

The importance of studying and managing salmon within an ecosystem perspective

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SALTWATER

Sub Adult - Adult

SALTWATER & FRESHWATER

Smolt

Puffin
Gulls
Terns
Cormorant
Heron
Pelicans

Fungi
Bacteria
Viruses
Parasites

Hatchery fish
Other salmon
Steelhead

Mayflies
Stoneflies
Caddisflies
Trueflies
Beetles

Small fish
(trout,
salmon)

Waste
Products

SALMON

NUTRIENTS

PREY

COMPETITORS

PATHOGENS

PREDATORS

Sea Lion
Seal
Humans
Orca
Lamprey

Bacteria
Viruses
Parasites
Fungi

Hatchery fish
Sand larvae
Other salmon
Steelhead

Amphipods
Crustaceans
Sand larvae
Crab mealopa
Squid
Sticklebacks
Zooplankton
Other fish
Rockfish
Herring
Pilchards
Anchovies

Waste
Products

Carcass material
Waste
Products

Nothing

Hatchery
Conspecifics
Spawning
Space (redd
superimposition)

Bacteria
Viruses
Parasites
Fungi

Seal
Sea lion
Mink
Lamprey
Humans
Otters
Bears
Bald eagle

Adult - Carcass

SALTWATER & FRESHWATER

Mayflies
Stoneflies
Caddisflies
Trueflies
Beetles

Mountain whitefish
Hatchery fish
Rainbow trout
Redside shiner

Parasites
Viruses
Bacteria
Fungi

Cutthroat Trout
Rainbow trout

Bull Trout
Sculpin
Bass

Cat fish
Mink
Merganser

Cormorant
Heron
Kingfisher

Hatchery fish
Other salmon

Egg - Parr

FRESHWATER

Direct nutrient contribution by salmon

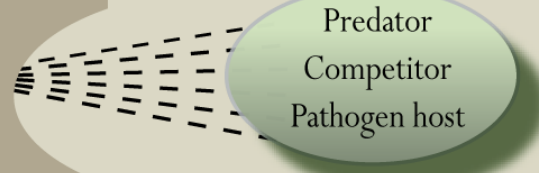
Energy flow

Ecological interactions by salmon within guild

Eggs
Juveniles
Adults
Carcasses



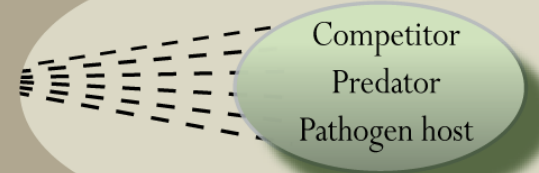
PISCIVORES



Carcasses



FISH



Eggs
Juveniles
Carcasses



INVERTEBRATES

Carcasses



ALGAE, BIOFILM,
PHYTOPLANKTON

RIPARIAN
VEGETATION

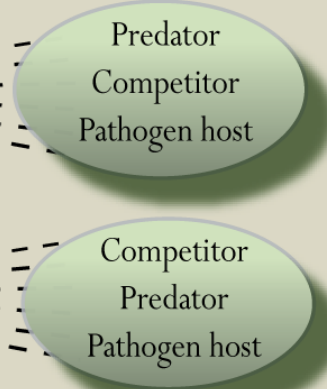
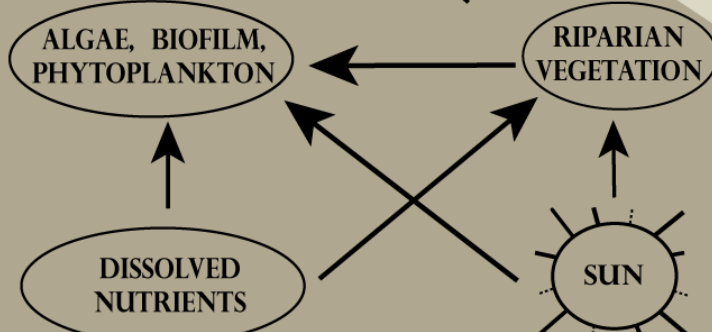
Carcasses

Eggs

Waste products



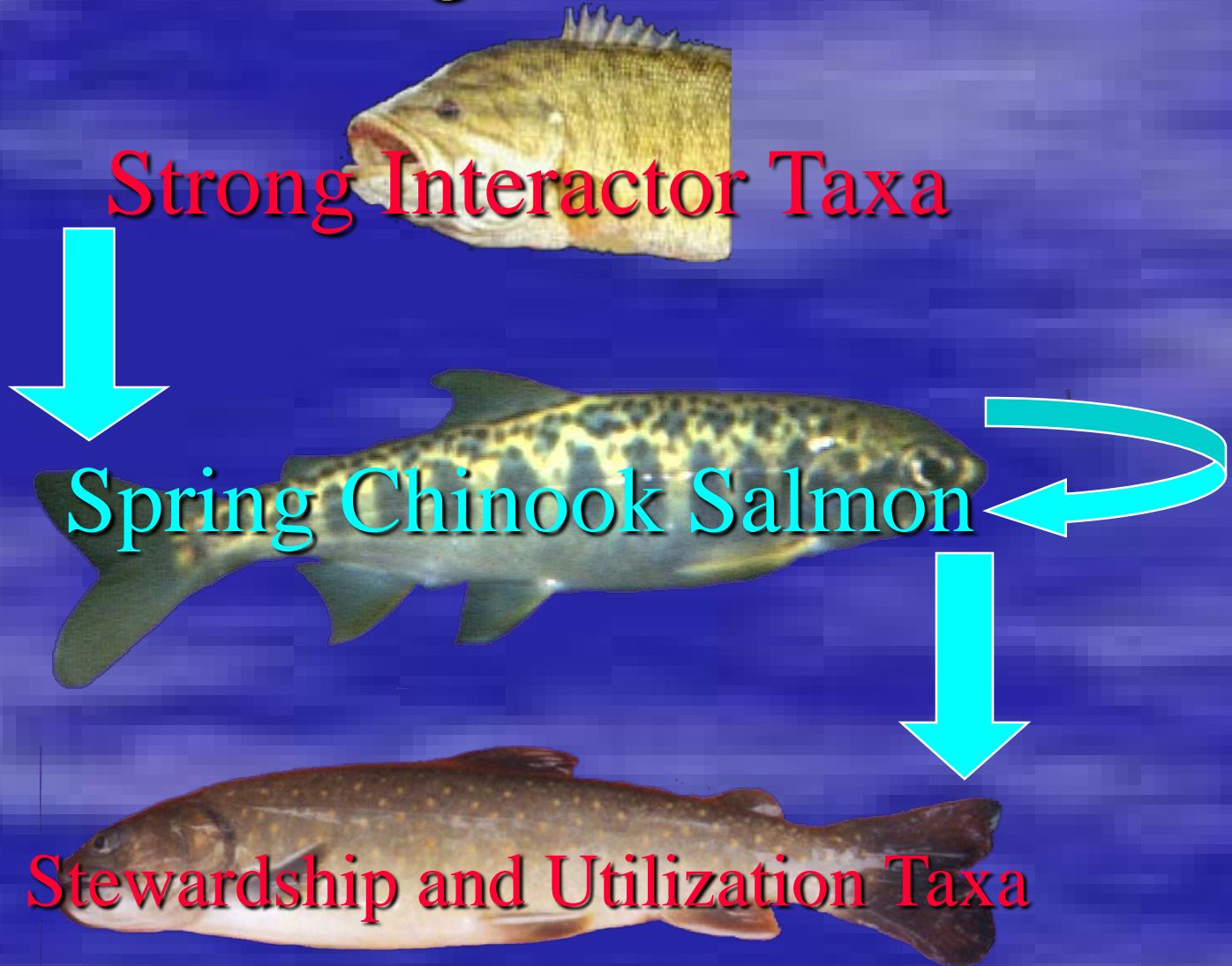
DISSOLVED
NUTRIENTS



Implications

- We shouldn't expect that altering the abundance of a strong interactor like salmon will not have impacts to other species
- In the face of this reality and complexity, how should we focus our limited budgets and energies?

Critical Ecological Interactions



Rewards of Multi-species Perspective

- Managers have information to facilitate desirable interactions and minimize undesirable ones resulting in better net benefit to community
- Management actions that have unintended consequences (impacts to ESA) can be corrected

Thanks

- Molly Kelly constructed the first 2 groovy figures