

DRAGON COUNTING

Dragonflies have been a part of the earth's natural history for more than 300 million years. They were here before dinosaurs ruled the planet and remained when those great animals disappeared into extinction. Dragonflies saw the first birds take wing, they watched mammals evolve, survived as ice ages gripped the earth, and lived on as the ancestors of the human race emerged. And they're still here, relatively unchanged and abundant, their striking colors and remarkable skills of flight gracing the skies above lakes, ponds and rivers in almost every corner of the globe.

Here in New England, if you've spent a summer afternoon in your canoe, basked in the sun by your favorite lake, or hiked along a mountain stream, you've shared your day with dragonflies. They are one of the true treasures of our spring and summer landscape, common yet also extraordinary, familiar enough to pass unnoticed, but ready to reward the close observer with flashes of beauty and fantastic aerial feats.

Lately, New Hampshire's dragonflies have not wanted for close observers. This spring and summer mark the final year of the New Hampshire Dragonfly Survey (NHDS), a joint venture between the N.H. Fish and Game Department and New Hampshire Audubon, funded by State Wildlife Grants, that will provide the first-ever comprehensive picture of the dragonfly and damselfly in New Hampshire. Since 2007, biologists, assisted by citizen volunteers, have been searching our freshwater habitats and compiling data. Their work will provide a vital snapshot of the dragonfly in New Hampshire, enabling wildlife biologists to better understand and protect these ancient insects and their diverse habitats.

DRAGONS AND DAMSELS

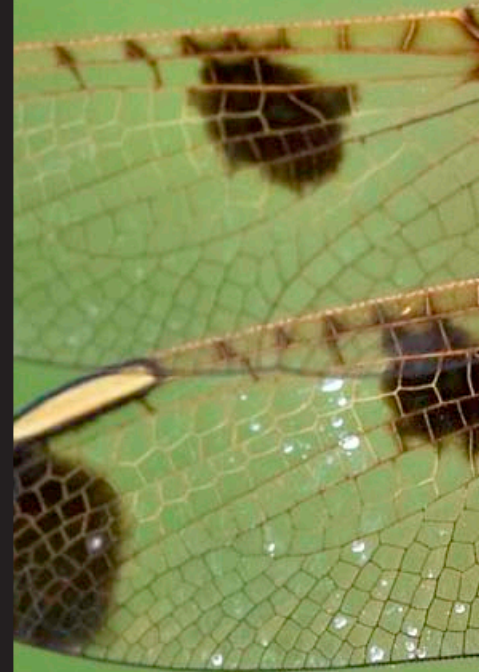
Dragonflies and damselflies are two distinct subgroups of the insect order Odonata. Though our modern odonates are much smaller than their ancient ancestors, some of which were as big as hawks, they are otherwise little changed in appearance. Ranging in size from the length of a thumbnail to seven inches in wingspan, they are most quickly identified by their large eyes, long slender abdomens, and two pairs of transparent wings. Their giant eyes serve a brain that devotes 80% of its function to interpreting visual information, and those fabulous wings can carry the fastest species of dragonfly forward more than 100 body lengths per second, and enable all odonates to hover, fly backwards, and change direction at dizzying speed. These highly refined skills of sight and flight are essential for survival, for the dragonfly is both hunter and hunted. Birds, lizards and frogs happily make a meal of a dragonfly; and dragonflies themselves live on mosquitoes, flies, gnats, mayflies and smaller odonates.

Dragonflies and damselflies share the same basic characteristics, but they're easy to tell apart. On the whole, dragonflies are more sturdily built, with rounded heads, while damsels are delicate in appearance and have broader, flattened heads. Dragonfly rear wings have a wide base, allowing them to reach greater flight speeds, while the front and back pairs of damselfly wings are nearly identical. Distinguishing between the two types is most easily done when the insects are at rest. Damselflies have hinges that allow their wings to fold upright together. Dragonflies do not; at rest their wings are fully horizontally extended.

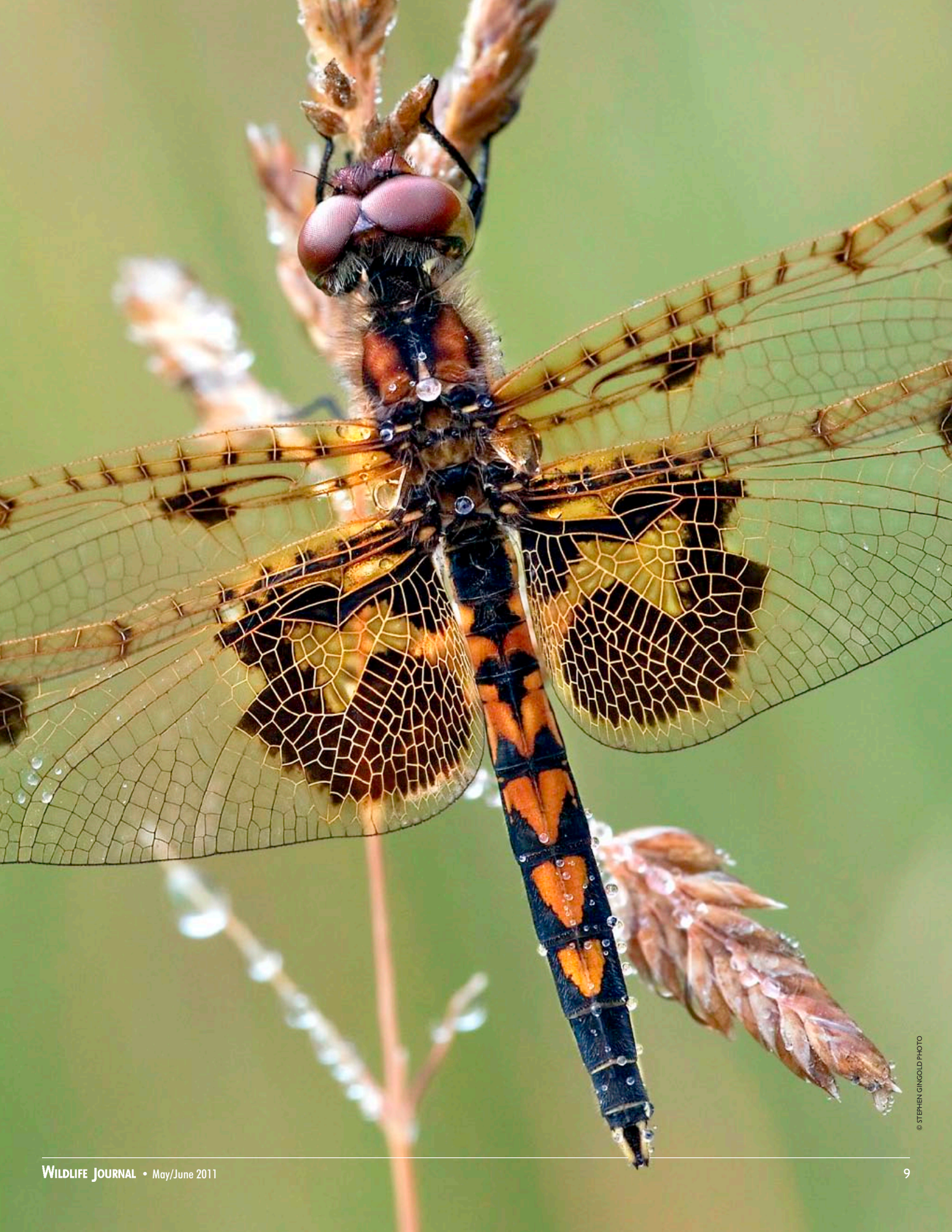
There are close to 5,000 known species of odonates worldwide, more than 160 of which

New Hampshire
takes a
closer look
at its
dragonfly
population

by
Nancy Skarmneas



A calico pennant dragonfly covered in early morning dew perches atop a stalk of grass to dry its wings.



have been identified in New Hampshire. This wonderfully diverse group of insects also live in a variety of habitats. There are species common in Seacoast marshes that won't be seen near North Country lakes, and species sighted along large rivers that will not visit backyard ponds. Season matters, too. In spring, baskettails and clubtails reign. Mid-summer heralds the arrival of the large colorful skimmers. And as August fades into September, meadowhawks, darners and spreadwings predominate.

All odonates move from a larval stage to an adult stage, skipping over the transformative pupal stage seen in butterflies. Depending upon their species, however, odonates can remain larvae for a period that ranges from one year to nearly six. During that period they molt several times and are formidable predators, feeding on other insect larvae, small tadpoles and tiny fish. When the larval stage is ended, the nymph climbs out of the water and molts for a final time, leaving behind its shed skin, or *exuvia*. The emerging adults

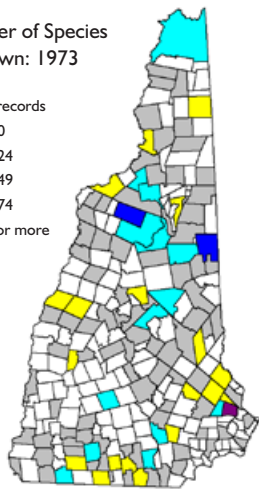
are vulnerable while their wings dry and harden. Then they are up and flying, ready to begin an adult flight stage that lasts only a matter of weeks, ready to hunt, mate and produce the next generation.

MAPPING THE DRAGONFLY

In Dr. Pam Hunt's office at New Hampshire Audubon, along with the jars of dragonfly exuvia and file cabinets bursting with data, there are stacks of maps. Some she's meticulously hand colored; others are computer generated. Each shows the state at a certain point in time, with towns color-coded to indicate the number of dragonfly species identified within their borders. Seen in chronological order, these maps tell the story of dragonfly populations in the state. This is not so much the story of populations increasing or decreasing, as it is the story of our knowledge growing. Hunt, a senior conservation biologist at Audubon and Project Coordinator for the N.H. Dragonfly Survey, points to a map made in 2006, the year before the

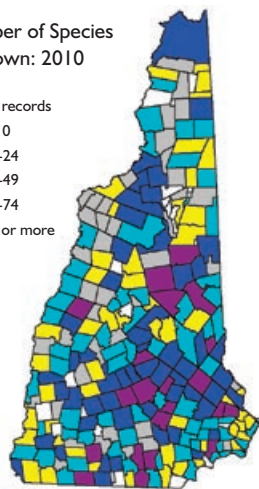
Number of Species per Town: 1973

- no records
- <10
- 11-24
- 25-49
- 50-74
- 75 or more



Number of Species per Town: 2010

- no records
- <10
- 11-24
- 25-49
- 50-74
- 75 or more



© NHFG / VICTOR YOUNG PHOTO



© PAM HUNT PHOTO

Clockwise from above: The number of species known to exist in each town has expanded dramatically with the N.H. Dragonfly Survey; Dragonfly larvae, or "nymphs," are aquatic; A young volunteer demonstrates correct dragonfly handling technique; Searching a Colebrook wetland – the net is an important tool of the trade; Dragonhunting by boat allows access to vegetated backwaters and stretches of riverbank that are hard to reach from shore.



© PAM HUNT PHOTO



© PAM HUNT PHOTO

survey began. This map, the result of a compilation of all existing dragonfly data up to that year, has many unshaded counties – signifying no reported species – and very few in the shades of blue and purple that signify 50 or 75 reported species. The lack of shading does not indicate a lack of dragonflies, Hunt says, but rather a lack of information.

The dragonfly project grew out of Fish and Game's N.H. Wildlife Action Plan, completed in 2005, which called for biologists to identify species and habitat at risk. When it came specifically to dragonflies, the nearly white 2006 pre-survey map made it clear that the first step must be collecting data. The survey was launched in 2007 with three goals. First, the survey sought to identify odonata species of concern. The second goal followed naturally from the first – in order to identify species of concern, the survey would focus on collecting data from poorly surveyed areas. Finally, biologists hoped, through the use of citizen volunteers, to raise public awareness about dragonflies and their habitats. Simply stated, the idea was to fill in the map. This is clearly happening. Four years into the survey, Hunt's maps show that the blue and purple counties have spread and white spaces are fewer and further between. "For the first time," she says, looking forward to when the survey work is done, "biologists will have a comprehensive picture of dragonfly distribution across the state; information that can be used for conservation planning and against which future changes can be measured."

CITIZEN SCIENTISTS

In part, the N.H. Dragonfly Survey is an act of faith by the scientists involved, a gift to the next generation of biologists who, fifteen, maybe twenty years from now, will draw more meaning from their own observations and data with this survey for comparison. But the survey is not all about the future. For the cadre of volunteers who tramp through bogs, canoe down rivers and soak themselves in local streams, the survey has been a chance to translate their concern for the environment into action.

More than 200 volunteers have been trained since the spring of 2007. They've been taught where to look for dragonflies, how to identify them, how to record and submit data and how to preserve a specimen. This devoted crew of ordinary citizens, armed with binoculars, nets, magnifiers and a good deal of patience, became the state's official dragonhunters.

Holly Grant, a Middleton, N.H., woman who joined the survey team in 2009, embodies the spirit of these citizen scientists. Grant returned to her hometown of Middleton in 2008 hoping to reconnect with the natural world that had enchanted her as a child. A tiny red dragonfly, photographed on one of her daily hikes, brought her to the survey. Unable to identify the speci-

AUTUMN MEADOWHAWK

This tiny dragonfly is a late-season flyer seen into November. Look for it near marshes, lakes, ponds, slow-moving streams and temporary pools.



© STEVENANZ PHOTO / STEVENANZ.COM

DRAGONHUNTER

The dragonhunter is the largest clubtail dragonfly in North America. Look for it in July and August near slow-moving rivers and streams.



© STEVENANZ PHOTO / STEVENANZ.COM

SCARLET BLUET

This diminutive damselfly is often found perching on lily pads or flying low over the water. Rare in many parts of its range, it is the only red bluet found in New England.



© PAM HUNT PHOTO

EBONY JEWELWING

This damselfly is the only New England odonate with all black wings. It is a mid-summer damsel that prefers wooded streams and rivers.



© PAM HUNT PHOTO

RINGED BOGHAUNTER

The only New Hampshire species listed as endangered, this dragonfly is thought to be a survivor from the glaciers that once covered our state. The boghaunter prefers cool climates and flies from early spring to early summer in bogs with open pools.







© TOM YOUNG PHOTO



The clamp-tipped emerald dragonfly is primarily a coastal species and derives its name from the peculiar clamp at the tip of its tail.

WANT TO BE A DRAGONHUNTER?

Though the N.H. Dragonfly Survey is no longer training new volunteers, dragon hunting is an exciting pastime for the curious wildlife watcher. Dragonflies and damselflies are not hard to find from April to September. Here are a few tips:

-  A good guidebook is essential. A *Field Guide to the Dragonflies and Damselflies of Massachusetts* is the most current and comprehensive guide to local species.
-  The N.H. Fish and Game website has information on dragonflies and the survey. (www.wildnh.com/Wildlife/Nongame/dragonflies.html).
-  Warm, sunny days with little wind give you the best chance of seeing odonates in flight.
-  A Flickr site set up by survey volunteers is a place to share photos and identify species. (www.flickr.com/groups/nhdragonfly)


© STEPHEN GINGOLD PHOTO

men, she went to the Fish and Game website, found Pam Hunt's name, and emailed her the photo. In reply, she got not only a correct identification but information about the ongoing survey. The following spring, Grant became a trained volunteer, and within two seasons, she'd single-handedly identified 75 species, turning Strafford Country purple on the survey map. Grant is passionate about the survey, and about citizen science. "To me," she says, "the survey shows that we care."

WHAT NEXT?

The dragonfly survey will end this summer, and it seems certain that the final map will abound with blues and purples. Already the survey has offered some pleasant surprises. The tiny scarlet bluet, a damselfly thought to be extremely rare, actually turned up at 38 different sites. Only one species – the ringed boghaunter – is officially listed as endangered. When the data are compiled, Fish and Game biologists will look for species counts that seem lower than expected and for any indications of habitat decline; and the whole of the survey results will become part of the much larger pool of data collected as part of the N.H. Wildlife Action Plan.

The very fact that dragonflies have survived for 300 million years is irrefutable evidence of their remarkable resilience, and all indications are that they are thriving still in New Hampshire. Nonetheless, they merit our continued close attention. Humans, after all, have been around for only a tiny fraction of those 300 million years, and our modern, highly developed human civilization for only a small fraction of that. Global warming, pesticide use, fertilizers seeping into our wetlands, development devouring habitat: these are all recent developments on the dragonfly timeline and it's impossible to expect that they'd have no impact.

The dragonfly survey represents New Hampshire's pledge to keep a close watch on our dragonflies and damselflies. And we needn't be biologists or trained volunteers to help fulfill that pledge. Each of us can learn to identify local species and keep track of what we see. We can think twice before using fertilizer on our lawn and get involved in local habitat conservation. We can pause long enough on a summer day to reflect upon the dragonfly's imponderably ancient role in the earth's ecosystem. We can, quite simply, pay attention. Because the more closely we all pay attention, the more likely it is that the next time New Hampshire counts its dragonflies, they will be abundant and thriving still. 

Nancy Skarmeas is a writer and educator living in Hopkinton, N.H.