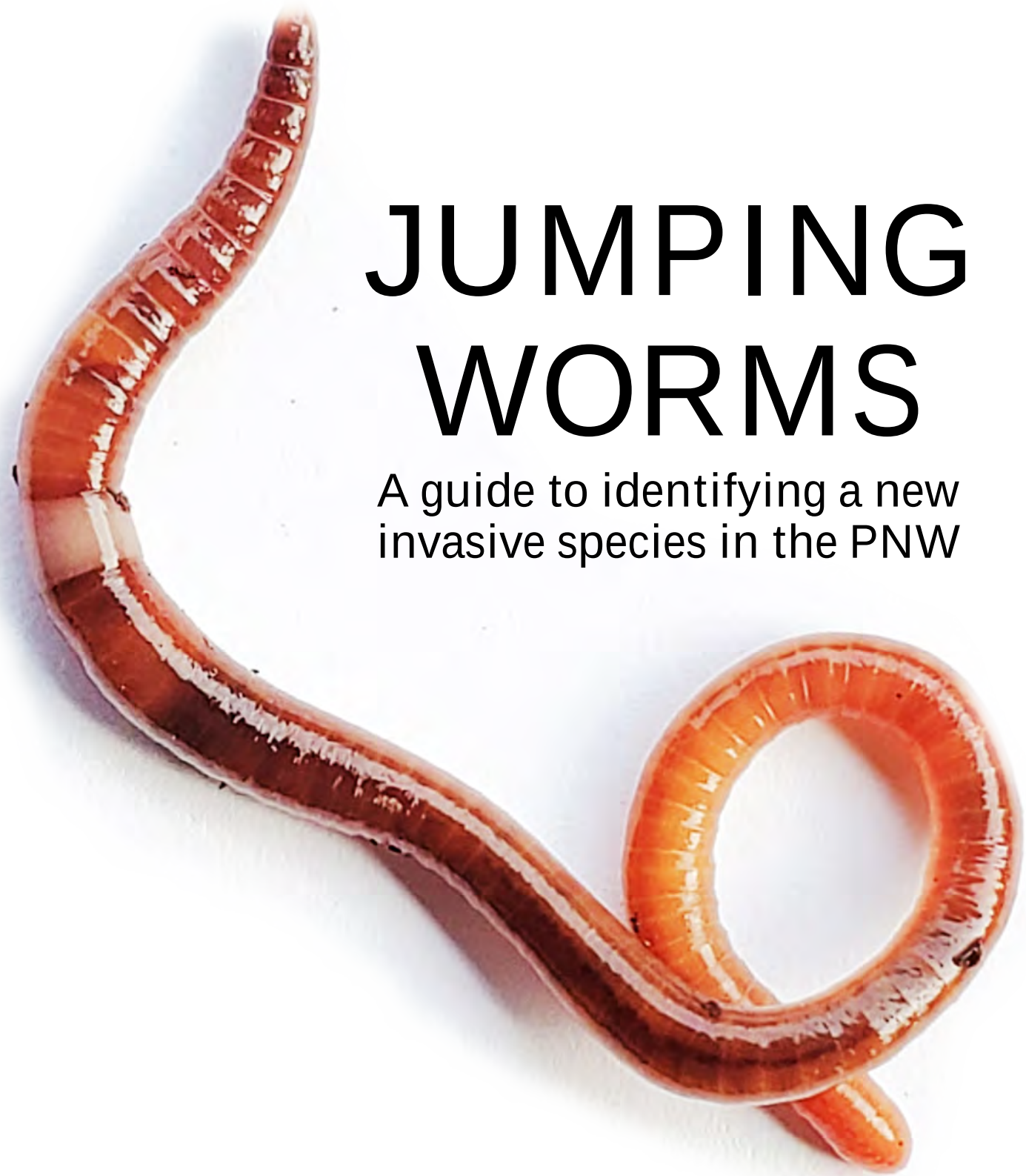

JUMPING WORMS

A guide to identifying a new invasive species in the PNW

Research compiled by Rebecca Sinichko, Portland State University

In partnership with Samuel Chan and Linda Tucker Serniak, Sea Grant Extension, Oregon State University

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Introduction to the Guide

This guide is intended for master gardeners, amateur gardeners, outdoor hobbyists, anglers, naturalists, educators, parents, and the curious student. It provides the reader with information on the invasive Jumping Worm. This includes the background, identification, impacts, prevention, management and reporting of this species. If you wish to explore this topic beyond the scope of this guide, or learn more about other non-indigenous species threatening the Pacific Northwest, please explore Oregon Sea Grant's other available resources at https://seagrant.oregonstate.edu/.

It is important to note the name Jumping Worm commonly refers to three similar species, *Amynthas agrestis, Amynthas tokioensis, and Metaphire hilgendorfi*. *Amynthas agrestis,* is known for being the most aggressive and widespread of the three species within the United States, though they often co-occur. Research compiled for this guide focuses on *Amynthas agrestis,* but all 3 species have similar environmental impacts and physical markings. The discovery of any of these three species in the Pacific Northwest should be cause for concern.

Photos and Illustrations

Photos included in this guide were provided by Linda Tucker Serniak, a PhD candidate at Oregon State University and Joanne Schneidermann Dole, a master gardener. Illustrations were drawn by Rebecca Sinichko, a master's candidate at Portland State University.

Background

Worms are often thought of as a welcome guest in our gardens, known for aerating our soils, breaking down organic matter, distributing nutrients, and acting as a source of food for many creatures. A less known fact is that many earthworms native to North America were scraped away with the topsoil by glaciers during the last ice age, greatly reducing the number of earthworm species endemic to Oregon. Most commonly, the European Nightcrawler and the Common Earthworm, two species introduced through European colonization, are the ones found in Oregon soils today. Though they certainly influence this modern landscape, the introduction of the Jumping Worm, endemic to Korea and Japan, poses a severe threat to Oregon's ecosystem.

Detritus and leaf litter are known for providing habitat for small animals, and play an important role in soil nutrient cycling. Earthworms can speed up the decomposition of this litter layer, impacting the natural soil structure. Jumping Worms have a shallow vertical range, living primarily in the top 6 inches of soil. Their feeding habits degrade the litter layer at alarming rates compared to other species.

Jumping Worms were first reported in the United States in the mid twentieth century. Their introduction to eastern and central states has led to changes in soil composition, nutrient cycling, and litter layer decomposition, diminishing the health of understory species. The severity of their impacts in the Pacific Northwest are unclear, but studies are underway. There are confirmed sightings of this species in Oregon, Washington, and BC, with a heavy presence along the I-5 corridor. They are often introduced as fishing bait, but have been known to spread through horticulture and composting practices, as well as hiking.

Prevention

Prevention is always the first line of defense against invasive species, and the most cost-effective. It is important to understand potential transport pathways, and follow prevention protocols, to minimize their spread.

Soil and Organic Material

Jumping Worms, and their cocoons, can be transported via soil, compost, and other organic materials. Whether you are transporting material from one property to another, or bringing home a new purchase, it is essential to check all soil and organic material for worms and cocoons.

- Clean dirt and debris off shoes and equipment before entering a new area
- Examine plants before transplanting
- Buy bareroot stock when possible
- Inspect compost, mulch, and soil
- Never share compost, mulch, soil, or plants with a known infestation

Fishing Bait

Jumping Worms are commonly sold as fishing bait because of their sustained erratic thrashing movements.

- Never buy fishing bait under the name Jumping Worm, Asian Jumping Worm, Crazy Worms, Alabama Jumpers, or Snake Worms
- Seal all fishing bait as tightly as possible
- Destroy unused fishing bait

Management

If you find yourself in a position where Jumping Worms are already present, actions can be taken, *in addition to* prevention protocols, to mitigate their impacts.

Heating Soil

Jumping Worms, and their cocoons, are unable to survive temperatures above 40°C (104°F). Increasing soil temperatures above this threshold is one way to manage Jumping Worm populations.

To Increase Environmental Temperatures

- Tarp sections of soil or compost that receive direct sunlight
- Temporarily place soil in plastic bins and place in direct sunlight

Other Management Methods

- Apply a vermicide
- Perform a controlled burn

Reporting

There are many tools out there to help researchers track the spread of invasive species. Public participation aids in the the process of early detection and rapid response (EDRR), and helps protect our native environment.

Resources to report a sighting in the PNW

Washington

www.invasivespecies.wa.gov/report-a-sighting/

Oregon

www.oregoninvasiveshotline.org

1-866-INVADER

California

wildlife.ca.gov/Conservation/Invasives

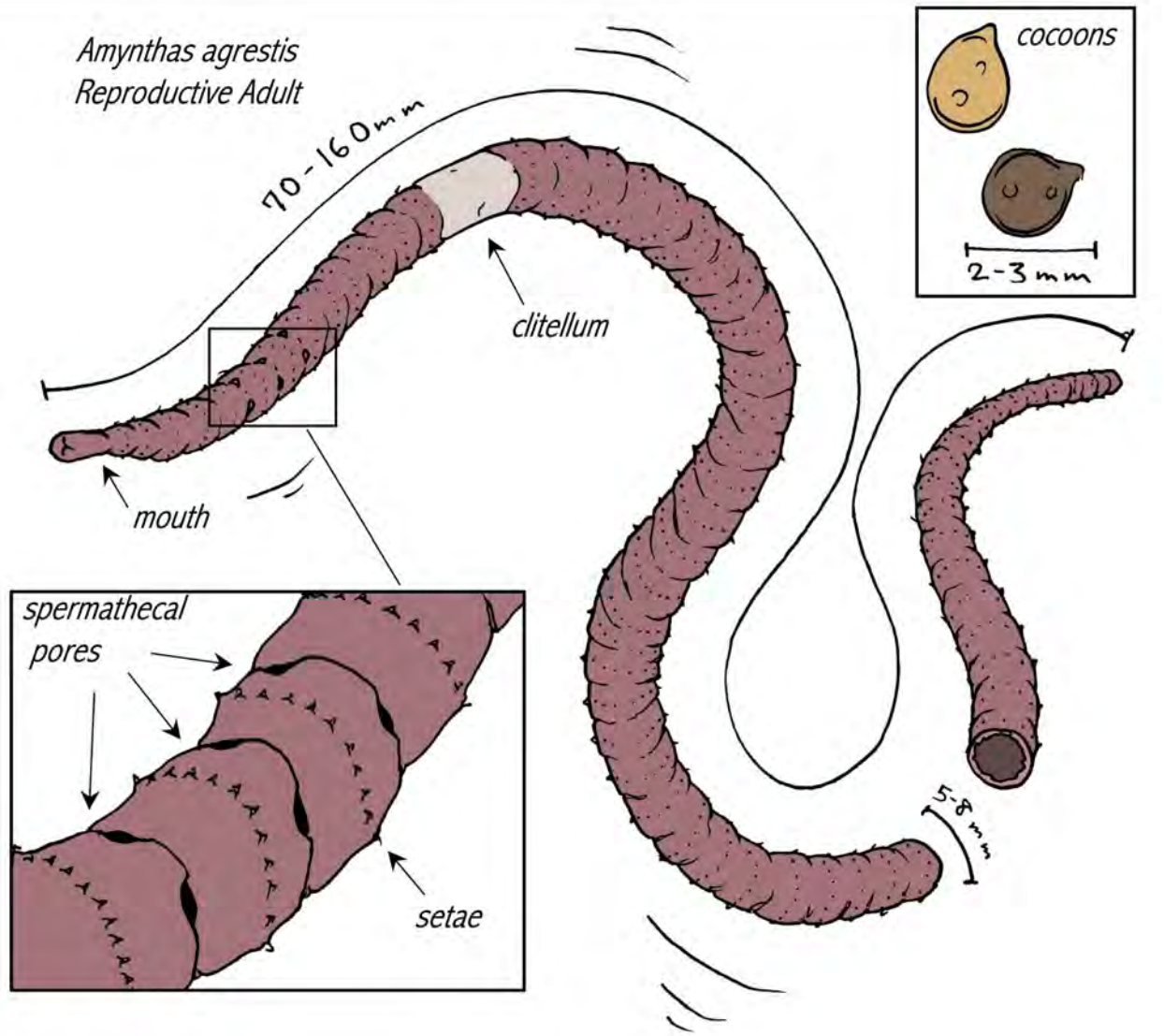
866-440-9530

invasives@wildlife.ca.gov

General

imapinvasives.org

IDENTIFICATION | *Jumping Worm*



Color

Red/Brown/Purple with Iridescence

Size

Length: 70-160 mm

Width: 5-8 mm

Mouth

This species has a large distinct mouth

Segments

A linear series of repeating parts forming the body

# of Segments: 63-100

Setae

A stiff bristle like structure used for movement

The middle of each segment has a ring of >40 setae

Clitellum

A section of glandular tissue composed of reproductive segments

The clitellum is present in segments 14-16. It is smooth, milky in color, flush with the body, and fully encircles the worm.

Spermathecal Pores

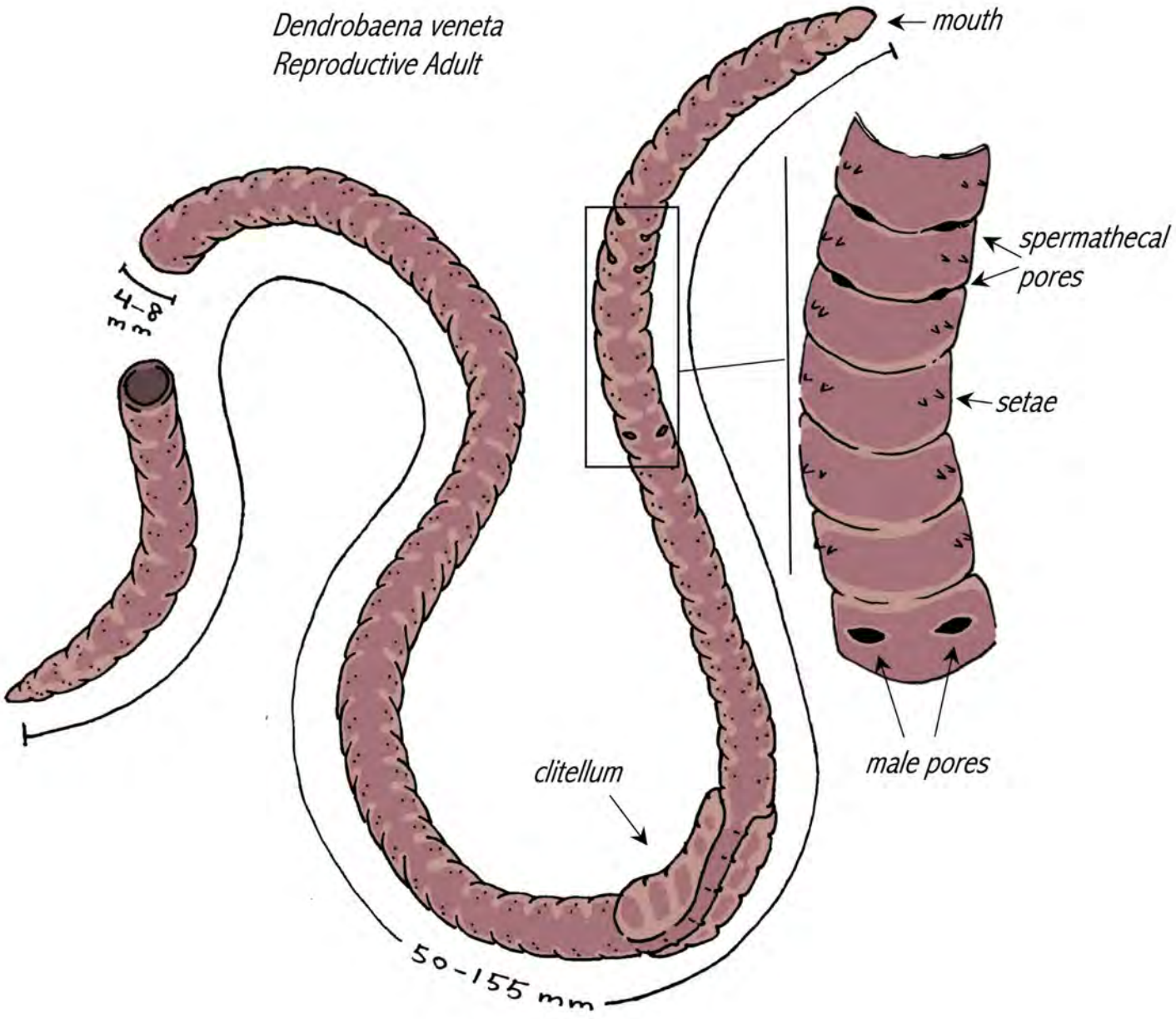
Opening to the spermathecae, an organ that receives and stores sperm

3 pairs between segments 5-6, 6-7, 7-8

Movement

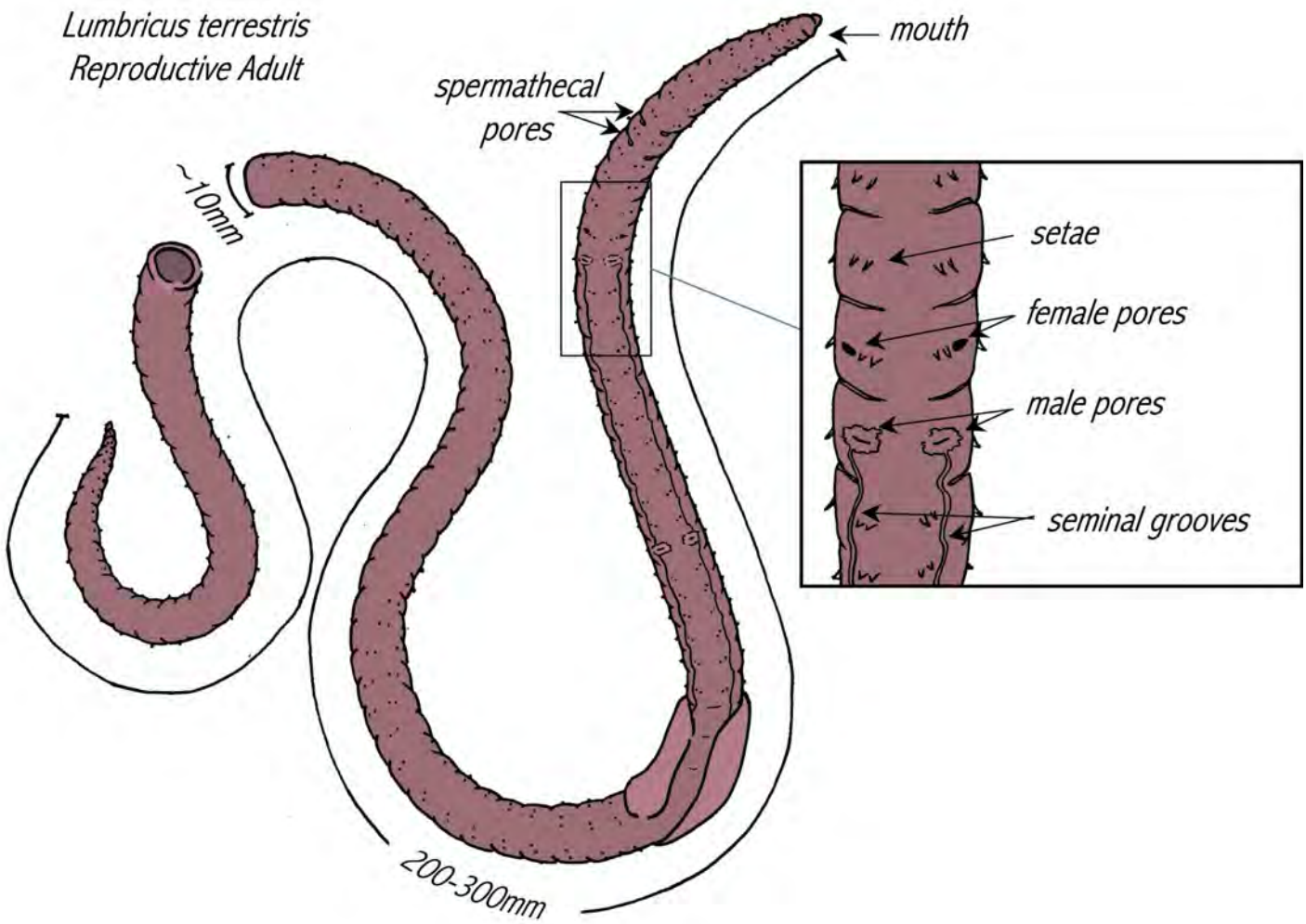
Erratic jumping movement that can last upwards of 30 minutes

IDENTIFICATION | *European Nightcrawler*



Color	Setae
Red/Brown/Banded appearance	*A stiff bristle like structure used for movement*
Size	Wide pairs
Length: 50-155 mm	Spermathecal Pores
Width: 4-8 mm	*Opening to the spermathecae, an organ that receives and stores sperm*
Clitellum	2 pores present ~segments 8-9 and 9-10
A section of glandular tissue composed of reproductive segments	Other Reproductive Markings
Saddle-shaped and raised	Male pores present in segment 14

IDENTIFICATION | *Common Earthworm*



Color

Red/Brown

Size

Length: 200-300 mm

Width: 10 mm

Clitellum

A section of glandular tissue composed of reproductive segments

Saddle-shaped and raised

Spermathecal Pores

Opening to the spermathecae, an organ that receives and stores sperm

2 pores present ~segments 9-10 and 10-11

Other Reproductive Markings

Female pores present in segment 14

Male pores present in segment 15

Seminal grooves

Visualizing Changes in Soil

Jumping Worms have a negative impact on soil structure. Over time, soil turns into coffee ground like granules. As these granules aggregate and harden, they begin to repel water. This creates a more porous soil, reducing moisture content.

OUTREACH AND EDUCATIONAL MATERIALS

Watch Card

A wallet-sized identification card highlighting features unique to *Amynthas agrestis.* It includes prevention and reporting information and a QR code to connect to additional resources.

Wanted Poster

A flyer institutions can post up to attract public interest and raise awareness about the Jumping Worm in the Pacific Northwest. Includes background information, reporting sites, and a tearaway watch card.

Coloring Page

A coloring page developed to introduce young students to the Jumping Worm and strengthen color pattern recognition.

Worm Dessert Activity

An activity developed to help young students learn how to find and identify worms, and their cocoons, in a fun and delicious manner.

Worm Anatomy Worksheet

A worksheet developed to help students learn the different external components of the Jumping Worm

Brochure

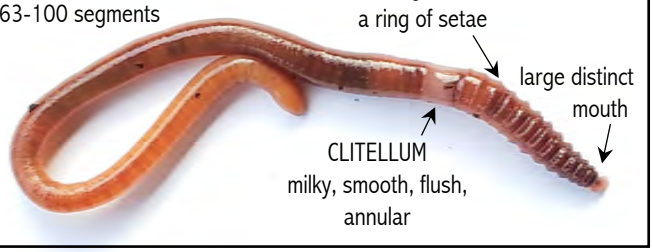
A brochure developed for distribution and outreach. It is a comprehensive overview of the background, identification, prevention, management and reporting of the Jumping Worm.

JUMPING WORM

Amynthas agrestis

reddish brown iridescent worm that will thrash and jump when disturbed

SIZE: 70-160mm x 5-8mm
63-100 segments



REPORT TO OREGON INVASIVE SPECIES HOTLINE
www.oregoninvasiveshotline.org / 1-866-INVADER

SCAN FOR MORE INFO

HELP PREVENT THE SPREAD

CLEAN SHOES AND EQUIPMENT OF DIRT / DEBRIS BEFORE ENTERING A NEW AREA

EXAMINE PLANTS BEFORE TRANSPLANTING

BUY BARE ROOT STOCK

DO NOT BUY A. AGRESTIS FOR BAIT

INSPECT COMPOST / MULCH / SOIL FOR A. AGRESTIS

HEAT COMPOST / MULCH / SOIL <40 DEGREES CELSIUS

WANTED

AMYNTHAS AGRESTIS

SNAKE WORM | JUMPING WORM | ALABAMA JUMPER | CRAZY WORM

FOR DEGRADING THE LITTER LAYER

ORIGIN
Korea & Japan

TRANSPORTATION
Fishing, hiking, composting, horticulture

SIGHTINGS
Oregon and Washington

IMPACTS
Soil composition, nutrient cycling, litter layer, understory species

IDENTIFICATION

70-160mm x 5-8mm

63-100 segments

Red / brown / purple / iridescent

Erratic jumping movements

Large distinct mouth

>40 setae per segment

CLITELUM: milky white, smooth, annular, flush with the body

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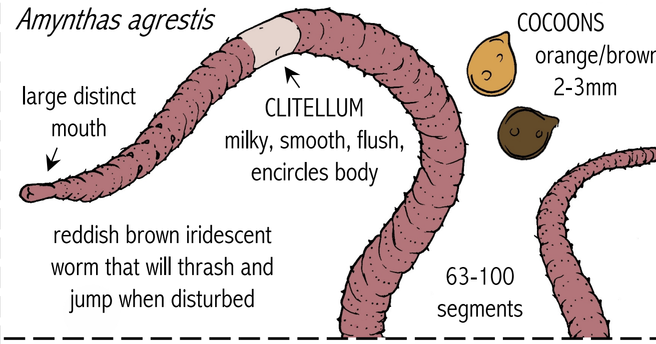
REPORT SIGHTINGS TO:

OREGON INVASIVE SPECIES HOTLINE

OREGONINVASIVESHOTLINE.ORG / 1-866-INVADER

TAKE ONE

JUMPING WORM SIZE: 70-160mm x 5-8mm
Amynthas agrestis



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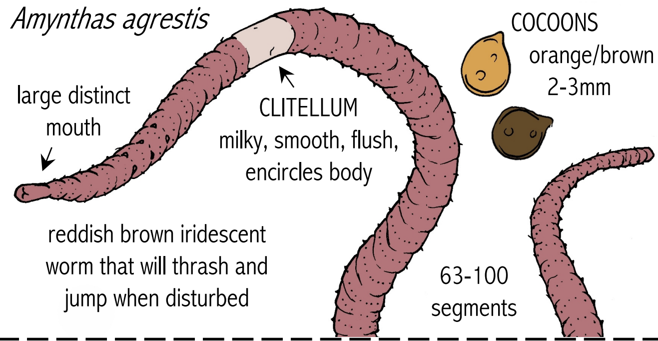

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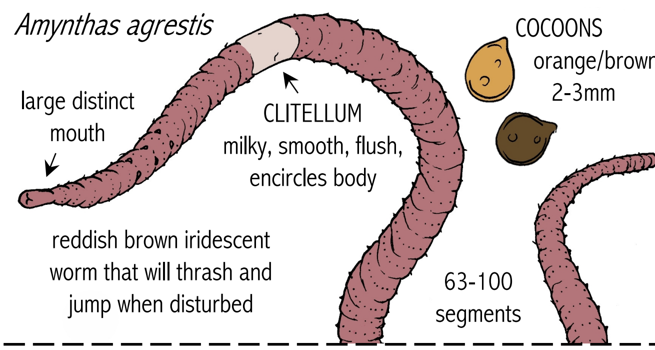

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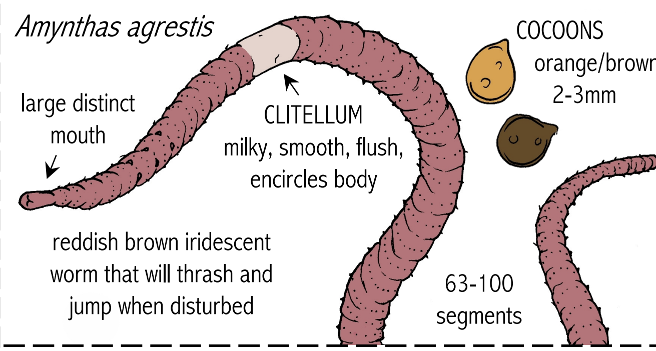

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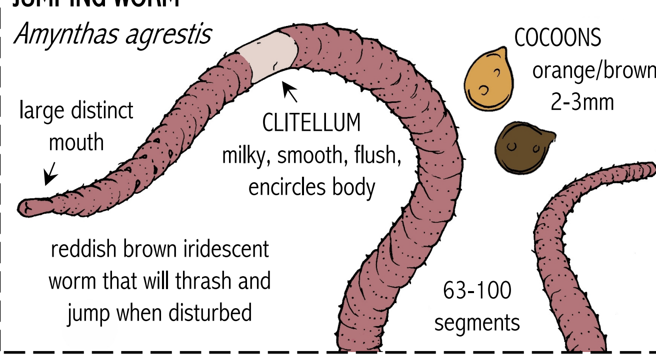
Amynthas agrestis



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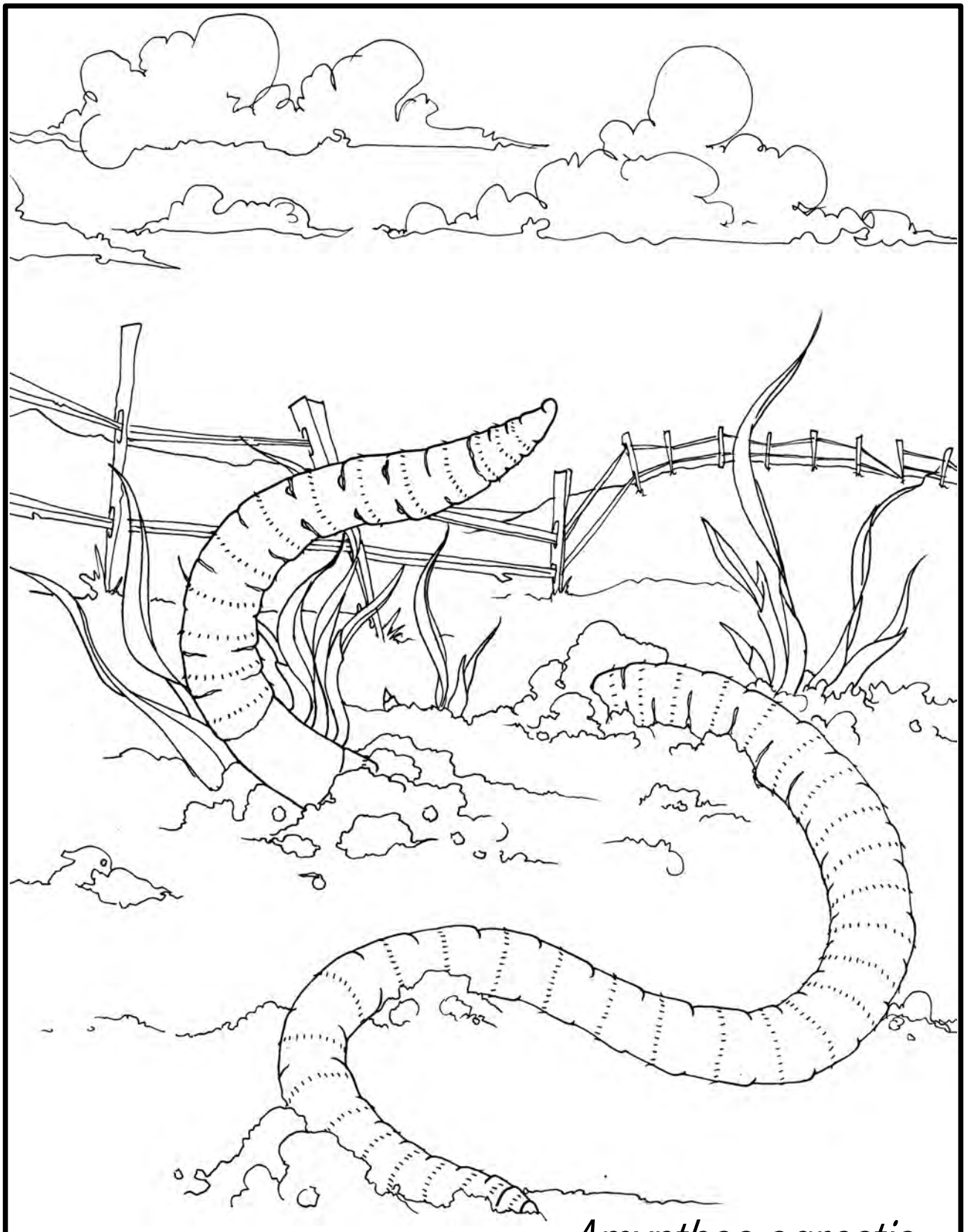
EDUCATIONAL ACTIVITY - COLORING PAGE



Amynthas agrestis

JUMPING WORM

WORM DESSERT

INGREDIENTS

- 12 chocolate creme-filled cookies
- 1 package instant chocolate pudding mix
- 2 cups milk
- 1 package gummy worms candy
- 1 package M&Ms

DIRECTIONS

1. Crush chocolate cookies into crumbs (you may remove creme for a more dirt-like appearance)
2. Separate worms by color
3. Mix chocolate pudding mix and milk together
4. Place 1/3 of cookie crumbs in bottom of serving container
5. Spoon ½ of pudding over crumbs
6. Bury one color of worms in first layer of pudding
7. Spread 1/3 of cookie crumbs over layer of pudding
8. Spread remaining pudding over the layer of cookie crumbs
9. Choose a new color worm and bury in the top layer of pudding
10. Bury some brown and yellow M&Ms in top layer of pudding
11. Sprinkle remaining cookie crumbs over top of dessert
12. Refrigerate until serving

ACTIVITY AND QUESTIONS

As you eat, pay attention to where in the dessert you find worms and M&Ms.

What color worm was in the top layer of dirt? – The worm on top could be a Jumping Worm! They like to eat leaf litter and stay close to the surface.

What color worm was further down? – This worm could be a Common Earthworm! They come up to the surface for food but prefer to live up to 8 feet underground!

What do you think the M&M represents? – Cocoons!

Was it easy to find the M&Ms? – which color was easier? Cocoons could be red, brown, or yellow.

Do you think it would be easy to miss cocoons in the dirt? – They could easily be missed! Especially if you weren't looking for them. The brown ones are especially hard to find.

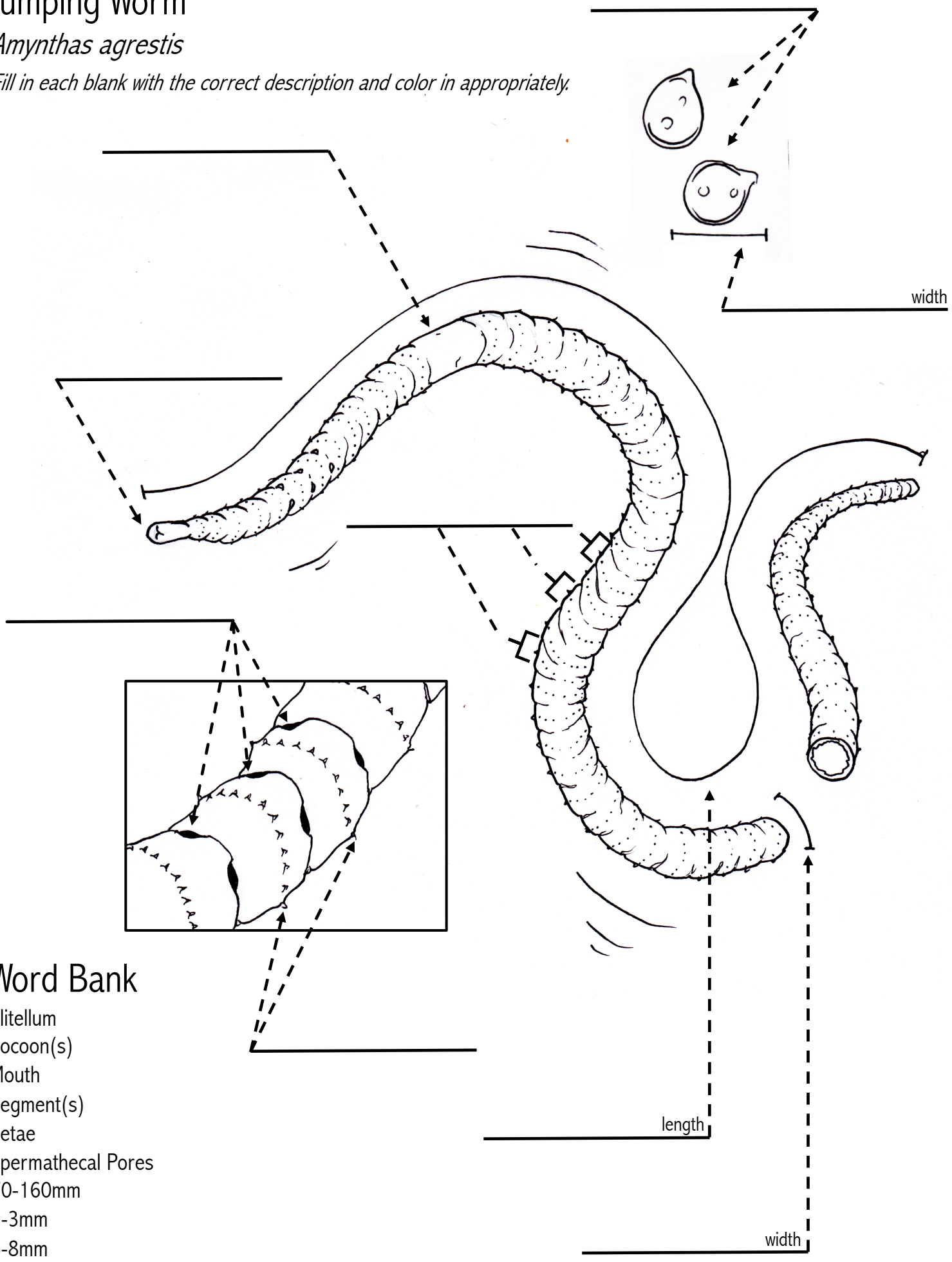
What do you think the cookie crumble on top represents? – Leaf litter! This is dead plant material that lots of decomposers love to eat.

What do you think the worms eat? – Worms love to eat leaf litter, especially the Jumping Worm! Worms will also eat other organic materials found in the soil.

Jumping Worm

Amynthas agrestis

Fill in each blank with the correct description and color in appropriately.



Word Bank

Clitellum
Cocoon(s)
Mouth
Segment(s)
Setae
Spermathecal Pores
70-160mm
2-3mm
5-8mm

HAVE YOU SEEN ME?

JUMPING WORM

Amynthas agrestis

The Jumping Worm is an invasive species endemic to Korea and Japan. They spread through horticulture, fishing, composting, and hiking. Their introduction to the United states has led to changes in soil composition, nutrient cycling, and litter layer decomposition, posing a threat to understory species. The severity of their impacts in the PNW are unclear, but studies are underway.

There are confirmed sightings in Oregon, Washington, and BC, with a heavy presence along the I-5 corridor.

IDENTIFICATION

Color

Red/brown/purple with iridescence

Size

Length: 70-160 mm

Width: 5-8 mm

Mouth

This species has a large distinct mouth

Segments

# of Segments: 63-100

Setae

The middle of each segment has a ring of >40 setae

Clitellum

The clitellum is present in segments 14-16. It is smooth, milky in color, flush with the body and fully encircles the worm.

Spermathecal Pores

3 pairs between segments 5-6, 6-7, 7-8

Movement

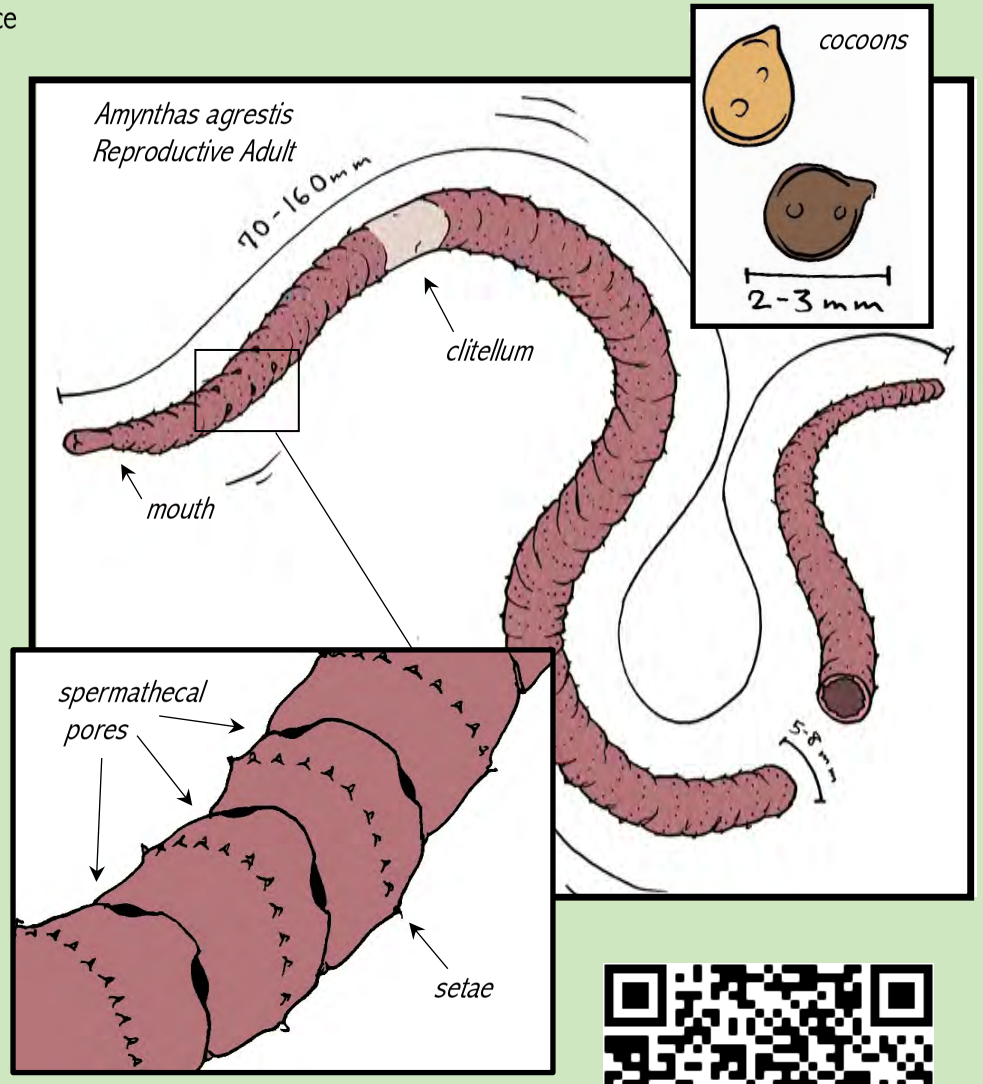
Erratic jumping movement that can last upwards of 30 minutes

Cocoon

Color: orange-brown

Size: 2-3mm

1-3 embryos per cocoon



SCAN FOR MORE INFO

PREVENTION

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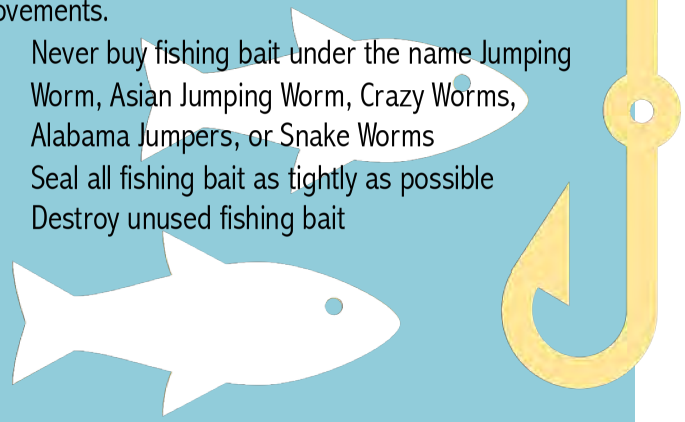

MANAGEMENT

If you find yourself in a position where Jumping Worms are already present, actions can be taken, *in addition to* prevention protocols, to mitigate their impacts.

Heating Soil

Prevention is always the first line of defense against invasive species. If you find yourself in a position where Jumping Worms are already present actions can be taken to mitigate their impacts.

Jumping Worms, and their cocoons, are unable to survive temperatures above 40°C (104°F). Increasing soil temperatures above this threshold is one way to manage Jumping Worm populations.

To Increase Environmental Temperatures

- Tarp sections of soil or compost that receive direct sunlight
- Temporarily place soil in plastic bins and place in direct sunlight

Other Management Methods

- Apply a vermicide
- Perform a controlled burn

HOW TO REPORT

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GENERAL

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