

Trinity River Acoustic Survival Study Update

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Juvenile Salmonid Acoustic Tags

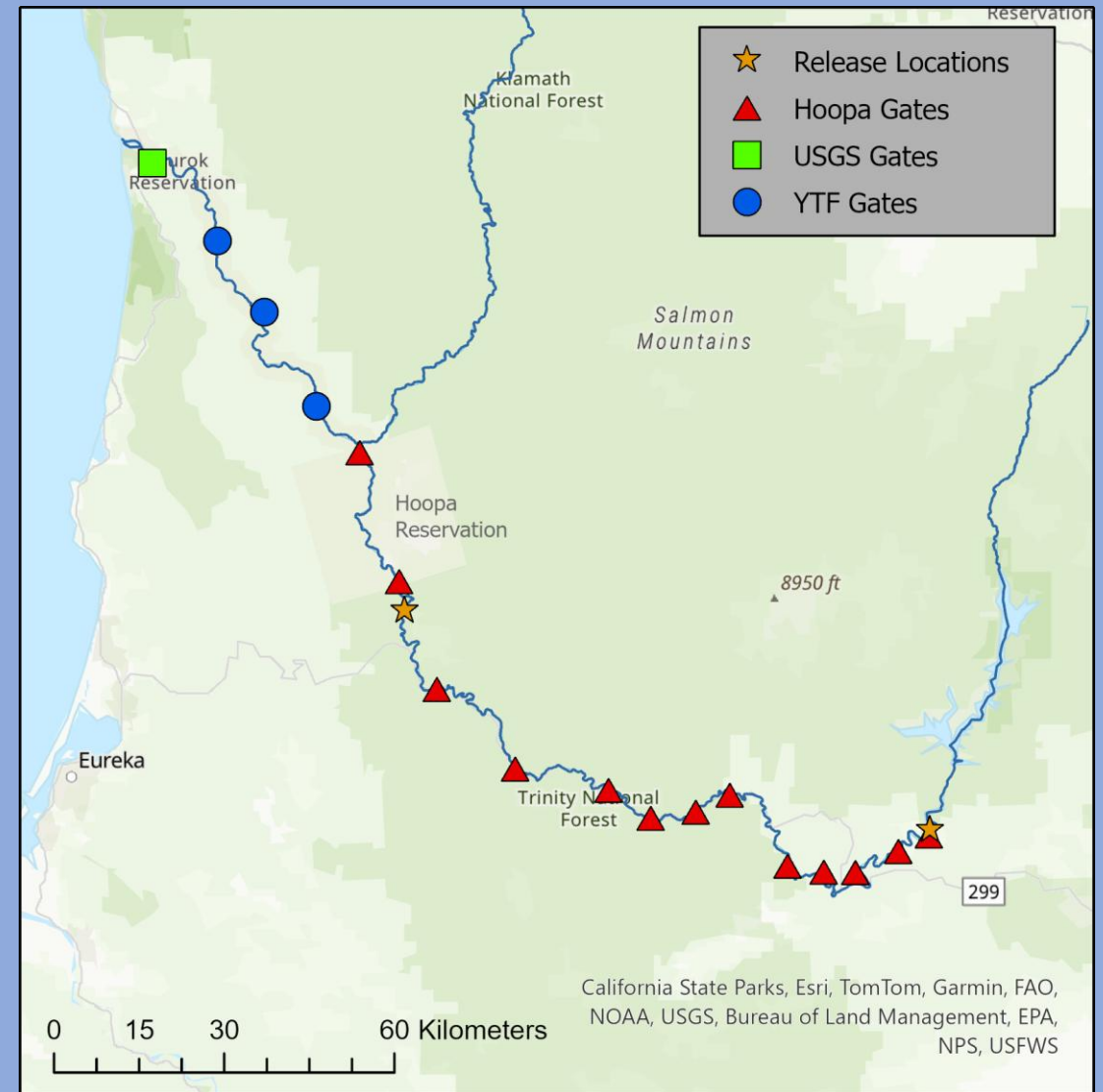
- JSAT tags were surgically implanted into a juvenile chinook between 65 and 123mm
- Fish were held for 24 hours before subsequently released in the river at TRH
- JSAT emitted a signal every 3 or 5 seconds
 - Signals identify individual fish
- Receivers downstream of the release location detected fish as they moved downstream



Receiver Deployment

- Receivers were deployed and managed by USGS and Tribal partners
 - Several receivers upstream of the Trinity-Klamath confluences
- The data from each receiver is summarized as an encounter history from which survival rates can be estimated:

FishID	Gate1	Gate2	Gate3
101	1	1	1
102	1	0	0
103	1	0	1
104	0	1	1



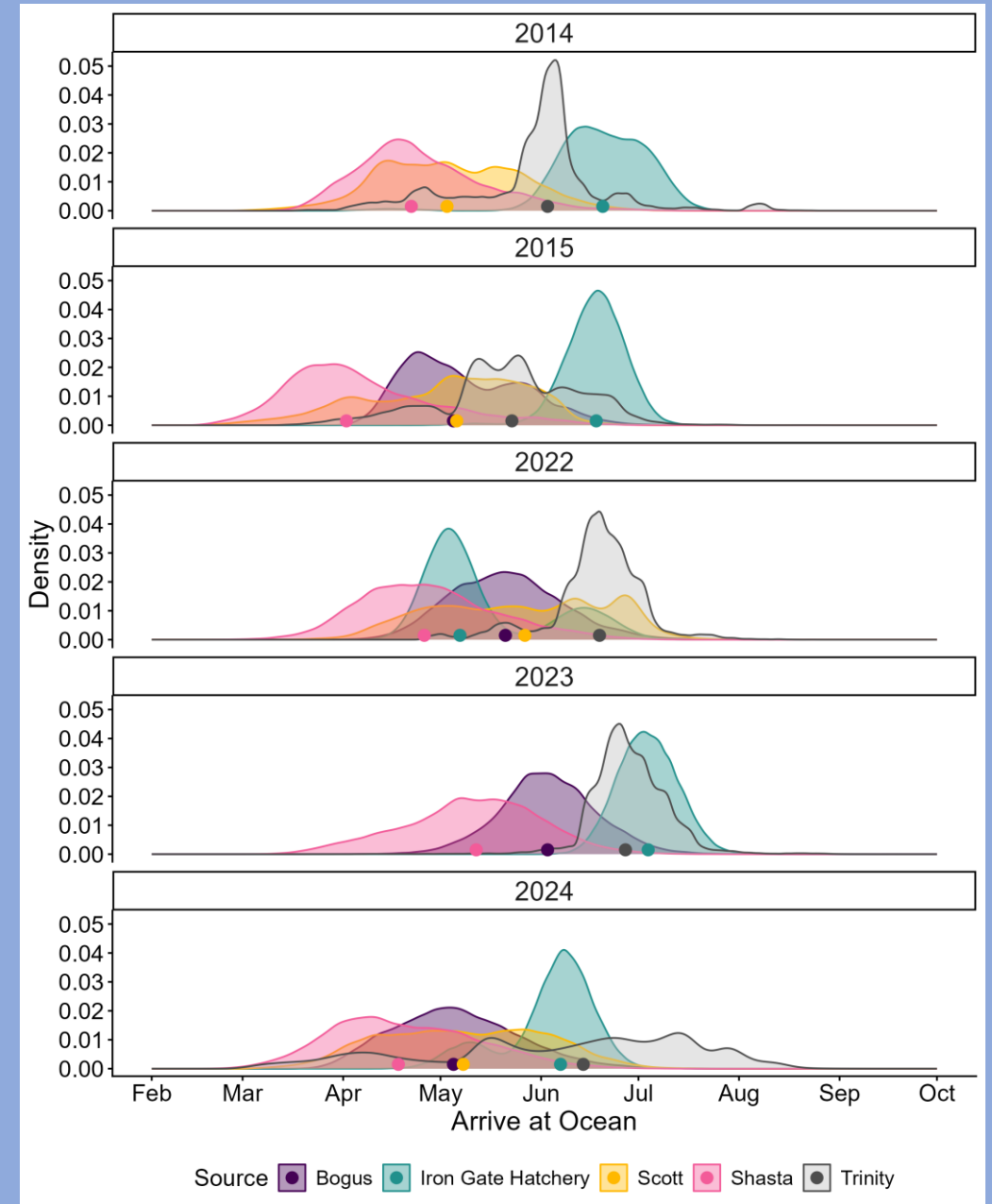
Total Tags Deployed

- One pilot year and four study years
- Original plan for 1200 tags per year,
 - 400 for each tribe
- Additional tags in 2025 and 2026 thanks to USGS partners
 - ELAT tags

Org.	2022	2023	2024	2025	2026	Total
HVT	276	398	408	693	839	5,131
YTF	--	399	406	419	420	2,484
Total	276	797	814	1,112	1259	7,615

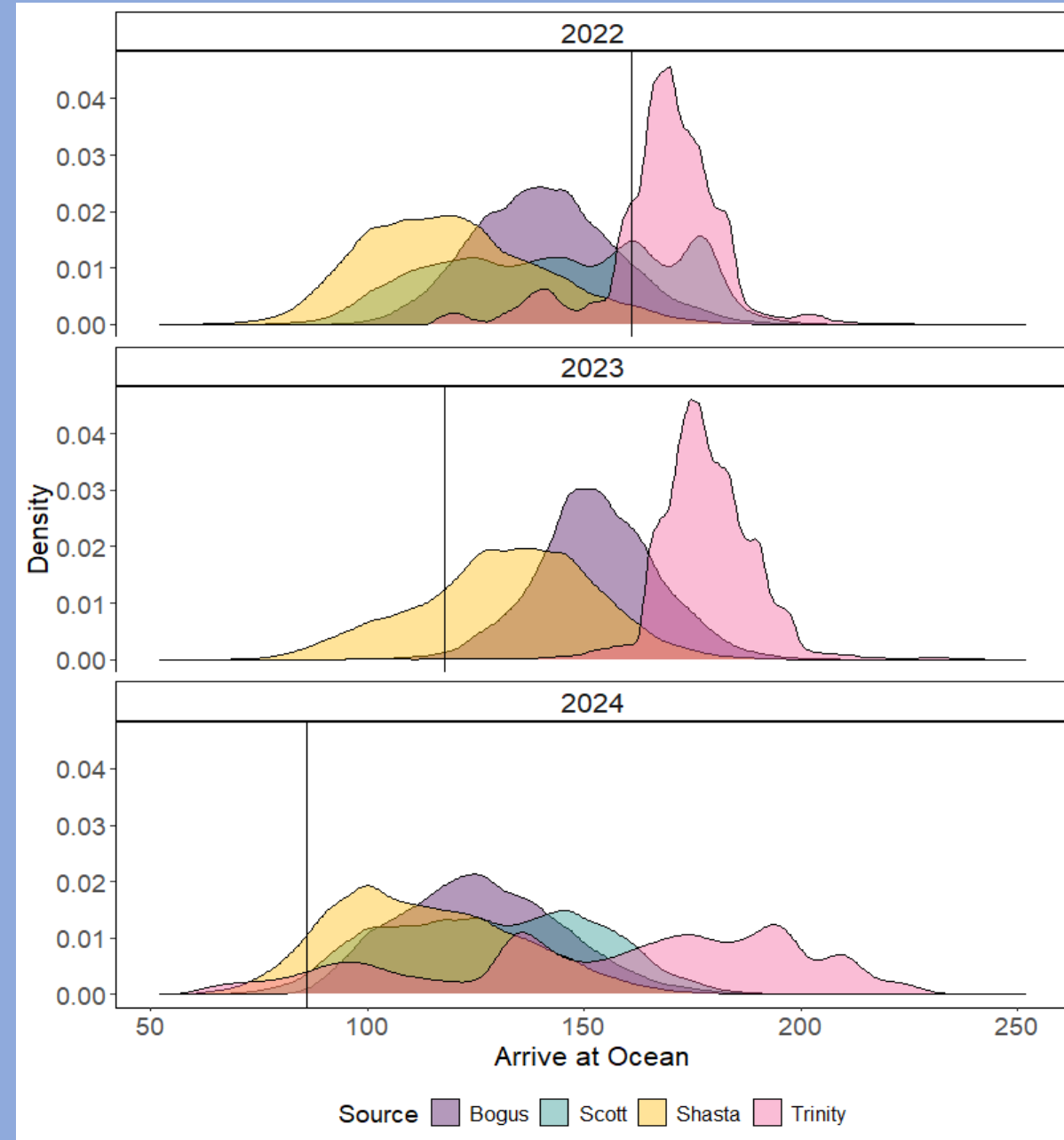
Klamath Movement Analysis

- Data from this project included was included in larger movement and migration analysis of Klamath River fish
 - Migration was modeled and simulated for several Klamath River source populations: Bogus Creek, IGH, Scott River, Shasta River, and Trinity River
- Trinity river fish found to consistently enter the Klamath and reach the ocean later than other populations

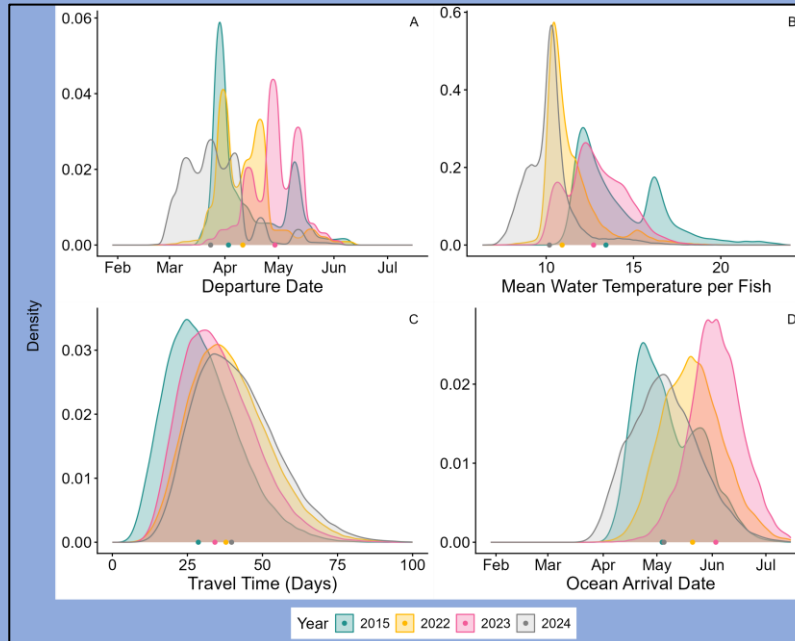


Klamath Movement Analysis

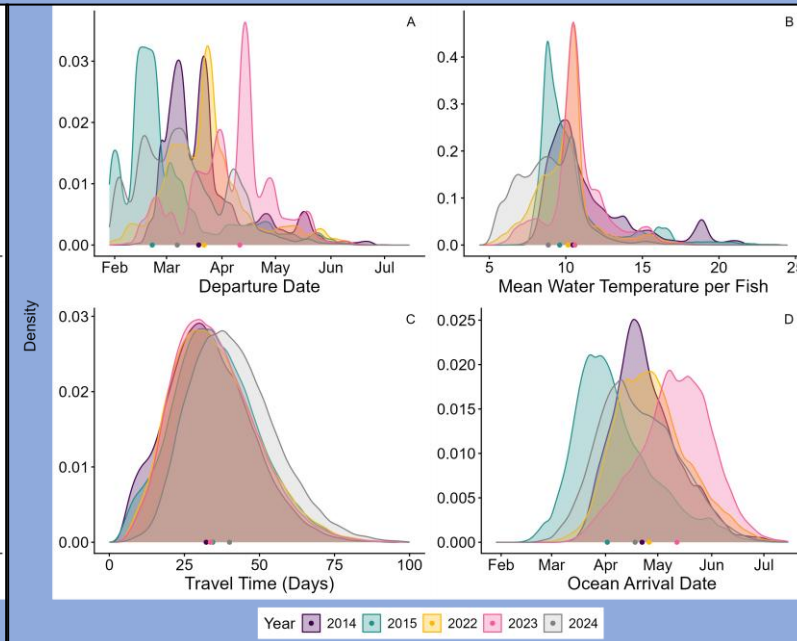
- Several consequences to the late arrival
 - Larger portions of Trinity outmigrants experience warmer water temperatures in the lower Klamath
 - In most years, Trinity outmigrants may be missing the optimal phenotypic window in the nearshore environment



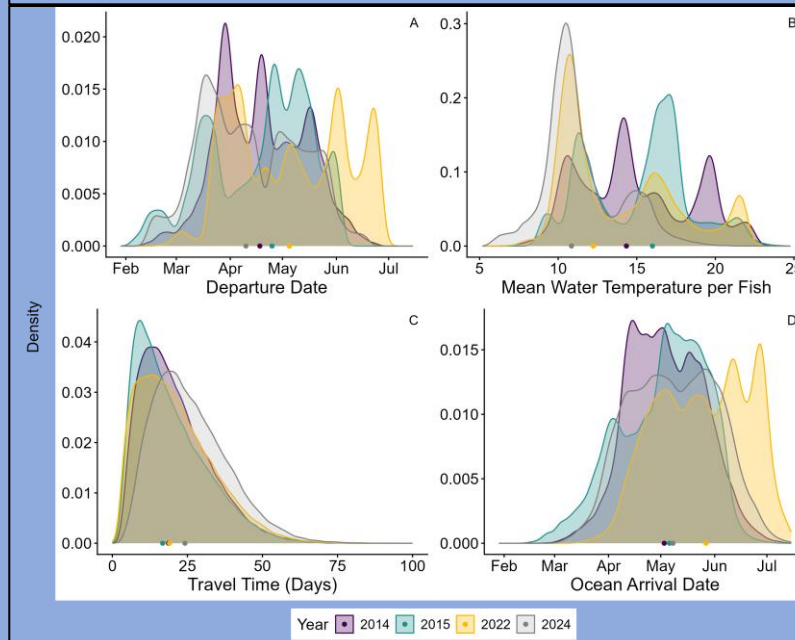
Bogus Creek



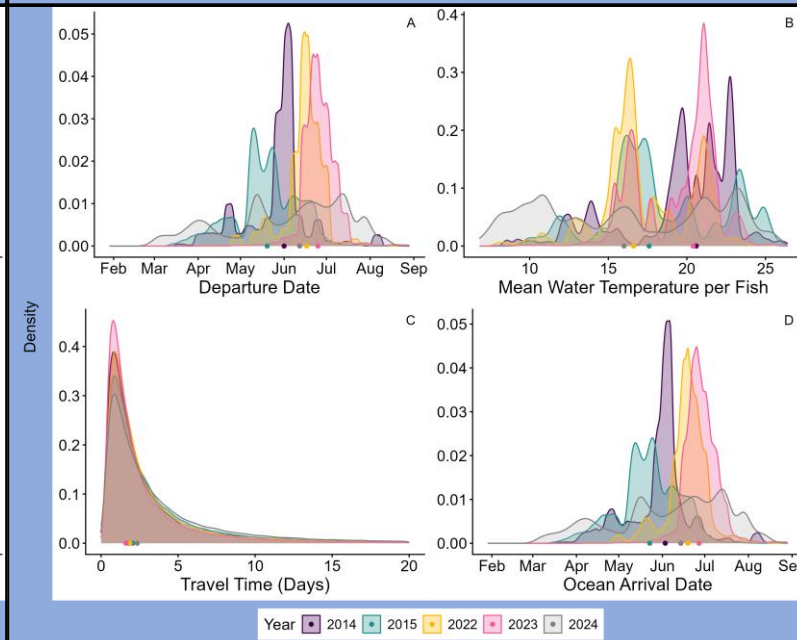
Scott River



Shasta River

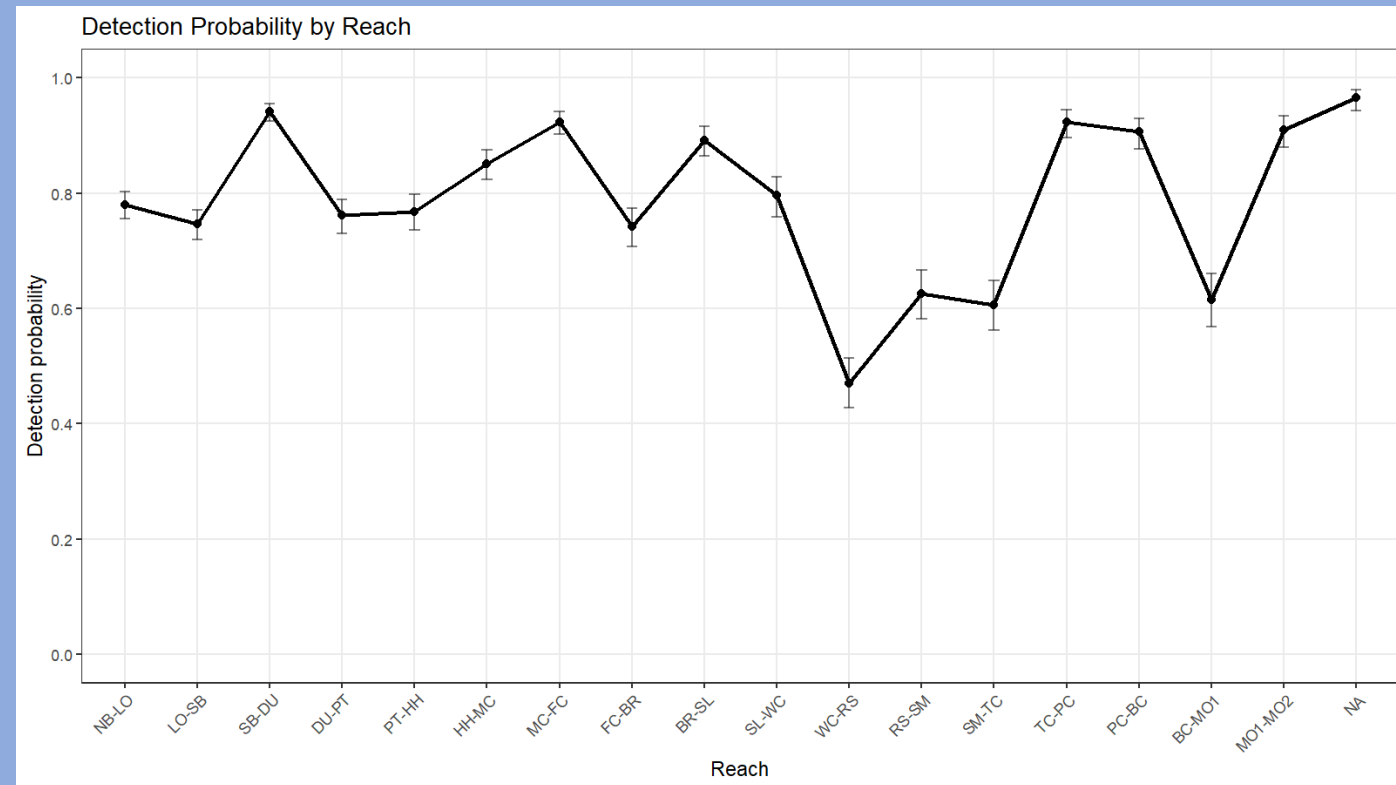


Trinity River



Survival Analysis – First Three Years

- Brief analysis completed on the first three years of data using
 - CJS model in Rmark
- Compared a few models
 - Top model:
 - Survival $\sim$ fork length + time
 - Detection $\sim$ time
 - Time = gate or reach



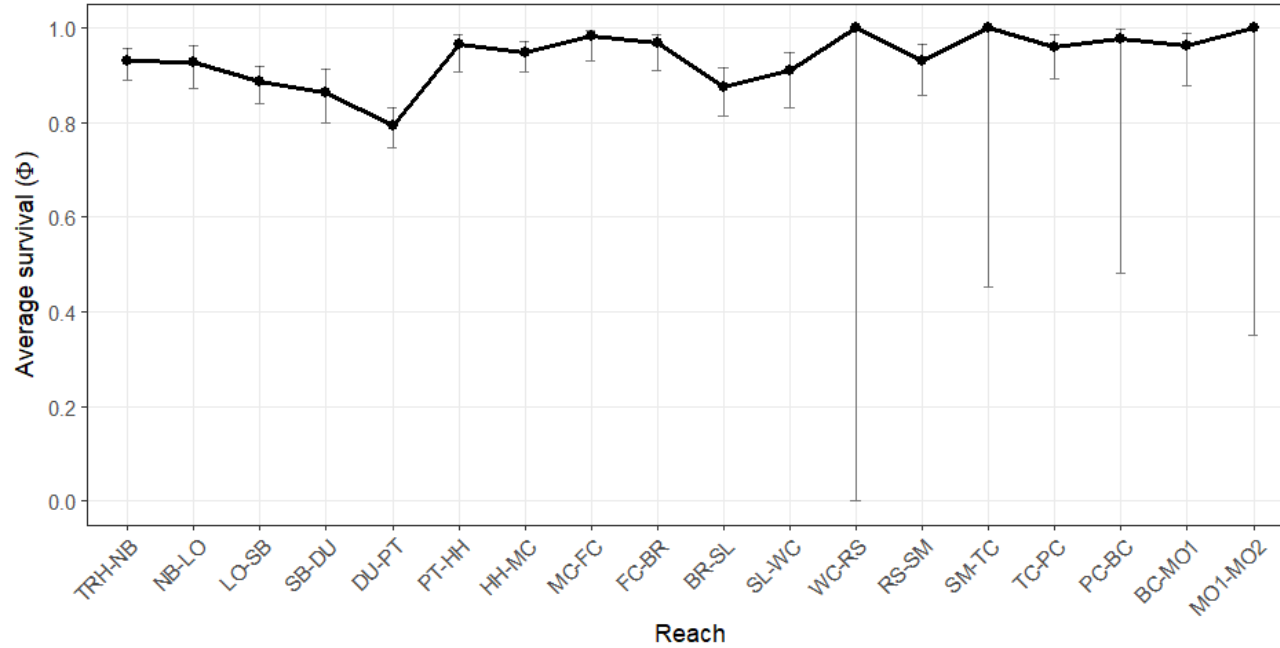
Survival Estimates

- By gate survival appears high
 - But reaches are variable in length
 - Survival estimates were adjusted to allow comparison across reaches
- Survival estimates were multiplied to show survival across reaches and the system as a whole

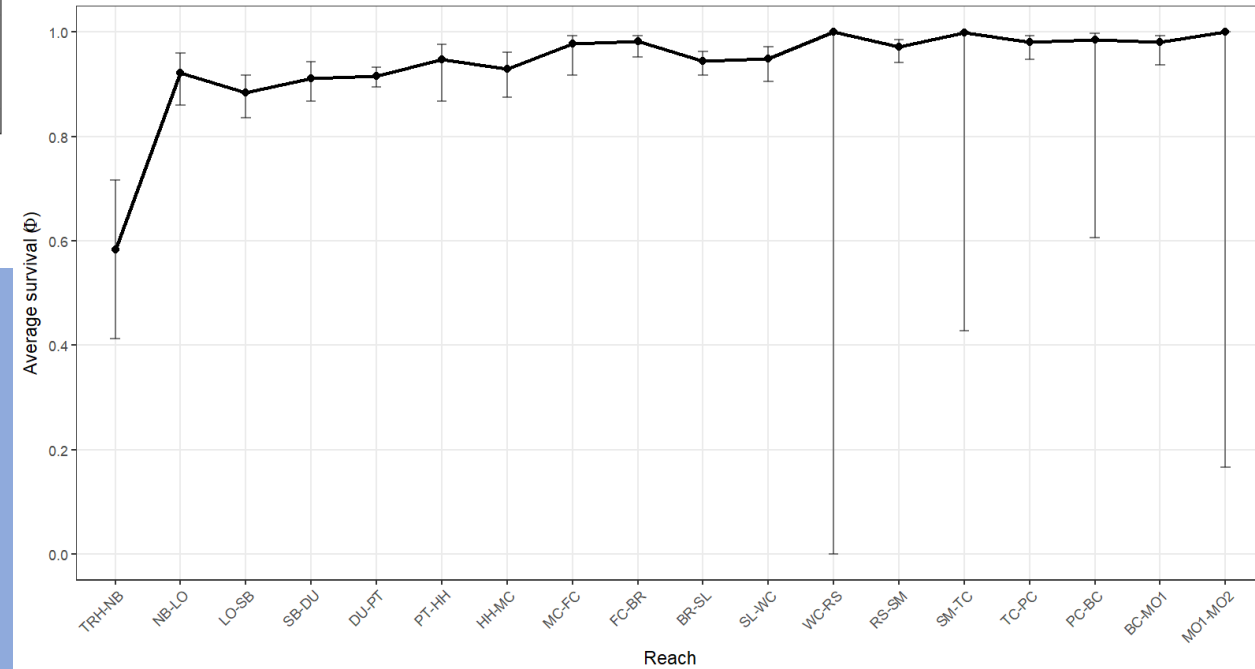
Reach	km	Survival Estimate	95% CI	Standardized (10km)	95% CI
TRH-NB	1.3	0.93	(0.89-0.96)	0.58	(0.41-0.72)
NB-LO	9.2	0.93	(0.87-0.96)	0.92	(0.86-0.96)
LO-SB	9.8	0.89	(0.84-0.92)	0.88	(0.84-0.92)
SB-DU	15.6	0.86	(0.8-0.91)	0.91	(0.87-0.94)
DU-PT	26.1	0.79	(0.75-0.83)	0.92	(0.89-0.93)
PT-HH	6.8	0.96	(0.91-0.98)	0.95	(0.87-0.98)
HH-MC	7.3	0.95	(0.91-0.97)	0.93	(0.88-0.96)
MC-FC	8.3	0.98	(0.93-0.99)	0.98	(0.92-0.99)
FC-BR	19.5	0.97	(0.91-0.99)	0.98	(0.95-0.99)
BR-SL	24.0	0.87	(0.81-0.91)	0.95	(0.92-0.96)
SL-WC	18.5	0.91	(0.83-0.95)	0.95	(0.91-0.97)
WC-RS	7.8	1.00	(0-1)	1.00	(0-1)
RS-SM	25.2	0.93	(0.86-0.96)	0.97	(0.94-0.99)
SM-TC	9.4	1.00	(0.45-1)	1.00	(0.43-1)
TC-PC	21.3	0.96	(0.89-0.99)	0.98	(0.95-0.99)
PC-BC	14.6	0.98	(0.48-1)	0.98	(0.61-1)
BC-MO1	20.1	0.96	(0.88-0.99)	0.98	(0.94-0.99)
MO1-MO2	5.8	1.00	(0.35-1)	1.00	(0.17-1)
System wide		0.30			

Survival Estimates

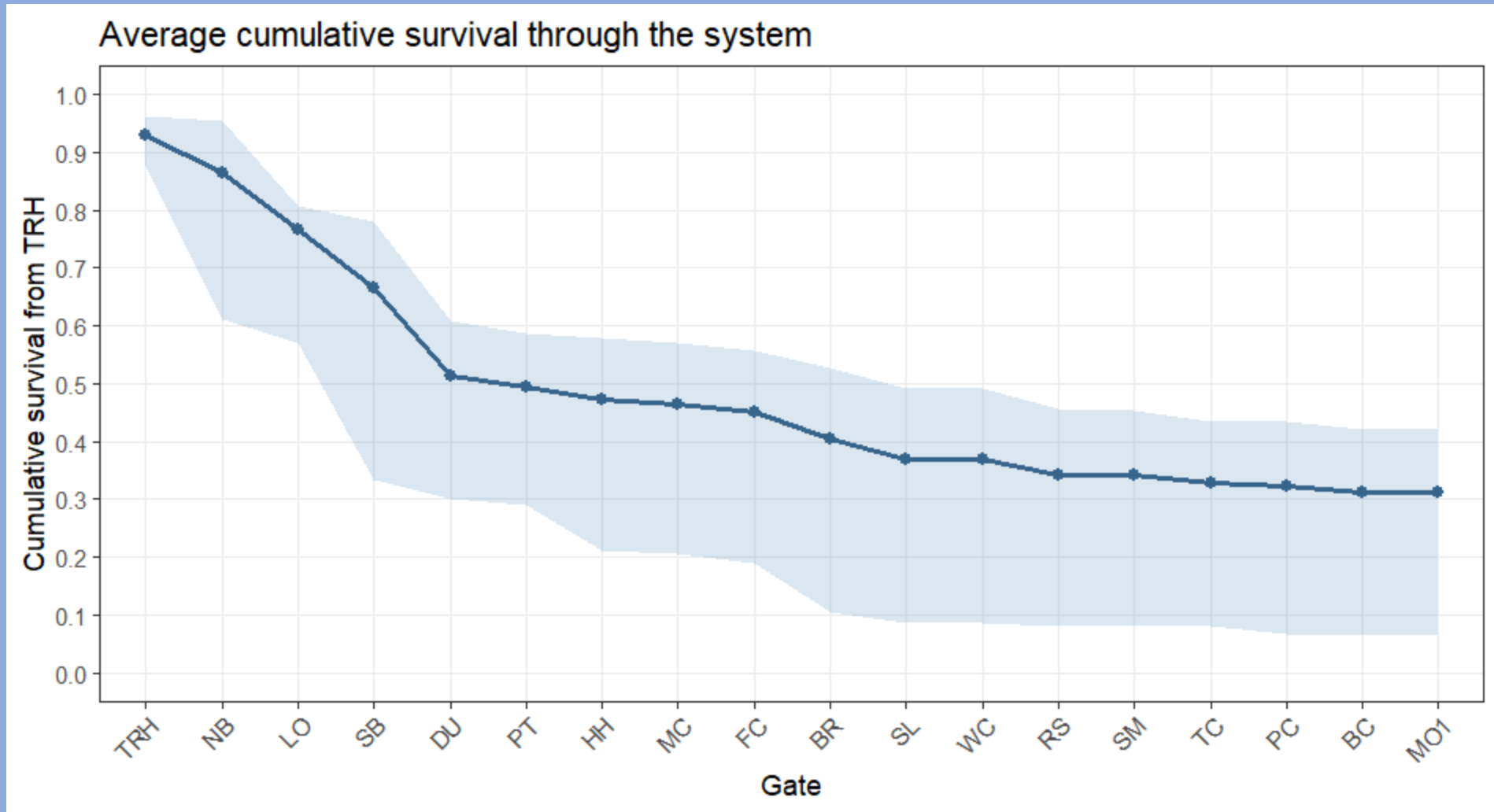
Average Survival by Reach



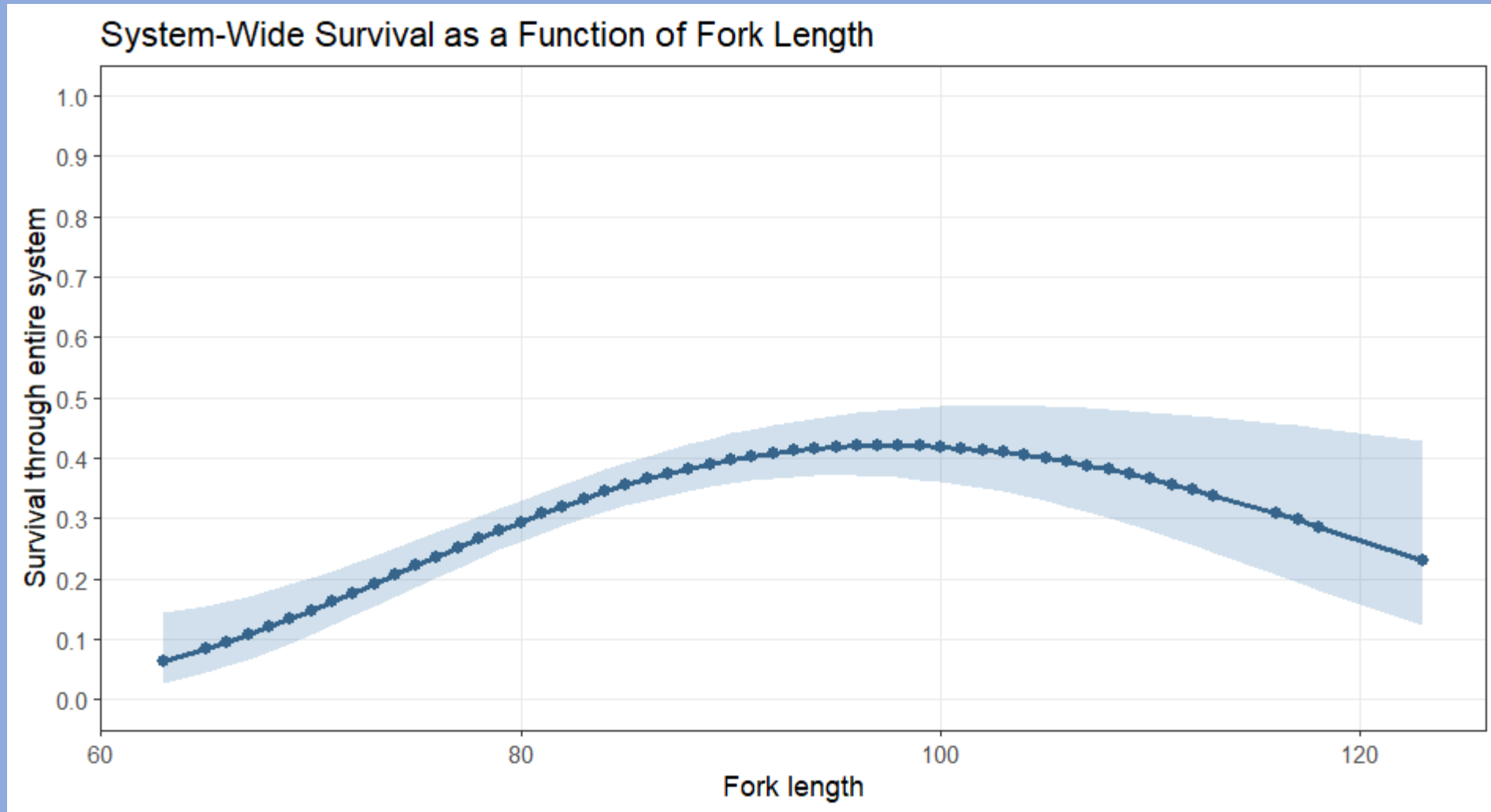
Average Survival by Reach



Survival Estimates

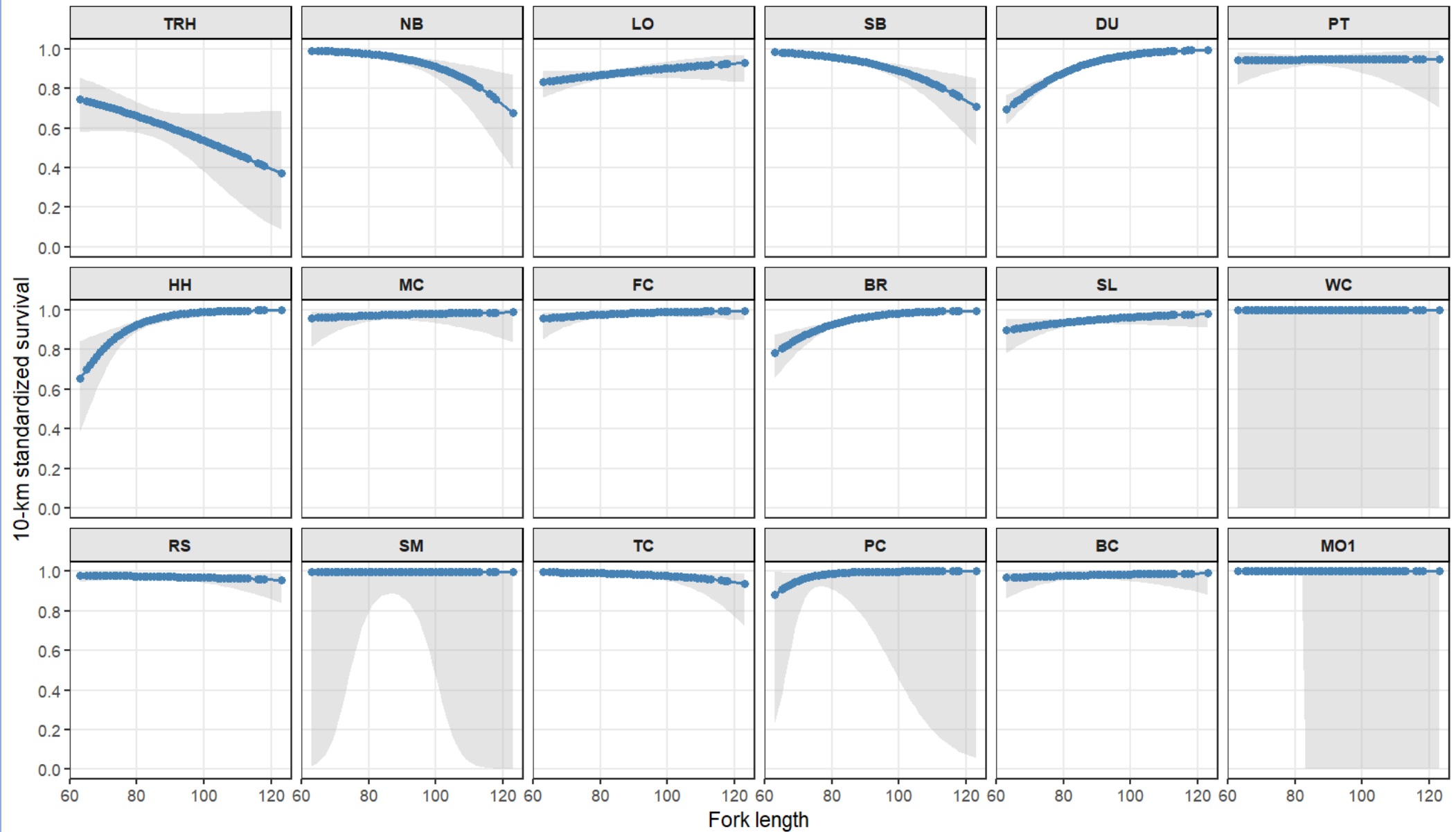


Survival Estimates



Standardized Survival by Fork Length and Gate

Top model: $\text{Phi}(\sim \text{forklength} * \text{time})$, $p(\sim \text{time})$



Future Plans

- Report –
 - Larger report will incorporate data from across the basin (HVT, YTF, and KTF).
 - Include environmental covariates
- The infrastructure to continue this work is in place
 - LFA used data from the first two years
 - Interest expressed in several TRRP WGs to continue this work
 - Ability to expand the work, increase the number of receivers for higher resolution
 - Tagging adults?

Thank you, questions?

Thank you to Bureau of Reclamation California Great Basin Region for funding this important work

Thank you to our partners:

- Yurok Tribal Fisheries , Karuk Tribal Fisheries, and the USGS CRRL Team



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