A preliminary survey of the **Butterflies** and adult **Odonata** of the Anderson Properties, Lincoln and Bristol, Addison County, Vermont during part of the 2001 field season.

Report to the Colby Hill Ecological Project

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Introduction

This is the third consecutive annual report on the adult butterflies and odonata of the Colby Hill Ecological Project (CHEP) in Lincoln and Bristol Townships, Addison Co., Vt. on the farm properties of Mr. Lester Anderson. During the 2001 season, I also did a preliminary and very limited inventory of moths.

Previously surveys were conducted at three farms: Guthrie/Bancroft, Pierce, and Wells. During the 2001 season, no surveys were conducted on the Wells farm for two reasons: 1) data from the two previous seasons indicated that the biodiversity of the target taxa was relatively lowest on the Wells farm and 2) because of this and a more limited field agenda in 2001, I decided not to inventory at the Wells farm and instead concentrated my efforts at the other two farms.

I followed essentially the same field protocols as during the 1999, and 2000 field seasons (see Appendix I for specific details on the daily routes I took at each farm). A running total of all adult species of butterflies and odonata for the three seasons (1999 through 2001) was compiled, with additional details by specific sites (Tables 1-6).

Methods

For the inventories of the adult butterflies and odonates, I used the same general procedures as for the 1999 and 2000 surveys. This consisted of: 1) random searches through the major habitats (meadows, swamps, marshes, fields, and woodlands), 2) a general survey along transects in some areas (especially along the wooded part of Isham Creek) and 3) intensive point surveys at several loci, particularly at Guthrie Pond. At the latter relatively high biodiversity site, I also attempted (as during the previous years) a limited mark/recapture of odonata and a more or less temporal survey of the daily flight activity of selected species of odonates at Guthrie Pond.

I was in the field during all or parts of five days: 8 June, 16 July, and 7,8,and 9th of August 2001 (Appendix I).

I attempted to blacklight for moths in 2000 at the Pierce farm but the results were limited by untoward cold weather conditions. In 2001, I placed a standard (Bioquip) pail-type fluorescent blacklight at two sites for one night each at the Pierce

farm. Ethyl acetate was employed as the killing agent. This fluid is relatively safer to handle than substances such as cyanide compounds, although it doesn't have the "knock-out" properties of the latter. However, I was reluctant to use the latter chemical at sites over which I didn't have absolute control.

(I had originally intended to run traps simultaneously (on the same date) at two adjacent sites but equipment failure precluded that plan). Therefore, only one blacklight was run during the evening of 7 Aug. It was placed in the mixed swamp/marsh south of the woodland pond on the Pierce property at 1845 hrs and recovered at 0615 hrs on the 8th of Aug. The trap was placed on a stump in the more or less open swamp part of the habitat. The light was approximately 75 cm. above the wet substrate. This potentially attracted insects from both the marsh (with *Typha* and other wetland species) and the adjacent low shrubby woodland swamp, of a mixed variety of deciduous shrubs and both deciduous and coniferous (primarily hemlock) species of trees and saplings. The substrate was quite hydric in the general environs of the trap. It was saturated at the immediate site of the trap (with *Sphagnum* moss in the ground layer).

The same UV trap was transferred to the south bank of the woodland pond of the Pierce property (i.e., south of the homestead). It was put out at 1845 hrs on the 8th and picked-up at 0545 hrs on the 9th of Aug. The bucket trap was placed on the ground, with the UV light element approximately 50 cm. above the surface of the ground. This light potentially attracted species from the wooded swamp, immediately south of the light, the adjacent pond, and the surrounding upland mixed woods. Depending on the distance of attraction of nocturnal insects, it may also have attracted insects from the relatively near open fields to the east of the set-up (estimated at 30 meters or so away). Both light stations had relatively good (as the British put it!) "throws" for the area of illumination around the traps. However, since the trap at the pond was, in effect, on a small ridge over-looking the adjacent lower woodland swamp and marsh, it potentially had a greater radius of attraction than the trap at the latter site.

The weather conditions seemed fairly good for both nights, but not ideal. There were low wind velocities and relatively warm temperatures. However, the moon was near full phase which reportedly is not ideal, especially for sampling sites in the open, such as in fields. Nevertheless, the weather conditions were essentially the same for each night of trapping. The light that was used worked perfectly both nights. Nor was there any disturbance of the trap by outside entities, either night.

When checking the traps for the AM pick-up, any unique species of moths that were clinging to the outside of the apparatus were collected, if possible. Within an hour or two of the collection of the trap, the contents were dumped and roughly sorted at a "field" station, under rather primitive laboratory conditions. All species of macro-moths that could be identified were immediately noted and recorded. All those that were not recognized during the original sorting were collected, rechecked, and then spread and tentatively identified at my home by me. Some were transferred to a local "expert", Mr. Warren J.Kiel, for final determination and verification. Voucher specimens except for the very obvious and well known species, were prepared according to standard techniques. These are deposited in the private collection of Donald H. Miller.

Selected micro-moths, beetles, and trichoptera were also collected. These have not yet been determined, pending the availability of taxonomists to do so.

For those not familiar with the condition of specimens taken by blacklighting, it should be noted that considerable numbers of moth specimens are often fragmented and rubbed. It is essentially impossible with this (standard!) technique (or any other) to kill every moth instantaneously as it enters the trap, much less other insects, particularly beetles. Thus, it is inevitable that some fragmentation and rubbing of specimens takes place. However, this investigator, although not a moth expert, has had extensive experience with the moth fauna of New England, including doing blacklighting for many nights under similar conditions as were experienced here. I am quite sure that very few if any, species of macro-moths were overlooked from those sampled. However, it is almost impossible to ascertain the degree of error involved in not being able to identify badly damaged specimens. Undoubtedly, a far greater proportion of micro-moths were destroyed beyond recognition (to species). I simply did not have the time, facilities, or resources to make genitalic mounts of the fragmented specimens. This latter technique, especially with the "micros" would at least, theoretically, allow identification of many more species- but not all (because some taxa cannot be determined to species, even with genitalic mounts-that is, one needs both the latter and excellent specimens that are not rubbed-a very daunting expectation, indeed). As is, the sorting of the "macros" and the subsequent relaxing, spreading, mounting and labeling is very time consuming. Some of the more intact specimens of "micros" have been retained, along with a few of the very small species of "macros" and a later attempt will be made to have as many of these identified to species as resources allow.

((This investigator plans to get as many of the other taxa of insects identified as possible, if the resources (especially taxonomic experts) can be located to assist with this.)) All the beetles that were collected have already been pinned and labeled. The sample of Trichoptera, particularly, needs much further work and processing before identifications can be attempted.

The Science Dept. of Lyndon State College permitted the use of the Bioquip pail-type UV-blacklights and provided the ethyl aetate. I supplied the 12 volt batteries for the project from personal funds. I would also like to thank Lester Anderson for help with recharging the battery for the moth project and for providing overnight lodging during the two nights of the moth inventory.

Diurnal activity of adult odonata at Guthrie Pond

During the 7th, 8th and 9th of August I spent a total of 175 minutes at Guthrie Pond attempting to mark and recapture adult odonates and to ascertain the general diurnal activity of the more common species. The clock intervals (DST) and total time spent doing this were: 7th: 2015-2040 hrs (25 mins.), 8th: 1030-1110, 1300-1310 hrs, 1740-1815 hrs (85 mins.) and on the 9th: 0710-0800 and 0905-0930 hrs (75 mins) for a total of 175 minutes (2.92 hrs) of intensive observation at the Pond. This effort was dove-tailed around other project activities but the intent was to "spread out" the observation of activity behavior over as broad a range of dates and time intervals that were feasible within the context of my other inventory activities.

(Relative to the reports for the previous two seasons, I deliberately keep the

discussion and interpretation of results to a minimum in this report with the intent that total costs for preparation time will be reduced, as requested).

I have kept speculation with respect to the interpretation of the data at a minimum, relative to the reports for the two previous seasons. However, some anecdotal notes are incorporated with respect to issues of ecology and natural history that I think have potential significance for planning more detailed research during a later time or that seem to be of potential interest to readers with general interests. As I understand it, one of the goals of the CHEP, with which I entirely agree, is to make the information, garnered by scientists working on the project, more generally available and comprehensible to the public-at-large. I believe that, initially, general descriptions of the natural history of an area are of greater interest to the public than detailed ecological analyses of the data from the field inventories.

Results and Discussion

Before presenting the results of the various inventories, I will briefly describe the general weather and surficial ground water conditions observed during the three periods of inventorying at the Guthrie/Bancroft and Pierce farm sites. These have potentially significant abiotic effects on the phenology of appearance and activity of the insects that were inventoried.

During the 8th of June 2001 it was a relatively warm day with a slight breeze. The ponds on both the Pierce and Guthrie sites, were full. Water stood several cms deep over most of the woodland swamp/marsh site on the Guthrie farm and beavers had ponded the south end of that site to a depth of 30-50 cms. Ambystomid (mole salamander) ova clumps were abundant at the small pond just north of the Pierce homestead. Generally, it seemed to be an ideal day for sampling flying insects. However, later in the afternoon the wind velocity did noticeably increase and this probably depressed the intensity level of the flight activity of butterflies over the open and more exposed fields. However, I doubt than any species of butterflies were completely deterred from flying and therefore missed during the inventory.

On the 16 July conditions again seemed ideal for sampling. The morning was relatively cool but it warmed considerably as the day progressed.

The fields had recently (within the past week or two) been completely mowed, except for the field north of the Pierce homestead. Mrs. Anderson had left a considerable strip of unmowed field at the Bancroft farm in an area where I had noticed quite a few potential nectar-providing plants during the previous season, particularly at a large stand of dogbane. However, when I checked these unmowed strips, much of the dogbane had already gone to fruit and there was essentially no nectaring activity of butterflies at the unmowed field sites.

Surficial water levels were still high throughout the wetland study sites. Beaver activity was very obvious in the woodland swamp/marsh site of the Guthrie farm. Standing water was relatively high over most of the site, up to 50 cms or more in many places. The ditch that coursed through the site was completely filled.

The Green Frog (*Rana clamitans*) was in full chorus at both the Guthrie

Pond site and the extensive beaver meadow complex at the upper end of Isham Br. on the Pierce Farm.

Relatively large schools of an unidentified cyprinid (minnow) were present throughout the upper stretches of Isham Br. and bright-colored breeding males were avidly courting females. There is obviously a large breeding population of at least one species of cyprinid in the upper reaches of Isham Brook. It would be extremely interesting to study the breeding biology of the minnows in Isham Brook, other than just doing a brief "creel" survey such as by electric shocking techniques.

Throughout the area, Joe-Pye-Weed and Boneset were approaching flowering but most were still in bud.

On July 16th 2001, conditions throughout the area again seemed ideal for the inventorying of flying insects. However, there seemed to be a definite hiatus, in the availability of nectar to butterflies, between the cessation of flowering of the early vernal species of flowers and the onset of the copious nectar sources from the early autumn flowering plants (such as Joe-Pye-Weed and Boneset).

By contrast, the surficial ground water condition during the August period of the inventory was very different from the June and July periods. The Guthrie woodland swamp/ marsh complex was almost entirely dry underfoot except at the immediate site of the beaver dam. No signs of fresh beaver activity was evident. Overall, ambient air temperatures during mid-afternoon were relatively high making field work rather trying to the field worker. In fact I noticed that some of the larger odes that I saw in the Guthrie swamp/marsh complex seemed reluctant to fly over great distances. That is, when first "flushed" they often appeared to fly a short distance over the site and then flew into the shade of the adjacent woodland where they apparently perched until the ambient air temperatures declined. (A few were seen to perch). This temperature avoidance behavior has been reported for several species of odonata. However, little is known about the details of this activity with respect to its precise proximal causation, frequency, and temperature thresholds that stimulate it. It was my definite impression that the flight activity of at least some species of odonata and perhaps even butterflies was reduced during relatively high ambient air temperatures, contrary to what is generally believed (especially at these latitudes).

Joe-Pye-Weed and Boneset were near the end of their flowering period, though most inflorescences still had nectar, as evidenced by the many butterflies that were still visiting the plants, especially in the corner marsh of the Guthrie farm site (aka the wet old field area-sw of Guthrie Pond and adjacent to the open field).

Regionally, 2001 was one of the driest summers on record. The trend during the course of the field season was for a very marked decrease in the presence of surficial ground water and, I suspect, a concomitant physiological water stress on many plants. This would seem to have deleterious effects on the larval feeding stages of many lepidoptera, especially those that are more typical of open field sites. Furthermore, unusually high temperatures are known to inhibit, or even prevent, the eclosion of the adult stages of some butterflies from pupae.

All three (Guthrie and the two Pierce farm) pond sites retained relatively high levels of water throughout the span of time I was on the CHEP study area. Isham

Brook flowed continuously during all sampling periods. The water level behind the dam across the beaver meadow, along the upper part of Isham Br., was relatively high during all three visits to that site. In general, I believe that the trend of drought conditions observed during the field season of 2001 was probably more detrimental to the ecological requirements of lepidoptera than to odonata. I suspect that the (population) mortality of the former was higher than the latter as the season progressed. Possibly, the larvae of the species of odonata that tend to breed in temporary pools were stressed to unusually high levels and their development may have been curtailed or ceased entirely. A species such as Sympetrum obtrusum, a meadowhawk, was undoubtedly in this predicament. I also noticed unusually low numbers of butterflies flying over the fields, particularly in July and August. This may have been due to the relatively dry conditions in the fields. However, the effect of mowing during the start of the driest period of the season certainly is a compounding factor to consider. It may have reduced the availability of nectar and certainly would have made the larvae of the species of butterflies that feed on graminoids more exposed to higher temperatures. One way to better understand the relative effect of mowing on insect populations in fields would be to conduct detailed comparative studies of duplicated plots of mowed and unmowed areas of the field sites. Mowing undoubtedly has both direct and indirect effects on butterfly populations.

Butterfly Inventory:

The inventory data for butterflies are presented in Tables 1,2 and 5.

Two species were recorded for the first time this season: 1) the Black Swallowtail was seen in the beaver meadow at upper Isham Brook, nectaring at mostly Boneset, and 2) the Aphrodite Fritillary was found in the corner marsh, adjacent to the field of the Guthrie farm. The Aphrodite can be easily confused with the Atlantis F., especially when it is not observed directly in hand. I have indicated before that I was quite certain that this species was present in the project area and it is reassuring to have positively verified its presence and to document this with a voucher specimen.

Twenty-five species of butterflies were recorded from the project area, the lowest total to date for one season. Forty-two species have been recorded during all three years of the study but the trend in total numbers of species for each year has been negative.

The season of 2001 was very unusual in several respects:1) the relative numbers of the Cabbage White and the Pearl Crescent were unusually low and, inexplicably, *Enodia anthedon* , the N. Pearly-eye and the White Admiral were not recorded. However, the sampling effort was relatively limited and these species may have been present. However, both of the latter are not uncommon and I suspect that there absence was a real phenomenon. Either they were present in very low numbers and over-looked during the inventories or they may, indeed, have been completely absent from the study area for 2001.

I also noted an apparently unique and, to the best of my knowledge, a heretofore unreported situation with respect to potential negative interspecific nectaring competition between species of *Speyeria* and the European Skipper (*Thymelicus lineola*) at the corner marsh of the Guthrie farm site. During the July inventory I

observed literally "swarms" of the latter nectaring at Joe-Pye Weed. The latter were so abundant and seemingly aggressive that they appeared to be literally "muscling" (for want of a better non-technical word !) the various species of *Speyeria* off the flowers. On many occasions I noticed a species of *Speyeria* land on a flower, almost certainly in an attempt to nectar, and then it was apparently jostled off by the skippers. A behavioral ecologist would say that the fritillary had been directly displaced by the skipper. That is, the non-native European S. seemed to be definitely interfering with the access of the native species of *Speyeria* to one of their major vital resources-nectar. Nectar is generally regarded as a key resource to the adults of many species of butterflies.

This situation should be investigated in much greater detail. Here we have the potential of a non-native skipper severely impacting one or more species of native butterflies, particularly those of the genus *Speyeria*. The almost astronomical numbers of the non-native skipper that occur in the fields adjacent to the habitat (s) of the fritillaries far outnumber those of the latter! One might argue that the presence of a mosaic of mowed grassy fields, where the European S. breeds in large numbers, would have possibly dire effects on those native butterflies which are usually more closely associated with adjacent woodland clearings. The European S. is already considered to be a potential pest of hay crops, such as Timothy, but its overall impact on the butterfly biodiversity of ecosystems may be much more perverse! Since several species of fritillaries (*Speyeria* and other genera) are at potential risk from extinction, this negative competitive interference effect (of the introduced European skipper on the native *Speyeria* spp.) seems to be another potential threat to *Speyeria* spp., wherever each are found in ecological juxtaposition to each other. I'm not aware that this specific type of negative competitive interaction has been reported before. Most field lepidopterists hardly bother to closely observe the European Skipper. This potential negative effect of resource competition would seem to be most severe in those ecological situations where important nectar sites for *Speyeria* spp. are adjacent to certain types of fields that favor the European S. That is, it could be an "edge" effect. As usual we have more questions than answers and the general problem of edges again rears its perplexing ecological head.

General inventory of Odonata:

The data for the inventories of odonata are presented in Tables 3, 4, and 6.

Three species of odonata were taken for the first time on the project site during the 2001 field season. These were: *Coenagrion resolutum*, the Taiga Bluet, *Somatochlora walshii*, the Brush-tipped Emerald and *Gomphus borealis*, the Beaverpond Clubtail.

One of these, the Beaverpond C. is listed by Carle as a S2 species, a designation that, in my experience, in northeastern Vt., seems far too conservative. However, the NEK (Northeast Kingdom) may be the "hotspot" of this species in Vermont. We need to know much more about its abundance throughout Vermont. It was taken both during June and July at the beaver dam/beaver meadow site along upper Isham Brook. I have identified this distinctive species without question and

vouchers are in my private collection. Interestingly, this is the first Clubtail (Gomphidae) that has been recorded anywhere on the Project sites. The emerald was taken taken both on the Guthrie farm site and the beaver meadow site of the Pierce farm (Tables 3 and 4). This species seems to be one of the more common emeralds in Vt., in my experience. The Taiga Bluet is generally regarded as a northern species and I was pleased to finally verify it from the study area. Interestlngly-and, to me, not surprisingly-it was taken in June at Guthrie Pond, that odonate mecca.

Even with the addition of three new species to the recorded fauna of odonata from the CHEP study area, the total number recorded in 2001 was 25, seven less than in 2000 but equal to the number recorded in 1999. The total number of odonata now positively recorded from the general CHEP area stands at 39, compared to the total of 42 species of butterflies. Again, I predict more species of odonata will be found on the CHEP properties.

With another year of data (2002), it will be interesting to see what the four-year annual trend in total number of species will be for both groups: butterflies and odonata. To date (1999-2001), the total number of species of butterflies seems to be declining whereas odonata do not.

This writer is very conservative in reporting species from brief glimpses in the field. I am sure that there were some species of odonata present on the area that I did not positively identify. On several occasions during the 2001 season, I "missed" some adult of species of odonates along the Isham Brook and along the ditches of the upper beaver meadow. Many adult emeralds, clubtails, and those of some other groups of dragonflies are extremely quick and elusive, as many a frustrated odonatologist can attest! Of course this situation also obtains with some species of butterflies. I suspect, however that in the general surveys on the CHEP sites, more species of odonata are overlooked than species of butterflies. On average, many odonate species are more difficult to net than species of butterflies. I personally don't feel that the use of so-called close-focusing binoculars eliminates the problem of the correct field identification of some odes. The difficult species must be netted and then often prepared as voucher specimens for futher study, especially if the individuals are females.

I also did a brief survey along Baldwin Creek, immediately adjacent to the CHEP property, from 1335 to 1402 hrs on 16 July. I hoped to determine that certain species of odes, normally associated with fast flowing mountain streams, might be found there. I walked upstream from the bridge that crosses rt. 17 for about 200 meters. I recorded only the damselfly, *Calopteryx maculata.*

Diurnal activity of odonata at Guthrie Pond:

7th Aug. (2015-2030 hrs)- no odes caught but many were seen flying, mostly darners. No Azure Bluets were seen. These are, incidentally, relatively easy to identify in the field and could easily be seen flying over and along the edge of the pond.

8th Aug.: (started at 1030 and, at various intervals, inventoried until 1815 hrs)

The Azure Bluet was very abundant during the interval from 1030-1100 hrs. I recorded only one (male) briefly during the 1740 to 1815 hr interval. On the 9th of August, during the 0710 to 0800 time period, I recorded none of this species. Thus,

it appears that the diurnal period of flight activity of te Azure B. during early August starts around 0900 hrs and ends about 1700 hrs, a total period of activity of about eight hours. Thus, it seems to have a period of activity that, for unknown reasons, terminates relatively early in the day and starts fairly late. However, at both the earlier and later time periods, darners were active and seemingly even more so at dusk. Does the Azure Bluet adjust its flight activity to prevent or reduce predation by darners? Do members of the genus *Aeshna* even prey on bluets? I have never seen this at Guthrie Pond. It would also be extremely interesting to compare the period of activity of the Azure Bluet with other species of odonates at Guthrie Pond, such as the Spotted Spreadwing.

Lestes congener, Spotted Spreadwing, tenerals were extremely abundant all along the edge of the pond. It was by far the most abundant spreadwing at the pond site. This species, incidentally, unlike some other species of *Lestes,* is very easy to identify and would therefore be ideal for detailed studies in the field. It seemed extremely vulnerable to predation by various species of larger dragonflies. I did see some predation of this species by unidentified species of darner. However, this was not quantified. I had the definite subjective impression that the Spotted S. was a definite prey target of the darners, but this did not seem to be the situation with the Azure B. However, all or most of the latter I observed appeared to be hardened adults.

I recaptured a male American Emerald during the 1740-1815 interval which I had marked during the 1030-1110 time interval. To my knowledge, this is the first record of a recaptured American Emerald over any time period, much less one of five or six hours. Thus, this male apparently spent all or much of the day at the pond site. This is interesting because many investigators feel that there is a very rapid turnover of, particularly, species of anisoptera (dragonflies) at small ponds of this size, during the course of one day or more. We know very little about short-term turnover rates (hrs or days) of odonates for any site.

One perplexing observation was that I never recorded *Aeshna umbrosa*, at the Guthrie Pond during the entire period of observation. Indeed, the only aeshnid darner that I recorded at the pond was *A. interrupta.* During every previous year I have recorded *A. umbrosa* at Guthrie Pond, often in relatively large numbers. I have no ready explanation for this apparent paradox. It could possibly be due to sampling error since at most *Aeshna* spp. were sampled on only two days during the season. However, I doubt that was the reason for the apparent complete absence of this usually common aeshnid species-*umbrosa*. Furthermore, I did record the latter species during the same August period of inventorying at the Pierce beaver meadow site. *Umbrosa*, incidentally, is one of the easiest to capture, of all the darners, so it is highly unlikely that I would have missed recording it.

As stressed in a previous report, Guthrie Pond continues to hold forth great promise as a model field site to study the behavior of many species of odonata. Its relatively small size far belies its importance in this regard. The extremely important "take home" message here is that small size of a habitat, relative to a similar one of larger size, doesn't necessarily mean that the smaller habitat is proportionally less important, especially in terms of elucidating the importance of the effect of area on the

level of the biodiversity of a taxon in a habitat.

A perusal of the specific details of the inventory of both odonata and butterflies (Tables 1-4) clearly reveals which of the specific sites have the highest biodiversity for either of the two groups. I leave it to the reader to study these tables without further elaboration here.

(In those tables, the Roman numerals indicate **the months** of record).

Results of the two nights of blacklighting for moths:

Thirty-two species of macro-moths were identified (Table 7). As is typical, the cutworms (Noctuidae) predominated, consisting of 18/32 or 56.2 % of the species that were recorded. Twelve species were recorded from the lowland marsh/swamp of the Pierce farm and 24 from the higher pond site. Only four species were taken at both sites which, to me, was very surprising. None of the species is listed at < S4 status, although the scientific basis for the listing status of moths in Vt., in general, is very suspect.

Essentially all of the species recorded are general feeders on a fairly broad spectrum of plants and most are associated with mixed habitats of anthropogenic influence (Covell, 1984). None, to my knowledge, are known to be particularly rare in general surveys. The inventory of moths on the CHEP sites is however, clearly in its infancy.

In two nights of blacklighting, the minimal number of recorded species of macro-moths exceeds that of all butterflies taken during each of the entire 2000 and 2001 field seasons on the Project area and falls short by just two species of equaling the total number taken during the 1999 season. Further work with moths will undoubtedly prove to be very interesting. If and when the other species of moths are identified, the total number of species of moths taken during the two nights at two nearby sites on one farm will certainly exceed that for for butterflies.for all years of sampling for butterflies over the entire CHEP study area. The eventual total from more intensive sampling of the macro-moths alone will easily approach 200 species or more and, ultimately, if the micro-moths are included, well over 500 species of moths! The greatest obstacle in reaching the goal of understand-ing the biodiversity of moths anywhere is both limited by logistical considerations (cost, equipment, space, etc.) and, more poignantly, by the lack of availability of taxonomists willing to work on such projects and trained to do so. The extremely few moth taxonomists, professional or otherwise, are already swamped with their own agendas, much less trying to accommodate the demands of many others. This, ultimately, is why most surveys of moths concentrate on the macro-moths and even this is a very daunting challenge, indeed. However, it does beg the question of which taxa should we concentrate on in biodiversity surveys in terms of achieving the goals of the study. I suspect that the most speciose taxa would ultimately be the most important to inventory.

(With respect to the problem of identifying moths, I feel very fortunate to have Mr.Warren J.Kiel at least currently willing to assist in this survey effort. He arguably knows the local macro-moth fauna of northern Vermont and New Hampshire better than any living person. I have been extremely privileged to have been mentored by him for over a decade.)

Summary

Butterflies and odonata were sampled during three dates of the 2001 field season on the CHEP project area at both the Guthrie/Bancroft and the Pierce farms. Macro-moths were sampled during two consecutive nights in August only at the Pierce farm. No inventories were conducted at the Wells farm site during the 2001 field season.

Three partial days were spent conducting a general activity study of selected odonata at Guthrie Pond. The activity period of *Enallagma aspersum* was restricted to a period between 0900 and 1700 hrs DST, in early August. This has not, to my knowledge, been previously described for this species.

Two species of butterflies (Black Swallowtail and Aphrodite F.) and three of odonata (Taiga Bluet, Brush-tipped Emerald, and Beaverpond C.) were recorded for the first time on the study area. The Beaverpond C., *Gomphus borealis*, is state listed as a S2 species, a listing which the author feels is too conservative.

45.2% (19 of 42) species of butterflies and 38.5% (15 of 39) of odonata have been recorded on the CHEP project area during each of the three field seasons.

The European Skipper seemed to pose a potentially serious negative interference competition effect with (*Speyeria* spp..). This phenomenon may be more general than observed on the CHEP study area and may have potentially very serious implications with respect to the conservation of some native species of *Speyeria* and perhaps other species of butterflies that use nectar as a major resource.

Species of the family Noctuidae were the most commonly recorded macro-moths, constituting 56% of the total of 32 recorded species of macro-moths.

Literature Cited and Bibliography

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Layberry, R.A., P.W. Hall and J. Donald Lafontaine 1998. The butterflies of Canada, Univ. Toronto Press, Toronto, Canada, 280 pp.

Note: Other general sources have been indicated in the two previous reports for the field seasons of 1999 and 2000.

Appendix I: A generalized description of dates, routes, and sites visited during the 2001 field season during three separate inventories at the CHEP area.

8th June Pierce Farm- I followed the same general track as during previous years, namely visited all previous sites both n.and s. of the e-w dirt road.

Guthrie Farm- ditto- followed the usual route on Guthrie farm.

16 July Pierce Farm- I did not go to any areas, south of the road, south of the Pierce homestead. Rather, I concentrated all my time at sites n.of the road, namely the open small pond, across the field to Isham Brook, up the brook to the beaver meadow and then to the dam at the n. end of the meadow.

Guthrie Farm- I followed essentially the same route as during the 8th of June.

I also spent about one hour along a portion of Baldwin Creek (as described in the narrative above).

7th August Pierce Farm- set-up blacklights in PM.

Guthrie Farm-went to Guthrie Pond in late afternoon.

8th August Pierce Farm- recovered blacklights in early AM from the two sites. Discovered that one was not working, Therefore, transferred the light from the lowland wooded marsh/swamp site to the woodland pond (all s. of the Pierce homestead). Later, I essentially followed the same route as described above (8th) for the Pierce Farm. I spent roughly two hrs sorting the moth catch from the set-up in the swamp/marsh.

Guthrie Farm- I went to Guthrie farm twice during the day. I followed essentially the same route as before but did not go down to the Bancroft field (it was stifling hot in the field and I saw essentially little or no activity over the fields). I went back to Guthrie Pd later in the afternoon.

9th August Pierce Farm-Picked up the blacklight and field processed the take.

Guthrie Farm- went to Guthrie Pond twice in the AM to do behavioral studies.

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*Generally, I followed more or less the same routine and the same general routes across the two farm properties as during the previous two seasons, as amended in the above descriptions.

Table 1. Butterflies of Guthrie (G) and Bancroft (B) Farms, Lincoln Twp., Addison Co., Vt.-2001.

SPECIES (names after Layberry et al, 1998)	COMMON NAME	STATE RANK (S)*	G - open fields	G corner marsh	G woodland swamp/ marsh	G wood-land	G totals sites	B field	Grand Totals sites G & B	Species Verified 2001
Battus canadensis	Canadian T. Swallowtail	5	VI		VI		2	VI	3	X
Pieris rapae	Cabbage White	5	VI				1			X
Colias eurytheme	Orange Sulphur	5	VIII				1			X
Colias philodice	Clouded Sulphur	5	VII,VIII	VIII			2			X
Celastrina ladon or neglecta	Celastrina "Complex"	5			VI,VII		1			X
Glaucopsyche lygdamus	Silvery Blue	5	VI				1			X
Speyeria aphrodite	Aphrodite Fritillary	5		VIII			1			X
Speyeria atlantis	Atlantis F.	5		VII,VIII		VII,VIII	2			X
Speyeria cybele	Great Spangled F.	5		VIII		VII	2			X
Boloria bellona	Meadow F.	5	VIII				1			X
Boloria selene	Silver-bordered F.	5		VIII			1			X
Vanessa sp.?	"ladies"		VI		VI		2			
Vanessa atalanta	Red Admiral	5	VI	VIII		VI	3			X
Vanessa virginiensis	American Lady	5		VIII			1			X
Limenitis archippus	Viceroy	5			VIII		1			X
Cercyonis pegala	Common Wood-Nymph	5	VII	VIII		VIII	2			X
Megisto cymela	Little Wood Satyr	5	VI							X
Coenonympha tullia	Common Ringlet	5	VI,VIII				1	VI	2	X
Danaus p. plexippus	Monarch	5	VIII	VIII			3			X
SKIPPERS							1?			
Erynnis icelus	Dreamy Duskywing	5			V I		1			X
Thymelicus lineola	European Skipper	5	VII	VII	VII		1?			X
Polites themistocles	Tawny-edged Skipper	5		VIII-?						
Poanes hobomok	Hobomok Skipper	5			VI					X
Euphyes vestris metacomet	Dun	5		VIII-?						
Total species verified +?			12+0	10+2?	6+0	4+0		2+0		21
*fm. Grehan & Sabourin, 95	% species verified (21)		57.1	47.6	28.6	19		9.5		

Table 2. Butterflies of Pierce Farm, Lincoln Twp., Addison Co., Vt.-2001

SPECIES (names after Layberry et al, 1998)	COMMON NAME	STATE RANK (S)*	Pierce fields	Pierce Woods	Pierce Beaver Meadow - swamp	Pierce-lowland wooded marsh/ swamp	Pierce - totals sites	Species Verified 2001
Battus canadensis	Canadian T. Swallowtail	5	VI		VI		2	X
Papilio polyexenes	Black Swallowtail	5			VIII		1	X
Pieris napi	Mustard White	5		VI-?			?	
Pieris rapae	Cabbage White	5			VII,VIII		1	X
Colias philodice	Clouded Sulphur	5			VII,VIII		1	X
Celastrina ladon and/or neglecta	Celastrina "Complex"	5	VI		VII		2	X
Speyeria sp.	Fritillaries				VII		1	
Speyeria atlantis	Atlantis Fritillary	5			VIII		1	X
Phyciodes sp.	Crescents				VI	VI	2	
Vanessa sp.	"ladies"		VI				1	
Vanessa atalanta	Painted Lady	5	VI		VIII	VI	3	X
Limenitis archippus	Viceroy	5			VII,VIII		1	X
Satryodes eurydice	Eyed Brown	5			VII		1	X
Cercyonis pegala	Common Wood-Nymph	5	VII,VIII				1	X
Megisto cymela	Little Wood Satyr	5	VI	VI-?			1+1?	X
Coenonympha tullia	Common Ringlet	5	VI		VI		2	X
Danaus p. plexippus	Monarch	5			VIII		1	X
SKIPPERS								
Ancyloxpha numitor	Least Skipper	5			VIII		1	X
Thymelicus lineola	European Skipper	5	VII		VII		2	X
Carterocephalus palaemon	Arctic Skipper	5			VI		1	X
Poanes hobomok	Hobomok Skipper	5			VI		1	X
Total species verified +?			7+0	0+2?	15	1		17
*fm. Grehan & Sabourin, 1995	% total verified (17)		38	0	88.2	5.9		

Table 3. Odonata of Guthrie and Bancroft Farms, Lincoln, Twp., Addison Co., Vt. 2001

SPECIES	COMMON NAME	STATE RANK (S)*	Guthrie-pond & immedi-ate environs	Guthrie-open fields	Guthrie-corner marsh to sw	Guthrie-woodland swamp/ marsh	Guthrie woodland	**Guthrie totals sites**	Ban. field (NONE '01)	Grand Totals sites B & G	**Species verified 2001**
C. maculata	Ebony Jewelwing	5	VIII					1			X
Lestes sp.	Spreadwings		VI, VII					1			
Lestes congener	Spotted Spreadwing	3	VIII					1			X
L.disjunctus	Common Spreadwing	5	VIII					1			X
Coenagrion resolutum	Taiga Bluet	5	VI					1			X
Enallagma aspersum	Azure Bluet	5	VIII					1			X
Enallagma cyathigerum	Northern Bluet	5	VI					1			X
E. ebrium	Marsh Bluet	5	VII					1			X
E. hageni	Hagen's Bluet	5	VII					1			X
Ishnura verticalis	Eastern Forktail	5	VII,VIII			VII		2			X
Nehalennia irene	Sedge Sprite	5	VIII			VIII		2			X
Aeshna sp.	Darners		VIII		VIII	VIII		3			
Aeshna canadensis	Canada Darner	5	VIII					1			X
A. i. interrupta	Variable Darner	4	VIII					1			X
Cordulia shurtleffi	American Emerald	5	VI,VII,VIII					1			X
Somatochlora sp.	Emeralds		VII			VII		2			
S. walshii	Brush-tipped E.	3				VII		1			X
Ladona julia	Chalk-fronted C.	5	VI					1			X
L. glacialis	Crimson-ringed W.	3	VI,VII,VIII	VIII				2			X
Sympetrum sp.	Meadowhawks				VIII	VII		2			
S. internum or janae	Cherry-faced or Jane's	5				VIII		1			X
S. vicinum	Yellow-legged M.	5				VIII	VIII	2			X
Total species verified +?			15+0?	0	0	5	1				18
Carle,FL 1994	% species verified(18)		83.3			27.8	5.6				

Table 4. Odonata of Pierce Farms, Lincoln, Twp., Addison Co., Vt. 2001.

SPECIES	COMMON NAME	STATE RANK (S)*	Pierce Fields	Pierce Ponds-woods (w) open area (o)	Pierce Beaver Marsh Area-Upper Isham Brook	Pierce Lowland Wooded marsh-swamp	Pierce Site Totals	Species verified Pierce 2001
Calopteryx maculata	Ebony Jewelwing	5			VII		1	X
Lestes sp.	Spreadwings				VII		1	
L. disjunctus	Common Spreadwing				VII, VIII		1	X
Chromagrion conditum	Aurora Damsel	5			VII		1	X
Enallagma sp.	Bluets				VI		1	
E. ebrium	Marsh Bluet	5			VII		1	X
E. hageni	Hagen's Bluet	5		VII (w)	VII		1	X
Ishnura verticalis	Eastern Forktail	5			VII, VIII		1	X
Nehalennia irene	Sedge Sprite	5		VII-?	VII		1+1?	X
Aeshna sp.	Darners			VII-?(o)			1?	
Aeshna canadensis	Canada Darner	5			VIII		1	X
A. umbrosa	Shadow Darner	5			VIII		1	X
Gomphus borealis	Beaverpond Clubtail	2			VI, VII		1	X
Cordulia shurtleffi	American Emerald	5		VII-? (w)			1?	
Epitheca canis	Beaverpond B.	5			VI		1	X
Somatochlora sp.	Emeralds			VII-?(o)	VIII		1+1?	
S. elongata	Ski-tailed Emerald	3			VI, VIII		1	X
S. walshii	Brush-tipped E.	3			VII		1	X
Libellula pulchella	12-Spotted Skimmer	5			VII, VIII		1	X
Plathemis lydia	Common Whitetail	5						
Sympetrum sp.	Meadowhawks			VII-? (o)	VII		1+1?	
S. internum or janae	Cherry-faced or Jane's	5			VIII		1	X
Total species verified + ?			0	1+5	15	0		15
Carle,FL 1994	% species verified(15)		0	6.7	100	0		

Table 5. Butterflies of Guthrie/Bancroft, Pierce and Wells Farms, Vt. :1999-2001

SPECIES (names after Layberry et al, 1998)	STATE RANK (S)*	Gut-Ban 1999	Gut-Ban 2000	Gut-Ban 2001	Gut-Ban 99-21	Pierce 1999	Pierce 2000	Pierce 2001	Pierce 99 - 21	Wells 1999	Wells 2000	Wells 99 & 20	GBPW 1999 (T=present)	GBPW 2000	GBP 2001	GBPW 99-01-no. yrs (of 3)
Battus canadensis	5	X	X	X	S		X	X	S				T	T	T	3
Papilio polyexenes								X	S						T	1
Pieris napi	5	X	X		S								T	T		2
Pieris rapae	5	X	X	X	S	X	X	X	S		X	S	T	T	T	3
Colias eurytheme	5	X	X	X	S	X	X		S	X		S	T	T	T	3
Colias philodice	5	X	X	X	S	X	X	X	S	X	X	S	T	T	T	3
Lycaena phlaeas	5	X			S								T			1
Celastrina complex	5	X	X	X	S		X	X	S	X		S	T	T	T	3
Everes comyntas	5		X		S	X			S				T	T		2
Glaucopsyche lygdamus	5	X	X	X	S								T	T	T	3
Speyeria aphrodite	5			X	S										T	1
Speyeria atlantis	5	X	X	X	S	X	X	X	S	X	X	S	T	T	T	3
Speyeria cybele	5	X		X	S	X			S				T		T	2
Boloria bellona	5	X	X	X	S								T	T	T	3
Boloria selene	5	X	X	X	S								T	T	T	3
Phyciodes cocyta	5	X	X		S	X	X		S				T	T		2
Phyciodes tharos	5		X		S									T		1
Euphydryas phaeton	5															
Chlosyne harrisi	5	X			S								T			1
Polygonia faunus	5															
Polygonia interrogationis	5	X			S								T			1
Polygonia progne	5	X			S								T			1
Nymphalis antiopa	5						X		S	X		S	T	T		2
Nymphalis milberti	5	X			S		X		S				T	T		2
Vanessa atalanta	5		X	X	S		X	X	S		X	S	T	T	T	3
Vanessa cardui	5															
Vanessa virginiensis	5			X							X	S		T	T	2
Limenitis a. arthemis	5		X		S								T			1
Limenitis archippus	5	X		X	S	X	X	X	S		X	S	T	T	T	3

Table 5. Butterflies of Guthrie/Bancroft, Pierce and Wells Farms, Vt. :1999-2001

SPECIES (names after Layberry et al, 1998)	STATE RANK (S)*	Gut-Ban 1999	Gut-Ban 2000	Gut-Ban 2001	Gut-Ban Totals 99-21	Pierce 1999	Pierce 2000	Pierce 2001	Pierce Totals 99 & 20	Wells 1999	Wells 2000	Wells Totals 99 & 20	GBPW 1999	GBPW 2000	GBP 2001	GBPW 99-01-no. yrs (of 3)
Enodia anthedon	5	X	X		S	X	X		S	X		S	T	T		2
Satryodes appalachia	5						X		S					T		1
Satryodes eurydice	5	X	X		S		X	X	S				T	T	T	3
Cercyonis pegala	5	X	X	X	S	X	X	X	S		X	S	T	T	T	3
Megisto cymela	5	X	X	X	S		X	X	S				T	T	T	3
Coenonympha tullia	5	X	X	X	S	X	X	X	S	X	X	S	T	T	T	3
Danaus p. plexippus	5	X	X	X	S	X	X	X	S	X		S	T	T	T	3
SKIPPERS																
Erynnis icelus	5	X		X	S								T		T	1
Erynnis juvenalis	5		X		S		X		S					T		1
Ancyloxpha numitor	5					X	X	X	S				T	T	T	3
Thymelicus lineola	5	X	X	X	S		X	X	S	X		S	T	T	T	3
Carterocephalus palaemon	5	X			S			X					T		T	2
Polites mystic	5	X			S		X		S	X		S	T	T		2
Polites themistocles	5	X			S					X		S	T			1
Euphyes bimacula	5															
Poanes hobomok	5	X	X	X	S		X	X	S				T	T	T	3
Amblyscirtes hegon	5															
Amblyscirtes vialis	5															
Euphyes vestris metacome	5	X	X		S		X		S				T	T		2
*Grehan & Sabourin, '95		31	25	21	36	13	24	17	26	11	8	16	36	31	25	42
per cent (%) total (42)					85.6				61.9			38.1				

Table 6. Odonata of Guthrie/Bancroft and Pierce Farms, Lincoln Twp., Addison Co., Vt. :1999-2001.

SPECIES	STATE RANK (S)*	Gut-Ban 1999	Gut-Ban 2000	2001	Gut-Ban Totals 99-'01	Pierce 1999	Pierce 2000	Pierce 2001	Pierce Totals 99-'01	Wells 1999	Wells 2000	Wells totals 99 & 20	GBPW 1999	GBPW 2000	GBPW 2001	GBPW 99-01-no yrs (of 3)
Cordulegaster maculata	5						X		S					T		1
Cordulia shurtleffi	5	X	X	X	S		X		S				T	T	T	3
Dorocordulia libera	4		X		S									T		1
Epitheca canis	5						X	X	S					T	T	2
S. elongata	3	X			S		X	X	S				T	T	T	3
S. minor	2															
S. walshii	3			X	S			X	S						T	1
Ladona julia	5	X	X	X	S		X		S				T	T	T	3
Leucorrhinia frigida	5															
L. glacialis	3	X	X	X	S								T	T	T	3
L. hudsonica	5															
L. intacta	5		X		S									T		1
L. proxima	3	X			S								T			1
Libellula luctuosa	5	X	X		S								T	T		2
Libellula pulchella	5		X		S	X	X	X	S				T	T	T	3
Libellula quadrimaculata	5	X	X		S								T	T		2
Plathemis lydia	5		X		S	X		X	S				T	T	T	3
S. internum or janae	5	X	X	X	S		X		S				T	T	T	3
S. obtrusum	5	X			S	X	X		S				T	T		2
S. semicinctum	3					X	X		S				T	T		2
S. vicinum	5	X		X	S		X		S				T	T	T	3
Total species verified		19	24	18	32	11	19	15	26	0	0	0	25	32	25	39
*Carle,FL 1994 (% per cent total)					82.1				66.7			0.0				

Table 6. Odonata of Guthrie/Bancroft and Pierce Farms, Lincoln Twp., Addison Co., Vt. :1999-2001.

SPECIES	STATE RANK (S)*	Gut-Ban 1999	Gut-Ban 2000	Gut-Ban 2001	Gut-Ban Totals 99 - 21	Pierce 1999	Pierce 2000	Pierce 2001	Pierce Totals 99 - 21	Wells 1999	Wells 2000	Wells totals 99 & 20	GBPW 1999	GBPW 2000	GBPW 2001	GBPW 99-01-no yrs (of 3)
Calopteryx maculata	5			X	S	X		X	S				T		T	2
Lestes congener	3		X	X	S		X		S					T	T	2
L.disjunctus	5	X	X	X	S	X	X	X	S				T	T	T	3
Lestes dryas																
Lestes rectangularis							X		S					T		1
Lestes vigilax																
Argia moesta	5															
Argia f. violacea	5															
Chromagrion conditum	5						X	X	S					T	T	2
Coenagrion resolutum	5			X	S										T	1
Enallagma aspersum	5	X	X	X	S	X			S				T	T	T	3
Enallagma boreale																
Enallagma cyathigerum	5	X	X	X	S								T	T	T	3
E. ebrium	5			X	S	X		X	S				T		T	2
E. hageni	5	X		X	S	X		X	S				T		T	2
Ishnura posita	5					X	X		S				T	T		2
Ishnura verticalis	5	X	X	X	S	X	X	X	S				T	T	T	3
Nehalennia irene	5	X	X	X	S		X	X	S				T	T	T	3
Aeshna canadensis	5		X	X	S		X	X	S					T	T	2
Aeshna constricta	5		X		S									T		2
A. eremita	4		X		S									T		1
A. i. interrupta	4	X	X	X	S								T	T	T	3
A. tuberculifera	2		X		S									T		1
A. umbrosa	5	X	X		S		X	X	S				T	T	T	3
Anax junius	5	X	X		S								T	T		2
Gomphus borealis	2							X	S						T	1

Table 7. Moths at blacklight Pierce Farm-CHEP during August 2001.

Scientific name	Common Name	Woodland	Pond
Drepanidae (1 species)			
Drepana arcuata	Arched Hooktip	X	X
Geometridae (8 species)			
Ecliptopera silaceata albolineata	Small Phoenix		X
Epirrhoe alternata	White-banded Toothed Carpet		X
Euphia unangulata intermediata	Sharp-angled Carpet		X
Hydria prunivorata	Ferguson's Scallop	X	
Itamae pustularia	Lesser Maple Spanworm	X	
Lymantria dispar	Gypsy Moth	X	X
Pero honestaria	Honest Pero	X	
Xanthorhoe ferrugata	Red Twin-Spot	X	
Noctuidae (18 species)			
Amphiprea americana	American Ear		X
Anaplectoides prasina	Green Arches	X	
Athetis miranda	Miranda		X
Caenurgina erechtea	Forage Looper	X	
Feltia herilis	Master's Dart	X	
Idia rotundalis	Rotund Idia	X	
Lacinipolia renigera	Bristly Cutworm	X	
Leucania commoides	(none)	X	
Ochropleura plecta	Flame-shouldered Dart	X	
Phlogophora periculosa	Brown Angle Shade	X	
Polia pupurissata	Purple Arches	X	
Pseudaletia unipuncta	(The) Armyworm	X	
Pseudohermonassa tenuicula	(none)	X	
Tricholita signata	Signate Quacker	X	
Xestia normaniana	Norman's Dart	X	
Xestia smithii	Smith's Dart	X	
Zanclognatha laevigata	Variable Zanclognatha	X	
Zanclognatha jacchusalis	Yellowish Zanclognatha		X
Arctiidae (2 species)			
Hyproprepia miniata	Scarlet-winged Lichen	X	
Phragmatobia fulginosa	Ruby Tiger		X
Notodontidae (2 species)			
Clostera albosigma	Sigmoid Prominent	X	X
Clostera strigosa	none		X
Pyralidae (1 species)			
Herpetogrammma aeglealis ?	none	X	X
Totals 32 species		24 spp.	12spp.