

**Surveys for Odonates at Mid-Elevation Wetlands
Colville National Forest
Northeast Washington
Summer 2013
ISSSP Project**

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SUMMARY

This is the last of a two-year project to document odonates that occupy mid-elevation wetlands on the Colville National Forest within the northeastern Washington counties of Ferry, Stevens, and Pend Oreille. We surveyed three wetlands and visited each site three times, (early, middle and late summer) during warm, sunny weather and periods of the day when odonates are typically active. We also kept track of incidental captures in the three counties. We documented 40 species overall and, at every site, photographed the first specimen of each species captured. We were unable to voucher the single county record captured, but photos were sent to Dennis Paulson (Professor Emeritus, University of Puget Sound). For all species, we measured the length of the first five males and five females captured at each site and added these to our database of CNF odonate body lengths.

INTRODUCTION

In northeastern Washington (NEWA), surveys for invertebrates, even the charismatic Lepidoptera and Odonata, were ad hoc in nature until 2009. Though Cannings (2002) and Paulson (1999) listed species that probably occurred in NEWA, no systematic surveys had been conducted to document NEWA odonate distribution.

Beginning in 2005, the Colville National Forest (CNF) coordinated limited surveys for odonates at various sites on public land in NEWA. Most sites were located at low or middle elevations. The CNF also maintained records of miscellaneous odonate sightings. Beginning in 2009, the CNF implemented a three year systematic survey program to document the distribution of odonates over time and space at elevations greater than 3,500 feet (Loggers & Moore, 2009; Loggers & Moore, 2010; Loggers & Moore, 2011). In 2012, we expanded the program with a two year survey of mid-elevation wetlands; data from the first year were previously reported (Loggers & Moore 2012) and this report concludes the project. Since 2005, these surveys and sightings resulted in the documentation of 23 county records (first captures in a specific county) and records that have expanded the known flight seasons of several species (Paulson, D., personal communication).

This survey program was begun in part due to the “Update of the Regional Forester’s Sensitive Species Lists and Transmittal of Strategic Species List” (USDA Forest Service 2008, updated 2012), which list five odonates as “sensitive” and one as “strategic”:

Sensitive species	Strategic species
<i>Aeshna subarctica</i> (Subarctic darner)	<i>Leucorrhinia borealis</i> (Boreal whiteface)
<i>Aeshna sitchensis</i> (Zigzag darner)	
<i>Coenagrion interrogatum</i> (Subarctic bluet)	
<i>Somatochlora franklini</i> (Delicate emerald)	
<i>Somatochlora whitehousei</i> (Whitehouse’s emerald)	

All of the above species are considered boreal obligates, their distribution being either holarctic (*Aeshna subarctica*) or restricted to North America (the others). This boreal environment dips into Washington in two locations: the NE part of the state (the area covered by the CNF) and the central part of the state (the Okanogan Highlands).

In 2012, we expanded the surveys in an attempt to complete distribution maps of odonate species that occur in NE Washington by concentrating on mid-elevation sites. This two year survey program of mid-elevation sites was completed in 2013. The completion of the 2013 surveys also marks the completion of the CNF's five year program to document the spatial and temporal distribution of odonates on the CNF.

METHODS

We used the National Wetlands Database GIS and the CNF digital elevation GIS coverages to select three wetland complexes, larger than five acres and at elevations less than 4,000 feet that were accessible and had not been previously surveyed (Table 1).

Table 1. Wetlands chosen for survey in 2013

Location	WGS 84, UTM Zone 11N			T	R	Sec	County	Elev. (ft)
	Lat (N)	Long (W)						
Crown Creek	48° 56.886	-117° 57.074	40	38	26	Stevens	2,547	
Parker Lake	48° 28.902	-117° 21.580	34	43	3	Pend Oreille	2,484	
Woodward Meadows	48° 13.714	-117° 34.153	32	41	36	Stevens	2,815	

Since odonate seasonal flight periods vary by species, our general sampling protocol includes surveys at three times during the general flight season to increase the likelihood of encountering all potential species: (1) early summer - between mid-June and mid-July; (2) middle summer - between mid-July and mid-August; and (3) late summer/early autumn - between mid-August and the end of September. Table 2 shows the sampling dates for each location for 2013.

Table 2. Survey dates by location

Location	Dates surveyed in 2013*		
Crown Creek	12-June	28-July	13-September
Parker Lake	11-June	27-July	10-September
Woodward Meadows	16-June	26-July	09-September

* Attempts were made to sample Crown Creek (5/27), Parker Lake (5/30), and Woodward Meadows (5/31 & 9/8) on days where the weather proved to be too cool and cloudy for sampling.

Two to six people surveyed each wetland area and surveys were performed on warm, sunny days to maximize the chances of encountering flying odonates. We recorded time, temperature, and a general description of the weather at the beginning and end of each survey. Surveyors walked the entire wetland and associated dry, open uplands, if present. We identified each odonate caught, or placed it in a live container for identification later that day. If identification was uncertain, we vouchered the specimen and sent it to D. Paulson for verification. The first time we captured a species at a site during a survey, we photographed it to establish a photographic voucher database. The single specimen identified as a county record was photographed but not physically vouchered (the specimen was released before it was identified as a county record). We also measured overall length (head to tip of the cerci) of the first five males and five females of each species at each site, for inclusion in the CNF database of local body lengths. To avoid duplicate measurements, we marked measured animals by removing a small section of the hindwing. All records are stored in a spreadsheet maintained by the CNF and will be entered into NRIS by spring 2014. County records have been uploaded to Odonata Central (<http://www.odonatacentral.org>).

RESULTS AND DISCUSSION

Across all sites and survey periods we encountered 40 species of odonates (Table 3). This compares to 32 species in 2009, 26 in 2010 and 31 in 2011 at the high elevation sites (Loggers & Moore, 2009; Loggers &

Table 3. Results of odonate surveys, by survey period and wetland, on the CNF, Summer 2013

Survey periods: 1 = early summer; 2 = middle summer; 3 = late summer.

Species	Crown Creek	Parker Lake	Woodward Meadows
<i>Aeshna canadensis</i>	2,3	3	2,3
<i>A. constricta</i>		3	
<i>A. eremita</i>	2	2	3
<i>A. interrupta</i>	2,3	2,3	2,3
<i>A. juncea</i>	3*	1	
<i>A. palmata</i>	2,3	2,3	2,3
<i>A. tuberculifera</i>		3	
<i>A. umbrosa</i>	3	3	3
<i>Amphiagrion abbreviatum</i>		1	1
<i>Calopteryx aequabilis</i>		1	
<i>Coenagrion interrogatum</i>		1	1
<i>C. resolutum</i>	1	1	1
<i>Cordulegaster dorsalis</i>	1		1
<i>Cordulia shurtleffii</i>	1	1	1
<i>Enallagma annexum</i>	1		1,2
<i>E. boreale</i>	1,2	2	1,2
<i>E. ebrium</i>		2	2
<i>Epitheca spinigera</i>		1	1
<i>Ischnura cervula</i>		1	2
<i>I. perparva</i>			3
<i>Ladona Julia</i>		1	
<i>Lestes congener</i>	3	3	3
<i>L. disjunctus</i>	2	2	2
<i>Leucorrhinia hudsonica</i>	1	1	1
<i>L. intacta</i>	1		1,2
<i>L. proxima</i>	1	2	2
<i>Libellula forensis</i>	1	1,2	1,2,3
<i>L. pulchella</i>		2	
<i>L. quadrimaculata</i>	1	1,2	1,2
<i>Nehalennia irene</i>	1	1	1,2
<i>Ophiogomphus occidentis</i>		2	
<i>Plathemis lydia</i>			1,2
<i>Rhionaeschna californica</i>	1	1	1
<i>Rhionaeschna multicolor</i>		2	
<i>Somatochlora semicircularis</i>			1
<i>S. walshii</i>	1	2	2
<i>Sympetrum costiferum</i>	3		
<i>S. danae</i>	3	2,3	2,3
<i>S. obtrusum</i>	2,3	2	2,3
<i>S. pallipes</i>	2,3	2,3	2,3

* County Record

Moore, 2010; Loggers & Moore, 2011) and 45 in 2012 (Loggers & Moore, 2012) at the previous mid elevation sites sampled. As in 2012, the total number of species encountered in the 2013 mid-elevation sites is substantially higher than the totals encountered during the three years of high elevation sampling. In 2013, the early and middle summer sampling periods had identical numbers of odonate species present, and the last sampling period had substantially fewer species encountered (Table 4). This differed from 2009-2012 when the middle sampling period consistently had more species present than either of the other two sampling periods. Because 2013 included the three lowest elevation wetlands (all below 3,000 feet), this may indicate an elevation gradient in phenology, but with these few data the result is merely suggestive.

Table 4. Number of species captured, by location and capture session.

Survey Period	Crown Creek	Parker Lake	Woodward Meadows	Total
Early Summer	13	14	15	42
Middle Summer	8	16	18	42
Late Summer	10	9	11	30

We encountered 25 of the 40 species at Crown Creek, 33 of the 40 at Parker Lake, and 31 of the 40 at Woodward Meadows. Twenty of the 40 species were present in all three sample sites, while 11 of the 40 species were encountered at only one of the sites. Of the 11 species encountered at a single site, one was at Crown Creek, three were at Woodward Meadows and seven were at Parker Lake (Table 3).

As in 2012, *Aeshna* (8) and *Sympetrum* (4) were the two most speciose genera. Although previously captured in NEWA, the encounters of *Calopteryx aquabilis*, *Cordulegaster dorsalis*, and *Rhionaeschna multicolor* were a first for the CNF project. In 2013, we captured one Stevens County record, *A. juncea*. Since ISSSP began funding these systematic surveys in 2009, we have recorded 13 county records, leading to a total of 23 county records since the CNF began documenting odonate distributions in NEWA in 2005. A physical specimen of *A. juncea* was not retained, but photographic vouchers were sent to D. Paulson.

Of the 40 species we observed, only one, *Libellula forensis*, was encountered during all three survey periods, 17 species were encountered during two survey periods, and 22 species were encountered during a single survey period (Table 3). After five years of sampling, these data provide a fairly robust picture of the temporal distributions of the adult phase of the life cycle for NEWA odonates in mid to high elevation wetlands.

These surveys have also extended the known distribution of two of the “strategic” odonate species identified by the Forest Service. *A. subarctica* has now been documented at seven different locations on the CNF in Stevens, Pend Oreille and Ferry Counties, and *S. franklini* has now been documented at two locations on the CNF in Pend Oreille County.

Over the next several decades, climate change is predicted to profoundly affect species that use wetlands across the globe, particularly temperature sensitive ectothermic species such as insects. In NEWA, where climate change is expected to cause warmer, drier, summers, many insect species may be forced to shift latitudinally and/or elevationally to find suitable habitats. This project documents an indicator taxon's spatial and temporal distribution within the CNF. These data provide a baseline against which future distribution data can be compared.

This two year systematic survey of mid-elevation wetlands across the CNF was performed using ISSSP funds. In addition to the contractor and CNF staff, 6 volunteers contributed a total of 189 hours to the 2013 sampling efforts. Over the five years that ISSSP funded the CNF odonate sampling program, ten individuals volunteered a total of 676 hours to field surveys.

LITERATURE CITED

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