

What gets eaten?

- Predation is a Complex Series of Interactions
- $V = S * E$
 - E is $f(x)$
 - Pred. density
 - Prey density movement
 - Seasonal overlap
 - Spatial overlap
 - Diel effects
 - Turbidity (reactive distance)
 - Flow and turbulence
- Q: Are we measuring these at the appropriate temporal and spatial scales?

What gets eaten??

- $S=A * C$
 - A is $f(x)$
 - Handling time
 - Hunger \rightarrow food signal \rightarrow functional response
 - Risk of being eaten themselves
 - C is $f(x)$
 - Prey size/pred. size ratios and relative growth rates
 - Turbidity
 - Turbulence

How much gets consumed??

- Bioenergetics (balance of feeding and the costs of doing business)

- $W_t = W_o C_{\max} (p) A - R_{\text{tot}} \Delta t$

- $W_t = W_o + \dots = \text{growth}$

- C_{\max} is $f(X)$

- Fish size, temperature---i.e., diet with size

- R_{tot} is $f(x)$

- Fish size, temperature, activity

Recommendations

- Think outside of the box---issue is more complex than just numbers of preds. and what they eat—need a better mechanistic understanding at the process level--use existing data to focus on
 - DELTA SMELT
 - When and where predation occurs (if possible)
 - Temporal and spatial overlap of preds and prey at various, perhaps finer, levels of resolution
 - Pred. population sizes and their distributions, size distributions
 - Prey. population sizes and their distributions, size distributions

Recommendations

- Explore scenarios along the lines as those discussed by Cathy Ruhl—use the flexibility inherent in the engineering of the system to experiment with varying the time and space applications of pumping strategies to minimize prey delivery
 - Tides, gates, etc.
 - Model experiments

Recommendations

- Need diet data for major predator species, predator growth rates, diel and seasonal patterns of movement and how these are related to hydrodynamics and animal behavior
 - Bioenergetics modeling, ultrasonic tagging and other mark/recapture approaches, otoliths, other estimates of consumption
- Need to evaluate the magnitude of predation very near and within the facilities, and the degree to which entrainment and not impingement is an issue (especially for Delta Smelt)—efficiency of the louvers