Revisiting Classrooms and School Science Projects as Pathways for Invasive Species

Sam Chan and Tania Siemens, Sea Grant College Program, Oregon State University
Wei-Ying Wong, Woodland Zoo, Seattle, WA
Julian Olden, School of Aquatic and Fisheries Sciences, University of Washington

ICAIS, Montreal Canada; 10/28/2019

Come join us for the “Spring release party”
4th grade teacher

Photo Courtesy: Tania Siemens

FOSS Science Kit used in ~30% of all USA School Districts

Delta Education
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FOSS Third Edition Structures of Life Complete Kit

Grade 3

Part #: 1325219

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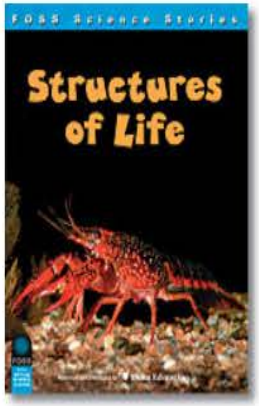
In the **Structures of Life Module**, students observe, compare, categorize, and care for a selection of organisms. Students observe and describe the life cycles of plants and animals, observe the characteristics of the human body, and explore food chains.

RECENTLY VIEWED



FOSS K-6 Second Edition Structures of

Curriculum Kits (example) often Shipped Without Scientific Names and Source

Structures of Life

Grades 3–4

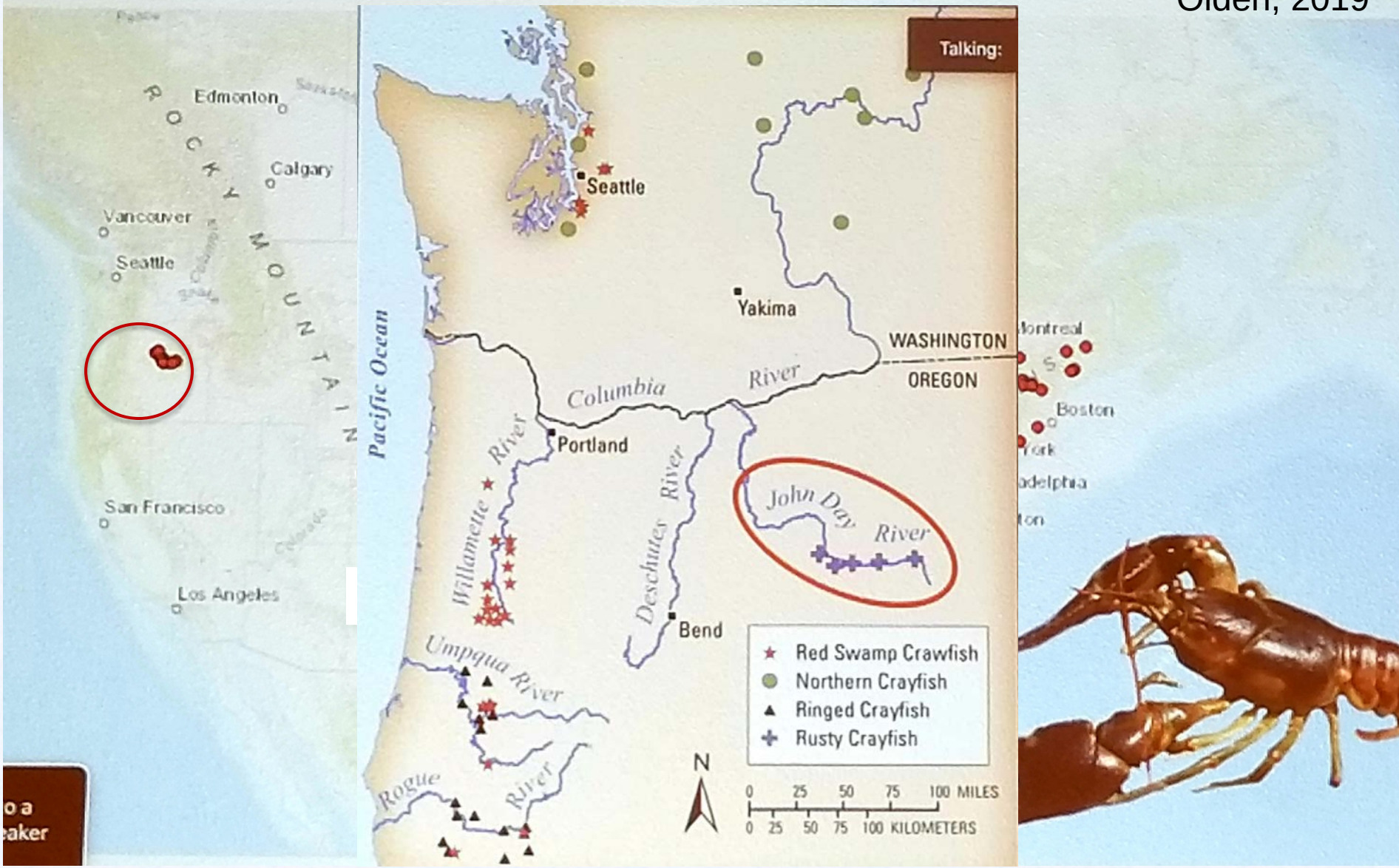
WXP-742-5020 $487.00

** Live Material Card, 12 crayfish, 12 anacharis (*Elodea* water plant)	WXP-270-4184	1 set
**Live Material Card, 12 bess beetles	WXP-270-4420	1 set

Red swamp crayfish (P. Clarkii) and Brazilian Elodea (Egeria densa) shipped Without Scientific Name or Source from a Biological Supply House

Rusty Crayfish Distribution

Olden, 2019



Schools and Science Curricula as Potential Aquatic Invasive Species Pathways

Biological supply houses

Organism suppliers

Science curricula developers

Schools

Euthanasia

Pets

Disposal options

Release

Thanks to our Partners

Survey in 7 States, 3 Canadian Provinces

Fisheries and Oceans Canada

Pêches et Océans Canada

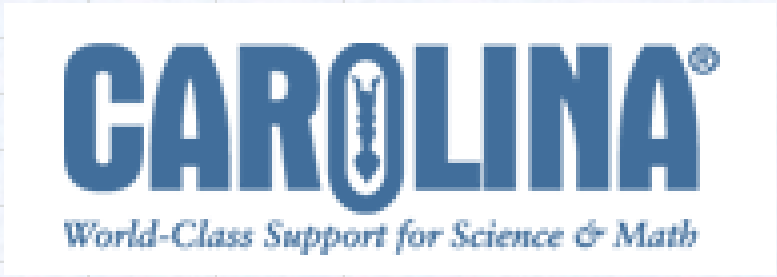
PRIMARY Biological Suppliers to Schools:

Alden Forbes Laboratories
Baltimore Biological Lab., Inc.
Bio Corporation
Berkshire Biological Supply Company
Blue Spruce Scientific Supply
Carolina Biological Supply Co.
Connecticut Valley Biological Supply
Fisher Scientific Company
Gulf Specimen Marine Lab
Marine Biological Laboratory
Gulf of Maine, Marine Life Supply Company
Marinus Scientific
Mountain Home Biological
Narco Bio-Systems, Inc.
Niles Biological, Inc.
Ward's Natural Science Establishment, Inc.
Sargent-Welch Scientific

SECONDARY:

Delta Education
Fisher Science Education (same as Fisher?)
Flinn Scientific
Frey Scientific
Nebraska Scientific

Science Education Suppliers are a $6 Billion Business



(~$400 million in sales)

Mountain Home Biological

https://www.wardsci.com/store/catalog/searchCategory.jsp?id=PSSC10366931&searchUrl=/search?isSciedProductListingPage=true&pimId=PSSC10366931&navAction=pop&navCount=9

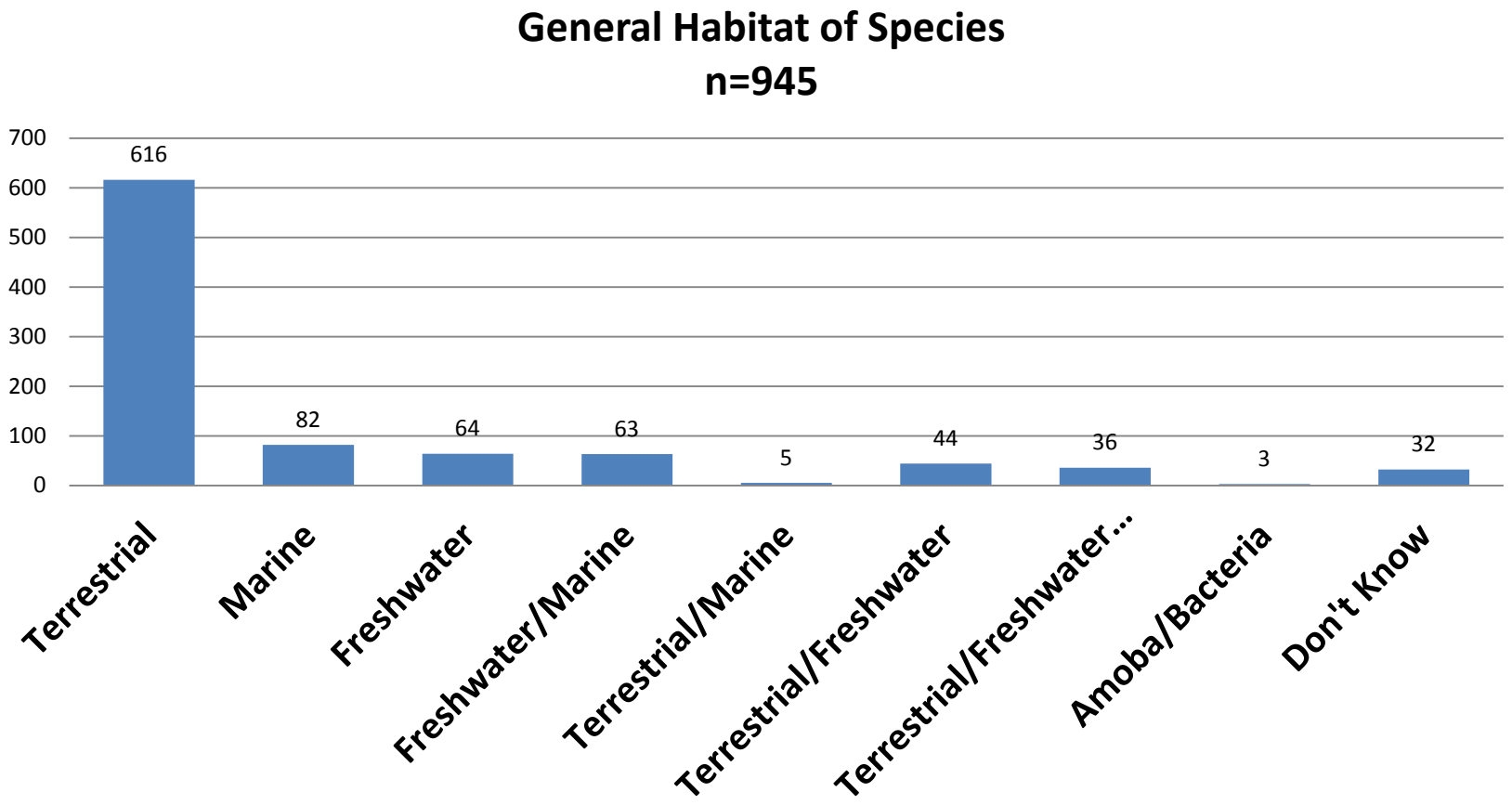
Top three crayfish for science education

Orconectes rusticus (Rusty)

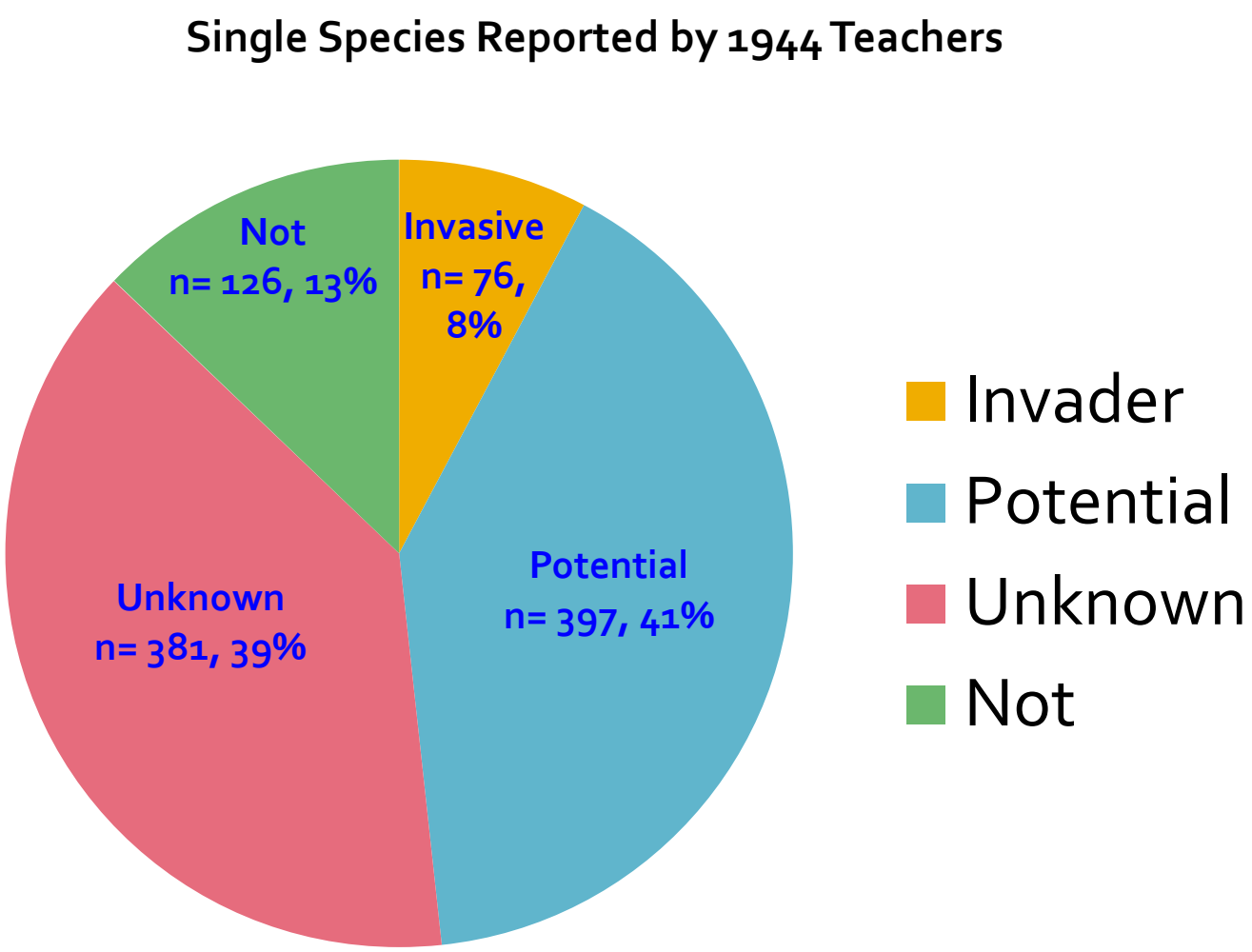
Procambaris clarkii (Red swamp)

Orconectes neglectus (Northern ringed)

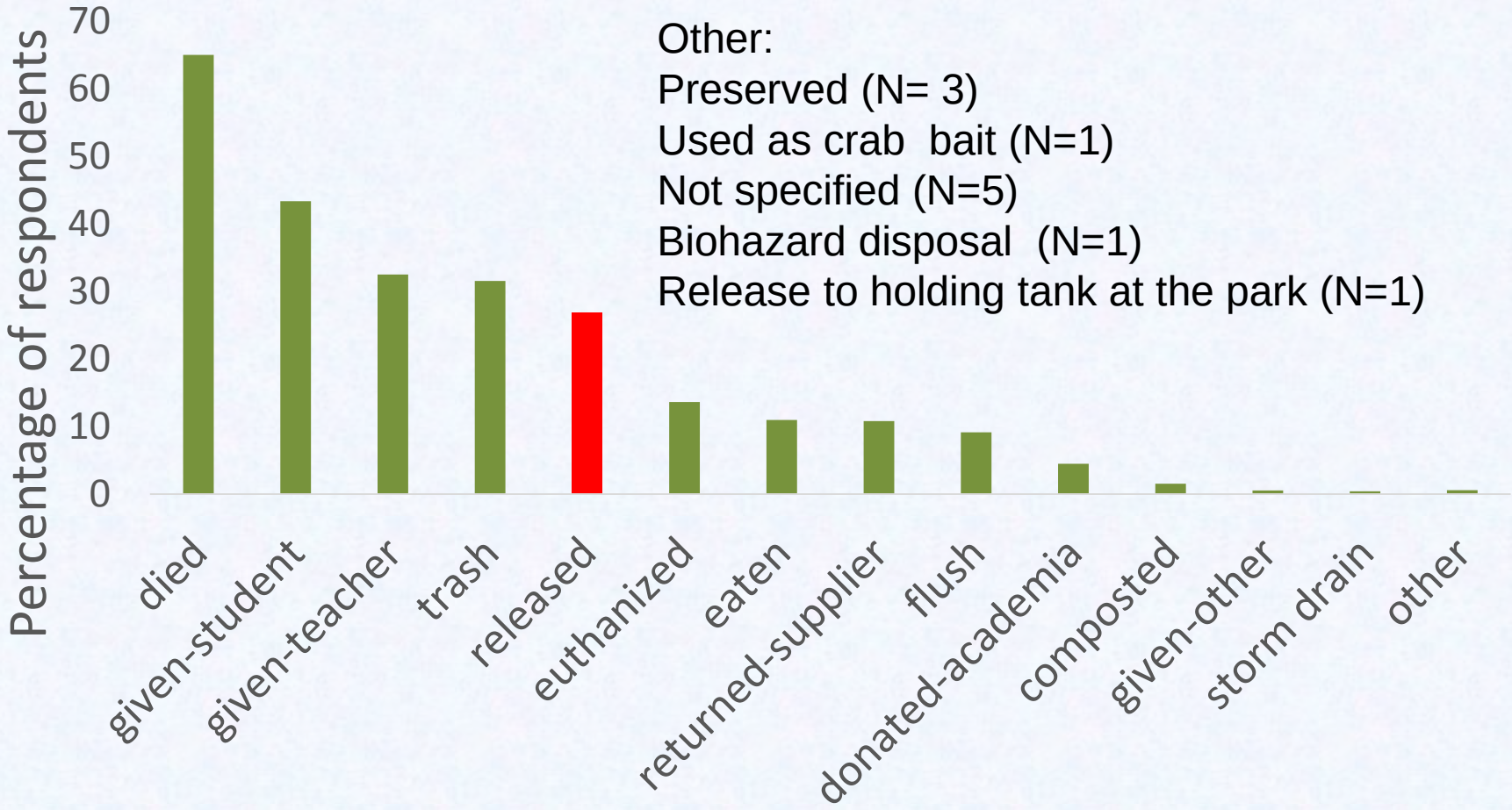
Approx. 32% of Species used in the Classroom are Aquatic



Invasive Status of Species Used in Classrooms (out of nearly 1000 species of organisms reported by teachers)

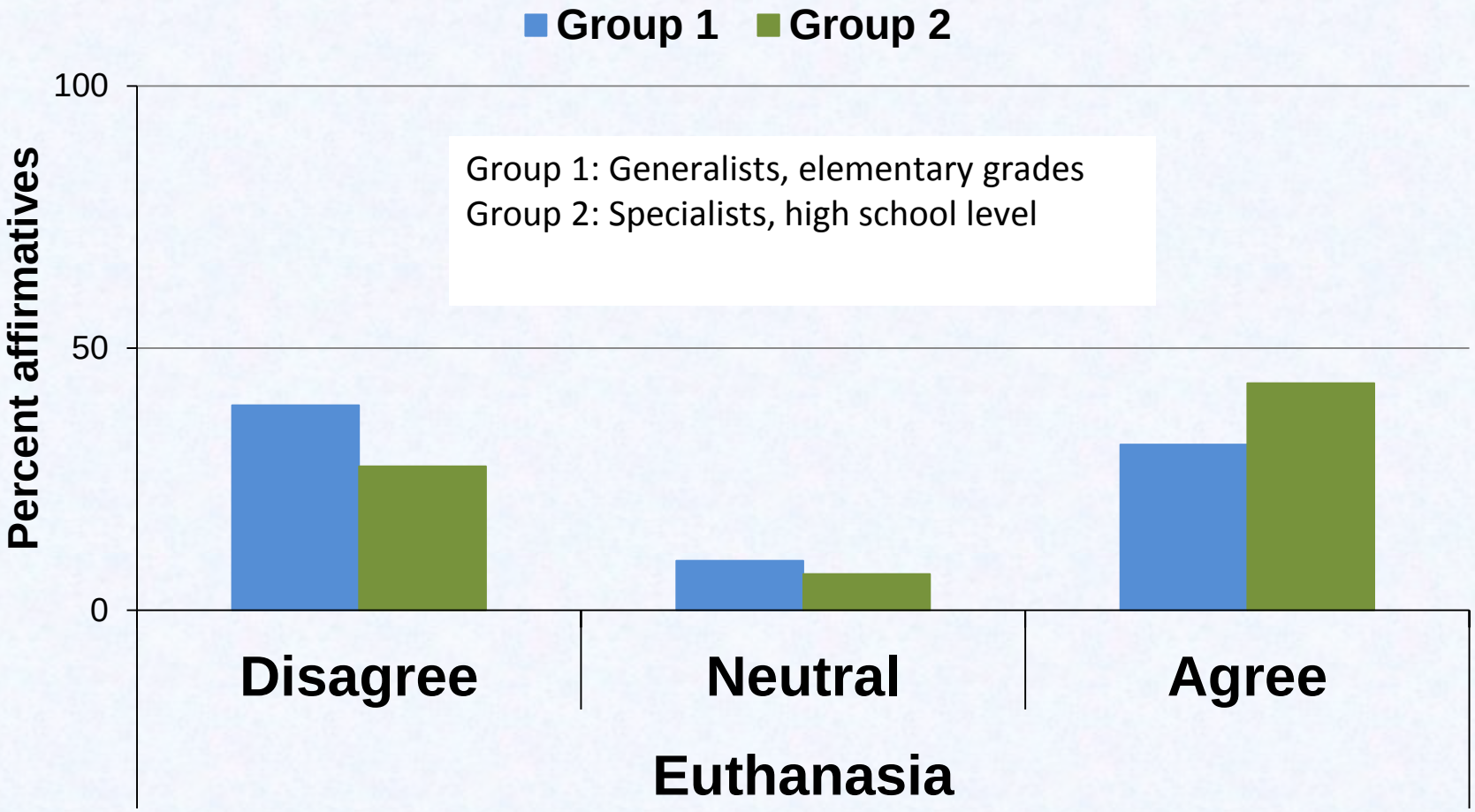


What happens to Classroom Plants and Animals?
N=1979 Teachers



Other:
Preserved (N= 3)
Used as crab bait (N=1)
Not specified (N=5)
Biohazard disposal (N=1)
Release to holding tank at the park (N=1)

Teacher's agreement on Euthanizing Animals Used in Classrooms (n=1944)



6 Research Focus Groups with Teachers : Solutions Suggested by Teachers

- **Live organisms in classrooms have many benefits for scientific inquiry, builds responsibility, fosters social skills and empathy**

- **Lists of invasive/prohibited species for each region**
- **Use only native species, or ban invasives from the classroom**
- **List of BSH's that specialize in native or non-invasive species**
- **List of alternatives to species in kits**
- **Guidelines on catch/release**
- **Guidelines on care/disposal of organisms, and alternatives to euthanasia**

Not that simple to “use natives”

- Not available for much of the school year.
- State regulations only permit harvest between May and Sept.
- Not as hardy and die more quickly in classroom.
- Still need to emphasize “Don’t let it loose”

DON'T LET IT LOOSE!

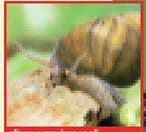
It's bad for your pets. It's bad for the environment.

DISPOSE OF CLASSROOM PLANTS AND ANIMALS PROPERLY!

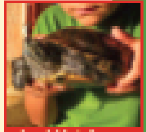
WHY SHOULDN'T I RELEASE CLASSROOM PLANTS AND ANIMALS INTO THE WILD?

Common aquatic plants and animals can become invasive when released into the wild, including:

- goldfish and other aquarium fish
- Chinese mystery snail
- elodea, hydrilla, and other aquarium plants
- crayfish
- red-eared slider turtle



Chinese mystery snail



red-eared slider turtle

WHAT DAMAGE DO INVASIVE SPECIES CAUSE?

- Degrade aquatic habitats
- Outcompete desirable native species
- Decrease biodiversity
- Alter food chains
- Introduce diseases
- Limit recreation
- Damage infrastructure
- Contaminate water resources
- Necessitate expensive controls

WHAT IF MY CLASSROOM PLANT OR ANIMAL IS NATIVE TO MY REGION?

Even if your plant or animal is native to your region, it may carry diseases and should never be released into the wild.

WHAT SHOULD I DO WITH UNWANTED CLASSROOM PLANTS AND ANIMALS?

PLANTS: Completely dry or freeze aquatic plants, then put them in your garbage. Composting should be avoided, as seeds can still sprout.

FISH, INVERTEBRATES, AND REPTILES: Return to the seller or find them a home with a friend or another classroom. Ask the new owner to take a pledge* not to release. If you cannot find a new home for your animal and you want to consider euthanasia as an option, consult a veterinarian.

WATER: The water that contained your aquatic plant or animal could be contaminated and should be sterilized. To sterilize, add 5 drops of bleach for each quart (about 1 liter) of water, 1/4 teaspoon for each gallon, or 5 teaspoons for 10 gallons of water. Put the sterilized water down the toilet or sink—never down a storm drain.

PACKAGING: Invaders can also hitchhike on packaging. Inspect packaging and remove any visible plants or animals. Rinse containers with a bleach solution that contains 2 fluid ounces of bleach per quart of water (or 1/4 cup bleach per gallon of water). Dispose of it in your garbage.

LEARN HOW YOU CAN TAKE ACTION ON THESE WEBSITES!

Fun ways for teachers and students to learn about aquatic invaders:
www.iiseagrant.org/NabInvader

Educational Toolkit on Aquatic Invasive Species:
http://seagrant.oregonstate.edu/invasive-species-toolkit

*Classroom animal adoption pledge:
www.iiseagrant.org/NabInvader/Labs/admin/classroom.html

**Aquatic species regulations database:
www.iiseagrant.org/speciesregs

Ways you can prevent invasions:
www.protectyourwaters.net/prevention

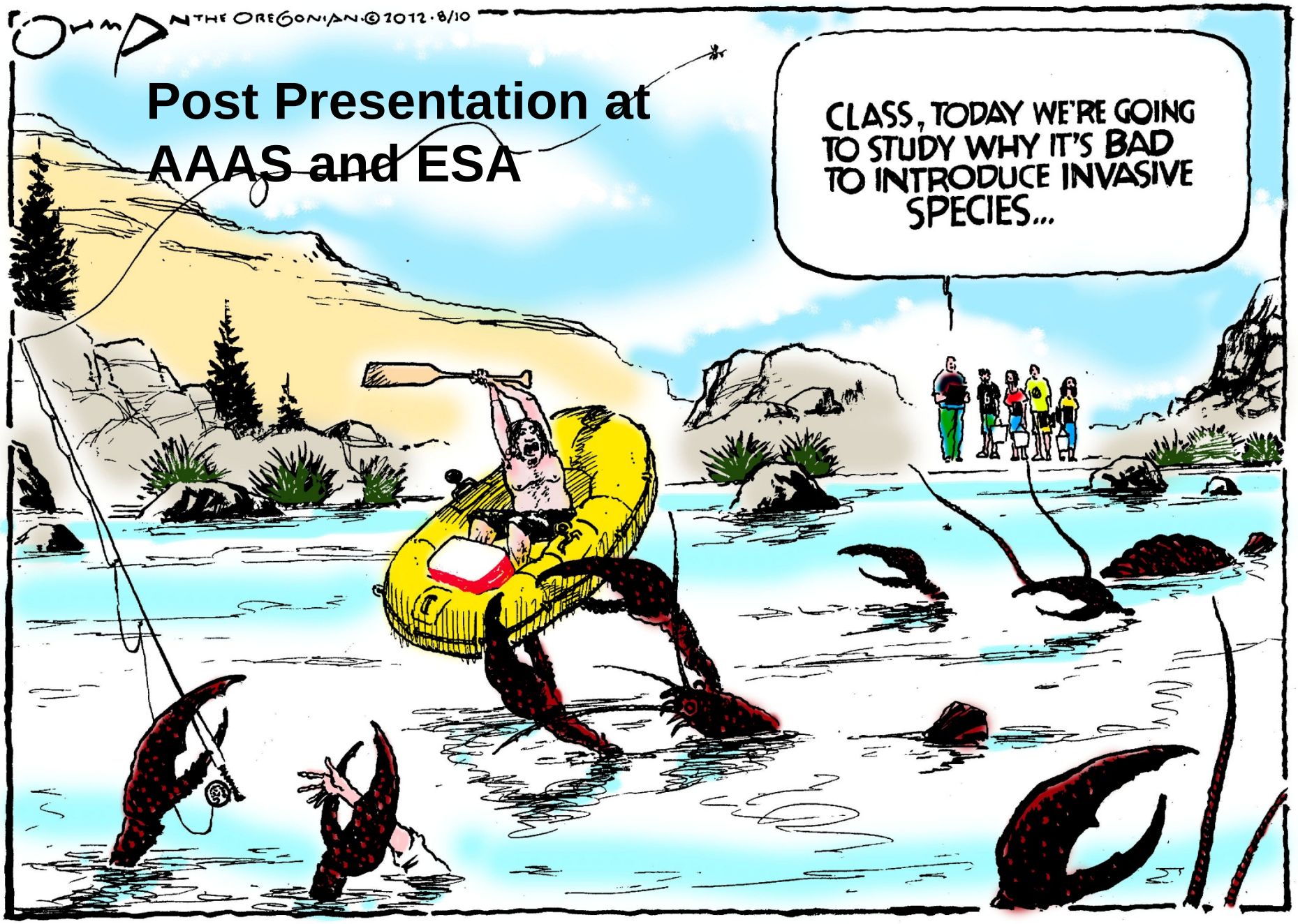
The Urban Ocean Program at USC Sea Grant:
http://www.usc.edu/org/seagrant

Information from Canada about invasive species:
www.InvadingSpecies.com

THINKING OF GETTING A CLASSROOM PLANT OR ANIMAL?

- Plan ahead and research the best species to use in your classroom. Select species that are native or non-invasive.
- Use the aquatic species regulations database** as a resource.
- Develop a plan for future care or disposition of the animal or plant in case it can no longer be held in your classroom.

Sea Grant


THE OREGONIAN © 2012 · 8/10
Post Presentation at AAAS and ESA
CLASS, TODAY WE'RE GOING TO STUDY WHY IT'S BAD TO INTRODUCE INVASIVE SPECIES...

TOPICS > SCIENCE

Classroom Culprits? Invasive Crayfish Threaten Western Waterways

March 10, 2011 at 12:00 AM EST

Vince Patton of "Oregon Field Guide" reports on the threat posed to western waterways by invasive crayfish from the eastern U.S. that had been shipped to elementary schools for biology classes and later released where they don't belong.

EMAIL COMMENTS

MORE VIDEO

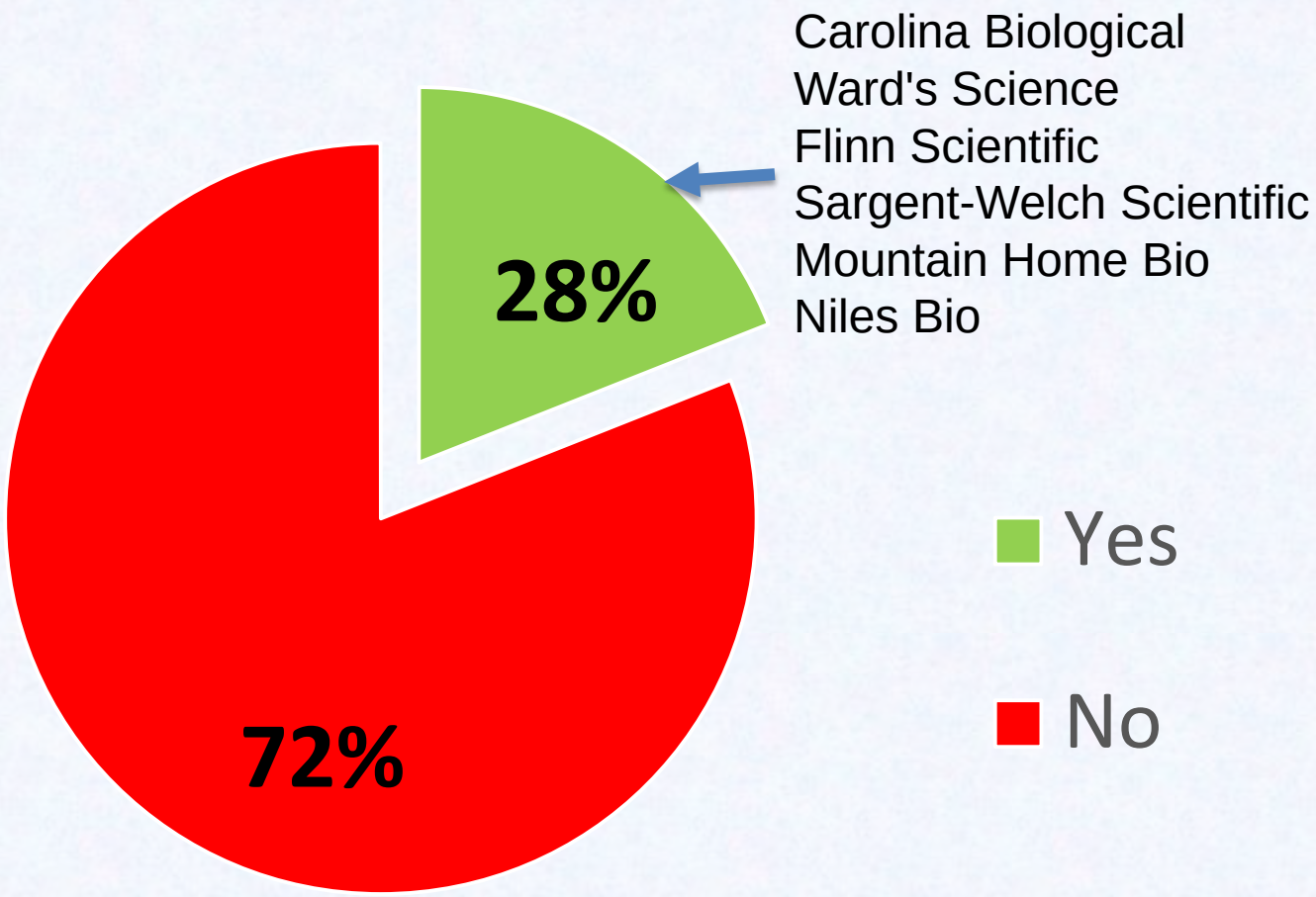

How scientists are tracking a massive iceberg in the making


Students devise science experiment that will really take off


Human moon missions could be on the horizon under Trump

http://www.pbs.org/newshour/bb/science-jan-june11-pledge_03-10/

Proportion of Biological Supply Houses that provide info/guides not to release organisms. (N=21)



n site was searched for the terms "release" "invasive" "live". We also

Live Materials Care Guides

Crayfish

Species: *clarkii*
Genus: *Procambarus*
Family: Pleocyemata
Order: Decapoda
Class: Malacostraca
Subphylum: Crustacea
Phylum: Arthropoda
Kingdom: Animalia

Conditions for Customer Ownership

We hold permits allowing us to transport these organisms. To access permit conditions, click here.

Never purchase living specimens without having a disposition strategy in place.

There are currently no USDA permits required for this organism. In order to protect our environment, never release a live laboratory organism into the wild. Restricted in Arizona. If you live in Arizona, please contact your state agriculture department to obtain a permit. We cannot ship this organism to a customer in Arizona unless they have an individual state permit.

Living Care Information

Procambarus clarkii

CONTENTS

About the Organism

DISPOSAL

Carolina provides living organisms for educational purposes only. As a general policy, we do not advocate the release of organisms into the environment. In some states, it is illegal to release organisms, even indigenous species, without a permit. The intention of these laws is to protect native wildlife and the environment.

We suggest that organisms be:

- Maintained in the classroom.
- Donated to another classroom or science department.
- With parental permission, adopted or taken home by students.
- Donated to a nature center or zoo.
- Disposed of humanely, as a last resort.

Crayfish can be chilled to immobility and then frozen. After being frozen for a few days, they can be thawed, sealed in plastic bags, and disposed of.

It's summer break and my classroom is alive!!

By Candace Berkeley
Product Developer

Incorporating live organisms into your classroom enhances students' understanding of many science concepts. However, you have to determine what to do with these organisms at the end of the school year.

Maintaining the Organisms

There are many options for keeping live organisms over the summer or finding them permanent homes. The following is a list of our suggestions.

- Contact biology teachers at year-round schools in your area. They may be grateful for the contribution to their classroom. Also, daycares and preschools that operate through summer may adopt certain classroom organisms.
- Donate your live organisms to local aquariums or science centers. They may be happy to give the organisms a new home.
- Pack your organisms up and take them home with you. If this won't work, you might make regular visits to your classroom to care for them (depending on the type of organisms, of course). Discuss this option with the school administration to ensure that you can access the classroom all summer and that scheduled school maintenance activities do not preclude this approach.
- Find your organisms a foster home. Many students fall in love with classroom organisms, especially furry ones, and would love fostering them over the summer. Make sure that parents are on board with this plan! **Note:** *Never send any USDA-regulated organisms home with students. Dispose of them according to USDA guidelines.*
- Establish a self-sustaining aquarium for aquatic organisms. Introduce aquatic plants and invertebrates that you used in your classroom. At the end of summer, you just may have a mini ecosystem for your new students to enjoy.

Disposal of Live Organisms

USDA-regulated species or species for which you can find no suitable option for continued care must be disposed of appropriately. Below is a list of guidelines for doing so.

- Allow plants to die naturally and then dispose of them in the trash. You may also bag living plants and place them in a freezer for at least 24 hours to kill them. Then discard the bag in the trash. **Note:** *Do not put any living plants in the trash; they may be invasive species.*
- Freeze small crustaceans, protists, and aquatic invertebrates and then discard them in the trash. If suitable, feed them to aquarium fish.
- Place unwanted terrestrial invertebrates, e.g., pill bugs and all life cycle stages of butterflies, in a sealed container and freeze for 24 hours. Then discard in the trash.
- Autoclave containers of microorganisms, e.g., bacteria and fungi, and place them in the trash. If an autoclave is unavailable, soak all the containers and media in a bleach solution (1 part household bleach to 9 parts water) for 24 hours and then discard.

Protecting the Environment

It is important that you follow your local, state, and federal guidelines and regulations for handling and caring for live organisms in your classroom—and for dealing with them after your use. We at Carolina Biological Supply Company do not advocate releasing live organisms into the outdoors. Many environmentally disruptive populations of invasive species began with the intentional release of individuals. Even a species that is native to your area may disrupt the local gene pool if released. In addition, individuals from one area may harbor diseases or pests to which local populations or other local species are vulnerable.

Review Order

Shipping Address Edit

TANIA SIEMENS
2055 GRANT ST
EUGENE, OR 97405-1569

tania.j.siemens@gmail.com
(541) 914-0701

Billing Address

Same as Shipping Address ▼

TANIA SIEMENS
2055 GRANT ST
EUGENE, OR 97405-1569
(541) 914-0701

Payment Details

Enter Credit Card Info

Submit My Order

Your Items

Living & Perishable Items

DELIVERY DATE	ITEM #	PRODUCT	QTY	YOUR PRICE	ITEM TOTAL
10/30/2019 Second Day Air	142502	Crayfish, Large, Living, Pack of 12	1	$49.40	$49.40

Additional Instructions:

Please enter any special shipping instructions or notes for your order (maximum 120 characters)

Item Total	$49.40
Freight & Handling	$21.95
Tax	$0.00
Total	$71.35

Submit My Order

Structures of Life Extension: Learning about Invasive Species through Art and Scienc

By Danielle Goodrich, Tania Siemens, Jennifer Lam, Sam Chan, Oregon Sea Grant College Program, Oregon State University and Jeff Adams, Washington Sea Grant; Julian Olden, University of Washington; Linda Chilton, USC Sea Grant; Marsha Gear, California Sea Grant; and Thea Hayes, Portland Public Schools, Portland, Oregon

FIGURE 1: STONE SOUP © JAN ELIOT. REPRINTED WITH PERMISSION OF UNIVERSAL UCLICK. ALL RIGHTS RESERVED.

In a wonderful blend of art and science, nationally syndicated *Stone Soup* creator Jan Eliot depicts her character Alix, a young girl and "budding" scientist, innocently releasing an invasive crayfish into the wild. Th

crawdad), are vital to helping students understand science, and stimulating inquiry to the world outside of the traditional classroom. Yet, after the lesson, teachers must decide what to do

Classroom Guidelines for Preventing the Introduction and Spread of Aquatic Invasive Species (AIS)

- ***When obtaining a live study specimen for your classroom:***
- **Research** and **select** species that comply with laws and regulations[2].
- **Confirm** the scientific name of plants or animals with the vendor.
- **Inspect the contents and packaging that arrives with your organism.** Remove any unwanted seeds, plants, animals and dispose via guidelines below.
- **Report** to your state/provincial natural resources agency if you suspect an organism may have escaped
- **Dispose** of packaging materials in a sealed plastic bag in the trash.
- **Sterilize** discarded water and **dispose** sterilized water down the toilet or sink—never down a storm
- ***What to do with unwanted plants and animals?:***

Adopting a Classroom Animal

Pledge Form

DON'T LET IT LOOSE!

By adopting this classroom animal, I hereby pledge to:

1. Never release or allow this animal to escape into the environment;

   (Releasing an animal can be harmful to both the animal and the environment. It may be illegal to release animals and plants in your state.*)

2. Provide and properly care for the animal's essential needs (see animal care sheet on back);
3. Share this pledge with anyone wishing to adopt this or another animal.

Date: _____

Species being adopted: _____

Student (print name): _____

Student Signature: _____

Parent/Guardian (print name): _____

Parent/Guardian Signature: _____

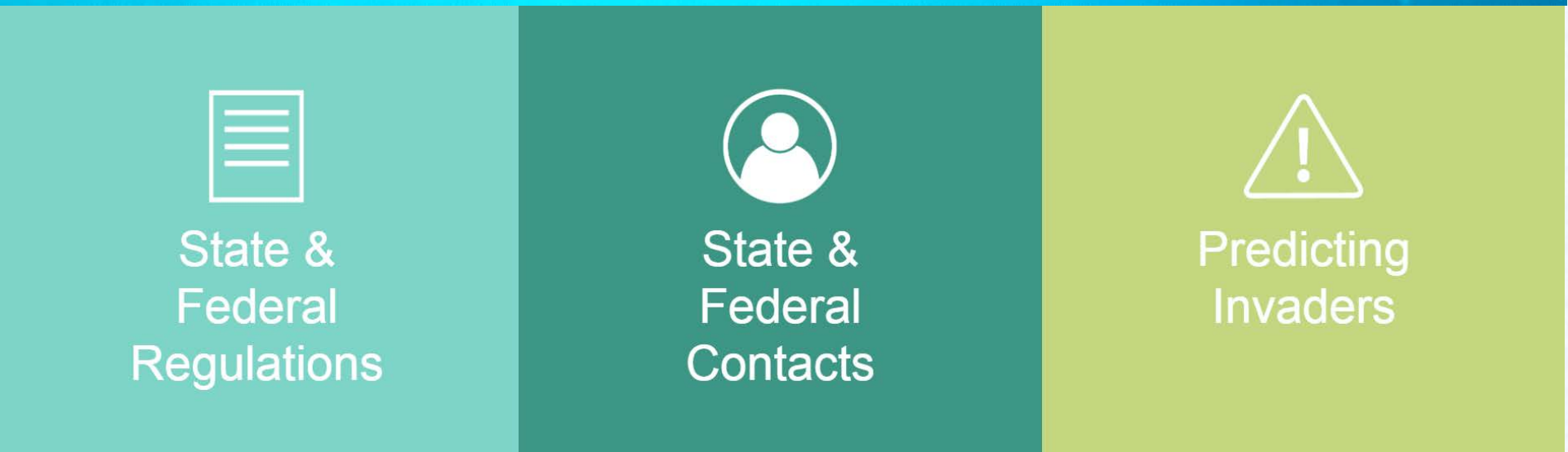
Teacher (print name): _____

Teacher Signature: _____

*Please check with your state wildlife agency/local natural resource agency or visit www.ilseagrant.org/speciesregs regarding the regulation for your state.

Take AIM: http://takeaim.org/

Aquatic Invaders in the Marketplace



Internet Sales of AIS will Continue to Expand!
Without Outreach, Easily Accessible, Updated Databases, Collaboration from the Virtual Marketplace and Enforcement

Pet Supplies | Pet Profiles | Dogs | Cats | Fish & Aquatics | Small Animals | Birds | Reptiles | Horses | Deals & Coupons | Pet Care Tips | Subscribe & Save | Dash Buttons

amazonfresh — Save up to 40% on groceries — Shop now

‹ Back to results

Roll over image to zoom in

Toledo Goldfish Live Crayfish for Koi Ponds, Goldfish Aquariums or Tanks – Live Crawdads – Born and Raised in The USA - Live Arrival Guarantee

by Toledo Goldfish

4.5 stars — 19 ratings | 17 answered questions

Price: $40.00 Prime FREE Delivery

Get $70 off instantly: Pay $0.00 ~~$40.00~~ upon approval for the Amazon Prime Rewards Visa Card. No annual fee.

Size: **25 Count**

5 Count	10 Count	**25 Count**	50 Count	75 Count
$35.00	$39.99	**$40.00**	$65.00	$80.00
prime	prime	prime	prime	prime

100 Count
$100.00
prime

$40.00
Prime FREE Delivery

This item cannot be shipped to your selected location.

In Stock.
Ships from and sold by Toledo Goldfish.

Qty: 1

$40.00 + Free Shipping

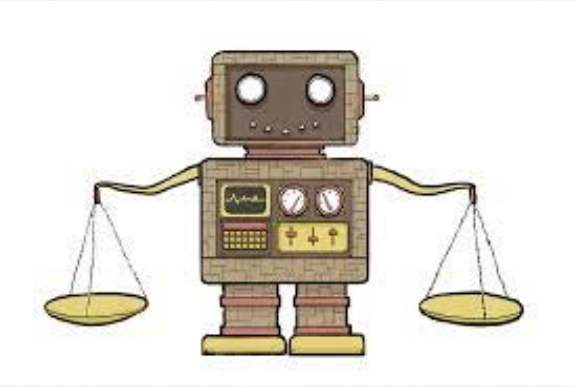
Add to Cart

Buy Now

Eugene

Regulatory Solutions?

- Prohibiting/regulating import, sale and or release of non-native/invasive crayfish
  - Keeping lists and regulatory databases up to date
  - Challenging for users to keep up with all species
- Permits for education use and disposition
  - School districts in Oregon, WA* must obtain permit and agree to euthanize and properly dispose
    - Effective only with outreach and permit admin funding



NEXT STEPS

- Renewed outreach with Biological Suppliers as AIS Prevention Partners
- Renewed “Don’t Let it Loose” education campaigns through state, provincial and national science teacher’s organizations
- Embark ona new collaborative focused teacher’s survey?
- How do teachers, school districts & BSHs find the information they need on species regulations?

Thanks again to all of our partners

- Sam Chan, Jennifer Lam, Tania Siemens, Tim Miler-Morgan, DVM and Danielle Goodrich, Oregon Sea Grant
- Linda Chilton, USC Sea Grant
- Marsha Gear, California Sea Grant
- Jeff Adams, Washington Sea Grant, Julian Olden, University of Washington
- Robin Goettel, Pat Charlebois, Danielle Hildrich , Illinois/Indian Sea Grant
- Doug Jensen, Minnesota Sea Grant
- Erika Jensen, Great Lakes Panel
- Thea Hayes, Portland Public Schools, Oregon Invasive Species Council, Education consultant
- Jeff Brinsmead, Ontario Ministry of Natural Resources, Canada
- Robyn Draheim, USFWS
- Chuck Jacoby, University of Florida, St. Johns River Water Management District, Palatka, FL & Indian River Lagoon National Estuary Program
- Wei-Ying Wong, Philadelphia Zoo
- Helen Domske, New York Sea Grant
- Rochelle Sturtevant, NOAA GLERL
- Susan Pasko, NOAA, USFWS
- Laura Norcutt , USFWS consolidated reviews from the ANSTF Spring Meeting
- Isabelle Desjardins, Quebec Ministère du Développement durable, de l'Environnement, de la Faune et des Parcs

Thank you!


WHERE'S PINCHY?
Stone Soup
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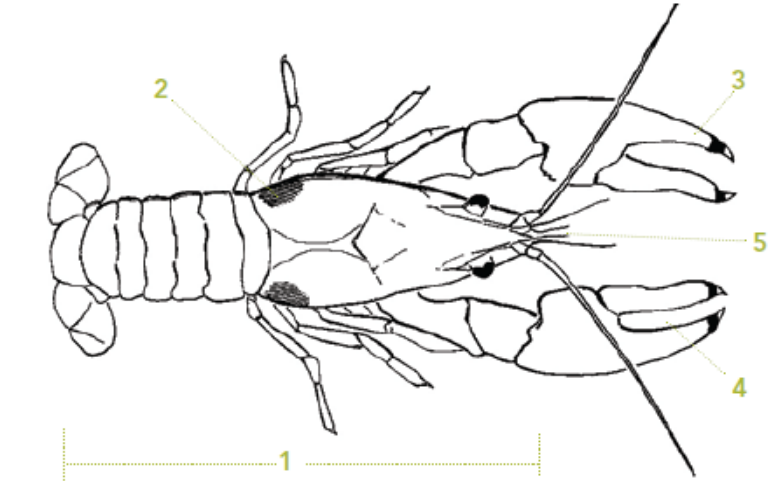
Rusty Crayfish

Orconectes rusticus



Rusty crayfish line drawing. Drawing: Minnesota Sea Grant

What You Can Do

- Learn how to identify rusty crayfish and how to prevent accidentally spreading this invasive species.
- If you want to use crayfish as bait, you may only use them in the waterbody in which they were caught. It is illegal to transport them over land. The maximum number of live crayfish you can have in your possession at one time is 36.
- If you have any information about the illegal importation, distribution or sale of rusty crayfish, report it immediately to the Ministry of Natural Resources TIPS line at 1-877-TIPS-MNR (847-7667) toll-free any time, or contact your local Ministry of Natural Resources office (ontario.ca/mnroffices) during regular business hours. You can also call Crime Stoppers anonymously at 1-800-222-TIPS (8477).
- If you've seen a rusty crayfish or other invasive species