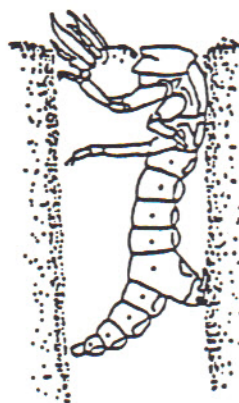
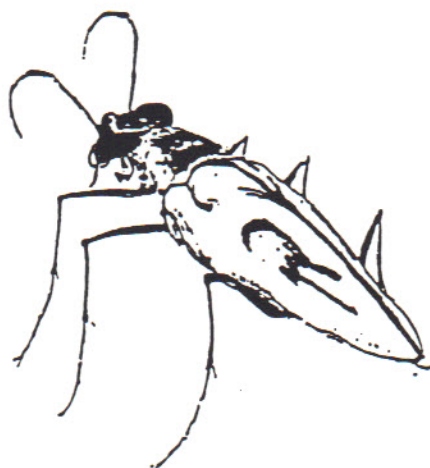


**DETERMINATION OF POPULATION SIZE OF RESIDENT  
ADULT NORTHEASTERN BEACH TIGER BEETLES, LARVAL  
RECRUITMENT AND IMMIGRATION AT COVE POINT,  
CALVERT COUNTY, MD, IN 1998**



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## INTRODUCTION

The Northeastern Beach Tiger Beetle, *Cicindela dorsalis dorsalis*, is Federally listed as a Threatened Species. It has been near extirpated from nearly all of its range in the northeast, from New Jersey to Massachusetts. The species remains well-established within the Chesapeake Bay of Virginia and Maryland. The large breeding populations of this species in Calvert County, Maryland, occur at Flag Ponds Nature Park, Western Shores Estates, Scientists Cliffs and Cove Point. These Maryland populations have experienced a dramatic decline since 1994, especially the Flag Ponds and Western Shores populations which each peaked at  $\geq 4000$  adults in the early 1990's (Fig. 1). Most dramatic has been the Flag Ponds population which peaked at over 4000 adults in 1992, and declined to 1080 in 1995, 810 in 1996 and 213 in 1997, and  $<50$  in 1998. The Western Shores and Scientists Cliff populations have also declined significantly. The primary cause of the decline at Flag Ponds seems to be natural shoreline changes which decreased larval habitat, but other factors may have been involved since such changes have not been seen at Western Shores or Scientists Cliffs. The Cove Point adult population peaked at 707 in 1990, then declined to about 200 in 1995 and 1996 and to 32 in 1997. This decline started earlier than that at the other sites. Factors causing the decline at Cove Point are also unknown, but the severe erosion in 1997 may have had a significant effect. There may also be a decline in suitable beach habitat for larvae but this is not apparent. The objectives of this proposal were to: 1. accurately determine the adult population size at Cove Point in 1998; 2. determine the amount of larval recruitment; and 3. determine if adults might be moving in from other Calvert County sites. This work is especially important because the population at Cove is at such a low size that it is in danger of extinction, and it may have been further impacted by the serious erosion of the early February, 1998 nor'easters.

## METHODS:

Adult surveys were conducted along the Cove Point shoreline on June 21, June 26, July 2, July 14 and July 28, 1998. The first three dates were selected because these were believed to be before adult beetles were in their dispersal phase and should thus give an accurate indication of the numbers of resident adults at Cove Point. The July 14 date would likely be during the dispersal phase while the



late July date would be after the dispersal phase. An increase in numbers between the early and later dates should be indicative of changes in population size at the site due to dispersal (immigration from other sites, as seen in 1996)). The visual search index method was used to determine adult numbers at the site. This method involves walking along the shoreline and counting all of the adult beetles that are seen. Separate counts were made for each 200 meter section of shoreline (see Fig. 3) so that information on both distribution and abundance could be obtained. Two counts were made on each day and the highest used as the index count for population size.

Counts of larval burrows were made on two separate dates, September 30 and October 20, 1998. This is the period of high larval activity and after all eggs should have hatched, and when larvae are in the first and second instar. The numbers of the second instars would indicate larval recruitment from the 1998 adults while the third instar larvae seen at this time would likely be from the previous years cohort. The larval index count method involved walking along the shoreline and carefully searching the ground surface of the upper intertidal zone for the characteristic tiger beetle larval burrows. Most of the search effort was concentrated in the 400 m section where adults were found. All burrows seen were recorded, and the specific instar determined (first, second, third). As a part of other work I also surveyed adult numbers at the other Calvert County populations during July of 1998.

## RESULTS

The numbers of adults counted at the Cove Point site in 1998, given in Figure 2, ranged from 16 to 32, with the peak counts of 30-34 between July 2 -28. These numbers were nearly identical to the peak numbers of 26-32 in 1997, and much lower than the late July peak of 217 in 1996. The distribution of adults in 1998 was the same as in the previous two years in being concentrated in the area 400-600 m south of the pier (see enclosed map). Specifically, all of the adults were in this area except for two individuals on July 14 and two on July 28 which were in the area 600-700 m south of the pier.

The numbers of larvae counted in fall 1998 were 11 (0 first instars, 4 second instars, 7 third instars) on September 30 and 16 (0 first instars, 7 second instars, 9 third instars) on October 20. All of these larvae were found in the same area of



beach where adults were concentrated (400-600 m south of the pier). All were at or just above the recent high tide level. Because of the typical two year life cycle of *C. d. dorsalis*, it is likely that the second instars were the 1998 cohort (from 1998 adults) and the third instars were the 1997 cohort (from 1997 adults). The larval numbers in 1998 were similar to the peak larval numbers of 11 in 1996. No fall larval surveys were made in 1997.

## DISCUSSION

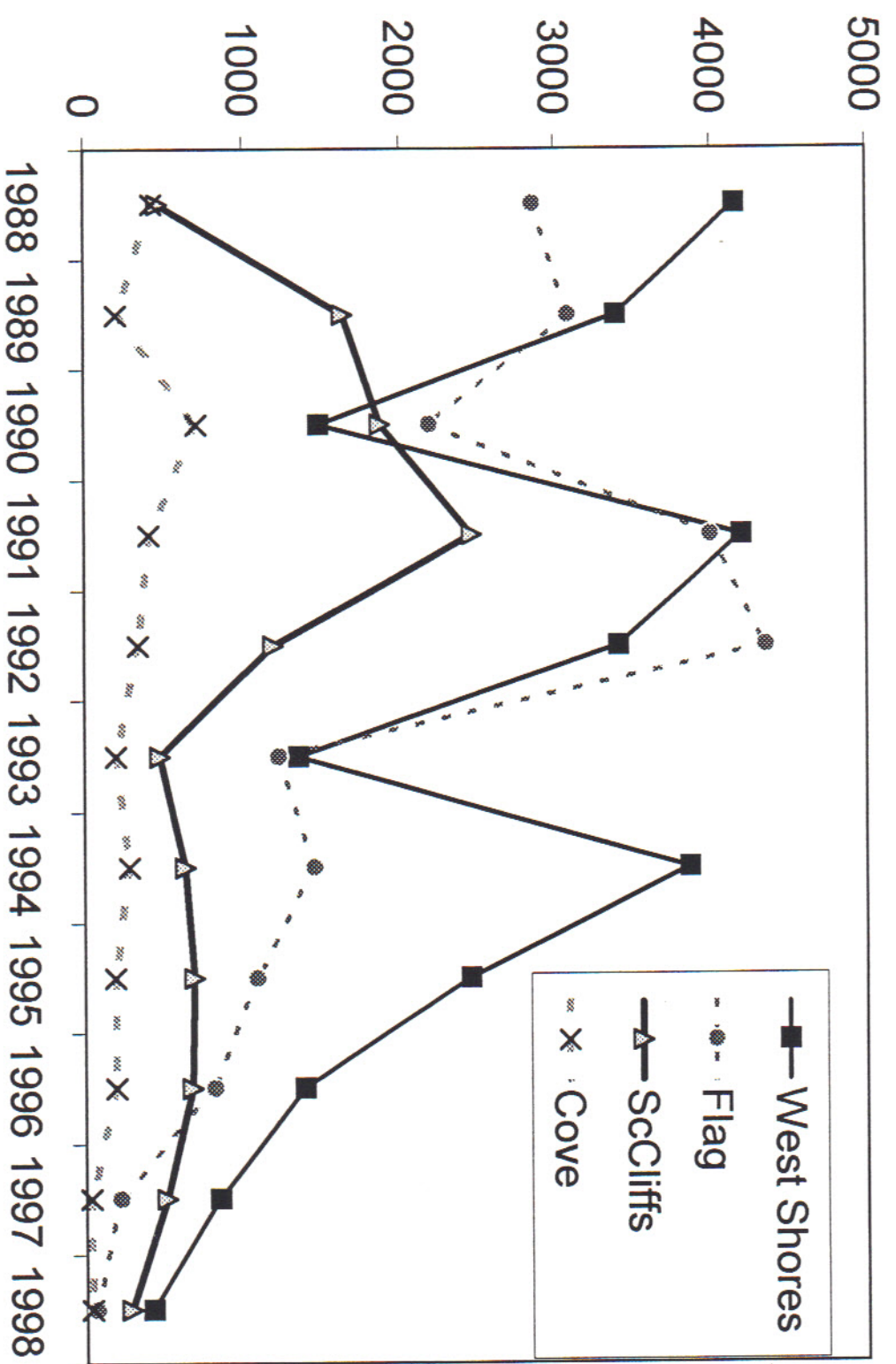
**The Status of the Cove Point and Other Calvert County Population, 1996-1998.** The results of my recent studies of the *C. d. dorsalis* population at Cove Point suggest the resident adult population and larval recruitment are both very low, but the cause of this is unknown. The numbers, based on adult counts, have been about 30 for the past two years. It seems clear that the large increase in adult numbers (over 200) in late July of 1996 were the result of many adult beetles immigrating to Cove Point from another site, probably Western Shores Estates. No such increase was seen in the late July count in this study or in late July of 1997. Counts in 1996 were 50-70 adults in early July, before the apparent immigration. Previous studies with *C. d. dorsalis* indicated that in large populations adult beetles migrate about the time of peak density, which is usually mid-July. The apparent lack of immigration to Cove Point in 1997 and 1998 was probably because the other large Calvert County populations (especially Flag Ponds and Western Shores) have decreased in size and did not reach densities that were high enough to trigger dispersal.

The cause or causes of the dramatic decline in the Calvert County *C. dorsalis* populations are not known. nor is it certain if the decline in the Cove Point population is related to what is occurring at these other sites. The decline at Cove Point did begin several years before the decline at the other sites. It is obvious that the shoreline changes are the major cause of decline at Flag Ponds, but this cannot explain the declines at Western Shores and that at Scientists Cliffs which have paralleled the Flag Ponds decline. Also, the new shoreline at Flag Ponds has become seemingly suitable (wide enough beach with fine sand) habitat and should already be supporting larger larval and adult numbers. There has been some recent erosion at a critical part of the Western Shores site where many adult and larval *C. dorsalis* have been found in the past. This may well be affecting this population.

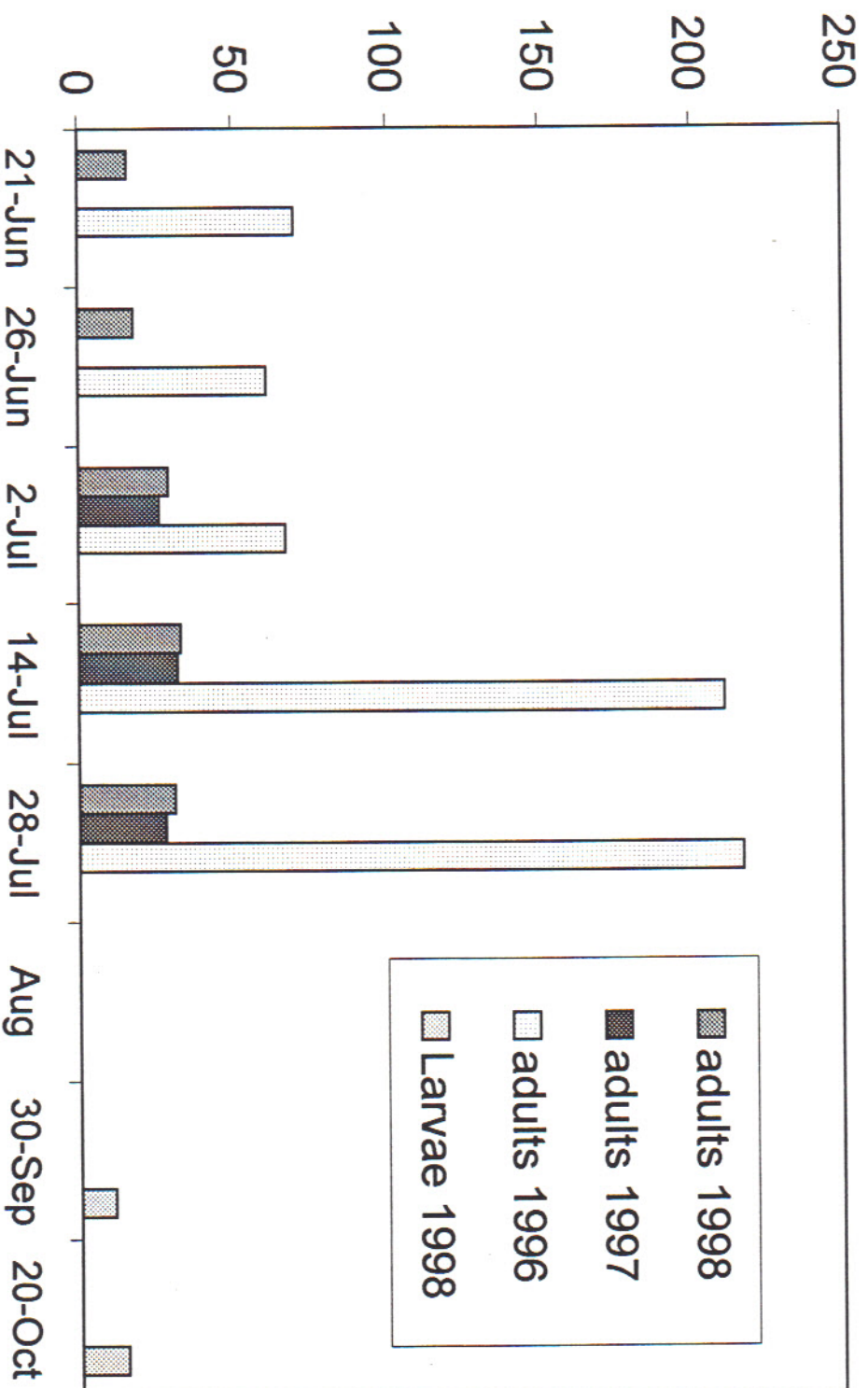
There may however be other factors responsible for the Calvert County declines. A large sand bar about 100 m offshore from Flag Ponds south to near Cove Point has been noticed in recent years. It is possible that this bar is trapping sand and disrupting the normal shoreline sand movement and dynamics upon which *C. dorsalis* may depend. This species is known to be a colonizing species which seems to depend on new or dynamic sandy beach habitats. The apparent stability of much of the southern half of the Cove Point shoreline may also explain why this area has never supported many adult or larval tiger beetles. This portion of the shoreline seems otherwise suitable because of the very wide beach and fine sand. Other unknown causes such as disease, parasitism or food limitation could also be involved in these declines. Additional studies are needed over the next few years to seek answers to this population decline.



Fig. 1. Adult Numbers in Large MD Populations



**Fig. 2. Adult and Larval Numbers of *Cicindela dorsalis* at Cove Point, 1996-1998**



**Fig. 3. Map of the Cove Point shoreline showing beach sections where *C. d. dorsalis* studies were conducted.**

