Comparing In-River Survival of Coleman National Fish Hatchery- and Nimbus Fish Hatchery-Origin Steelhead Smolts Released in the Lower American River

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Outline

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2) Methods
- Tagging
- Mobile Surveys
- Stationary Data

3) Results and Discussion
- Fish and environmental
- Migration rates
- LAR and ocean survival

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Background

History at the Hatchery

1955- Nimbus Hatchery operations began in the lower American River

Impacting the recovery of federally threatened California Central Valley steelhead

Background

The Need

2009 Biological Opinion

New stock must contribute, or at least not detract from recovery of the Central Valley Steelhead

Background

The Plan

- Identify potential broodstock source populations within the CV Steelhead DPS

- Compare growth, smoltification rates, and survival at Nimbus Hatchery

- Compare outmigration behaviors and survival

Background

The Plan

- Identify potential broodstock source populations within the CV Steelhead DPS

~~Upper American River *O. mykiss*~~

Coleman or Feather River (hatchery) *O. mykiss*

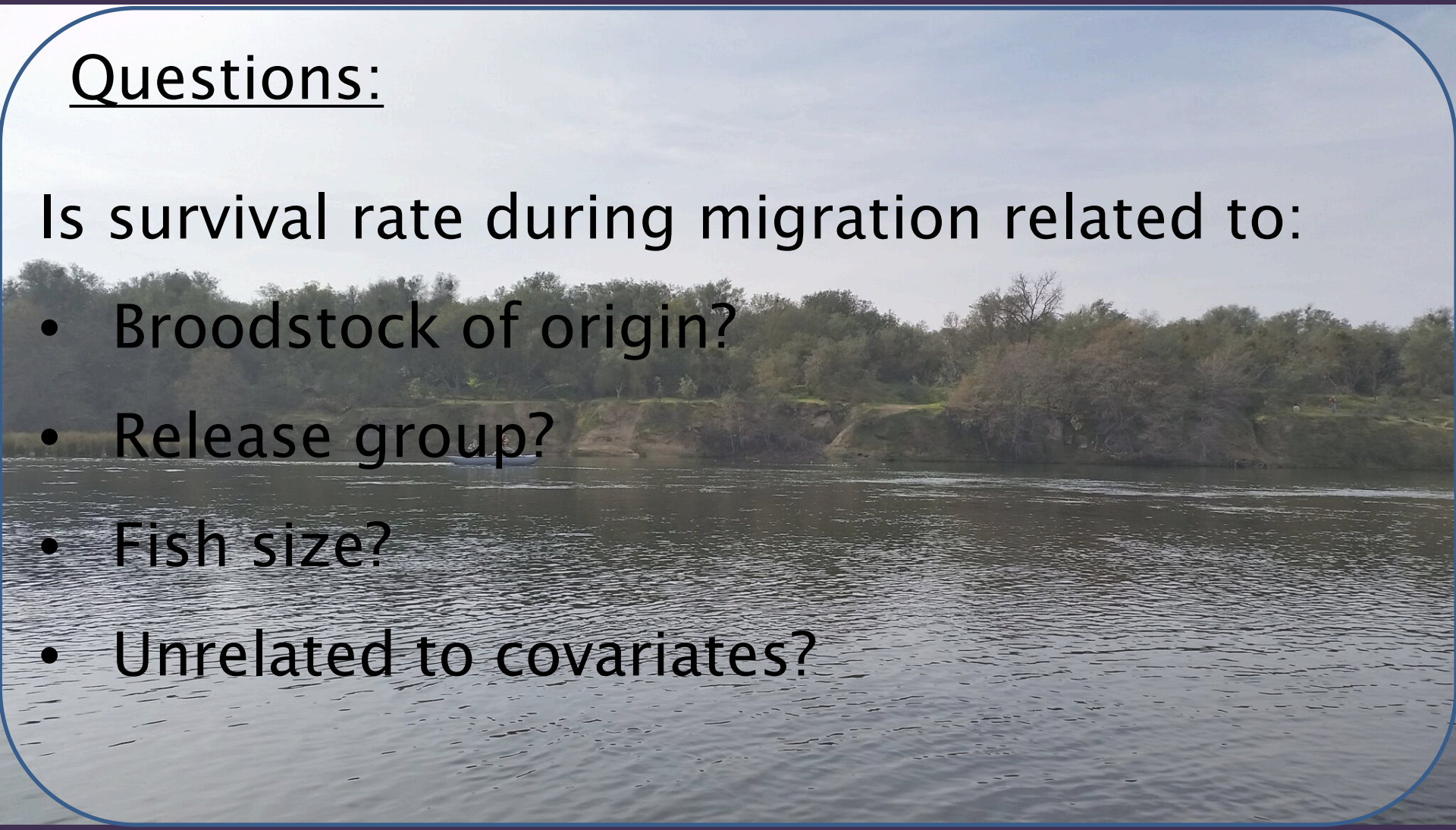
Background

The Plan

- ~~Compare growth, smoltification rates, and survival at Nimbus Hatchery~~

- Compare outmigration behaviors and survival

Background



Questions:

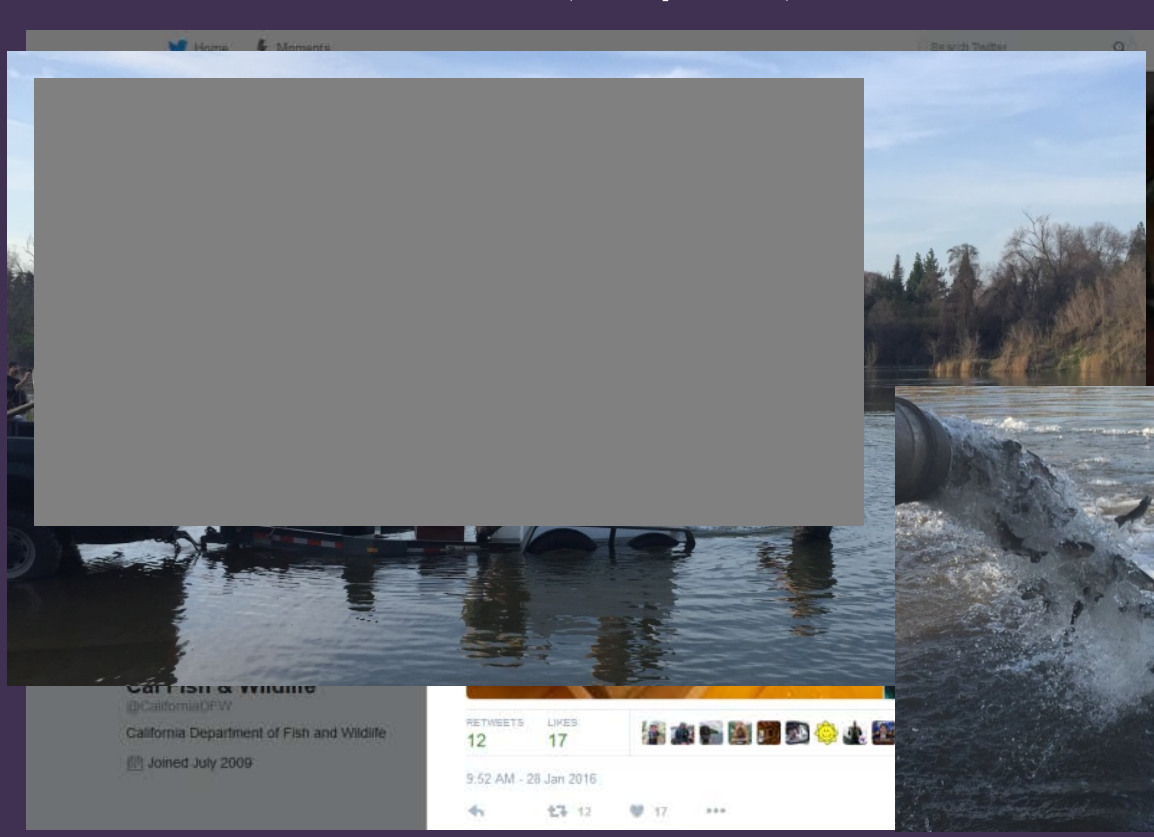
Is survival rate during migration related to:

- Broodstock of origin?
- Release group?
- Fish size?
- Unrelated to covariates?

Methods

2016 Tagging

200 Vemco V7 69kHz
Half-duplex Passive Integrated Transponder (PIT) tag
Howe Ave
Rel 1: Feb. 11th (47/50) Rel2: Feb. 24th (46/57)

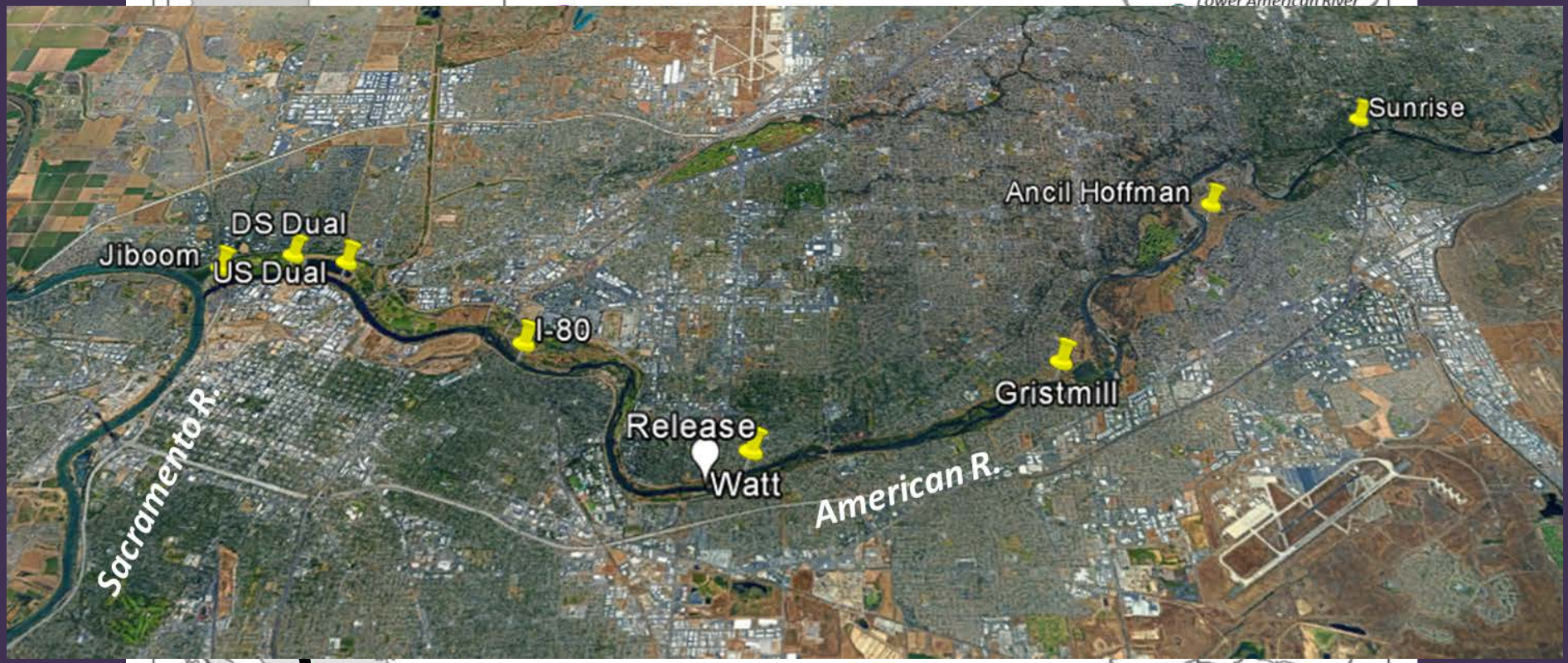


Methods

LAR Mobile Monitoring

Methods

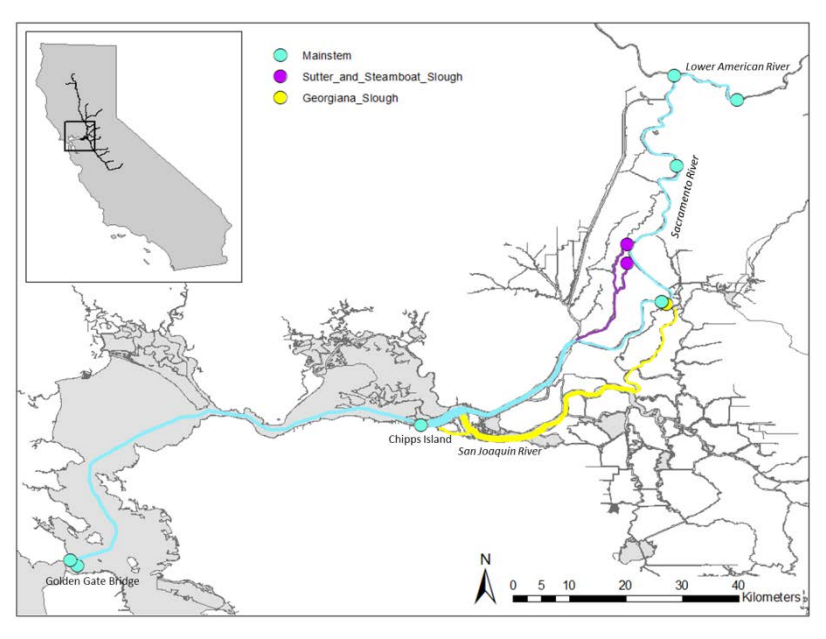
Stationary Monitoring



Methods

Stationary Monitoring

- Reach specific survival



MARK
Multi-state model

1. Broodstock Origin
2. Release Group
3. Fork length as a continuous predictor
4. No covariate

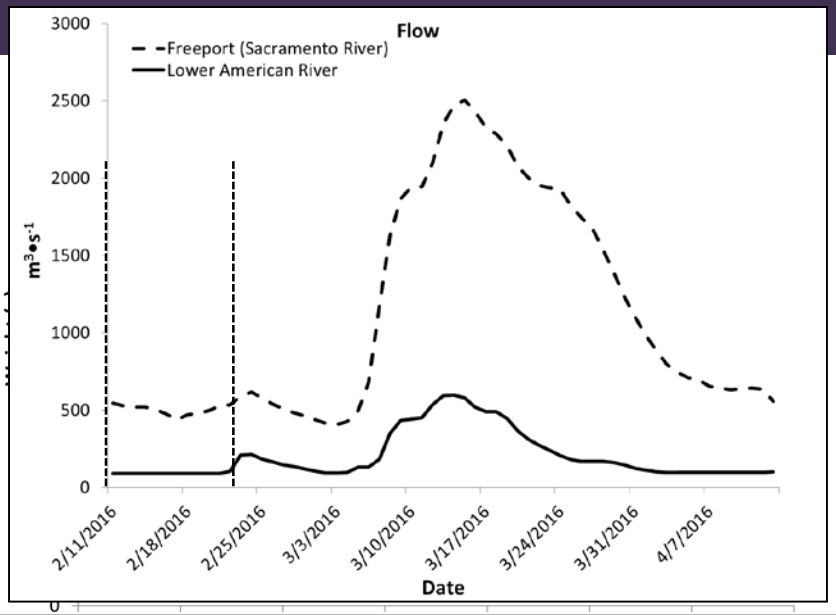
- Release-Golden Gate survival

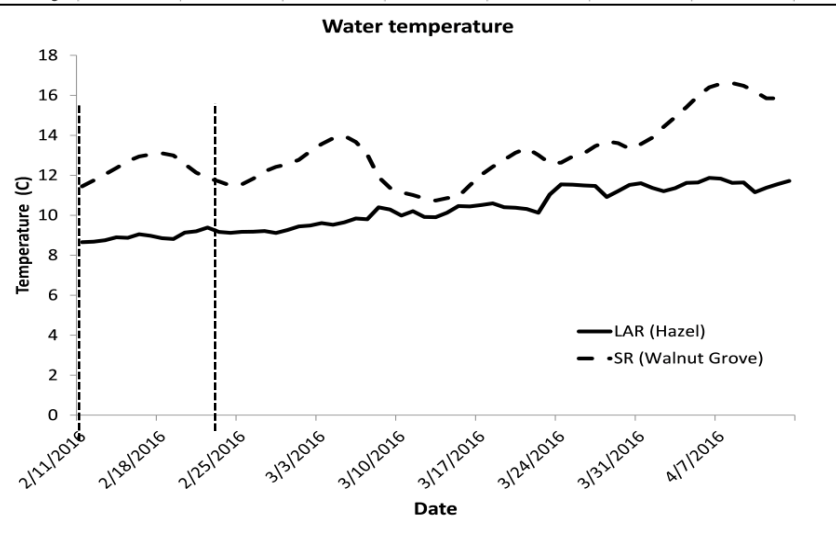
Results and Discussion

Fish and environmental conditions

Fork Length

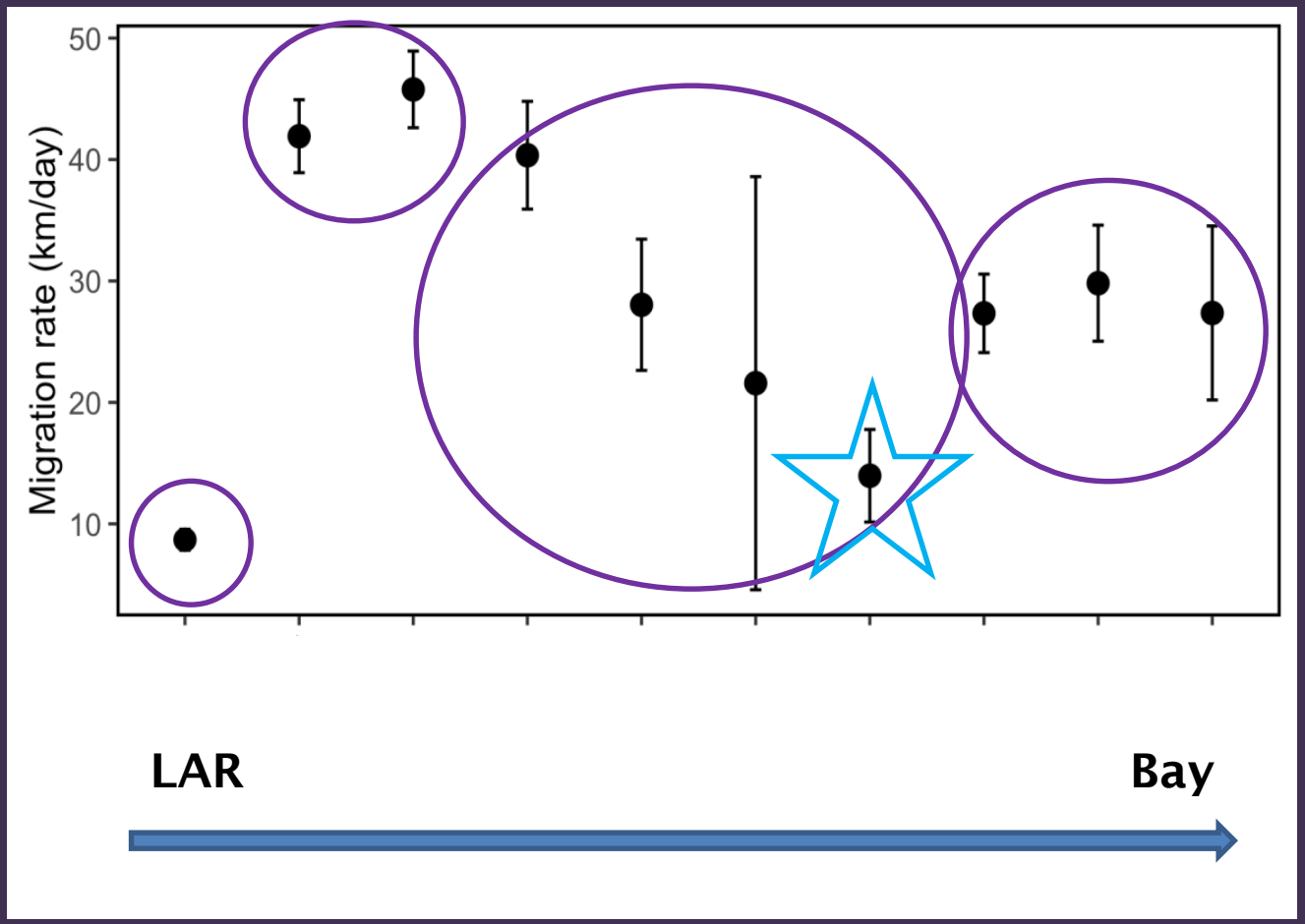
Nimbus-origin: 165-268 mm. avg = 216
Coleman-origin: 171-252 mm. avg. = 211





Results and Discussion

Migration Rates

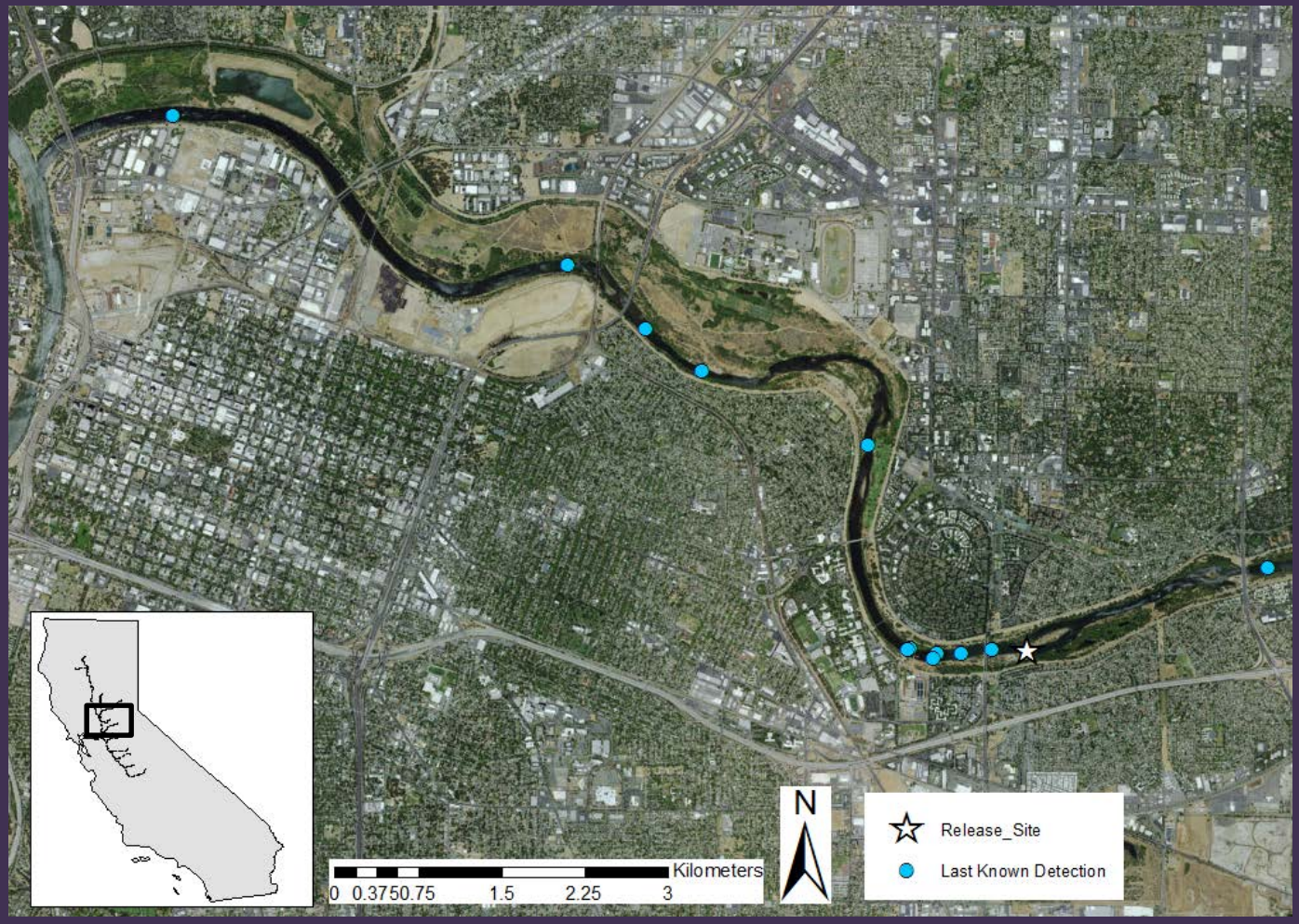


Results and Discussion

Survival in the LAR: Mobile Monitoring

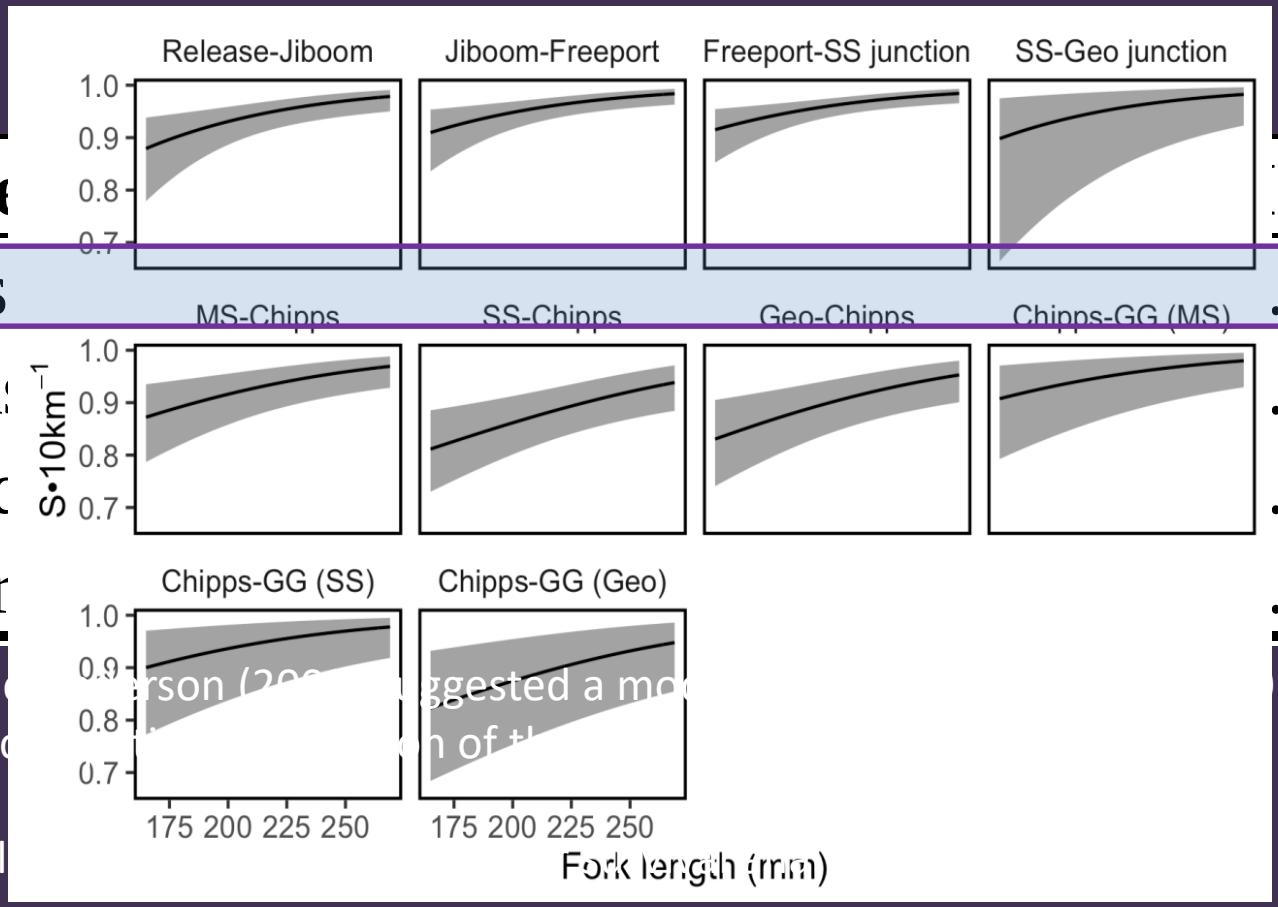
11 LAR last known detections

*15 via stationary = 93% survival



Results and Discussion

Reach Specific and Route Survival



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Fish s	.950
Releas	.029
Brooc	.017
No gr	.004

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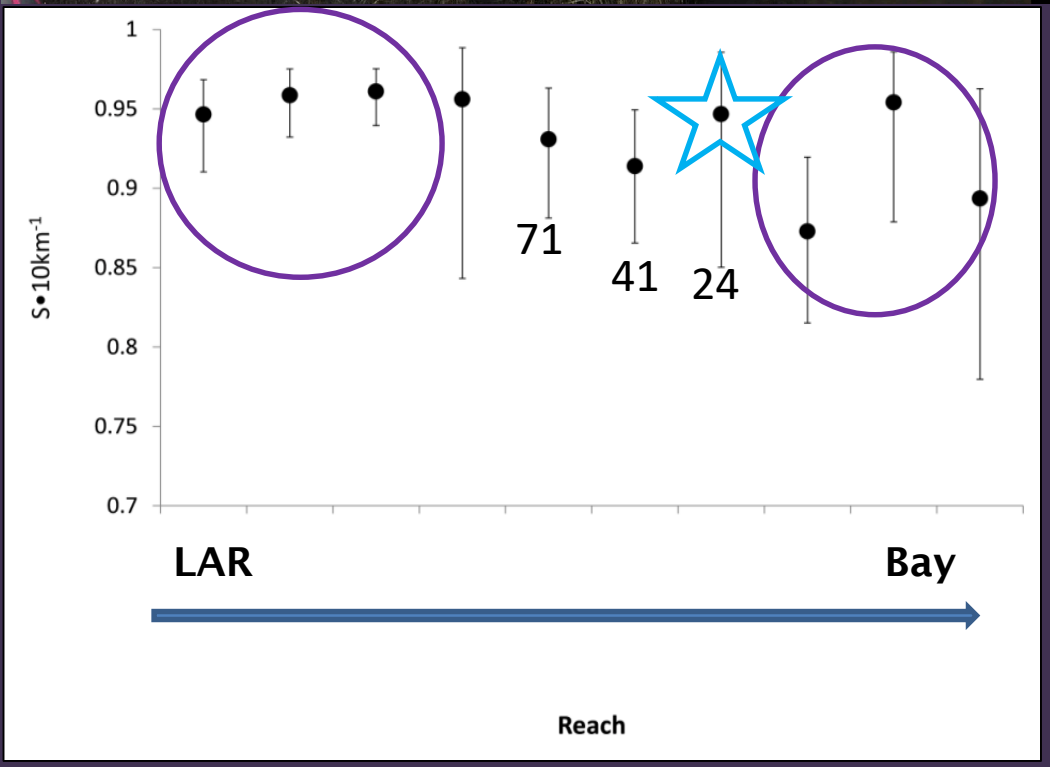
*Grouped Col

Results and Discussion

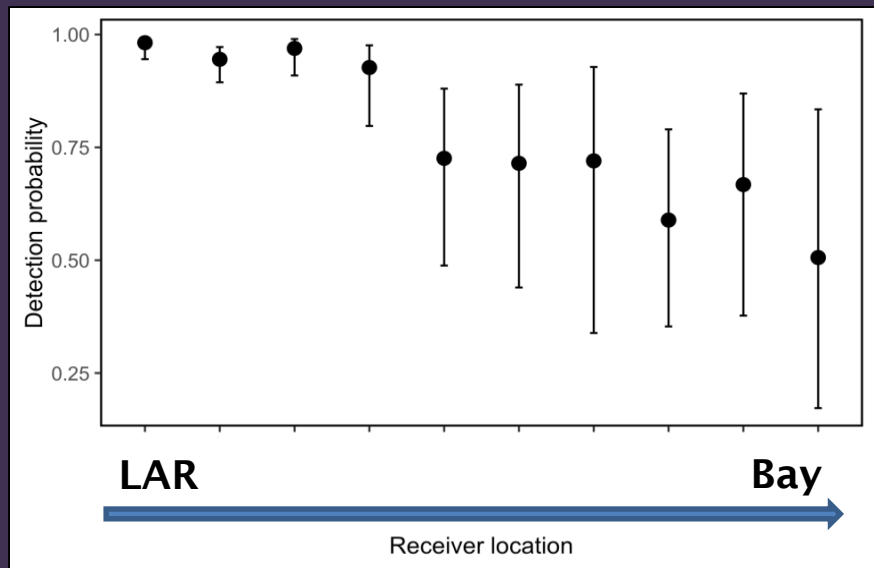
Reach Specific and Route Survival



CI overlap for survival in most reaches

Sample size

Low detection probabilities



CI overlap for detection probabilities in the Delta

Channel complexity

Sample size

Results and Discussion

Reach Specific and Route Survival

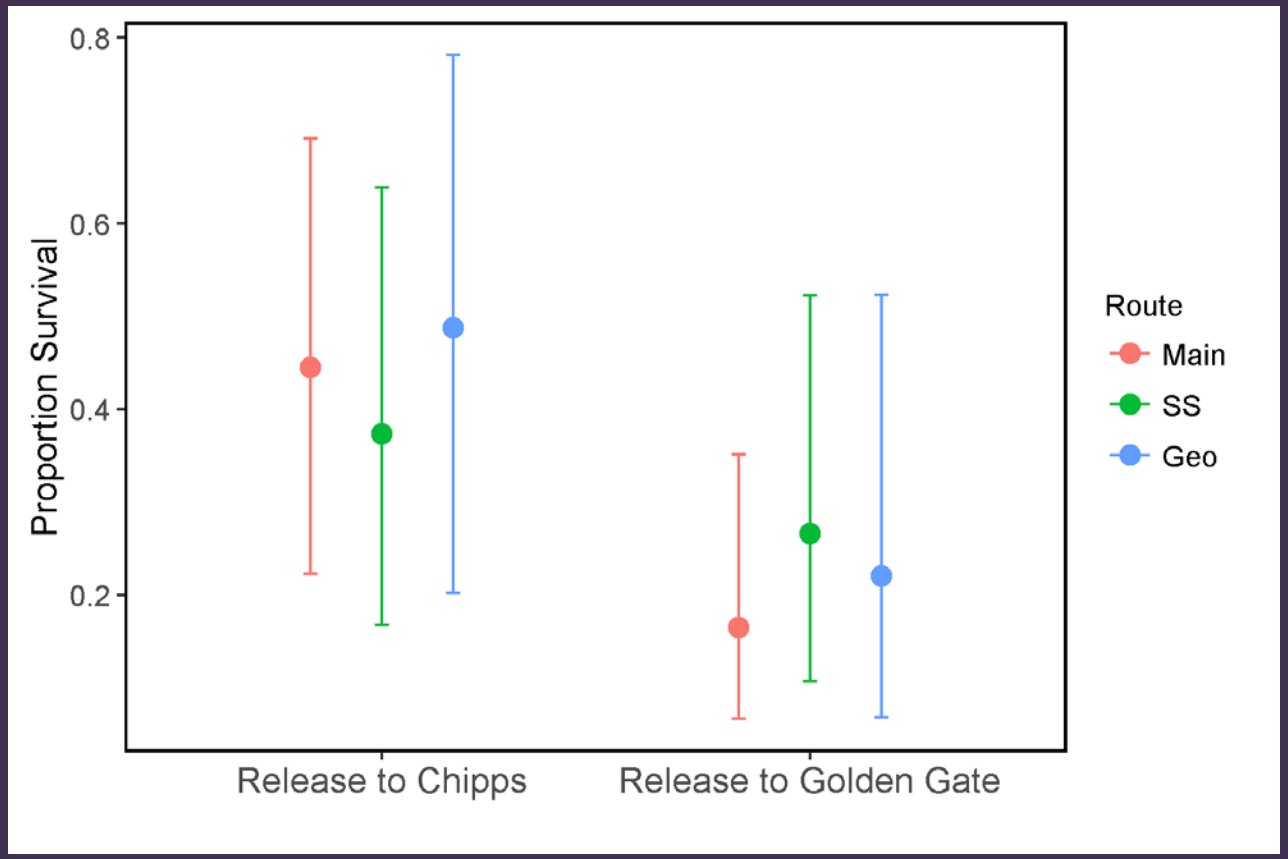
Survival to Golden Gate:

Release to GG (MS): 16.4%

Release to GG (SS): 26.6%

Release to GG (Geo): 22.1%

18 Coleman, 21 Nimbus



Summary

*Model using broodstock did not provide strong support for differences in survival.

- As fork length increases, so does survival rate.
- No evidence of residualization or holding in the LAR
- High survival through the LAR

*Future:
Study different life-stages in-hatchery and in-river.

Acknowledgments

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Staff from the California Department of Fish and Wildlife Fisheries Branch provided crucial support during tagging and deployed and retrieved acoustic monitors in the Lower American River.

Equipment and expertise provided by CDFW/USBR made mobile monitoring possible.

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