

South Fork Snake River



— BUREAU OF —
RECLAMATION





Management History

- 1997 – Henderson graduate study for spawn timing and spawn location
 - Found RBT were spawning in tribs
- Early 2000s – Host graduate study and public opinion
 - Documented how many were spawning in tribs = start weir program
 - Goal of removing RBT to keep spawning refugia for YCT
 - Killed RBT during fall surveys and public weighed in on that

Management History

- Mid-2000s – weirs were not enough to change increasing trend of RBT
 - USGS study on river flows and connections to habitat alteration – Hauer et al.
 - Van Kirk – flows and YCT trends
 - Both studies concluded needed 25,000 spring freshet flow
 - Led to the 3-prong approach – flows, weirs, & harvest
 - Regulation changes – open year around, removed bag limits on RBT

Management History

- Mid-2000s – weirs were not enough to change increasing trend of RBT
 - USGS study on river flows and connections to habitat alteration – Hauer et al.
 - Van Kirk – flows and YCT trends
 - Both studies concluded needed 25,000 spring freshet flow
 - Led to the 3-prong approach – flows, weirs, & harvest
 - Regulation changes – open year around, removed bag limits on RBT
- Late-2000s – 2009 was a big recruitment year in RBT
 - 2010 RBT harvest incentive program began

Management History

- Mid-2000s – weirs were not enough to change increasing trend of RBT
 - USGS study on river flows and connections to habitat alteration – Hauer et al.
 - Van Kirk – flows and YCT trends
 - Both studies concluded needed 25,000 spring freshet flow
 - Led to the 3-prong approach – flows, weirs, & harvest
 - Regulation changes – open year around, removed bag limits on RBT
- Late-2000s – 2009 was a big recruitment year in RBT
 - 2010 RBT harvest incentive program began
- 2017 – evaluation of freshet flows
 - 25,000 cfs (never attained) was not successfully limiting RBT recruitment
- 2017 – another big RBT recruitment year
 - Weirs, incentive, flows – did not result in a decline in RBT

Management Goals

- 26 yrs. ago – Preserve genetic integrity and population viability of wild native Cutthroat Trout
 - First established in 1996 – 2000 FMP
- 15 yrs. ago – added to Restore main stem SF to < 10% RBT at Conant
 - First established in 2007 – 2012 FMP
- Also, Maintain YCT pop. viability and genetic integrity
 - Goal of introgression $\leq 10\%$
 - Idaho Department of Fish and Game. 2007. Management plan for conservation of Yellowstone cutthroat trout in Idaho. Boise, ID



Management Strategies

- Incentivize angler harvest of RBT
- Manual suppression of RBT
- Main stem abundance fish surveys



How we arrived at manual RBT suppression

- Angler harvest didn't keep up
- 2011-2015 manual suppression of RBT in Palisades Cr WORKED
 - Sportfish to conservation population
 - Over this time, angler harvest appeared to be working in the SFSR, then RBT outpaced
- 2018 we tested suppression in the main stem SFSR
 - Determined we could efficiently remove RBT from redds (~6K RBT removed)
 - RBT recolonized redds after initial removals
- 2019 increased testing efforts
 - Feasibility – resulted in 6k removed
- 2020 COVID (non-essential activity)
- 2021 first full effort

ARTICLE

Purifying a Yellowstone Cutthroat Trout Stream by Removing Rainbow Trout and Hybrids via Electrofishing

Kevin A. Meyer* and Patrick Kennedy

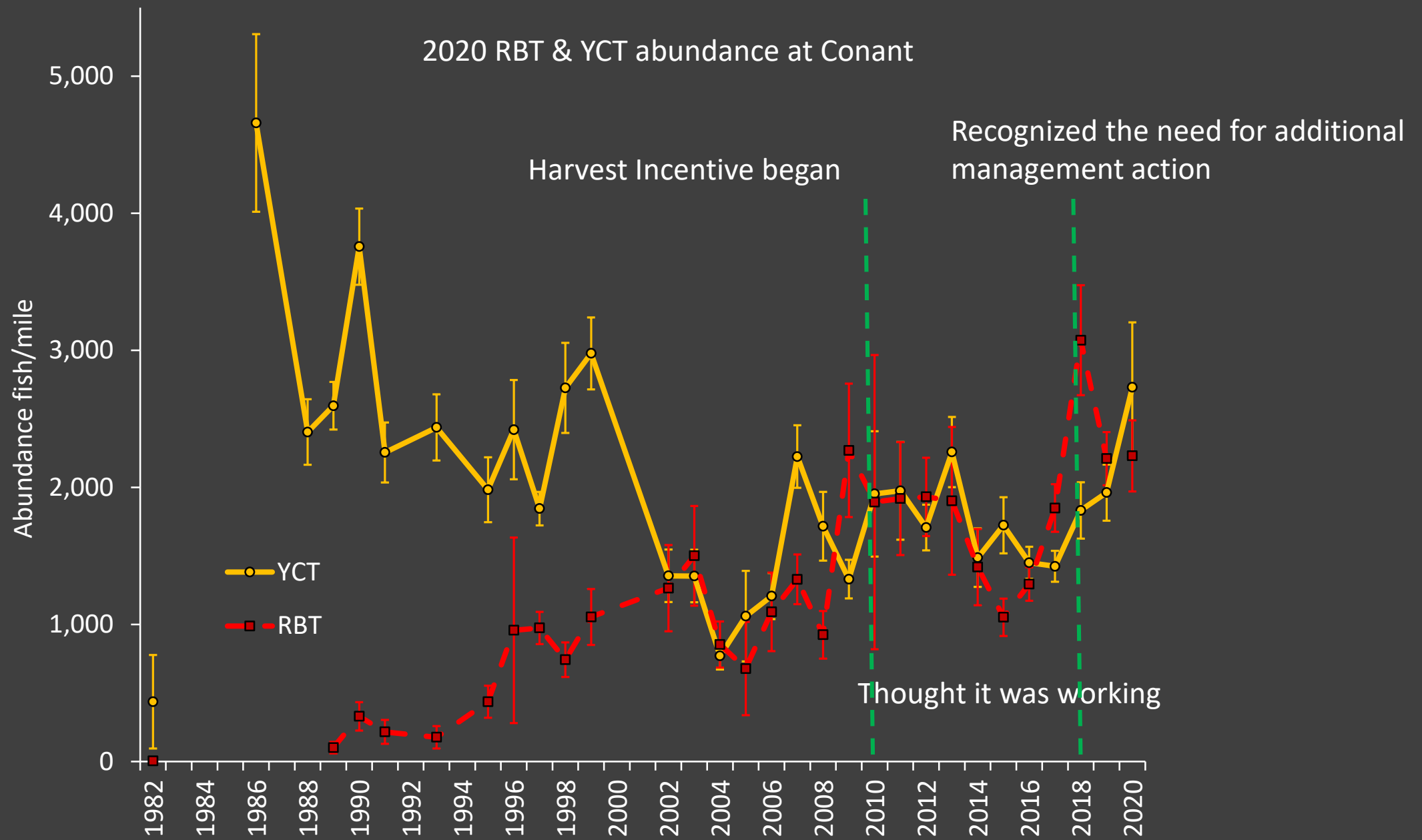
Idaho Department of Fish and Game, 1414 East Locust Lane, Nampa, Idaho 83686, USA

Brett High

Idaho Department of Fish and Game, 4279 Commerce Circle, Idaho Falls, Idaho 83401, USA

Matthew R. Campbell

Idaho Department of Fish and Game, 1800 Trout Road, Eagle, Idaho 83616, USA



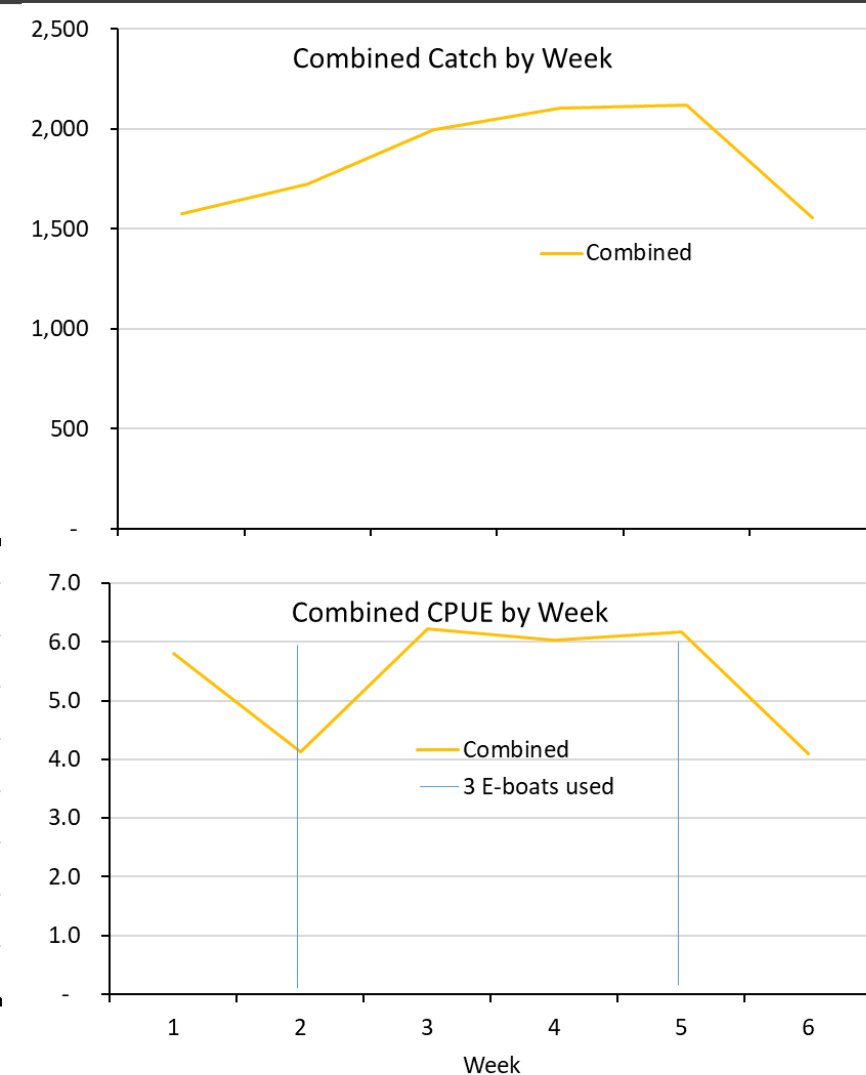
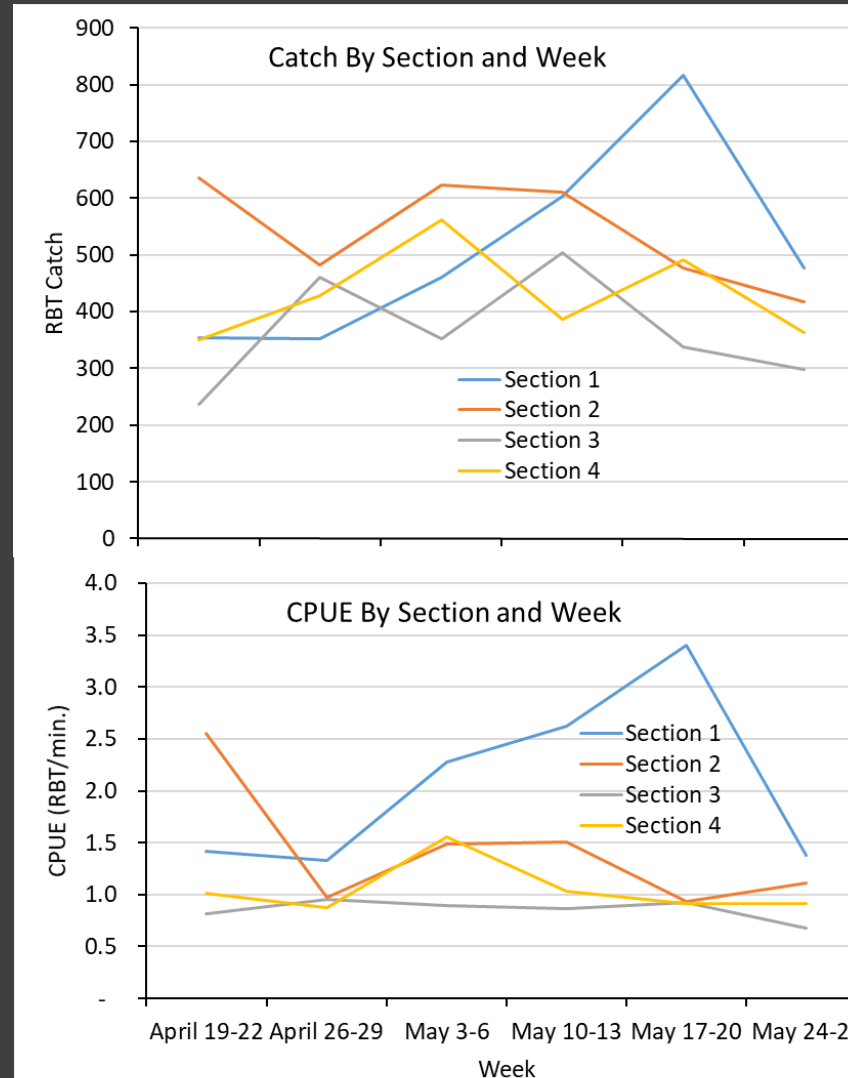
2021 RBT Suppression Goals

- From fall abund. at Conant - $2,230/\text{mi} \pm 259$
- * 19 mi (Dam to Dry Canyon)
- = 42,370 RBT
- 30% of 42,370 = 12,711
 - % from Devita & Van Kirk study
- Anglers harvest on average 2,900
 - From 2010 - 2020



2021 RBT Spring Suppression Results

- 24 days completed
- Avg. 377 min/day shocking
 - 2 boats for 4 wks.
 - 3 boats for 2 wks.
- Avg. 1.4 RBT/min (CPUE)
- 10,654 RBT removed
 - 16% (2,057) short of our goal
- 2.0% mortality
 - Up to 11 hrs. post-capture
 - Total 211 – used for further research



2021 RBT Spring Suppression Results

River section	#Fish	Avg L (in)	Avg W (lbs)	Avg % of Stand. W _r	# Male	# Female	#Unknown	Sum sex	%Female
Section 1	96	16.1	1.9	107%	21	17	2	40	44.7%
Section 2	145	16.1	1.6	94%	34	58	53	145	63.0%
Section 3	194	15.4	1.4	97%	20	61	113	194	75.3%
Section 4	143	15.0	1.3	95%	21	58	64	194	73.4%
% measured =	5.4%								
Total	578				96	194	232	573	66.9%
Average		15.7	1.6	98%					

Day	Section	Launch site	Upstream bound.	Downstream bound.
Mon	1	Palisades Ramp	Palisades Dam	Palisades Creek
Tue	2	Spring Cr Ramp	Indian Creek	Hwy 26 Bridge
Wed	3	Conant Ramp	Hwy 26 Bridge	Pine Creek
Thu	4	Conant Ramp	Dry Creek	Lufkin Bottom

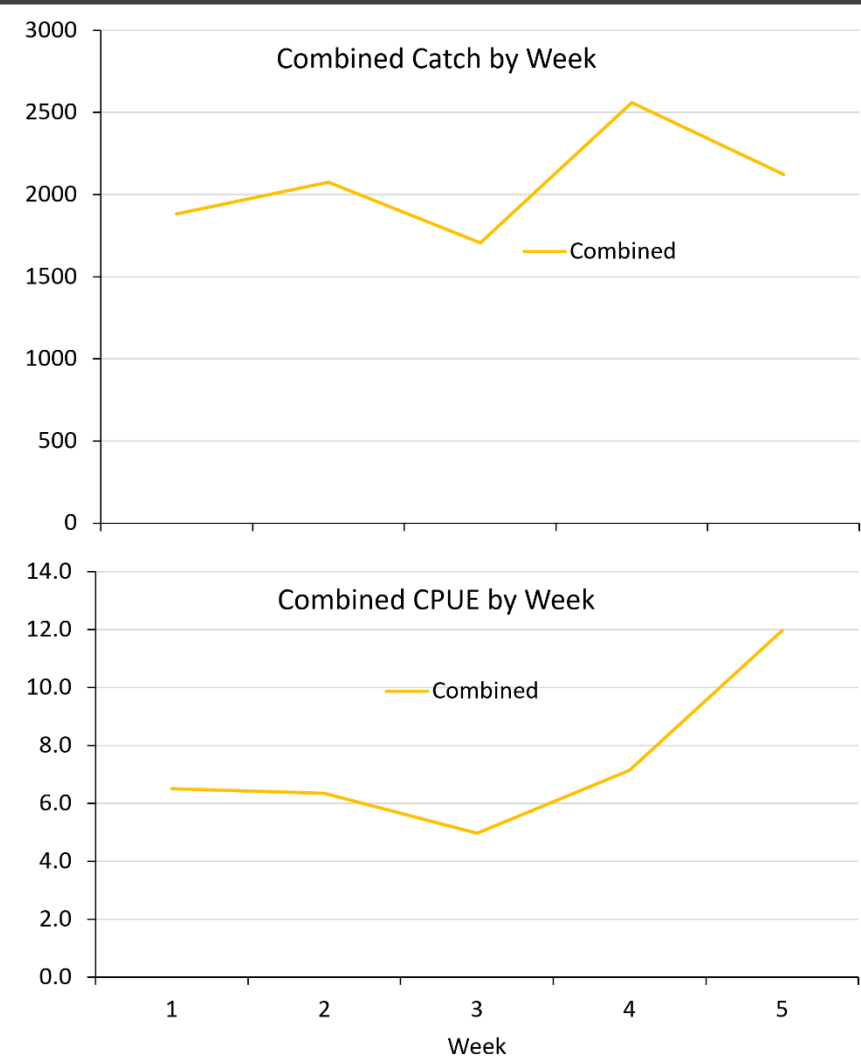
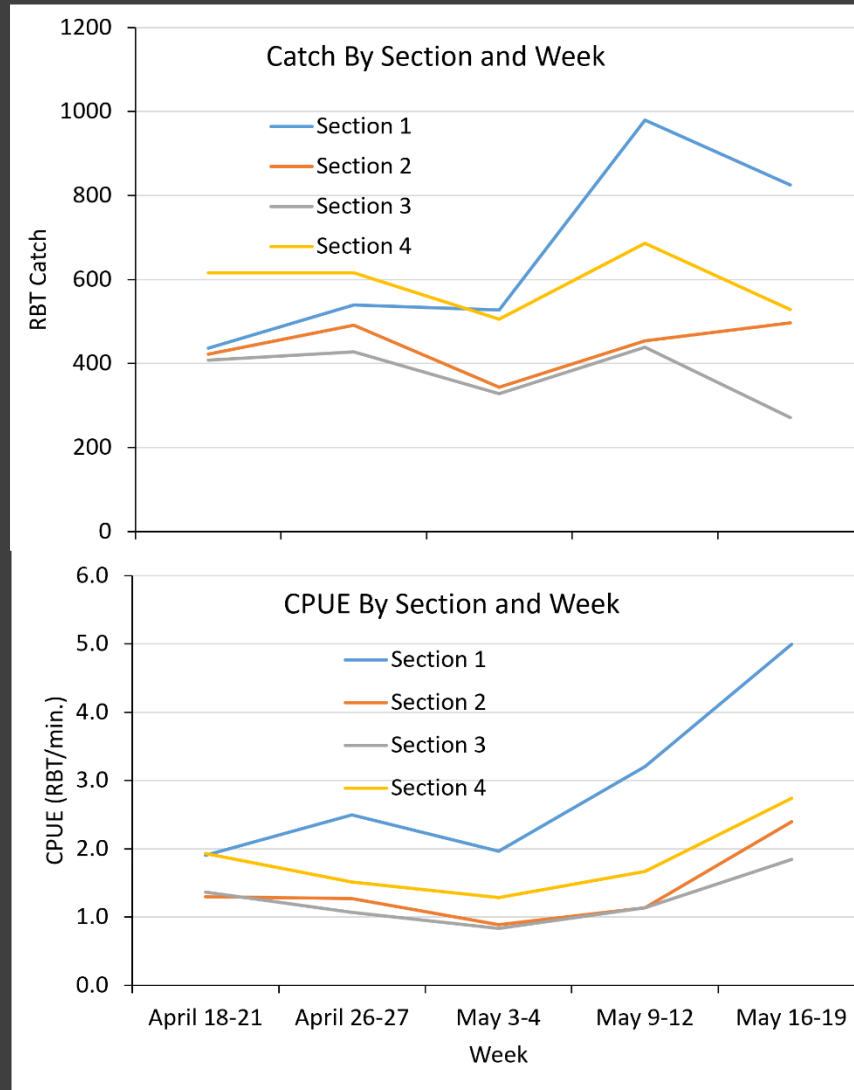
2022 RBT Suppression Goals

- From fall abund. at Conant - $2,063/\text{mi} \pm 289$
- * 19 mi (Dam to Dry Canyon)
- = 39,197 RBT
- 30% of 39,197 = 11,759



2022 RBT Spring Suppression Results

- 16 days completed
- Avg. 307 min/day shocking
 - 2 boats for 3 wks.
 - 4 boats for 2 wks.
- Avg. 1.7 RBT/min (CPUE)
- 9,551 RBT removed
 - 19% (2,208) short of our goal
- 2.0% mortality
 - Up to 11 hrs. post-capture



Overall RBT Suppression

- Goal of 30% or 11,877
 - 9,551 RBT removed in spring
 - 2,326 RBT harvested by anglers (minimum)
 - 165 RBT removed during October surveys
- 12,276 RBT removed (31.3% of the 2021 RBT abund. at Conant)

2022 RBT Spring Suppression Results

River section	#Fish	Avg L (in)	Avg W (lbs)	Avg L (mm)	Avg W (g)	Avg % of Stand.	# Male	# Female	#Unknown	Sum	
						W _r				sex	%Female
Section 1	197	16.9	1.9	429.5	875.8	100%	89	65	43	197	42.2%
Section 2	145	15.6	1.5	396.1	660.0	93%	25	42	78	145	62.7%
Section 3	n/a	15.4	1.4								
Section 4	n/a	15.0	1.3	-	-	-	-	-	-	-	-
% measured =	3.6%										
Total	342						114	107	121	342	48.4%
Average		16.3	1.7	412.8	767.9	97%	-	-	-	-	-

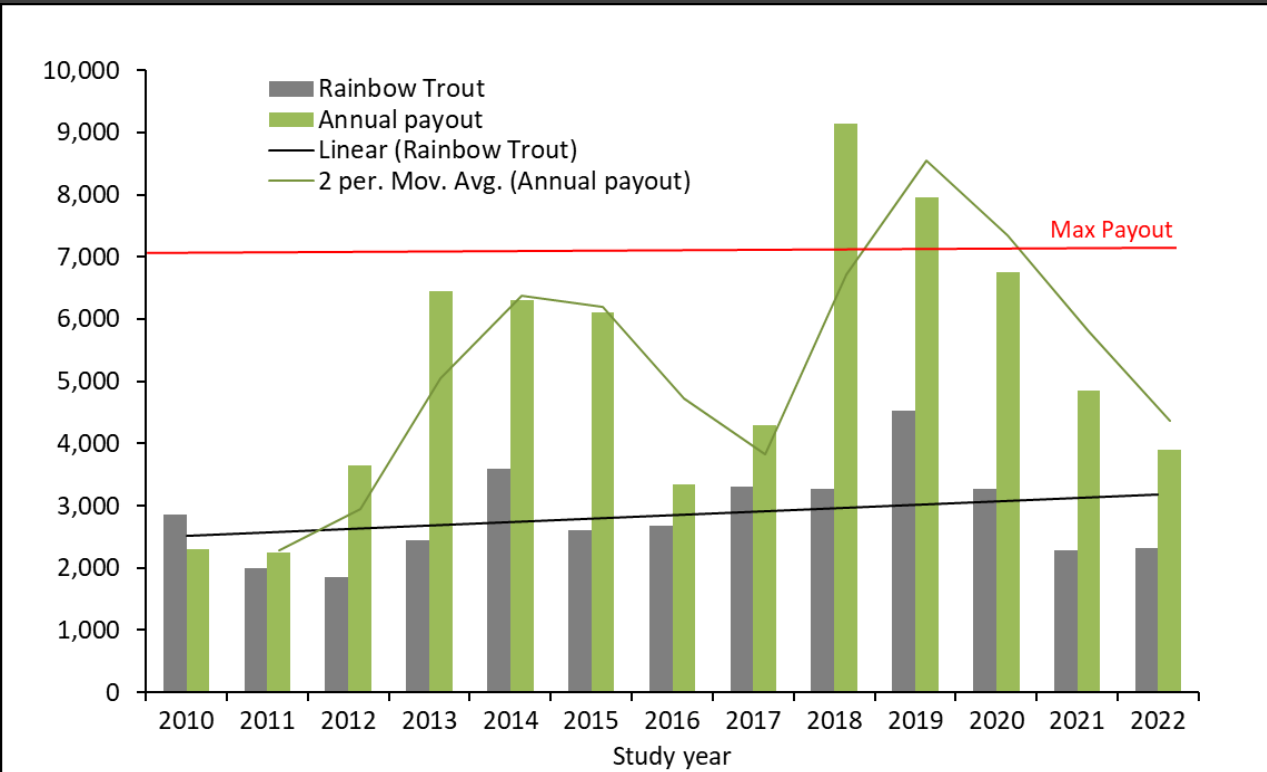
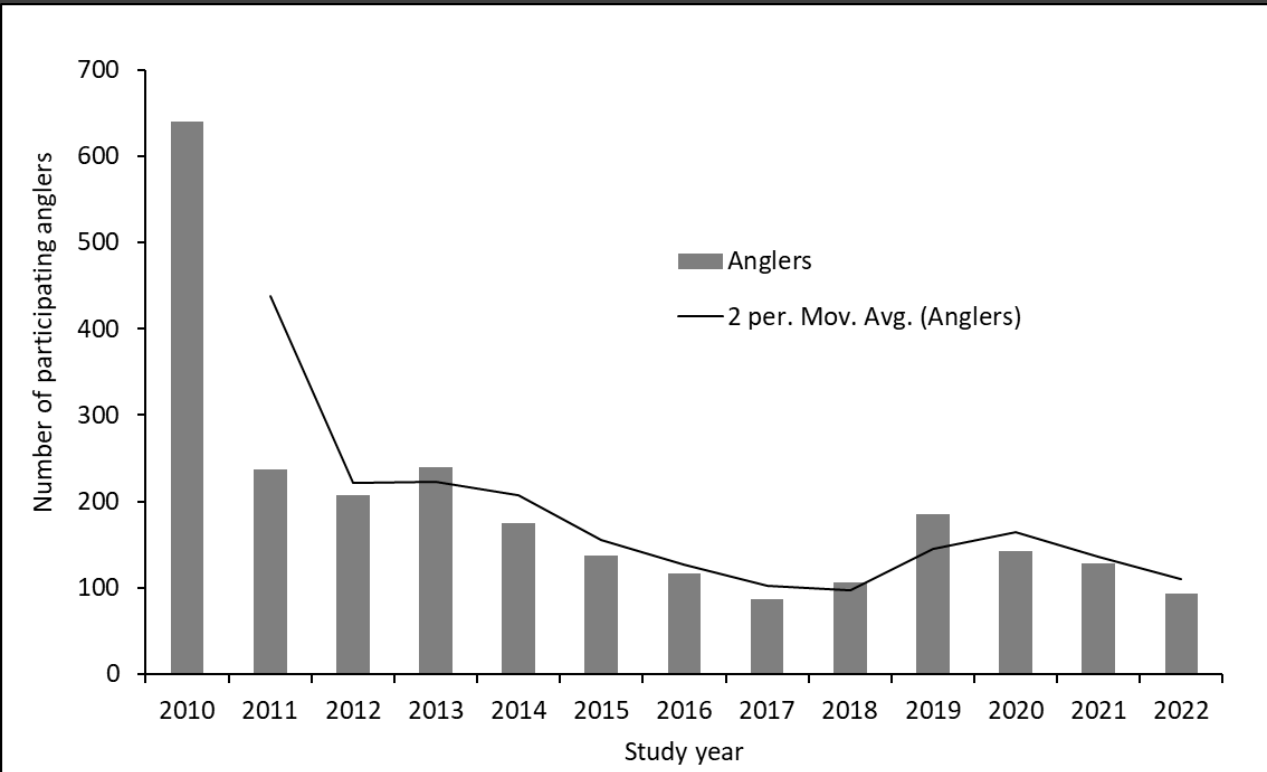
Day	Section	Launch site	Upstream bound.	Downstream bound.
Mon	1	Palisades Ramp	Palisades Dam	Palisades Creek
Tue	2	Spring Cr Ramp	Indian Creek	Hwy 26 Bridge
Wed	3	Conant Ramp	Hwy 26 Bridge	Pine Creek
Thu	4	Conant Ramp	Dry Creek	Lufkin Bottom

RBT Harvest Incentive

- 13 yr. program (2010 – 2022)
 - Harvested 37,006 RBT (avg. 2,847)
 - Avg. 938 tagged
 - Avg. 2.4% reward rate
 - \$67,300 paid (avg. \$5,705)
- In 2022:
 - 2,326 harvested
 - Tagged 646
 - 2.3% reward rate
 - \$3,900 paid

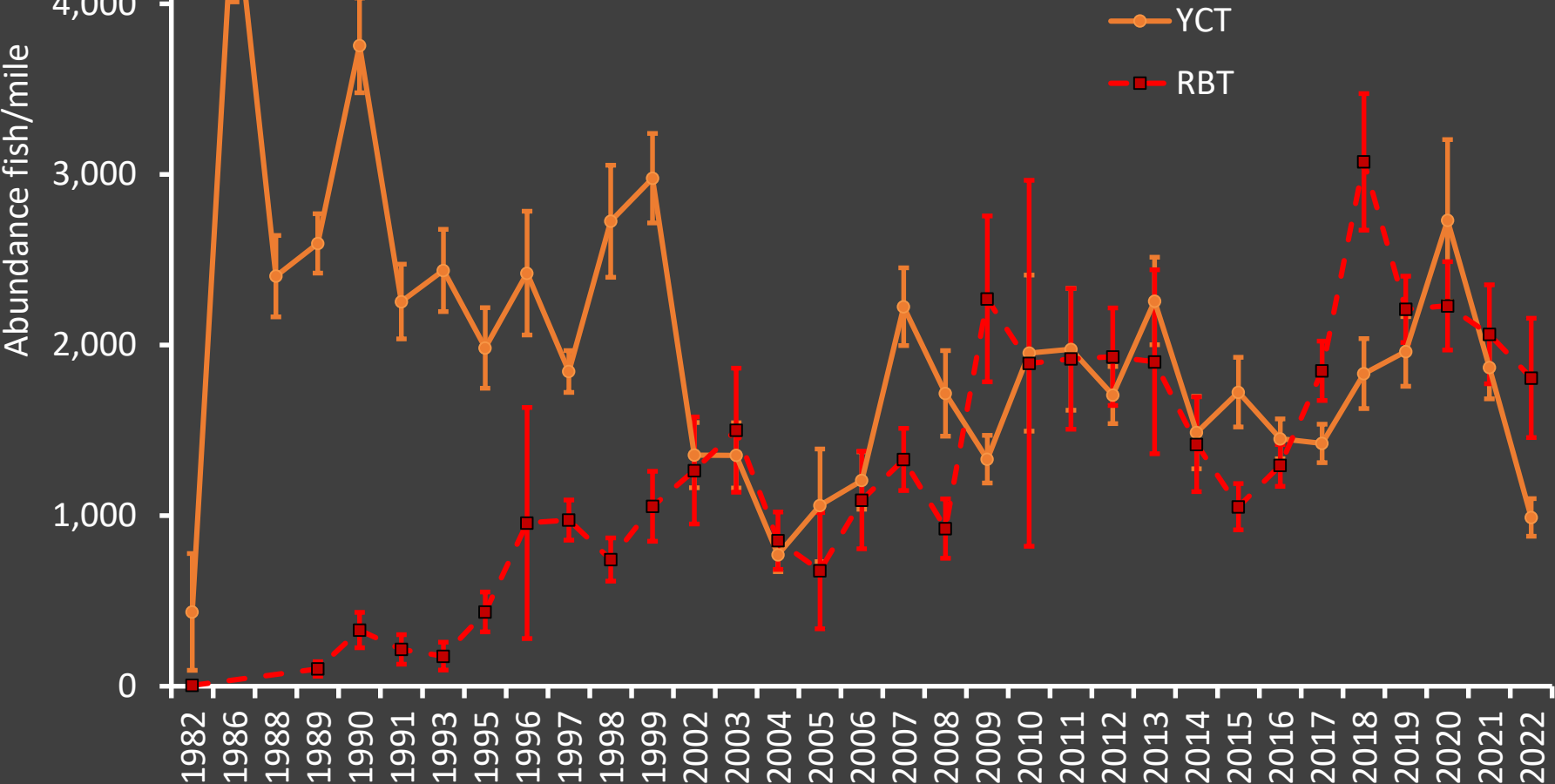


RBT Harvest Incentive Program



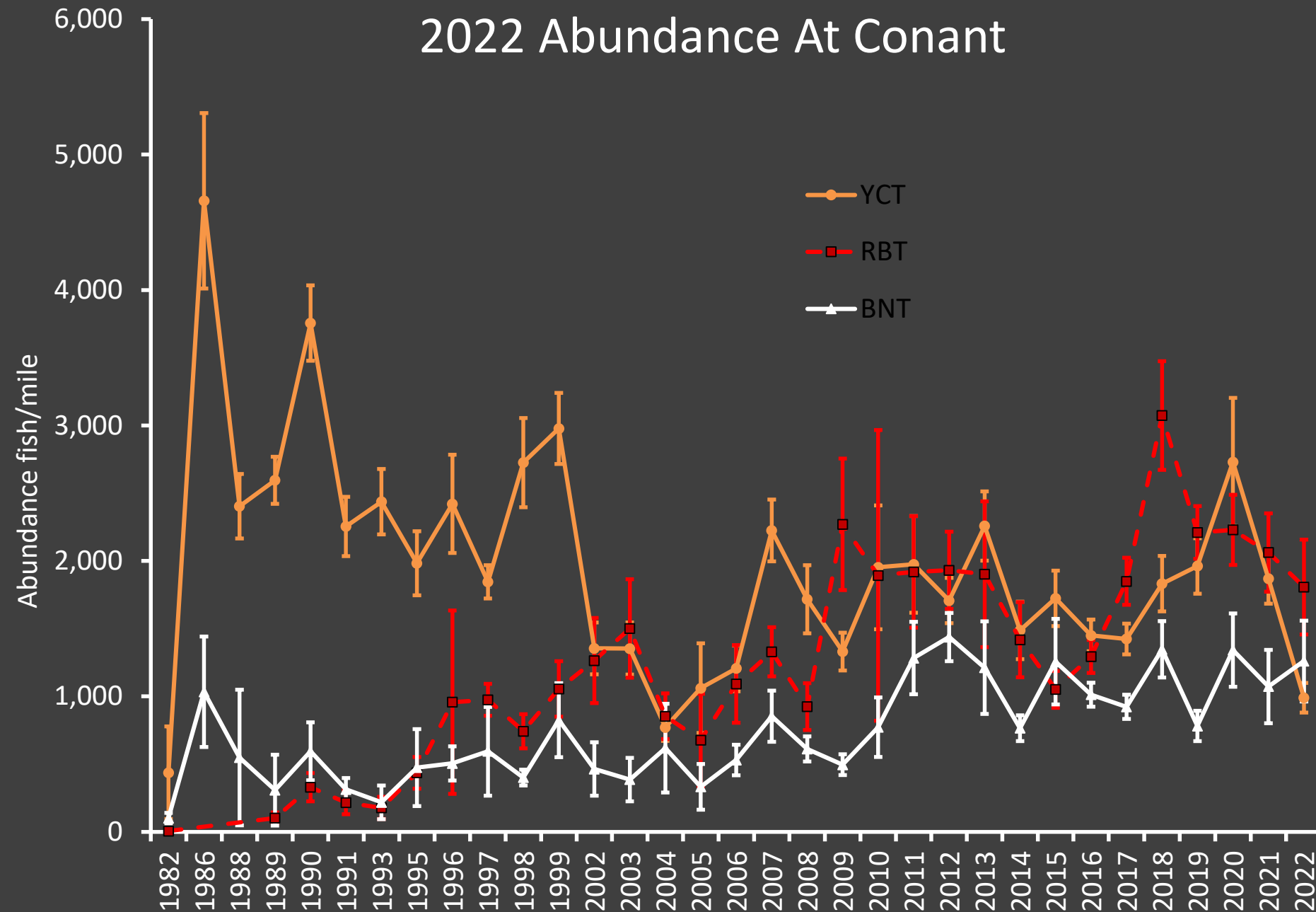
2022 Abundance at Conant

- Species Composition (based on abundance)



Species Comp (w/o BNT)		
Year	YCT	RBT
2013	42.0%	35.4%
2014	40.5%	38.6%
2015	42.7%	26.1%
2016	38.6%	34.5%
2017	33.9%	44.1%
2018	29.3%	49.2%
2019	39.6%	44.6%
2020	43.3%	35.4%
2021	37.3%	41.2%
2022	24.4%	44.5%

2022 Abundance At Conant



Total trout decreased to 4,058/mi, and is lower than 10-yr. avg. (4,862/mi)

YCT (990/mi) was below the 10-yr. average (1,844/mi).

RBT (1,807/mi) were below the 10-yr. average (1,902 /mi).

BNT (1,261) were above the 10-yr. average (1,115/mi)

2022 Abundance At Lorenzo

Total trout (2,837/mile) stayed above the 10-yr. average (2,032/mile). Second highest on record...

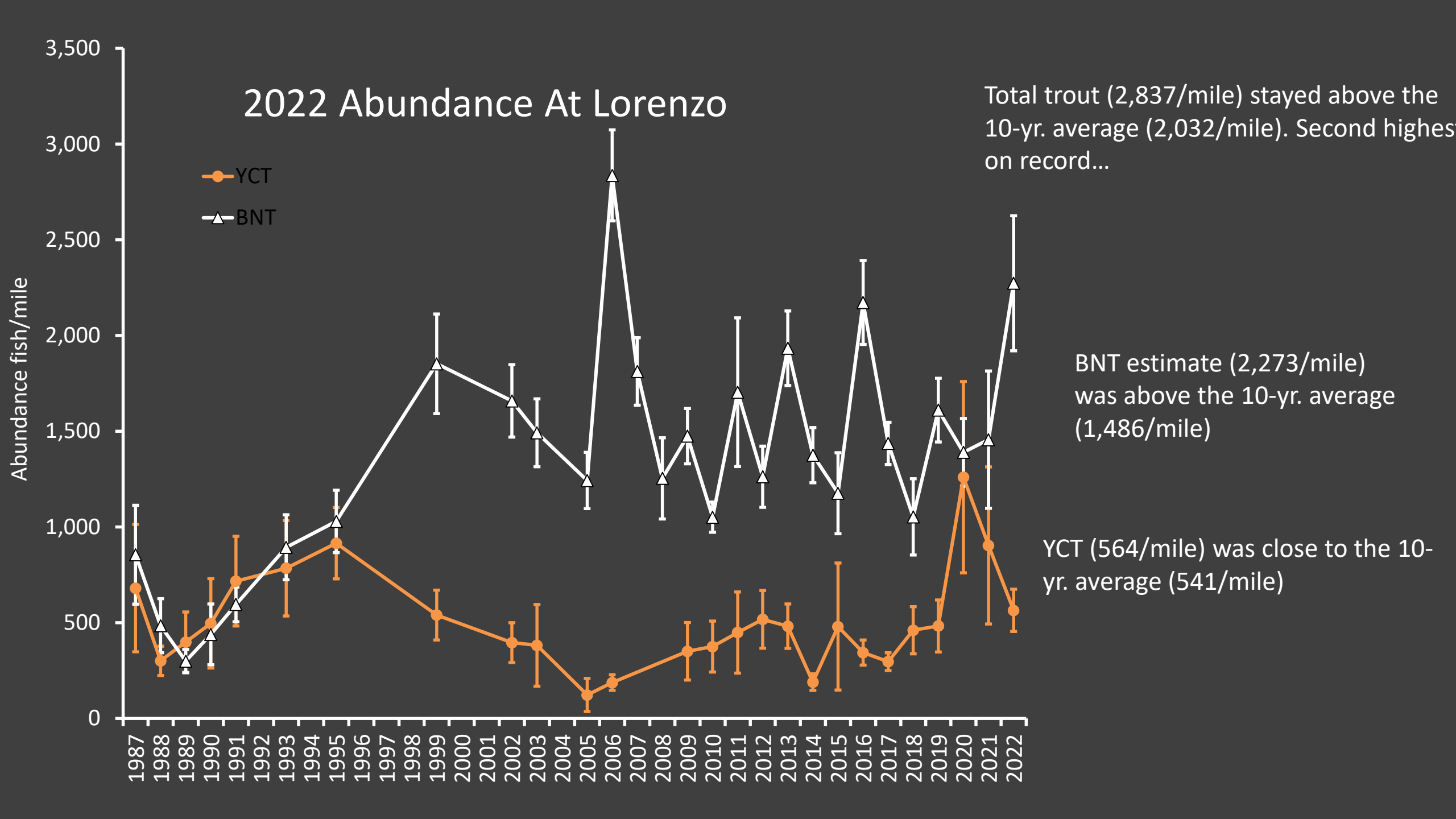
YCT
BNT

Abundance fish/mile

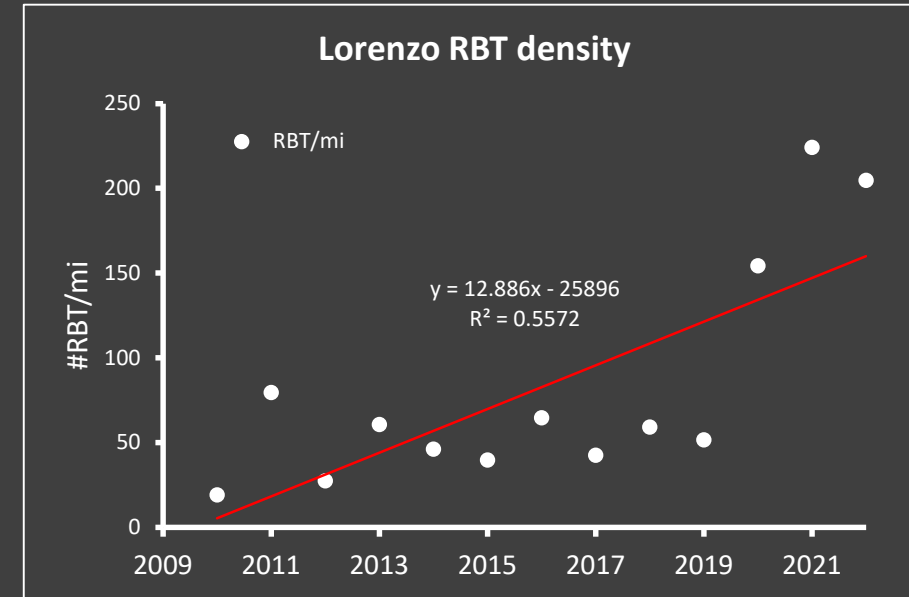
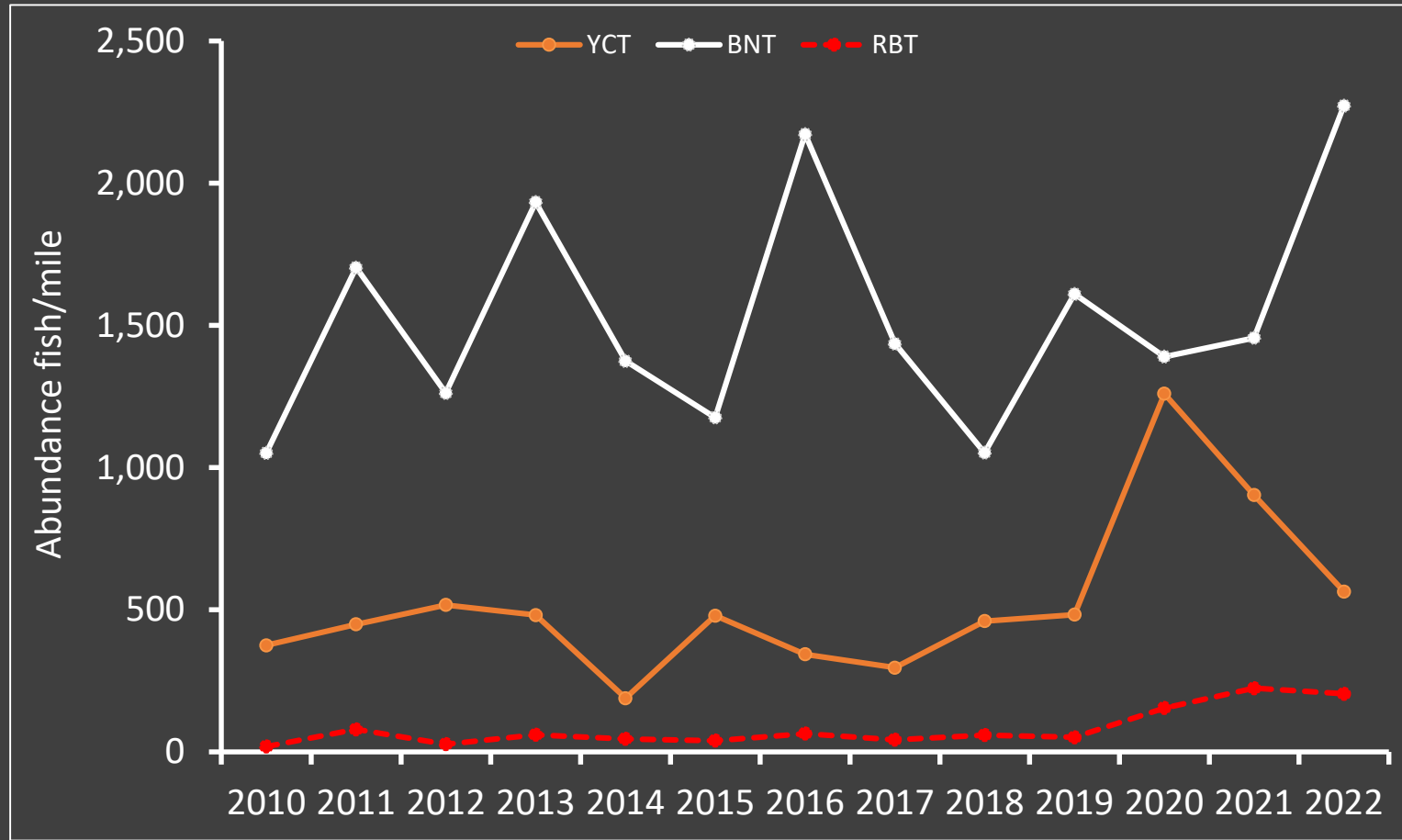
BNT estimate (2,273/mile) was above the 10-yr. average (1,486/mile)

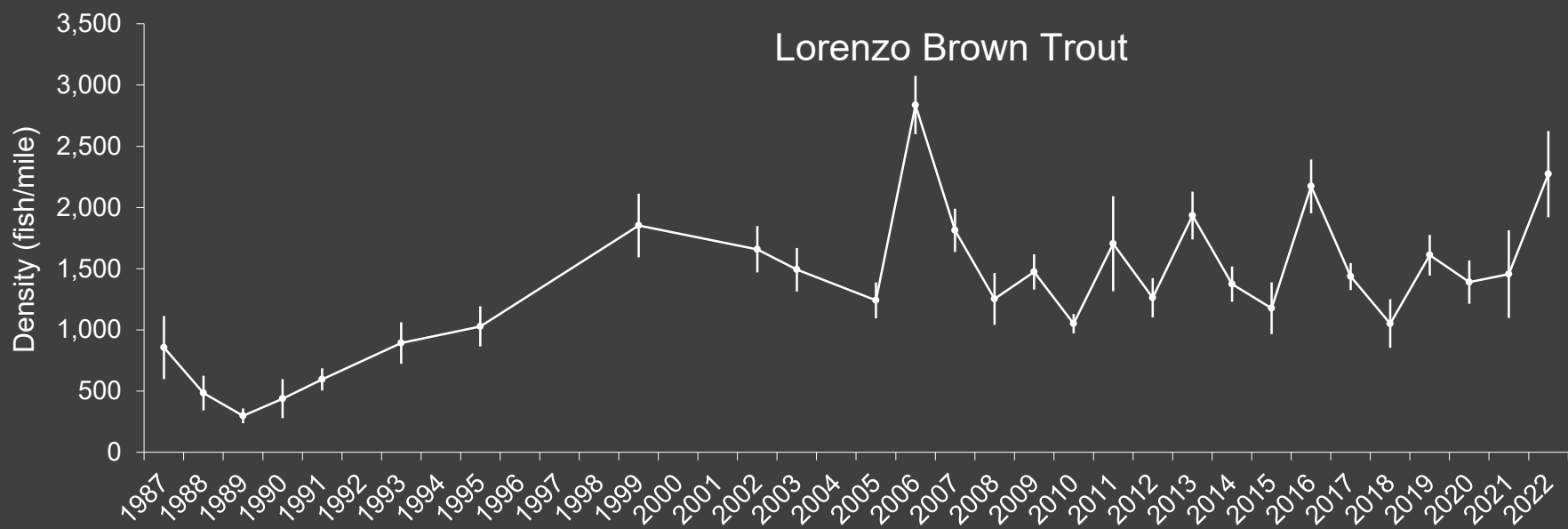
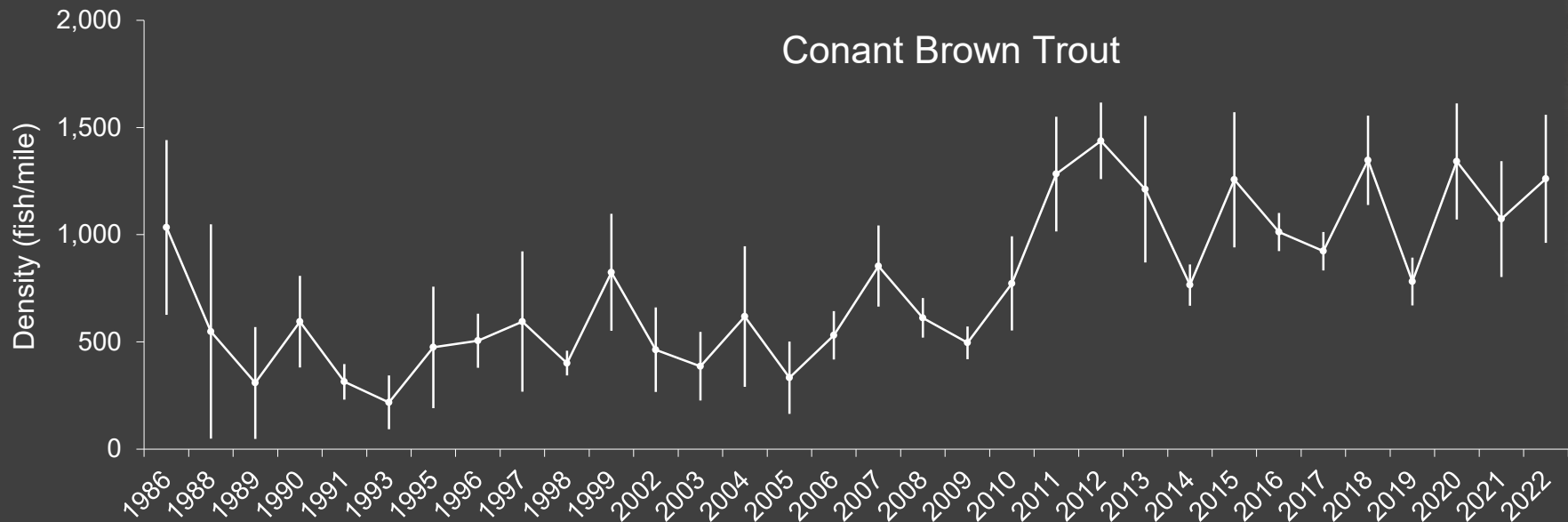
YCT (564/mile) was close to the 10-yr. average (541/mile)

1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022



RBT Expansion at Lorenzo





2023 RBT Suppression Plans

- Continue to remove 30% of the RBT from the main stem South Fork in the spring
- Maintain Harvest Incentive Program
- Remove non-tagged RBT during last survey pass in October at Conant

2023 RBT Relocation Plans

- Relocation plan:
 - Snake River
 - Big Lost River
 - Trail Cr pond & Jim Moore pond

Tributary vs. main stem spawner abund. (most spawn in the main)

Year	Rainbow Trout	Cutthroat Trout
2001	163	3,647
2002	370	3,068
2003	189	2,207
2004	27	2,143
2005	341	3,913
2006	55	1,944
2007	22	1,232
2008	0	129
2009	7	3,072
2010	56	5,212
2011	19	2,430
2012	23	2,162
2013	30	3,415
2014	84	2,522
2015	20	4,126
2016	44	5,745
2017	71	4,246
2018	33	3,893
2019	20	5,210
2020	47	5,854
2021	50	4,845
2022	79	3,445

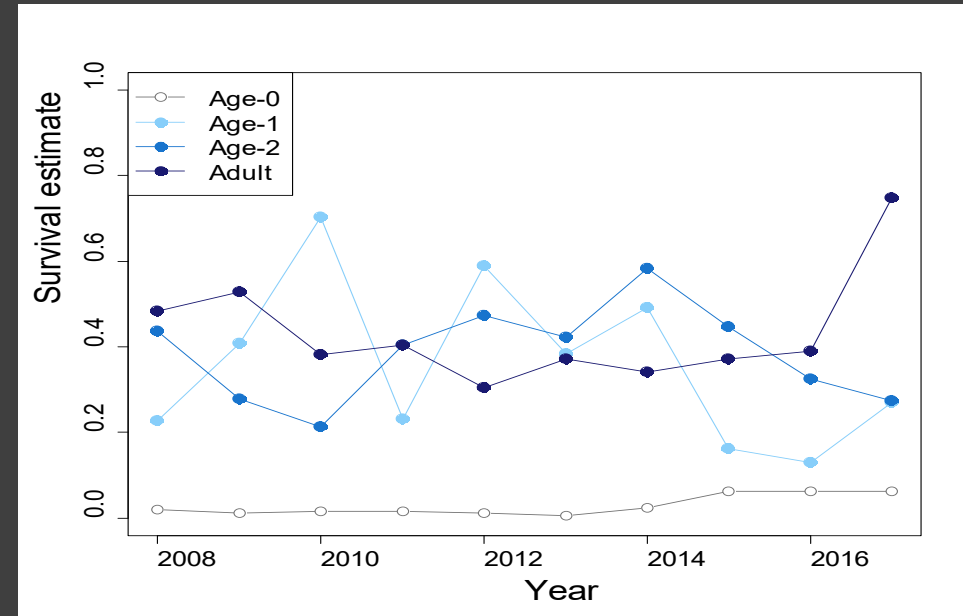
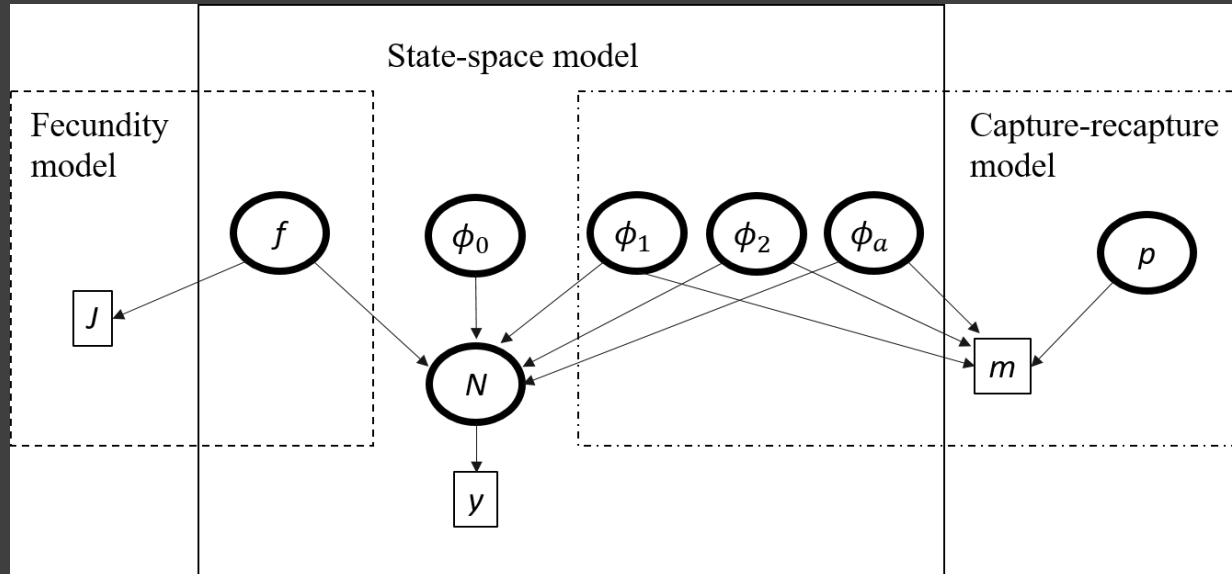
- 990 YCT/mi.
- *19 mi.
- 18,810 YCT (> 201 mm)
- 20% from past telemetry

Future of Suppression

- Not to eradicate RBT – FMP is clear about this
- How many years?
- Future modeling is likely to focus our efforts to your benefit
 - X # fish in a given year to sustain management goals
 - Ideally, angler harvest can achieve this #
 - If harvest increases, we may not need to suppress in spring.....



The YCT model (IPM)



Using an Integrated Population Model to Evaluate Yellowstone Cutthroat Trout Responses to Management Actions

Joshua L. McCormick*

Idaho Department of Fish and Game, 1414 East Locust Lane, Nampa, Idaho 83686, USA

Brett High

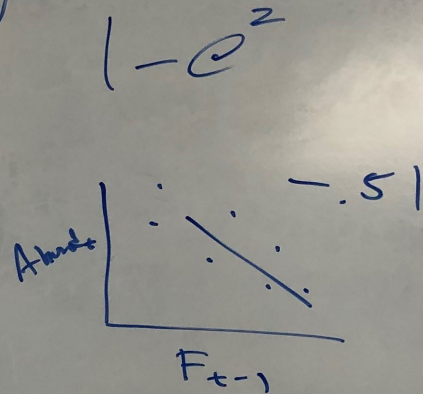
Idaho Department of Fish and Game, 4279 Commerce Circle, Idaho Falls, Idaho 83401, USA

THE RBT model

$$N_{a,t} = N_{a,t-1} e^{-(F+M+R)}$$

$$Y_{a,t} = N_{a,t} \cdot \textcircled{F}$$

$$C = \frac{F}{2} N e^{-2}$$



$$H = \frac{F}{2} N (1 - e^{-2}) \lambda$$

$$T_R = \frac{\textcircled{F}}{2} (1 - e^{-2})^{\textcircled{R}} \lambda$$

$$K = \frac{R}{2} N (1 - e^{-2})$$

$$T_{Rk} = \frac{\textcircled{R}}{2} (1 - e^{-2})^{\textcircled{F}}$$

$$\textcircled{Z} = \textcircled{F} + \textcircled{R} + M$$

$$M = Z - (F + R)$$

$$F = B_0 + B_1 R_{ew}$$

$$M = B_0 + B_1 \text{Cutthroat}$$



- Survival by year-class for YCT and RBT annually

$F \uparrow R \uparrow M \downarrow$

Other work:

- Outreach
 - Newsletter(s)
 - Blogs
 - Reporters
 - Guide meetings
 - TU meeting and TU position statement
 - Outfitter presentation & subsequent check-ins
 - Designated web page
- Fall abundance surveys at Lorenzo and Conant
- Gunnel study repeat
- Study triploid YCT stocking in Palisades Res
- Creel study in 2023 (SFSR & Palisades Res)



