Juvenile Chinook Salmon Abundance Estimates in the Lower Stanislaus River: 1996 - 2007

Clark Watry

Acknowledgements: **Dr. Ayesha Gray and Brian Pyper**

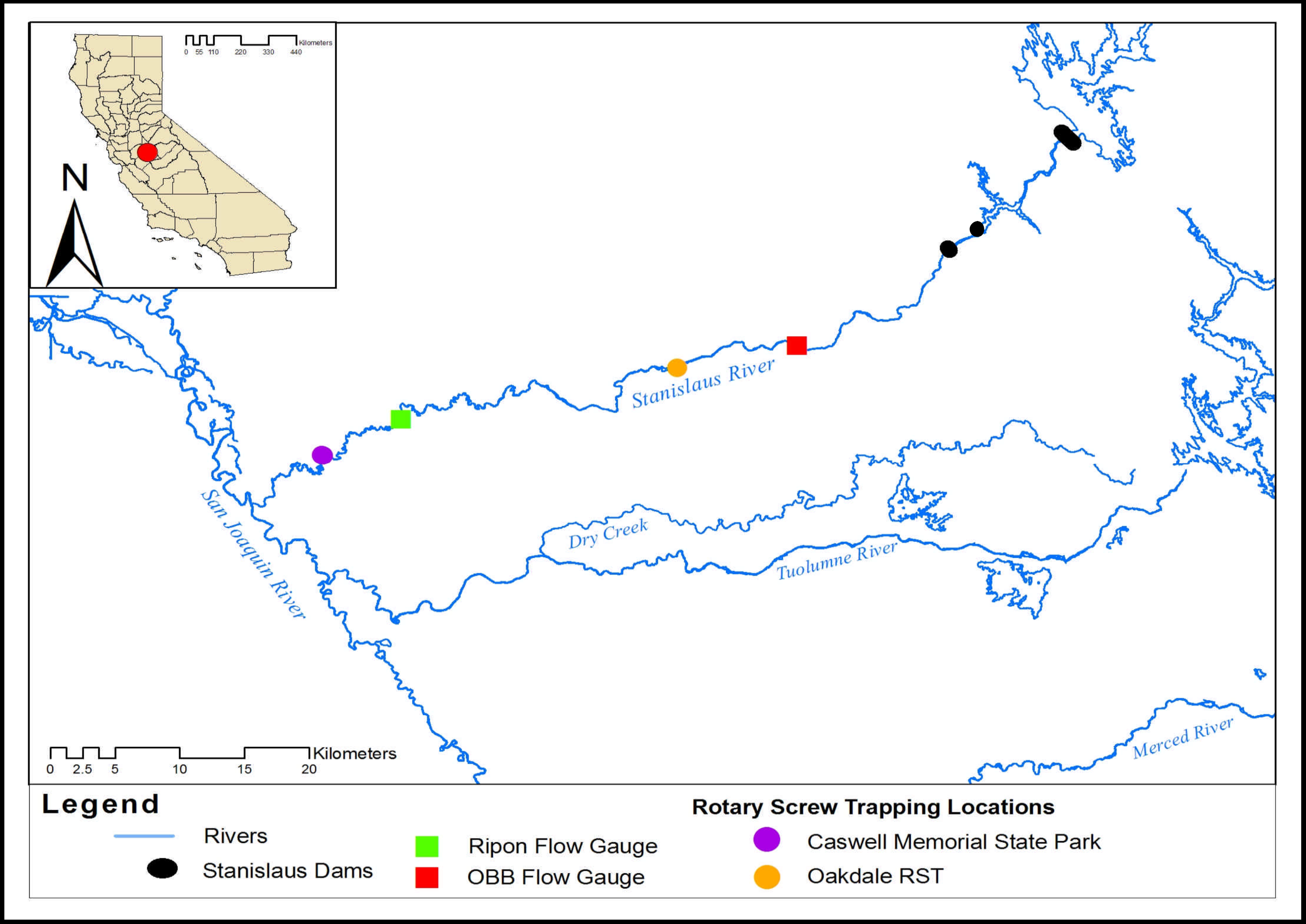
CRAMER
FISH SCIENCES

www.fishsciences.net
(209) 847-7786

The Bay Delta Region

CRAMER FISH SCIENCES ~ WWW.FISHSCIENCES.NET

Stanislaus River

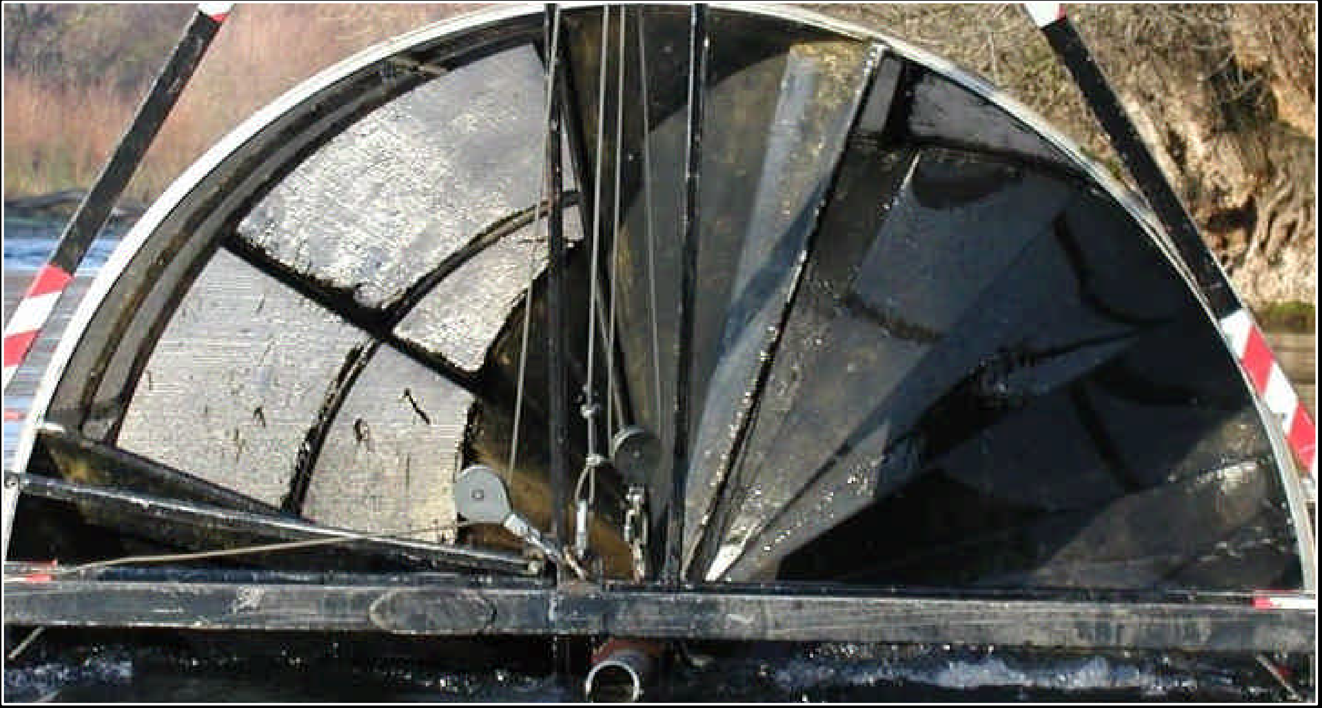


Objectives

- Estimate juvenile abundance
- Estimate in-river survival
- Evaluate patterns of timing
- Relate flow and other environmental conditions to abundance and timing

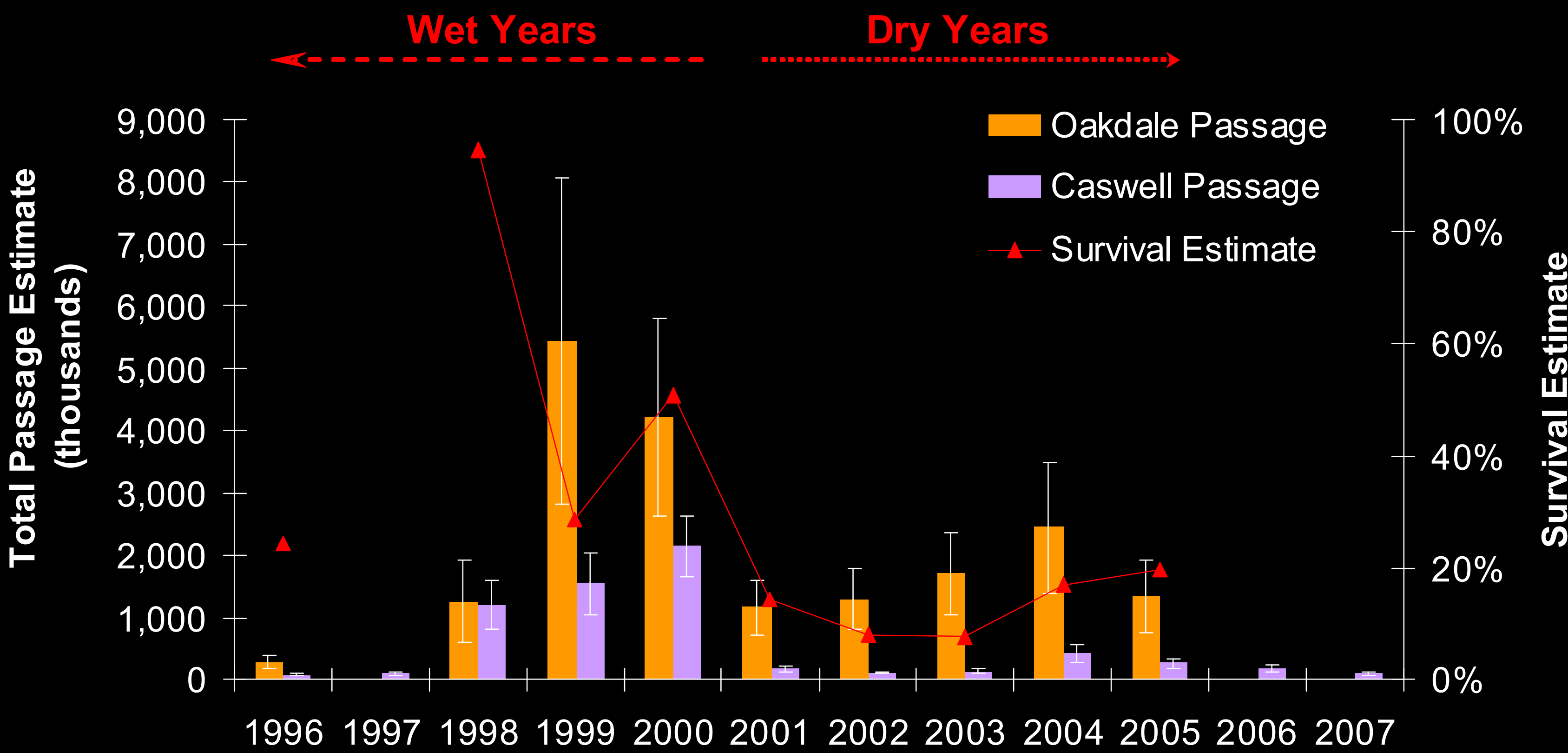
Trap Efficiency/ Passage Estimates

Trap Efficiency Estimate: $q = c/R$



Daily Passage Estimate: $n = C/q$

Abundance

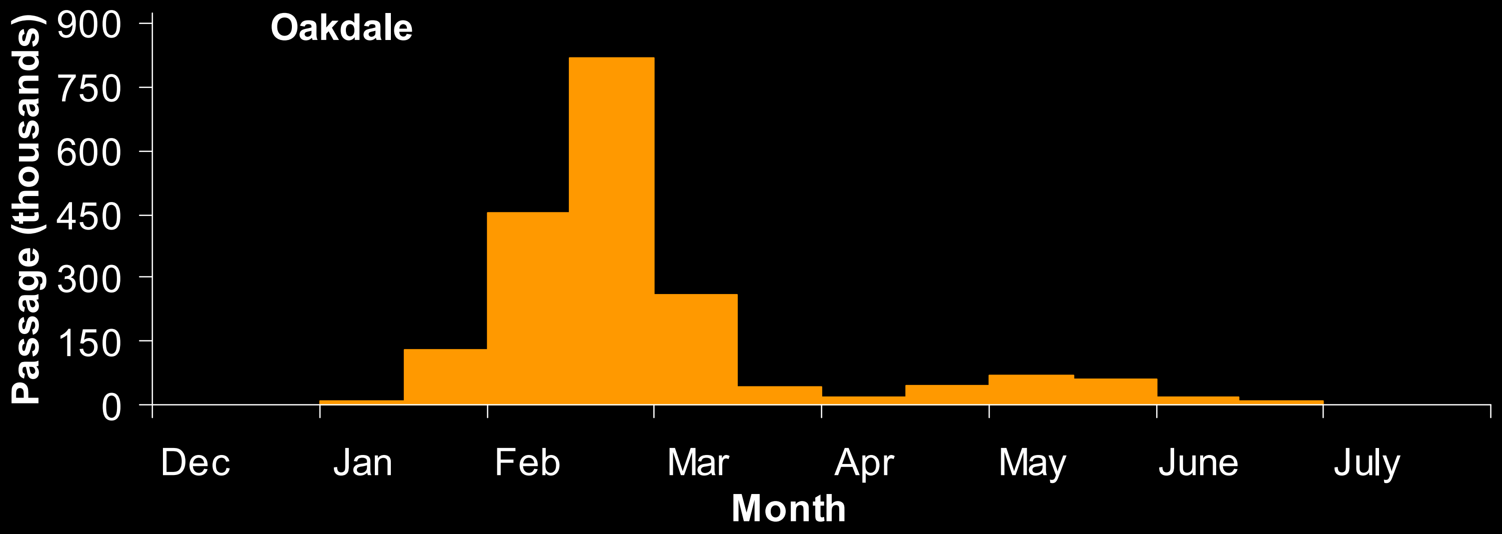


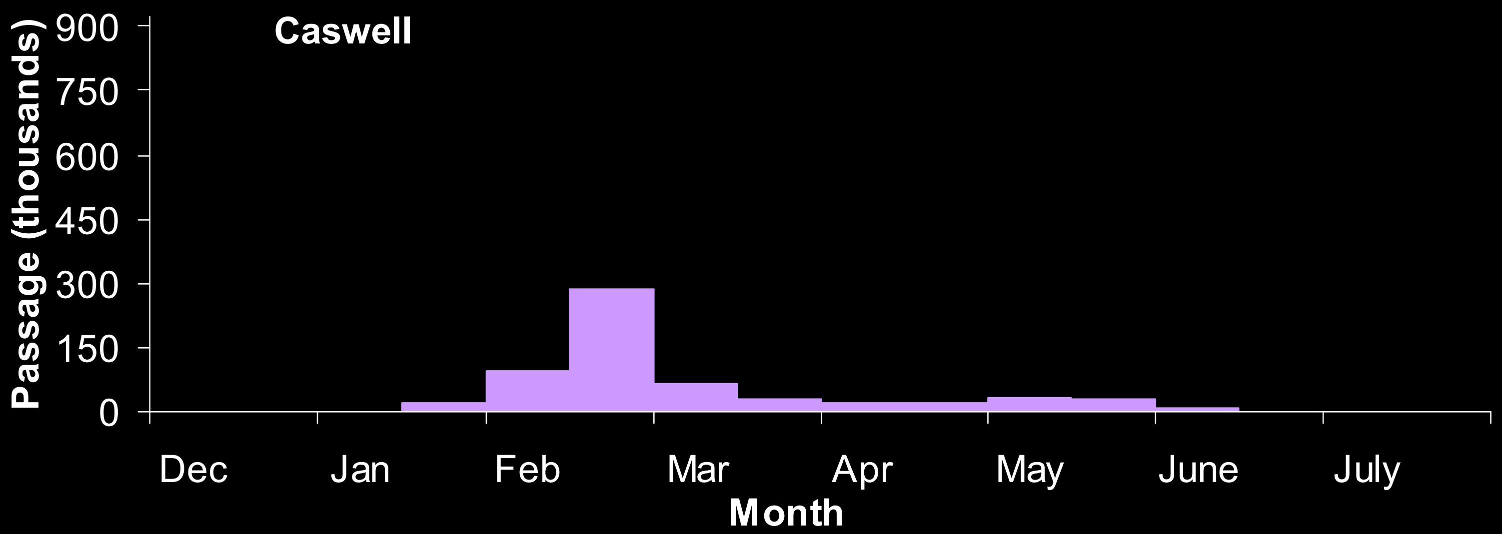
Oakdale:	279	----	1259	5434	4214	1154	1299	1701	2438	1334	----	----
Caswell:	67	89	1194	1544	2140	165	103	132	412	260	188	94

Passage Estimates (thousands)

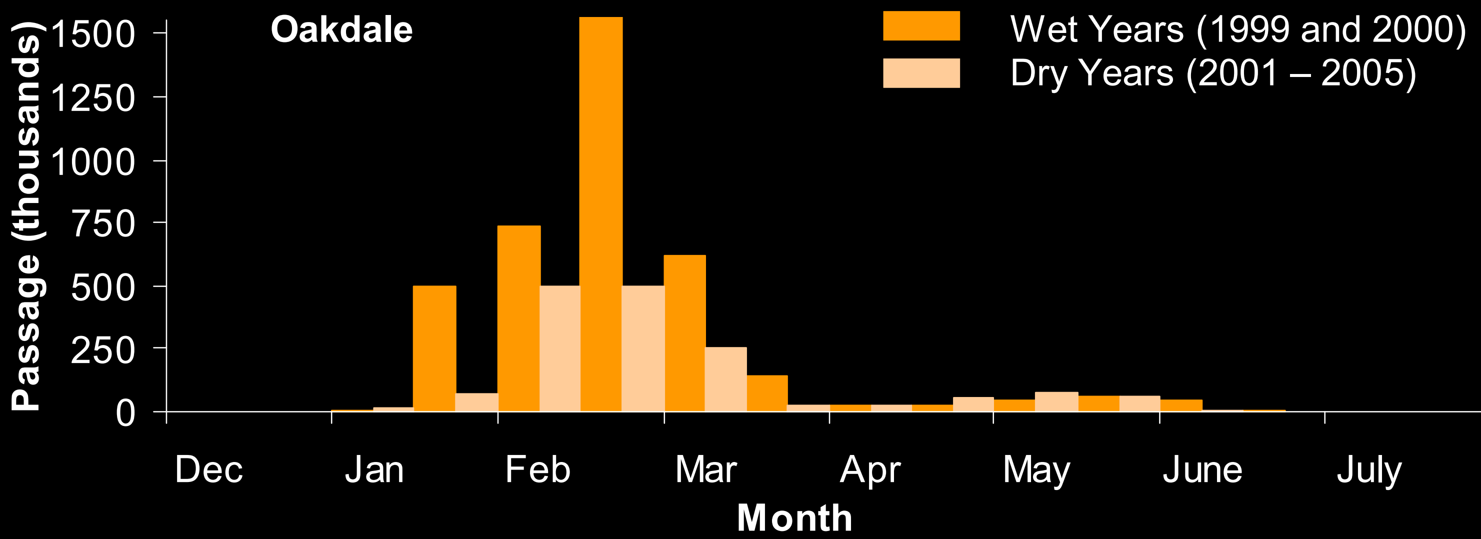
CRAMER FISH SCIENCES ~ WWW.FISHSCIENCES.NET

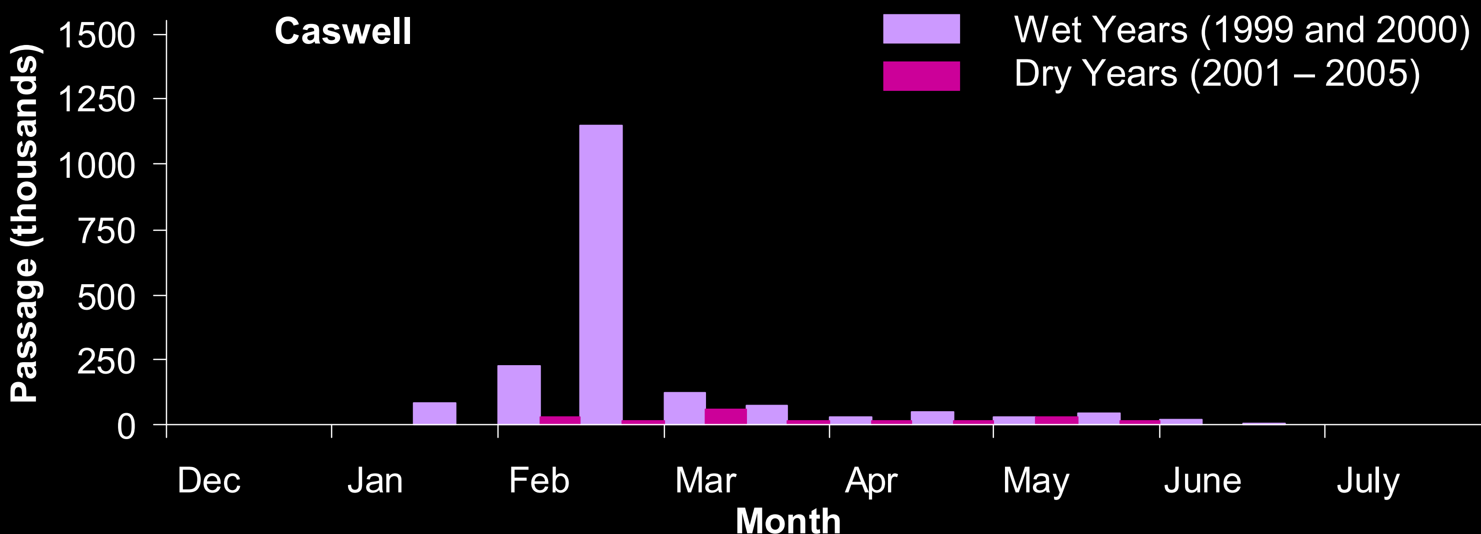
Passage Timing





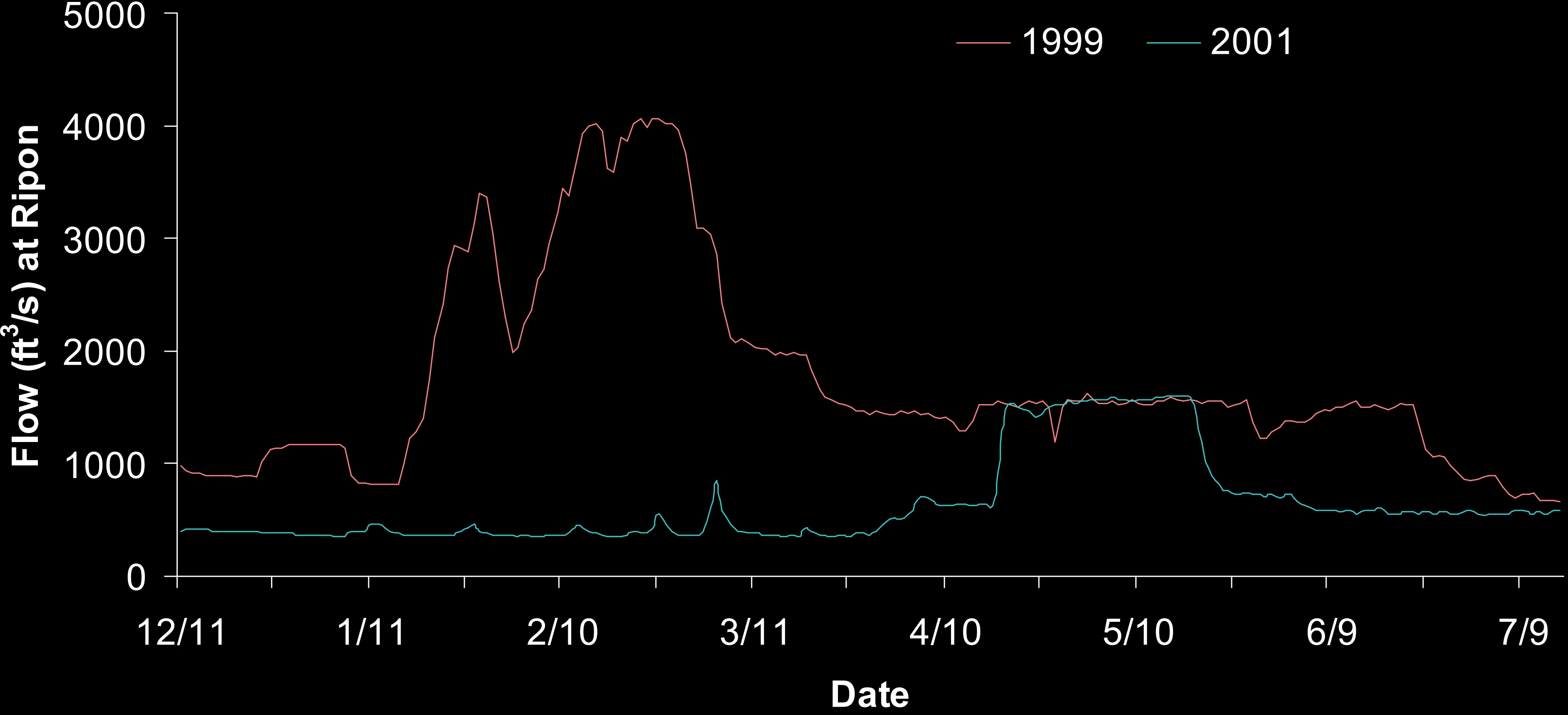
Passage Timing and Water Year





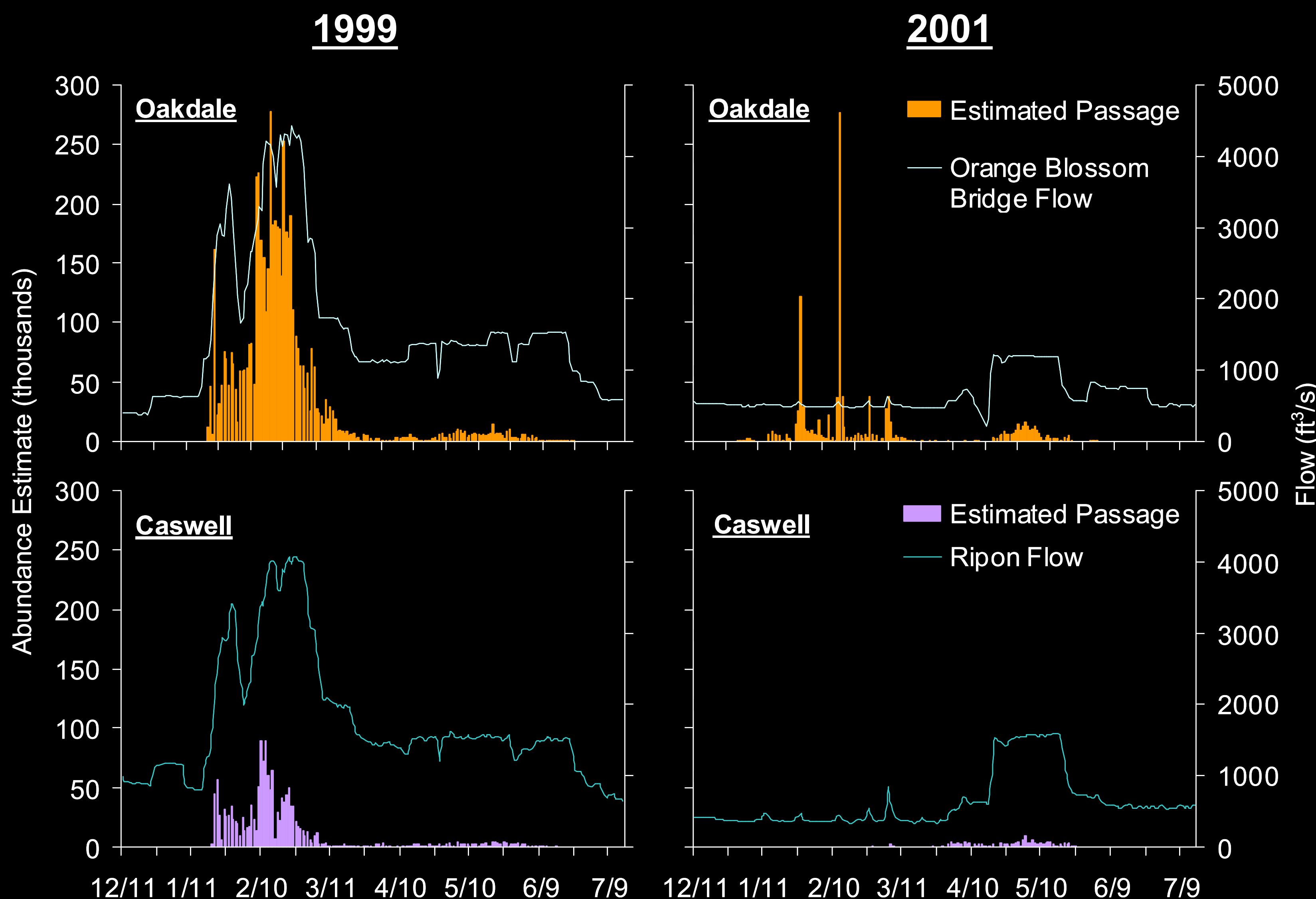
CRAMER FISH SCIENCES ~ WWW.FISHSCIENCES.NET

Representative Flow Years

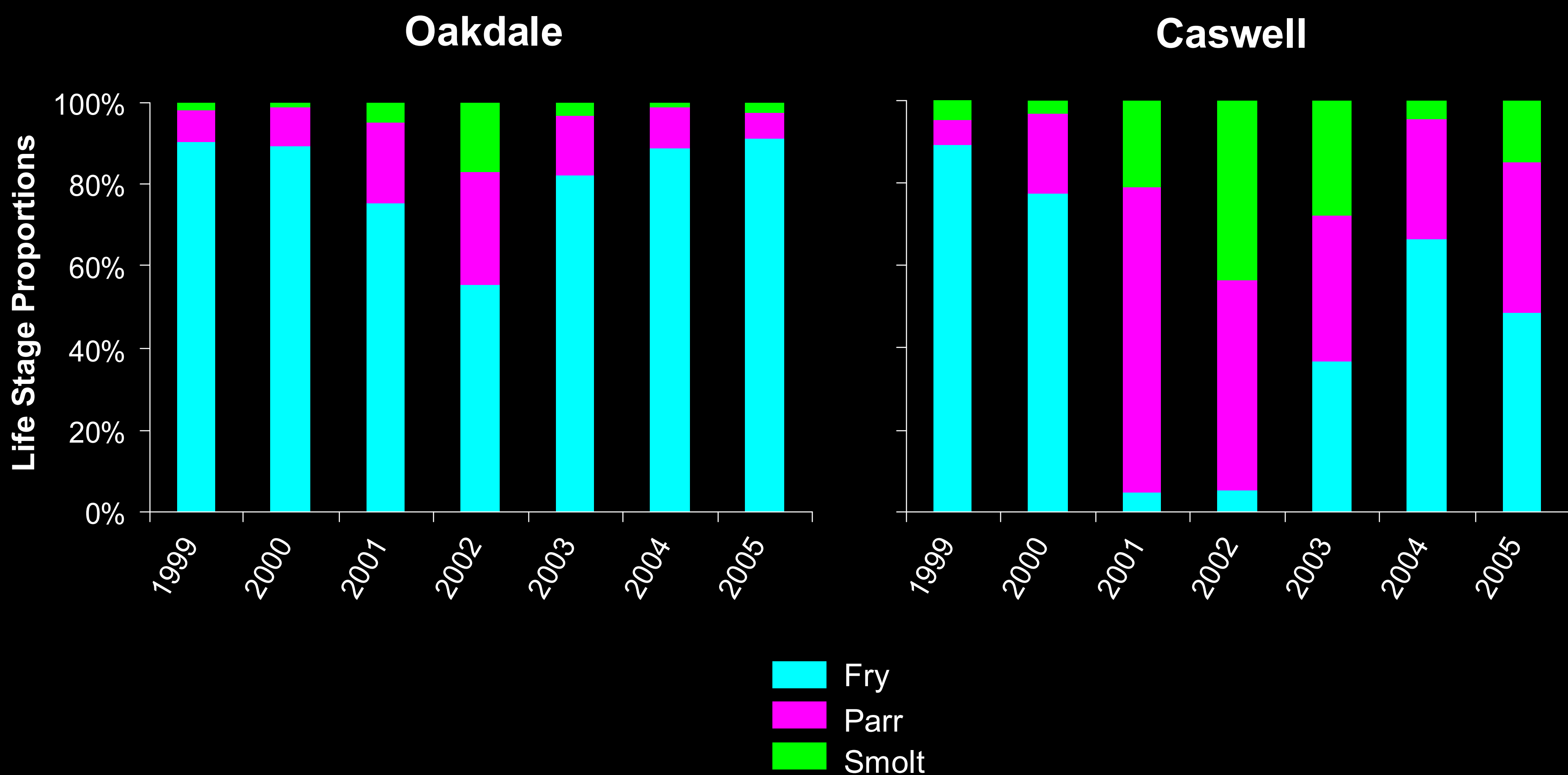


CRAMER FISH SCIENCES ~ WWW.FISHSCIENCES.NET

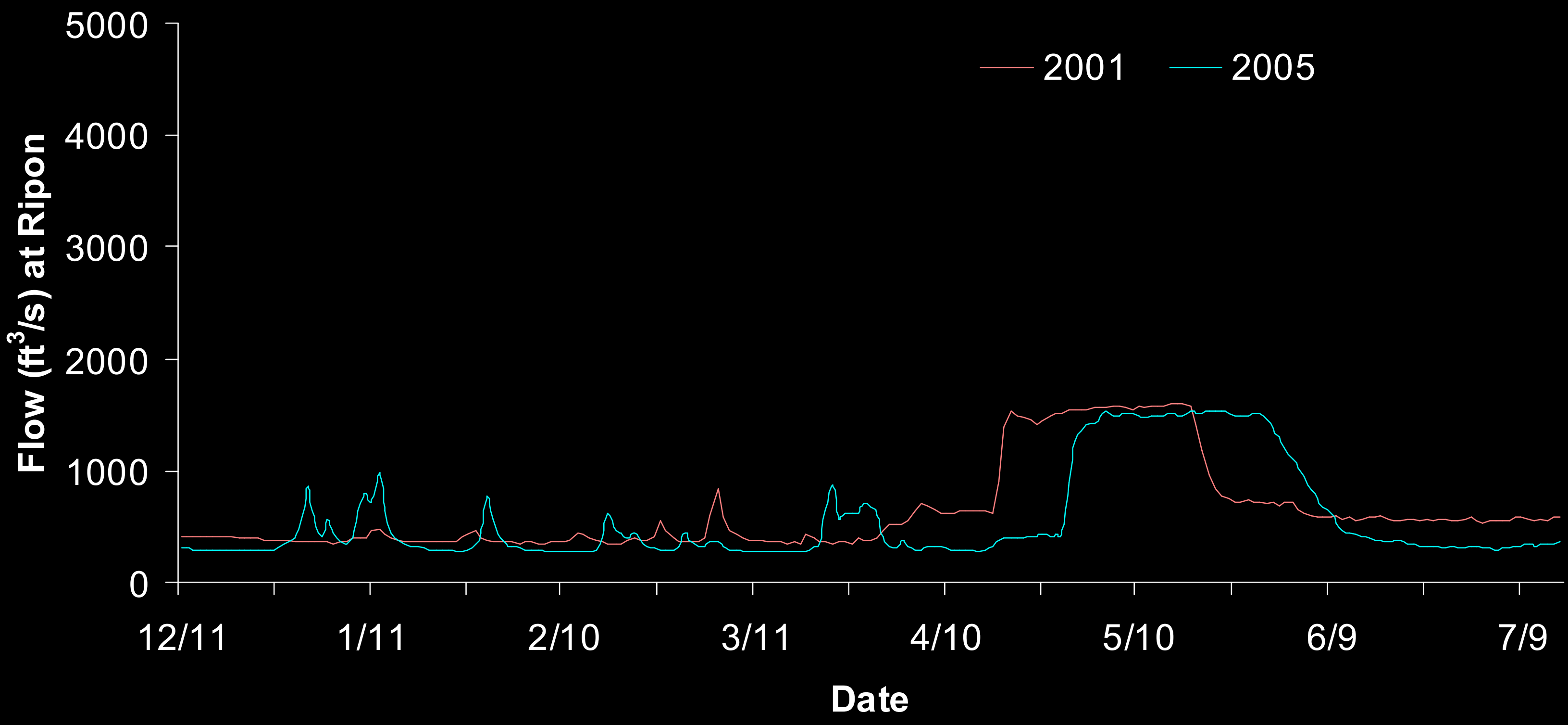
Flow Effects



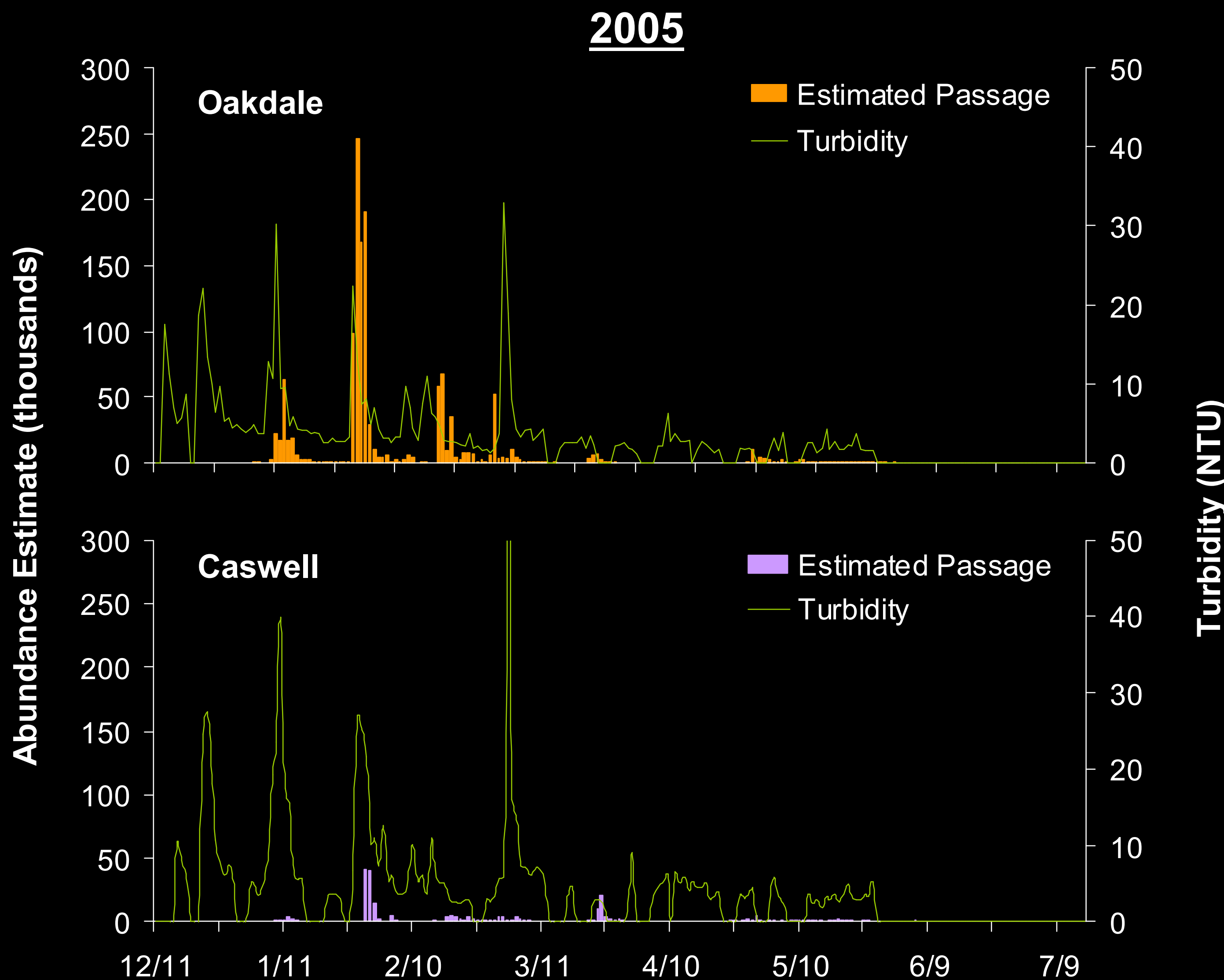
Life Stage Proportions



Representative "Dry" Flow Years



Effects of turbidity?



CRAMER FISH SCIENCES ~ WWW.FISHSCIENCES.NET

Significance of Physical Variables

- Survival estimates were positively correlated to:
  - Flow at OBB (P = 0.049; R^2 = 0.45)
  - Turbidity at Caswell (P = 0.016; R^2 = 0.59)
- Survival estimates were not significantly related to water temperature

Possible Hypotheses?

- Density dependence—“Pied Piper Effect”
- Turbidity provides cover and reduces predation
- Higher velocity flow increases migration speeds
- Increased in-river rearing or residence time during dry years
- Low flows associated with increased temperatures (poor health, decreased performance, improved predator efficiency, etc.)

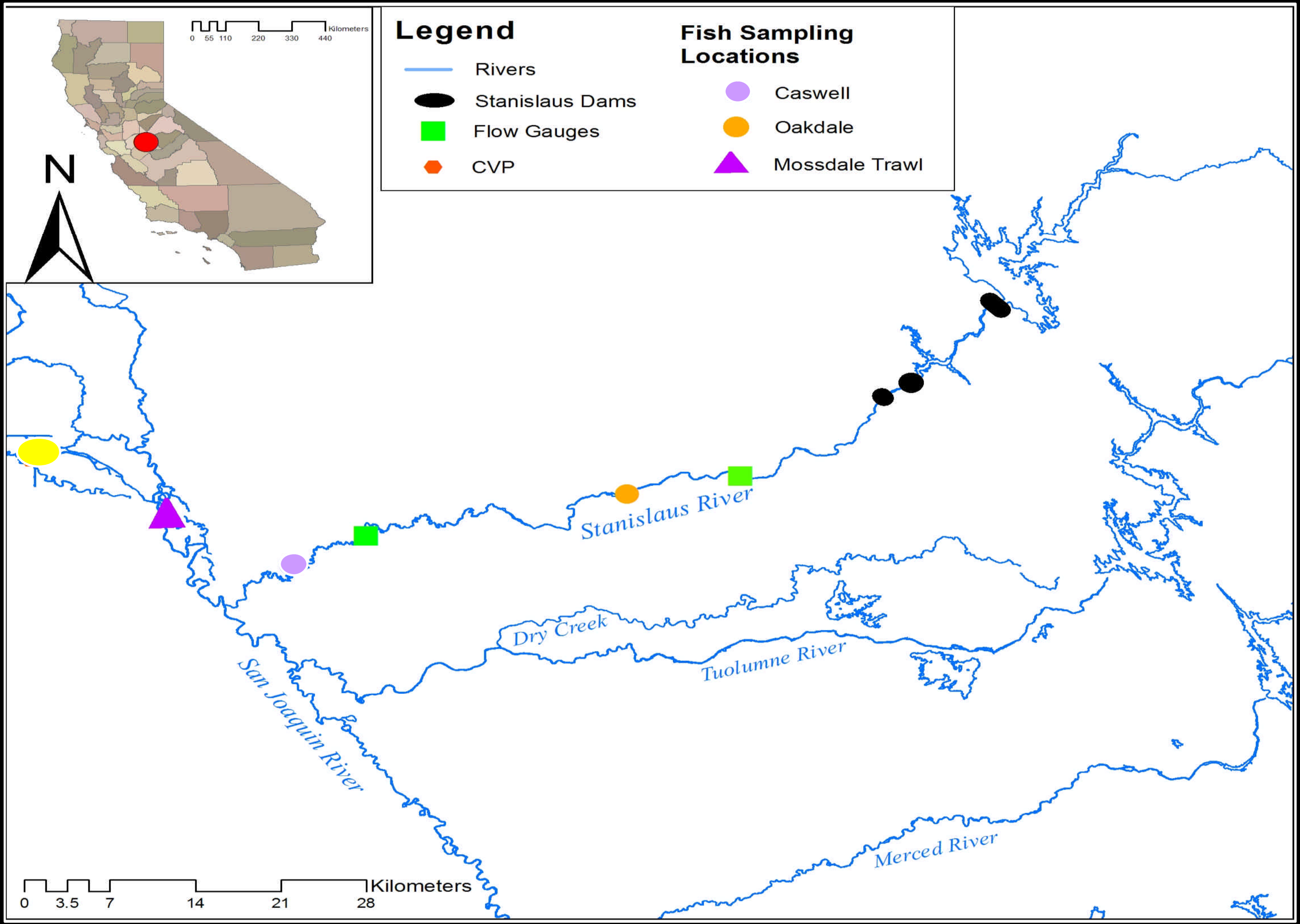
Current and Future Studies?

- Continue trapping at upstream and downstream locations
- Implemented Coded Wire Tag pilot component of the Contribution Rate study
- Look more closely at fish health
- Compare spawner escapement and juvenile abundance
- In-depth predator studies

Contribution Rate Project

- Determine contribution rates of different life stages to adult escapement with CWT and adult otolith analysis
- Draw inferences on survival, growth, and timing
- Identify affects of flow schedules on production
- Provide additional data to resource managers

CWT Recoveries



Cramer Fish Sciences ~ www.fishsciences.net

Recoveries

Recovery Date	Tagging Date	Code	Recovery Location	Avg. Size at Tagging (mm FL)	Size at Recovery (mm FL)
4/1/07	3/12 to 3/25/07	062402	CVP	38.6 ± 2.1	70
4/4/07	3/21/07	Unknown	Mossdale trawl	65	70
4/27/07	2/26 to 3/4/07	062401	Mossdale trawl	35.0 ± 0.2	88

Conclusions

- We see increased fry survival during wet years
- Small freshets and associated turbidity may stimulate fry migration and increase survival, even in dryer years
- Fry abundance and survival are disproportionately low compared to smolts in dryer years

Acknowledgements

U.S. FISH & WILDLIFE SERVICE

AFRP
Anadromous Fish Restoration Program

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

CRAMER FISH SCIENCES ~ WWW.FISHSCIENCES.NET