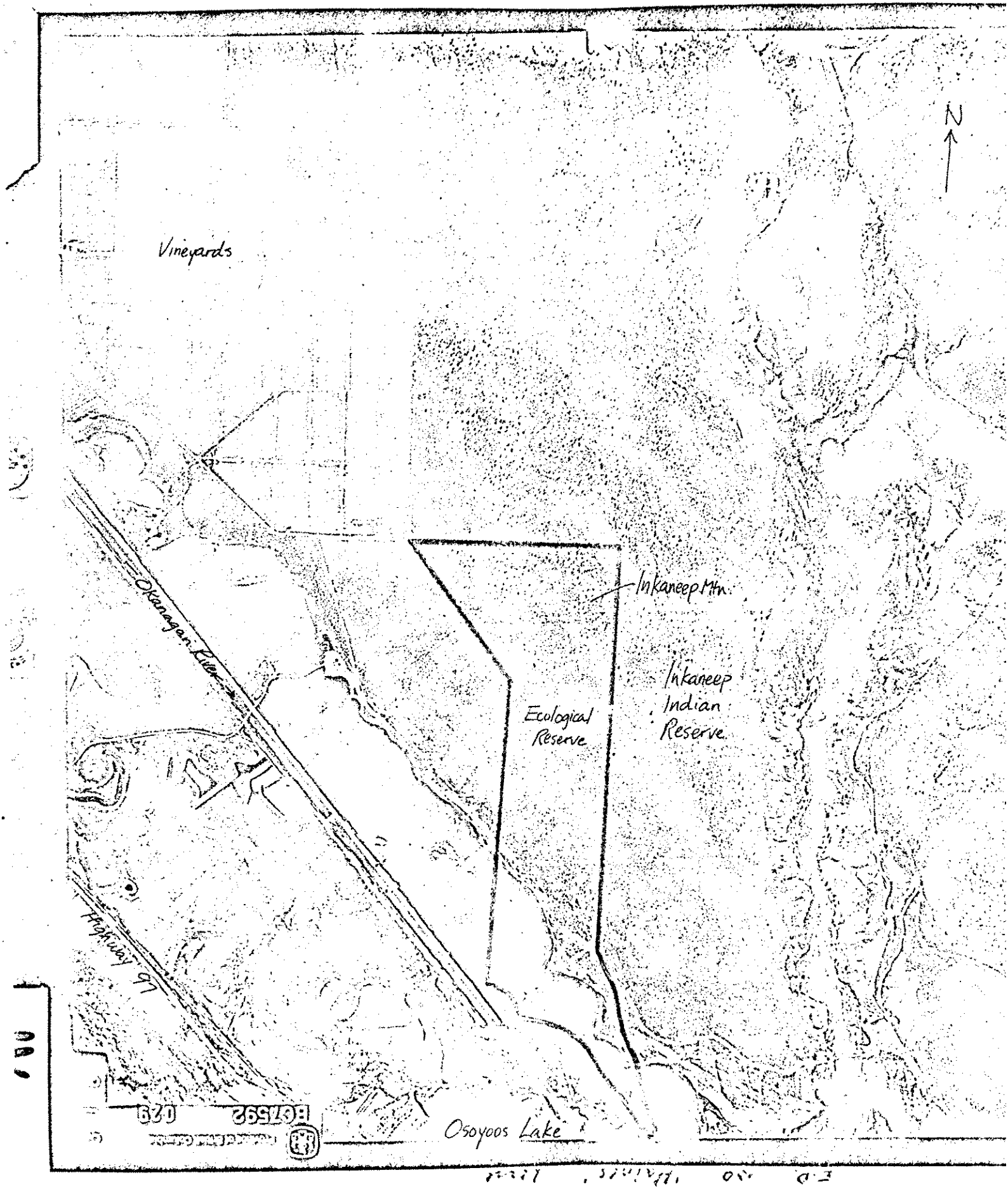
II. Latitudinal Series

A. Lower Grasslands

There are two localities especially suited for research in this grassland type apart from the lowland locality in the Kamloops elevational series noted above. One, at Osoyoos, is dominated by sandy soil and the shrub Purshia tridentata (Antelope Brush); the other, at Chopaka, consists mainly of clayey soil with Artemesia tridentata (Sage) as the dominant shrub. Both areas are included in the "Osoyoos Arid Biotic Zone" of Munro and Cowan (1947) and potentially include Great Basin arthropod faunas absent a few miles to the north.

Haynes Lease Ecological Reserve

Created as B. C. Ecological Reserve No. 100 on December 17, 1980, this 101 ha. strip of land runs from the northeast corner of Osoyoos Lake north to the cliffs of Inkaneep Mountain. It contains a variety of habitats from lakeshore, river oxbows, riparian woodland and marsh to xeric shrubby grassland and cliffs. About three-quarters of the area can be considered grassland. The ecological reserve is fenced and bounded on the north and east by Inkaneep Indian Reserve and on the west by a similar gradient of marsh and arid grassland. The benchland to the west is a grazing reserve, preventing its incorporation into adjacent vineyards and leaving it available for future use as an ecological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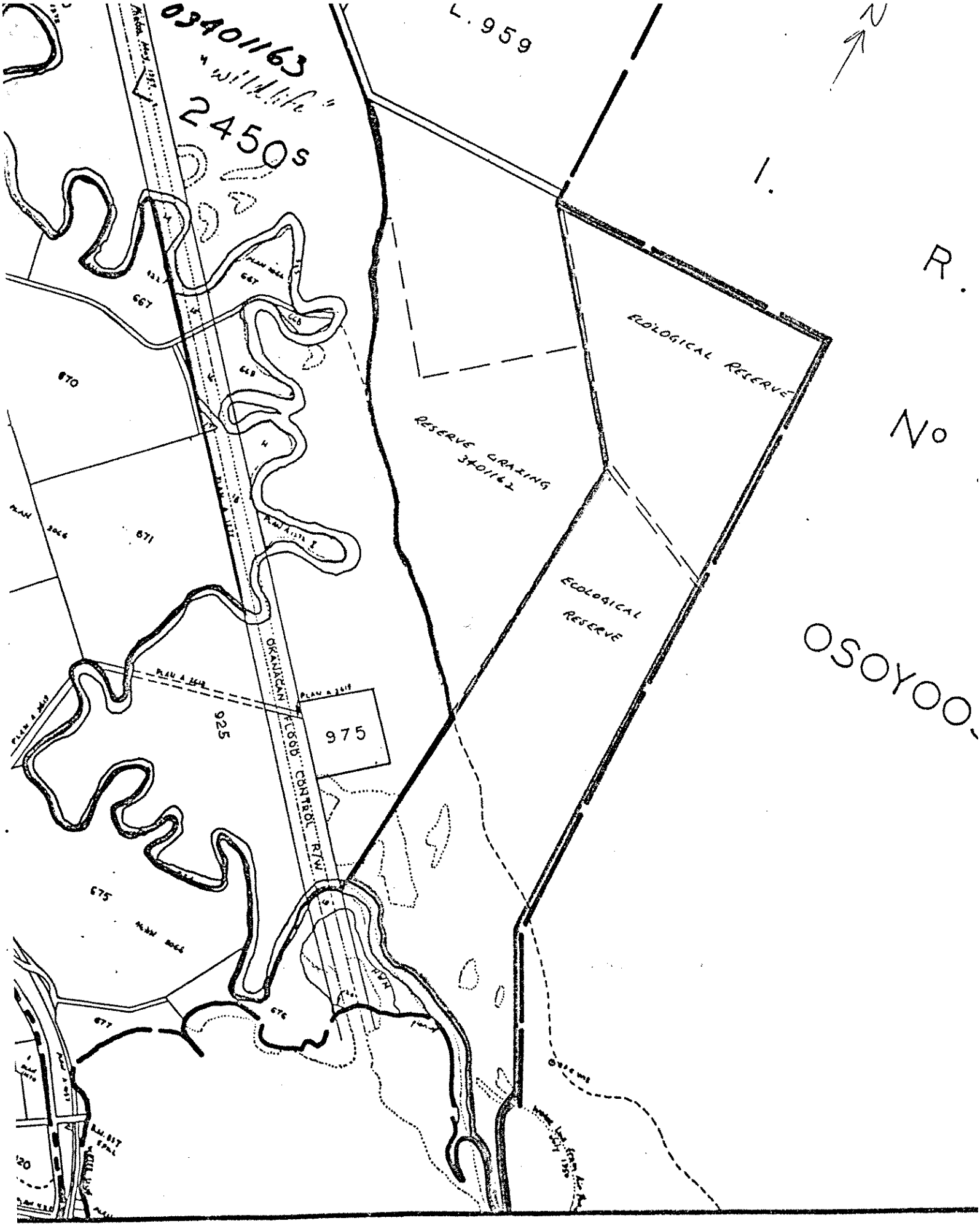
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reserve. Adjacent wetlands are established as a Wildlife Management Reserve and will be maintained in a more or less natural state. Thus there exists potential for research comparing communities of grassland, wetlands and irrigated vineyards.

There are three main physiographic divisions in the reserve, with a total of 13 plant communities:

1. Alluvial floodplain
   a) Betula occidentalis/Salix rigida/Rosa -- silty banks and sandy river levee; on driest sites.
   b) Salix exigua -- riparian thickets on edge of marshland.
   c) Phragmites communis -- marsh/fen on edge of marshland.
   d) Scirpus lacustris -- marsh in river delta and oxbows.
   e) Typha latifolia -- marsh in river delta and oxbows.

2. Sandy terraces
   a) Purshia tridentata/Aristida longiseta/Sporobolus cryptandrus -- shrub/steppe community (moderately grazed) on sandy outwash.
   b) Sporobolus cryptandrus/Bromus tectorum/Opunta fragilis -- overgrazed phase of 2a.
   c) Pinus ponderosa/Purshia tridentata -- savannah/steppe community at base of Inkaneep Mountain.

3. Cliffs and ledges (Inkaneep Mountain)
   a) Agropyron spicatum/Poa juncifolia -- bunchgrass steppe community in ungrazed condition; fine textured silts over bedrock outcrop.
   b) Pinus ponderosa/Agropyron spicatum -- savannah in ungrazed condition; fine textured silts over bedrock outcrop.
   c) Rhus glabra/Rhus radicans/Philadelphus lewisii -- thickets at base of talus slopes and other coarse textured colluvium.

d) Pseudotsuga menziesii/Agropyron spicatum -- savannah, ungrazed; equivalent to 3b on northerly aspects.

e) Pseudotsuga menziesii/Amelanchier alnifolia -- dry forest at highest elevations; over coarse till and colluvium.

Grassland studies are mainly concerned with 2a, b, and c and 3a, b, and d. Comparisons between 2 and 3 will throw light on the effects of grazing since communities in 2 have been grazed for 120 years while those in 3 are in pristine condition. Comparisons of grassland communities within the newly fenced reserve with those in the adjacent Indian Reserve and Grazing Reserve may also be instructive.

Scudder (1980) lists some of the noteworthy arthropods that are characteristic of the Osoyoos Arid Biotic Zone. These inlcude the scorpion Paruroctonus boreus (Girard), the wind-scorpion Eremobates scaber (Kraepelin) and the native mantid Litoneutria minor (Scudder). Other species virtually confined to this area in B. C. include the lygaeid Phlegyas annulicrus Stal, the reduviid Fitchia spinulosa Stal, the hebrid Merragata hebroides White, the butterflies Apodemia mormo (Felder and Felder) and Euchloa hyantus Edw., the apiocerid Apiocera haruspex O. S., the syrphids Asemosyrphus polygrammus (Loew) and Copestylum caudatum (Cn), the tiger beetle Cicindela parowana Wickham and the scarabs Euphoria inda rufobrunnea Csy. and Hoplia deserticola Bayar.

Some of these undoubtedly occur on the Haynes Lease; at least Paruroctonus and Apiocera have been collected there. With additional study, the site will yield new Canadian records for Great Basin species.

Chopaka Flats

This area of sage grassland immediately north of the Chopaka Customs house on the International Boundary has good potential for a Lower Grassland study site. The land is privately owned but Second

Century Fund is presently negotiating its purchase. The density of asilid genera such as Efferia, Scleropogon and Stenopogon is extremely high.

B. Middle Grasslands

Kalamalka Lake Park, Vernon

This park represents a protected, easily accessible and diverse area of grassland ideally suited to entomological research. The North Okanagan Naturalists Club for several years has been studying the natural history of the park and has identified at least some of the insect species there. One of the workers is James Grant, a retired entomologist from the Forest Insect Survey. The use of this site represents an opportunity for the Biological Survey to involve interested amateurs.

C. Upper Grasslands

Lac du Bois

This is the site mentioned previously in the altitudinal series. It is a typical Upper Grassland site for the southern Interior and similar to the more extensive grasslands in the Nicola Valley.

Riske Creek, Chilcotin

As noted earlier, the grasslands of the Cariboo/Chilcotin are special Upper Grasslands, and perhaps deserve a separate site. This area has been studied entomologically for a number of years by E. R. Buckell, G. J. Spencer and G. G. E. Scudder and his students. Its northern location gives it special significance in biogeographical studies.

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