

An inventory of the adult **Butterflies** and **Odonata**  
of the Anderson Properties ,  
Lincoln and Bristol Townships, Addison County, Vermont  
during five days of the 2002 field season with a  
general summary of the inventories from 1999-2002.

**Report to the Colby Hill Ecological Project (CHEP)**

April 2003

Donald H. Miller

Professor Emeritus of Biology  
Department of Science  
Lyndon State College, Lyndonville, Vt. 05851.



## Introduction

This is the fourth consecutive annual report on the species diversity of the adult butterflies and odonata of the Lester Anderson farms in Lincoln and Bristol Townships, Addison Co., Vt., USA. This is part of the extensive Colby Hill Ecological Project.

I followed essentially the same field protocols as during the previous three seasons (Appendix I). The major change to the previous general routine was the addition of two inventories along the (unnamed) intermittent brook which runs in a general southeast to northwest direction along the western boundary of the Guthrie and Bancroft farms. This was to look for odonates that are normally associated with small woodland streams (see results and discussion), a habitat which is unique on the Guthrie/Bancroft farm sites.

This report also includes a general summary of the data over the first four years for selected species including trends in numbers, annual occurrence and habitat affinities. I have also evaluated the veracity of the listed Status of some odonata and butterflies as indicated by preliminary lists developed by the State of Vermont's Natural Heritage program, from a variety of sources, mostly unpublished. Although the geographic extent of the CHEP project area is relatively small, compared to the whole state of Vermont, it is the only locality in the State where there has been an inventory of both butterflies and odonata for four consecutive years in a variety of habitats. Thus, the data from this project should be germane to addressing the issue of making recommendations for possible changes in the official listings of Status for certain species.

## Methods

The same general inventory procedures that were employed during the 1999-2001 field seasons were employed. These consisted of random and/or opportunistic searches on all farms, 2) a transect-type survey along the upper Isham Brook, and 3) a relatively intensive inventory at Guthrie Pond. Most of the effort was directed at selected sites on the Guthrie and Pierce farms. A very brief inventory was made at the Wells farm during the 2002 field season (Appendix 1).

I was in the field during five full days in 2002: 13 June, 15 July, 8 Aug., and the 7th and 26th of September. This permitted a rather extensive inventory over the duration of the field season when most species of butterflies and odonata are active.

The usual biases in recording obtained. Since I elected, for reasons stated in the 1999 report, to more or less simultaneously inventory both butterflies and odonata, I probably over-looked some species at some sites. However, I was con-

stantly alert for relatively rare sightings of species such as a single record of a species. Typically, when inventorying adult butterflies and odonata, individuals of some species are seen but are not netted, much less collected. During many observations, I was virtually sure what a species was from direct observation, without capture. For a few sight records, I could only confidently designate a species to genus. The two major summary tables (5 and 6) are based on records that are regarded as absolutely verified, either because I took vouchers or they were species that were either 1) identified to species with absolute certainty in the field (although neither netted or collected or 2) were netted, examined carefully and released. Since, after four field seasons I am becoming very familiar with the most of the butterflies and odonata that occur regularly at the various project sites ( Guthrie field, Upper Isham Brook, etc.), I vouchered very few specimens from the 2002 observations. In summary, the data presented in the tables reflect a conservative estimate of the kinds of species present. Occasionally, a species or common genus was entered as a question mark (?) in the tables for the specific sites but not in the final summary tables.

((I attended, at personal expense, three major national meetings: two on odonata and one on butterflies: two before and one during the 2002 field season in Vt. Thus, my own learning curve about these two extremely important taxa (butterflies and odonata) continues to flatten. I also recently attended (March '03) a major two-day regional meeting on invertebrate conservation in New England. These experiences enable me to better put the work of the CHEP into a broader perspective and have allowed me to acquire a much broader understanding of some of the issues related to the regional conservation biology of both odonata and butterflies)).

Most vouchers are in the author's private collection, save a few that other researchers have requested. I was also particularly glad to collect and prepare for DNA analyses six specimens of four species for Mr. James Sanford of the University of Florida, Gainesville. Jim is doing his doctoral dissertation on the taxonomy of the genus *Speyeria* in North America. I also collected and contributed a similar sample for him from Caledonia Co., Vt. Even though I expect no changes in the taxonomy of our local species of *Speyeria*. based on Jim's analysis, this does reflect how a project of this type can contribute to other national research projects. I also plan to send specimens of the *internum/janae* complex to an acknowledged authority on odonate systematics. Some of these will be from the CHEP area. I have also endeavored to get a better "handle" on the systematics of the *Celastrina* complex in New England and have concluded from this preliminary literature search to continue to report individuals of *Celastrina* as the *Celastrina* complex, although ultimately, three species of *Celastrina* may be recognized from the general area of New England and all of these may be on the CHEP sites.

There are also ongoing questions about the Crescents (*tharos* and *cocyta=selenis*) which I have also discussed in a previous report. I believe the majority of the *Phyciodes* spp. from the CHEP area are *cocyta*. The status of the two taxonomic problems mentioned above is still under investigation and the names proposed for the various taxa have not stabilized. To reiterate, the names in the species lists presented here reflect a conservative approach with respect to taxonomy.

I have not personally addressed these interesting taxonomic questions as part of this research. It would be just too time-consuming while trying to simultaneously inventory some 90 species of butterflies and odonata. It is challenging enough to keep accurate records of those species that can be identified and named without ambiguity much less those whose taxonomic status is in a state of review, if not flux.

## Results and Discussion

### General comments on field soil moisture, pond and stream levels, and mowing:

I don't have any comparative regional meteorological data to report here. However, from direct field observations it was obvious that 2002 was again a relatively dry year. The water level at Guthrie Pond was the lowest I've ever seen during the four years of the study although there was always at least an estimated depth of a meter or so at the deepest section of the pond. I have never seen Guthrie Pond without water which makes it hydrologically (and biologically) quite different from the three other ponds that I have inventoried (one at Wells and two at the Pierce farm). By contrast, the water level behind the dam of the Upper Isham Brook was at or close to the top of the dam during the 2002 season. Interestingly, the braided and complex system of canals below the dam, on the western side of the meadow, had more or less ample water (10-50 cm. or so) all season whereas the main brook, on the east side of the meadow was generally intermittent in flow in August and September. I believe the western half of the meadow below the beaver dam received most of its water directly from spill-over from the reservoir behind the dam.

Upper Isham Brook had a constant flow all season although the volume diminished markedly by the end of September. In contrast, the lower Isham Brook had a generally higher and more regular flow. Both of the Pierce ponds had standing water present, of at least 0.5 meters in depth, during all my inventories in 2002. Since the Guthrie Pond was at the lowest level I've ever witnessed, I thought that the two Pierce Ponds would completely "dry-up" as the season progressed, but I never saw this. These ground and surficial water conditions of 2002 were generally similar to those of the 2001 field season.

The intermittent brook (Guthrie boundary) which I inventoried on three dates (13 June, 15 July and 7 Sept.) had a low but steady flow on the earlier dates but was essentially "bone dry" except for a few (<ten) small and extremely shallow pools on 7th Sept. I never saw any odonata over or along the immediate bank of the stream. There were a few *Sympetrum* sp. among some stands of alders along the upper brook but, in the woodland proper, there were absolutely no odonata recorded over or along the stream during any period of inventory. Because of time constraints, I saw no point in trying to inventory the brook during the August and late September inventories. I am still convinced, however, that further sampling during periods of higher flow will yield some new CHEP records of stream inhabiting species of odonata along the intermittent brook along the western boundary of Guthrie farm.

Although I didn't record any species of stream odonata along the intermittent

stream, I did make some salient observations regarding other fauna during the early Sept. inventory. I found several large of water beetles (Gyrinidae) that were under stones in the **dried** stream bed. These were apparently near to or in a state of aestivation. More amazing to me!, I also saw several very densely crowded clusters (15-25 or so) of salamander larvae under several stones in the completely dried stream bed. Some larvae, on the periphery of the groups of salamanders were dead, others seemed close to death, but most were clearly alive. All were more or less individually enclosed in a rather thick mucoid-like substance. These were a plethodontid spp. (almost certainly the Two-lined Salamander, *Eurycea bislineata*) but I haven't confirmed an identification of the larvae to species. During over 50 years or more of turning over rocks in the beds of intermittent streams at literally hundreds of sites in this country, I have never seen this phenomenon (my first research project as an undergraduate in circa 1953, dealt with stream salamanders). That is, of immature plethodontid salamanders clumped under rocks on the dried stream-bed of an intermittent stream. I always assumed, based on my reading of the literature and my extensive personal observations in the field, that both the adults and the larvae of stream salamanders, especially those that occur along or in intermittent streams, burrow well down beneath the surface of the stream-bed (hyporheic zone) or adjacent bank during periods of drought (high temperatures and low soil moisture conditions). Burrowing into the substrate during periods of extremely low to no water flow is clearly not always the behavior exhibited by stream salamanders.

I checked two fairly recent and respected reports on salamanders ((Hunter et al (eds.), 1999 and Fingsten & Downs (eds.), 1989)) and found no explicit description of this behavior during any period of drought in any intermittent stream environment. I suspect that this behavior may be simply over-looked because herpetologists probably don't inventory intermittent streams during periods of extremely low to no water flow, that is under seasonably very dry conditions. There is a golden opportunity for researchers in the CHEP to compare the fauna of a stream that flows steadily during essentially the summer and fall seasons (Isham Brook) with the intermittent stream described here that flows early and is essentially dry later in the season.

The pattern and schedule of mowing was more or less like previous years although the Guthrie field was mowed somewhat later than in previous years, presumably because the ground water was at a higher level earlier in the season. However, when the latter field was mowed the emergent vegetation around Guthrie Pond was cut to a much more narrow strip than previous years. A swath of less than a meter of standing green cattails was left around much of the pond. Since living cattails are important for the oviposition of several species of odonata that do or could breed at the pond, it seems prudent to keep the cattail edge wider so that these endophytic species of odonata have more habitat to lay their eggs (oviposit). These include several species of darners (*Aeshna* spp.) and also some damselflies. The exact oviposition requirements for many of the species at Guthrie Pond is poorly known. **It is essential that the cutting of the emergent vegetation around the edge of the pond be curtailed as much as possible.**

The practice of delaying the mowing of the corner patch of baneberry in

the Bancroft Field is commendable. It is an important nectaring site for the butterfly fauna of the site. The availability of ample nectar is universally regarded as one of the important resources of many species of butterflies. Generally speaking, the longer the mowing of the woodland trails can be delayed, the better it will enhance the butterfly fauna of the CHEP site. Sites that native butterflies frequent should be mowed the latest in the season. These would generally be the woodland trails and any sections of fields that have a high diversity of flowers. The more open and drier fields could be mowed relatively earlier (Keller and Yahner, 2002) (please see the discussion of individual species below).

#### **Butterfly Inventory (2002 field season):**

The data for the sites on the individual farms and the totals for all farms are presented in Tables 1,2, and 5. A total of 27 species of butterflies was verified from all farms during the 2002 field season. 25 species were recorded from the Guthrie-Bancroft farms and ten from the Pierce farm. Last year, 21 were recorded from the former farms and 17 from the Pierce farm, a decrease of seven species from the Pierce farm sites between 2002 and 2001.

The total number of butterfly species taken on all farms was 30 in 2000 and 25 in 2001. Only one species of butterfly new to the Project area was recorded in 2002: Peck's Skipper, *Polites peckius*. This is a rather common species of skipper throughout New England and I am surprised it hasn't been recorded before from the CHEP area. Grasses are the host plant. In West Va. *Poa* and Rice Cutgrass (*Leersia oryzoides*) are reported (Allen, 1997). Perhaps, these grasses are low in abundance on the Project area? There is also the possibility that inter-larval feeding competition with the extremely abundant European S. may be a factor. I may have over-looked *P. peckius* in my previous inventories but I doubt it. The single individual was netted on 15 July in the Guthrie Woodland Swamp/Marsh complex. It was extremely worn so I did not voucher or attempt to sex it.

Among the more glaring omissions of species from the 2002 list was the total absence of any species of *Vanessa*, the *Celastrina* complex, or any of the Angle Wings, the genus *Polygonia*. The field season of 2002 was the first year when none of the species from any of these groups were recorded. Interestingly, members of *Polygonia* were recorded only during the first project year, 1999. I don't know why these taxa seemed to be either totally absent or, at the least, present in very low numbers, in 2002. All are quite conspicuous in the field and not apt to be over-looked.

#### **Butterfly Inventory (long-term trends and observations-'99-'02):**

Overall, the rate of increase in the running total of species of butterflies on the Project area, that is the number of records of species new to the area has diminished considerably. Sampling earlier in the season, such as during May may yield some new species to the list for the Project area. The cumulative total was 40,42, and 43 species in the years 2000, 2001, and 2002, respectively.

Although the sampling effort wasn't identical during each season, there was at least one full field day each of the four years for the months of June, July and August, the months when both butterfly and odonata numbers are universally recorded to be at their highest densities in the northeastern United States.

Of the 43 species of butterflies recorded over the four years of record, 15 were recorded for each field season (Table 7). Of these 15, nine either have larvae that feed on grasses or legumes common to mowed fields and one is essentially a widespread "weedy" species, the Cabbage White (*Pieris rapae*). The nine include *Coenonympha tullia* (Common Ringlet), the two *Colias* species (sulfurs-both legume feeders), *Cercyonis pegala* (Common Wood-Nymph), *Megisto cymela* (Little Wood Satyr), *Satryodes eurydice* (Eyed Brown), the ubiquitous European Skipper, *Glacuopysche lygdamus* (a legume feeder), and *Poanes hobomok*, the Hobomok S.

Of the latter nine only four are arguably recorded as definitely indigenous, that is native to the general area. The Clouded Sulphur was probably very rare, if at all present in the region during prehistorical times and there is good evidence that the Orange S. has spread northeast during the historical period of deforestation of the eastern woodlands (Opler and Krizek, 1984). The Common Wood N., the Little Wood Satyr, the Eyed Brown, and the Hobomok S. are all indigenous to the general study region. All feed on graminoids. *Poanes hobomok* feeds on woodland grasses such as *Poa* and *Panicum* in woodland clearings and open paths,

The remaining five, of the 15 species present every year, include the Monarch, the two fritillaries (*Boloria* and *Speyeria*), the White Admiral and the Canadian Tiger S. The latter two are generalist feeders on a variety of broad-leaved trees. Thus, six of those that were recorded every year on the Project area are grass feeders and several were not originally indigenous to the area. Overall, a rather uninteresting coterie of species with, in my view, one glaring exception. The exception is *Boloria selene*, the Silver-bordered Fritillary.

I think the Silver-bordered F. may be a good candidate for special adaptive management on the Project area. It is my impression (from unpublished conversations at recent meetings-such as the March New England meeting) but also from the literature, that this species is becoming rare in s. New England where it was once quite abundant. It has virtually disappeared from the greater New York City area. It has been recorded every year from the Project site. Its primary food plants are species of violets although other unknown food plants are suspected. It seems to thrive best in relatively moist areas with open clearings, such as in woodland marshes and swamps. It is reported to favor taller vegetation. However, on the Guthrie farm I've often seen it flying low over the mowed vegetation near the pond. In any case, I think it is a species that should be monitored more closely. Presently, there seem to be breeding populations on the study areas, especially at Guthrie Farm (see Table 1 for details of sites).

The preliminary State Rank of 5 for the Silver-bordered F. is probably too high. In view of its apparent decreasing abundance in other nearby areas of New England, it should be ranked at least as a 4. Furthermore, in examining the list of nine species that have been recorded during only one year of the four-year period (Table 7), I believe that both *Chlosyne harrisii* and *Satryodes appalachia*, based on the CHEP data and my own experiences in New England, are less common than suggested by a rank of 5. The larvae of the latter feed on grasses and possibly a sedge whereas the former feeds only on the Flat-topped White Aster (*Aster umbellatus*). The latter plant

seems to me to be quite uncommon on the Project area. The apparent lack of sufficient food for the larvae of Harris' C. may be negatively impacting the species on the Project area.

#### **Butterfly Summary:**

The four-year cumulative increase in the total number of butterfly species on the Project area suggests that, under the present mode of inventorying, the likelihood of recording many more new records of species from the Project area is relatively low.

A number of species seem relatively uncommon, as suggested by their frequency of annual occurrence, and should be considered for a State Status rank lower than five. *Boloria selene*, a species that is apparently decreasing in abundance elsewhere in New England and in the northeast, appears to be maintaining a reproducing population on the Project area. Inexplicably, there were no records of genera such as *Polygonia*, *Vanessa*, or *Celastrina* in 2002 whereas at least one species of one of these genera was recorded during each of the previous three field seasons. There seems cause for concern about the persistence of the populations of some species of butterflies on the project area and this may be indicative of a more widespread regional phenomenon of reduction in numbers of several species of butterflies.

The incredibly high density of the European Skipper continues, and I suspect this species may be adversely affecting the population levels of some other grass feeders, possibly because of competition with their larvae. The adults of the European S. also seem to be interfering with the nectaring of the adults of some of the native butterflies, particularly *Speyeria* spp. The single generation of the European Skipper species almost certainly outnumbers any other species on the Project area by at least two or three orders of magnitude. Interestingly, however, it seems to be single-brooded on the Project area.

Mowing of the fields and the woodland trails is the most obvious anthropogenic effect on the habitats of the Project area. At least in the open fields, this seems to promote those species of butterflies that are primarily feeders on grasses or legumes of open meadows. This latter group, mostly Satyrinae, seems to be maintaining consistently high populations each year. *C. tullia* is clearly at least double-brooded and may have a partial or full third generation. It seems very favored by the current mowing regime. *Megisto* and *Cercyonis* are clearly single brooded on the Project area. *Megisto* precedes *Cercyonis* phenologically and males of *Cercyonis* emerge several days to a week before the females.

The timing and extent of the mowing seem to be two of the most important anthropogenic factors that could be evaluated to maximize the fecundity of several species of indigenous, primarily woodland species of butterflies. Mowing may have particularly adverse effects on some of the species of odonata (see below).

#### **Odonate Inventory (2002 field season):**

The data for the 2002 inventory and the four-year summary of odonata are presented in Tables 3, 4 and 6. A total of 35 species of odonata was recorded from all the farm sites: 28 species from the Guthrie-Bancroft farms and 17 species from the Pierce farm. In 2001, 18 species were recorded from the former farms and 15 from

the Pierce farm. Thus, there was an increase of ten species at the Guthrie-Bancroft farm sites, six were recorded for the first time from the latter two farms and four were new records for the entire Project area: *Lestes eurinus*, *L. dryas*, *E. boreale*, and *Celithemis eponina*. Two species, *Gomphus borealis* and *Chromagrion conditum*, had been taken previously at the Pierce farm.

In 2001 a total of 25 species of odonata were recorded from all the farms. There was an overall increase of ten species of odonata between the field seasons of '01 and '02: 25 to 35, a remarkable 40 % increase in total number of species.

The pattern of both increase in the total number of species of odonates at all the farm sites and the remarkable increase of 55% at the Guthrie-Bancroft sites was completely different from the pattern of species diversity for butterflies, as discussed above. I did expect the number of records of odonates to continue to increase at a rather high rate but not at the levels recorded for 2002, particularly when 2002 was another relatively dry year and the perennial "hot spot" Guthrie Pond, had the lowest water levels during the four seasons of the inventory. Clearly, there is much more to be learned about both the pattern and the absolute levels of the diversity of odonate species at the CHEP sites. The odonate community seems to be much more dynamic than the butterfly community in terms of the degree of change and trends in the annual numbers of species from season to season over the whole Project area (see more discussion below).

A total of **five** new records of species was obtained for the 2002 year. These were: *Lestes dryas*, *L. eurinus*, *E. boreale*, *Lanthus parvulus*, and *Celithemis eponina*. (see Tables 3 and 4 for common names).

*E. boreale* and *L. dryas* may have been over-looked in the past. Both *boreale* and *dryas* are relatively early seasonal occurring species, although both are regularly reported in June from the northeast. I have sampled during June each of the four years so I doubt that I would have missed them if they were regularly on the Project area. If both species were present on the study area in relatively low numbers they may have been missed because of the lack of adequate sampling or, alternatively, the major adult flight periods of each may be more restricted than other members of their genera. It is well known among those who are very experienced with inventorying odonates, especially in the genera *Enallagma* (the bluets) and *Lestes* (the spreadwings) that the rarer members of these two genera may be over-looked, just because of chance factors (related to sample size). I have discussed this vexing sampling problem with eminent odonatologists at national meetings a number of times and there is no ready solution, except to spend more time sampling. This often is not feasible when doing a general inventory that includes many sites and several major taxa. This takes more time and therefore increases the total cost of the inventory.

By comparison, when inventorying butterflies, especially in the northeastern U.S., one can with few exceptions (e.g., the genus *Erynnis*) tell at a glance how many (not necessarily the kind) species are present within the immediate visual sphere of the field researcher. I have an abiding suspicion that the rarer species of odonata are more often over-looked than are rare species of butterflies. There seems to be a greater sampling bias toward missing the rarer odonates among those

genera of odonata where the individual species are relatively similar. Even though similar inventory protocols are used for different taxa, the "catch" recorded has inherent biases that vary with the taxa under study. These biases are difficult to quantify.

*C eponina*, the Halloween Pennant, is a species I've never seen anywhere else in Vt. However, Bryan Pfeiffer (pers. comm.) has taken it in the Champlain Valley. It may be a species that is starting to move into the State in increasing numbers. It is very conspicuous because of its habit of perching on tall vegetation in fields. Also, the wing maculation is very striking, making it very easy to detect at considerable distances, even with the naked eye. I doubt that I've missed this species before on the study area. I think this single record was that of a stray individual that probably flew-up from the adjacent valley in Bristol. The Halloween P. was taken on 15 July in the bramble patch on the Bancroft farm. It was a very fresh adult male.

I've taken *boreale* many times in the NEK triad of counties. I also have a few scattered records of *dryas* from Vermont but it seems far less common than many other *spp.* of *Lestes* in Vt. It is fairly easy to identify however, unlike several other species of *Lestes*. Normally it would not be over-looked (such as with males of *L. unquiculatus*, *L. forcipatus* and many females of *Lestes*), even if it were not netted or vouchered.

The record of *boreale* was a single male taken at Guthrie Pond on 13 June. It was with many *E. cyathigerum*. The *dryas* was a single fresh adult female taken in the Guthrie woodland swamp/marsh complex on 15 July. All have been vouchered.

*Lanthus parvulus*, the N. Pygmy Clubtail, is a species of small, shaded woodland streams (Dunkle, 2000). Adults are very difficult to detect and collect. There are relatively few records throughout its range which probably reflects more about how difficult it is to record than its actual abundance. I have always suspected it might be along the Upper Isham Brook. I found a fresh male on 13 June perched on an alder twig very close to the stream. It was the only one I saw. It was exceedingly hard to see against the broken spangle of shadowed and sunlit areas along the brook. I suspect the species breeds there. An intensive search for larvae would be very worthwhile. I have recorded the species only once before in Vermont: from Essex Co.

The most unexpected record was the discovery on 15 July at Guthrie Pond of an apparent breeding population of the Amber-winged Spreadwing (*Lestes eurinus*). I saw at least six males around the inside edge of the cattails and one pair in tandem on a live cattail stem. The female, with male in tandem, was ovipositing into the stem of a living cattail at a height of perhaps 0.5 m above the surface of the water. The observation of oviposition is very good evidence of breeding. This beautiful species is essentially impossible to miss in the field. It was a complete surprise to me that an apparent breeding population was at Guthrie Pond in 2002. *L. eurinus* had never been taken during the previous three years of inventory at the pond or at any other of the CHEP farms. Where did it come from and why did it apparently "choose" to breed at Guthrie Pond for the first time in 2002?

*L. eurinus* seems uncommon in Vt. but as more persons are becoming interested in the odonata of Vt., a scattering of records have surfaced. I have

taken it both in the NEK and in Chittenden Co., Vt., on the National Guard base in Colchester. The latter site was the first time the species was ever reported from Vermont. The habitat at the Colchester was an open temporary shallow pond or swale that was completely dry later in the season. It was quite different from Guthrie Pond which I have never seen without water. However, the species has been reported from a variety of lentic aquatic sites although the details of its breeding status and/or behavior at any of these sites is extremely sparse.

Glotzhober and McShaffrey (2002) reported that the species oviposits in both Bur-reed and cattails. Both adults remain in tandem during oviposition (as I observed). They also reported that unlike most *Lestes*, the young pass the winter in the larval stage and not the egg. The newly hatched larvae drop directly into the water. This beautiful species is probably more widespread in Vt. than the present records indicate, although it certainly is not common. For unknown reasons, it seems rather spotty in its distribution. This is somewhat peculiar because it seems to tolerate a fairly wide range of habitats. I believe it should have a Heritage rank of 4.

Perhaps it is a species that moves around from habitat to habitat more than other spreadwings? It is a species, in my field experience, that seems to be a relatively stronger flier than many other spreadwings. If this is a valid conjecture, it may partially explain why it so unexpectedly appeared at Guthrie Pond in 2002. I am virtually certain that it was not missed in the previous three years of the inventory. We know extremely little about how much movement there is between habitats by virtually all species of invertebrates, including those that are the most vagile, like the butterflies and odonata. It would be interesting to compare the wing-loading of the various species of *Lestes* as an index of how strongly they may be capable of flying, i.e., their vagality as adults. Corbet (1999) cites one paper (Wakeling, 1997) on odonate wing and body morphologies but I have not seen the latter. In general, such research, although very important, is seldom done. Significant work has been done with wing-loading (and thus aerial agility) of the odonate fauna of Europe (Corbet, 1999).

It will be extremely interesting to see if the Amber-winged S. occurs at Guthrie Pond in 2003. I regard it as one of the most beautiful of all the species of Spreadwings (*Lestes* spp.) in the entire country. If for no other reason, this makes it extremely worthwhile to manage for future generations of humans to enjoy. **It would be highly desirable to manage the mowing regime around Guthrie Pond so that a vigorous cattail population persists, especially during the breeding season of odonates.** This of course would also benefit many other species of both invertebrates and vertebrates that depend on cattails (*Typha* sp.) for reproduction, cover and other parameters of their respective biologies.

A rather enigmatic negative record from the 2002 field season was the complete absence of any records of *E. ebrium* which is arguably (along with *E. hageni*) one of the two most common species of bluets in the interior of New England. However, the latter has been recorded 3 out of the 4 census years and *ebrium* only during two which suggests that there is something more unfavorable to *ebrium* than *hageni* among the habitats on the study area where these species occur. And, although the tables don't reflect this, I have consistently taken *hageni* in larger

numbers than *ebrium* , over the entire study area.

**Odonate Inventory (long term trends and other observations-'99-'02):**

(See Tables 6 and 8 for the data on which the following discussion is based).

The cumulative annual total number of species was 30, 40, and 45 in 2000, 2001, and 2002, respectively. A much different pattern of change in cumulative numbers than with the butterfly fauna (see above). There was a 12.5% increase in total numbers from 2001 to 2002. The total number of species of odonata now verified from the farms exceeds that of the total number of species of butterflies (45 versus 43).

The woodland swamp/marsh complex on Guthrie Farm had the greatest annual increase of any other site on the entire Project area, between 2001 and 2002. There was a 100 % increase between 2001 and 2002, from six to 12 species. Obviously this statistic is quite extraordinary. To me, it was a complete surprise and I have no ready explanation for it. I believe the inventory effort was essentially similar between the years.

There were five new records of odonate species for the Project area in 2002 as compared to one of butterflies. This trend suggests that the total number of odonate species that will be potentially recorded from the Project area will approach 50 or 60. This would be roughly 50-60 % of the total expected species in Vermont, based on the total number of species that have been reported on various lists, many of which are quite incompletely documented. An important question would be, "How many of the odonates recorded from the Project area actually breed there?" Additional inventorying of the odonate fauna on the study area should produce several new records of species as well as much more data on breeding, activity patterns, seasonal and habitat occurrence and other aspects of the biology of the odonata.

As with the butterflies, I segregated the annual occurrence of all 45 of the odonate species of records by the number of years that each was taken anywhere on the Project area (Table 8). Albeit somewhat problematic, I think this relatively simple approach does suggest which species are relatively rare (those that have been documented only during one or two years) compared to those that are more common (documented over three or four years). I suggest most field ecologists would agree that the annual frequency of occurrence of most species, given a similar level of sampling each year, is a reasonable first-order surrogate as an indication of relative density. That is, on average, those species more frequently recorded are also apt to be those that have higher average population densities.

I will not discuss all the species and their annual occurrence in detail below but will describe some results that I think the data adequately support. Of the nine species that occurred every year, I think *Enallagma aspersum* and *Leucorrhinia glacialis* are perhaps the most surprising. *E. aspersum*, the Azure Bluet, has heretofore, in my experience, been rarely taken in Vermont. Guthrie Pond seems to be an ideal habitat for the species.

Carle (1994) assigned *L. glacialis*, the Crimson-ringed Whiteface, a Status rank of 3, suggesting that it is uncommon. Both species have been taken every year at Guthrie Pond. I have not found *L. glacialis* to be as common as the other species of Whitefaces during my (unpublished) work in the NEK. Despite its regular annual

occurrence at Guthrie Pond, I believe Carle's recommendation of a rank of 3 still seems reasonable for *glacialis* at the state-wide level.

By contrast to the four consecutive years of record for *L. glacialis*, I've never verified *L. hudsonica* from the Project area. This is enigmatic since it is one of the most commonly encountered species of Whitefaces in my field experience in the NEK, if not the most commonly occurring species, except for *L. intacta*. The latter is widespread in many pond and small lagoon habitats throughout the State. *Intacta* is not as common as *aspersum* at Guthrie Pond which seems a bit unusual to me.

Of the 11 species that have been recorded only once from the study areas, I discern none, except for *Cordulegaster maculata*, the Twin-spotted Spiketail, that I would not have expected to have been relatively uncommon, especially along Isham Brook. I believe *C. maculata* apparently occurs regularly along Isham Brook but it is quite elusive. I have only verified this species once, in 2000, and that was a sight record about which I was highly confident.

It is actually much more challenging to net fast-flying species of anisoptera along the narrow confines and dense riparian foliage of the upper Isham Brook than along wider and more open streams. The many boulders and slippery substrate also pose a considerable obstacle to capturing such species along that portion of the stream. As indicated above, the light conditions along such a brook also make it very difficult to see even those odonata that are merely perching on the vegetation along the stream. Of all the sites that I inventory on the entire study area, I believe the upper Isham Brook site is where I have had the greatest number of "misses" and many a frustrating moment as a result of adverse conditions for netting. Unfortunately, this is a constant problem with sampling many species of adult dragonflies from lotic environments. This is one of several major reasons why many lotic species of anisoptera are judged to have lower population densities and more restricted distributions than those from lentic sites. Simply put, the adults of species from lotic habitats are often much more difficult to net, and inventories based on adult specimens are especially biased with respect to both the presence/absence of species and to estimating the densities of species.

#### **Comments on the designations of State ranks:**

Unlike Grehan and Sabourin's (1995) designation of a rank of S5 for all the butterfly species that have been currently recorded from the area, Carle (1994) did offer a range of preliminary rankings for many of the species of odonates that have been recorded. These ranks ranged from 2-5 except for two for which he had no definite opinion of rank: *L. eurinus* and *C. eponina* (both as a questionable 4) (Table 8). Carle has had extensive field experience with the odonate fauna of the general northeastern states, including Vermont. Therefore, it seemed reasonable, as a strictly first-order approach, to see how the average of his status rankings and the frequency, of (my) arbitrarily selected rank of 5 for each year, correlated with the annual frequency of occurrence of the odonate species on the CHEP area (Table 8).

I am aware that one can't legitimately average scalar numbers like Status ranks without assigning appropriate weights to each but I attempted, combined with the frequency of rank data, to derive a very general first-order semi-quantitative analysis of the validity of the preliminary rankings of Carle. I compared these two sets of data

with the four seasonal categories of occurrence of all species. Presumably, one would hypothesize that, on average, those species that occur during one or two seasons would, with exceptions, have lower average scaled ranks and a lower frequency of 5 than those that were reported for three or four years. Indeed that was generally the case (Table 8). For example, those species that only were found on the Project area for one year had a scaled average Rank of 4.1 and a frequency of 54.5 % (6 of 11) with a rank of 5. By contrast, the comparable figures for those occurring for each of the four years on the entire area were 4.7 and a frequency of 63.7% (7 of 9 species) with a rank of 5. The comparative frequency of rankings of 5, by annual record of occurrence, correlated particularly closely with the number of years of record. My conclusion is that Carle's preliminary designations of rankings, based on this approach, are generally valid when comparing the combined lower categories (1 and 2 yrs of record) with the higher (3 and 4). However, those species that were only recorded two years had lower scores, with both categories, than those recorded during only one year. This suggests that the rankings for categories such as S 2 and S 3 may need finer tuning, that is more data about each species, assuming this admittedly simple semi-quantitative approach for judging the validity of rankings has utility.

Unlike this study, Carle, didn't provide an empirical data base for his general rankings, particularly in terms of the frequency of occurrence by year for each species.

Of the species ranked by Carle the one that seems clearly too low is the designation of 4 for *A. interrupta*. This should be designated as having a rank of 5. It is, in my experience, more common as such darners as *canadensis* and *umbrosa*, both of which are assigned rankings of 5. Among the emeralds (*Somatochlora spp.*) I think there may be a good argument for designating *elongata* with a rank of 4, not 3. It seems to be fairly regularly encountered during my field experience and was taken during three of the four years of record from the Project area. The designation of *Lestes congener* as a 3 is clearly inappropriate. It literally swarms at times at Guthrie Pond and I have taken it in large numbers at many sites in the NEK. I think it should have a designation of at least 4, if not 5. I do believe the designation of a 3 for *Leucorrhinia semicinctum*, however, is probably suitable.

I conclude that the so-called preliminary rankings by Carle are reasonably accurate. However, it is important to consider that the designation of Rank is largely qualitative in nature and is obviously subject to change as more data become available. I favor an approach, that relatively unknown species should be given higher rather than lower ranks until we know more about them. If a species is erroneously given a designation of say 1 or even 2, then it often becomes very difficult to get legal permission to study the species and usually these are just the ones that we need to learn much more about. However, there are biological, legal, ethical and even political considerations that impinge on the assignment of Rank. I generally prefer a ranking system that embodies at least a minimal study of the key factors of the conservation biology of each species, before any rank other than 4 or 5 is assigned.

Finally, it is most important that professional experts, familiar with the species, are consulted, if at all feasible, before any ranking is assigned to any species.

## Summary

This summary consists of two sections: 1) the report for 2002 and 2) a general summary of selected topics for the entire four years of the inventory of the adult odonata and butterflies on the three farms of the CHEP.

### **Report for the field season of 2002:**

The inventory was during five full days: one each in June, July, and August and two in September. Most of the effort was at the Guthrie and Pierce farms, as in previous years. I visited the Well's farm briefly, on the 7th of September.

One butterfly, the Peck's skipper and five species of odonata: three zygoptera (damselflies) and two anisoptera (dragonflies) were first recorded from the project area in 2002. The three damselflies were: *Lestes dryas*, *L. eurinus*, and *Enallagma boreale*, the two dragonflies were *Lanthus parvulus* and *Celithemis eponina*.

The record of the Peck's S. was not considered unusual. The records of *L. parvulus*, the N. Pygmy Clubtail and *L. eurinus*, the Amber-winged Spreadwing were considered especially noteworthy. The former is a rather rare (S2) species found along streams and small rivers. Only one male was seen along the upper Isham Brook. The record for *L. eurinus* was the most noteworthy for the the 2002 season. An apparent breeding population was observed at Guthrie Pond. One pair was in tandem on a live cattail stem and the female was almost certainly laying eggs, ovipositing.

An intermittent woodland stream was sampled twice on Guthrie Farm. In July, clusters of larvae of an unidentified plethodontid salamander, presumably the Two-lined S., *Eurycea bislineata* were found under stones in the dried bed of the stream. This behavior seems to be rather extraordinary.

Certain rather widespread butterfly species were not recorded from the study area in 2002. These included members of the genera *Vanessa*, *Celastrina*, and *Polygonia*. This seems quite unusual and could not be explained based on the limited data available. The European Skipper continued to swarm over the drier fields of all the farm sites and may be negatively impacting some of the native species through either inter-specific larval competition for food or by displacement of the adults of native species such as *Speyeria* spp. from nectar sources.

### **General comments on long-term trends and other observations during 1999-2002:**

The cumulative totals of all verified adults of butterflies for 2000, 2001, and 2002 were 40, 42, and 43, respectively. The cumulative totals for odonata were 30,40, and 45, respectively. Further inventorying for odonata on the general study site seems especially warranted.

The annual frequency of record for all species of butterflies and odonata was presented. Carle's state (S) ranks of odonates was evaluated by comparing the frequency of his S5 rankings for species with the number of years they occurred on the study area and by averaging all ranks for all species for each frequency year class. Generally, his preliminary rankings seemed reasonable.

Based on this writer's general experience in Vt. and the results from the CHEP four-year inventory, these recommendations and comments on the status of selected species of butterflies and odonata are made:

1) *Boloria selene* and *Chlosyne harrisii* need to be monitored more closely, especially the latter. Both species may be becoming at risk in the general region of northern Vermont.

2) *A. interrupta* should be re-classified as S5, not S4.

3) *Lestes congener* should be classified as S4 or S5, not S3.

4) *L. eurinus* - Carle's recommendation as a questionable S4 probably should be retained or even that of a S3, depending on a careful analysis of the limited (mostly unpublished) data from Vermont.

Further inventorying of butterflies will probably not yield many new records. Additional studies of butterflies should concentrate more on phenology and other aspects of the individual biology of select species with respect to adding to our knowledge of their conservation biology. Furthermore, the absence of several species of relatively common butterflies from the project area for 2002 suggests that additional studies are needed to see if the pattern is real or an artifact of limited sampling.

Additional inventorying of the odonata will almost certainly produce several new records for the project area. The odonata, in general, seem to be a more dynamically changing faunal community than do the butterflies. There is a need to know much more about the biology of the species of odonata on the Project area.

The cattail zone around Guthrie Pond should be maintained as intact and broad as possible. It serves as a very important resource for many species of invertebrates and some vertebrates. The relatively uncommon damselfly, *L. eurinus*, was observed ovipositing in a green cattail stem in 2002 at Guthrie Pond.

Overall, the analysis of the data from the four years of the Project has allowed some important conclusions on trends in accumulated numbers, annual frequency of species, and other aspects of the biology of the odonata and butterflies. This would have been impossible from a single annual inventory.

### **General footnotes to tables 1-8.**

The monthly records of take by species for different sites (Tables 1-4) are depicted as Arabic numerals: 6=June, etc. For the 2001 report these monthly data were presented using the conventional Roman numerals: VI= June, etc. This change was made because of space constraints in developing the more detailed tables for the 2002 report.

The symbols S,T, and X merely reflect details for species according to the headings of the columns (Tables 5-8). Different letters were employed to make it easier to follow the details for the various columns.

It would have been difficult and redundant to have paired scientific and common names for all species in all tables. The reader should refer to tables 1-4 for these equivalences. Otherwise, as with the accepted practice, only scientific names were used in tables 5-8.

Table 1. Butterflies of Guthrie (G) and Bancroft (B) Farms, Lincoln Twp., Addison Co., Vt.-2002

SPECIES (names after Layberry et al, 1998)	COMMON NAME	G - open fields	G corner marsh	G woodland swamp/ marsh	G wood- land	G totals (sites)	B field	Grand Totals (no.sites /sp.) G & B	Species Verified 2002 G&B
<i>Battus canadensis</i>	Canadian T. Swallowtail	6		6		2		2	X
<i>Pieris rapae</i>	Cabbage White	68? 9				1		1	X
<i>Colias eurytheme</i>	Orange Sulphur	9	9s			2		2	X
<i>Colias philodice</i>	Clouded Sulphur	6899s	6899s	9		3	8	4	X
<i>Glaucopsyche lygdamus</i>	Silvery Blue	6				1		1	X
<i>Speyeria aphrodite</i>	Aphrodite Fritillary	7	8			2		2	X
<i>Speyeria atlantis</i>	Atlantis F.		7? 8			1		1	X
<i>Speyeria cybele</i>	Great Spangled F.		8			1	8	2	X
<i>Boloria selene</i>	Silver-bordered F.	6, 8	8			2	8	3	X
<i>Phyciodes tharos/coccyta</i>	Crescents	6	6	6		3		3	X
<i>Nymphalis antipoda</i>	Mourning Cloak	6				1		1	X
<i>Nymphalis milberti</i>	Milbert's Tortoise Shell		8, 9			2	8	3	X
<i>Limenitis arthemis</i>	White Admiral			7		1		1	X
<i>Limenitis archippus</i>	Viceroy		8			1		1	X
<i>Enodia anthedon</i>	N. Pearly Eye	7		7		3		3	X
<i>Satryodes eurydice</i>	Eyed Brown			7		1		1	X
<i>Cercyonis pegala</i>	Common Wood-Nymph	7, 8	8			2	8	3	X
<i>Megisto cymela</i>	Little Wood Satyr		6			1		1	X
<i>Coenonympha tullia</i>	Common Ringlet	69 9s	9			2		2	X
<i>Danaus archippus</i>	Monarch	9s	9s			2		2	X
<b>SKIPPERS</b>									
<i>Erynnis icelus</i>	Dreamy Duskywing	6?				1?		1?	
<i>Thymelicus lineola</i>	European Skipper	7	7	7	7	4		4	X
<i>Polites mystic</i>	Long Dash	7?		7	7	2+1?		2+1?	X
<i>Polites peckius</i>	Peck's Skipper			7		1		1	X
<i>Polites themistocles</i>	Tawny-edged Skipper		8			1		1	X
<i>Poanes hobomok</i>	Hobomok Skipper			6	6	2		2	X
<i>Euphyes vestris metacomet</i>	Dun	7?	7?8?			2?		2?	
Total spp. verified +?/site		14+3?	15+1?	9	5		5		25
*fm. Grehan & Sabourin, 95	% species verified (25 )	56	60	36	20		20		100

Table 2. Butterflies of Pierce and Wells Farms, Lincoln Twp., Addison Co., Vt.-2002

SPECIES (names after Layberry et al, 1998)	COMMON NAME	Pierce fields	Pierce Ponds(w) open (0)	Pierce- riparian zone: U. Isham Br.	Pierce Beaver Meadow and Swamp: U. Isham Br.	Pierce- lowland wooded marsh/ swamp	Pierce- Totals ( by Sites)	Wells- swamp to nw- field edge	Wells- field	Grand Totals (no. sites) /sp. Pierce & Wells	Species Present Pierce & Wells
<i>Battus canadensis</i>	Canadian T. Swallowtail			6			1			1	X
<i>Pieris rapae</i>	Cabbage White				8?		1?			1?	
<i>Colias philodice</i>	Clouded Sulphur	9s	9s(0)		9	9s	4	9	9	6	X
<i>Speyeria</i> spp.	Fritillaries	7 9			9		2			2	X
<i>Boloria selene</i>	Silver-bordered F.				7?		1?			1?	
<i>Phyciodes</i> (re: <i>cocyta</i> ?)	N. Crescent?	9s	9s(w)	9	689		4			4	X
<i>Nymphalis milberti</i>	Milbert's Tortoiseshell						0		9	1	X
<i>Limenitis archippus</i>	Viceroy				6 8		1			1	X
<i>Enodia anthedon</i>	N. Pearly Eye	9?		8?			2?			2?	
<i>Satryodes eurydice</i>	Eyed Brown			7	7		2			2	X
<i>Cercyonis pegala</i>	Common Wood-Nymph	8		8	8		3			3	X
<i>Coenonympha tullia</i>	Common Ringlet	6		9	9		3		9	4	X
<b>SKIPPER</b>											
<i>Thymelicus lineola</i>	European Skipper				7		2			2	X
<i>Carterocephalus palaemon</i>	Arctic Skipper				6		1			1	X
<i>Euphyes vestris metacomet</i>	Dun				8		1			1	X
Total species verified +/-/site		6 +1?	2	5+1?	10+2?	1		1	3		12
*fm. Grehan & Sabourin, 1995		% of total verified (12	50	16.7	83.3	8.3		8.3	25		100

Table 3. Odonata of Guthrie and Bancroft Farms, Lincoln, Twp., Addison Co., Vt. 2002

SPECIES	COMMON NAME	Guthrie-pond & immediate environs	Guthrie-open fields	Guthrie-swamp/marsh	Guthrie-wooded land	Guthrie-wooded brook	Guthrie totals-of 6 sites	Ban. field ('02)	Grand Tot. G&B of 7 sites/sp.	Species verified G&B 2002
<i>Lestes congener</i>	Spotted Spreadwing	89, 9s					1	1	1	X
<i>Lestes eurinus</i>	Amber-winged S.	7 (1st)					1	1	1	X
<i>L. disjunctus</i>	Common Spreadwing	8?		8?			2?	2?	2?	
<i>Lestes dryas</i>	Emerald Spreadwing			7			1	1	1	
<i>Chromagrion conditum</i>	Aurora Damselfly			7			1	1	1	X
<i>Enallagma aspersum</i>	Azure Bluet	7 8					1	1	1	X
<i>Enallagma boreale</i>	Boreal Bluet	6					1	1	1	X
<i>E. cyathigerum</i>	Northern Bluet	6					1	1	1	X
<i>E. hageni</i>	Hagen's Bluet			7			1	1	1	X
<i>Ishnura posita</i>	Fragile Forktail	6?		7			1+1?	1+1?	1+1?	X
<i>Ishnura verticalis</i>	Eastern Forktail	6789		7			2	2	2	X
<i>Nehalennia irene</i>	Sedge Sprite	78					1	1	1	X
<i>Aeshna</i> sp.	Darners	89 9s	9s	89			3	8	4	
<i>Aeshna eremita</i>	Lake Darner	9s					1	7?	1+1?	X
<i>A. i. interrupta</i>	Variable Darner	79 9s	9s				2	2	2	X
<i>Anax junius</i>	Common green Darner	67		6? 8			2	2	2	X
<i>Gomphus borealis</i>	Beaverpond Clubtail	6					1	1	1	X
<i>Cordulia shurtleffi</i>	American Emerald	67		7?			1+1?	1+1?	1+1?	X
<i>Dorocordulia libera</i>	Racket-tailed Emerald				6		1	1	1	X
<i>Somatochlora</i> sp.	Emeralds			9			1	1	1	
<i>Celithemis eponina</i>	Halloween Pennant						0	8-1st	1	X
<i>Ladona julia</i>	Chalk-fronted C.	67					1	1	1	X
<i>Leucorrhina glacialis</i>	Crimson-ringed W.	67	7				2	2	2	X
<i>Leucorrhinia intacta</i>	Dot-tailed Whiteface	6		6			2	2	2	X
<i>Leucorhinia proxima</i>	Red-waisted Whiteface		6	6			2	2	2	X
<i>Libellula luctuosa</i>	Widow Skimmer						0	7	1	X
<i>Libellula pulchella</i>	12-Spotted Skimmer	7		78			2	7	3	X
<i>Libellula quad.</i>	Four-Spotted Skimmer			6			1	1	1	X
<i>Plathemis lydia</i>	Common Whitetail	6		7			2	2	2	X
<i>Sympetrum</i> sp.	Meadowhawks	899s		789			4	8	5	
<i>S. internum/janae</i>	Cherry-faced or Jane's	8		78			3	78	4	X
<i>S. vicinum</i>	Yellow-legged M.	9s					1	8	2	X
<b>Total species verified</b>	<b>+?/site</b>	19+2?	2	12+2?	2	0		5+1?		28
Carle,FL 1994	% species verified(28)	67.8	7.1	42.8	7.1	0		17.8		100

Table 4. Odonata of Pierce and Wells Farms, Lincoln, Twp., Addison Co., Vt. 2002

SPECIES	COMMON NAME	Pierce Upper field	Pierce Ponds - woods (w) & open (o)	Pierce Upper Isham Br.	Pierce Beaver Marsh Area-Upper Isham Br.	Pierce Beaver Dam Upper Isham Br.	Pierce Lower Woodland Marsh	Pierce Totals - 7 sites (Inc. 2 pds)	Wells Pond & adj. Open Fields	Wells Totals	Grand Totals Pierce & Wells - of 8 sites	Species verified P & W 2002
<i>Calopteryx maculata</i>	Ebony Jewelwing		78					1			1	X
<i>Lestes</i> sp.	Spreadwings			8							1	
<i>Lestes rectangularis</i>	Slender Spreadwing		9					1			1	X
<i>Enallagma hageni</i>	Hagen's Bluet			78				1			1	X
<i>Ishnura verticalis</i>	Eastern Forktail		69	78	67	9?		3			3	X
<i>Nehalennia irene</i>	Sedge Sprite			7				1			1	X
<i>Aeshna</i> sp.	Darners	89	9o9sw		79	89	9s				5	
<i>Aeshna canadensis</i>	Canada Darner		9			9		2			2	X
<i>A. umbrosa</i>	Shadow Darner		9s(w)	9	9	9		4			4	X
<i>Anax junius</i>	Common Green Darner			9?					9	1	1	X
<i>Boyeria</i> sp.											1?	
<i>Gomphus borealis</i>	Beaverpond Clubtail					6		1			1	X
<i>Lanthus parvulus</i>	N. Pygmy Clubtail			6-1st				1			1	X
<i>Cordulia shurtleffi</i>	American Emerald			6				1			1	X
<i>Leucorrhinia hudsonica</i>	Hudsonian Whiteface			7?							1?	
<i>Libellula luctuosa</i>	Widow Skimmer	6						1			1	X
<i>Libellula pulchella</i>	12-Spotted Skimmer	7						1			1	X
<i>Plathemis lydia</i>	Common Whitetail					7	7	2			2	X
<i>Sympetrum</i> sp.	Meadowhawks		9sow	9			9			1	4	
<i>S. internum/janae</i>	Cherry-faced or Jane's	7			789			2			2	X
<i>S. obtrusum</i>	White-faced M.				8			1			1	X
<i>S. semicinctum</i>	Band-winged M.				89			1			1	X
<i>S. vicinum</i>	Yellow-legged M.		9s(w)		9	8	9s	4	9	1	5	X
Total species + ?/site		3	2	6+1?	9+1?	6	2	17	2	2		18
Carle, FL 1994	% species verified(18)	16.7	11.1	33.3	50	33.3	11.1	94.4	11.1	11.1		100

Table 5. Butterflies of Guthrie/Bancroft, Pierce and Wells Farms, Vt. :1999-2002

SPECIES (names after Layberry et al, 1998)	STATE RANK (S)*	G-B '99	G-B '00	G-B '01	G-B '02	Gut-Ban Totals '99-'02	P '99	P '00	P '01	P '02	Pierce '99 - '02	W '99	W '00	W '02	Wells Totals	GBPW '99 (T=present)	GB P '00	GB P '01	GB PW '02	GBPW Totals no. yrs
<i>Battus canadensis</i>	5	X	X	X	X	S		X	X	X	S					T	T	T	T	4
<i>Papilio polyxenes</i>	5								X		S									1
<i>Pieris napi</i>	5	X	X			S										T	T			2
<i>Pieris rapae</i>	5	X	X	X	X	S		X	X		S					T	T	T	T	4
<i>Colias eurytheme</i>	5	X	X	X	X	S		X	X		S	X				T	T	T	T	4
<i>Colias philodice</i>	5	X	X	X	X	S		X	X	X	S	X	X	X		T	T	T	T	4
<i>Lycaena phlaeas</i>	5	X				S														1
<i>Celastrina complex</i>	5	X	X	X		S		X	X		S	X			S	T	T			3
<i>Everes comyntas</i>	5		X			S		X			S					T	T			2
<i>Glaucopteryx lydamus</i>	5	X	X	X	X	S										T	T	T	T	4
<i>Speyeria aphrodite</i>	5			X	X	S														2
<i>Speyeria atlantis</i>	5	X	X	X	X	S		X	X		S	X	X		S	T	T	T	T	4
<i>Speyeria cybele</i>	5	X	X			S		X			S					T	T	T	T	3
<i>Boloria bellona</i>	5	X	X	X		S										T	T	T	T	3
<i>Boloria selene</i>	5	X	X	X	X	S										T	T	T	T	4
<i>Phyciodes cocyta</i>	5	X	X	X	X	S		X	X	X	S					T	T	T	T	3
<i>Phyciodes tharos</i>	5					S														1
<i>Euphydryas phaeton</i>	5																			
<i>Chlosyne harrisi</i>	5	X				S										T				1
<i>Polygonia faunus</i>	5																			
<i>Polygonia interrogatoris</i>	5	X				S										T				1
<i>Polygonia progne</i>	5	X				S										T				1
<i>Nymphalis antiopa</i>	5				X				X		S	X			S	T	T	T	T	3
<i>Nymphalis milberti</i>	5	X			X	S		X	X		S			X	S	T	T	T	T	3
<i>Vanessa atalanta</i>	5		X	X		S		X	X		S		X		S	T	T	T	T	3
<i>Vanessa cardui</i>	5																			
<i>Vanessa virginiensis</i>	5			X										X	S			T	T	2
<i>Limenitis a. arthemis</i>	5		X		X	S										T			T	2
<i>Limenitis archippus</i>	5	X		X	X	S		X	X	X	S		X		S	T	T	T	T	4

(cont.)

Table 5. Butterflies of Guthrie/Bancroft, Pierce and Wells Farms, Vt. :1999-2002

SPECIES (names after Layberry et al, 1998)	STATE RANK (S)*	G-B '99	G-B '00	G-B '01	G-B '02	Gut-Ban Totals '99-'02	P '99	P '00	P '01	P '02	Pierce '99-'02	W '99	W '00	W '02	Wells Totals	GBPW '99 (T=present)	GB PW '00	GB PW '01	GB PW '02	GBPW Totals no. yrs
Enodia anethon	5	X	X		X	S	X	X			S	X			S	T	T	T	T	3
Satryodes appalachia	5						X	X			S						T			1
Satryodes eurydice	5	X	X		X	S		X	X	X	S					T	T	T	T	4
Cercyonis pegala	5	X	X	X	X	S	X	X	X	X	S		X		S	T	T	T	T	4
Megisto cymela	5	X	X	X	X	S		X	X	X	S		X			T	T	T	T	4
Coenonympha tullia	5	X	X	X	X	S	X	X	X	X	S	X	X	X	S	T	T	T	T	4
Danaus p. plexippus	5	X	X	X	X	S	X	X	X	X	S	X	X		S	T	T	T	T	4
<b>SKIPPERS</b>																				
Erynnis icelus	5	X			X	S										T		T		2
Erynnis juvenalis	5			X		S		X			S						T			1
Ancyloxypha numitor	5						X	X	X		S					T	T	T		3
Thymelicus lineola	5	X	X	X	X	S		X	X	X	S	X			S	T	T	T	T	4
Carterocephalus palaemon	5	X	X			S			X	X	S					T	T	T	T	3
Polites mystic	5	X				S			X		S	X			S	T	T	T	T	3
Polites peckius	5					S	S	S												1
Polites themistocles	5	X			X	S						X			S	T		T	T	2
Euphyes bimacula	5																			
Poanes hobomok	5	X	X	X	X	S		X	X		S					T	T	T	T	4
Amblyscirtes hegon	5																			
Amblyscirtes vialis	5																			
Euphyes vestris metacome	5	X	X			S		X		X	S					T	T	T	T	3
*Grehan & Sabourin, '95		31	25	21	25	38	13	24	17	10	28	11	8	3	17	36	31	25	27	43
per cent (%) total 4 yrs (43)						88.4					65.1				39.5					100

35 spp. total  
 10 - 10  
 43  
 35 spp. total  
 10 - 10  
 43  
 35 spp. total  
 10 - 10  
 43



Table 6. Odonata of Guthrie/Bancroft and Pierce Farms, Lincoln Twp., Addison Co., Vt. :1999-2002.

SPECIES	STATE RANK (S)*	G-B '99	G-B '00	G-B '01	G-B '02	G-B Totals	P '99	P '00	P '01	P '02	Pierce Totals	W '99	W '00	W '02	Wells Totals	GB PW '99	GB PW '00	GB PW '01	GBPW Totals '99-'02		
<i>Gomphus borealis</i>	2				X	S			X	X	S							T	T	2	
<i>Lanthus parvulus</i>	2									X	S									T	1
<i>Cordulegaster maculata</i>	5										S										1
<i>Cordulia shurtleffi</i>	5	X	X	X	X	S		X	X	X	S					T	T	T	T	T	4
<i>Dorocordulia libera</i>	4		X		X	S															2
<i>Epithea canis</i>	5										S										2
<i>S. elongata</i>	3	X				S		X	X		S					T	T	T	T	T	3
<i>S. walshii</i>	3			X		S			X		S										1
<i>Celithemis eponina</i>	?				X	S					S									T	1
<i>Ladona julia</i>	5	X	X	X	X	S		X			S					T	T	T	T	T	4
<i>Leucorrhinia frigida</i>	5	X				S										T	T	T	T	T	1
<i>L. glacialis</i>	3	X	X	X	X	S										T	T	T	T	T	4
<i>L. hudsonica</i>	5																				
<i>L. intacta</i>	5			X		S														T	2
<i>L. proxima</i>	3	X			X	S										T				T	2
<i>Libellula luctuosa</i>	5	X	X		X	S										T	T	T	T	T	3
<i>Libellula puichella</i>	5		X		X	S		X	X	X	S					T	T	T	T	T	4
<i>Libellula quadrimaculata</i>	5	X	X		X	S				X						T	T	T	T	T	3
<i>Plathemis lydia</i>	5		X		X	S		X		X	S					T	T	T	T	T	4
<i>S. internum or janae</i>	5	X	X	X	X	S		X		X	S					T	T	T	T	T	4
<i>S. obtrusum</i>	5	X				S		X	X	X	S					T	T	T	T	T	3
<i>S. semicinctum</i>	3							X	X	X	S					T	T	T	T	T	3
<i>S. vicinum</i>	5	X			X	S		X		X	S			X	S	T	T	T	T	T	4
<b>Total species verified</b>		20	24	18	28	40	11	19	15	17	28	0	0	2	2	26	32	25	35		<b>45</b>
(% per cent total-of 45)						<b>88.9</b>					<b>62.2</b>				<b>7.4</b>						<b>100</b>

Table 7. Butterflies of CHEP (all farms)-no. years recorded ('99-'02)

Species (all ranked as S5)*	one yr	2 yrs	3 yrs	4 yrs
Papilio polyxenes	X			
Lycaena phlaeas	X			
Phyciodes tharos	X			
Chlosyne harrisi	X			
Polygonia interrogationis	X			
P. progne	X			
Satryodes appalachia	X			
Erynnis juvenalis	X			
Polites peckius	X			
<b>SUM</b>	<b>9</b>			
Pieris napi		X		
Everes comyntas		X		
Speyeria aphrodite		X		
Vanessa virginiesis		X		
Limenitis a. arthemis		X		
Erynnis icelus		X		
Polites themistocles		X		
<b>SUM</b>		<b>7</b>		
Celastrina complex			X	
Speyeria cybele			X	
Boloria bellona			X	
Nymphalis antipoda			X	
Nymphalis milberti			X	
Vanessa atalanta			X	
Phyciodes cocyta			X	
Enodia anthedon			X	
Ancyloxpha numitor			X	
Carterocephalus palaemon			X	
Polites mystic			X	
Euphyes vestris metacomet			X	
<b>SUM</b>			<b>12</b>	
Battus canadensis				X
Pieris rapae				X
Colias eurytheme				X
C. philodice				X
Glaucopsyche lygdamus				X
Speyeria atlantis				X
Boloria selene				X
Limenitis archippus				X
Satryodes eurydice				X
Cercyonis pegala				X
Megisto cymela				X
Coenonympha tullia				X
Danaus p. plexippus				X
Thymelicus lineola				X
Poanes hobomok				X
<b>SUM</b>				<b>15</b>
*Grehan& Sabourin '95				

total no. species=43; sampling effort not the same each yr.

Table 8. Odonata of CHEP (all farms)-no. years recorded ('99-'02)

Species	one yr	Rank (S)	2 yrs	Rank (S)	3 yrs	Rank(S)	4 yrs	Rank (S)
Lestes dryas	X	5	X					
L. eurinus	X	4 (?)						
Coenagrion resolutum	X	5						
Enallagma boreale	X	5						
Aeshna constricta	X	5						
Aeshna tuberculifera	X	2						
Lanthus parvulus	X	2						
Cordulegaster maculata	X	5						
Somatochlora walshii	X	3						
Leucorrhinia frigida	X	5						
Celithemis eponina	X	4 (?)						
<b>SUM</b>	<b>11</b>							
Average S Rank & % of 5's		<b>4.1</b>		<b>&amp;54.5</b>				
Lestes rectangularis			X					5
Enallagma ebrium			X					5
Aeshna eremita			X					4
Gomphus borealis			X					2
Dorocordulia libera			X					4
Epithea canis			X					5
Leucorrhinia intacta			X					5
L. proxima			X					3
<b>SUM</b>			<b>8</b>					
Average S Rank & % of 5's							<b>3.6</b>	<b>&amp;50.0</b>

Total no.species=45; sampling effort not the same each yr

Table 8. Odonata of CHEP (all farms)-no. years recorded ('99-'02)

Species	one yr	Rank (S)	2 yrs	Rank (S)	3 yrs	Rank(S)	4 yrs	Rank (S)
<i>Calopteryx maculata</i>					X	5		
<i>Lestes congener</i>					X	3		
<i>Lestes disjunctus</i>					X	5		
<i>Chromagrion conditum</i>					X	5		
<i>Enallagma hageni</i>					X	5		
<i>Ishnura posita</i>					X	5		
<i>Aeshna canadensis</i>					X	5		
<i>Anax junius</i>					X	5		
<i>Somatochlora elongata</i>					X	3		
<i>Libellula luctuosa</i>					X	5		
<i>L. quadrimaculata</i>					X	5		
<i>Sympetrum obtrusum</i>					X	5		
<i>S. semicinctum</i>					X	3		
<b>SUM</b>					<b>13</b>			
<b>Average S Rank &amp; % of 5's</b>						<b>4.5</b>		<b>&amp;76.9</b>
<i>Enallagma aspersum</i>							X	5
<i>E. cyathigerum</i>							X	5
<i>Ishnura verticalis</i>							X	5
<i>Nehalennia irene</i>							X	5
<i>Aeshna i. interrupta</i>							X	4
<i>A. umbrosa</i>							X	5
<i>Cordulia shurtleffi</i>							X	5
<i>Ladona julia</i>							X	5
<i>Leucorrhinia glacialis</i>							X	3
<i>Libellula pulchella</i>							X	5
<i>Plathemis lydia</i>							X	5
<i>Sympetrum internum/janae</i>							X	5
<i>S. vicinum</i>							X	5
<b>SUM</b>							<b>13</b>	
<b>Average S Rank &amp; % of 5's</b>								<b>4.8 &amp; 84</b>

Total no.species=45; sampling effort not the same each yr

**Appendix I:** A generalized description of the dates, routes, and sites related to the inventory of Butterflies and Odonata for the 2002 field season for the CHEP. \*

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13 June Guthrie Farm-inventoried at Guthrie Pond, the corner swamp, the woodland swamp/marsh complex and along the intermittent stream that more or less coursed along the the western boundary of the farm. I walked up the bed of the stream and along both banks from where the stream leaves the property boundary at the northwest end to the northwest corner of the woodland marsh/swamp complex.

Pierce Farm-inventoried just n. of the e-w dirt road along upper Isham Brook, across the beaver meadow s. of the beaver dam and at the beaver dam.

15 July Guthrie Farm-I followed essentially the same route as on 13 June.  
Bancroft Farm- went across the west side of the upper field to the corner baneberry patch and then around the adjacent bramble stand.  
Pierce Farm- same general route as on 13 June.

8 August Guthrie and Bancroft farms-same general inventory as on 15 July except that I did not go to the woodland intermittent stream.  
Pierce Farm- same general route as on 13 June.

7 September

Guthrie Farm-I followed essentially the same route as on 13 June. I did inventory along the intermittent stream.

Bancroft Farm- no inventory

Pierce Farm- same general route as on 13 June and 8 August.

Wells Farm- Spent roughly 20 minutes going across field west of the building complex and through the swamp at the nw end of the field.

26 September

Guthrie Farm-I followed essentially the same route as on 7 September.

Bancroft Farm- no inventory

Pierce Farm-inventoried both ponds (the n. pond, north of the homestead and the s. pond, south of the homestead). I then went down to lower Isham Brook by way of the swamp, s. of the woodland pond, along the small seepy stream from the swamp to the brook. I returned from the brook via the upland woodland and across the large mowed field south of the e-w dirt road.

I did not inventory the three upper Isham Brook sites.

During these inventories I generally checked Guthrie Pond several times as I entered and left the Guthrie Pond area.

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\* See Appendixes 1A-1E of the 1999 report for generalized routes followed in 1999, which were more or less the same as followed in 2002 except for the addition of the census along the intermittent stream along the w. boundary of the Guthrie F. in 2002.

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\* See the 1999 report for a more comprehensive bibliography.

