

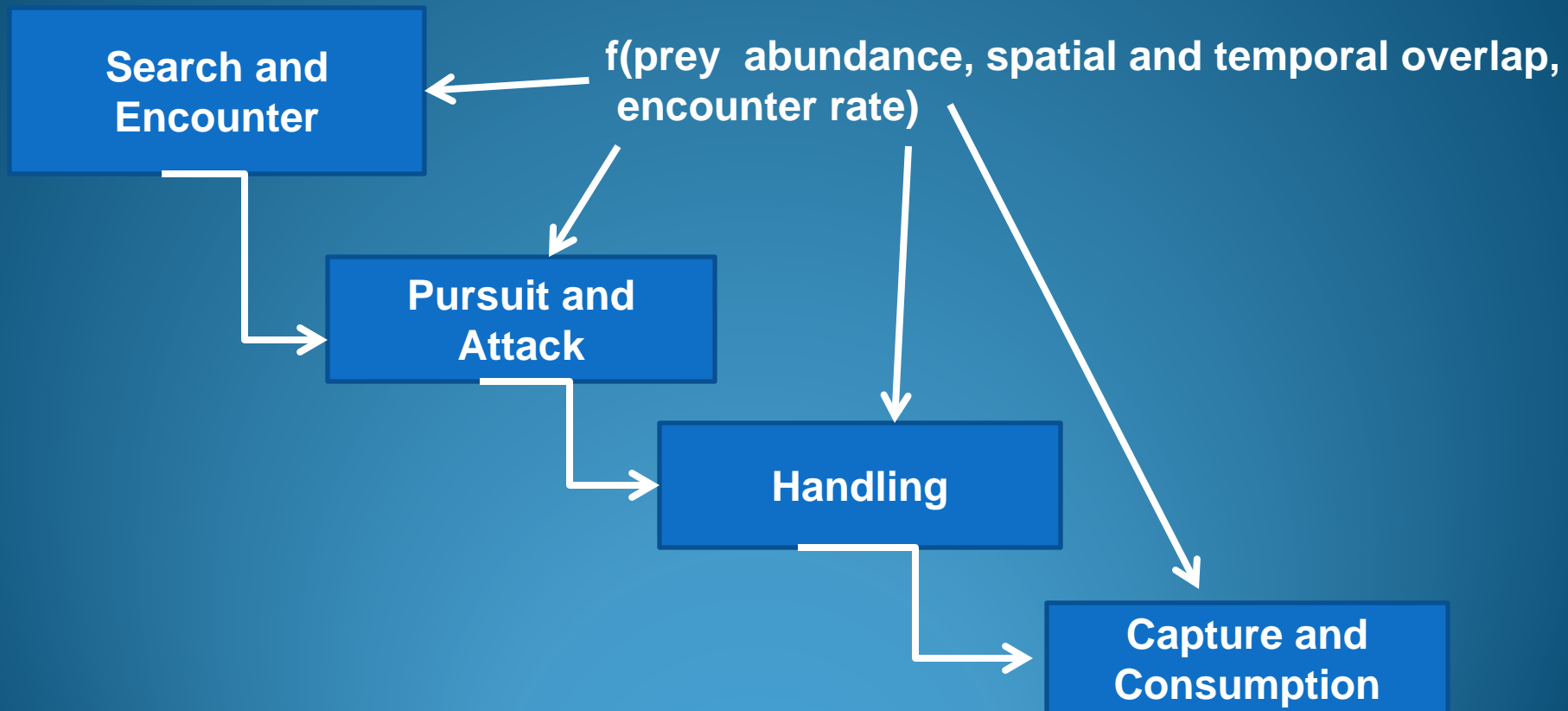
# **Fish predation on Central Valley salmonids in the Bay-Delta watershed**

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# Background

- **Interagency framework w/ stakeholder input**
  - **Development of charges**
  - **Panel selection – area experts**
  - **Background readings**
  - **Presentations**
- **Panel's charge – address a suite of questions**
- **Additional public commentary-**  
**[www.dfg.ca.gov/erp/predation.asp](http://www.dfg.ca.gov/erp/predation.asp)**

# Schematic of predation process



**1. What is the ecological context of predation by fish on Central Valley salmonids, and what can be learned from other systems that could inform our understanding of predation on anadromous salmonids?**

# System Characteristics

## Physical/Chemical Environment

Turbidity

SAV

Temperature

Salinity

Nutrients, DO

Shoreline

modifications

Water operations

Habitat

simplification

Irrigation return

flows

And many more...

## △ Predator Assemblage

Nonnative

predators

Changes in age

structure,

abundance and

composition

Novel interactions

## Prey Characteristics

Replacement of

macroinverts

Lower abundance

of smolts

Depensatory

mortality

Hatchery vs. wild

Smolt size and

outmigration

timing

# What can be applied from other systems?

- The Delta → unique system
- Salmonids → desirable prey
- Difficulty in predicting consequences → removal
- Predation → context dependent
- Habitat loss & invasive species → loss of natives
- Critical stages → population

**2. What do the available data and analyses tell us about the rates and population level effects of fish predation on Central Valley salmonids?**

**3. What related science is generally agreed upon; what are the key disagreements or uncertainties?**



# Charges 2 & 3

- **Do know:**
  - **Fish predation occurs**
  - **Hatchery fish → most studies, wild fish?**
  - **Low survivorship**
    - **Survivorship varies → spatially & temporally,**
    - **Mortality hot spots (Clifton Court Forebay/Red Bluff diversion)**
    - **No relationship between striped bass and salmon pops**
    - **Predator capacity is high**
- **Don't know:**
  - **Accurate population estimates → predators/salmonids**
  - **Tag effects**
  - **Mortality → physiology stress, predation, disease, transport to inhospitable habitats**
  - **How population will respond → change in predation**

**Conclusion: Does fish predation comprise a significant portion of salmonid mortality in the Delta?**

- **Available information → uncertain**



# Are there appropriate methods for estimation of predation rates and population level effects from the existing data?

- **Key information lacking**
- **Historic data should be used in models to generate mechanistic hypothesis.**
- **Forthcoming**

**What biological and physical factors are likely to affect the impacts of predation on salmonids?**

**What is understood about the interactions among major factors influencing predation on salmonids (e.g., interactions among predators, hydrology and temperature, etc.)?**

- **Physical: Flow, temperature, habitat, water quality**
  - **Predator: species, density, size, origin, distribution**
  - **Prey: species, density, size, origin, distribution**
- 
- **Consider biological and environmental variability**
  - **The three categories likely interact in unpredictable ways.**

**Have these factors changed over time, and do they vary between the major basins (i.e., San Joaquin and Sacramento)?**

- **Yes, three basins are different (South, Central, North)**
  - **Within a basin, conditions have changed historically**

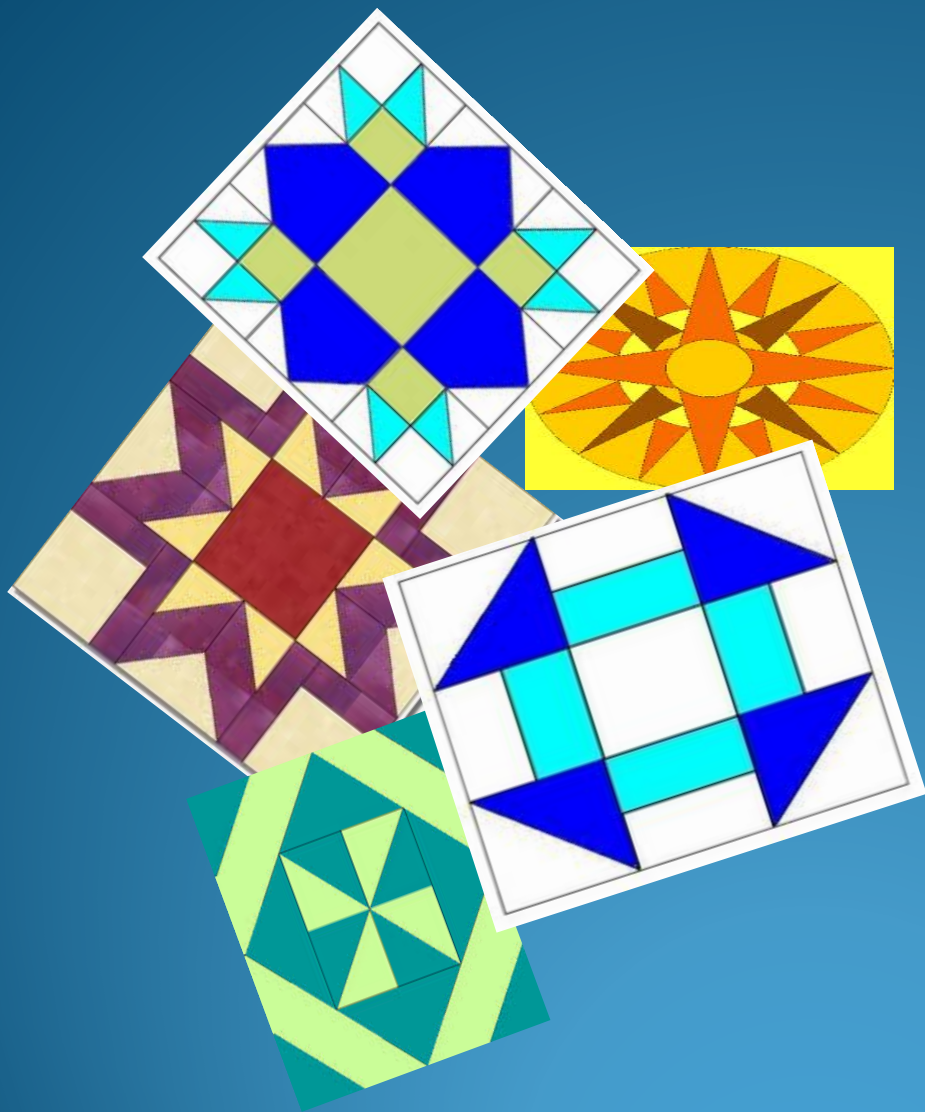
**Do these factors vary among the major reaches of the system (e.g., spawning areas, riverine reaches, delta, bay, ocean)?**

- **Yes.**
- **Little known about spatial variation in these processes from river to Ocean**
- **Persistent hot spots of low survival occur**
  - **Anthropogenic activities**

**What future work (e.g., feasible scientific studies, modeling, and pilot experiments) should be done to address key knowledge gaps by testing clearly stated hypotheses to substantially reduce scientific uncertainties that lead to disagreement? Please provide guidance on appropriate study design and methods for estimating predation rates and population level effects.**

- Panel still needs to think about this question. See final report.
- Better coordination of addressing common research needs (the quilt)
- Standardization of methods





NOTE: SLIDES ARE PART OF PANEL'S INITIAL THOUGHTS/RESPONSE TO PUBLIC; 7/23/13

**The Panel would like to thank  
the organizers, presenters and  
public for their efforts on our  
behalf**