

# Fort Tilden Dragonfly Migration Watch, 1993-1995

*Steve Walter*  
6921 Springfield Blvd  
Flushing NY 11364  
SWalter@nyc.rr.com

FORT TILDEN, A PART OF THE GATEWAY NATIONAL RECREATION AREA, is located in New York City's borough of Queens, on the Rockaway peninsula. From 1990 through 1995, it was the site of a formal hawk watch. For this reason and because of Fort Tilden's position along the coast, in early September 1992, I was invited to participate in the dragonfly migration data-gathering project conducted under the auspices of the Cape May Bird Observatory. The recording of data began in mid-September.

For me, that season had significant results: it introduced me to dragonfly identification and served to light a spark within me. The following summer I began studying dragonflies in the field in preparation for observing the year's coming migration, a project I believed needed to be started earlier in the season than the effort in 1992. The present summary was written following the 1995 dragonfly migration season and updated to include data from 1996 as well as records from more sporadic observations through 2000.

## **Study Area and Methods**

Fort Tilden is on the Rockaway peninsula, the westernmost extension of the Atlantic shore of Long Island, a long-known flyway for migratory birds. Rockaway Inlet borders its north side. The width of the peninsula where observations were made is about 550 meters. Fort Tilden itself extends from about five to six kilometers east of Breezy Point, the western tip of land. The imminent water barrier prevents any milling about or congregating of dragonflies. Migrants tend to continue moving to the west-southwest, the direction of migration, only slowing for feeding activity or because of weather changes.

Observations focused solely on dragonflies were conducted from ground level. Those made in conjunction with or incidental to the hawk watch were done from a 15-meter-high former gun battery, or bunker, and generally took place beginning in mid-September with the advent of significant hawk flights. The ground-level observations of the early season proved important, as a number of species were low fliers, and ground level was more productive than the bunker for spotting low-flying individuals. It was also possible to spot the approach of small dragonflies a bit sooner from the ground, providing a better chance for identification. Observers watched at times from the Fort Tilden parking lot; at times from the roadway leading to the parking lot; and at times from the beach. The observation point chosen depended on where the flight appeared most active and also on the amount of human and vehicular activity on a particular day.

Identification was done by sight and with binoculars. Most species were captured at some point to confirm the observers' identification of in-flight dragonflies. Random capturing of reddish-looking immatures of Green Darner (*Anax junius*) also took place in an effort to determine if Comet Darner (*Anax longipes*) appeared in migration situations. All individuals were released. Observers also frequently checked a small freshwater pond, about a kilometer east of the observation site.

Data recording followed the method used for the hawk watch, with readings taken at the start of each hour of coverage. The data gathered included wind direction and speed, temperature and percentage of cloud cover. Dragonflies were counted individually when possible, i.e., when they passed close enough for identification and when spotting hawks did not take priority. Unidentified dragonflies were not recorded. The hordes of Green Darners and Black Saddlebags (*Tramea lacerata*) flying simultaneously with significant hawk flights were not counted, just labeled "abundant," "common," etc.

It should be noted that the numbers given as maximums represent a cross section of the flight. Because of their small size, dragonflies must pass close to the observer to be visible and identifiable. Moreover, there is a bias toward the larger or more distinctive species such as Swamp Darner (*Epiaeschna heros*) or Twelve-spotted Skimmer (*Libellula pulchella*). The actual numbers migrating through Fort Tilden would be significantly higher, as the flight often occurred over the width of the peninsula.

Observations began with the first available cold front in August—15 August in 1993, 6 August in 1994. The success of both these outings confirmed the necessity to continue pushing the early starting date. In 1995,

a significant cold front passed through the northeastern United States on 30 July. Observations on this date showed southbound dragonfly migration could occur as early as the month of July; in fact, it was the most spectacular flight observed, excluding those dominated by Green Darners. There was some indication of movement prior to this date, a question that needs to be explored in the future. Because of the hawk watch operation at Fort Tilden, the dragonfly watch season had no "official" end—dragonflies were recorded as long as temperatures allowed them to stay active.

## Results

The greatest species diversity occurred in August, with twelve species recorded. In September eleven species were recorded, though many in reduced numbers. In fact, only Green Darner increased in numbers in September. Autumn Meadowhawk (*Sympetrum vicinum*) was the only species not recorded before September. Seven species were recorded in October, six of these regularly. Green Darner was always the last species recorded—to 14 November in 1993, 13 November in 1994, and 26 October in 1995.

Migration was most often associated with the passage of a cold front and winds from the north, the most common after a front. However, favorable winds may at times be long in coming. In fact, the peak flight (excluding those dominated by Green Darner) of 1994, on 27 August and 28 August, occurred on a southwest wind. Many of the species peaking with this flight were scarce after August in all three years, suggesting the lateness of the date provided an urgency to move on. Interestingly, a substantial movement of birds, most notably Eastern Kingbird (*Tyrannus tyrannus*) and Bobolink (*Dolichonyx oryzivorus*), also occurred on these two days.

Light to moderate wind speeds appeared to be preferable to strong winds, but this finding is not conclusive. Certainly the dragonflies responded to lighter winds than would be necessary to trigger hawk movements (on the coast). One situation that was definitely and without exception unfavorable was the onset of onshore winds. With the onset of the sea breeze, migration activity came to a screeching halt. As would be expected, the best migration days were those with an abundance of sunshine. In fact, migration was seen to slow when clouds obscured the sun and improve with the return of sunshine. However, a substantial flight (of mostly Green Darner) occurred on 8 September 1995, under mostly overcast conditions.

The temperature required to allow migration activity was a factor I constantly tried to determine. This was difficult for the early migrating

species, as temperatures in August seldom dropped below their tolerance level. One such occurrence came on 6 August 1994, when morning temperatures dropped to about 13° C. With an active wind from the north to northeast, few dragonflies were seen—until midday, when the temperature rose above 15.5° C. Recall that this was the first cold front of the season.

Did the day have to warm up to trigger the flight or did the dragonflies need time to reach the coast for the first time? This question may have been answered with the flight of 30 July 1995. Despite the so-called “cold” front and an active wind from the northwest, temperatures lowered only to 28.8° C (and rose to 34.4° C). Even though few dragonflies had been noted on the coast prior to this day, the flight was already in high gear by 8:00 a.m. After August, of course, more opportunities offered themselves for measuring the effect of temperature on dragonfly migration. Unfortunately, only Green Darner and Black Saddlebags appeared in a significant enough sample. The temperature required to trigger significant migration among these species appeared to be about 16° C. Green Darner, however, was occasionally spotted at temperatures below 10° C.

Two types of migration flight were observed. One, a direct, purposeful flight to the west-southwest, was the type normally exhibited by Swamp Darner, skimmers (*Libellula* sp.), and Eastern Pondhawk (*Erythemis simplicicollis*). The second type of behavior was swarming, the flight mannerism usually, though not always, seen in Green Darner, gliders (*Pantala* sp.), and saddlebags (*Tramea* sp.). Numbers of these migrating dragonflies could be seen feeding in swarms and every few minutes advancing in waves. This is one reason I advise against extrapolating counts on a per-minute or per-hour basis. Blue Dasher (*Pachydiplax longipennis*) distinguished itself from other species by landing frequently and by often appearing to avoid flying over paved areas. Green Darner, Swamp Darner, Blue Dasher, both gliders, and Black Saddlebags were observed flying in from the ocean, probably having been steered there by strong winds.

As noted above, identification was made mostly by sight. In the species accounts, I detail how each species was identified. Both mature and immature patterns are described, as all species with recognizable age (or sex) variations did, in fact, appear in those variations. Tandem flight was observed occasionally for Green Darner through the three years and for about 75 pairs of Wandering Glider (*Pantala flavescens*) on 30 July 1995. Green Darner and Twelve-spotted Skimmer were occasionally observed egg-laying at the pond. On one occasion, a Green Darner was observed eating a Blue Dasher at the pond.

### Species Accounts

**GREEN DARNER** (*Anax junius*), although the best-known migrant, proved to be atypical of migrant dragonflies. Some of the ways in which it differed from other species have been noted above. The highest recorded daily total was 1055 on 25 August 1995, however, this species was often much more numerous, appearing into the thousands. No attempt was made to count these larger flights as they occurred during September, coinciding with significant hawk flights. During these flights, American Kestrels (*Falco sparverius*) and Merlins (*F. columbarius*) heavily preyed on the dragonflies. This species was recorded as early as 30 July (1995) and as late as 14 November (1993). Green Darner was easily identified, even at a distance or altitude, by its large size and moderately slender build. At close range, its green thorax coupled with the bluish or reddish-brown abdomen added to the distinguishing characteristics.

**SWAMP DARNER** (*Epiaeschna heros*) was identified by its slender and dark appearance, very large size, and often drooped abdomen. This species was recorded as early as 21 July (1996) and as late as 24 September (1993). The maximum count of 754 was on 10 August 1996. This occurred in a year in which the species had been locally scarce prior to migration. Conversely, in 1995 the species had been very common in the New York region, but after a count of 125 on 30 July, numbers dropped to 14 on 13 August, to single digits thereafter and completely disappeared after 1 September. It seems likely the drought that affected the northeastern United States during August was responsible for this quick downward spiral. In suitable habitat away from Fort Tilden, I observed a good amount of egg laying into August, with one individual laying eggs as late as 28 August. This was done in the muddy edges of vernal ponds whose water was only receding, no doubt reducing the availability of juveniles of this and other vernal pond breeders to the fall migration. Consequently, the fall 1995 migration of the spring's invaders failed to live up to expectations.

**PAINTED SKIMMER** (*Libellula semifasciata*) was identified by its medium size, stout build, and reddish-brown body and wing patches. Although never common, its flight in its few appearances was direct and unquestionably that of a migrant. The daily high count reached 35 on 29 July 1997. This species was an early migrant, recorded as early as 27 July (1996) and only as late as 30 August (1994). Harder to quantify at Fort Tilden is this species' status as a spring migrant. In May 1993 it became numerous in the New York area, even appearing on Manhattan streets. It might have been expected that a notable southbound migration would follow, but only one

was recorded that fall. There may have been several reasons for this. With this study in its infancy, this was not a species I was on the lookout for nor did I realize that its flight could bypass me on a southwest wind. In addition, its flight, direct and low to the ground, did not make it conspicuous.

**TWELVE-SPOTTED SKIMMER** (*Libellula pulchella*) was the only member of its genus to appear with any frequency. The high count was 990 on 10 August in the good year of 1996. More typical were peaks such as 155 on 27 August 1994, and 112 on 13 August 1995. In all years, numbers dropped off sharply after August. Migration dates ranged from 27 July (1996) to 28 September (1995). This species typically exhibited a direct flight. Twelve-spotted Skipper was readily identified by its distinctive wing pattern consisting of three large dark spots on each wing and, in mature males, alternating white spots.

**GREAT BLUE SKIMMER** (*Libellula vibrans*) was first recorded 6 August 1994, and recorded six times that season through 14 September. The maximum count was 29 on 10 August 1996, with peak numbers relegated to single digits in most years. In the wake of a large northward eruption in the spring and summer of 1995, I looked forward to a more significant flight. However, only two of this species were observed migrating. My hope to further substantiate the species as a fall migrant may well have been dashed by the drought in the Northeast. So far, this has been the only species found migrating that exhibits dark wing tips and otherwise inconspicuous wing markings when in flight. At least two of the 1994 individuals were mature males, lending their color to the identification process.

**COMMON WHITETAIL** (*Libellula lydia*) is another common dragonfly in eastern North America with limited appearances along the migratory route. Two individuals were recorded with certainty on 10 August 1996.

**AUTUMN MEADOWHAWK** (*Sympetrum vicinum*) remains an enigma. A high count of seven on 22 October 1994, were moving in the direction indicative of migration. But such movements were too sporadic to be conclusive. In 1995 none were noted migrating. Only one individual appeared at the hawk watch on 28 September and provided the earliest sighting for Fort Tilden. In the New York area this species is notable for its lateness, breeding in October and continuing to mid-November in mild years. Nonetheless, it appears no more active in cold weather than other species. Fall 1995 featured cold weather setting in and becoming entrenched earlier than normal, a possible contributor to the species' near absence at Fort Tilden. The species was distinguished by its small size and bright red body.

**CALICO PENNANT** (*Celithemis elisa*)—a single mature male was

captured on 23 August 1995. It wasn't until 2000, particularly 19 - 22 August, that I saw additional evidence of migration. During those four days I found two individuals at Fort Tilden, three at Floyd Bennett Field, in Brooklyn, and two at Jones Beach, Nassau County. All these sites lie a good distance from the nearest breeding site. However, the arrival of these individuals at these sites could be just a dispersal rather than true southward migration. None was actually observed in a directional movement.

**BLUE DASHER** (*Pachydiplax longipennis*) was distinguishable by its small size and, in the case of closely seen mature individuals, black-tipped blue abdomen. Also helping with identification was the tendency of this species to land quite often, a stark contrast to other species' behavior. It was also usually, though not exclusively, observed close to the ground. Interestingly, this species, more than any other, seemed to avoid flying over paved areas. Nonetheless, movement was too consistently to the south and represented by too many individuals to doubt its migratory flight. The high count of 207, observed on 1 August 1998, is a relatively low total for a species considered by many as the most abundant dragonfly in the northeastern United States. Two causes may be responsible. First, its small size required close passage to the observer for detection. Second, it is possible the species may be only a partial migrant, evacuating only the more northern portions of its range where it may be less able to overwinter. A similar situation appears to exist for the Mourning Cloak (*Nymphalis antiopa*) butterfly; although well known in the New York area for appearing on the wing with the first mild spell of the spring or even winter, it may not be able to survive winters in areas to the north. It has also been suggested for spring migration (Soltesz, Barber, Carpenter, *Argia* Dec. 1995) that this species is more of a habitat generalist than other migrants and it is the populations using vernal ponds that undertake movements due to drought conditions. This species appeared at the freshwater pond in greater numbers than any other species. Following the flight of 7 August 1994, about 50 were found where only a very few had been before. The presence of so many, mostly mature individuals, provided additional evidence this species was migratory. Blue Dasher was recorded as early as 27 July (1996) and as late as 8 October (1995).

**EASTERN PONDHAWK** (*Erythemis simplicicollis*) was almost always seen close to the ground and, due to its relatively small size, within six meters of the observer. At this distance the distinctive green coloration of immatures and females could be seen. Blue males were also identified, fitting in between Blue Dasher and Great Blue Skimmer in size. This species was seen as early as 13 August (1995) and as late as 2 September (1994). The maximum count

was nine on 28 August 1994, rather low considering the species' general abundance. The same reasons cited for the Blue Dasher's rate of occurrence apply here.

**WANDERING GLIDER** (*Pantala flavescens*) was identified by its medium size and stout build and by its yellow to orange abdomen and clear wings. The species was not particularly common in 1993 and 1994, with no daily counts reaching 20. However, on 30 July 1995 a total of 2420 individuals were recorded. Thereafter, the highest count for 1995 was 56 on 13 August, with much lower numbers the rest of the season. Migration dates ranged from 21 July (1996) to 13 October (1995).

**SPOT-WINGED GLIDER** (*Pantala hymenaea*) was identified by its darker coloration compared to Wandering Glider and by the diagnostic spot at the base of the hind wing. With practice, the spot proved to be more detectable than expected and quite apparent in individuals directly overhead. This species was quite common in the New York area in the summer of 1994, and the abundance translated into a strong migration showing. It was less abundant, though still common, in 1995, peaking at 62 on 30 July. There was another strong flight in 1996 with a maximum count of 512 on 27 July. The species was seen in migration as early as 21 July (1996) and as late as 29 October (1994), although numbers dropped off sharply after the first week of September.

**BLACK SADDLEBAGS** (*Tramea lacerata*) was readily identified by its mostly black abdomen and the large black patches at the base of the hind wings. This species was observed as early as 27 July (1996) and as late as 25 October (1995). The highest count was 251 on 28 August 1994. In 1993, the high was 103 on 29 August and, in 1995, 195 on 25 August. My notes show it to be common to abundant as late as 24 September, but (because of having to deal with hawks) I had no numbers to compare it to the early season flights.

**CAROLINA SADDLEBAGS** (*Tramea carolina*) was identified by its red abdomen and wing patches. It is likely this species was undercounted since the brown-winged immatures were difficult to distinguish from Black Saddlebags except upon close passage. Nonetheless, this was a relatively uncommon species, as it is near the northern limit of its range. The maximum count was only 24 on 29 July 1997. Still, it appeared consistently on days when other species were moving. Migration dates were as early as 27 July (1996) and as late as 22 October (1994).

### Addendum

The early migration dates cited above are probably typical of most years, with activity of most species beginning in late July. However, in the summer of 2000, which featured a number of strong cold fronts, I observed a convincing movement on 5 July at Point Lookout, Nassau County. Species recorded that day in low numbers were Green Darner, Swamp Darner, Painted Skimmer, Twelve-spotted Skimmer, Great Blue Skimmer, Blue Dasher, Wandering Glider, Spot-winged Glider, Black Saddlebags and Carolina Saddlebags. In another good year for Spot-winged Glider, a major flight took place this day. Hundreds were observed, with many pairs in tandem.

### Future Efforts

In addition to continuing fall migration efforts, I would like to see similar methods employed for spring migration. The best locations to check would be north-pointing peninsulas and barrier islands, as well as water barriers to the north or east. Sandy Hook, New Jersey, should receive attention. The western shore of Chesapeake Bay may be worth a look, as would the southern shores of the eastern Great Lakes. Cape Cod and Plum Island, Massachusetts, are properly oriented but may be too far north for some of the species of interest. Subsequently, we could attempt to correlate spring and fall movements, as well as summer abundances of migratory species. The fall of 1995 proved a disappointment in this respect, most likely because of the drought in the northeastern United States. I had hoped to prove Bar-winged Skimmer (*Libellula axilena*) a migrant—in addition to the circumstantial evidence from appearances north of its normal range—but was unable to do so. Perhaps in a future year that opportunity will present itself. Certainly, every year is different, as the years 1993, 1994 and 1995 have shown. Future observations may yield more knowledge regarding fluctuations from year to year as well as the dynamics of daily flights.