

Community-based dragonfly & damselfly monitoring in Johnson Creek watershed

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Johnson Creek Watershed Council
Volunteer training
1 June 2018

Cardinal Meadowhawk male; C.A.S. Mazzacano

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Goals

- understand main elements of odonate ecology
- distinguish genders, life stages, and behaviors
- recognize common species in the watershed
- learn key components for identification
- know monitoring protocol and reporting methods

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Common Green Darter male; Don Jackson

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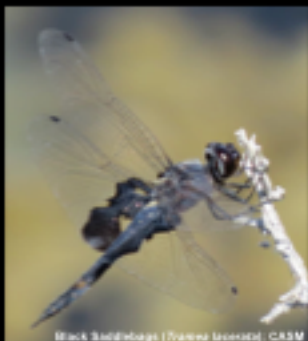
Meet the odonates



California Spottedwing (Archilestes californicus); CASM



California Spottedwing (Archilestes californicus); CASM



Black Saddlebags (Zonoxia leucosticta); CASM



Western Field (Ischnura elegans); CASM



Western Pondhawk (Erythemis californica); CASM

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>5952 species in the world

462 spp. in North America

93 spp. in Oregon

42 spp. in Multnomah Co.



Varied Darter (Erythemis simplicicollis); C.A.S. Mazzacano



Sierra Madre Darter (Aristocryptus); C.A.S. Mazzacano



White-bellied Nymph (Zygoptera); C.A.S. Mazzacano

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5 species in North America are annual long-distance migrants:

Common Green Darner
Variegated Meadowhawk
Black Saddlebags
Wandering Glider
Spot-winged Glider



Variegated Meadowhawk (*Sympetrum variegatum*), C.A.S. Mozdarian



Black Saddlebags (*Tramea lacerata*), C.A.S. Mozdarian

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aquatic nymphs



Dragonfly nymph (larva), C.A.S. Mozdarian



Blue Dasher (*Pachydiplax longipennis*), C.A.S. Mozdarian

terrestrial adults

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Cardinal Meadowhawk (*Sympetrum rubrum*), CASM



Vivid Darter (*Ania viridis*), CASM

large body
wider abdomen
eyes touch or nearly so
hindwings broader than forewings
wings horizontal when perched

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Cardinal Meadowhawk (*Sympetrum rubrum*), CASM



Vivid Darter (*Ania viridis*), CASM

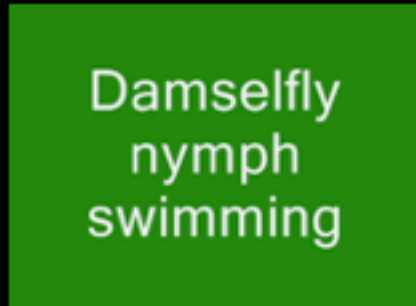
large body	small body
wider abdomen	slender abdomen
eyes touch or nearly so	eyes separated
hindwings broader than forewings	equal-sized wings
wings horizontal when perched	wings folded when perched

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stout, jet-propelled
dragonfly nymphs

slender, minnow-like
damselfly nymphs



internal gill chamber

external gill lamellae

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predators as nymphs...



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...and as adults

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nymphs use hinged, toothed, extendible
"lower lip" (labium) to catch prey



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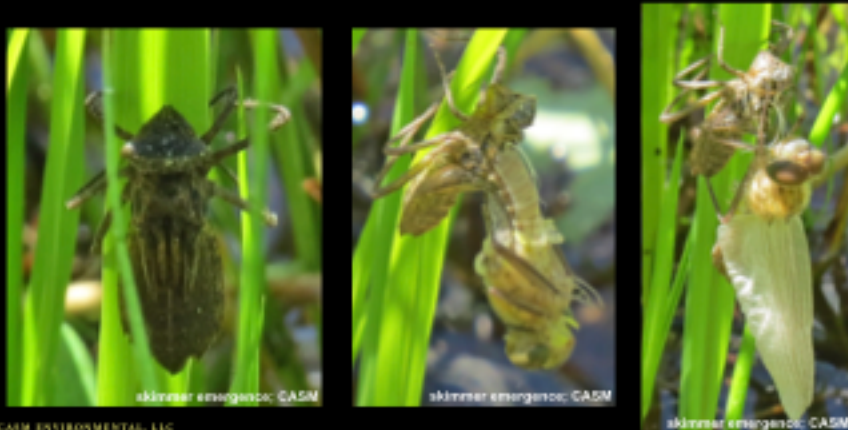
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adults use basket-like legs to
catch prey & bring it to mouth

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nymphs molts through multiple stages (instars)
 wing pads develop as nymph grows
 adult emerges from "skin" of final instar nymph



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dragonfly emergence



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teneral adult has soft body,
 pale color, weak flight



days to develop full color
 & sexual maturity

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color development
 continues with age



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males & females can
 look very different



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mating occurs in
flight or perched



Common Green Damselfly (*Anax junia*); C.A.S.M.

females lay eggs
soon after mating



Tule Bluet (*Erythemis simplicicollis*); C.A.S.M.

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eggs inserted in plants,
sediment, mud, or on water

female may be guarded by
male or oviposit alone



Blue-eyed Warrior (*Rhyothraupis multicolor*); C.A.S.M. Mazzacano



Common Green Damselfly (*Anax junia*); C.A.S.M. Mazzacano



Spiny Damselfly (*Anax junia*); C.A.S.M. Mazzacano

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Odonate Resources

project-specific

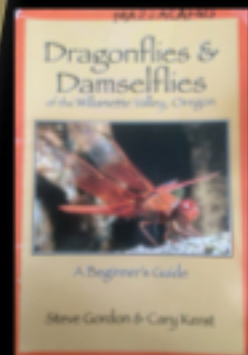


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regional



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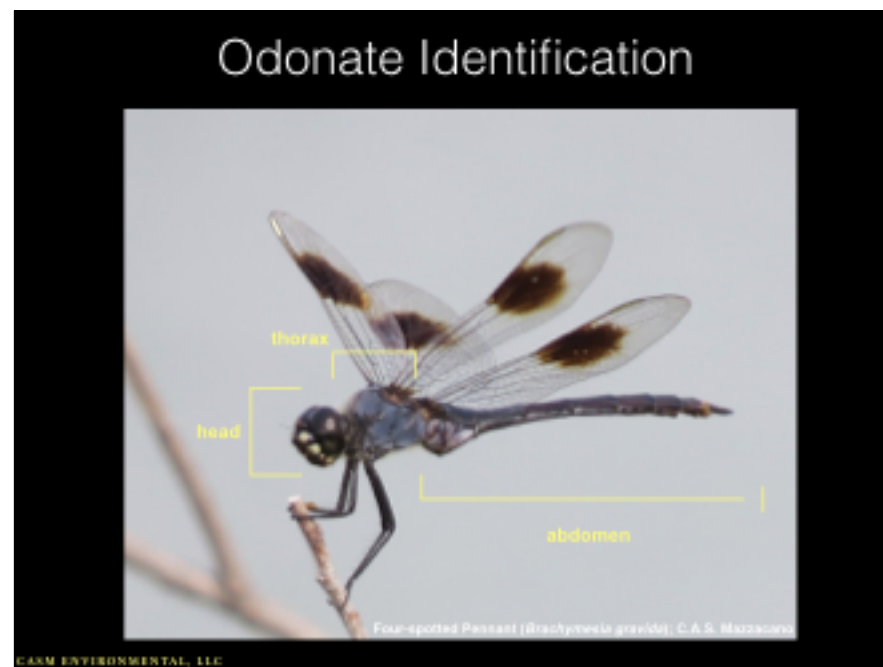
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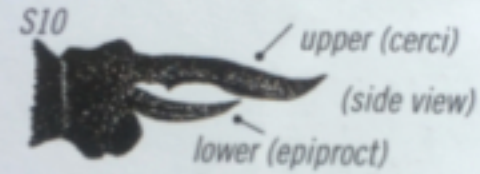
Four-spotted Pennant (*Brachymisla gravidei*), C.A.S. Mazzacano

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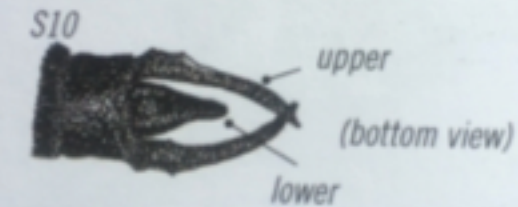
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male terminal appendages

dragonfly



damselfly



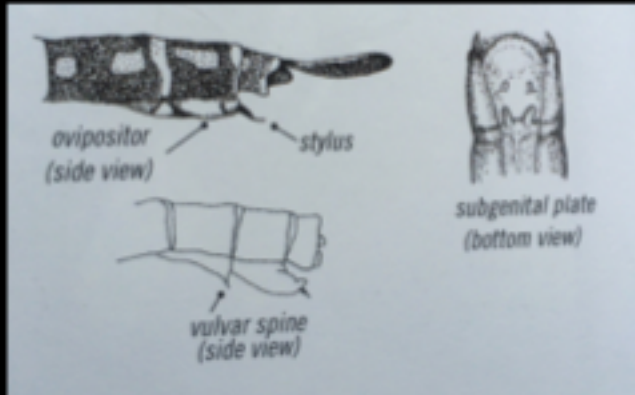
Dragonflies & Damselflies of Oregon; Cary Kerst & Steve Gordon

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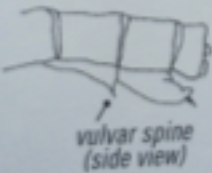
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female terminal appendages

dragonfly



damselfly



subgenital plate
(bottom view)

Dragonflies & Damselflies of Oregon; Cary Kerst & Steve Gordon

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Dragonflies: darners, skimmers, emeralds, cruisers, clubtails, spiketails, petaltails



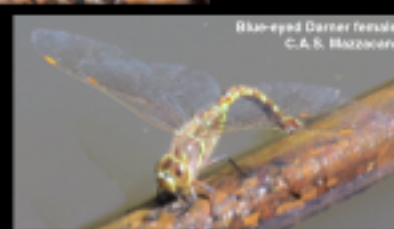
Pale Greenlet male;
C.A.S. Mazzacano



Dorsal-winged damselfly;
C.A.S. Mazzacano



Western River Cruiser male;
Jim Johnson, Naturalist



Blue-eyed Darter female;
C.A.S. Mazzacano



Chalk-fronted Corporal male;
C.A.S. Mazzacano

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Darners (Aeshnidae)

Green (*Anax*), Mosaic (*Aeshna*), Neotropical (*Rhionaeschna*)

big; blue, green, brown

large eyes touch along long seam



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Common Green Darner (*Anax junius*)

green thorax, no stripes

blue or brownish abdomen

black "bull's eye" on top of face

migratory



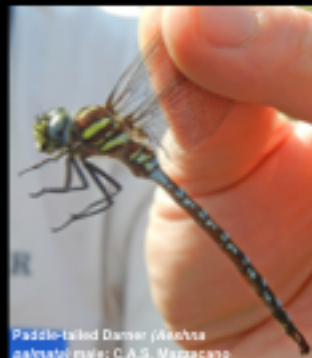
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Mosaic Darners (*Aeshna*)

brown with blue/green markings

ID by shape and color of thoracic stripes; male cerci; abdominal spots



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Paddle-tailed Darner (*A. palmata*)

thoracic stripes broad, greenish to blue, straight to slightly wavy

black line on face

blue spots on top of abdomen, inc. S10; none below abdomen

paddle-shaped cerci with spiked tip



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Variable Darner (*A. interrupta*)

thoracic stripes blue, narrow,
may be broken/interrupted

blue spots on top of
abdomen, inc. S10;
none below abdomen

black line on face

simple cerci



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Shadow Darner (*A. umbrosa*)

thoracic stripes green,
narrow rearward extension
at the top

small blue spots on top of
abdomen except S10;
spots below abdomen

no black line on face

paddle-shaped cerci,
spike at lower end



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Neotropical Darners (*Rhionaeschna*)

similar to *Aeshna* but
eyes bluer, tubercule
under S1

ID by shape of thoracic
stripes; male cerci



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Blue-eyed Darner (*R. multicolor*)

sky-blue face & eyes;
no black facial line

broad, straight, pale
blue, thoracic stripes

blue spots on top of
abdomen, inc. S10;
none below abdomen

cerci forked at tips



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California Darner (*R. californica*)

eyes blue above, brown below

black facial line

thoracic stripes narrow, pale blue, straight, black border; front stripe narrows at top

blue spots on top of abdomen, inc. S10; none below abdomen

simple cerci



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Skimmers (Libellulidae)

King skimmers (*Libellula*), meadowhawks (*Sympetrum*), whitefaces, others

large, sturdy, colorful, often with patterned wings

large eyes touch along seam

widespread, common



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King skimmers (*Libellula*)

patterned wings

males & older females develop pruinosity



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King skimmers (*Libellula*)

Twelve-spotted (*L. pulchella*) has 3 black spots on each wing

yellow stripe along side of abdomen



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King skimmers (*Libellula*)

Four-spotted Skimmer
(*L. quadrimaculata*): hairy,
brown, black-tipped
abdomen; dark spot
at each wing nodus



Flame Skimmer
(*L. saturata*):
red-orange; wings
with orange wash



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King Skimmers (*Libellula*)

Widow Skimmer (*L. luctuosa*): broad black patch along basal portion of all wings



yellow stripe on female
thorax splits along
abdomen



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Common Whitetail
(*Plathernis lydia*)



P. lydia has broken yellow dashes along abdomen;
L. pulchella has line



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Meadowhawks
(*Sympetrum*)

small, reddish,
perchers

ID by thoracic & abdominal patterns

Identification Chart 8 • Neurochaetids, Genus Symptetrus						Photo
Species Code	Host	Season	Wings	Abdomen	Legs	
Black <i>S. nigropunctatus</i> above New York 27-28 June	All hosts	Black, with white patches	Clear	Black	Black	
Variegated <i>S. variegatus</i> very 418-422 June	Black hosts locust, ash	Black, white, yellow, in patchy spots	Black, white and darkening edge	White, spots darkening in black	Black with brown-orange	
Reddish <i>S. rubicundus</i> Michigan 27-30 June	Bright red	Two stripes in yellow spots	Red in black stripes	Black and variegated	Brown	
Brown <i>S. pallidus</i> Michigan 27-30 June	Pale, black and brown spots	Two white stripes, 1 solid		Black, black darkening and some white	Black	
Brown-orange <i>S. castaneiventris</i> Michigan 30-40 June	Brownish black and spots	Complete black right	Orange, black in middle	Black along lower side	Black	

Identification Chart 8 • <i>Wendlandiana</i> , genus <i>Zygoptera</i> (continued)						
Species Name	Head	Thorax	Wings	Abdomen	Legs	Notes
<i>Libellula borealis</i> (<i>L. borealis</i>) Great Blue Darter 10-15 mm	Orange face, brown eyes	Plain	White mark at base, orange veins	Black spot, red-lined pattern	Black	
<i>Libellula borealis</i> (<i>L. borealis</i>) Great Blue Darter 10-15 mm	White face	Plain	Clear	Black spot, red-lined pattern	Black	
<i>Libellula borealis</i> (<i>L. borealis</i>) Great Blue Darter 10-15 mm	Red face, red eyes	Plain	Red at joint veins on leading edge	Black spot, red-lined pattern	Black	
<i>Libellula borealis</i> (<i>L. borealis</i>) Great Blue Darter 10-15 mm	Black face, black eyes	Plain	Spotted veins on leading edge	Black on base, sides	Black, brown darker at tip per color	
<i>Libellula borealis</i> (<i>L. borealis</i>) Great Blue Darter 10-15 mm	Red face, red eyes	Plain	Clear	Spotted, thin darker	Brown	

Dragonflies & Damselflies of Oregon:
Gary Kerst & Steve Gordon

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Meadowhawks (*Sympetrum*)



Cardinal Meadowhawk male
(*Sympetrum rubrum*); C.A.S. Mazzacano



Red-shouldered Meadowhawk male
(*Sympetrum vittatum*); C.A.S. Mazzacano



Autumn Meadowhawk male (*Sympetrum vittatum*); C.A.S. Mazzacano

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Meadowhawks (*Sympetrum*)



Black Meadowhawk male
(*Sympetrum nigricans*); C.A.S. Mazzacano



Cherry-faced Meadowhawk male (*Sympetrum intonsum*); C.A.S. Mazzacano



Striped Meadowhawk male (*Sympetrum vittatum*); C.A.S. Mazzacano

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Variegated Meadowhawk (*S. corruptum*) is migratory



Variegated Meadowhawk male (*Sympetrum corruptum*); C.A.S. Mazzacano



Variegated Meadowhawk male (*Sympetrum corruptum*); C.A.S. Mazzacano



Variegated Meadowhawk female (*Sympetrum corruptum*); C.A.S. Mazzacano

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Blue Dasher female (*Pachydiplax longipennis*); C.A.S. Mazzacano



Western Pondhawk female (*Zygonyx caucasicus*); C.A.S. Mazzacano



Blue Dasher male (*Pachydiplax longipennis*); C.A.S. Mazzacano



Western Pondhawk male (*Erythemis collocata*); C.A.S. Mazzacano

male Blue Dashers have
green eyes & white face

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Black Saddlebags (*Tramea lacerata*), Wandering Glider (*Pantala flavescens*), Spot-winged Glider (*P. hymenaea*) are migratory



Spot-winged Glider (*Pantala hymenaea*); Eric Isley, Naturalist



Black Saddlebags (*Tramea lacerata*); C.A.S. Mazzacano



Wandering Glider (*Pantala flavescens*); C.A.S. Mazzacano

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Emeralds (Corduliidae)

Spiny Baskettail (*Epitheca spinigera*)

very hairy thorax

dark body, dull yellowish markings

small spine below upper cerci



E. spinigera

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Spiny Baskettail (*Epitheca spinigera*); Jim Johnson, Naturalist



Spiny Baskettail (*Epitheca spinigera*); Matt Hunter, Naturalist

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Cruisers (Macromiidae)

Western River Cruiser (*Macromia magnifica*)

large; dark & yellow

long banded abdomen, side stripe on thorax

pearly gray eyes touch at seam on top of head



Western River Cruiser; Jim Johnson, Naturalist

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Clubtails (Gomphidae)

Olive Clubtail (*Stylurus olivaceus*)

eyes small, blue, separated

olive face & thorax

dark shoulder stripe

flared dark abdomen; pale green "arrows" pointed towards tip



Olive Clubtail; Jim Johnson, Naturalist

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Sinuous Snaketail
(*Ophiogomphus occidentis*)

eyes small, dark grey,
separated

greenish-yellow face

thorax pale green; wavy dark
shoulder stripes separated by
thin sinuous green line

flared black & yellow abdomen



Sinuous Snaketail; Jamniam, INaturalist

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Damselflies: broad-winged,
spreadwings, pond damsels



California Spreadwing (*Archilestes californicus*) male; C.A.S. Mazzacano



River Jewelwing male (*Calopteryx septentrionalis*)



Tail Blue (*Coelostoma caeruleum*) male; C.A.S. Mazzacano

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Spreadwings (Lestidae)

wings spread when perched

large; long leg spines

males pruinose, metallic above
(*Lestes*)



California Spreadwing female (*Archilestes californicus*); C.A.S. Mazzacano



California Spreadwing male (*Archilestes californicus*); C.A.S. Mazzacano



California Spreadwing male (*Archilestes californicus*); C.A.S. Mazzacano

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ID *Lestes* based on
appendages, pruinosity

Emerald Spreadwing
(*L. dryas*)

thorax metallic green above

stocky body

tips of medium-long
paraprocts point inwards



Emerald Spreadwing male (*Lestes dryas*); C.A.S. Mazzacano



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Spotted Spreadwing (*L. congener*)

thorax brown & white

small dark spots under
thorax

short paraprocts



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Lyre-tipped Spreadwing (*L. unguiculatus*)

thorax with blue stripes,
pruinose

bi-colored stigmas

lyre-shaped paraprocts



Lyre-tipped male;
C.A.S. Mazzacano



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Dennis Paulson

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Pond Damsels (Coenagrionidae)

Dancers (*Argia*)

blue, lavender, black

bouncy flight

perch with wings
above abdomen

long leg spines



Vivid Dancer female
(Argia vivida); C.A.S. Mazzacano



Vivid Dancer male
(Argia vivida); C.A.S. Mazzacano

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Bluets (*Enallagma*)

blue & black

S10 black on top

perch with wings along abdomen

shorter leg spines



Tule Bluets (*Enallagma carunculatum*);
C.A.S. Mazzacano



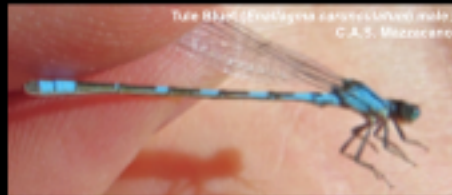
Northern Goral Bluet male (*Enallagma annexum*);
Mazzacano; C.A.S. Mazzacano

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Bluets (*Enallagma*)

Tule Bluet (*E. carunculatum*): male abdomen more black than blue; tubercle at end of male cerci



Northern/Boreal Bluet (*E. annexum/boreale*): male abdomen more blue than black



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Forktails (*Ischnura*)

thorax green or blue

male abdomen black with blue tip

S10 has forked projection



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Pacific Forktail (*I. cervula*):

4 blue dots on top of male thorax

female thorax pink/blue when young, becomes dull/dusky with age



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Western Forktail (*I. perparva*):

small; short wings

male thorax green-striped; blue at tip of abdomen edged in black

young females orange, pruinose when mature



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Red Damsels (*Amphiagrion*)

small; short abdomen

males red with black;
females orange



Western Red Damselfly male (*Amphiagrion abbreviatum*); Scott Blackmore, Naturalist



Western Red Damselfly female (*Amphiagrion abbreviatum*); Jim Johnson, Naturalist

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Broad-winged Damselfs (*Calopterygidae*)

River Jewelwing (*Calopteryx aequabilis*)

broad, colored wings

wings not stalked,
may lack stigma

metallic body



River Jewelwing female (*Calopteryx aequabilis*); C.A.S. Mazzacano



River Jewelwing male (*Calopteryx aequabilis*); Jim Johnson, Naturalist

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Monitoring Protocol



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Monitoring Protocol

Timing

once every ~14 days
during flight season

plan schedule
with team



Dennis Deak, volunteer; C.A.S. Mazzacano

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When should you survey?

Time range	10:00 am - 4:00 pm			9:30 am - 4:30 pm	
Temperature	< 59°F (15°C)	59-65°F (15-18°C)	65-75°F (18-24°C)	> 75°F (24°C)	> 88°F (31°C)
Cloud cover >60%	No	No	Yes	Yes	No
Cloud cover <60%	No	Yes	Yes	Yes	No
Windy (small tree branches swaying)	No	No	No	No	No
Rain	No	No	No	No	No

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Safety considerations:

don't work alone

look before you step (nutria tunnels, deep mud, blackberry, downed logs, trash, dead ducks, wasp nests, etc.)

stay hydrated



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Walk slow transect looking over water and in vegetation

perched, flying, mating, emerging, ovipositing adults



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stop and do visual scan at intervals

try to avoid double-counting

record abundance & behaviors on data sheet

designated team member will enter all records into iNaturalist project



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Basic information:

date, site, start and end time, observers

weather conditions

relevant notes

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record each species seen

indicate if males (M) and/or females (F) were present in each species seen

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ID method:

V (visual) = sight record only

C (captured) = netted & observed in-hand

P (photo) = took photo; **best for confirmation!**

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Abundance (ranges):

U (uncommon) = 1-4 individuals seen

F (frequent) = 5-20

C (common) = 21-100

A (abundant) = >100

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[illegible]

Reproductive stages:

W (wheel) = mating

TP (tandem pair) = male still holding female

O (ovipositing) =
laying eggs

TA (teneral adult) = newly-emerged



<http://www.inaturalist.org/projects/dragonfly-surveys-in-johnson-creek-watershed>

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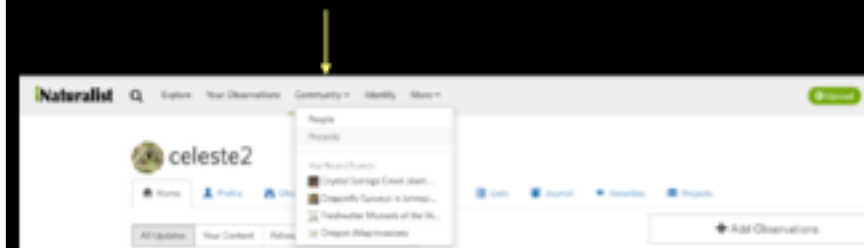
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How to use iNaturalist

go to www.inaturalist.org & register as a new user



mouse over "Community"& select "Projects" from dropdown menu that appears



then type "dragonfly surveys in Johnson Creek" into the search box that appears

click "join" when
project page appears

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Still confused? mouse over "More" at top of home screen and select "Help" to find FAQs, video tutorials, and more

"Help" option appears here



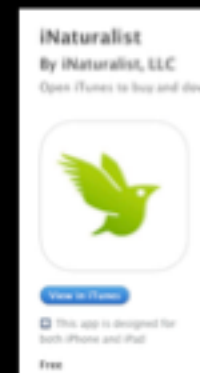
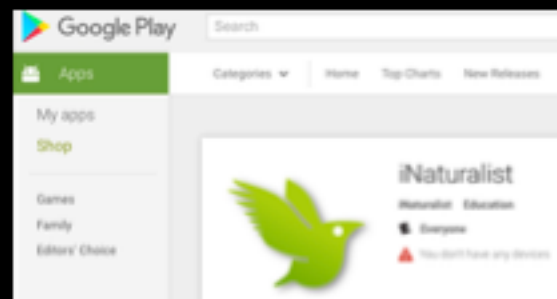
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download free iNaturalist app for iOS or Android

log in to app with same username & PW and add JCWC Dragonfly Survey Project

upload photos and report observations in the field



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