A Pocket Guide
Common Natural Enemies of Crop and Garden Pests in the Pacific Northwest

**Biological Control**

Determine the relative populations of pests and natural enemies with preliminary monitoring. Then use the following tactics to enhance biological control as part of an IPM program.

- Protect natural enemies from disturbances such as pesticides, other management practices, their own natural enemies (e.g., ants), or adverse environmental conditions.
- Provide supplementary nectar or pollen sources, alternate hosts, or shelter.
- Manipulate the behaviors of natural enemies with attractants or with plant structure and arrangement.
- Augment natural enemy populations with mass releases of lab-reared individuals.
- Introduce natural enemies that are absent from the area.

**General Observation Tips**

- When doing visual counts, also inspect the undersides of leaves.
- Approach fast-moving insects slowly, or use nets, beating trays, and traps to get a closer look.

**Distinguishing Natural Enemies from Plant Pests in General**

- Observe the specimen to see whether it feeds on animals or plants.
- To see whether a particular natural enemy attacks a target pest species, place individuals of both species together in an enclosed environment that allows them room to move.

**Using this Guide**

The cards in this guide are designed to help you quickly learn the main groups of natural enemies of crop and garden pests, their predacious activity, and tips for observing them. Photographs are of the most common species in the Pacific Northwest.

Use this guide as a field supplement to other publications that provide more detail on how to scout for and manage specific pests and natural enemies.

Print each sheet on regular paper or cardstock. Then fold on the central horizontal line and cut on the dotted orange lines to create three 2-sided cards. (Laminate if needed.)

Most of the photographs in this pocket guide are from the Ken Gray collection. All other photographs are from the author.
**Predacious Hoverflies**

*(Diptera: Syrphidae)*

**Identification**
Adults mimic wasps and bees, but fly more quickly or hover, often have yellow markings; larvae maggotlike; eggs small, whitish, and oblong.

**Observation tips**
Eggs, larvae, and tarlike excrement are found at aphid colonies; adults mostly on or hovering at flowers.

**Predacious activity**
Larvae prey mostly on aphids and scale insects; adults feed on flower feeders; some species not predacious.

**Other insects confused with hoverflies**
- Bee flies
- Bees
- Wasps

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**Ground or “Carabid” Beetles**

*(Coleoptera: Carabidae)*

**Identification**
Adults dark or metallic with ridged wing covers; larvae grublike with large mandibles.

**Observation tips**
Adults mostly active at night; look for fast-running adults under objects on soil surface or in soil samples, larvae in soil samples.

**Predacious activity**
Prey mostly on soil organisms, some feed on seeds.

**Other beetles confused with carabids**
- Tenebrionid beetles

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**Parasitoid Tachinid Flies**

*(Diptera: Tachinidae)*

**Identification**
Adults similar to houseflies, but with very long bristles on tail end; puparia red to brown and oblong; larvae inside host; eggs white and oblong on host.

**Parasitic activity**
Important endoparasitoids of many worm, beetle, sawfly, and bug pests; populations can increase rapidly.

**Observation tips**
Adults seen on flowers; look for eggs on host, puparia near host.

**Other insects confused with tachinids**
- House flies
- Blow flies
- Flesh flies

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**Rove Beetles**

*(Coleoptera: Staphylinidae)*

**Identification**
Adults are dark or metallic with ridged wing covers; larvae grublike with large mandibles.

**Predacious activity**
Prey mostly on small soil organisms.

**Observation tips**
Adults mostly active at night; look for fast-running adults under objects on soil surface or in soil samples.

**Insects confused with rove beetles**
- Leptacius batychrus
- Philonthus sordidus

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**Damsel or “Nabid” Bugs**

*(Hemiptera: Nabidae)*

**Identification**
Adults and nymphs long and thin with front legs slightly enlarged for grabbing prey.

**Predacious activity**
Adults and nymphs prey on other insects in same habitat.

**Other bugs confused with nabid bugs**
- Assassin bugs
- Some of the thinner mirid bugs
- Stilt bugs

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**Predacious Stink Bugs**

*(Hemiptera: Pentatomidae)*

**Identification**
Adults and nymphs have a broad pentagon or shield shape, usually brown or grey rather than green.

**Predacious activity**
Adults and nymphs prey on other insects in same habitat.

**Insects confused with stink bugs**
- Perillus bioculatus
- Brochymena sp.

**Observation tips**
Found on vegetation; may have to observe activity to determine whether the species is predacious or herbivorous.

**Similar-looking herbivorous stink bugs**

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Adults seen on flowers; look for eggs on host, puparia near host.

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- Assassin bugs
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- Perillus bioculatus
- Brochymena sp.

**Observation tips**
Found on vegetation; may have to observe activity to determine whether the species is predacious or herbivorous.

**Similar-looking herbivorous stink bugs**
**Minute Pirate Bug**  
(Hemiptera: Anthocoridae)

**Identification**  
Adults with a black and white cross pattern; nymphs orange to dark red.

**Predacious activity**  
Adults and nymphs prey on other small insects in same habitat.

**Observation tips**  
Found on vegetation and flowers; more easily monitored with nets or beating trays due to small size.

**Other similar-looking small bugs**
- Big-eyed bug nymphs
- Chinch bugs
- Some plant bug nymphs

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**Assassin Bugs**  
(Hemiptera: Reduviidae)

**Identification**  
Adults and nymphs resemble damsel bugs, but larger, with a wider abdomen, thinner neck, and often with spines.

**Predacious activity**  
Adults and nymphs prey on many types of insects in same habitat.

**Observation tips**  
Found on vegetation and flowers.

**Other bugs confused with assassin bugs**
- Damsel bugs
- Ambush bugs
- Stilt bugs

**Similar looking bugs**
- Assassin bugs
- Leaf-footed bugs
- Alydid bugs

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**Big-eyed Bugs**  
(Hemiptera: Lygaeidae)

**Identification**  
Adults and nymphs with big eyes; fast-moving and slightly larger than minute pirate bugs.

**Observation tips**  
Found on vegetation or the ground; more easily monitored with nets or beating trays due to speedy flight and small size.

**Predacious activity**  
Adults and nymphs prey on other small insects in same habitat.

**Soldier Beetles**  
(Coleoptera: Cantharidae)  

**Identification**  
Adults are long and thin with long antennae, often with red or orange markings.

**Predacious activity**  
Adults prey on other insects in same habitat.

**Observation tips**  
Found on leaves and flowers.

**Similar types of beetles**
- Soft-winged flower beetles
- "Fireflies"

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**Ambush Bugs**  
(Hemiptera: Phymatidae)

**Identification**  
Adults and nymphs are often camouflaged like leaves and flowers to ambush prey.

**Predacious activity**  
Adults and nymphs prey on other insects in same habitat.

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**Observation tips**  
Found on flowers and vegetation.

**Similar looking bugs**
- Assassin bugs
- Leaf-footed bugs
- Alydid bugs

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**Tiger Beetles**  
(Coleoptera: Cicindellidae)

**Identification**  
Adults shiny with large eyes and mandibles; very fast runners and flyers.

**Predacious activity**  
Adults and larvae prey on many types of insects in the same habitat.

**Observation tips**  
Found on leaves and flowers.

**Similar looking bugs**
- Soft-winged flower beetles
- Ground beetles

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**Other similar-looking small bugs**
- Big-eyed bug nymphs
- Chinch bugs
- Some plant bug nymphs

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**Other similar-looking small bugs**
- Big-eyed bug nymphs
- Chinch bugs
- Some plant bug nymphs
Thread-waisted Wasps
(Hymenoptera: Sphecidae)

Identification
Stout-bodied to slender, often with a very narrow waist and wide head.

Observation tips
Active near open sandy areas and flowers.

Predacious activity
Many species specialize on various insect prey species. Females capture prey and bring back to larvae in nests.

Other insects confused with thread-waisted wasps
Hoverflies, Vespidae

Vespid Wasps (Yellowjackets, Hornets)
(Hymenoptera: Vespidae)

Identification
Medium to large, black with yellow or white markings; wings smoky and folded longitudinally.

Predacious activity
Adults bring masticated insects, meat, and nectar of many types back to larvae in large nests.

Other insects confused with vespid wasps
Hoverflies, Thread-waisted wasps

Larger Parasitoid Wasps
(Hymenoptera: e.g., Ichneumonidae, Braconidae)

Identification
Braconids are <1/4", Ichneumonids are usually larger with a longer abdomen.

Parasitic activity
Kill hosts by parasitism or by piercing and feeding; hosts include insect larvae, pupae, and aphids.

Observation tips
Adults found at flowers or looking for hosts; monitor by looking for parasitized hosts (p. 23).

Parasitized and Diseased Insect Pests

Identification and observation tips
Parasitoid larvae and pupae are difficult to identify. One of the best identification methods is to collect hosts that look unusual and hold in a container until the parasitoid develops into an adult.

Any comments or questions regarding the content of this pocket guide are welcomed and can be directed to:
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