Food Webs, Contaminants, Ecosystems, and You

January 27, 2026

Dr. Olin E. Rhodes, Jr. – Director SREL
Professor, University of Georgia (UGA)

UNIVERSITY OF GEORGIA
Savannah River Ecology Laboratory

SREL History

1951 - Atomic Energy Commission (AEC) had concerns about environmental impacts resulting from Savannah River Site (SRS) construction and operations.

Dr. Eugene Odum

1951 to present – Funding from AEC, ERDA, and Department of Energy (DOE)

1954 – Established permanent lab on the SRS

1977 – Established current lab facilities

UNIVERSITY OF GEORGIA
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The University of Georgia operates SREL on the SRS under a Cooperative Agreement with DOE and is funded by a combination of DOE-EM, DOE-NNSA and other external funding sources, including USDA, DoD, COE, NSF, state agencies, and private NGO's. **SREL has been on the SRS for 75 years.**

SREL's Mission

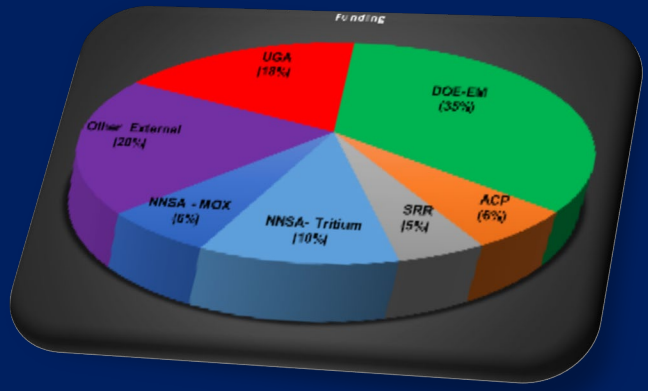
"To provide the public with an independent evaluation of the ecological effects of SRS operations on the environment" through:

- **Education** and research training for undergraduate and graduate students
- **Service** to the community through environmental outreach activities
- An interdisciplinary program of field and laboratory **Research** conducted largely on the SRS and published in the peer-reviewed scientific literature

SREL's Value Proposition to DOE

SREL is a significant scientific asset to the DOE and its contractors on the SRS

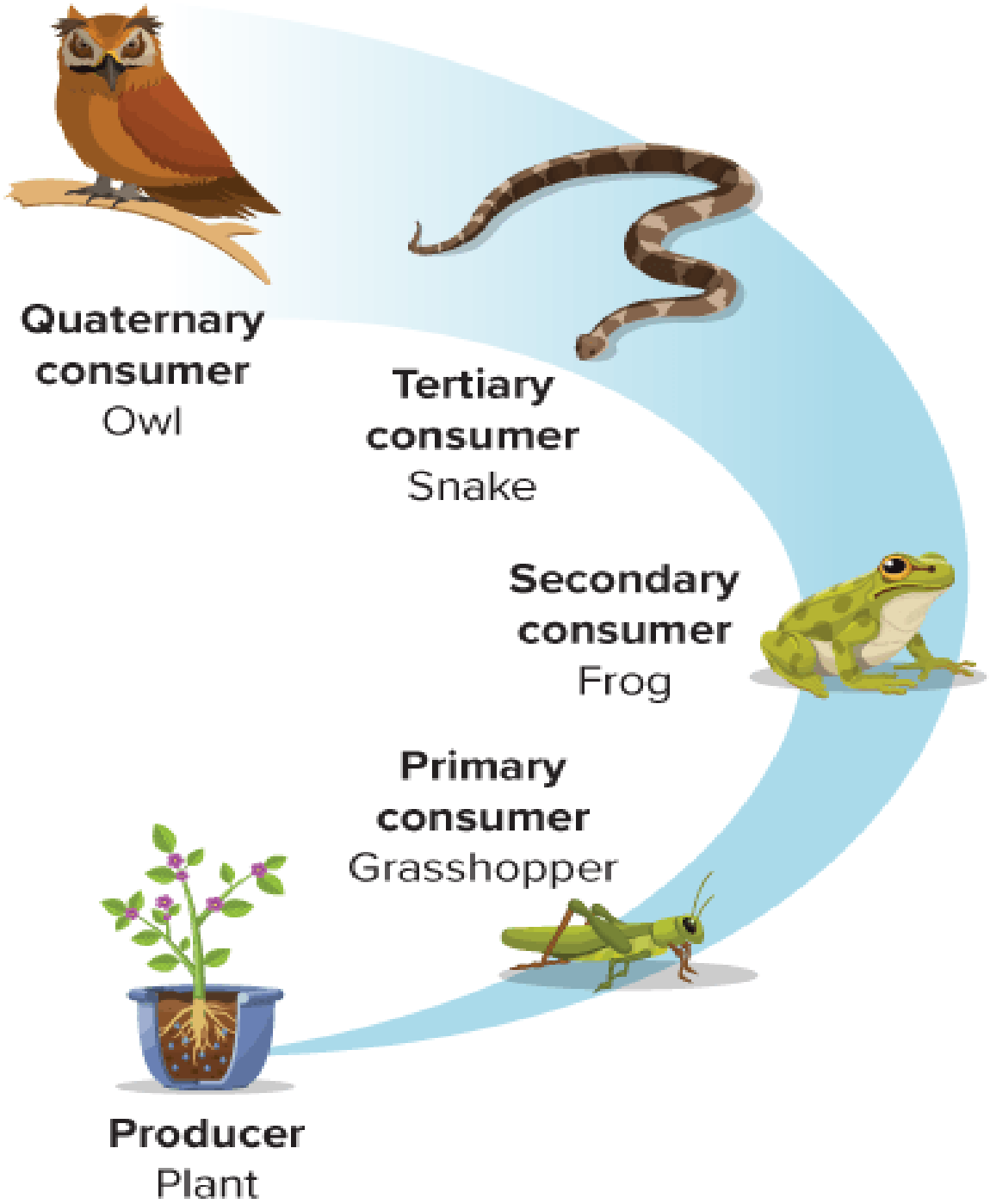
SREL is a good investment by DOE on the SRS

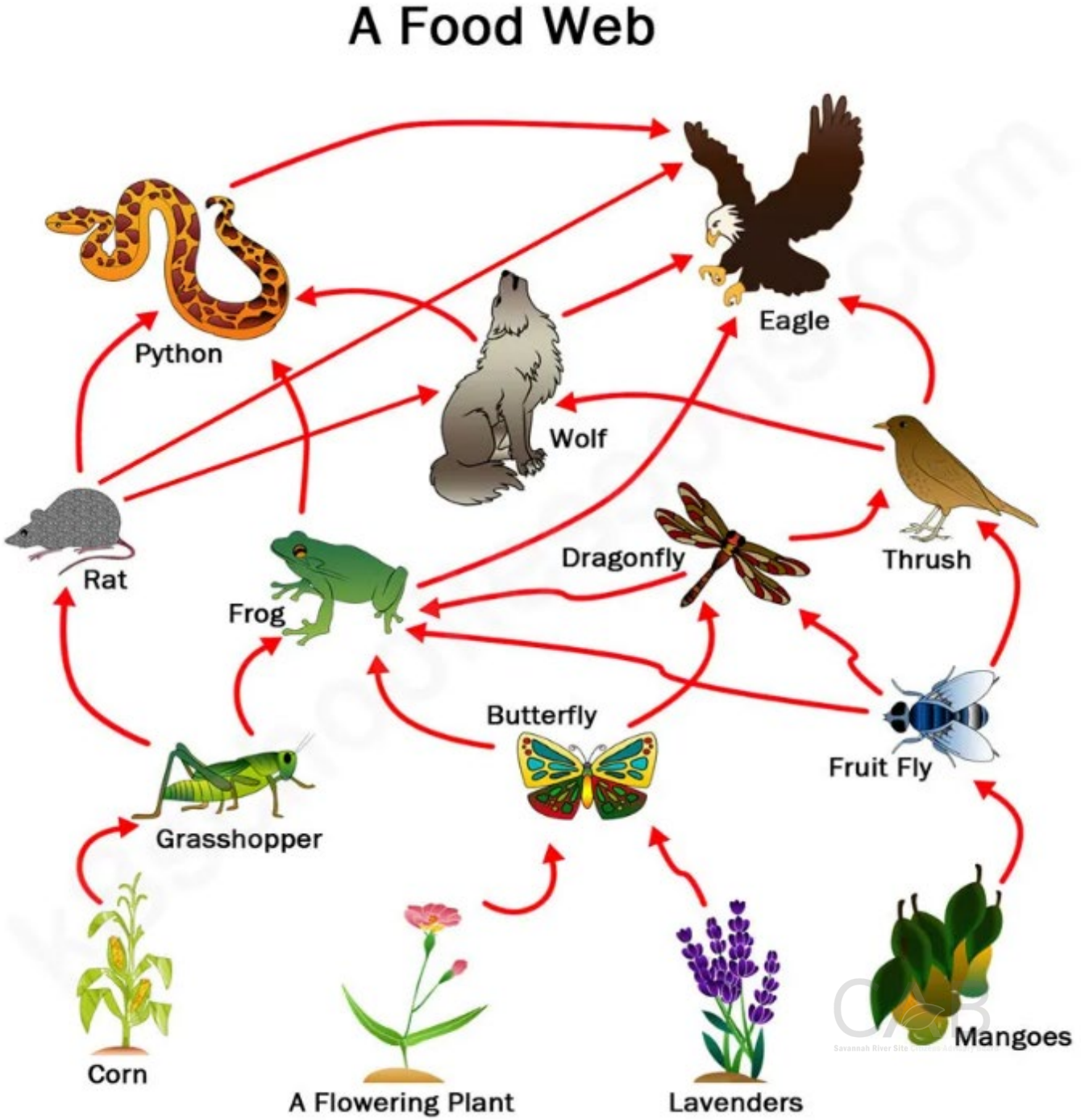


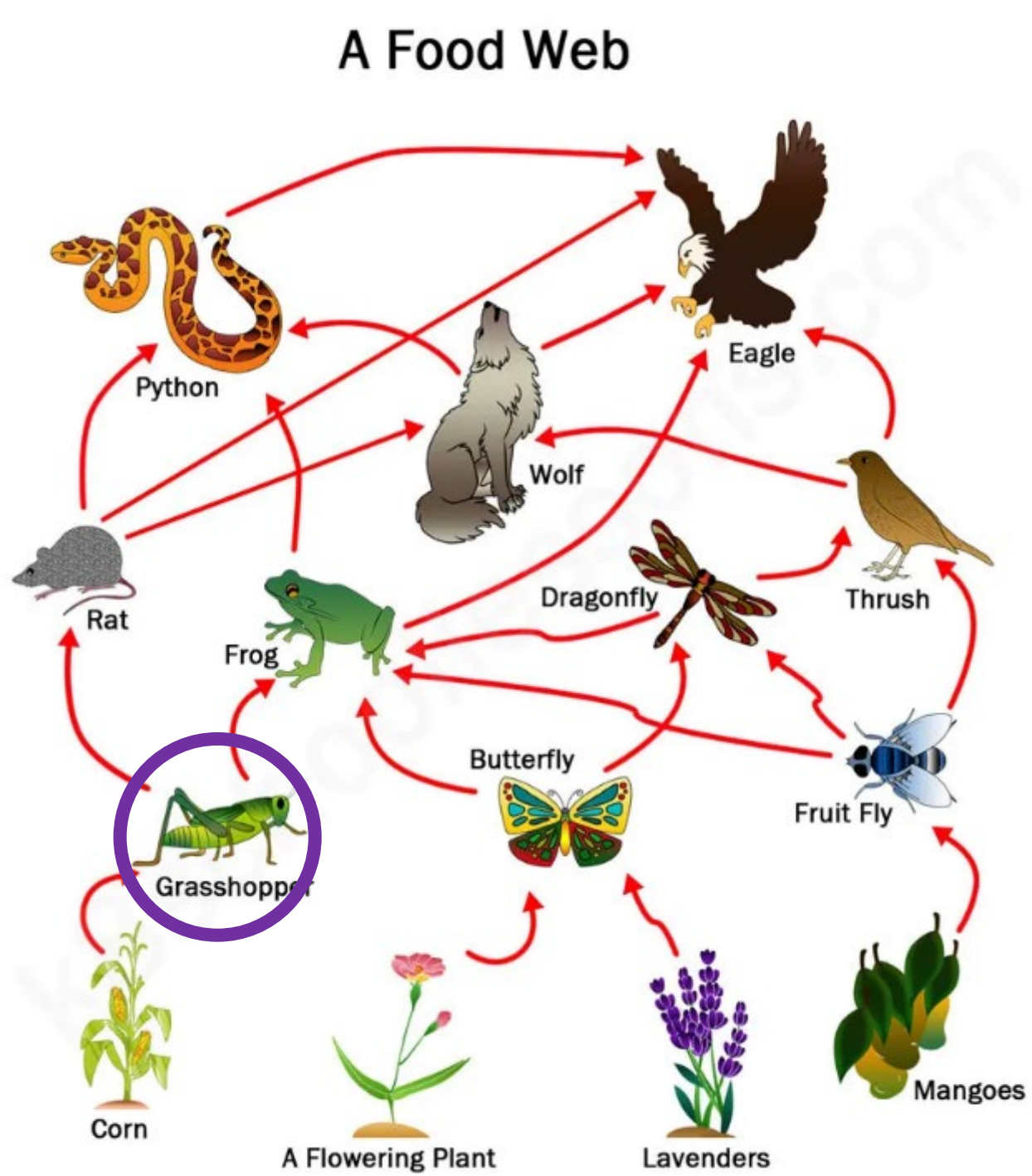
SREL's outreach program builds public trust in local communities

SREL's education programs fill gaps in critical scientific expertise for SRS and the nation

Trophic Transfer & Food Webs


Quaternary consumer
Owl
Tertiary consumer
Snake
Secondary consumer
Frog
Primary consumer
Grasshopper
Producer
Plant


A Food Web
Python
Eagle
Wolf
Rat
Frog
Dragonfly
Thrush
Butterfly
Fruit Fly
Grasshopper
Corn
A Flowering Plant
Lavenders
Mangoes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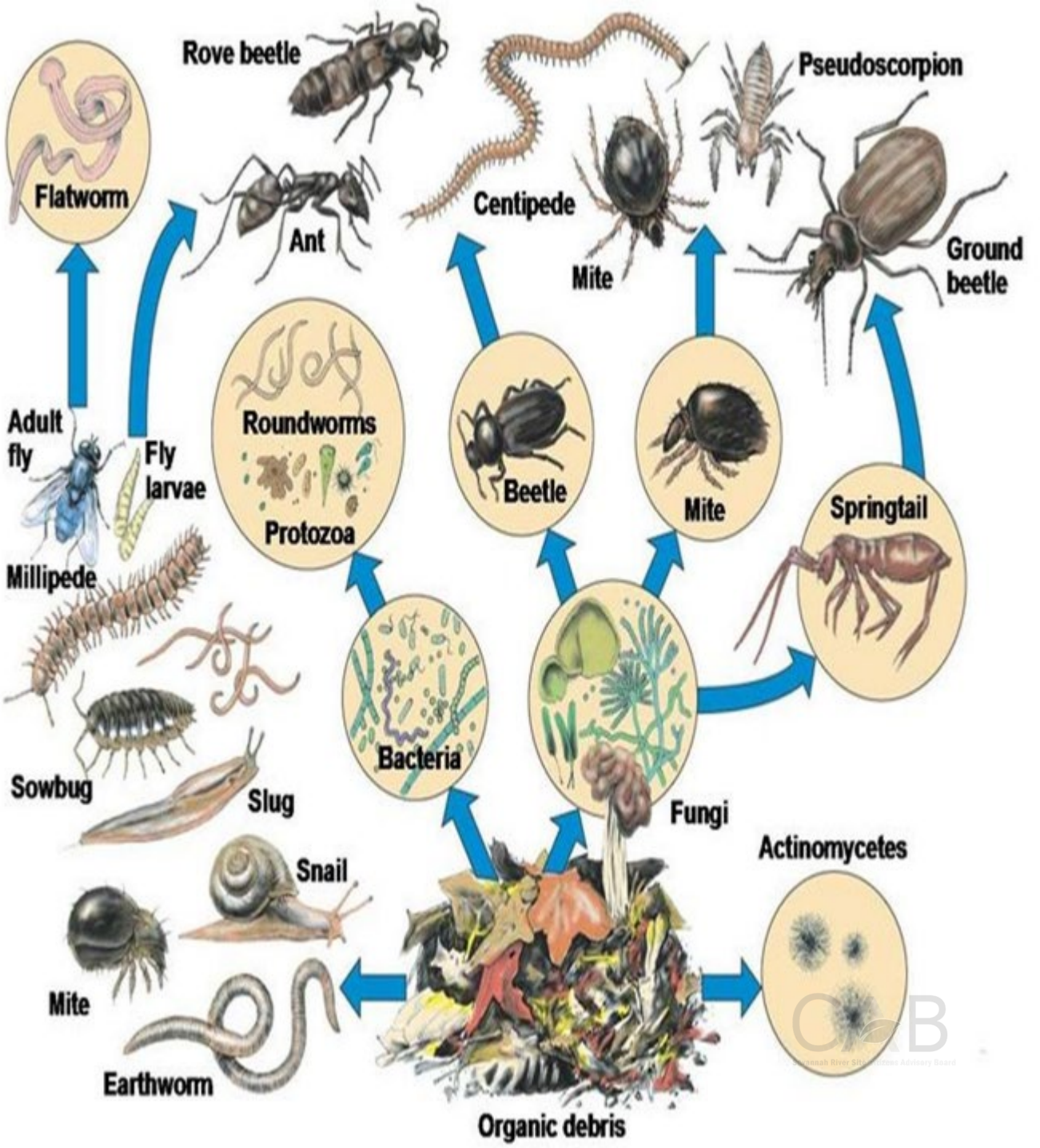
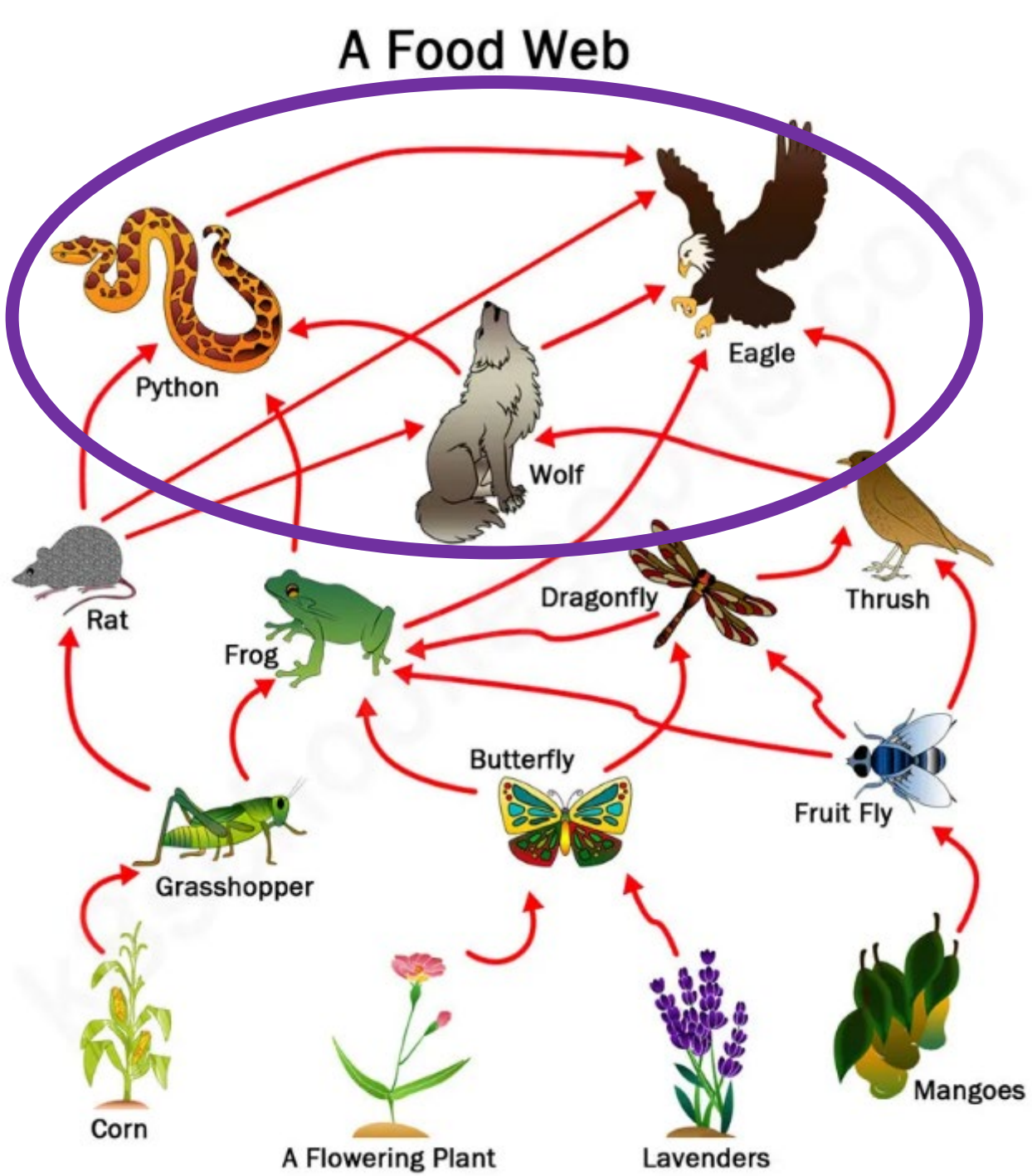

Rove beetle
Pseudoscorpion
Flatworm
Ant
Centipede
Mite
Ground beetle
Adult fly
Fly larvae
Roundworms
Protozoa
Beetle
Mite
Springtail
Millipede
Bacteria
Fungi
Sowbug
Slug
Snail
Actinomycetes
Mite
Earthworm
Organic debris

A Food Web


Python
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Corn
A Flowering Plant
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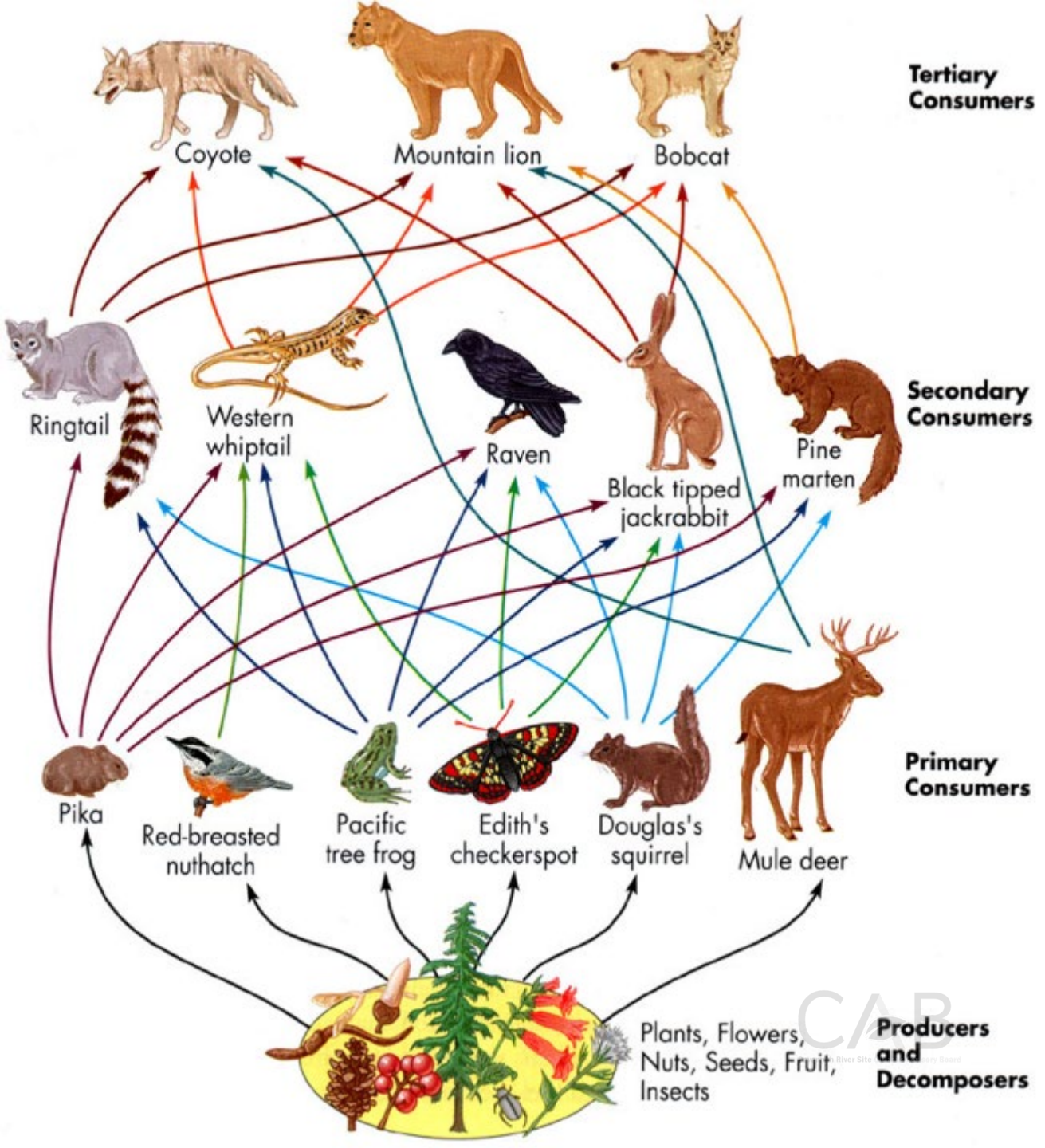
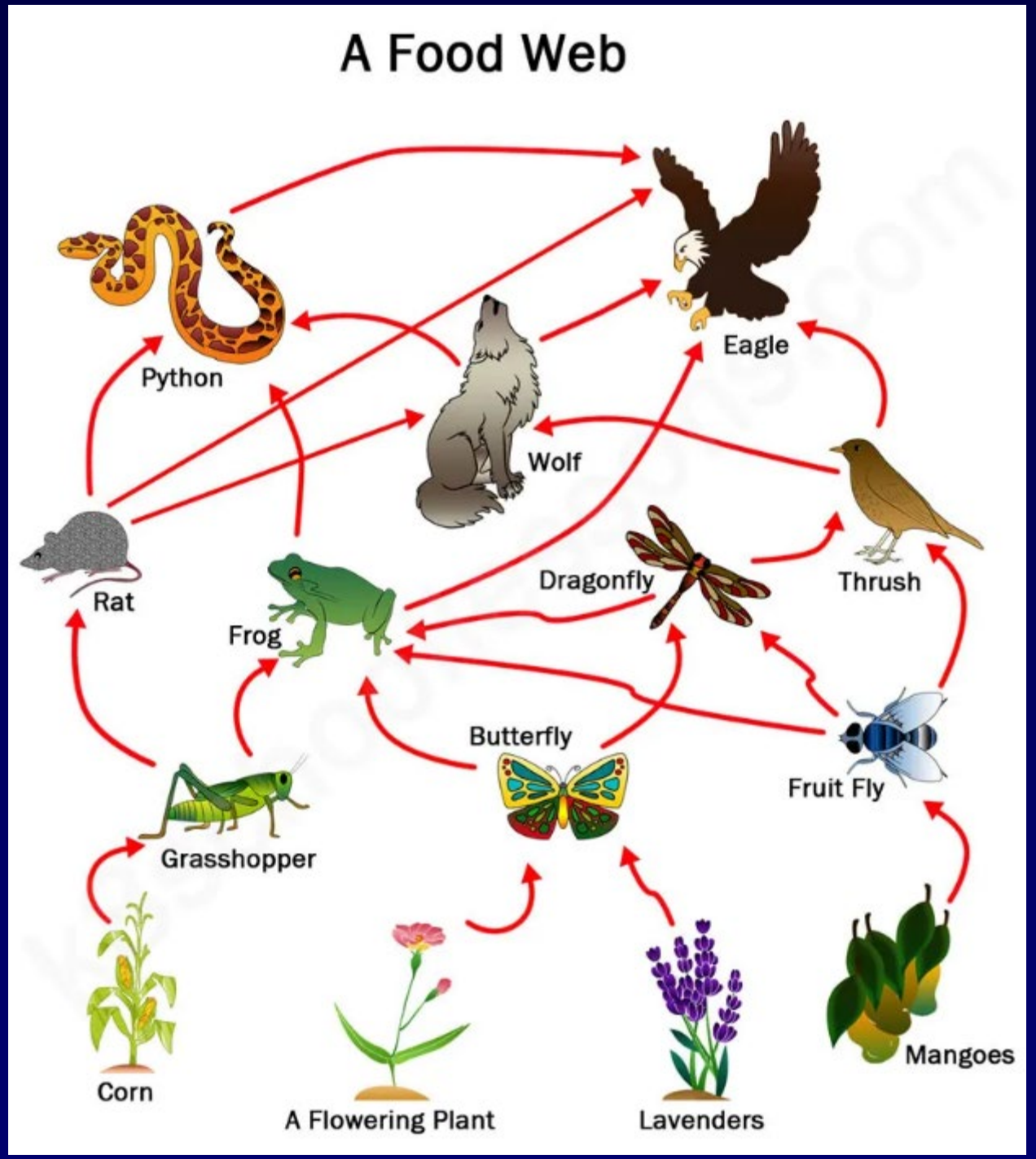
Mangoes


Tertiary Consumers
Coyote
Mountain lion
Bobcat
Secondary Consumers
Ringtail
Western whiptail
Raven
Black tipped jackrabbit
Pine marten
Primary Consumers
Pika
Red-breasted nuthatch
Pacific tree frog
Edith's checkerspot
Douglas's squirrel
Mule deer
Producers and Decomposers
Plants, Flowers, Nuts, Seeds, Fruit, Insects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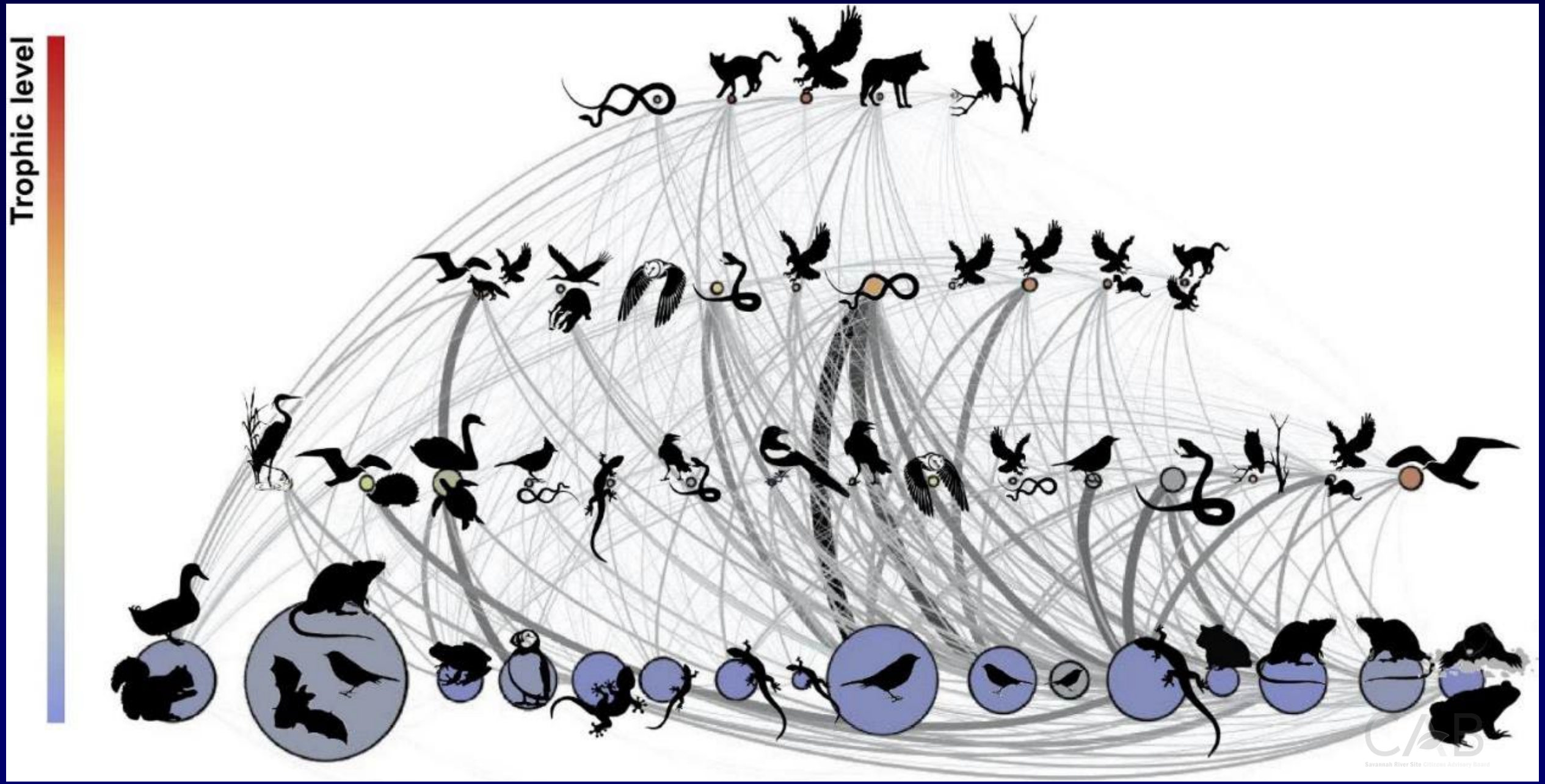

Trophic level

Important Concepts

Bioaccumulation

Biomagnification

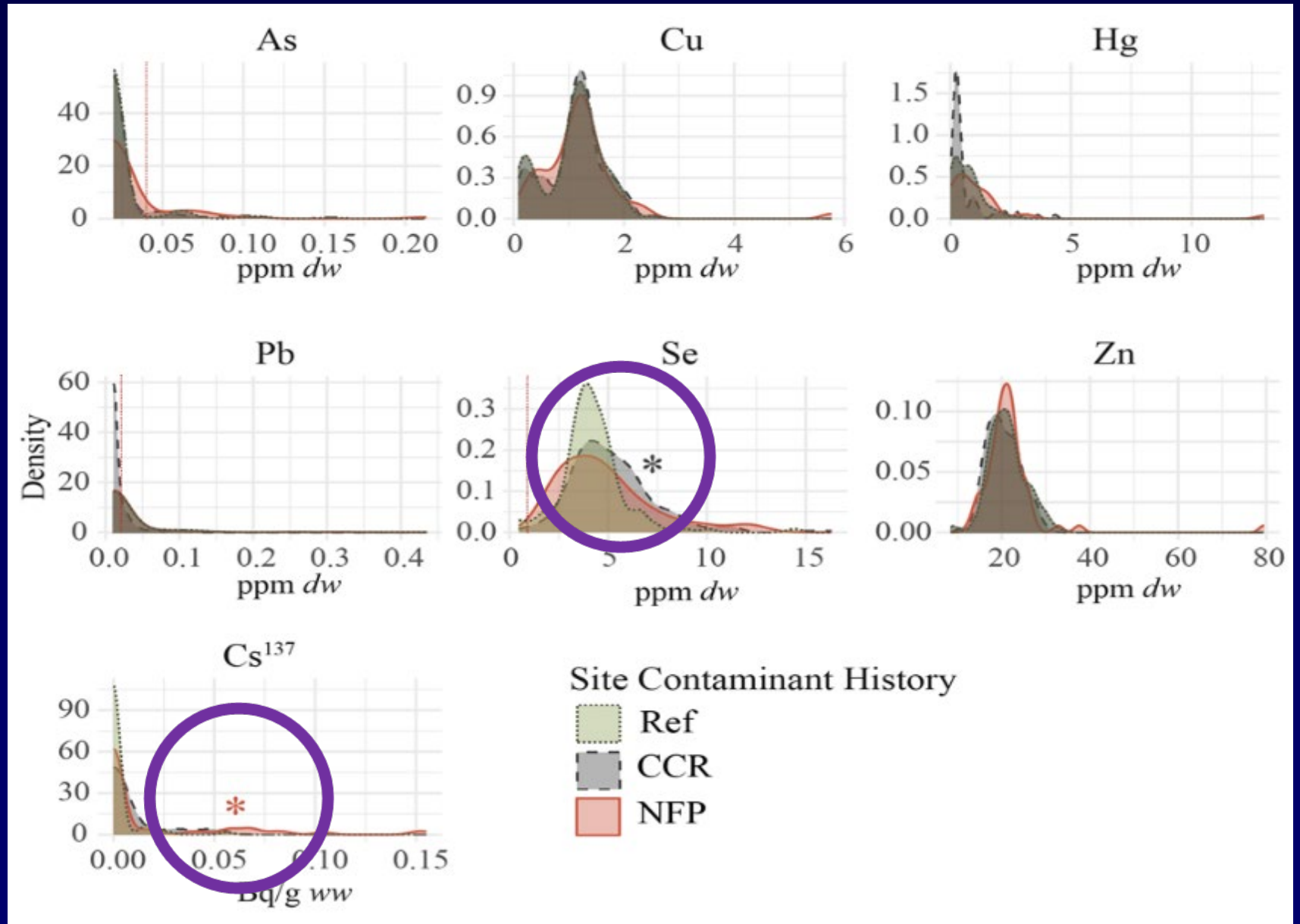
Tissue Specificity

Hyperaccumulation

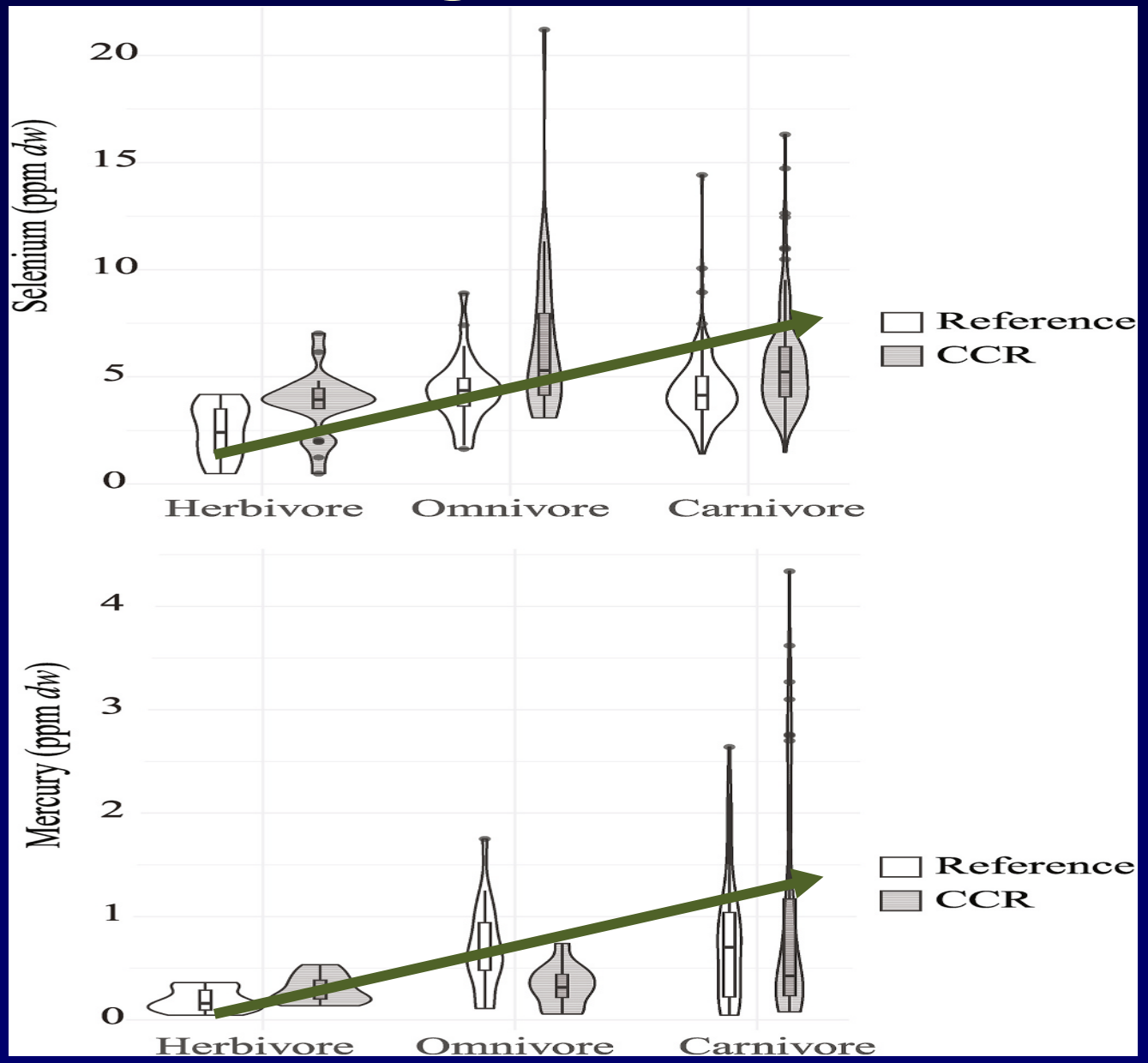
Exposure Pathways


TIME
CONTAMINANT

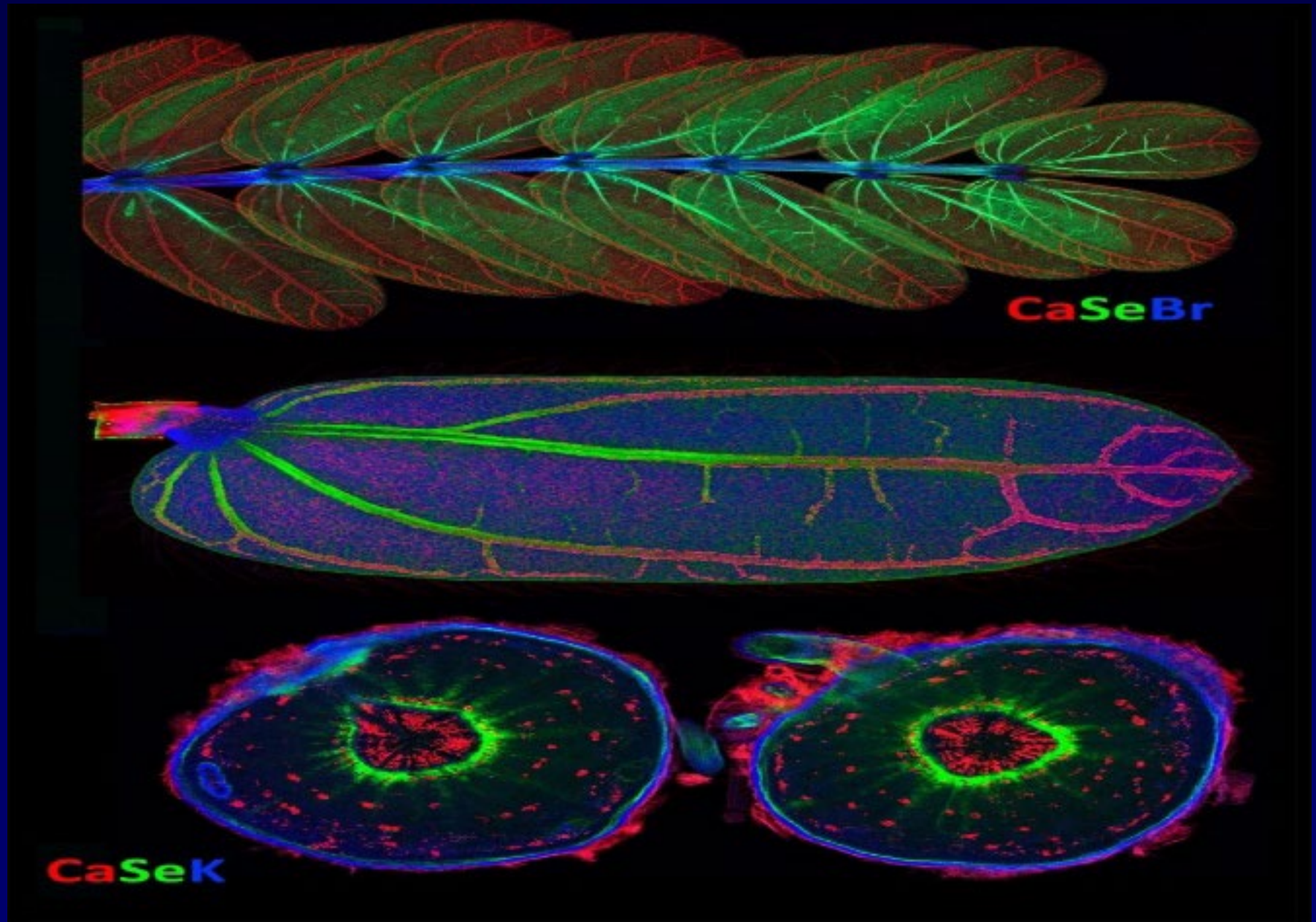
Bioaccumulation



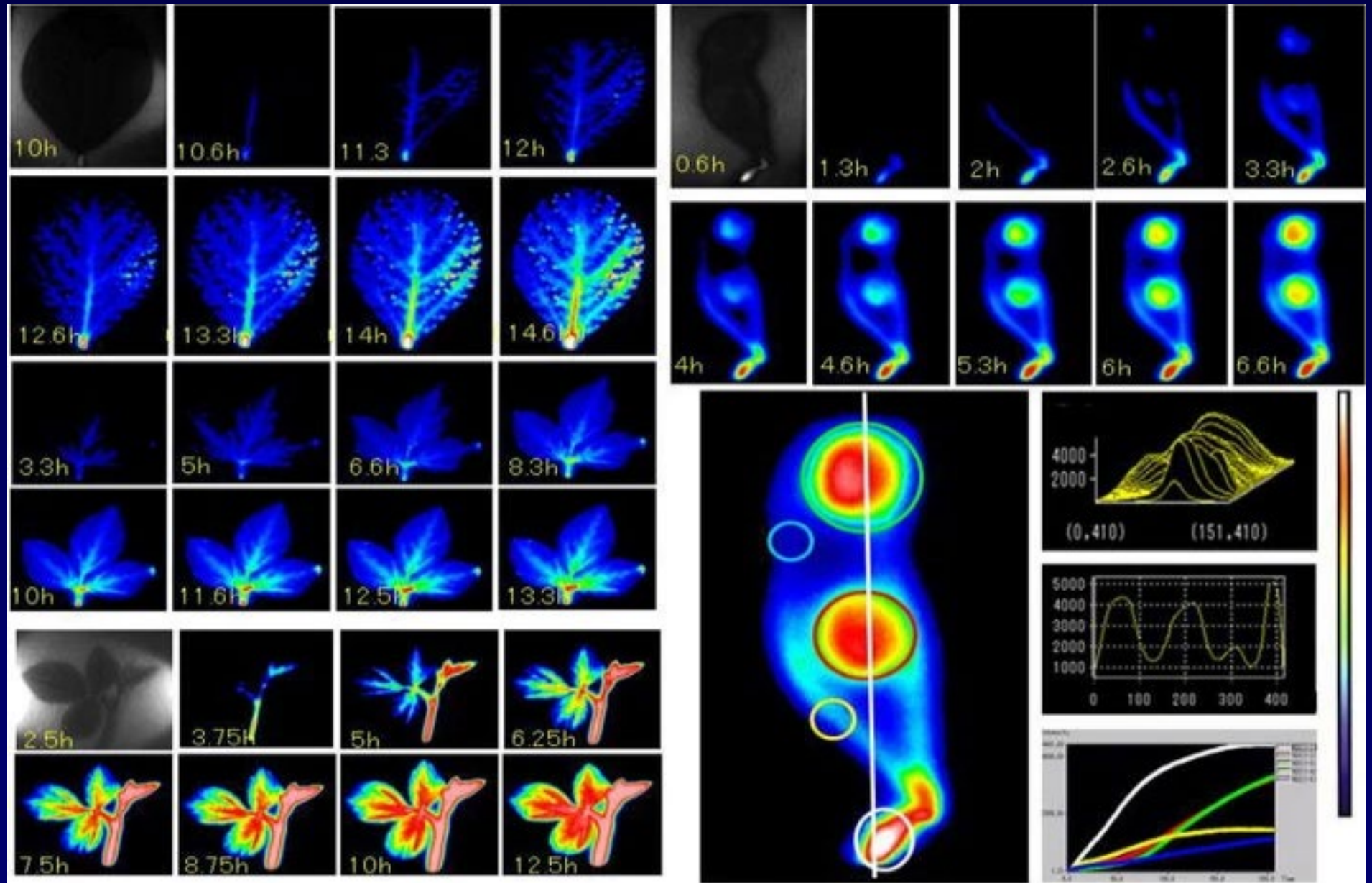
Biomagnification



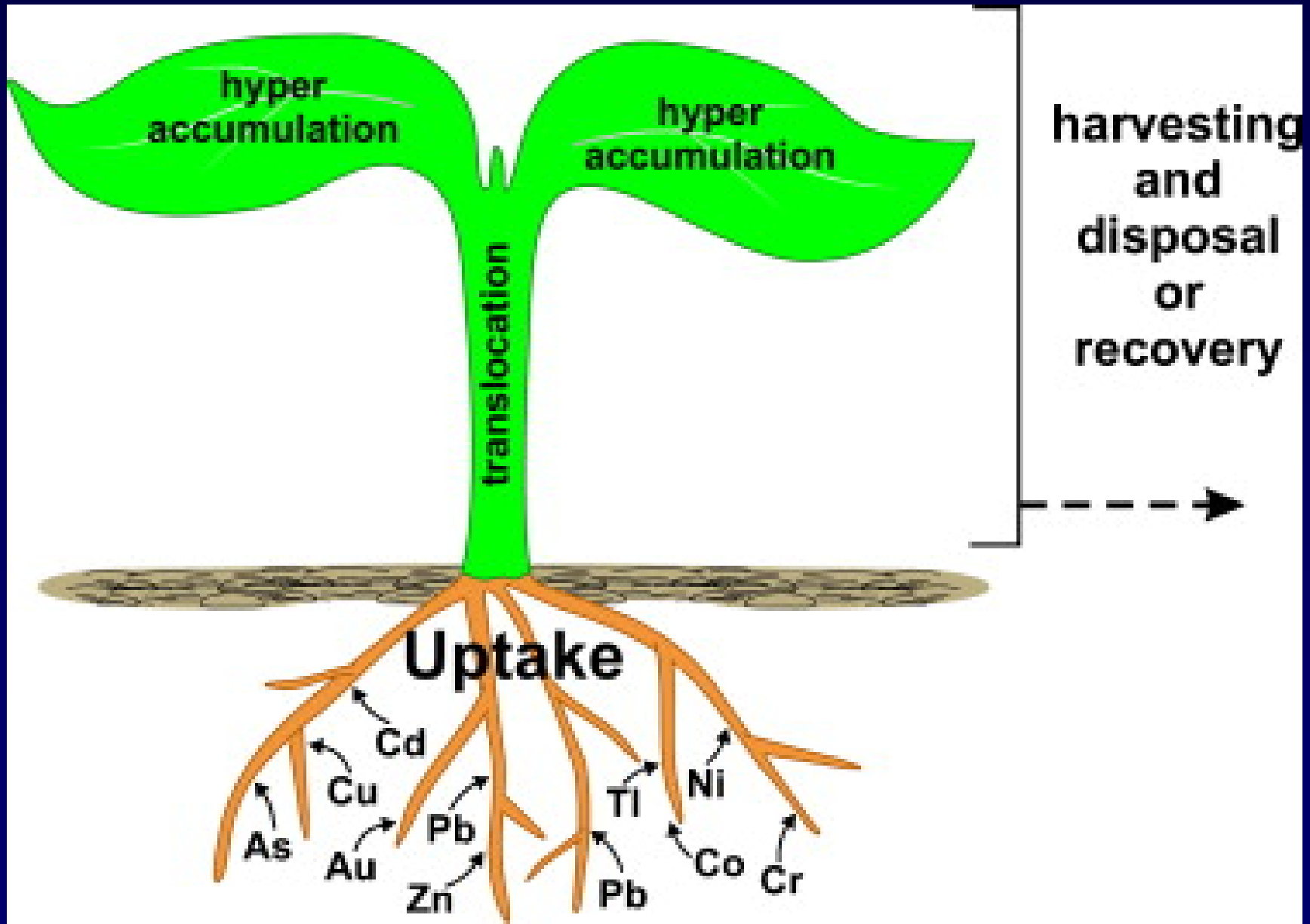
Tissue Specific Incorporation of Metals - Plants



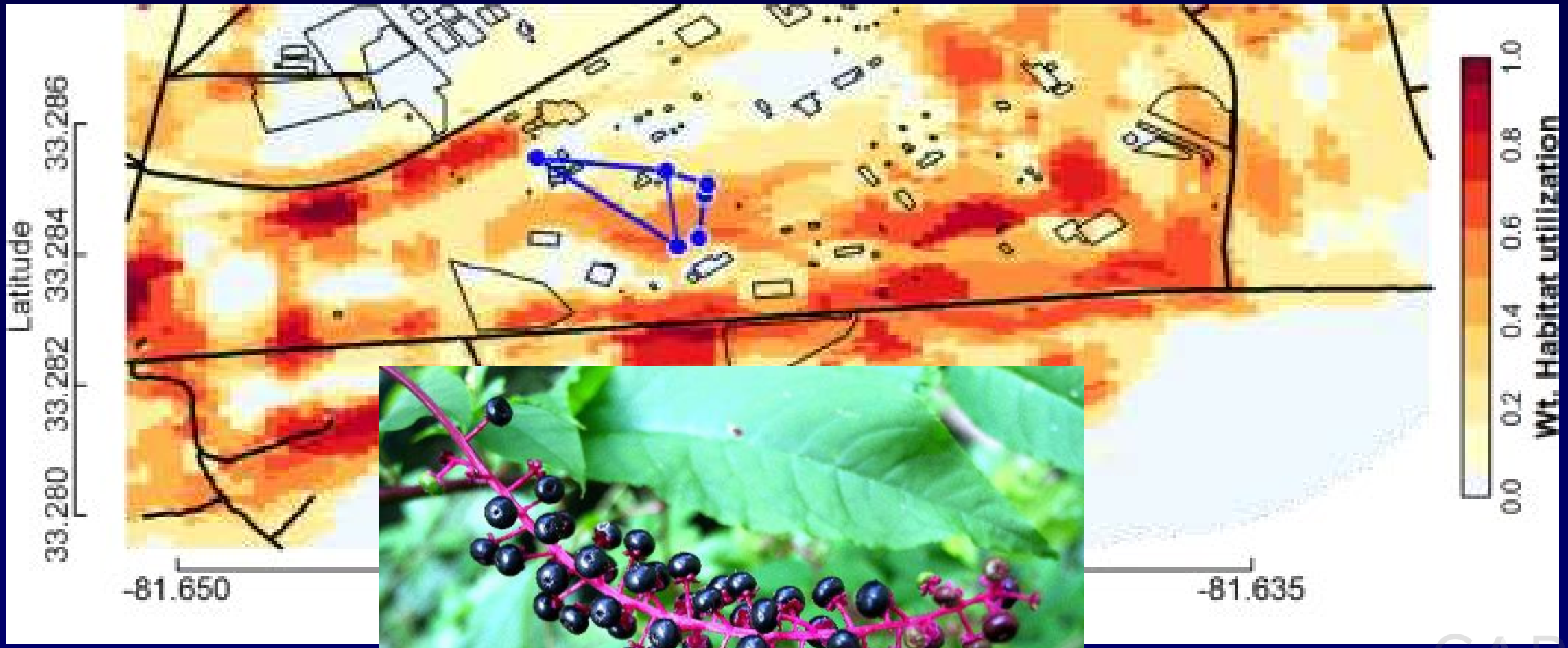
Tissue Specific Incorporation of Radionuclides - Plants



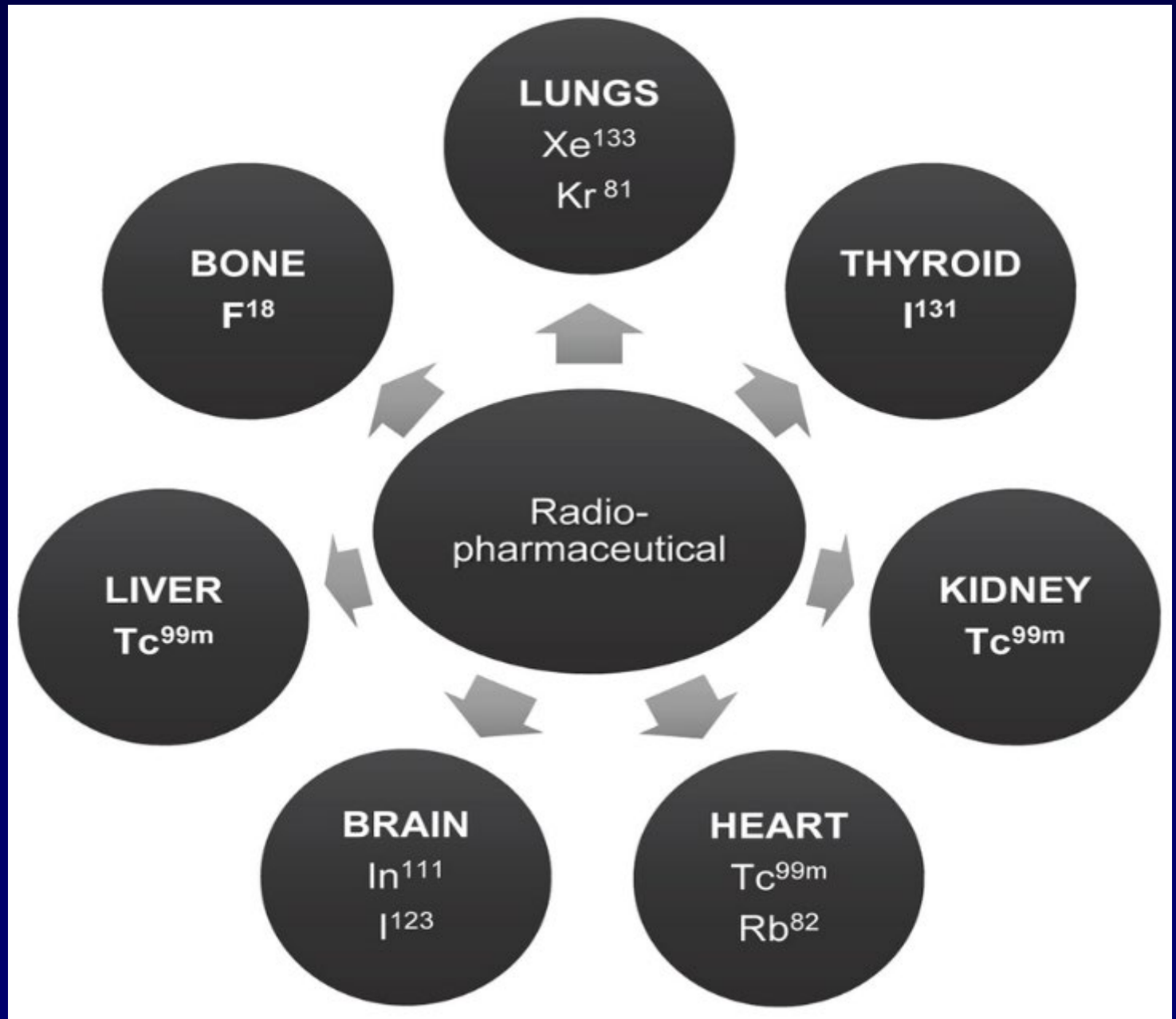
Hyperaccumulation - Plants



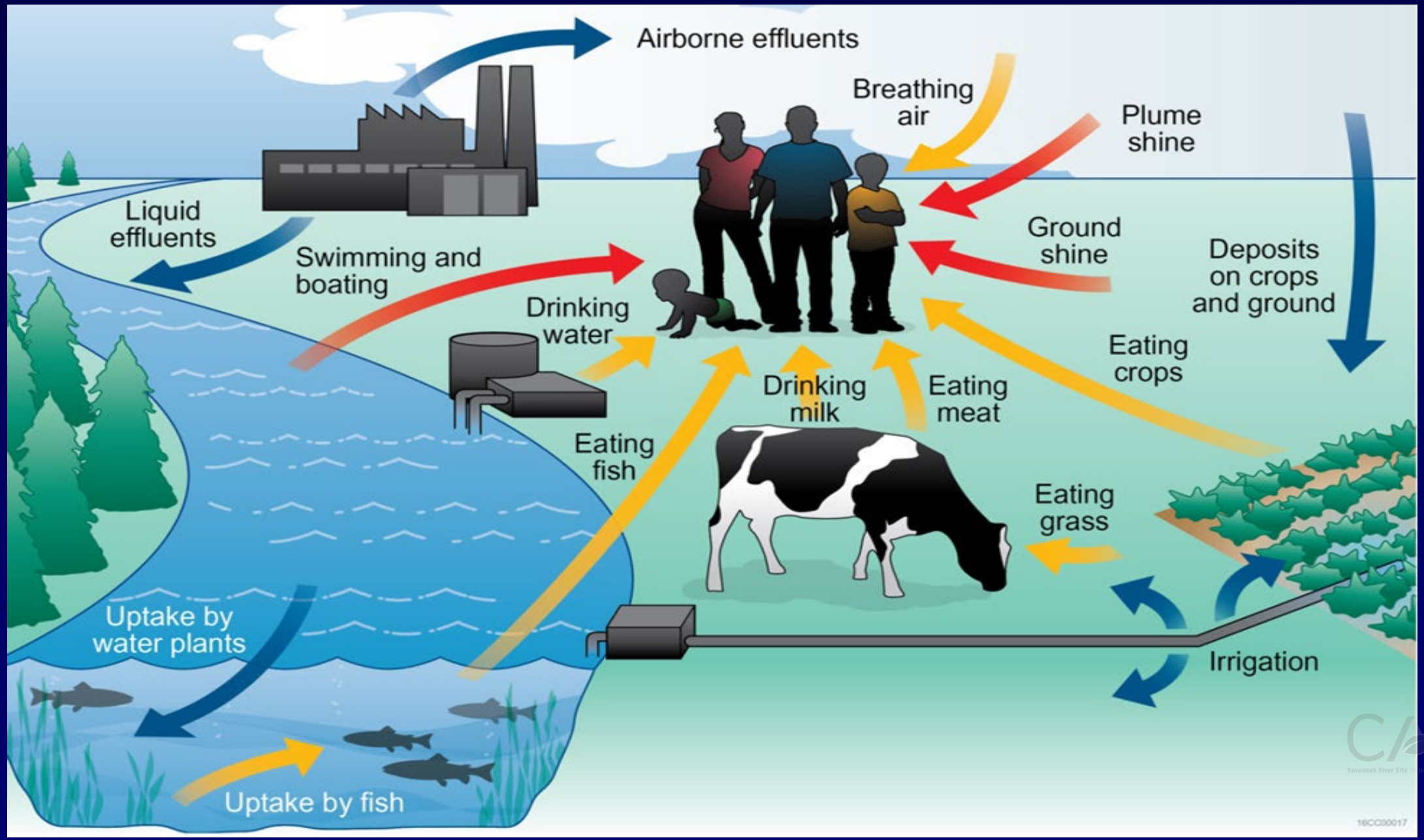
Hyperaccumulation - Example



Tissue Specific Incorporation of Radionuclides - Animals



Exposure Pathways and Monitoring Programs



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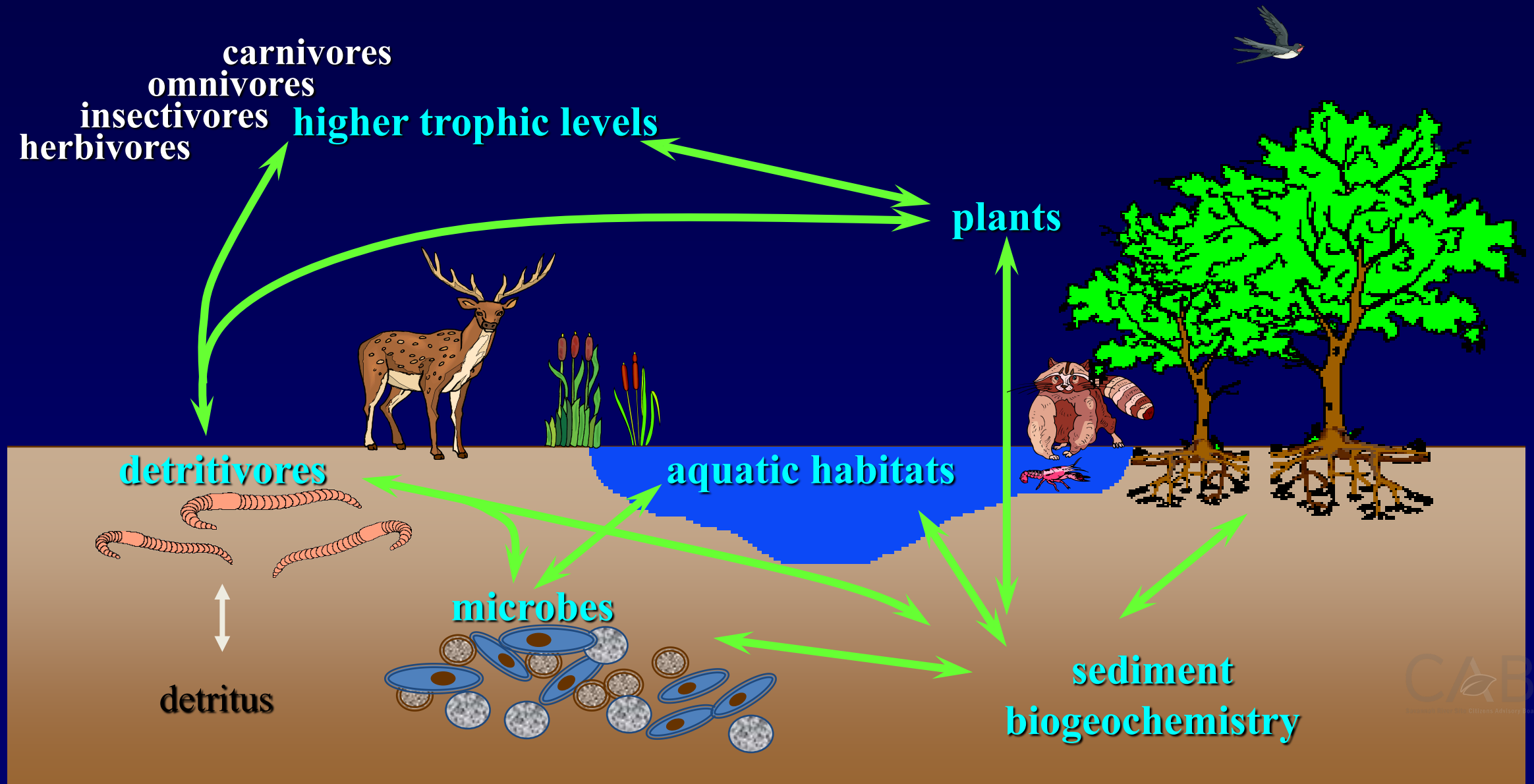
Radiological Impact of 2023 Operations at the Savannah River Site

B. H. Stagich
K. L. Dixon
M. Peyton

July 2024
SRNL-STI-2024-00262, Revision 0

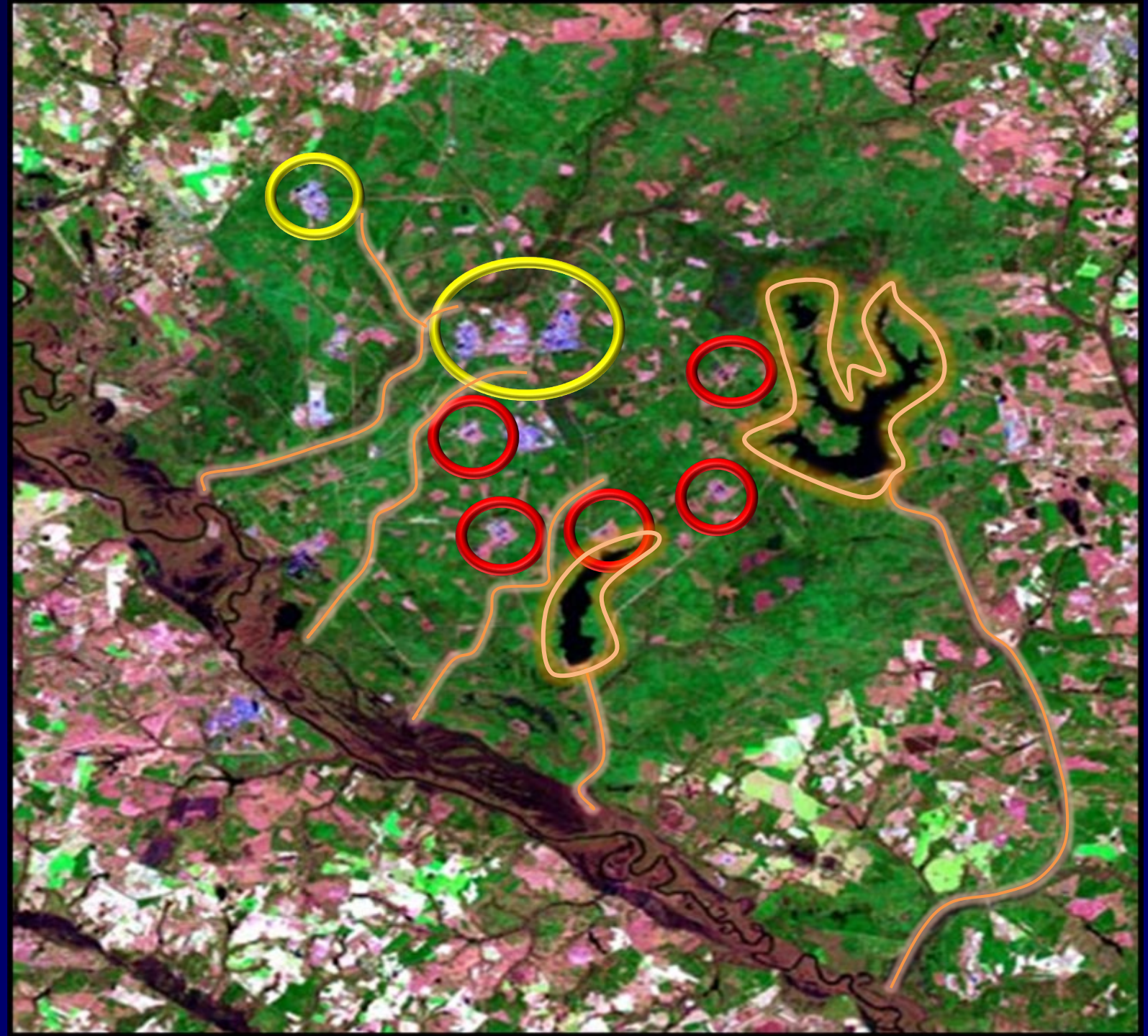
Understanding Risk Means That you Need to Know the Where, When, How's and What's of Contaminant Transfer

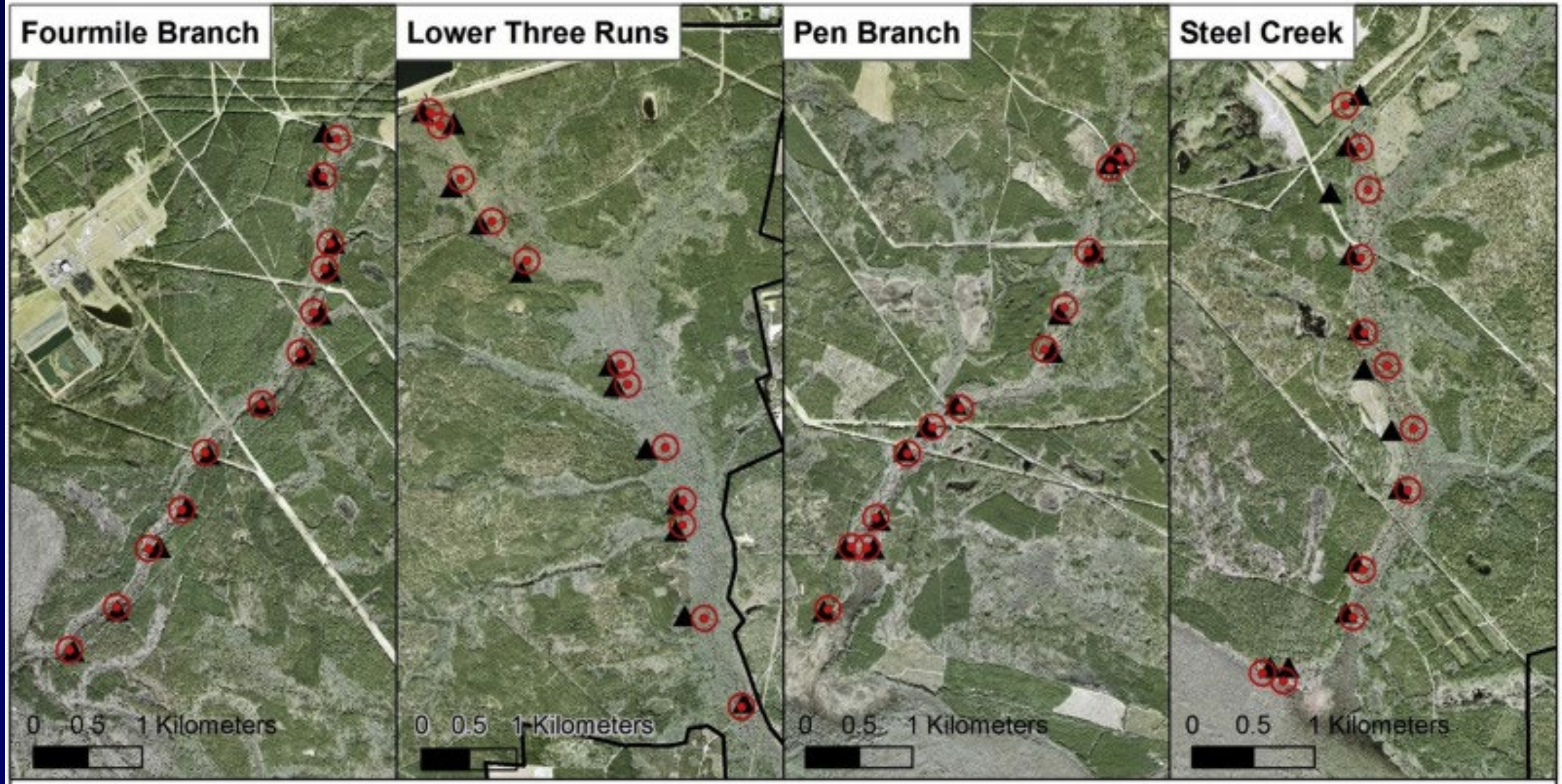
Ecosystems Approach to Ecotoxicology



WHERE ?

SRS is one of the best characterized sites in the DOE complex



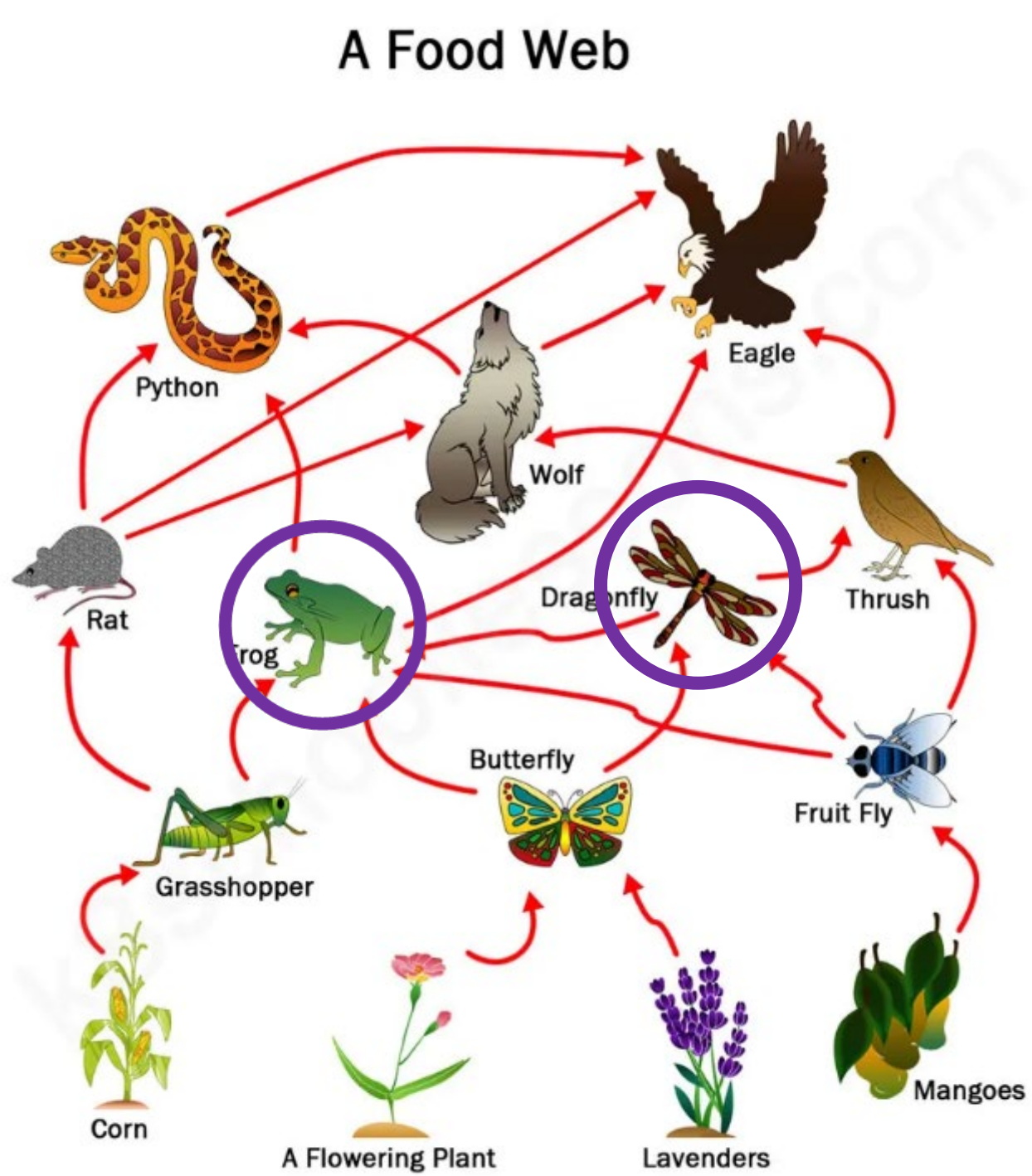


Paired Sample Distance Characteristics

	Fourmile Branch	Lower Three Runs	Pen Branch	Steel Creek
Mean distance	56 m	125 m	52 m	128 m
Max distance	101 m	205 m	78 m	312 m
Min distance	17 m	58 m	36 m	58 m

WHEN ?

Temporal and spatial variation in exposure routes is critical to understanding the probability of exposure and uptake rates of animals and plants


A Food Web
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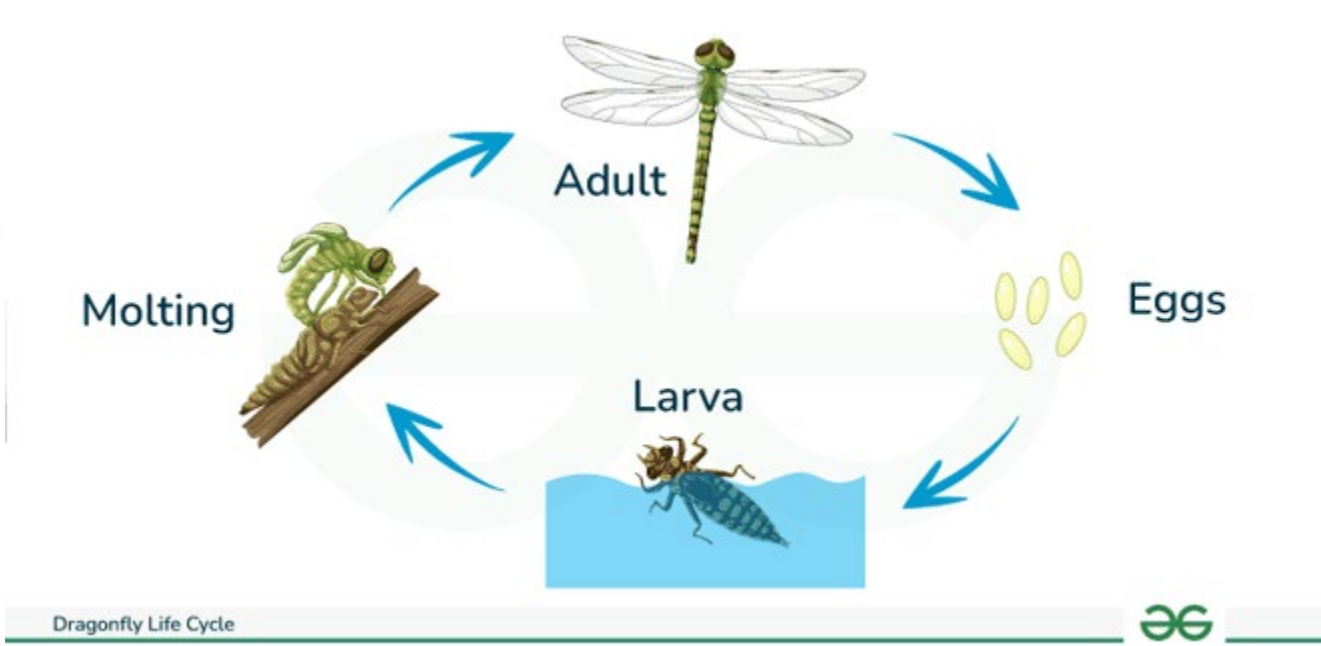
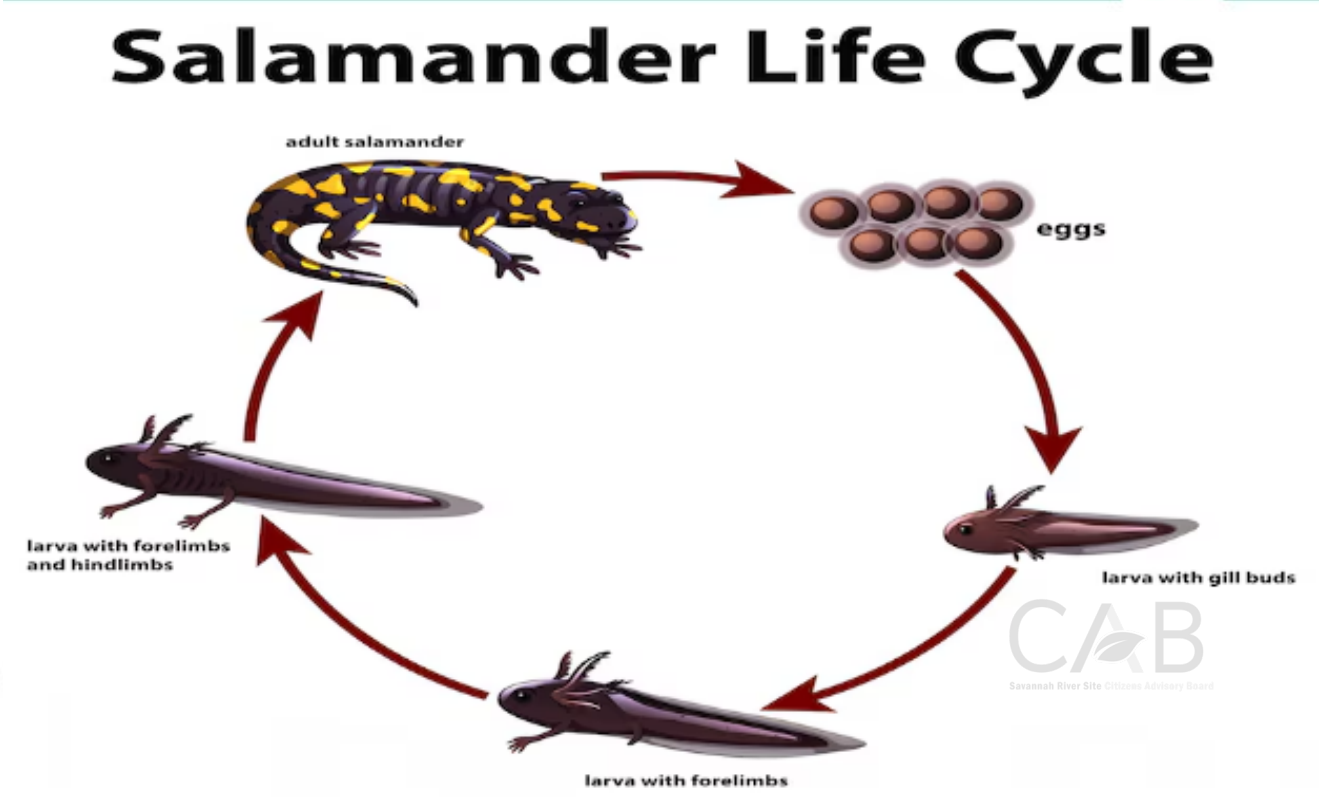
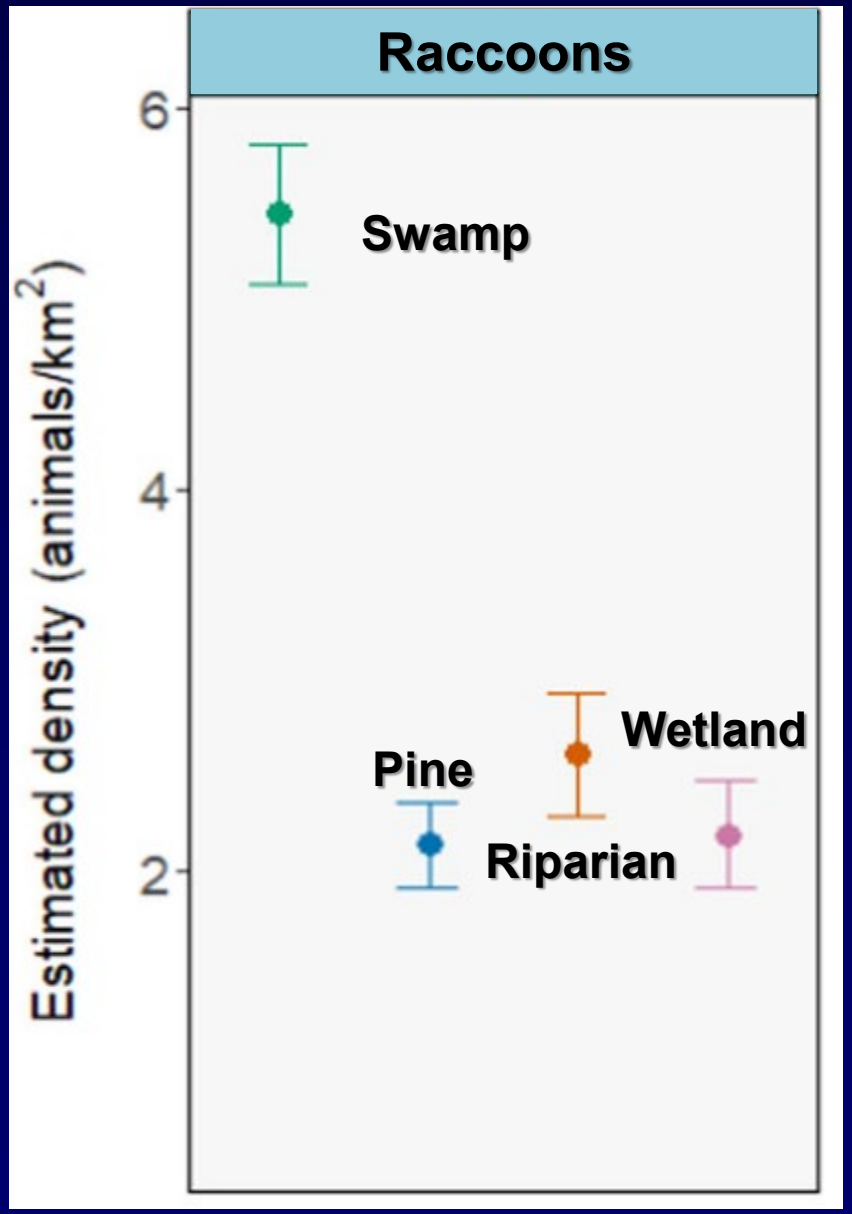
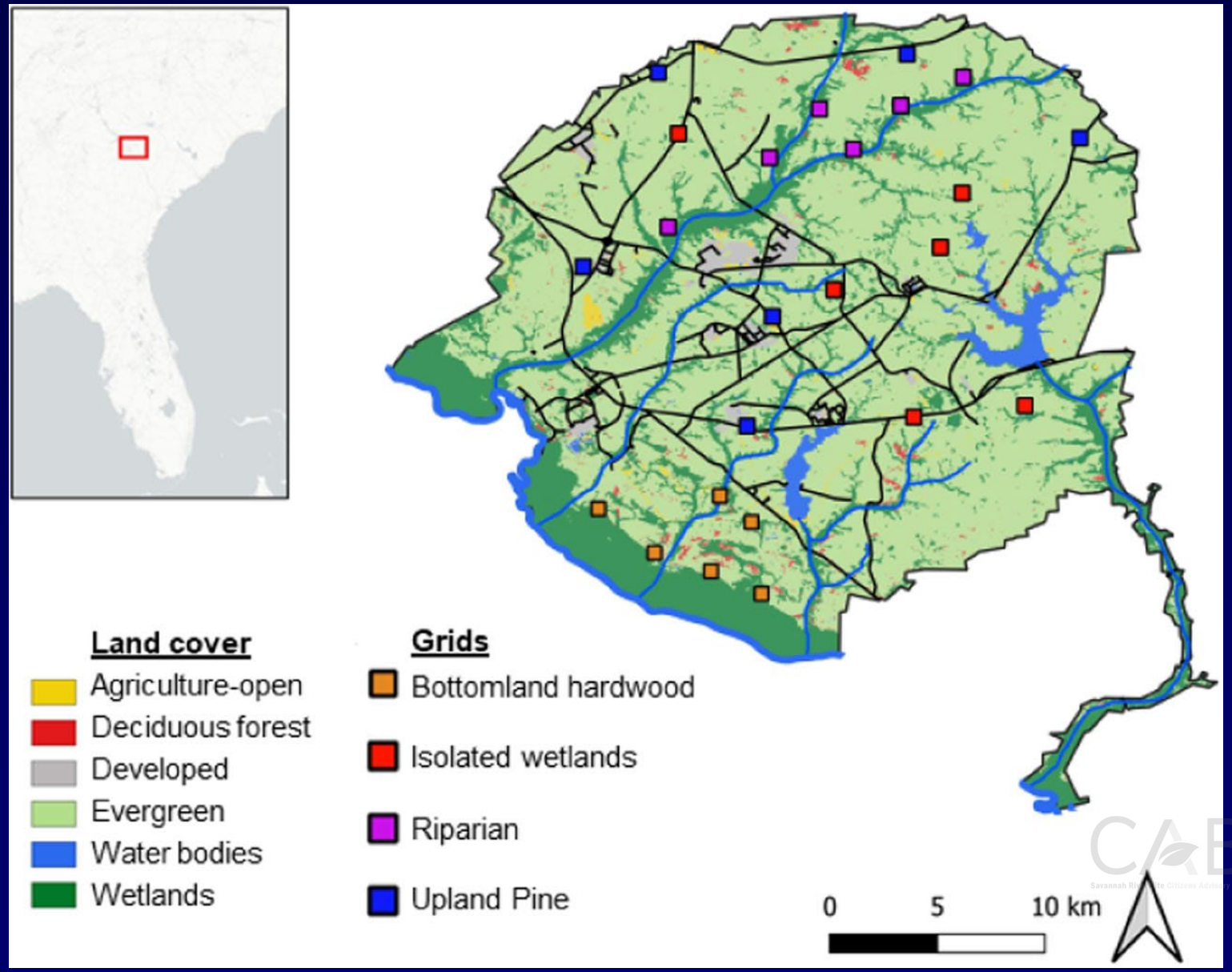

Adult
Eggs
Larva
Molting
Dragonfly Life Cycle

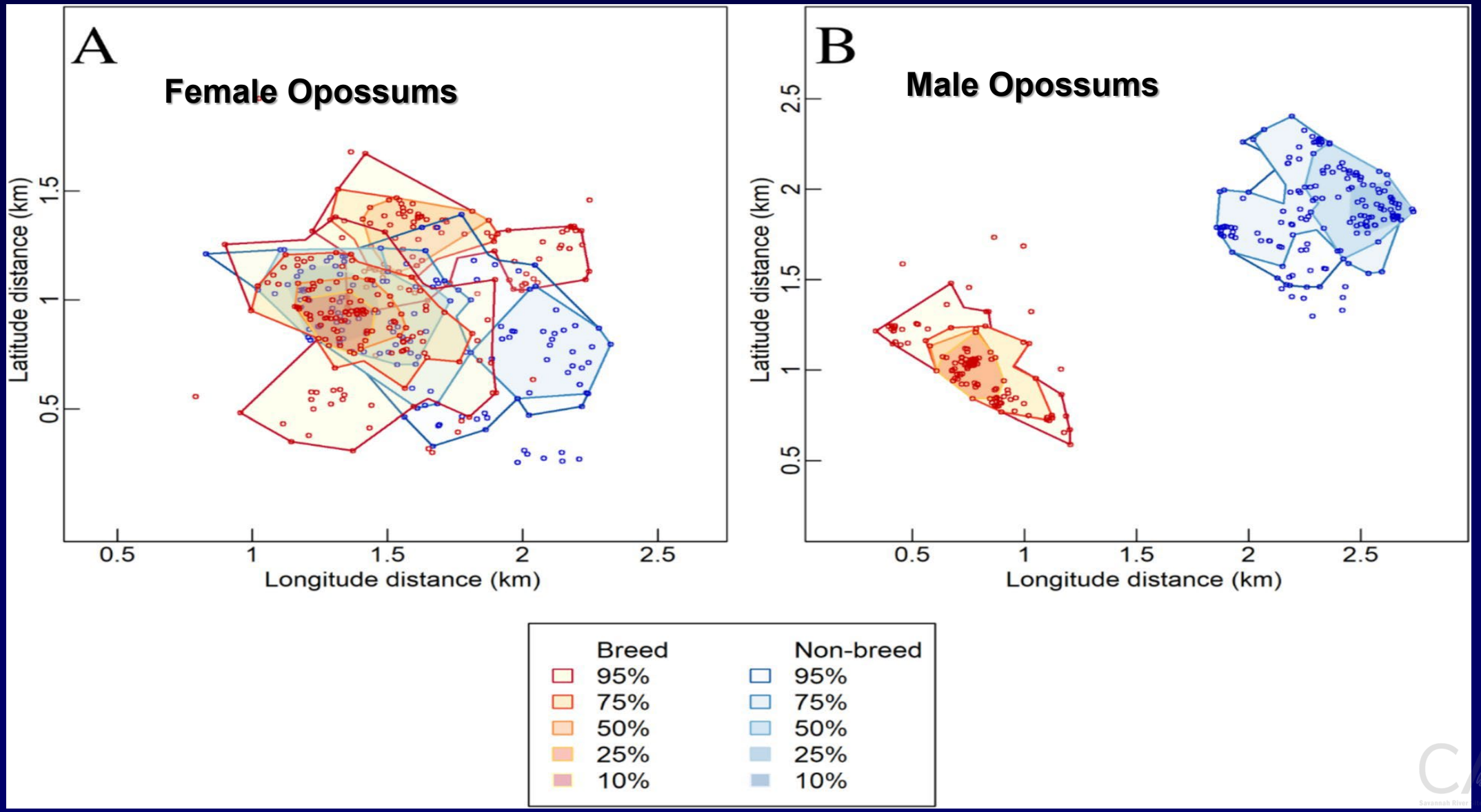

Salamander Life Cycle
adult salamander
eggs
larva with gill buds
larva with forelimbs
larva with forelimbs and hindlimbs

Animal Abundance Varies Across Habitats on the SRS





Animals use Different Habitats in Different Seasons

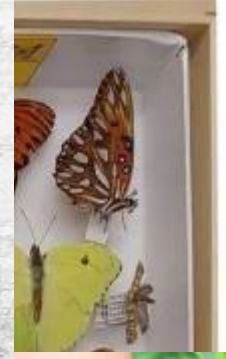


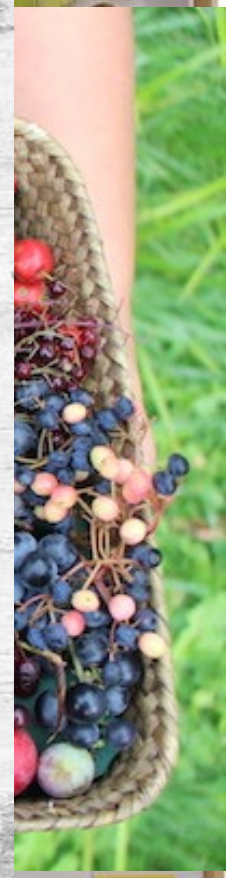
HOW ?

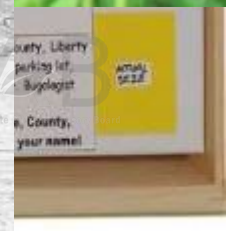
Understanding the complex trophic relationships that lead to contaminant transfer is key


SONG
SUMMER TANAGER
PIRANGA RUBRA
YELLOW-RU
WARBL
SETOPHA
CORONAT
RED-
WINGE
BLACKBI
AGELAIUS PHOE
NOR
CAR
CARDINAL
© ROGER HALL • INKART.NET


· DIURNAL RAPTORS of SOUTH CAROLINA ·
Mississippi Kite
Northern Harrier
Sharp-shinned Hawk
Broad-winged Hawk
Turkey Vulture
Osprey
Swallow-tailed Kite
Peregrine Falcon
Red-tailed Hawk
Merlin
Bald Eagle
Black Vulture
Red-shouldered Hawk
Cooper's Hawk
American Kestrel







What?

Understanding what has the potential to enter the exposure pathways and what does not is critical to evaluating risk of human exposure

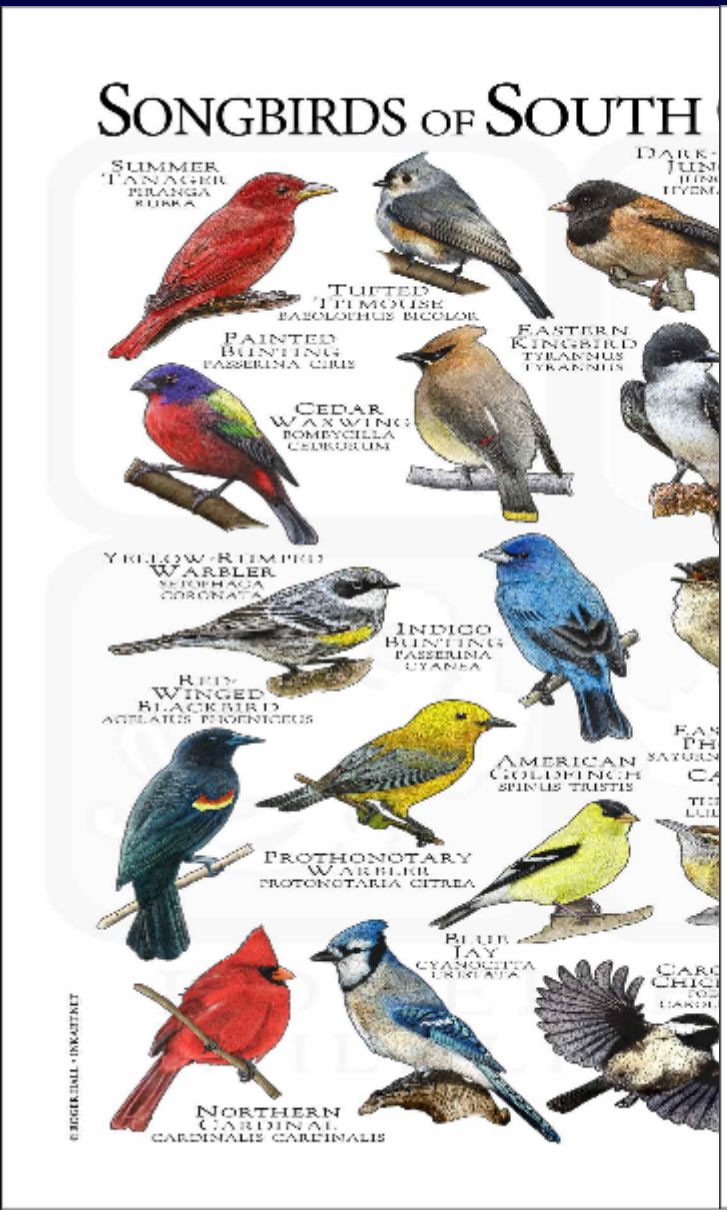
Potential Consumption Risk

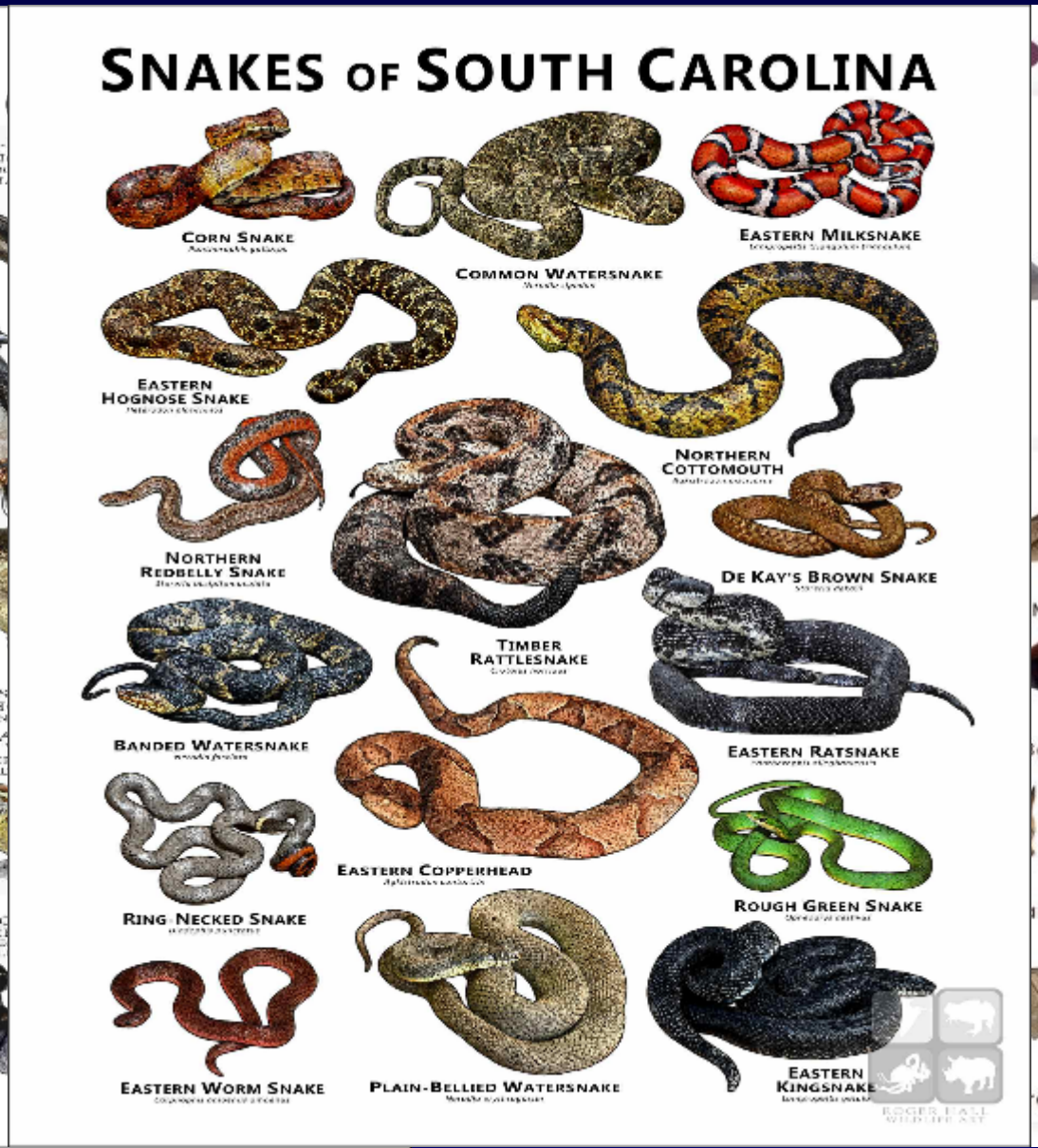
From and SRS Perspective - Consumption Risk Also Depends on Where They are Going

Greater Regional Consumption Risk

Limited Local Consumption Risk

No Consumption Risk but Critical to Understanding Contaminant Mobility





Highly Localized Understanding of Contaminant Presence and Mobility

THANK YOU