

Cougar Canyon

Ref. No.:

303

ECOLOGICAL RESERVES COLLECTION
GOVERNMENT OF BRITISH COLUMBIA
VICTORIA, B. C.
V8V 1X4

AN INTERPRETATION ASSESSMENT OF

KALAMALKA LAKE PARK

BY ROB CANNINGS

OCTOBER, 1975

Report No. 25

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whole report*

THE CLIMATE *

The Okanagan climate is one of the mildest in Canada. Summers are warm with cool nights and winters are mild with occasional low temperatures lasting from a few days to a week. Generally there are one or two cold periods each winter, when the temperature may reach zero or go below zero. During such periods the smaller lakes are covered with ice, but Okanagan Lake is generally ice-free, excepting once or twice in a decade when a late cold spell will cause it to freeze over.

In the southern part of the valley, only about half of the winters have short periods of zero temperature, while in the north zero temperatures are somewhat more frequent. Important features of the valley climate are a rise in mean temperature, a gradual drying off, and an extension of the frost-free period from north to south.

Temperature

Since temperatures constantly change, the use of mean annual temperature has greatest value for comparative purposes. Different stations show that the northern part of the valley is from 4° to 6° colder than the south end.⁽⁵⁾ The mean annual temperature at Salmon Arm in the north is 46° F., but it drops to 44° at Armstrong. Southward the mean annual temperature increases to 50° at Oliver.

Winter temperatures for December, January, and February are 26 for Salmon Arm and 29° at Oliver. These are among the highest winter temperatures in Canada. The lake influence is very marked, as indicated by the lower temperatures at Armstrong shown in table 1. Spring temperatures are the average of the monthly means for March, April, and May, and are useful in showing the relative earliness of the season. These are 47° at Salmon Arm and 51° at Oliver.

TABLE 1: AVERAGE SEASONAL TEMPERATURES. (Deg. F) (5)

Station	Elevation Feet	Winter	Spring	Summer	Autumn	Year
Salmon Arm.....	1159	26	47	65	46	46
Armstrong.....	1187	24	45	64	44	44
Vernon.....	1287	26	47	66	46	47
Kelowna.....	1130	28	46	65	47	47
Summerland.....	1300	29	48	68	48	49
Penticton.....	1121	30	48	66	48	48
Oliver.....	995	29	51	71	49	50
Keremeos.....	1165	28	50	68	49	49

The summer temperature is the average of the monthly means for June, July, and August. These are 65° at Salmon Arm and 71° at Oliver, a difference of 6°. Autumn temperatures for September, October, and November are important for many late crops. The range of autumn temperature from north to south in the valley bottom is from 46° at Salmon Arm to 49° at Oliver. For some purposes, it may be desirable to supplement the seasonal temperatures with monthly means. The monthly means for selected stations are given in appended table 1.

In table 2 are shown the highest and lowest temperatures on record. At the north end of the valley, a high of 106° F. occurred at Salmon Arm in 1941, while at Oliver, 111° was recorded in the same year. The lowest known temperature in the north is -39° F., experienced at Armstrong in 1943. At Oliver a minimum of -21° was placed on record in 1943.

TABLE 2: EXTREME TEMPERATURES AND AVERAGE SNOWFALL
1916 TO 1946, (5)

Station	Temperature (Deg. F)			Year	Snowfall (Inches)
	High	Year	Low		
Salmon Arm.....	106	1941	-31	1916&17	66.7
Armstrong.....	105	1941	-39	1943	46.4
Vernon.....	104	1941	-26	1917	43.6
Kelowna.....	102	1941	-17	1935	31.9
Summerland.....	104	1941	-17	1916	29.9
Penticton.....	105	1941	-12	1935&36	31.2
Oliver.....	111	1941	-21	1943	21.5
Keremeos.....	106	1926	-20	1923	23.5

* From Kelley and Spilsbury, 1948.

Among the chief factors affecting the micro-climate of the valley depression is altitude, which has an important influence on temperature and precipitation. The temperature drops as elevation is increased and the air loses its ability to hold moisture. Native vegetation and agriculture are affected by the greater relative humidity and shorter growing season at the higher elevations.

In the growing season, the deeper parts of the valley attain moderately high temperatures during the day, but collect cool air which drains from the slopes at night. Frost danger at night is offset by the valley lakes, which stabilize the climate of nearby areas.

The Growing Season

Each plant has its own growing season. Some plants are more resistant than others to cold and their periods of growth vary accordingly. A measure of this period is essential, however, in a description of climate, and this is defined as the date on which the mean of 43° F. occurs in spring and fall. On this basis, growth at Salmon Arm begins around April 6, and extends to October 22, a period of about 199 days. At Oliver, growth begins about March 16, and ends 226 days later on October 28, a difference of about 27 days in favour of the south end of the valley. The growth period at other stations is shown in appended table 2.

The occurrence of the last frost in spring and the first frost in fall is of significance mainly to the group of crops with the least frost resistance. It is with these crops that large commercial losses are likely to occur, and for them the last date in spring on which the temperature 32° F. is recorded, or the first similar condition in fall, is regarded as the date of the first and last killing frost.

The conditions surrounding the occurrence of frost are complex; altitude and air drainage being of primary importance in the interior valleys. The distribution of frost and its relative severity often varies with slight differences of elevation, owing to the tendency of cold air to collect in local depressions. Bodies of water also have a moderating influence and the frost-free period near valley lakes is generally greater than a mile or two away.

Because the period available for plant growth is largely confined to the time between the last killing frost in spring and the first in fall, the dates of these frosts and the periods between them are the most important statements of frost occurrence that can be recorded. These dates in any locality are subjected to wide variations from year to year, and the most significant fact regarding them is their irregularity. With spring planting, the possibility of frost damage lies between the narrowest and the widest limits, hence the question the farmer must decide is the degree of risk he is able to incur in order to make use of the period between the earliest final spring frost and the latest spring frost in the local record. In appended table 2 is shown the frost datum at selected stations in the Okanagan and Similkameen valleys.

Precipitation

The shape of the precipitation pattern in the valley region is dominated by the general climatic factors which affect the southern interior. These are the influence of the Pacific Ocean and the arrangement of the Coast Mountain systems.

In winter, the moisture-saturated winds from offshore, turned upward by the Cascades and the Coast Range, are cooled with increased elevation and they discharge the bulk of their water on the higher western slopes. When these winds arrive on the east side of the mountains they are at high elevation and much of their moisture has been lost; thus limiting the interior to a smaller total precipitation than the coast.

There is a secondary maximum of precipitation on the western slopes of the Selkirk Range, not far from the north end of the Okanagan Valley. Southward, the Okanagan veers away from the Selkirks, hence the north end is the most humid part, with a gradual drying off towards the International Boundary.

Summer is dominated by comparatively cloud-free westerly winds which bring dryness to the coast and to the interior. High winter precipitation succeeded by summer dryness, the chief characters of the coast climatic regime, yields a modified precipitation pattern in the Okanagan district as illustrated in Fig. 1.

In the interior, the lighter winter precipitation falls mainly in the form of snow; with an uneven distribution caused by difference of elevation. The high mountains receive the greatest snowfall and low elevations farthest away from high elevations receive the lightest fall of snow. Decreased rainfall in summer follows the trend of lighter snowfall and the whole precipitation pattern shrinks as distance from the high mountains to the low elevations is increased. A departure from the coast precipitation pattern is the secondary peak of rainfall in June. This feature is of great importance to agriculture, particularly in the North Okanagan.

Salmon Arm, at the north end of the Okanagan district, has an annual precipitation of 19.23 inches. Southward, the decrease in precipitation is progressive until at Oliver there is an annual average of only 9.42 inches. The gradual reduction of precipitation from north to south is the factor which creates successively more arid soil and the vegetative distinctions in the valley bottom. Appendix table 3 shows the amounts of precipitation under which these climatic types developed. Salmon Arm exemplifies the minimum needs of the Inter-

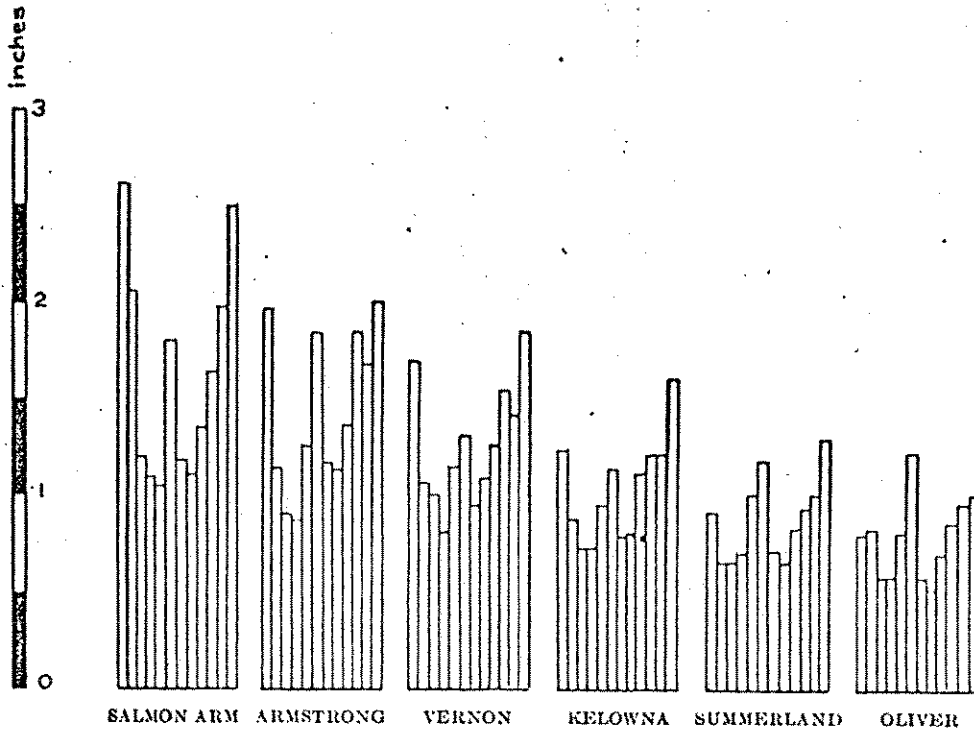


Fig. 1: Precipitation pattern in the Okanagan Valley, January to December, illustrating the drying off from north to south and important June rainfall. Average for 23 years or more.

mountain Podsol. Armstrong and Vernon, with high June rainfall, indicate the north and south limits of the Black Earth in the valley bottom. The Kelowna station shows the precipitation associated with the Dark Brown Soils, while Summerland and Oliver indicate the northern and southern precipitation of the Brown Soils.

Relative Humidity

Relative humidity, calculated from wet and dry bulb readings, is highest in winter and lowest in summer, as shown in Fig. 2. The average relative humidity at Vernon is shown in appended table 4.

In the absence of rain, the comparative constancy of water vapour in the atmosphere brings a drop in relative humidity as the temperature rises with the sun. Under these conditions, a relative humidity of 80 per cent at dawn may drop to 20 per cent in the hottest part of the day. While Vernon has the only humidity station in the Okanagan from which continuous data are available, there are many indications that relative humidity in the northern and southern parts of the district have some variation. Higher summer humidity in the north permits the growth of certain crops that cannot be produced successfully in the south.

Low relative humidity in summer also has a direct influence on the growth of parasitic fungi. Apple scab and similar parasites, which have gained a foothold in the north, cannot maintain their existence in the southern Okanagan because of the prevailing low humidities. An expression of comparatively low humidity throughout the map area in the growing season is the freedom of crop foliage from fungus spots of all kinds. However, the virile codling moth thrives under these conditions much better than in more humid districts.

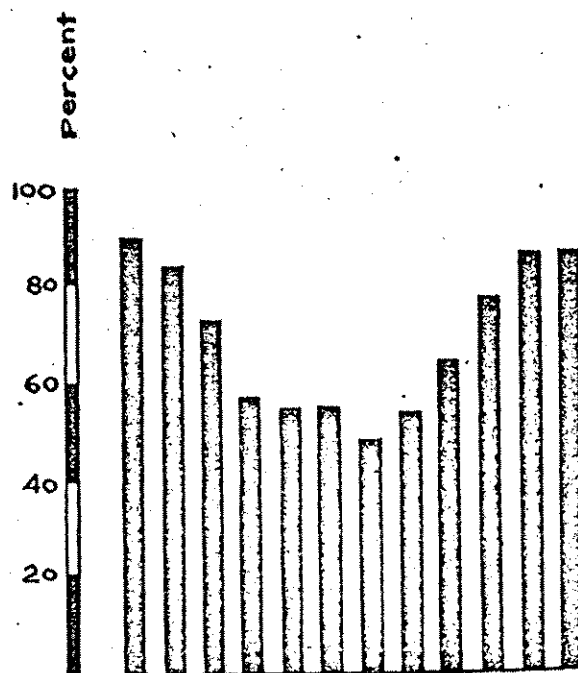


Fig. 2: Relative humidity at Vernon, January to December, average for 17 years.

Cloudiness and Bright Sunshine

In November, December, and January extreme cloudiness prevails in the southern part of British Columbia and bright sunshine is restricted to a remarkable degree. In the Okanagan Valley, this general cloudiness is increased by a low ceiling which forms at the height of the valley rim, and in mild winters when north winds rarely occur, the cloudiness can be greater than in any part of the Province where records are kept. In cold winters, which have more north wind, the hours of bright sunshine are considerably increased. While lack of sunshine in winter is not always appreciated, it has fundamental value to the valley agriculture. The cloud ceiling levels winter temperatures and the winter-killing of fruit trees by freak weather is of rare occurrence.

In summer, bright sunshine reaches a peak in July with 324 hours at Summerland. In the whole Province, this average is exceeded only by Victoria with 334 hours of sunshine. The distribution of sunshine throughout the year is shown in Fig. 3, and hours of bright sunshine at 4 valley stations are appended in table 4.

Prevailing Wind

For all months of the year, except July, the prevailing surface wind is up-valley from the southwest, with average velocity of 6.17 miles per hour. In July the wind prevails from the northeast, with average velocity of 6.94

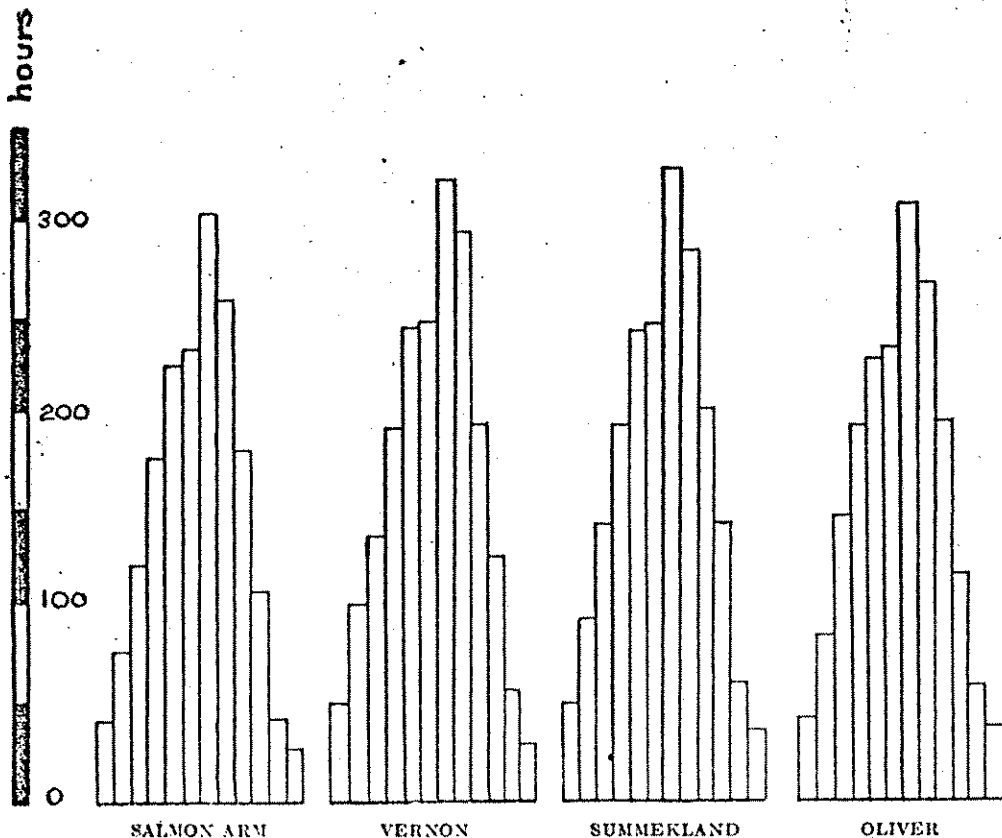


Fig. 3: Sunshine pattern, January to December, at four Okanagan Valley stations. Average for 23 years or more.

miles per hour. These winds are warm and light, but occasionally strong in spring and fall. They are varied with local down-draft from tributary stream coulees on the west and more rarely on the east, with occasional north winds. At the Summerland Experimental Station, the maximum velocity recorded in 10 years is 46 miles per hour, the average maximum velocity being about 24 miles per hour, and the yearly total about 51,000 miles.

The prevailing drift of air from the southwest in winter is slight, and this permits the accumulation of a low cloud ceiling over the valley depression. When the wind shifts to the north, the cloud ceiling is dispersed, but it returns when the drift of air is again from the southwest.

APPENDIX 2 . SOME COMMON MOSSES OF THE COSENS BAY AREA

- Aulacomnium androgynum: On logs in coniferous forest.
- Brachythecium sp.: On forest floor (Deep L.)
- Dicranum linvelli(?): On earth and logs.
- Dicranum tauricum: Logs.
- Dicranum sp.: Dry rangeland.
- Grimmia apocarpa: On rocks, usually in exposed sites.
- Hylocomium splendens: In forests on boulders, logs, earth.
- Metaneckera menziesii: On logs and deciduous trees.
- Mnium spinulosum: In wet woods on earth, rocks and logs.
- Philonotis fontana: Seepage areas.
- Plagiomnium sp.: Deep L.
- Pohlia cruda: Shaded, damp coniferous forest; cliff crevices, streambanks.
- Polytrichum juniperinum: In open or in forest; earth and rocks, especially in dry sites.
- Portilla sp.
- Pterigynandrum filiforme:
- Ptilium crista-castrensis: Usually on the floor of coniferous forest.
- Racomitrium brevipes: Rangeland.
- Rhytidiadelphus triquetrus: Logs, rocks and forest floor in all types of forest.
- Timmia austriaca: Coniferous forests; logs, banks and forest floor.
- Tortula muralis: On rocks.

APPENDIX 3. A PRELIMINARY LIST OF THE VASCULAR
PLANTS OF THE COSENS BAY AND DEEP LAKE AREA
INCLUDING COUGAR CANYON AND THE RIDGES EAST OF
KALAMALKA LAKE.

The following is an annotated list of the vascular plants known by the author to occur in the area outlined on the accompanying map. The list is a preliminary one; many more species will be added in the future as the area becomes better explored botanically. In particular, the aquatic plants and monocots, especially the sedges, rushes and grasses, require more study. Spring wildflowers need much more attention.

The list contains 432 species, most of which were seen and identified by me during field work from June 16 to August 21, 1975. Information on a number of species, especially those appearing early in the spring, was supplied by local naturalists. Their initials follow the species reported. Joan Heriot (JH) and John Shephard (JS) were particularly helpful. I would like to acknowledge the efforts of James Grant (JG); his botanical knowledge and companionship in the field are much appreciated. John Pinder-Moss (J.P-M.) of the Dept. of Botany, U.B.C., identified some of the ferns.

The nomenclature and phylogenetic order used follow the rather conservative treatment of the Pacific Northwest flora by C. L. Hitchcock and A. Cronquist (1973).

General habitats are listed; these are taken from field notes as are specific location records and some information on flowering (flr) and fruiting (fr) dates in 1975. Common names largely are taken from Hitchcock and Cronquist (1973). Some identifications are in doubt; a question mark precedes these species.

Localities are noted on the accompanying map. Locality records are abbreviated as follows:

1. BV Bear Valley
2. BVM Bear Valley Meadow
3. CB Cosens Bay
4. CB Pond Cosens Bay Pond
5. CC Cougar Canyon
6. C Cr Cosens Creek
7. CP Cattle Pond
8. DG Devil's Gorge
9. DL Deep Lake
10. ER Ellison Range
11. FB Falcon Bay
12. FP Foxtail Pond
13. Ja B Jade Bay
14. Ju B Juniper Bay
15. PLR Powerline Road
16. RH Rattlesnake Hill
17. RHC Red Hawthorn Creek
18. R Pt Rattlesnake Point
19. TP Turtle Pond

Lakes in Cougar Canyon are numbered from the south. All localities mentioned above 2500 feet in elevation are alongside the logging road that climbs the ridge to the east of Kalamalka Lake and descends into the Oyama Creek Valley.

Rob Cannings
September, 1975

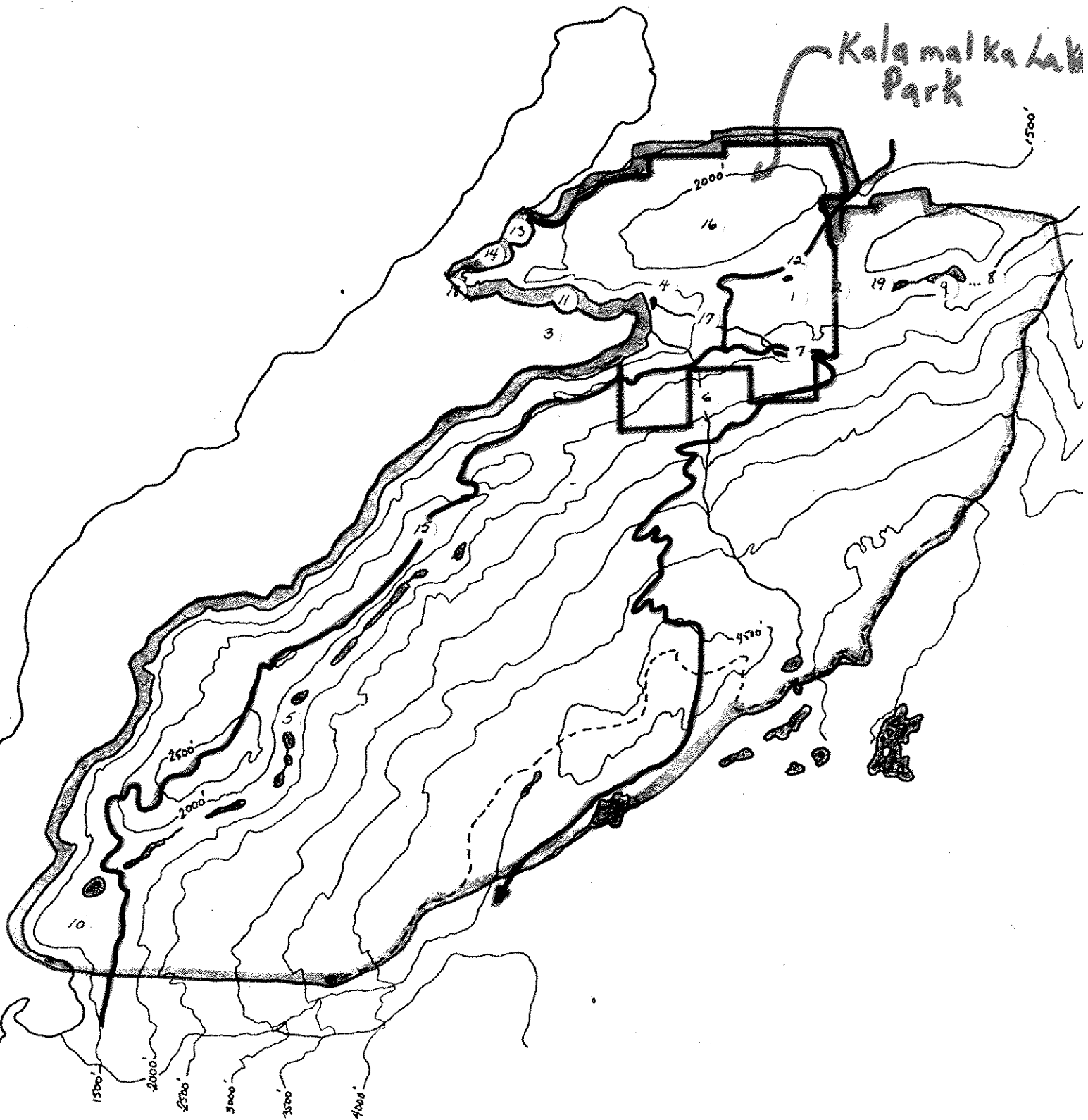


Figure 12. The Study Area.

Flora and fauna observations were made in the area outlined in blue. Key on preceding page.

LYCOPODIACEAE

Clubmoss Family

Lycopodium annotinum L. (Stiff Clubmoss) Reported from DL
by JH.

SELAGINELLACEAE

Selaginella Family

Selaginella densa Rydb. var. scopulorum (Maxon) Tryon (Compact Selaginella). Abundant ground cover on slopes and rangeland, especially dry, exposed sites.

Selaginella wallacei Hieron. (Wallace's Selaginella). Talus slopes in CC.

EQUISETACEAE

Horsetail Family

Equisetum arvense L. (Common Horsetail) Widespread in area; beaches, water margins, damp woods.

Equisetum fluviatile L. (Water Horsetail) Growing abundantly with Potentilla palustris and Carex rostrata in small marsh at height of land east of Kalamalka Lake.

Equisetum hymale L. var. affine (Engelm.) A.A. Eat. (Common Scouring-rush) Widespread; beaches, DG, good growth between 10th and 11th lake CC.

Equisetum laevigatum A.Br. (Smooth Scouring-rush) JuB.

Equisetum scirpoides Michx. (Sedgelike Scouring-rush) Marsh margin between 2nd and 3rd lakes CC; marsh east of height of land, about 4500 ft.

Equisetum sylvaticum L. (Wood Horsetail) Wet roadside at about 4500 ft. elevation just east of height of land.

Equisetum variegatum Schleich. var. variegatum (Northern Scouring-rush). JuB.

OPHIOGLOSSACEAE

Adder's-tongue Family

Botrychium lunaria (L.) Swartz var. onondagense (Underw.) House (Moonwort) Dense cedar woods north of 10th lake, CC.

Botrychium virginianum (L.) Swartz (Virginia Grape-fern) Dense cedar woods north of 10th lake, CC.

POLYPODIACEAE

Fern Family

Athyrium filix-femina (L.) Roth. (Lady-fern) Widespread in damp, shady places; DL, DG, CC.

Cheilanthes feei Moore (Fee's Lip-fern) In rocks in open
grassland. Identified by J. P-M.

Cryptogramma crispa (L.) R.Br. (Parsley Fern) Talus, broken
rock, CC.

Cystopteris fragilis (L.) Bernh. (Brittle Bladder-fern) Douglas
Fir forest, RH 2000 ft.

Dryopteris austriaca (Jacq.) Woynar (Spiny Wood-fern) Deep
cedar woods north of 10th lake CC; logging road crossing
of CCr.

? Dryopteris cristata (L.) Gray (Crested Wood-fern) DG.

Gymnocarpium dryopteris (L.) Newm. (Oak Fern) CCr, about 2800 feet.

Polypodium hesperium Maxon (Licorice Fern) S. side DL; CC;
CCr logging road crossing.

Polystichum lonchitis (L.) Roth (Mountain Sword-fern) Deep
cedar woods, north of 10th lake CC.

Polystichum munitum (Kaulf.) Presl var. munitum (Common Sword
Fern). Same habitat as P. lonchitis.

Pteridium aquilinum (L.) Kuhn. (Bracken) 10th lake CC.

Woodsia scopulina D.C. Eat. (Rocky Mountain Woodsia) Rocks,
open range; CC; talus DL.

CUPRESSACEAE

Cypress Family

Juniperus communis L. var. montana Ait. (Common Juniper)
Widespread on dry slopes and open woods.

Juniperus scopulorum Sarg. (Rocky Mountain Juniper) Open woods
throughout; RPt, JuB.

Thuja plicata Donn. (Western Red Cedar) Damp woods throughout;
BV, DL, DG, CC; grows abundantly on western slope of mountains
east of Kalamalka L.

PINACEAE

Pine Family

Abies lasiocarpa (Hook.) Nutt. (Alpine Fir) Ridges east of
KL, generally above about 3300 feet.

Larix occidentalis Nutt. (Western Larch) Ridges east of KL and
south of DL, as low as about 2200 feet.

Picea engelmannii Parry (Engelmann Spruce). Grows above about
2800 feet.

Pinus contorta Dougl. var. latifolia Engelm. (Lodgepole Pine)
Grows as low as about 2000 feet. Dominant tree at height
of land east of KL (about 4500 ft.)

Pinus ponderosa Dougl. (Ponderosa Pine). Dominant tree in low,
dry sites; grows sometimes as high as about 4000 ft. A.S.L.

Pseudotsuga menziesii (Mirbel) Franco (Douglas Fir) Widespread
in moist and dry areas.

SALICACEAE

Willow Family

Populus tremuloides Michx. (Trembling Aspen) Beaches; wet
areas on rangeland; CC; widespread.

Populus trichocarpa T. & G. (Black Cottonwood) Beaches; wet
areas throughout.

Salix scouleriana Barratt (Scouler's Willow) Widespread
throughout.

Salix spp. Several other species present but unidentifiable
(by me) in summer without catkins.

BETULACEAE

Birch Family

Alnus incana (L.) Moench var. occidentalis (Dippel) Hitchc.
(Mountain Alder) Beaches; wet areas throughout.

Alnus sinuata (Regel) Rydb. (Sitka Alder) At higher elevations
than A. incana, generally above 3000 ft.

Betula occidentalis Hook. (Water Birch) Beaches, BV, DL, CC.
Apparently intergrading with following sp.

Betula papyrifera Marsh. var. commutata (Regel) Fern. (Paper
Birch) Mostly wetter and shadier areas than above sp.;
DL, DG, CC.

Corylus cornuta Marsh. var. californica (DC.) Sharp (Hazelnut)
Widespread on well-drained soil, esp. BV; CC.

ULMACEAE

Elm Family

Ulmus sp. (Elm) Introduced species at N. end CB beach.

URTICACEAE

Nettle Family

Parietaria pensylvanica Muhl. (Pellitory) Shaded rocks S. end
of 3rd lake CC; DG.

Urtica dioica L. ssp. gracilis (Ait.) Seland. (Stinging Nettle)
Damp places throughout.

LORANTHACEAE

Mistletoe Family

Arceuthobium americanum Nutt. (American Dwarf Mistletoe)
Parasiticon Pinus contorta.

Arceuthobium douglasii Engelm. (Douglas Dwarf Mistletoe)
On D. Fir.

SANTALACEAE

Sandalwood Family

Comandra umbellata (L.) Nutt. (Bastard Toadflax) Abundant on
dry rangeland.

ARISTOLOCHIACEAE

Birthwort Family

Asarum caudatum Lindl. (Wild Ginger) Moist, shady woods, DL.

POLYGONACEAE

Buckwheat Family

Eriogonum heracleoides Nutt. var. angustifolium (Nutt.) T. & G.
(Umbrella Plant) Abundant on rangeland. Flr. June 16;
Fr. July 23.

Eriogonum niveum Dougl. (Snow Buckwheat) Exposed sites on
rangeland, especially towards RPt.

Eriogonum umbellatum Torr. var. subalpinum (Greene) Jones
(Sulfur Eriogonum) Rocky places about 4500 ft. Flr. August 20.

Polygonum achoreum Blake (Knotweed) Dry roads throughout.

Polygonum amphibium L. (Western Ladysthumb) Widespread in
standing water; CB pond, TP (Flr. July 23); CC.

Polygonum aviculare L. (Doorweed) Widespread weed of dry,
waste places; roads.

Polygonum coccineum Muhl. (Water Smartweed) Similar habitats
to P. amphibium, though more local: TP (Flr. July 23)
3rd lake CC.

Polygonum convolvulus L. (Climbing Bindweed) RH logged areas
(Flr. June 26); CC south end.

Polygonum douglasii Greene var. douglasii (Douglas Knotweed)
Dry areas, esp. later in summer. Flr, fr. June 25, July 29.
Var. latifolium (Engelm) Greene (Mountain Knotweed), with
P. minimum on rocky places at about 4500 ft. Flr, fr. August 20.

Polygonum minimum Wats. (Leafy Dwarf Knotweed) Rocky places,
4500 ft.

Polygonum punctatum Ell. (Dotted Smartweed) DL. flr., fr.
August 10.

Rumex acetosella L. (Sheep Sorrel) Common and widespread.

Rumex crispus L. (Curly Dock) Widespread, usually near water.

Rumex obtusifolius L. (Broad-leaved Dock) DL.

Rumex maritimus L. (Golden Dock) Pond edges, dried ponds on
rangeland. CB pond, fr. August 18.

CHENOPODIACEAE Goosefoot Family

Chenopodium album L. (Lambsquarters) Widespread in disturbed
places.

Chenopodium chenopodioides (L.) Aellen (Pink Goosefoot)
Rangeland above FB, flr. July 25.

Chenopodium hybridum L. (Maple-leaved Goosefoot) DL west end.

? Chenopodium murale L. (Sowbane) FP, fr. August 18.

Chenopodium rubrum L. (Red Goosefoot) JuB. Flr. August 16.

Salsola kali L. (Russian Thistle) Scarce on rangeland, roadsides.

AMARANTHACEAE Amaranth Family

Amaranthus albus L. (White Pigweed) CB Pond.

Amaranthus graecizans L. (Prostrate Pigweed) Roadside weed.

Amaranthus retroflexus L. (Rough Pigweed) DL.

PORTULACACEAE Purslane Family

Claytonia lanceolata Pursh var. lanceolata (Springbeauty)
Rangeland, flr. April.

Montia perfoliata (Donn) Howell (Miner's Lettuce) BVM

Portulaca oleracea L. (Common Purslane) Disturbed areas,
roadsides.

CARYOPHYLLACEAE Pink Family

Arenaria capillaris Poir. (Thread-leaved Sandwort) Exposed,
rocky places, 4500 ft.

Arenaria serpyllifolia L. (Thyme-leaved Sandwort). Trailsides
west end RH.

Cerastium vulgatum L. (Common Chickweed) Widespread; BV,
beaches.

Silene menziesii Hook. (Menzies' Catchfly) JaB. flr. June 25;
ER flr. July 29.

Silene noctiflora L. (Night-flowering Catchfly) Scarce on
roadsides. More common in Coldstream.

Spergularia rubra (L.) Presl (Red Sandspurry) Logging road at
about 4500 ft.

Stellaria media (L.) Cyrill. (Chickweed) Widespread in damp
places.

Stellaria crassifolia Ehrb. (Thick-leaved Starwort) Marsh at
4500 ft. Flr., fr. August 20.

NYMPHACEAE Water-lily Family

Nuphar polysepalum Engelm. (Yellow Pond-lily) Lakes CC.

CERATOPHYLLACEAE Hornwort Family

Ceratophyllum demersum L. (Hornwort) Lakes CC; DL.

RANUNCULACEAE Buttercup Family

Aconitum columbianum Nutt. (Monkshood) Damp areas above about
3000 feet.

Actaea rubra (Ait.) Willd. (Baneberry) CC 10th lake; damp areas
along roads above about 3000 feet.

Aquilegia formosa Fisch. (Red Columbine) Open woods; BV flr.
June 16.

Clematis columbiana (Nutt.) T. & G. (Columbia Clematis)
Woods, CC; DL.

Clematis ligusticifolia Nutt. (Western Clematis) Widespread,
climbing on shrubs, etc. Flr. June 27.

Delphinium nuttallianum Pritz. var. nuttallianum (Upland
Larkspur) Grasslands and open forests; Flr. June 16.

Ranunculus aquatilis L. (White Water-buttercup) TP, lakes in
CC flr. July 23.

? Ranunculus flammula L. (Lesser Spearwort) lakes CC. flr. July 29.

Ranunculus glaberrimus Hook. (Sagebrush Buttercup) Common on
grassland, flr. March.

Ranunculus macounii Britt. var. macounii (Macoun's Buttercup)
CC between 2nd and 3rd lakes. Flr., fr. July 29.

Ranunculus pensylvanicus L. (Bristly Buttercup) DL flr. July 23,
pond by PLR. Flr., fr. August 18.

Ranunculus repens L. var. repens (Creeping Buttercup) JaB
beach flr. June 24.

Ranunculus scleratus L. var. multifidus Nutt. (Celery-leaved
Buttercup) Widespread in wet habitats; beaches, pond edges.
CB pond flr. July 23.

Ranunculus uncinatus D. Don. (Little-flowered Buttercup)
Widespread in moist, shady places.

Thalictrum venulosum Trel. (Veiny Meadowrue) Ridge south of
DL. Fr. August 17.

BERBERIDACEAE Barberry Family

Berberis aquifolium Pursh (Shining Oregongrape) Widespread,
especially in open woods.

Berberis vulgaris L. (Common Barberry) Naturalized on rangeland.
One plant below corrals. Fr. August 16.

FUMARIACEAE Fumitory Family

Corydalis aurea Willd. (Golden Corydalis) Dry woods north of
2nd lake CC.

CRUCIFERAE Mustard Family

Arabis glabra (L.) Bernh. (Tower Mustard) Woods, BV June 23,
flr., fr.

Arabis hirsuta (L.) Scop. (Hairy Rockcress) Slope south of DL,
fr. August 17.

Arabis holboellii Hornem. (Holboell's Rockcress) PLR, fr.
August 18.

Arabis microphylla Nutt. var. microphylla (Littleleaf Rockcress)
Dry slope north end CC, fr. August 18.

Berteroa incana (L.) DC. (Berteroa) Coldstream gate, flr.,
fr. June 24.

Camelina microcarpa Andrz. (Hairy False Flax) JaB fr. June 25;
ER July 29 fruit open.

Capsella bursa-pastoris (L.) Medic. (Shepherd's Purse)
Ubiquitous weed.

Cardamine oligosperma Nutt. var. oligosperma (Little Western Bittercress) Wet roadside, 3500 feet.

Cardamine pensylvanica Muhl. (Pacific Bittercress) Marsh edge between 2nd and 3rd lakes, CC. Flr., fr. July 29.

Descurainia pinnata (Walt.) Britt. (Western Tansymustard) JaB June 24, flr., fr.

Lepidium virginicum L. (Tall Peppergrass) Dry ridge north of BV flr., fr. June 23; BV flr., fr. August 10; Widespread weed.

Rorippa curvisiliqua (Hook.) Bessey var. curvisiliqua (Western Yellowcress) Wet places; CB pond flr., fr. July 23; between 2nd and 3rd lakes CC, fr. July 29.

Rorippa islandica (Oed.) Borbas var. islandica (Marsh Yellowcress) Marsh between 2nd and 3rd lakes CC. Flr., fr. July 29. Marsh at 4500 ft. fr. August 20.

Sisymbrium altissimum L. (Tumblemustard) Widespread in dry places, especially disturbed areas.

CRASSULACEAE Stonecrop Family

Sedum stenopetalum Pursh (Wormleaf Stonecrop) Widespread and common on rangeland, especially near rock outcrops. Flr. June 19.

SAXIFRAGACEAE Saxifrage Family

Heuchera cylindrica Dougl. var. cylindrica (Roundleaf Alumroot) Common on rocky hillsides, talus slopes. Flr. June 23 South side DL (late).

Lithophragma bulbifera Rydb. (Bulbiferous Fringecup) Grasslands in spring, reported by JH. Not so common as following sp.

Lithophragma parviflora (Hook.) Nutt. (Small-flowered Fringecup) Grasslands in spring.

Mitella nuda L. (Bare-stemmed Mitrewort) Moist, shady places. BV, DL, DG. (Flr. June 23)

Tiarella trifoliata L. var. unifoliata (Hook.) Kurtz. (Foamflower) Wet roadside, 3400 feet.

GROSSULARIACEAE Currant Family

Ribes cereum Dougl. (Squaw Currant) One plant RPT; widespread on PLR.

Ribes hudsonianum Richards var. petiolare (Dougl.) Hancz.
(Northern Black Currant) Damp areas about 4500 ft.
(fr. August 20).

Ribes inerme Rydb. (Whitestem Gooseberry) Scattered plants
throughout; beaches; DL flr. over June 23.

Ribes lacustre (Pers.) Poir. (Swamp Gooseberry) Moist woods
and streambanks DL, DG (flr. over June 23)

Ribes viscosissimum Pursh (Sticky Currant) Sidehills above
about 2000 feet east of Kalamalka Lake.

HYDRANGEACEAE

Hydrangea Family

Philadelphus lewisii Pursh (Mock Orange) Rangeland, especially
where rocky. Flr. June 16.

ROSACEAE

Rose Family

Amelanchier alnifolia Nutt. (Saskatoon) Common on rangeland
and in open woods. Fr. June 16.

Crataegus columbiana Howell var. columbiana (Red Hawthorn)
Rangeland draws, especially immediately above CB pond.

Crataegus douglasii Lindl. var. douglasii (Black Hawthorn)
Abundant on rangeland, especially where damp, at least in
spring.

Crataegus monogyna Jacq. (European Hawthorn) A few plants
escaped from cultivation, probably through bird dissemination.
Mainly above JaB.

Fragaria vesca L. (Wood Strawberry) Widespread. Abundant in
open woods of CC.

Fragaria virginiana Duchesne var. platypetala (Rydb.) Hall
(Broadpetal Strawberry) Widespread and common in open woods.

Geum aleppicum Jacq. (Yellow Avens) DL; TP (Flr. June 23;
July 23).

Geum macrophyllum Willd. (Large-leaved Avens) Moist woods and
marsh edges. BV, DL, CC. Flr. June 23 DL; Flr. July 29 CC.

Geum triflorum Pursh (Long-plumed Purple Avens) Grasslands.

Holodiscus discolor (Pursh) Maxim. (Ocean Spray) BV flr. June 23;
Common on rocky hillsides ER, CC flr. July 29.

- Physocarpus malvaceus (Greene) Kuntze (Mallow Ninebark) PLR;
C Cr. about 2800 ft.
- Potentilla anserina L. (Common Silverweed) Patches around 1st
lake, CC (flr. July 29).
- Potentilla argentea L. (Silvery Cinquefoil) Scattered, usually
on roadsides; ER mature fr. July 29.
- Potentilla arguta Pursh (Tall Cinquefoil) Abundant BV, especially
BVM (flr. June 16). Open woods and grasslands generally.
- Potentilla biennis Greene (Biennial Cinquefoil) Dry pothole,
RH Flr. August 9.
- Potentilla glandulosa Lindl. var. glandulosa (Sticky Cinquefoil)
BVM with P. arguta but much less abundant. Flr. June 23.
- Potentilla gracilis Dougl. (Slender Cinquefoil) BV flr. June 23.
- Potentilla norvegica L. (Norwegian Cinquefoil) Edge of road and
marsh, about 4200 ft.
- Potentilla palustris (L.) Scop. (Marsh Cinquefoil) Marshes and
ponds in CC, especially 3rd lake; Marsh at 4500 ft, flr.
August 20.
- Potentilla recta L. (Erect Cinquefoil) Weedy in disturbed and
overgrazed areas, often in company with knapweed; especially
abundant on west slopes above RPt.
- Potentilla rivalis Nutt. (River Cinquefoil) Pond margins FP.
Flr., fr. August 21.
- Prunus emarginata (Dougl.) Walp. var. emarginata (Bittercherry)
Dry slopes north end CC.
- Prunus virginiana L. var. melanocarpa (Nels.) Sarg. (Chokecherry).
Widespread on rangeland, often forming copses in moister
pockets with Crataegus, Rosa and P. tremuloides.
- Pyrus malus L. (Cultivated Apple) Old homestead SE of CB beach.
- Rosa canina L. (Dog Rose) Naturalized. 1st lake CC; old homestead
SE of CB beach.
- Rosa gymnocarpa Nutt. (Baldhip Rose) Deep woods, 10th lake
CC (fr. August 18); open woods at about 3000 ft.
- Rosa nutkana Presl. var. hispida Fern. (Bristly Nootka Rose)
Widespread (BV flr. June 23).
- Rosa woodsii Lindl. var. ultramontana (Wats.) Jeps. (Pearhip
Rose) Common throughout (BV flr. June 23).

- Rubus idaeus L. var. gracilipes Jones (Red Raspberry) Common in both wet and dry woods. Fr. ripe July 23.
- Rubus leucodermis Dougl. (Black Raspberry) Scattered throughout.
- Rubus parviflorus Nutt. (Thimbelberry) Widespread in dry and wet woods. BV flr. June 19.
- Rubus pedatus J.E. Smith (Trailing Rubus) Wet woods at about 4500 ft.
- Rubus pubescens Raf. (Dwarf Red Blackberry) DG.
- Sorbus aucuparia L. (European Mountain Ash) Garden escape, probably bird-disseminated. DL; logging road about 4500 ft.
- Sorbus scopulina Greene (Cascade Mountain Ash) Scattered shrubs in DG, DL and on slopes east of Kalamalka Lake.
- Spiraea betulifolia Pall. var. lucida (Dougl.) Hitchc. (Flat-topped Spiraea). Widespread in open woods and on rangeland. (BV flr. June 19)

LEGUMINOSAE

Pea Family

- Astragalus agrestis Dougl. (Field Milk-vetch) Grasslands (Flr. June 23); RHC (JS)
- Astragalus miser Dougl. var. serotinus (Gray) Barneby (Weedy Milk-vetch). Common on grasslands throughout. Flr. June 19; mostly fr. July 29.
- Lathyrus ochroleucus Hook. (Cream-flowered Pea) Dry to moist woods (BV flr. June 19)
- Lotus denticulatus (Drew) Greene (Meadow Lotus) Widespread but not common. BVM flr. June 23.
- Lupinus latifolius Agardh var. subalpinus (Piper and Robins.) Smith (Arctic Lupine) Above about 4000 feet.
- Lupinus sericeus Pursh (Silky Lupine) Abundant in grasslands and open woods. Flr. June 16.
- Medicago falcata L. (Yellow Alfalfa) Escaped; south end CC (Flr. July 29)
- Medicago lupulina L. (Black Medic) Abundant and weedy along roadsides (BV flr., fr. July 23)
- Medicago sativa L. (Alfalfa) Disturbed areas.

Melilotus alba Desr. (White Sweet-clover) Common weed along roadsides and in disturbed areas.

Melilotus officinalis (L.) Lam. (Yellow Sweet-clover) Less abundant than *M. alba*.

Trifolium pratense L. (Red Clover) Roadsides, especially where shaded.

Trifolium repens L. (White Clover) Disturbed areas.

Vicia americana Muhl. (American Vetch) Widespread in dry to moist woods (BV flr. June 19)

GERANIACEAE Geranium Family

Erodium cicutarium (L.) L'Her. (Cranesbill) Rangeland. Flr., fr. August 18.

Geranium carolinianum L. (Carolina Geranium) East end of DG (Flr., fr. August 17)

Geranium pusillum Burm. (Small-flowered Cranesbill) Mostly disturbed areas; BVM, JaB (Flr. June 23)

Geranium viscosissimum F. and M. (Sticky Geranium) Abundant in BVM (Flr. June 16; all fr. July 23)

ANACARDIACEAE Sumac Family

Rhus glabra L. (Western Sumac) Common on dry, open hillsides.

Rhus radicans L. (Poison Ivy) Especially abundant at W. end and N. side DL; JuB; roadside above CB beach.

CELASTRACEAE Staff-tree Family

Pachystima myrsinites (Pursh) Raf. (False Box) D. Fir forests; also common up to about 4500 ft. in Lodgepole Pine woods.

ACERACEAE Maple Family

Acer glabrum Torr. var. *douglasii* (Hook.) Dippel. (Douglas Maple). Widespread in damper areas.

BALSAMINACEAE Touch-me-not Family

Impatiens noli-tangere L. (Touch-me-not) S. end 2nd lake CC (Flr. in bud July 29)

RHAMNACEAE

Buckthorn Family

Ceanothus sanguineus Pursh (Redstem Ceanothus) Scattered in dry places. ER, PLR.

Ceanothus velutinus Dougl. (Sticky-laurel) Power line; PLR.

MALVACEAE

Mallow Family

Iliamna rivularis (Dougl.) Greene (Streambank Globemallow) Slope S. of DL (Flr., fr. August 17)

Malva neglecta Wallr. (Dwarf Mallow) Scattered weed of dry areas.

HYPERICACEAE

St. John's-wort Family

Hypericum perforatum L. (Common St. John's-wort) Introduced. Overgrazed and disturbed areas, especially above JuB (Flr. June 25; July 22); PLR.

VIOLACEAE

Violet Family

Viola adunca Sm. var. adunca (Early Blue Violet) BV flr. June 23.

Viola canadensis L. var. rugulosa (Greene) Hitchc. (Canada Violet) Moist, shady woods; TP (Flr. June 23)

Viola nephrophylla Greene var. nephrophylla (Northern Bog Violet) Shaded streambank, TP (Flr. June 23)

Viola nuttallii Pursh (Valley Yellow Violet) Blooms in spring on grasslands (JS)

Viola orbiculata Geyer (Round-leaved Violet) Wet roadside and streambank about 3300 ft.

CACTACEAE

Cactus Family

Opuntia fragilis (Nutt.) Haw. (Brittle Cactus) Dry, exposed sites in rocky rangeland and on cliffs, especially southern exposures. Flr. June 16, June 26.

ELEAGNACEAE

Oleaster Family

Shepherdia canadensis (L.) Nutt. (Soopolallie). Widespread in open woods. JaB, DL

ONAGRACEAE

Evening-primrose Family

Circaea alpina L. (Enchanter's Nightshade) Abundant at marsh edge DG (Fr. August 10); 10th Lake CC

Epilobium angustifolium L. (Fireweed) Widespread. BV Flr. June 23.

Epilobium glandulosum Lehm. var. tenue (Trel.) Hitchc. (Common Willowherb) Wet places throughout.

Epilobium minutum Lindl. (Small-flowered Willowherb) Dry places; BV flr. June 23.

Epilobium paniculatum Nutt. var. paniculatum (Tall Annual Willowherb) Dry roadsides and banks. Flr., fr. July 29 CC.

Oenothera biennis L. (= O. strigosa?) (Common Evening Primrose) Introduced. Plants on trailside, TP (flr. July 23)

HALORAGACEAE

Water-milfoil Family

Myriophyllum spicatum L. (Spiked Water-milfoil) Lakes, CC.

HIPPURIDACEAE

Mare's-tail Family

Hippuris vulgaris (Common Mare's tail) Lakes and marshes in CC.

ARALIACEAE

Ginseng Family

Aralia nudicaulis L. (Wild Sarsaparilla) Common in shady woods.

Oplopanax horridum (Smith) Miq. (Devil's Club) Wet creek gorges on mountainside; CCr (fr. August 18); slope south of DL

UMBELLIFERAE

Parsley Family

Angelica arguta Nutt. (Sharp-tooth Angelica) Marsh at about 4500 feet.

Cicuta douglasii (DC.) Coult. and Rose (Western Water-hemlock) DG (common); Marsh at 4500 ft. (fr. August 20)

Heracleum lanatum Michx. (Cow Parsnip) Marsh at 4500 ft.

Lomatium ambiguum (Nutt.) Coult. and Rose (Swale Desert-parsley) Open grassland, especially abundant on slopes north of BV and DL. Flr., fr. June 24.

Lomatium dissectum (Nutt.) Math. and Const. (Fern-leaved
Biscuit-root) Widespread in grassland. Fr. June 19.

Lomatium macrocarpum (Nutt.) Coult. and Rose (Large-fruited
Desert-parsley) Grasslands, reported by JH.

Osmorhiza chilensis H. and A. (Mountain Sweet-cicely) Moist
woodlands. DL, DG, TP, CC.

Sium suave Walt. (Hemlock Water-parsnip) Abundant in standing
water; TP (Flr. July 23); PLR.

CORNACEAE

Dogwood Family

Cornus canadensis L. (Bunchberry) Shady and open forests
throughout. Flr. June 16; fr. July 23.

Cornus stolonifera Michx. var. stolonifera (Red-osier Dogwood)
Mainly wet sites; BV, TP, DL, beaches. Fr. July 23 (mature).
Var. occidentalis (T. and G.) Hitchc. DL (Fr. August 10 -
mature).

ERICACEAE

Heath Family

Arctostaphylos uva-ursi (L.) Spreng. (Kinnikinnick) Open woods
and dry, exposed sites. DL, CC, abundant in Lodgepole Pine
woods at higher elevations.

Chimaphila umbellata (L.) Bart. (Pipsissewa) Coniferous woods
throughout. Flr. June 23.

Ledum glandulosum Nutt. var. glandulosum (Smooth Labrador Tea)
Marsh at about 4500 ft.

Monotropa uniflora L. (Indian Pipe) Local in deep woods; DG
(just emerging July 23)

Pterospora andromeda Nutt. (Woodland Pinedrops) In coniferous
woods; saprophytic. CC above 2nd Lake (fr. July 29);
abundant in Lodgepole Pine woods at 4500 ft.

Pyrola asarifolia Michx. var. asarifolia (Common Pink Wintergreen)
Moist places in forests; DG Flr. June 23.

Pyrola secunda L. var. secunda (One-sided Wintergreen) Widespread
in coniferous woods; DL Flr. June 23.

Pyrola uniflora L. (Single Delight) Moist woods at 4500 ft.

Vaccinium caespitosum Michx. (Dwarf Huckleberry) Open Lodgepole
Pine woods at about 4500 ft.

Vaccinium membranaceum Dougl. (Thin-leaved Blueberry) Open
woods above about 3300 ft.

Vaccinium scoparium Leiberg (Grouseberry) Growing with
V. caespitosum (Fr. August 20)

PRIMULACEAE Primrose Family

Dodecatheon pulchellum (Raf.) Merrill var. pulchellum (Shooting
Star) Common on rangeland, flr. April.

GENTIANACEAE Gentian Family

Gentiana amarella L. (Northern Gentian) Damp roadsides in
mountains; slope south of DL (fr. August 18); logging road
at 3400 ft.

APOCYNACEAE Dogbane Family

Apocynum androsaemifolium L. (Spreading Dogbane) Generally
on rather dry soil; DL, CC, EL (Flr. July 29)

Apocynum cannabinum L. (Hemp Dogbane) DL.

ASCLEPIADACEAE Milkweed Family

Asclepias speciosa Torr. (Showy Milkweed) A few plants at
Coldstream gate.

CONVOLVULACEAE Morning-flory Family

Convolvulus arvensis L. (Field Bindweed) BV flr. July 29.

POLEMONIACEAE Phlox Family

Collomia linearis Nutt. (Narrow-leaved Collomia) Logging
road, 3400 ft.

Microsteris gracilis (Hook.) Greene (Pink Microsteris) Common
on rangeland. Flr. June 16, 1975.

HYDROPHYLLACEAE Waterleaf Family

Hydrophyllum capitatum Dougl. var. capitatum (Ballhead Waterleaf)
Dry ridge north of BV. Fr. June 24.

Phacelia hastata Dougl. var. leucophylla (Torr.) Cronq.
(Whiteleaf Phacelia) BVM flr. June 23.

Phacelia linearis (Pursh) Holz (Threadleaf Phacelia) Dry
rangeland. Flr. June 23.

BORAGINACEAE Borage Family

Asperugo procumbens L. (Catchweed) Introduced weed; BVM
(Fr. June 23); JaB.

Lappula redowskii (Hornem.) Greene var. redowskii (Stickseed)
BVM (Flr., fr. June 23)

Lithospermum arvense L. (Corn Gromwell) Introduced. Dry trails
on RH. Flr. June 26.

Lithospermum ruderale Dougl. (Lemonweed) Abundant on dry range-
land. Flr. June 16; Fr. July 22.

Myosotis micrantha Pall. (Blue Forget-me-not) Disturbed places,
especially JaB.

Myosotis verna Nutt. (Spring Forget-me-not) Blooms with
Collinsia on grasslands; reported by JH.

LABIATAE Mint Family

Lycopus americanus Muhl. (Cut-leaved Water Horehound) Wet
sites; DL (Flr. July 23); lakes in CC.

Mentha arvensis L. var. glabrata (Benth.) Fern. (Field Mint)
Wet sites, often emergent. BV, DL (Flr. July 23); CC,
especially abundant around 3rd Lake.

Monarda fistulosa L. var. menthaefolia (Grah.) Fern. (Wild
Bergamot) Grasslands. Flr. July 23.

Nepeta cataria L. (Catnip) Introduced. Abundant in damp
places. BV, DL (flr. July 23)

Prunella vulgaris L. (Self-heal) Abundant in moist places.
BV, DL (flr. June 23); CC.

Scutellaria galericulata L. (Marsh Skullcap) Common in marshy
areas. CC, BV, DL (flr. July 23).

Scutellaria lateriflora L. (Blue Skullcap) Marshy areas; CC
Flr. July 29.

Teucrium canadense L. var. occidentale (Gray) McClintock and
Epling (Germander). Common in wet places at S. end CC
(flr. July 29)

SOLANACEAE Potato Family

Solanum dulcamara L. (Bittersweet) CB Pond flr., fr. August 9;
wet area near PLR.

SCROPHULARIACEAE

Figwort Family

- Castilleja hispida Benth. (Harsh Paintbrush) Open woods, especially BV (Flr. June 16)
- Castilleja miniata Dougl. (Scarlet Paintbrush) Flr. August 20 in open woods above about 4000 ft.
- Castilleja thompsonii Pennell (Thompson's Paintbrush) Grasslands flr. June 16.
- Collinsia parviflora Lindl. (Small-flowered Blue-eyed Mary) Abundant in grasslands in spring (JH).
- Mimulus floribundus Lindl. (Purple-stemmed Monkey-flower) Moist trail-side, west face RH (flr. June 26)
- Mimulus guttatus DC. var. guttatus (Yellow Monkey-flower) Wet places; CC, DG (flr. June 23)
- Pedicularis bracteosa Benth. (Bracted Lousewort) Slope south of DL; open woods at 4500 ft.
- Penstemon confertus Dougl. (Yellow Penstemon) Common in less arid grassland, especially BVM (Flr. June 23)
- Penstemon fruticosus (Pursh) Greene var. scouleri (Lindl.) Cronq. (Shrubby Penstemon). Rocky outcrops; DL June 23 (fr.)
- Penstemon procerus Dougl. var. procerus (Small-flowered Penstemon). Reported from rangeland by JH.
- Verbascum thapsus L. (Mullein) Dry, waste places; BV Flr. July 23.
- Veronica americana Schwein. (American Speedwell) Common in wet, shady places. BV, DL (Flr. June 23); CC (Flr. July 29).
- Veronica peregrina L. var. xalapensis (H.B.K.) St. John and Warren (Purslane Speedwell) Hidden (Round) L. Flr., fr. August 20.
- Veronica serpyllifolia L. var. humifusa (Dickson) Vahl. (Thyme-leaved Speedwell). Moist logging roads at about 3400 ft.

OROBANCHACEAE

Broomrape Family

- Orobanche uniflora L. (Naked Broomrape) JuB, reported by JH.

LENTIBULARIACEAE

Bladderwort Family

- Utricularia vulgaris L. (Greater Bladderwort) Abundant in lakes and ponds throughout; TP, CB Pond, DL, CC (Flr. July 29), CP (Flr. August 21).

PLANTAGINACEAE

Plantain Family

Plantago lanceolata L. (English Plantain) Uncommon; BV road.

Plantago major L. (Common Plantain) Common and widespread; beaches, roadsides, trails, disturbed areas.

Plantago patagonica Jacq. (Indian Wheat) Grassland.

RUBIACEAE

Madder Family

Galium aparine L. (Cleavers) Woodlands; flr., fr. June 19.

Galium boreale L. (Northern Bedstraw) Abundant on grasslands and in open woods. Flr. June 16.

Galium trifidum L. var. pacificum Wieg. (Small Bedstraw) Widespread in woodlands; CC flr., fr. July 29.

Galium triflorum Michx. (Fragrant Bedstraw) Woods (Flr. June 23 BV)

CAPRIFOLIACEAE

Honeysuckle Family

Linnaea borealis L. var. longiflora Torr. (Twinflower) Rather moist woods; DL, DG, CC (Flr. July 29).

Lonicera ciliosa (Pursh) DC. (Orange Honeysuckle) Woodlands, especially BV (Flr. June 16)

Lonicera involucrata (Rich.) Banks var. involucrata (Black Twinberry) Open areas at about 4500 ft. (Fr. August 20)

Lonicera utahensis Wats. (Red Twinberry) Woods above about 3300 ft.

Sambucus cerulea Raf. var. cerulea (Blue Elderberry) Dry rangeland, especially ER (Flr. July 29)

Sambucus racemosa L. var. melanocarpa (Gray) McMinn (Black Elderberry) Woods above about 2800 ft.

Symphoricarpos albus L. (Waxberry) Abundant and widespread on rangeland and in woods.

Viburnum edule (Michx.) Raf. (Squashberry) Wet area about 4500 ft.

VALERIANACEAE

Valerian Family

Plectritis macrocera T. and G. (White Plectritis) R Pt, early spring (JG).

COMPOSITAE

Aster Family

Achillea millefolium L. ssp. lanulosa (Nutt.) Piper (Yarrow).
Common on grasslands and in open woods (Flr. June 16)

Agoseris glauca (Pursh) Raf. var. glauca (Pale Agoseris)
BV (flr. June 19)

Agoseris heterophylla (Nutt.) Greene (Annual Agoseris)
BV (flr. June 19)

Anaphalis margaritacea (L.) B. and H. (Pearly Everlasting)
Widespread, especially in open woods, grasslands and on
roadsides (Flr. June 19).

? Antennaria anaphaloides Rydb. (Tall Pussytoes) Dry, rocky
area at 4500 ft.

Antennaria dimorpha (Nutt.) T. and G. (Dwarf Pussytoes) Forms
silvery, circular mats on rangeland, especially R Pt.

Antennaria microphylla Rydb. (Rosy Pussytoes) Rangeland
(Flr. June 19).

Antennaria neglecta Greene var. attenuata (Fern.) Cronq.
(Field Pussytoes) BV June 23 (flr.)

Antennaria racemosa Hook. (Raceme Pussytoes) Common in open
woods in CC (Flr. over July 29) and abundant on entire
slope east of Kalamalka Lake.

Antennaria umbrinella Rydb. (Umber Pussytoes) Rangeland;
R Pt June 24 (flr.)

Arctium minus (Hill) Bernh. (Common Burdock) Scattered plants
in disturbed areas.

Arnica cordifolia Hook. var. cordifolia (Heart-leaved Arnica)
Widespread in forests; BV flr. June 23.

Arnica latifolia Bong. var. latifolia (Mountain Arnica)
Open places above about 4500 ft.

Arnica sororia Greene (Twin Arnica) Abundant in grassland and
open woods. Flr. June 16.

Artemesia absinthium L. (Wormwood) CB beach; PLR at C Cr
(Flr. August 18)

Artemesia biennis Willd. (Biennial Wormwood) Roadside about
4000 ft.

Artemesia campestris L. ssp. borealis (Pall) Hall and Clem.
(Northern Wormwood) ER (flr. July 29)

Artemesia dracunculus L. (Tarragon) Rangeland.

Artemesia frigida Willd. (Pasture Wormwood) Widespread on grasslands.

Artemesia tridentata Nutt. (Sagebrush) On bench above CB beach beside access road.

Aster conspicuus Lindl. (Showy Aster) Widespread in open woods; DL, CC, JuB (Flr. July 22)

? Aster foliaceus Lindl. (Leafy Aster) Potholes RH (Flr. August 9); moist areas at 4500 ft.

Aster laevis L. var. geyeri Gray (Smooth Aster). BV, DL (Flr. August 10)

Aster modestus Lindl. (Few-flowered Aster) Open woods; BV (flr. July 23); CC (flr. August 18)

Aster pansus (Blake) Cronq. (Heath-leaved Aster) Rangeland (Flr. August 9)

Balsamorhiza sagittata (Pursh) Nutt. (Sunflower) Abundant on rangeland. Flr. May.

Centaurea diffusa Lam. (Diffuse Knapweed) Abundant in disturbed and overgrazed areas, often to the exclusion of other plants. Especially prevalent behind beaches. Flr. July 22.

Chicorium intybus L. (Chicory) PLR flr. August 18.

Chrysanthemum leucanthemum L. (Ox-eye Daisy) Roadside east of height of land, about 4500 ft.

Chrysopsis villosa (Pursh) Nutt. var. hispida (Hook.) Gray (Golden-aster) Rangeland, especially in dry, rocky places. Flr. June 19; August 21.

Chrysothamnus nauseosus var. albicaulis (Nutt.) Rydb. (Rabbit-brush) Rangeland, mainly towards RPt. Noted as high as 3000 ft. on logging road east of Kalamalka Lake.

Cirsium arvense (L.) Scop. var. horridum Wimm. and Grab. (Canada Thistle) Disturbed places.

Cirsium undulatum (Nutt.) Spreng. (Wavy-leaved Thistle) Rangeland.

Cirsium vulgare (Savi) Tenore (Bull Thistle) Disturbed areas.

Conyza canadensis (L.) Cronq. (Canada Fleabane) Dry roadsides; BV (Flr. August 10)

- Crepis atrabarba Heller (Slender Hawksbeard) Rangeland
Flr. June 19.
- Erigeron acris L. (Northern Fleabane) BVM Flr. June 24.
- Erigeron compositus Pursh var. glabratus Macoun (Cut-leaved
Daisy) Cliffs above CC, west side.
- Erigeron corymbosus Nutt. (Long-leaved Fleabane) Common
and abundant on rangeland (Flr. June 19)
- Erigeron divergens T. and G. (Spreading Fleabane) BV
(Flr. June 23, August 10)
- Erigeron philadelphicus L. (Philadelphia Fleabane) Moist places;
DL (Flr. June 23)
- Erigeron pumilus Nutt. ssp. intermedius Cronq. (Shaggy Fleabane)
Grasslands; Flr. June 23.
- Erigeron subtrinervis Rydb. var. conspicuus (Rydb.) Cronq.
(Three-veined Fleabane) Widespread in open woods.
Flr. June 19 (BV)
- Filago arvensis L. (Field Filago) European weed, becoming
common on overgrazed ranges.
- Gallardia aristata Pursh (Brown-eyed Susan) Common on
grassland (Flr. June 24)
- Gnaphilium palustre Nutt. (Lowland Cudweed) Dried pool above
RHC (Flr. August 16)
- Gnaphilium viscosum H.B.K. (Sticky Cudweed) PLR (Flr. August 18)
- Hieracium albiflorum Hook. (White-flowered Hawkweed) DL
(Flr. June 23)
- Hieracium canadense Michx. (Canada Hawkweed) DL (Flr., fr.
August 10)
- Hieracium cynoglossoides Arv.-Touv. (Western Hawkweed)
Widespread on rangeland and in open woods. Flr. June 26.
- Hieracium umbellatum L. (Narrow-leaved Hawkweed) Apparently
intergrading with H. canadense; plants with mixed characteristics.
- Lactuca biennis (Moench) Fern. (Tall Blue Lettuce) CC
(Flr. July 29); DG (Flr. August 10)
- Lactuca pulchella (Pursh) DC (Blue Lettuce) DL (Flr. July 23)
- Lactuca serriola L. (Prickly Lettuce) Abundant weed, especially
BV (Flr. July 29)

Madia exigua (J.E. Smith) Gray (Little Tarweed) Rangeland,
especially disturbed areas. Flr. June 25.

Matricaria matricarioides (Less.) Porter (Pineapple Weed)
Native weed of disturbed places. Flr. June 19.

Petasites frigidus (L.) Fries var. palmatus (Ait.) Cronq
(Coltsfoot) Moist woods, DG.

? Petasites sagittatus (Banks) Gray (Arrowleaf Coltsfoot) Wet
area at 4500 ft.

Senecio triangularis Hook. var. triangularis (Arrowleaf
Groundsel) Moist seepage area at 4500 ft.

Solidago canadensis L. var. salebrosa (Piper) Jones (Canada
Goldenrod). Generally moist soil; DL (Flr. July 23);
Marsh at 4500 ft. (Flr. August 20)

Solidago occidentalis (Nutt.) T. and G. (Western Goldenrod)
Around 1st Lake CC.

Sonchus arvensis L. (Field Sow Thistle) DL (Flr. August 10)

Taraxacum laevigatum (Willd.) DC (Red-seeded Dandelion)
CB beach.

Taraxacum officinale Weber (Common Dandelion) Ubiquitous.

Tragopogon dubius Scop. (Yellow Salsify) Widespread in
grasslands and disturbed areas.

ALISMATACEAE

Water-plantain Family

Alisma plantago-aquatica L. var. americanum Schul. and Schul.
(American Water-plantain) Local in marshy areas; DL,
pond on PLR (Flr., fr. August 18)

NAJADACEAE

Water-nymph Family

Najas flexilis (Willd.) Rost. and Schmidt (Wavy Water-nymph)
CC 1st lake.

POTAMOGETONACEAE

Pondweed Family

? Potamogeton natans L. (Floating-leaved Pondweed) Marsh at
4500 ft.

JUNCACEAE

Rush Family

Juncus alpinus Vill. (Northern Rush) Ja B (Fr. August 16)

? Juncus articulatus L. (Jointed Rush) Marsh between 2nd and 3rd
lakes CC (Fr. August 19)

Juncus balticus Willd. var. balticus (Baltic Rush) CB pond
(Fr. July 23)

Juncus bufonius L. (Toad Rush) Range potholes, marsh edges, damp
roadsides.

Juncus ensifolius Wikst. (Daggerleaf Rush) Wet areas at
4500 ft.

Juncus longistylus Torr. (Long-styled Rush) Dried pothole,
RH (Fr. August 9)

Luzula parviflora (Ehrh.) Desv. (Small-flowered Woodrush)
Roadside at about 4500 ft.

CYPERACEAE Sedge Family

Carex bebbii Olney (Bebb's Sedge) DL, CC (Fr. July 29)

Carex canescens Bailey (Gray Sedge) Wet roadside at 4500 ft.

Carex comosa Boott (Bristly Sedge) Marsh between 2nd and 3rd
lakes CC (Fr. July 29)

Carex microptera Meck. (Small-winged Sedge) Marsh at 4500 ft.
(Fr. August 20)

Carex retrorsa Schw. (Retrorse Sedge) Abundant in CC
(Fr. July 29); DL (Fr. August 10)

Carex rostrata Stokes (Beaked Sedge) CC (Fr. July 29); marsh
at 4500 ft. with Potentilla palustris.

Carex stipata Muhl. (Sawbeak Sedge) CC (Fr. July 29)

Eleocharis palustris (L.) R. and S. (Common Spike-rush)
CB Pond (Fr. July 23); dried potholes RH (Fr. August 9)

Scirpus acutus Muhl. (Hardstem Bulrush) Abundant in CB pond,
DL, CC, beaches.

Scirpus maritimus L. (Seacoast Bulrush) Uncommon, CB pond
(Fr. August 9)

GRAMINEAE Grass Family

Agropyron caninum (L.) Beauv. (Bearded Wheatgrass) Rangeland.

Agropyron cristatum (L.) Gaertn. (Crested Wheatgrass)
Introduced along trails, etc. Planted over Lashene Estate
subdivision tile field.

Agropyron repens (L.) Beauv. (Couch Grass) Roadsides
(Flr. August 17)

Agropyron spicatum (Pursh) Scribn. and Smith var. spicatum
(Bluebunch Wheatgrass). Awned and unawned plants, according
to Hitchcock, are the same taxon. Abundant. Dominant
grass of rangeland (Fr. July 29)

Agrostis alba L. (Redtop Bentgrass) Roadsides, beaches, marsh
edges, moist grassland. DL (Flr., fr. July 23)

Agrostis scabra Willd. (Rough Bentgrass) Marsh edges, CC
(Fr. July 29)

Alopecurus aequalis Sobol (Marsh Foxtail) Emergent grass in
most ponds; CC (Flr. July 29)

Aristida longiseta Steud. (Red Threeawn) Grasslands.

Bromus commutatus Schrad. (Meadow Brome) Grasslands (introduced).

Bromus inermis Leys. (Smooth Brome) Widely cultivated and
escaped.

Bromus japonicus Thunb. (Japanese Brome) Introduced; roadsides
and disturbed lands.

? Bromus mollis L. (Soft Brome) Introduced and weedy.

Bromus tectorum L. (Cheat Grass) Extremely common and abundant
introduction to disturbed areas and overgrazed rangeland.

Calamagrostis canadensis (Michx.) Beauv. (Bluejoint Reedgrass)
Mountainside above Kalamalka Lake (Flr. August 20)

Calamagrostis rubescens Buckl. (Pinegrass) Dominant grass of
open forests, especially with Douglas Fir. At 4500 ft,
flr. August 20.

Cinna latifolia (Trevir.) Griesb. (Wood Reedgrass) Wet places,
esp. DL, DG (Fr. August 10)

Dactylis glomerata L. (Orchard Grass) Introduced; common along
trails, especially DL.

Deschampsia elongata (Hook.) Munro (Slender Hairgrass) Moist
areas near streams and marshes, especially BV, DL
(Fr. August 10)

Echinochloa crusgalli (L.) Beauv. (Cockspur) Common in damp
areas; introduced along trails and roads BV, DL
(Fr. August 10)

Elymus cinereus Scribn. and Merr. (Giant Wildrye) CB pond, JuB.

Elymus glaucus Buckl. var. jepsonii Davy (Blue Wildrye) DL.

Festuca idahoensis Elmer (Idaho Fescue) Grasslands.

Glyceria elata (Nash) Jones (Tall Mannagrass) Mountain marshes.

Hordeum brachyantherum Nevski (Meadow Barley) BV.

Hordeum jubatum L. (Foxtail Barley) Abundant in moist places,
especially pond edges.

Panicum capillare L. (Common Witchgrass) Near water CC
(Fr. July 29)

Phleum pratense L. (Common Timothy) Commonly cultivated and
freely escaped, often in disturbed areas.

? Poa juncifolia Scribn. (Alkali Bluegrass) Grassland.

Poa pratensis L. (Kentucky Bluegrass) Throughout.

Poa sandbergii Vasey (Sandberg's Bluegrass) Rangeland.

Polypogon monspeliensis (L.) Desf. (Beard Grass) Moist ground;
DL (Fr. August 10)

Stipa comata Trin. and Rupr. (Speargrass) Rangeland; not as
common as following species.

Stipa occidentalis Thurb. var. minor (Vasey) Hitchc.
(Columbia Speargrass) Abundant on rangeland.

SPARGANACEAE

Bur-reed Family

Sparganium emersum Rehmman var. multipedunculatum (Morong)
Reveal (Simplestem Bur-reed) Ponds in CC; CP
(Flr., fr. August 21)

TYPHACEAE

Cat-tail Family

Typha latifolia L. (Common Cat-tail) DL, CC.

ARACEAE

Arum Family

Lysichitum americanum Hulten and St. John (Skunk Cabbage)
DG, CC.

LEMNACEAE

Duckweed Family

Lemna minor L. (Water Lentil) Lakes in CC; CP.

Spirodela polyrhiza (L.) Schleid. (Great Duckweed) Lakes in CC.

LILLIACEAE

Lily Family

- Asparagus officinalis L. (Asparagus) Escaped from cultivation; scattered plants in grassland and on roadsides.
- Brodiaea douglasii Wats. (Douglas Brodiaea) Grasslands in spring, especially near Coldstream gate. Reported by JH.
- Calochortus macrocarpus Dougl. (Mariposa Lily) Grassland BV (flr. July 23)
- Clintonia uniflora (Schult.) Kunth. (Queen's Cup) Moist woodlands throughout.
- Disporum hookeri (Torr.) Nicholson (Hooker Fairybells) Slope south of DL (Fr. August 18)
- Disporum trachycarpum (Wats.) Benth. and Hook. (Wartberry Ferrybells) Moist woods; BV, DL (Fr. July 23)
- Fritillaria lanceolata Pursh (Rice-root) Widespread but not abundant; grasslands, open woods. Fr. June 23.
- Fritillaria pudica (Pursh) Spreng. (Yellow Bell) Grasslands (Flr. April-May).
- Lilium columbianum Hanson (Tiger Lily) Open and moist woods (Flr. June 19)
- Smilacina racemosa (L.) Desf. (False Solomon's Seal) Moist woods throughout. DL (fr. June 23)
- Smilacina stellata (L.) Desf. (Star-flowered Solomon's Seal) Moist to dry woods; BV, DL, CC.
- Streptopus amplexifolius (L.) DC. var. chalazatus Fassett. (Clasping-leaved Twisted-stalk) Deep woods; CC, at 3400 ft. east of Kalamalka Lake.
- Zygadenus venenosus Wats. var. gramineus (Rydb.) Walsh (Meadow Death-camas) Widespread in grasslands (Fr. June 23).

ORCHIDACEAE

Orchid Family

- Calypso bulbosa (L.) Oakes (Calypso) Shady woods, especially north slopes; logging road at about 3000 ft.
- Corallorhiza maculata Raf. (Spotted Coral-root) Deep woods near 10th lake CC (Fr. August 18)
- Corallorhiza striata Lindl. (Striped Coral-root) Moist woods; DL (Flr. June 23)
- Goodyera oblongifolia Raf. (Western Rattlesnake-plantain) Dry to moist woods; DL, CC.

Habenaria dilatata (Pursh) Hook. var. leucostachys (Lindl.)
Ames (White Bog-orchid) Marsh east of height of land,
about 4500 ft. (Flr. August 20)

Habenaria elegans (Lindl.) Boland. (Elegant Rein-orchid) Slope
south of DL (Flr. August 17); N. end CC.

APPENDIX 5 BIRDS RECORDED IN THE COSENS BAY AREA, VERNON, B. C.

The following is an annotated list of the birds known to have occurred in the Cosens Bay area as indicated on the accompanying map. Since there are many other species recorded for the surrounding region, it should be an easy matter to increase the number of birds on this list in the future.

The list has been compiled from my own field notes and to a large extent from information supplied by James Grant of Lavington. His comments and companionship in the field are gratefully acknowledged.

An asterisk denotes a positive breeding record for the Cosens Bay area.

Rob Cannings
September, 1975

- COMMON LOON (Gavia immer): To be seen throughout the year on Kalamalka Lake. Breeds in North Okanagan but probably not in Cosens Bay area.
- RED-NECKED GREBE (Podiceps grisegena): Nests on Swan Lake. On Kalamalka Lake in the Cosens Bay area this species is a transient and rare winter visitor.
- HORNED GREBE (Podiceps auritus): On Kalamalka Lake a transient and the most common winter grebe. There are no recent breeding records for the North Okanagan.
- WESTERN GREBE (Aechmophorus occidentalis): The closest breeding spot is Swan Lake, where a precarious nesting colony exists. Migrating flocks rest on Kalamalka Lake during April and May, September and October. A few birds may overwinter.
- WHITE PELICAN (Pelecanus erythrorhychos): Seen in area only rarely during migration (late April to mid-May; September to October) in flight or resting on Kalamalka Lake.
- GREAT BLUE HERON (Ardea herodias): Breeds at Otter Lake near Armstrong. Most migrate south for the winter, but a few may overwinter. Cosens Bay beach is a favorite feeding spot.
- *CANADA GOOSE (Branta canadensis): This familiar species has increased in the Okanagan in the last 20 years. The majority of locally breeding geese migrate, but recently there has been a large increase in the number of wintering flocks. Adults with young were observed on Cosens Bay pond and on the first lake, Cougar Canyon.
- *MALLARD (Anas platyrhynchos): Common resident; the most abundant summer duck in the Cosens Bay area. Breeds at Cosens Bay pond, Turtle Pond and Deep Lake.
- GREEN-WINGED TEAL (Anas carolinensis): At Cosens Bay a transient and occasional winter visitor.
- BLUE-WINGED TEAL (Anas discors): A transient at Cosens Bay. There have been very rare winter records for the Vernon area, but none for Cosens Bay.
- CINNAMON TEAL (Anas cyanoptera): In Cosens Bay area seen only during migration.
- AMERICAN WIGEON (Mareca americana): May nest in Cosens Bay area. Most often seen during migration; small flocks may overwinter.
- REDHEAD (Aythya americana): Nests on Swan Lake. Unpredictable in Vernon area in winter, but may be seen on Kalamalka Lake.
- CANVASBACK (Aythya valisineria): A fairly common transient; a few occasionally winter.
- COMMON GOLDENEYE (Bucephala clangula): Migrant and winter visitor.

*BARROWS GOLDENEYE (Bucephala islandica): Nests at Cosens Bay pond, probably in old Cottonwoods, also Deep Lake and Turtle Pond. Usually scarce after the end of October.

BUFFLEHEAD (Bucephala albeola): Common on migration, often seen at Cosens Bay pond. Scarce in winter.

*COMMON MERGANSER (Mergus merganser): Resident, rather common on Kalamalka Lake in summer, unpredictable in winter.

HOODED MERGANSER (Lophodytes cucullatus): Not known to nest in the immediate Cosens Bay area. Usually seen as a transient; uncommon in winter.

TURKEY VULTURE (Cathartes aura): A summer visitor, usually arriving at the end of March and departing in September. In Cosens Bay area, mainly seen from Rattlesnake Hill, soaring over Coldstream.

GOSHAWK (Accipiter gentilis): Much more common in fall and winter in Okanagan than in breeding season.

SHARP-SHINNED HAWK (Accipiter striatus): Seen most often in spring migration (coinciding with the White-crowned Sparrow migration in late April and early May) and in autumn. Not uncommon in winter. Locally breeds mostly in subalpine forest.

*COOPER'S HAWK (Accipiter cooperii): Locally the only accipiter likely to be encountered at low elevations during summer.

*RED-TAILED HAWK (Buteo jamaicensis): Locally the most common large hawk in spring and summer. On grasslands preys principally on pocket gophers, ground squirrels, mice and snakes; in forests, snowshoe hares and Red Squirrels. Sometimes seen harassing Golden Eagles over Rattlesnake Hill.

SWAINSON'S HAWK (Buteo swainsoni): A bird of the grassland (April-September); no winter records.

ROUGH-LEGGED HAWK (Buteo lagopus): A winter visitor (October-March) to open grasslands.

*GOLDEN EAGLE (Aquila chrysaetos): Resident. Grasslands, cliffs and open forest in Cosens Bay area. Seen often in June over Rattlesnake Hill. Has nested in Cougar Canyon (2nd lake); the nest was probably not used in 1975.

BALD EAGLE (Haliaeetus leucocephalus): Resident. Usually seen near water.

MARSH HAWK (Circus cyaneus): A bird of fields and marshes, sometimes seen on grasslands. A few usually winter in the Vernon area.

- OSPREY (Pandion haliaetus): Summer visitor (late March-October), scarcer than formerly. Sometimes seen at Kalamalka Lake, mainly during migration.
- *PRAIRIE FALCON (Falco mexicanus): Now a very rare resident of the driest parts of B. C. Up to 10 years ago nested on cliff at base of Rattlesnake Point. One seen there June 17, 1975.
- *PEREGRINE FALCON (Falco peregrinus): Up to the 1920's Peregrines evidently occupied the nesting site later held by Prairie Falcons on Rattlesnake Point. Now only a very scarce visitor.
- MERLIN (Falco columbarius): Scarce resident.
- *AMERICAN KESTREL (Falco sparverius): Very common in open forest and grassland. Nests commonly in Flicker holes in Ponderosa Pines (Juniper Bay, Rattlesnake Point, Bear Valley).
- *BLUE GROUSE (Dendragapus obscurus): Mainly in open Douglas Fir forests locally. In summer may descend to grasslands to feed; it is very fond of grasshoppers. Abundant in summer of 1975; adults with broods in woods throughout area.
- *RUFFED GROUSE (Bonasa umbellus): Favors forests with at least a fair percentage of deciduous growth; Cougar Canyon, Bear Valley, Deep Lake.
- *CALIFORNIA QUAIL (Lophortyx californicus): Never common in North Okanagan. Seen near Cosens Bay beach.
- *RING-NECKED PHEASANT (Phasianus colchicus): Most common on edges of agricultural land such as the north side of Rattlesnake Hill; less common in Bear Valley and west slope of Rattlesnake Hill.
- *GRAY PARTRIDGE (Perdix perdix): Uncommon on grasslands; there may be none left in the Cosens Bay area.
- SORA (Porzana carolina): Summer visitor to marshes. Seen at Turtle Pond.
- *AMERICAN COOT (Fulica americana): Nests at Cosens Bay pond; common in winter.
- *KILLDEER (Charadrius vociferus): Common summer resident in grasslands and fields. The only plover nesting locally; some usually winter. Although the killdeer may breed where there is no water, it moves to lakeshores, etc. after breeding season. Migrants arrive in mid-March. In 1975 nested on first bench above Cosens Bay beach.

COMMON SNIPE (Capella gallinago): Breed in wet meadows. Small numbers usually remain in winter. Observed at Turtle Pond.

LONG-BILLED CURLEW (Numenius americanus): No breeding records for the grasslands of Cosens Bay, but this species is often seen here in spring migration. Usually arrives in early April.

*SPOTTED SANDPIPER (Actitis macularia): The only "typical" sandpiper that breeds locally; a common summer resident. Breeds near Cosens Bay beach and pond and is seen often at Juniper Bay, Jade Bay, Turtle Pond, etc. Migrants usually arrive at the end of April; there are no winter records for the North Okanagan.

SOLITARY SANDPIPER (Tringa solitaria): A fairly common spring and fall migrant in the Okanagan. Nine birds stayed at the Turtle Pond from August 9 to August 21, 1975.

GREATER YELLOWLEGS (Totanus melanoleucus): Rather common spring and autumn migrant, especially to pond edges.

LESSER YELLOWLEGS (Totanus flavipes): Migrant.

LONG-BILLED DOWITCHER (Limnodromus scolopaceus): A fairly common autumn transient, but rare in spring.

HERRING GULL (Larus argentatus): Non-breeding Herring Gulls are present on Kalamalka Lake throughout the year.

CALIFORNIA GULL (Larus californicus): Fairly common late summer and fall transient; there are no winter records for the Vernon area.

RING-BILLED GULL (Larus delawarensis): Common migrant; the most often-seen gull in summer (the only breeding colony in B. C. is on Okanagan Lake at Carr's Landing). There are only a few winter records for the North Okanagan.

BONAPARTE'S GULL (Larus philadelphia): Abundant transient, especially in spring (late April-May).

MOURNING DOVE (Zenaidura macroura): A very common summer resident in grassland and open coniferous forest. Some winter in agricultural areas.

SCREECH OWL (Otus asio): A scarce resident. The low-elevation deciduous thickets of lake shores which are its preferred habitat are fast disappearing.

GREAT HORNED OWL (Bubo virginianus): Locally one of the more common birds of prey. Breeds early; eggs may be laid in February.

- PYGMY OWL (Glaucidium gnoma): A diurnal hunter, resident year-round, but more common in fall and early winter at Cosens Bay. This species prefers subalpine forest for breeding.
- LONG-EARED OWL (Asio otus): In this area this species inhabits thickets of aspen, hawthorn and other tall shrubs on hillsides, and brushy forest. Probably less common in winter than in summer.
- SHORT-EARED OWL (Asio flammeus): A more or less diurnal owl of open grassland, more common in fall and early winter than in breeding season.
- *SAW-WHET OWL (Aegolius acadicus): A resident in a wide variety of forest habitats. This owl has nested in Bear Valley.
- *POORWILL (Phalaenoptilus nuttallii): Does not hawk for insects in open sky like following species. Prefers steep, rocky hillsides with scattered trees and shrubs. Its distinctive call is common in June and July along Ramparts and in Bear Valley. Migrants arrive at the end of April and depart by the end of September.
- *COMMON NIGHTHAWK (Chordeiles minor): Usually the last of our spring migrants to return - sometimes as late as the first part of June. Common over forest and grassland, but evidently less abundant than in former years.
- BLACK SWIFT (Cypseloides niger): Summer visitor, less common than following species.
- VAUX'S SWIFT (Chaetura vauxi): Summer visitor.
- WHITE-THROATED SWIFT (Aeronautes saxatalis): Uncommon; needs high, sheer cliffs on which to breed. May nest on high, cleft face at north end of Cougar Canyon; some seen nearby on August 18, 1975.
- *RUFIOUS HUMMINGBIRD (Selasphorus rufus): Common summer visitor. For nesting, prefers shady woods close to water. Returns about the third week in April.
- *CALLIOPE HUMMINGBIRD (Stellula calliope): Usually in open, immature forest and open areas with scattered shrubs and wildflowers. Bear Valley is a good place to observe this species. Males arrive in area about the first of May.
- BELTED KINGFISHER (Megaceryle alcyon): Lakeshores, Turtle Pond, Deep Lake. A few remain in winter.
- *COMMON FLICKER (Colaptes auratus): The red-shafted race is a common permanent resident; the yellow-shafted race is a rather uncommon winter visitor and transient.
- PILEATED WOODPECKER (Dryocopus pileatus): A permanent resident, most common in mature forest. Cougar Canyon is a good summer habitat. The large lakeshore cottonwoods are a winter attraction.

- *LEWIS'S WOODPECKER (Asyndesmus lewis): A rather common woodpecker in the area of Cosens Bay beach and the Ramparts where about 4 pairs (1975) nested in pine stubs and probably the mature cottonwoods on the beach. Often seen fly catching from a commanding perch. Winters only occasionally in Vernon area (Cosens Bay).
- *YELLOW-BELLIED SAPSUCKER (Sphyrapicus varius): Very common among birches of Bear Valley and Cosens Creek. Visitor from early April until September.
- *HAIRY WOODPECKER (Dendrocopos villosus): Prefers mixed and coniferous forest at middle elevations. Bear Valley. Resident.
- *DOWNY WOODPECKER (Dendrocopos pubescens): Permanent resident; prefers deciduous thickets. Nests in Bear Valley and Cosens Creek delta.
- *EASTERN KINGBIRD (Tyrannus tyrannus): Habitat variable, but most common in deciduous growth along lakeshores. Usually arrives about May 10, leaves around the end of August.
- *WESTERN KINGBIRD (Tyrannus verticalis): This species is most common in open grassland with just enough trees or poles to provide perches and nest sites.
- SAY'S PHOEBE (Sayornis saya): Usually frequents dry, open country. A very early arrival, usually the first week of March.
- WILLOW FLYCATCHER (Empidonax traillii): Inhabits tall deciduous thickets, usually in moist locations. Returns from the south in early May.
- HAMMOND'S FLYCATCHER (Empidonax hammondi): Usually found in mature coniferous or mixed forest, locally most common at higher altitudes. Records for Deep Lake. It is usually the first Empidonax to return in the spring, about the last week in April
- DUSKY FLYCATCHER (Empidonax oberholseri): Usually in tall shrubbery rather than forest, but in drier, upland sites.
- *WESTERN FLYCATCHER (Empidonax difficilis): Preferred habitat is coniferous forest near streams and shaded rock outcrops. An old nest, probably of this species, was found concealed in a bank where the power line road crosses Cosens Creek.
- *WESTERN WOOD PEWEE (Contopus sordidulus): One of the most often-recorded summer birds in the Cosens Bay area; an inhabitant of deciduous and mixed woods throughout the lower and middle elevations. In 1975, nested at the mouth of Cosens Creek.

- OLIVE-SIDED FLYCATCHER (Nuttallornis borealis): Mature coniferous forest, especially at higher elevations.
- HORNED LARK (Eremophila alpestris): A transient (occasionally wintering) on grasslands.
- *VIOLET-GREEN SWALLOW (Tachycineta thalassina): Usually the first swallow of spring (usually mid-March). Nests mainly in cliff crevices (Ramparts).
- *TREE SWALLOW (Iridoprocne bicolor): Arrives about the second week in March. Nests in cavities in the Cottonwoods at Cosens Bay beach.
- ROUGH-WINGED SWALLOW (Stelgidopteryx ruficollis): Seen over Cosens Bay, Deep Lake, etc. Migrants arrive in mid-April.
- BARN SWALLOW (Hirundo rustica): Very common; usually arrives in early May and may stay until mid-October. In the Okanagan this species may be triple-brooded; young may be seen in the nest in September.
- CLIFF SWALLOW (Petrochelidon pyrrhonota): Often seen feeding over Rattlesnake Hill. Spring migrants usually arrive in late April.
- GRAY JAY (Perisoreus canadensis): A resident at higher levels; seen at 4500 ft.
- STELLER'S JAY (Cyanocitta stelleri): In the Cosens Bay area, this species probably breeds in Devil's Gorge, but it is not common in summer at these low altitudes. By mid-August larger numbers may begin to appear at lower levels where they often spend fall and winter.
- *BLACK-BILLED MAGPIE (Pica pica): Perhaps the most ubiquitous of Okanagan birds. In Cosens Bay area most common on grassland and in open Ponderosa Pine forests. Tall Hawthorn bushes are favorite nesting sites. Nesting is early, sometimes in early April.
- COMMON RAVEN (Corvus corax): A rather common resident throughout.
- COMMON CROW (Corvus brachyrhynchos): Common summer visitor. Although most of the crows that breed in the Okanagan are migratory, some remain for the winter.
- CLARK'S NUTCRACKER (Nucifraga columbiana): A common resident of Ponderosa Pine and Douglas Fir forests. Eggs may be laid as early as the first week of March.
- BLACK-CAPPED CHICKADEE (Parus atricapillus): Prefers shrubby deciduous growth to dense forest. Very common in Bear Valley and at Deep Lake. Resident.

MOUNTAIN CHICKADEE (Parus gambeli): Usually in semi-open Douglas Fir, Ponderosa Pine or Lodgepole Pine forest. Common resident.

*WHITE-BREASTED NUTHATCH (Sitta carolinensis): Closely confined to Ponderosa Pines; a rather common resident.

RED-BREASTED NUTHATCH (Sitta canadensis): Resident in many types of forest.

PYGMY NUTHATCH (Sitta pygmaea): Common and permanent resident in Ponderosa Pines, especially where a good proportion of mature trees exists.

BROWN CREEPER (Certhia familiaris): A resident that prefers dense stands of mature conifers, thus it is not often seen near Cosens Bay. It is more common in winter than in summer.

DIPPER (Cinclus mexicanus): May be seen on beaches in winter in Cosens Bay area.

HOUSE WREN (Troglodytes aedon): Common in summer in dry, open woods and aspen copses. Bear Valley, Rattlesnake Hill.

WINTER WREN (Troglodytes troglodytes): Only the wettest and densest forests in the Cosens Bay area will regularly produce this bird (Devils Gorge). Probably more common at higher elevations. Resident.

CANYON WREN (Catherpes mexicanus): In Canada this bird is restricted to the cliffs of the South Okanagan where it is a resident. Populations were decimated in the winter of 1968-69, but are now recovering. There is one record for the cliffs near the Coldstream Gate (Ramparts); this is the most northerly place in Canada the Canyon Wren has been seen.

*ROCK WREN (Salpinctes obsoletus): Summer visitor to arid, cliffy areas in the Southern Interior; there are some winter records. Breeds in the cliff crevices of the Ramparts.

*GRAY CATBIRD (Dumetella carolinensis): At Cosens Bay this bird is restricted to dense deciduous growth, most often seen in hawthorn thickets on rangeland. Spring migrants appear in mid-May.

*AMERICAN ROBIN (Turdus migratorius): Common throughout the area; some usually winter.

VARIED THRUSH (Ixoreus naevius): Seen in migration, occasionally wintering.

SWAINSON'S THRUSH (Hylocichla ustulata): Relatively common in coniferous and mixed forest at middle elevations. Locally most often seen at higher levels of the dry forest and in the subalpine. Usually arrives in mid-May and leaves in early September.

- VEERY (Hylocichla fuscescens): Prefers deciduous thickets and woodland near water. First spring migrants return about mid-May.
- *WESTERN BLUEBIRD (Sialia mexicana): Less common than the following species. Favors open Ponderosa Pine woods. Rarely winters in North Okanagan.
- *MOUNTAIN BLUEBIRD (Sialia currucoides): One of the earliest spring migrants; males arrive in late February and early March. None overwinter. Usually seen in dry, open coniferous forest and on grassland.
- *TOWNSEND'S SOLITAIRE (Myadestes townsendi): Found in open, rocky coniferous forest; Rattlesnake Hill is good habitat. Breeds most commonly in Lodgepole Pine forest at higher elevations. The majority of Solitaires migrate, but a few usually overwinter.
- GOLDEN-CROWNED KINGLET (Regulus satrapa): A resident of coniferous forest, mainly Douglas Fir and spruce.
- RUBY-CROWNED KINGLET (Regulus calendula): Summer visitor (a few winter records), more often in deciduous growth than above species.
- WATER PIPIT (Anthus spinoletta): An abundant transient, especially from August to October, on grasslands. Rare in winter.
- BOHEMIAN WAXWING (Bombycilla garrulus): Usually an abundant winter visitor to the valley floor, especially near orchards (October-March). May breed at higher elevations east and south of Cosens Bay near mountain meadows and swamps.
- *CEDAR WAXWING (Bombycilla cedrorum): Summer visitor; some may winter. This species is among the last spring migrants, usually arriving during the last week of May.
- NORTHERN SHRIKE (Lanius excubitor): Winters in lowlands of the Okanagan from October to April.
- *COMMON STARLING (Sturnus vulgaris): Common, but most of population migrates.
- SOLITARY VIREO (Vireo solitarius): Less common at lower elevations (in North Okanagan) than the following 2 species. Prefers mature fixed forest. Spring arrivals appear near the end of April.
- *RED-EYED VIREO (Vireo olivaceus): A common summer visitor to deciduous and mixed forest. Cosens Bay beach, Bear Valley, Deep Lake, etc. Usually arrives by mid-May.

- WARBLING VIREO (Vireo gilvus): Deciduous woods (Deep Lake).
This vireo arrives in spring about the first week in May.
- ORANGE-CROWNED WARBLER (Vermivora celata): A rather common summer visitor to shrubby deciduous woods and brushy openings in coniferous forest. Sometimes arrives by the first week in April.
- NASHVILLE WARBLER (Vermivora ruficapilla): Locally common at middle and high elevations in streamside shrubbery and brushy deciduous or mixed forest (Bear Valley). Migrants appear about the third week in April.
- YELLOW WARBLER (Dendroica petechia): Breeds in deciduous thickets, most often by water (Cosens Bay pond; Turtle Pond). Returns by the first week in May.
- YELLOW-RUMPED WARBLER (Dendroica coronata): The Audubon's subspecies is the most common and conspicuous transient warbler in the valley bottom, but only a few stay to breed, usually in the upper levels of the dry forest and in subalpine areas. It is an early spring migrant, arriving at the end of March. The Myrtle subspecies is a less common transient, apparently more numerous in spring than in the fall.
- TOWNSEND'S WARBLER (Dendroica townsendi): Breeds at higher elevations in mature conifers. Migrants appear about the second week in May. Numbers were foraging in the trees beside the power line road on August 18, 1975.
- NORTHERN WATERTHRUSH (Seiurus noveboracensis): Always near water. Turtle Pond.
- MACGILLIVRAY'S WARBLER (Oporornis tolmiei): A warbler of low brush and deciduous thickets (Bear Valley, Deep Lake). Arrives in the first week of May.
- COMMON YELLOWTHROAT (Geothlypis trichas): Borders of marshes from mid-May on. Deep Lake.
- WILSON'S WARBLER (Wilsonia pusilla): A common transient, seen from the first week in May in spring migration. During fall migration this species is occasionally seen as late as October.
- *AMERICAN REDSTART (Setophaga ruticilla): Deciduous growth, especially alders near water. Redstarts are late spring migrants, arriving about the third week in May.
- *WESTERN MEADOWLARK (Sturnella neglecta): Very common on grasslands, especially in summer when young are flying. Uncommon most winters; some stay around feedlots. Migrants return in March.

*RED-WINGED BLACKBIRD (Agelaius phoeniceus): A common summer visitor; some may overwinter. Nests at Cosens Bay pond, Deep Lake.

*NORTHERN ORIOLE (Icterus galbula): A bird of deciduous forest edges and rangeland copses, but breeds in Ponderosa Pines as well as birches, aspens, etc. Nests in Bear Valley, on Rattlesnake Hill, at Cosens Bay beach. Ours is the subspecies bullockii.

*BREWER'S BLACKBIRD (Euphagus cyanocephalus): Rather common in summer; a few occasionally winter.

*BROWN-HEADED COWBIRD (Molothrus ater): Most often seen (at Cosens Bay) on rangeland in the company of cattle; but widespread throughout. Cowbirds arrive early in May and are last seen in September.

WESTERN Tanager (Piranga ludoviciana): A common summer visitor to Douglas Fir forests; usually also appearing at lower elevations in late summer. It is more often heard than seen. First males arrive in early May.

LAZULI BUNTING (Passerina amoena): Found most often in open areas bordered with rose and waxberry bushes. A summer visitor from the first week of May to early September.

EVENING GROSBEAK (Hesperiphona vespertina): Breeds in subalpine areas locally. At lower elevations in the Okanagan it is most often seen as a migrant and winter visitor. However, the summer of 1975 saw numbers of this species in Douglas Fir forests throughout.

CASSINS FINCH (Carpodacus cassinii): Essentially a summer visitor to the southern interior, although there are many winter records. Frequently heard and seen in open coniferous forest.

PINE GROSBEAK (Pinicola enucleator): Breeds only in the higher subalpine forest in this area. Winter movements are unpredictable, but this is the time to see them at Cosens Bay, especially feeding on the buds and fruit of hawthorns, etc.

GRAY-CROWNED ROSY FINCH (Leucosticte tephrocotis): Nests above timberline but winters sporadically in large flocks on the grasslands of the Vernon area.

COMMON REDPOLL (Acanthis flammea): An unpredictable winter visitor to the Okanagan. Locally, flocks of this species are best seen where there are plenty of birch trees, for birch seed is a staple food.

PINE SISKIN (Spinus pinus): Breeds in coniferous forest, anytime from March to August. Versatile for a forest finch; noisy flocks may be seen in areas ranging from deep forests to open farmland.

- AMERICAN GOLDFINCH (Spinus tristis): A finch of open deciduous growth. Common in summer; usually present in winter.
- *RED CROSSBILL (Loxia curvirostra): Erratic in occurrence and breeding habits. Locally known to nest as early as February and as late as September. Usually rather common in Douglas Fir forests.
- *RUFIOUS-SIDED TOWHEE (Pipilo erythrophthalmus): A very common bird in Bear Valley and the Deep Lake area. In late July these areas are full of lately-fledged young. In the area from mid-March to October; some may winter.
- SAVANNAH SPARROW (Passerculus sandwichensis): Frequents rangeland, especially moister sites, from early May to the end of September. There are no winter records.
- *VESPER SPARROW (Poocetes gramineus): A bird of open grasslands, one of the most common and easily-observed summer sparrows in the area from early April to September. No winter records.
- *LARK SPARROW (Chondestes grammacus): A conspicuous summer visitor to the dry Interior, never very common. Inhabits brushy rangeland copses.
- *DARK-EYED JUNCO (Junco hyemalis): The Oregon race is a common bird throughout except on grasslands. It may be seen the year round. The slate-coloured race is an occasional winter visitor.
- *CHIPPING SPARROW (Spizella passerina): Very common in open, dry woods, especially Bear Valley and slopes to the south. Late April to September.
- CLAY-COLOURED SPARROW (Spizella pallida): A bird of the plains that consistently breeds on Goose Lake Range west of Vernon. It has been seen on the grasslands of Cosens Bay. This uncommon bird should be looked for from mid-May to the end of June in rose and waxberry bushes on the rangeland.
- WHITE-CROWNED SPARROW (Zonotrichia leucophrys): In the Cosens Bay area, best known as an abundant spring migrant, usually appearing about the end of April. May breed locally in subalpine areas. Some immatures may overwinter, but adults rarely do.
- *SONG SPARROW (Melospiza melodia): One of the most common sparrows in all seasons, especially in dense shrubbery. During the breeding season it prefers thickets near marshes.

APPENDIX 6 . THE MAMMALS KNOWN TO OCCUR IN THE COSENS BAY AREA

Little Brown Myotis Myotis lucifugus (LeConte) Mainly seen at dusk in summer.

Snowshoe Hare Lepus americanus Erxleben. Throughout.

Yellow-bellied Marmot Marmota flaviventris avara (Bangs) Abundant in dry, rocky areas. Extensive burrows along cliff edges north of Cosens Bay and in rock outcrops throughout rangeland. An interesting animal; in Cosens Bay area a major food of the Coyote and Pacific Rattlesnake (the snakes feed on young marmots) and a favored host of the wood tick Dermacentor andersoni.

Columbian Groundsquirrel Spermophilus columbianus columbianus (Ord). Small population on north slope south of Cosens Bay beach. May hibernate as early as mid-July.

Northwestern Chipmunk Eutamias amoenus (Allen) affinus Widespread, especially common in Bear Valley and Cougar Canyon.

Red Squirrel Tamiasciurus hudsonicus (Erxleben) streatori (Allen) Common in woods throughout area.

Northern Flying Squirrel Glaucomys sabrinus (Shaw) columbiensis Howell. Deep Lake.

Northern Pocket Gopher Thomomys talpoides (Richardson) incensus Goldman. Grasslands and open woods throughout.

Great Basin Pocket Mouse Perognathus parvus (Peale) laingi Anderson. Grassland.

American Beaver Castor canadensis Kuhl leucodontus Gray Workings especially prevalent in Cougar Canyon.

White-footed Mouse Peromyscus maniculatus (Wagner) artemisiae (Rhoads) Ubiquitous.

Bushy-tailed Wood Rat Neotoma cinerea (Ord) occidentalis Baird. Mainly found in talus and cliffs.

Meadow Vole Microtus pennsylvanicus (Ord) drummondi (Audubon and Bachman). Meadows, open woods, especially near water.

Mountain Vole Microtus montanus canescens Bailey. Confined to grasslands.

Long-tailed Vole Microtus longicaudus (Merriam) mordax (Merriam)

Muskrat Ondatra zibethica (Linnaeus) osoyoosensis (Lord) Seen in Cosens Bay pond and Turtle Pond.

- Porcupine Erethizon dorsatum nigrescens Allen. Found mainly where open pine forests are associated with cliffs and broken rock.
- Coyote Canis latrans Say lestes Merriam. Rather common on grasslands and in open woods. One den with four young found in Bear Valley. Seen preying on Yellow-bellied marmots and Pocket Gophers.
- American Black Bear Ursus americanus Pallas cinnamomum (Audubon and Bachman). Several records for the ridge east of Kalamalka Lake, Deep Lake and Bear Valley. The berry patches in Bear Valley seem to be especially popular.
- Short-tailed Weasel Mustela erminea Linnaeus invicta Hall. Throughout.
- Long-tailed Weasel Mustela frenata Lichtenstein nevadensis Hall. Throughout.
- Mink Mustela vison Schreber energumenos (Bangs) Mainly around water; Cosens Bay beach, Deep L.
- Yellow Badger Taxidea taxus taxus (Schreber) Formerly, at least, this species lived on the south-facing slopes above Cosens Bay beach.
- Striped Skunk Mephitis mephitis (Schreber) hudsonica Richardson
- River Otter Lutra canadensis (Schreber) evexa Goldman Kalamalka Lake.
- Cougar Felis concolor Kerr missoulensis Goldman. A cougar killed a deer at Cosens Bay pond during the spring about eight years ago.
- Bobcat Lynx rufus (Schreber) pallescens Merriam.
- Mule Deer Odocoileus hemionus hemionus (Rafinesque) Common throughout.
- White-tail Deer Odocoileus virginianus ochrourus Bailey. Not as common as the above species; seen mainly on Rattlesnake Hill. Some evidently enter Coldstream orchards in winter.