1975 SUMMARY (Final Report available on request)

Insect Fauna of the Gulf Island Ecological Reserves (#4, Lasqueti Island) (#15, Saturna Island) (#16, Saltspring Island)

The purpose of the present study was to compile a species list, make permanent insect collections, appraise the population abundance of some species, and to survey the relationships between insects and vegetational types of three Ecological Reserves (#4, #15 and #16) on the Gulf Islands. Diurnal insects were collected by general netting, sweep netting, soil sampling, or pitfall trapping. Nocturnal and crepuscular insects were collected by U-V light trapping. Most specimens were identified at least to the family level, and added to the permanent collection maintained at the University of Victoria.

Fifty-seven families of insects belonging to thirteen different orders were collected and identified during the period May-August, 1975. Species lists and notes on the relative abundance of species in the different vegetational zones of each Reserve were compiled. Since this is the first study of insects that has been carried out on these Reserves, it is hoped that it will form the baseline for more intensive investigations in future years. Some recommendations to improve sampling techniques, etc. are included in the report.

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1. INTRODUCTION

This report is the result of the summer 1975 study of the insects of Ecological Reserves #4, #15 and #16, sponsored by the Ecological Reserves Program of British Columbia. The purpose of the study was to compile a species list, make a permanent insect collection, make a rough appraisal of the relative populations of the insects, and to survey relationships between insects and vegetation types. Fifty-seven families of insects belonging to thirteen orders were collected on Saturna, Lasqueti and Mr. Tuam Reserves between May and August, 1975. It was found that the majority of insect species covered a wide range of habitats. This is the first study of insects that has been carried out on these Reserves and it is hoped that the information contained herein will facilitate further, more extensive studies.

2. MATERIALS AND METHODS

Ground inhabiting insects, especially those that were nocturnal, were caught in pitfall traps which consisted of a pint jar set into the ground with the rim flush to the soil surface. The jar was 1/4 filled with a mixture of 50% glycerol; 45% water; 5% formalin. Glycerol attracts insects and the formalin acts as a preservative. A piece of bark was placed over the trap to prevent debris and rain entering. Twenty-five traps were set in 5 rows, 5 meters apart and spaced along the rows at 5m intervals. One quadrant of traps was set up for each of Saturna and Saltspring. On Saturna the traps were located in the S.E. corner of the N.E. quarter of the reserve. The traps were set just off the road in Douglas Fir/salal vegetation. Moss and salal dominated the forst floor and the canopy layer consisted mainly of Douglas Fir with a few Red Cedar and Western Hemlock. The soil varied from red clay to a dark humus mixture, with areas of rotting wood and bedrock. On Mt. Tuam Reserve on Saltspring Island, the traps were located in the west part of the east half of section 39. The traps were placed just inside the reserve on the left-hand side of the road. The traps were placed in a Douglas Fir, Cedar, Hemlock community with salal, moss, vanilla and mushrooms on the forest floor.

Flying insects were captured in the standard fashion. Insects concealed in foliage were captured in a sucep net, and fast moving, wingless insects such as ants and termites were caught in an aspiration bottle. Caterpillars and other similar slow moving insects were collected by hand and aquatic insects were caught by dip net. Night flying insects

were collected in a net after being attracted to a headlamp at dusk.

All insects except those in pitfall traps were killed with ethyl acetate in a milling jar. Soft bodied insects were preserved upon capture in 70% ethanol and pitfall trap insects were also preserved this way upon removal from the traps. Hard bodied insects were pinned in the usual fashion. All insects were identified to at least family level, and on many occasions identified as far as species level.

Description of the Reserves

Saturna Island is in the Cowichan District of B.C. just south of Mayne and Pender Islands. Its southern tip is adjacent to the U.S.-Canada border. The Ecological Reserve (#15) encompasses the northwest quarter of section 3 and the southeast quarter of section 9, and has an area of 324 acres. The Reserve has a stream but is otherwise quite flat. There is no shoreline and the basic plant community is Douglas Fir/salal.

Lasqueti Island is in the Nanaimo District of B.C. south of Texada Island in the Strait of Georgia. The Ecological Reserve (#4) is located on the west side of Lasqueti and encompasses section 17 and a fraction of section 24. It has an area of 496 acres. The Reserve contains a little over a mile of shoreline. The terrain of the region is very rugged with numerous hills and valleys often containing a stream or rivulet which drains a marshy area. The Reserve has a variety of plant communities.

Saltspring Island is in the Cowichan District of B.C. The Mt. Tuam Ecological Reserve (#16) is in the southern part of Saltspring opposite Schwartz Bay, on the eastern slopes of Mt. Tuam. It encompasses the northeast quarter of section 32 and section 39 except for the eastern strip, and has an area of

627 acres. There are approximately one and one half miles of rocky shoreline containing one beach within the Reserve. A small river and swamp are also present. The terrain of the Reserve is quite rugged with rocky outcroppings on hills and along the shoreline.

Vegetation/Insects

The following data lists the various vegetation zones on the Reserves and the insects caught within them. Insects are classed as belonging to that area in which they were most abundant. However, some specimens were occasionally caught in other locations. The insects caught on all three Reserves are related to broad vegetation areas each of which includes several smaller plant communities. This was done because the enclosed smaller communities had similar microclamtic conditions and also because the insects present showed little variations within this broad zone.

Saturna

1) Open logged area.

   There are 2 major regions of this type located on the Reserve. They are waste-land areas with abundant herbs, and flowers. Insects were most abundant in these areas and the largest variety of species was found in them.

2) Douglas Fir with mossy carpet.

   This area includes dense Douglas Fir stands and also many small, sunny clearings amongst the trees. Most insects included in this category were caught in these clearings where vegetation consisted of mosses and small herbs.

3) Douglas Fir/salal.

This was the largest vegetation zone on the Reserve. The salal is quite tall and dense in many areas and virtually no herbs or mosses are present. It is generally quite dark and damp with few flying insects. However, Carabidae and other crawling insects were captured in abundance in the pitfall traps located here.

Lasqueti

1) Valleys.

Numerous valleys run throughout the Lasqueti Reserve and this zone includes the valley bottoms. Most valleys were moist and sunny with few trees and many flowers. Insects were most abundant in this area.

2) Alder.

There were two large stands of alder on the Reserve. This comprises very dense vegetation found only in the deepest valleys with moist conditions. The community consists of alder, bracken fern, and salal. It was generally quite dark and damp with much debris on the ground. Few flying insects were present.

Saltspring

1) Douglas fir/Arbutus.

This zone is fairly common and occurs throughout the Reserve blending into outcrop along the shoreline and on the hilltops. It is generally a dry area and often has a mossy carpet.

2) Open logged areas.

There were 2 areas of this kind that were sampled on the Reserve. They contained many herbs, shrubs and flowers. Insects were most abundant here.

3) Douglas Fir.

This is a very broad zone covering all areas dominated by Douglas fir. Cedar, salal, Hemlock, moss and ferns were commonly associated with this zone, although they varied slightly in different areas. There were few flying insects but many crawling insects were caught in the pitfall traps.

Relationships Between Vegetation and Insect Species

The following data lists the various Vegetation Zones on the Reserves and the insects caught within them are listed (Table I). Insects are classed as belonging to that area in which they were most abundant. However, some specimens of these insects were occasionally caught in other locations.

The insects caught on all three Reserves are related to broad vegetation areas, each of which includes several smaller plant communities. This was done because each of the enclosed smaller communities have similar conditions. The insects present showed little variation within this broad zone.

DISCUSSION

Over the summer many definite relationships between the activity of insects and the climatic conditions were observed. Populations of most flying insects increased as the weather grew warmer. The population changes in most Lepidoptera, Vespidae, Cercopidae and Cicadellidae were particularly obvious in this respect. Bombus spp. were very abundant at all times of the summer on all Reserves. On overcast or rainy days most insects, especially Lepidopterans were inactive and virtually the only insects seen were Vespids, Culicids, Apids, Halectids and Formicids. Insects of all groups were most active during the warmest parts of the day, and became inactive around sunset (ie. 6-8 p.m.). Only moths, culicids and coleopterans were caught at night.

The majority of insects observed on all three Reserves were the most abundant in open, sunny areas as opposed to dense forests. Very few flying insects were caught in dense forests and virtually the only ones seen were Vespids, Culicids, Pyralids, Geometrids, and Noctuids. Furthermore, few were caught because of the difficulty in collecting them in dense underbrush. Of these open, sunny areas more insects were caught in those that contained flowering herbs than in those that were mossy and open because of rocky outcrops. This is probably because flowers are attractive to many insects.

The majority of insect species inhabited the more open plant communities. However, a few insects such as culicids, apids, formicids and vespids, seemed to be widespread. On the other hand, there were several species such as Chrysopids, acridids, gryllids, most Hemiptera and most hepidoptera that only inhabited specific areas. In general, those insects that are scavengers, predators,

or those that feed on nectar, are more widespread than those that eat plants.

Most of the Coleoptera were caught in pitfall traps since many species are nocturnal, crawling insects. Unfortunately, the traps were only set up in one vegetation zone on each Reserve due to ease of access and the large amount of surface rock in other areas. This means that the Coleoptera were not adequately sampled in relation to vegetative zones.

As the summer progressed, the number of insects taken from the pitfall traps diminished. For example, on Saturna a total of 243 insects were taken on June 10 after the traps had been left for 27 days, and on August 11 after traps had been left for 62 days, only 283 were taken. On Saltspring the decrease was more drastic. On June 10, 183 insects were taken from the traps after 43 days and on August 12, after 34 days only 54 were taken. This may be due to the decrease in the amount of moisture which caused the death of the adults following egg-laying in the late summer months. However, the more drastic decrease on Saltspring is also due to the fact that on August 12 about half the lids on the traps had been displaced and they were full of debris.

On the traps on Saltspring on August 12 there were two distinct sizes of Gryllids, most were larger but some were smaller than those collected on May 30 and July 10. The smaller Gryllids were freshly hatched nymphs that would over-winter while maturing through several instar stages. Since adult insects don't moult and grow once they have reached maturity, the larger Gryllids probably had a more abundant food source at the time they were maturing. This theory is also backed by the presence of a larger and smaller Pterostichus sp. although the later Pterostichus sp. was also present earlier in the season. This distinct difference in size between members of the same

species was not observed on Saturna. This observation would seem to rule out the existence of a larger and smaller sub-species of both Pterostichus and the Gryllids.

RECOMMENDATIONS

The following suggestions would be helpful to those pursuing further studies of this sort. A more thorough study using permanent pitfall traps would establish continuity from year to year. An effort should be made to place pitfall traps in all vegetation zones of the Reserves in order to sample all species of crawling insects. A type of permanent collecting device to sample flying insects would be superior to searching for insects with a net, since many insects are omitted due to the physical impossibility of capturing them. An attempt should be made to systematically sample all communities on the Reserves. The maps and vegetative data compiled by the botanists working in the same program would help in this respect. Access maps to each of the Reserves have been included in this report since the Reserves are not well marked and it is often difficult to find them. Detailed maps available at the Geography Department Map Library in the University of Victoria would also be helpful. It is recommended that a maximum of two Reserves be sampled per summer in order to carry out a more intensive study.