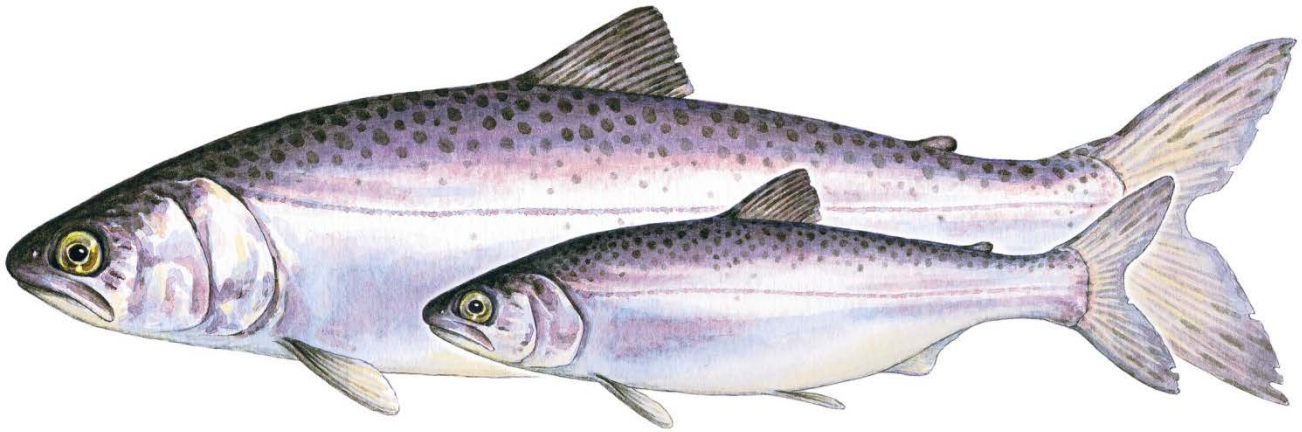
JUVENILE LIFE HISTORY AND TWO-STAGE STOCK-RECRUITMENT MODELING WITH COVARIATES



Contributors: Ken Tiffan, Russell Perry, John Plumb, Bill Young, Stuart Rosenberger, Debbie Milks, Tom Cooney, Fred Mensik, Shawn Rapp, Bill Arnsberg, Doug Marsh, Rich Zabel

JWG ====> PATH ====> TRT ====> COMPASS ====> AMIP

OUR GOALS UNDER AMIP:

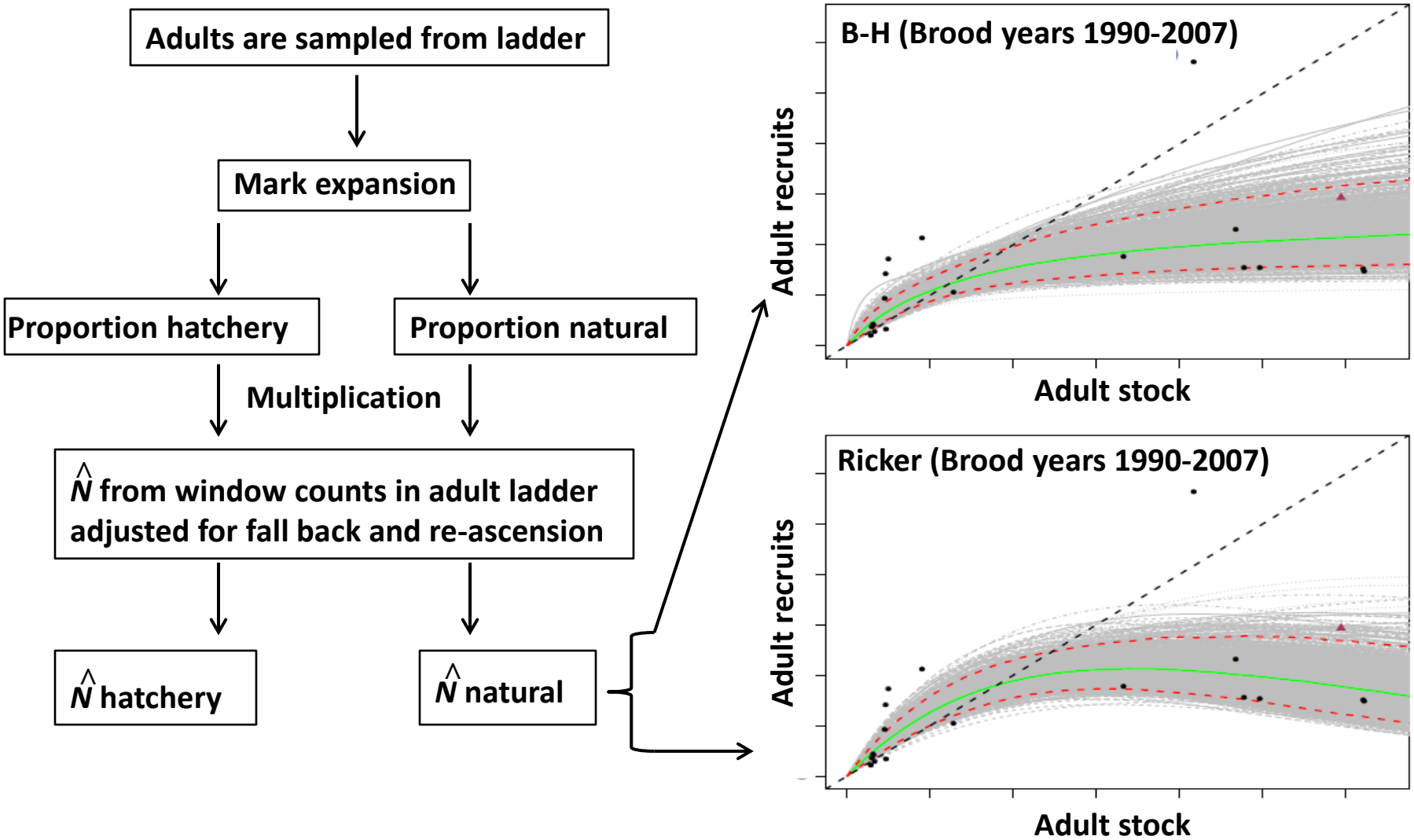
INCREASE THE UNDERSTANDING OF THE FACTORS THAT INFLUENCED THE GROWTH OF THE NATURAL POPULATION (I.E., DESCRIPTIVE STATISTICAL MODELING)

EVALULATE THE VIABILITY AND LONG-TERM RISK OF EXTINCTION OF THE NATURAL POPULATION UNDER A RANGE OF MANAGEMENT AND CLIMATE SCENARIOS (I.E., PREDICTIVE MODELING)

***METHOD ===> TWO-STAGE STOCK RECRUITMENT MODELING WITH COVARIATES**

***DATA ===> AGE-SPECIFIC INFORMATION ON NATURAL-ORIGIN ADULT AND JUVENILE ABUNDANCE AT LOWER GRANITE DAM**

RUN RECONSTRUCTION AT LOWER GRANITE FOR NATURAL ADULTS AND PRELIMINARY STOCK-RECRUITMENT ANALYSES



THE MISSING PIECE:

ESTIMATES OF PASSAGE ABUNDANCE AT LOWER GRANITE DAM FOR NATURAL SUBYEARLING AND YEARLING JUVENILES FROM 1992 ON (A.K.A., JUVENILE RUN RECONSTRUCTION)

PRESENTATION OBJECTIVE:

PRESENTATION OBJECTIVE:

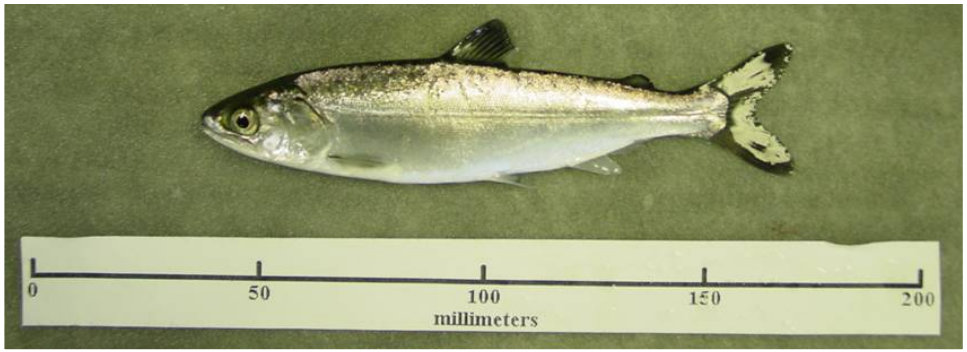
(A) DESCRIBE IN TEDIOUS DETAIL HOW WE HAVE PROPOSED TO RECONSTRUCT THE RUN AT LOWER GRANITE DAM FOR NATURAL JUVENILES ====> WARTS AND ALL ====> FEW RESULTS

PRESENTATION OBJECTIVE:

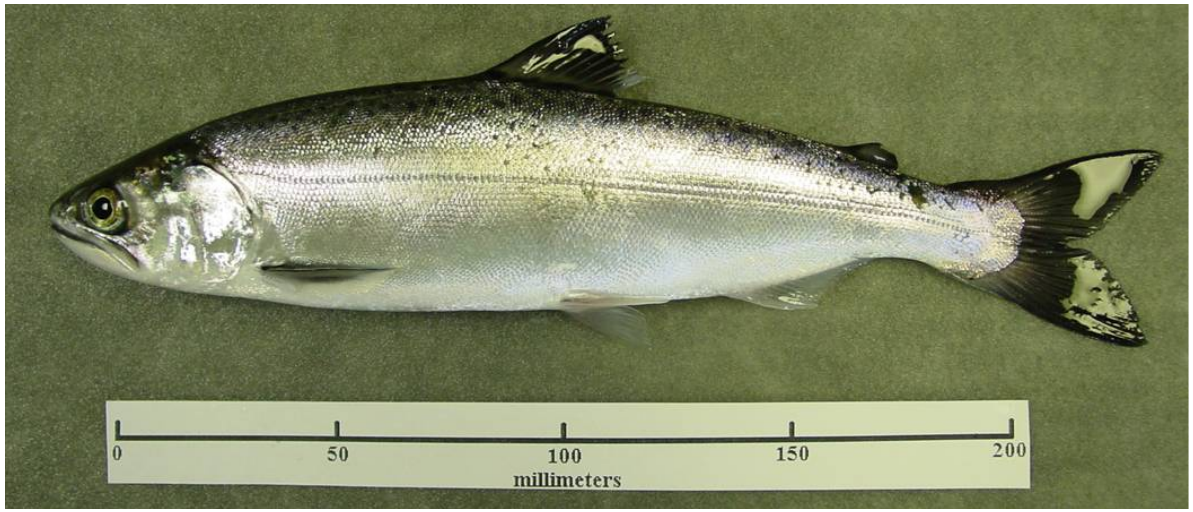
(B) STAND UP HERE AND WHINE ABOUT HOW HARD AND BORING RECONSTRUCTING THE JUVENILE RUN IS GOING TO BE

PRESENTATION OBJECTIVE:

(C) BRING FORTH THE CHALLENGES WE FACE BY DESCRIBING THE AVAILABLE TOOLS FOR THE JOB AND WHAT WE HAVE LEARNED ABOUT THE JUVENILES



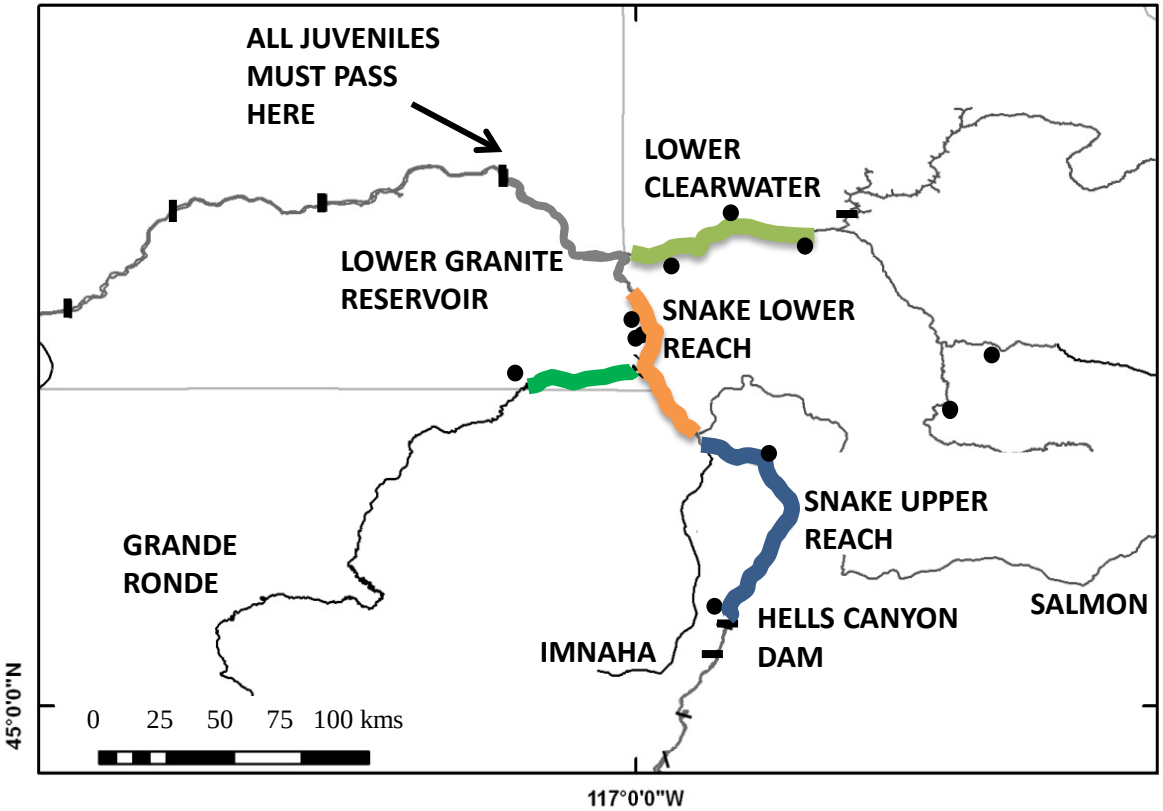
SUBYEARLING



YEARLING

NAJFM 22:703-712; TAFS 134:291-304

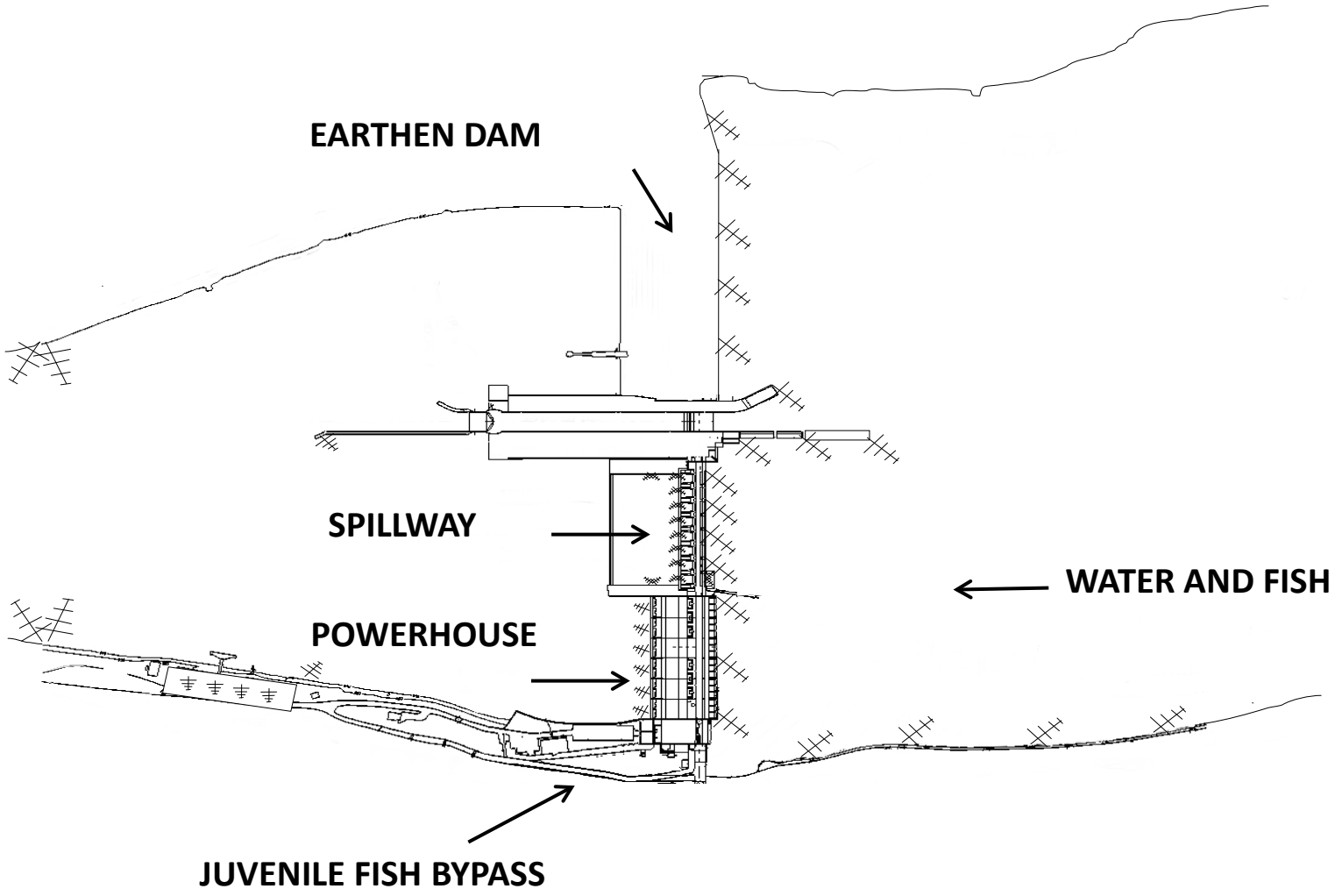
SOURCES OF JUVENILES UPSTREAM OF LOWER GRANITE DAM



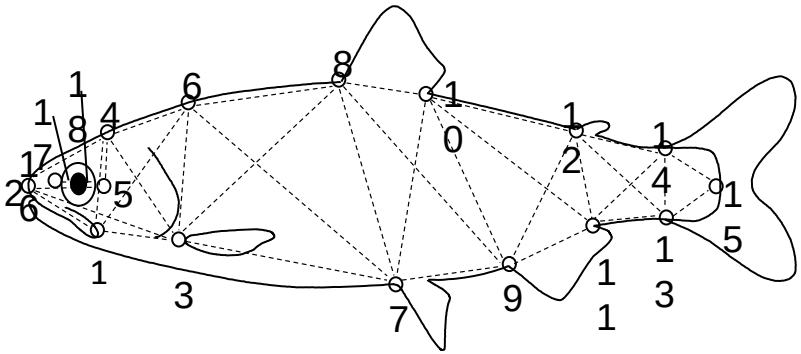
MAJOR SPAWNING AREAS

HATCHERY JUVENILE RELEASE POINTS •

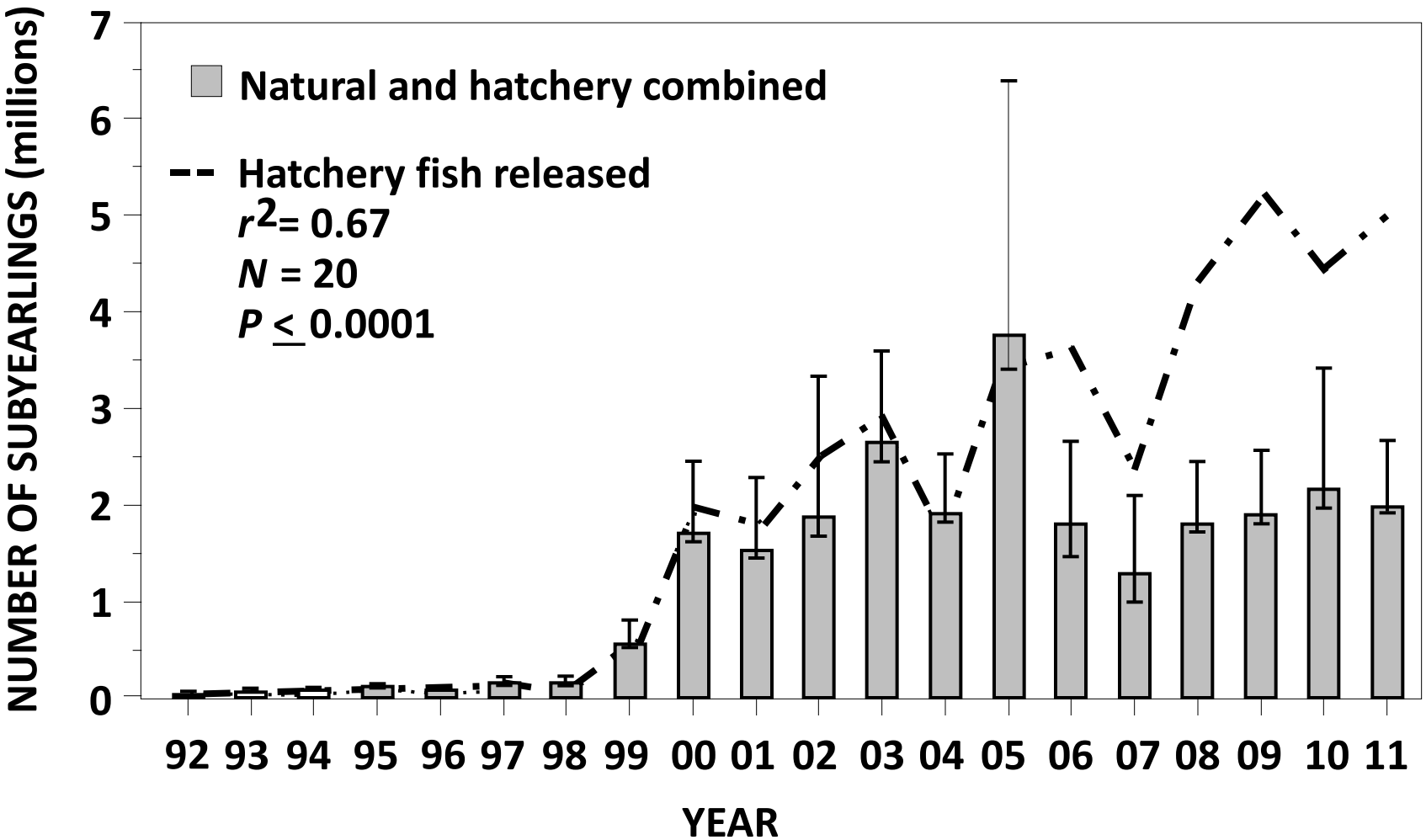
JUVENILE PASSAGE AT LOWER GRANITE DAM



SMOLT MONITORING PROGRAM

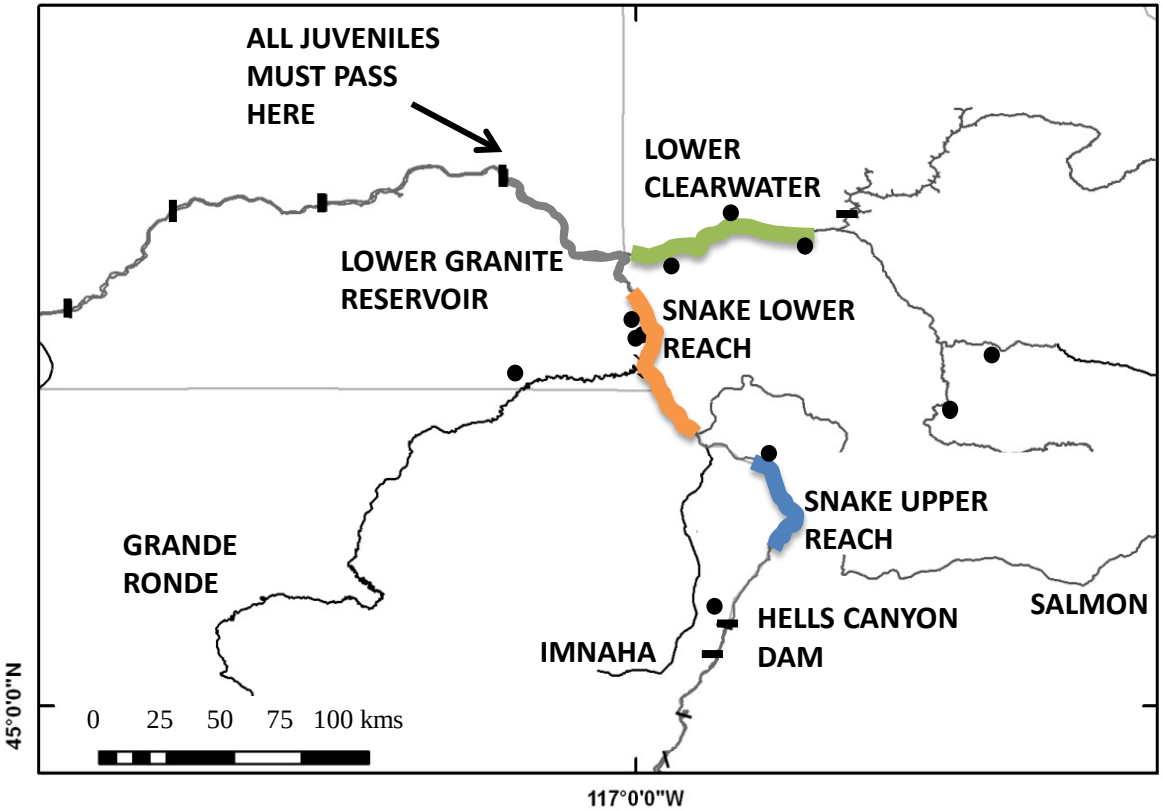


(TAFS 129:1389-1395)



(TAFS 141:1364–1373; IN PRESS)

SOURCES OF JUVENILE DATA UPSTREAM OF LOWER GRANITE DAM



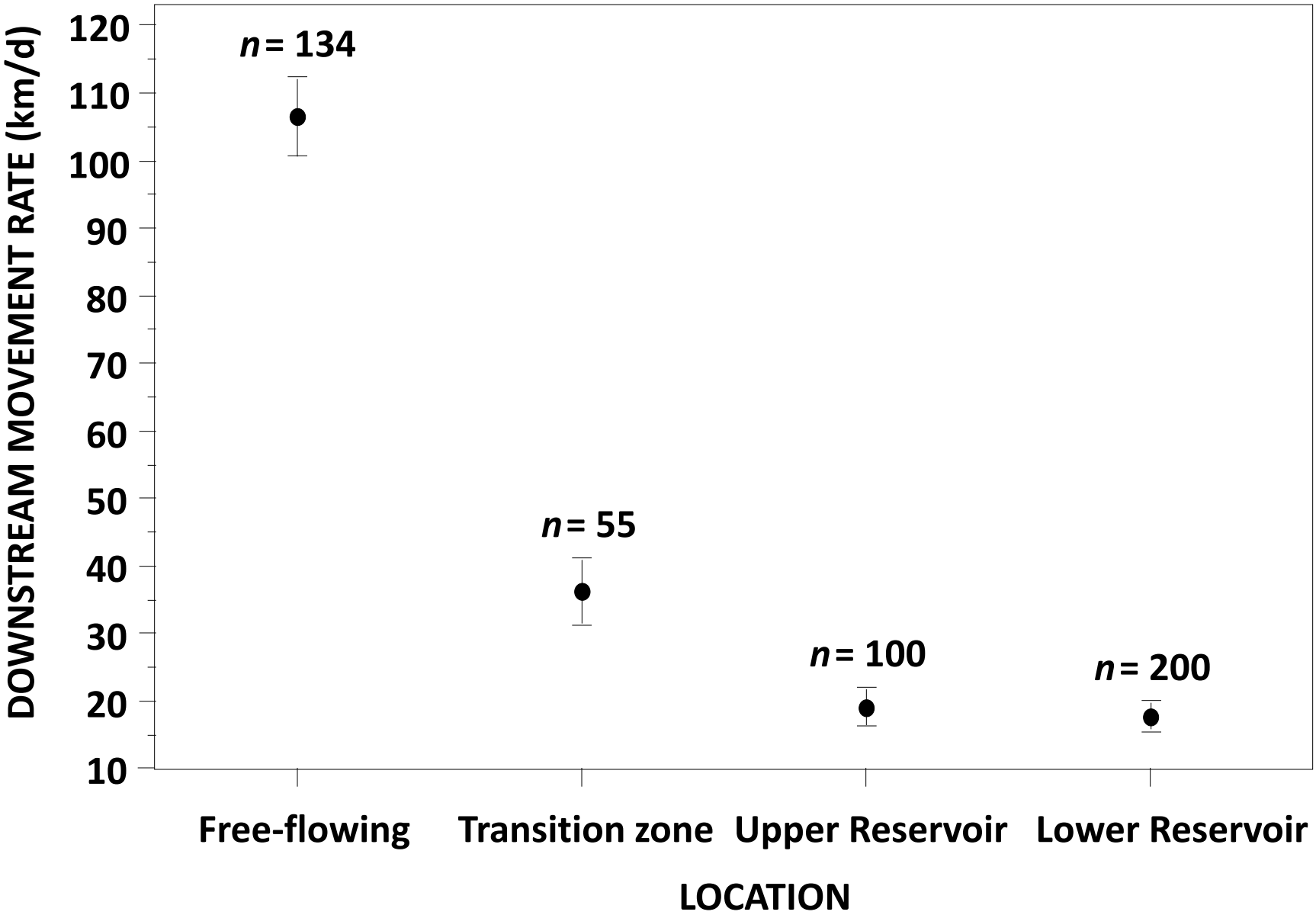
MAJOR SPAWNING AREAS SAMPLED

HATCHERY JUVENILE RELEASE POINTS •

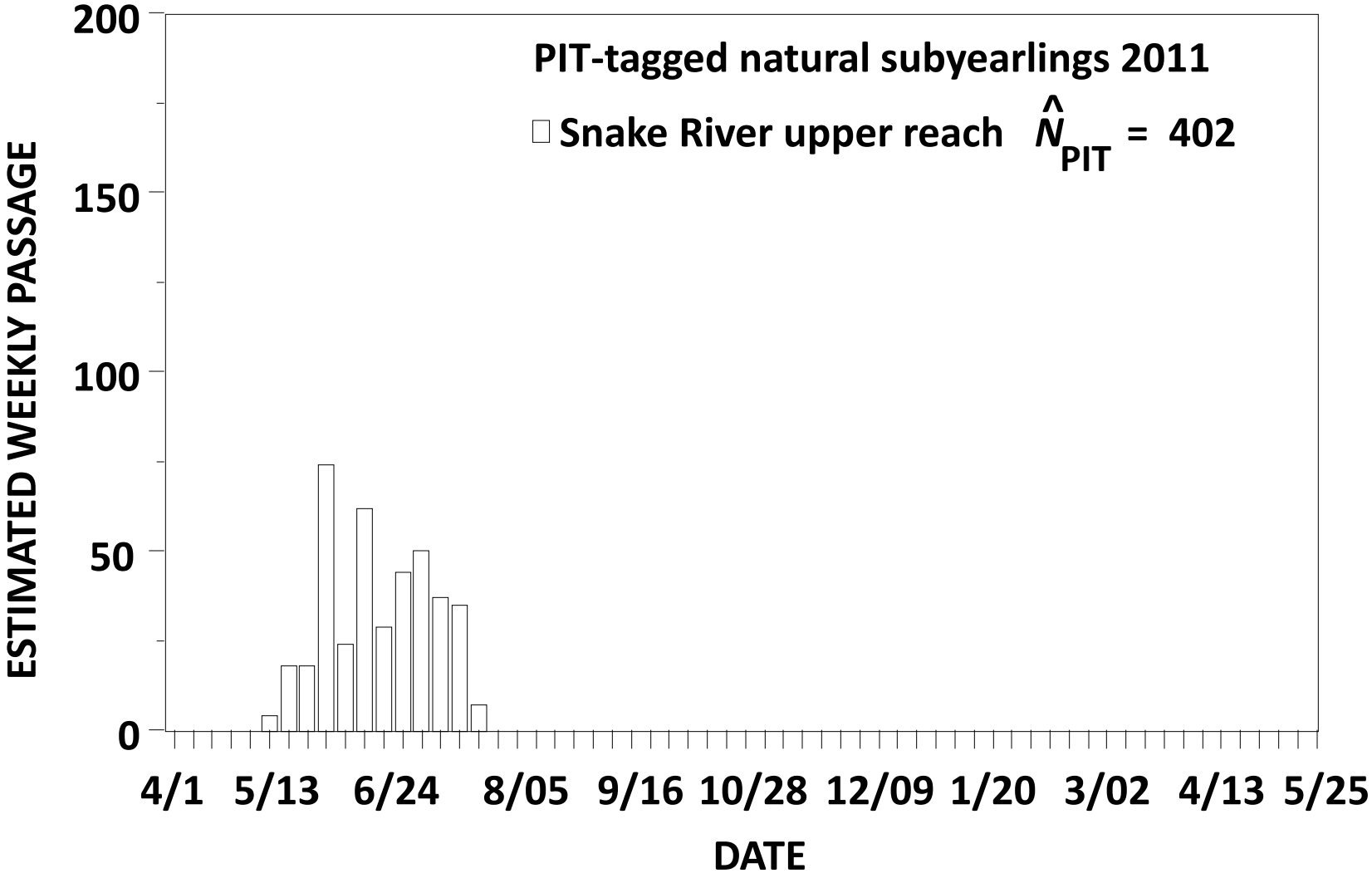
NATURAL

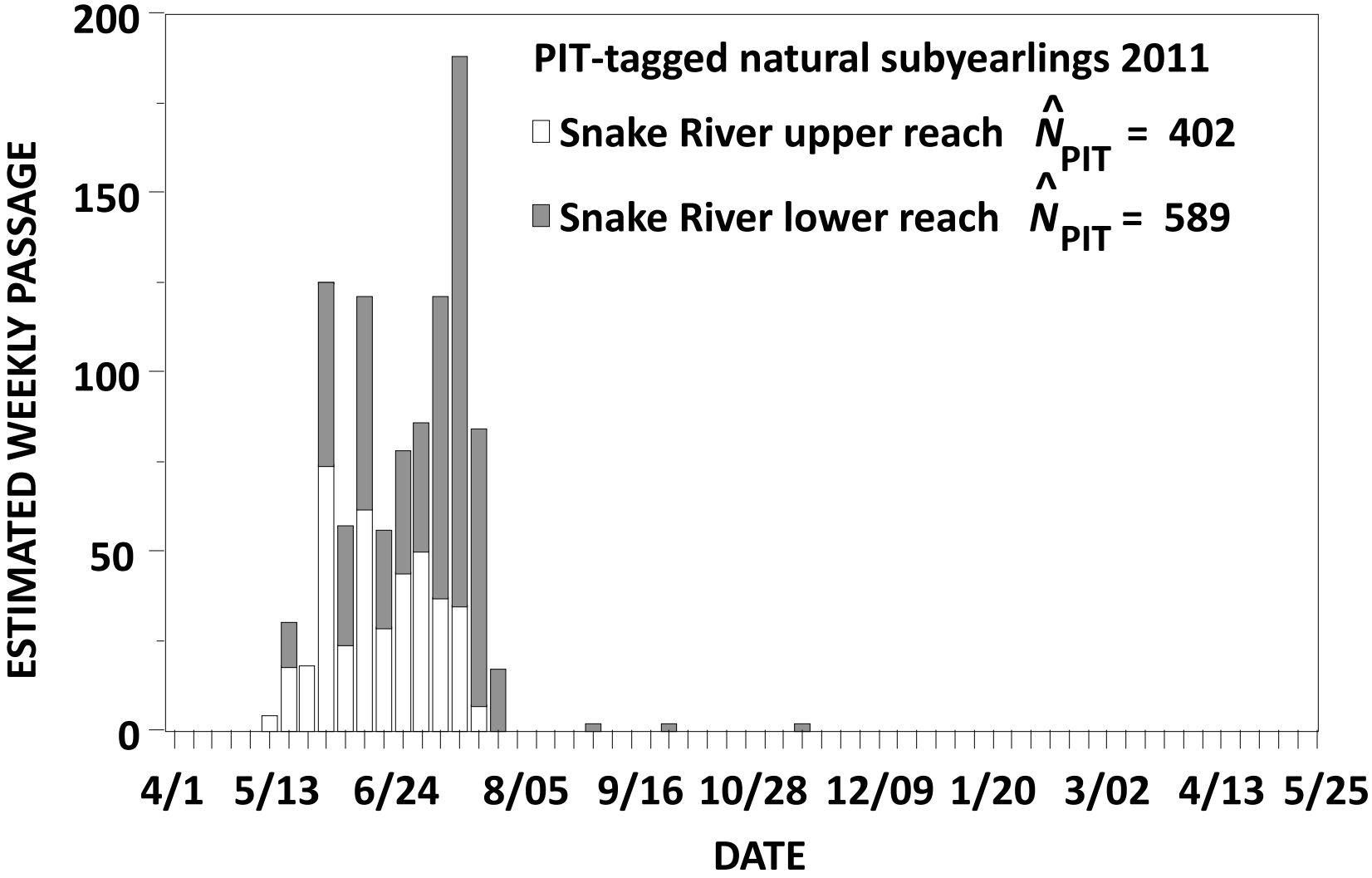
HATCHERY

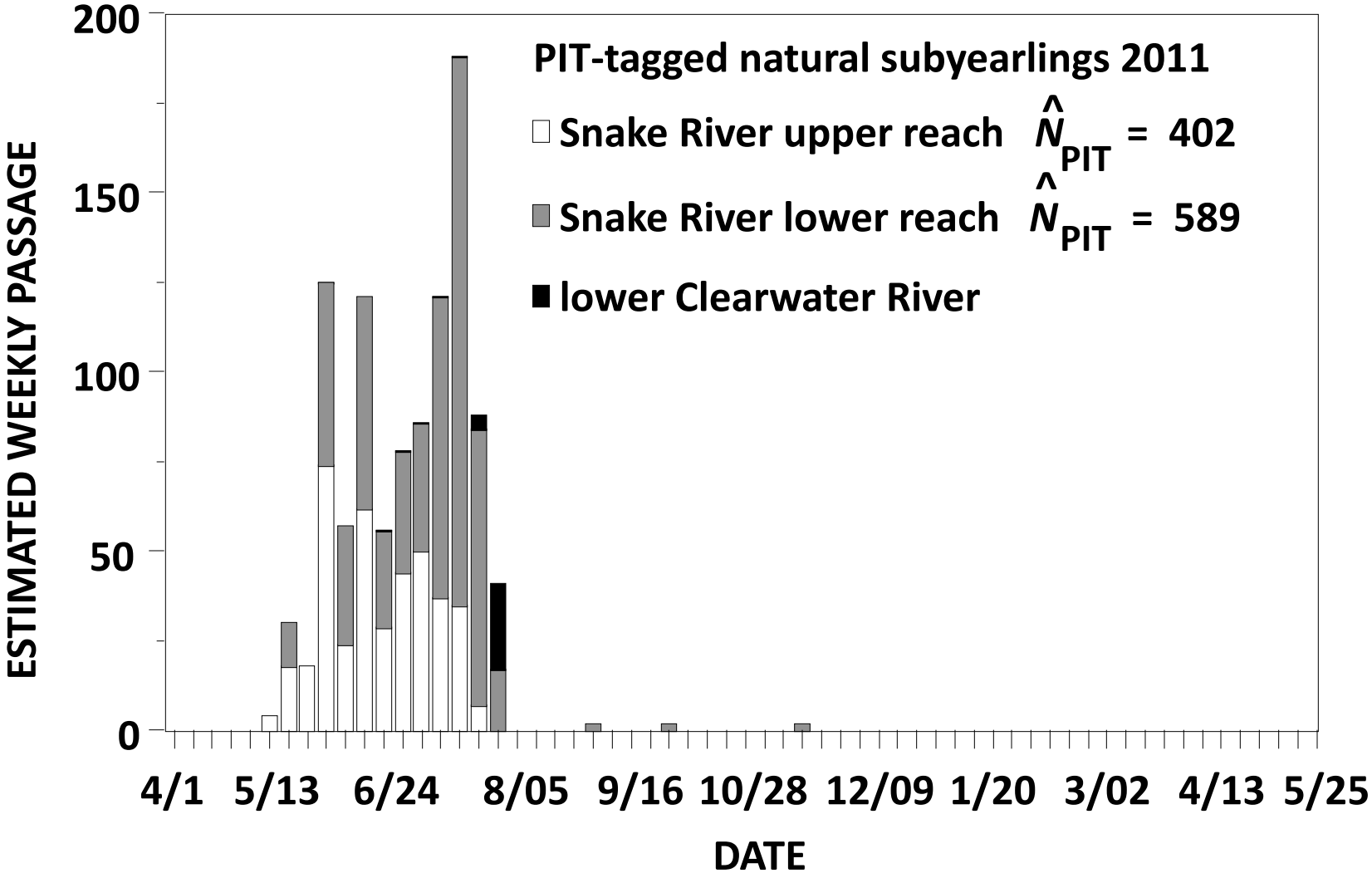
(TAFS 140:21-30)

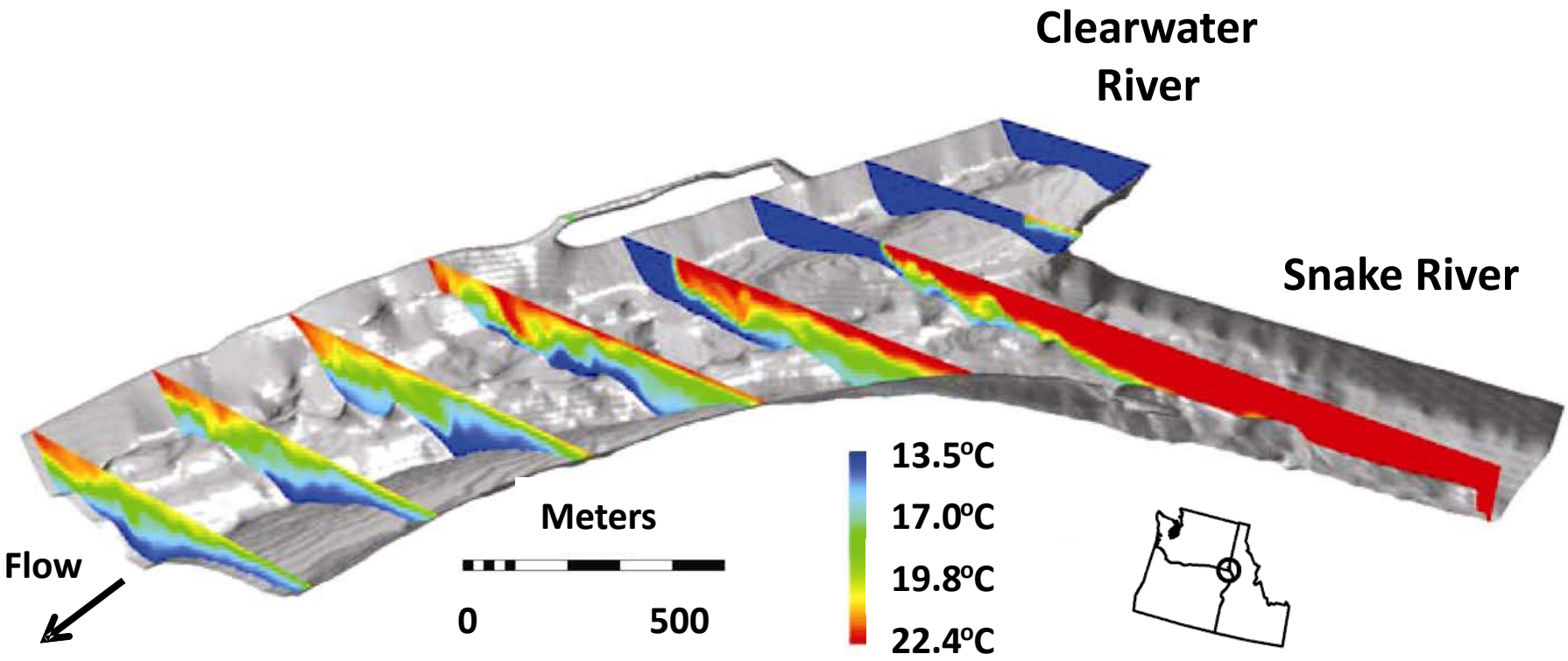


(NAJFM 23:414-430, 594-599; TAFS 138:373-384; JFB 74:1562-1579)

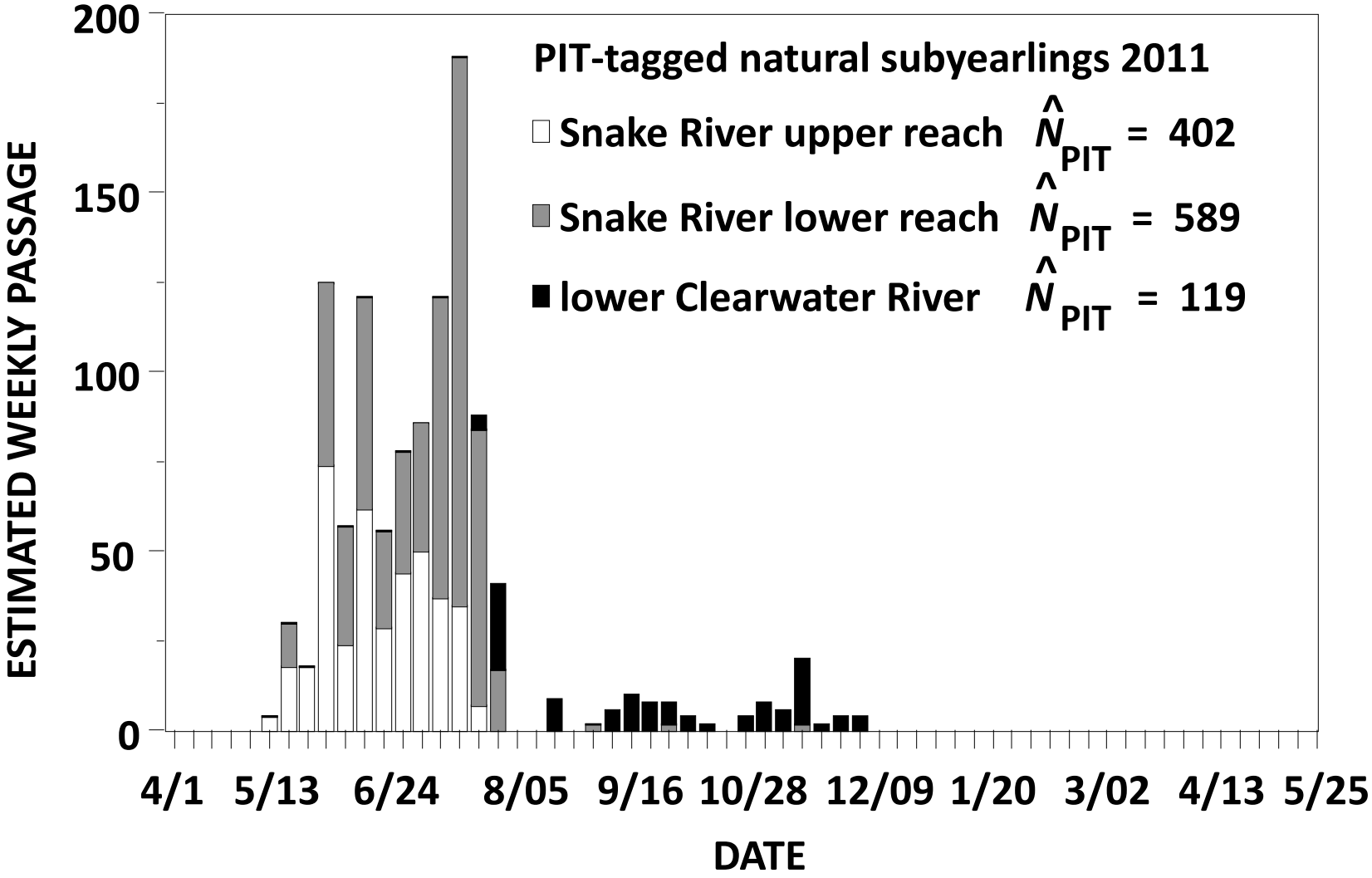

PIT-tagged natural subyearlings 2011
Snake River upper reach $\hat{N}_{PIT}$ = 402
ESTIMATED WEEKLY PASSAGE
200
150
100
50
0
4/1
5/13
6/24
8/05
9/16
10/28
12/09
1/20
3/02
4/13
5/25
DATE

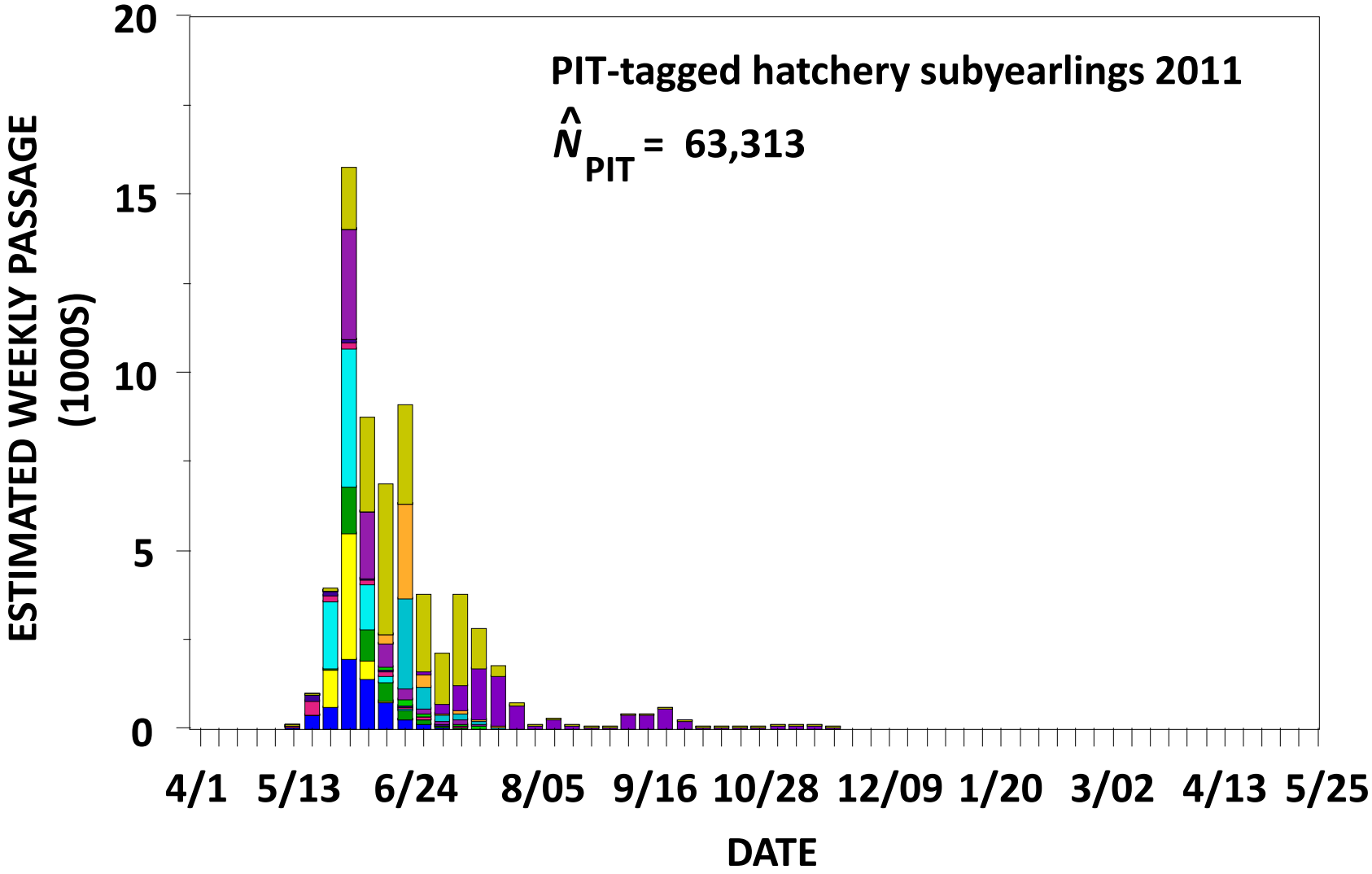

PIT-tagged natural subyearlings 2011
Snake River upper reach $\hat{N}_{PIT}$ = 402
Snake River lower reach $\hat{N}_{PIT}$ = 589
ESTIMATED WEEKLY PASSAGE
200
150
100
50
0
4/1
5/13
6/24
8/05
9/16
10/28
12/09
1/20
3/02
4/13
5/25
DATE

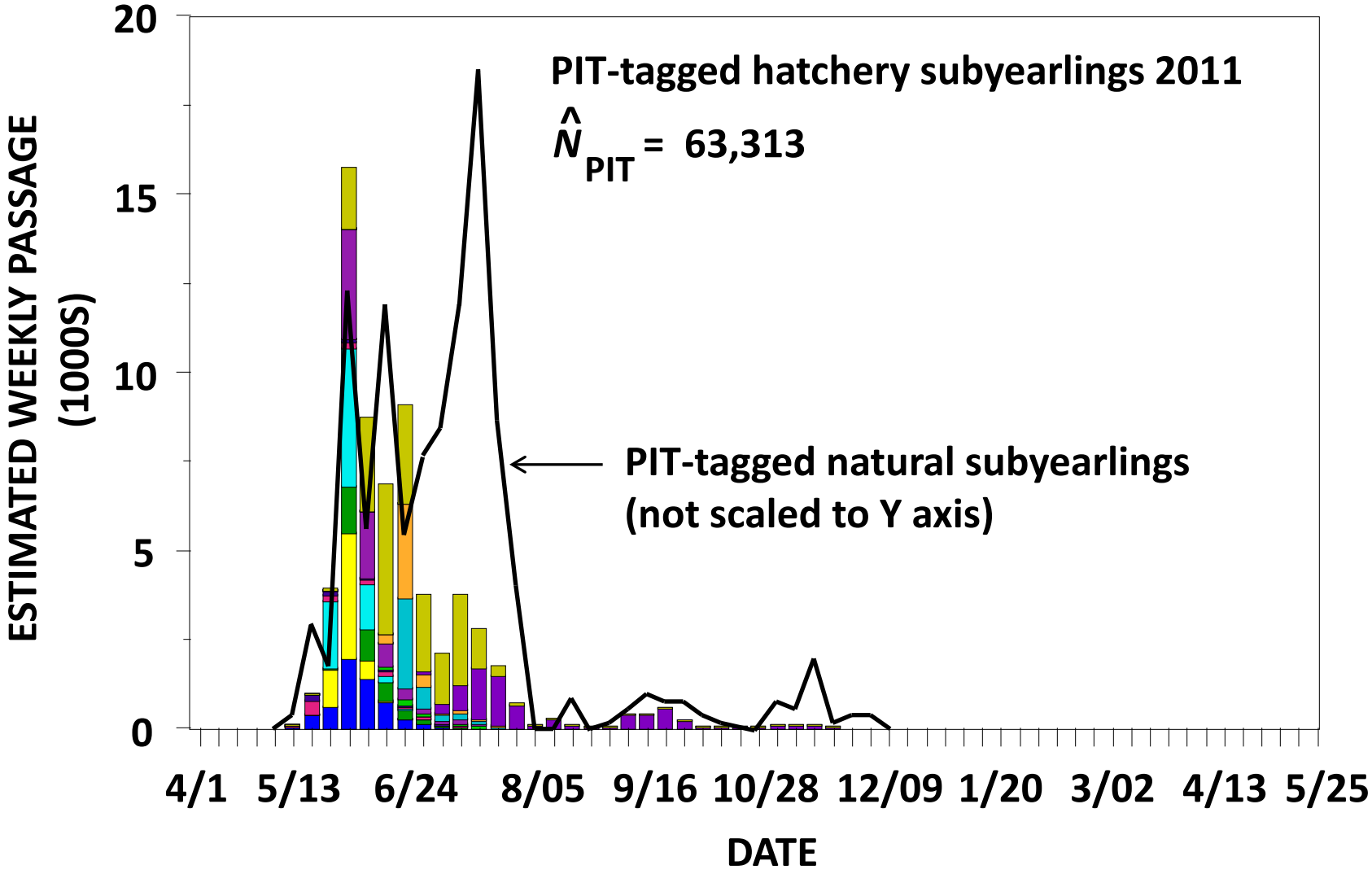

PIT-tagged natural subyearlings 2011
Snake River upper reach $\hat{N}_{PIT}$ = 402
Snake River lower reach $\hat{N}_{PIT}$ = 589
lower Clearwater River
ESTIMATED WEEKLY PASSAGE
200
150
100
50
0
4/1
5/13
6/24
8/05
9/16
10/28
12/09
1/20
3/02
4/13
5/25
DATE



Cook et al. (2006)


PIT-tagged natural subyearlings 2011
Snake River upper reach $\hat{N}_{PIT}$ = 402
Snake River lower reach $\hat{N}_{PIT}$ = 589
lower Clearwater River $\hat{N}_{PIT}$ = 119
ESTIMATED WEEKLY PASSAGE
200
150
100
50
0
4/1
5/13
6/24
8/05
9/16
10/28
12/09
1/20
3/02
4/13
5/25
DATE


PIT-tagged hatchery subyearlings 2011
$\hat{N}_{PIT}$ = 63,313
ESTIMATED WEEKLY PASSAGE (1000S)
20
15
10
5
0
4/1
5/13
6/24
8/05
9/16
10/28
12/09
1/20
3/02
4/13
5/25
DATE

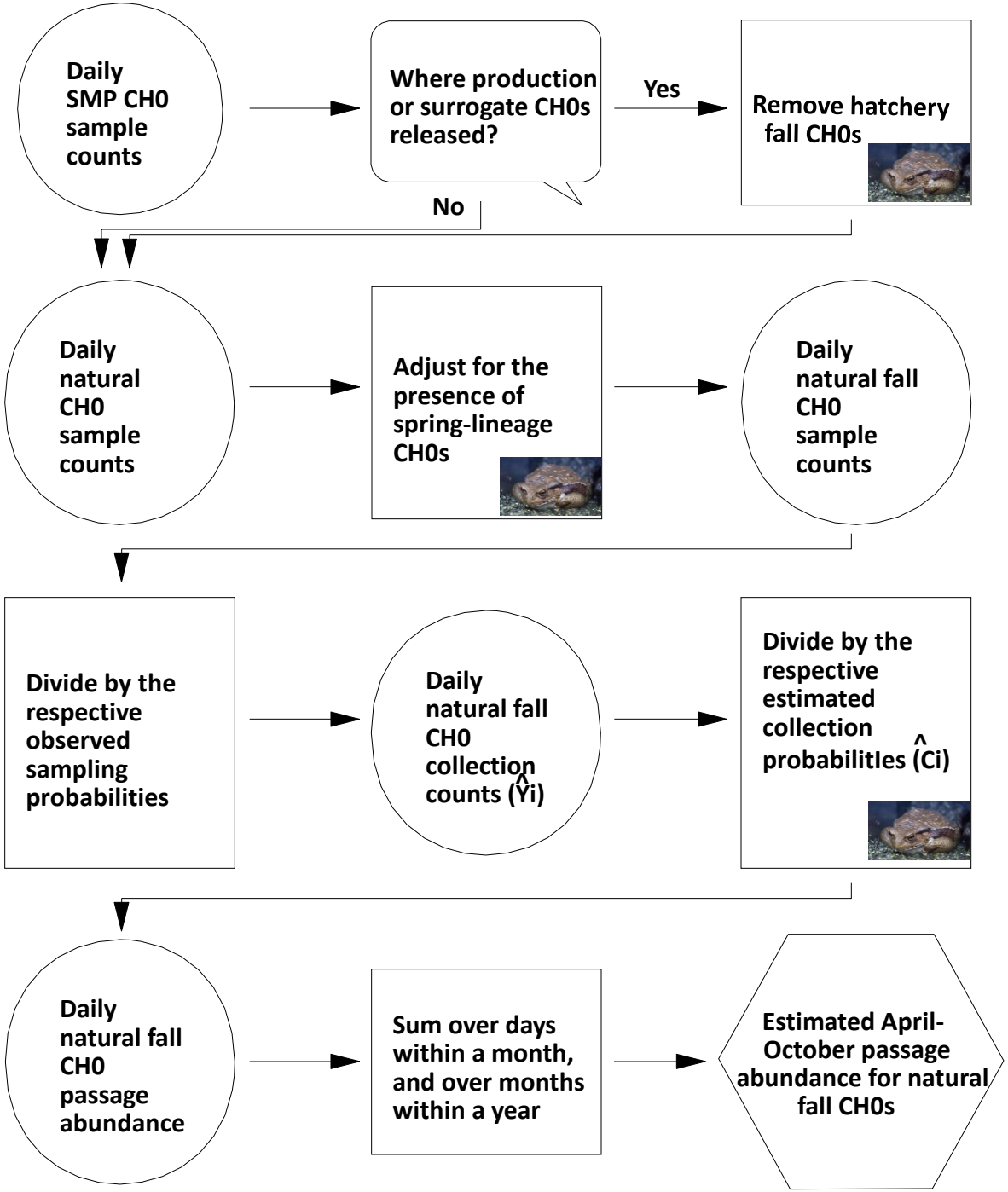

PIT-tagged hatchery subyearlings 2011
$\hat{N}_{PIT}$ = 63,313
PIT-tagged natural subyearlings
(not scaled to Y axis)
ESTIMATED WEEKLY PASSAGE
(1000S)
20
15
10
5
0
4/1
5/13
6/24
8/05
9/16
10/28
12/09
1/20
3/02
4/13
5/25
DATE

SMOLT MONITORING PROGRAM

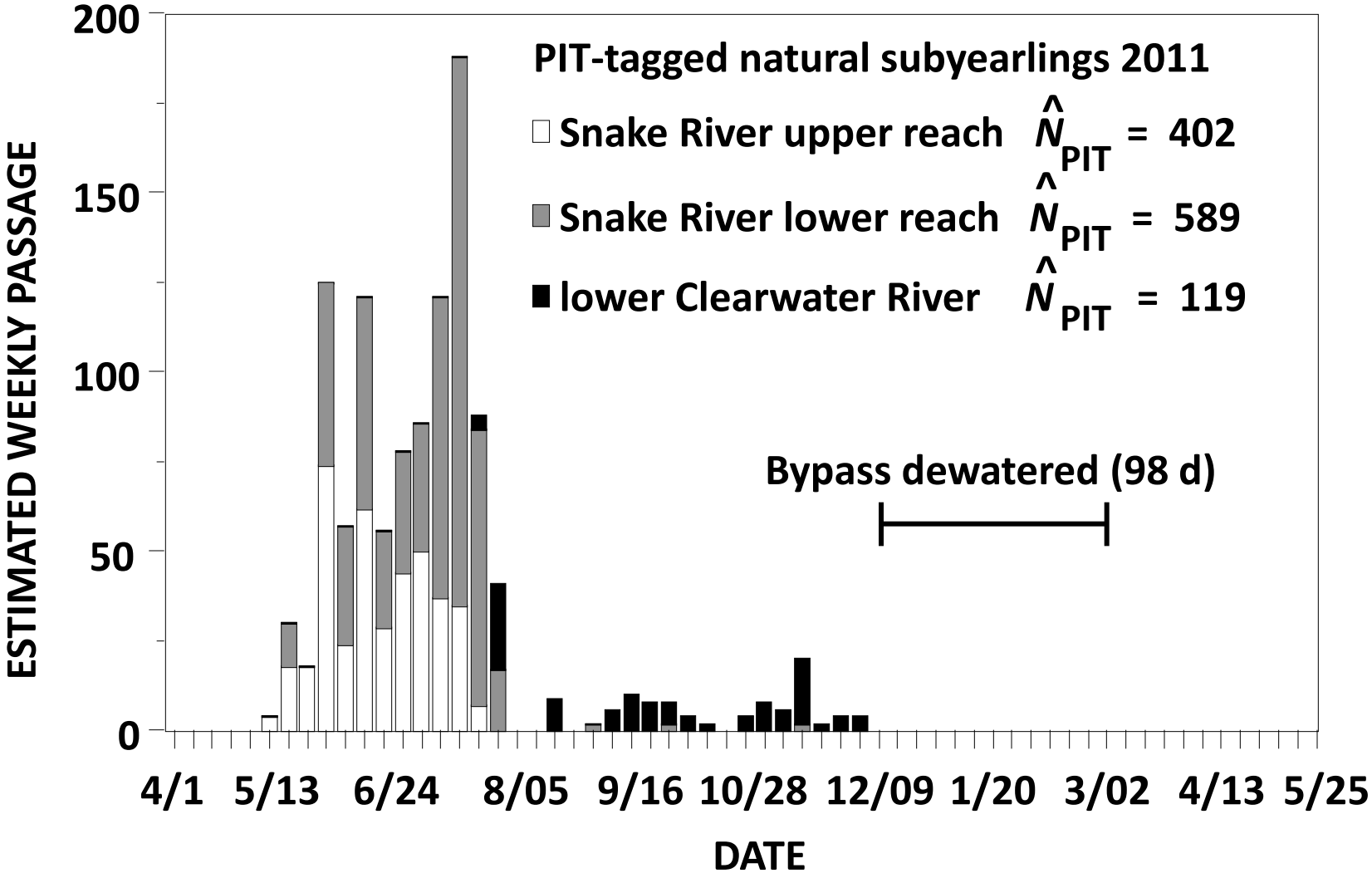
ENUMERATE
-CODED WIRE TAGS
-CLIPS
-PIT TAGS

RECONSTRUCTING THE JUVENILE RUN WHEN THE BYPASS WAS OPERATED

*COLLECT VALIDATION DATA BY PHOTOGRAPHING SUBSAMPLES OF FISH AND APPLYING MORPHOLOGICAL FUNCTION



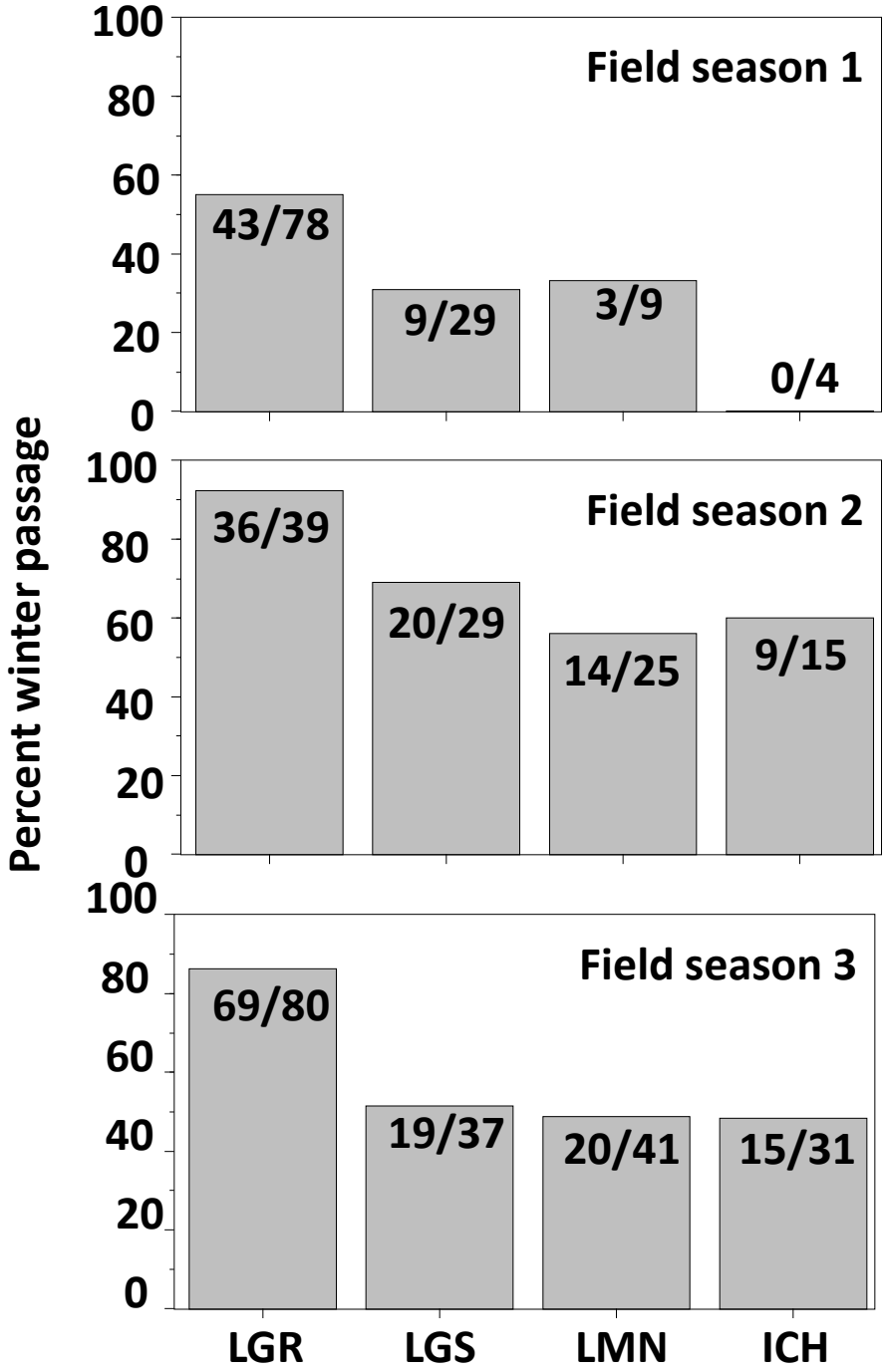
65 TONS
65 TONS

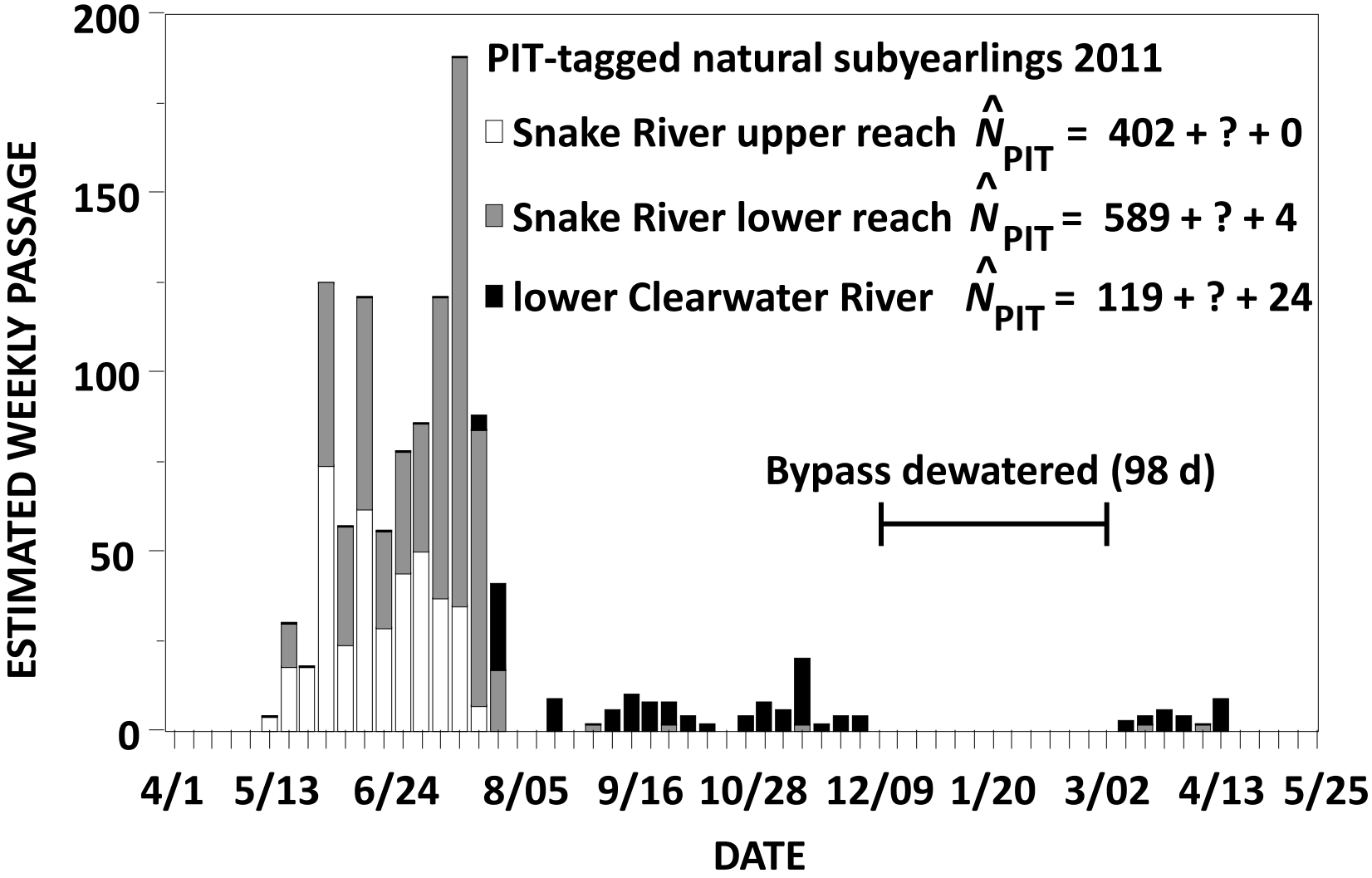

PIT-tagged natural subyearlings 2011
Snake River upper reach $\hat{N}_{PIT}$ = 402
Snake River lower reach $\hat{N}_{PIT}$ = 589
lower Clearwater River $\hat{N}_{PIT}$ = 119
Bypass dewatered (98 d)
ESTIMATED WEEKLY PASSAGE
200
150
100
50
0
4/1
5/13
6/24
8/05
9/16
10/28
12/09
1/20
3/02
4/13
5/25
DATE

Variable	Level	*N*	Downstream movement rate
Field season	1	57	11.3 ± 2.6
	2	78	12.7 ± 2.6
	3	87	9.2 ± 1.4
Season	Winter	135	7.5 ± 1.0
	Spring	87	16.4 ± 2.4
Reservoir	LGS	104	6.9 ± 1.3
	LMN	69	12.9 ± 2.0
	ICH	49	16.8 ± 3.4

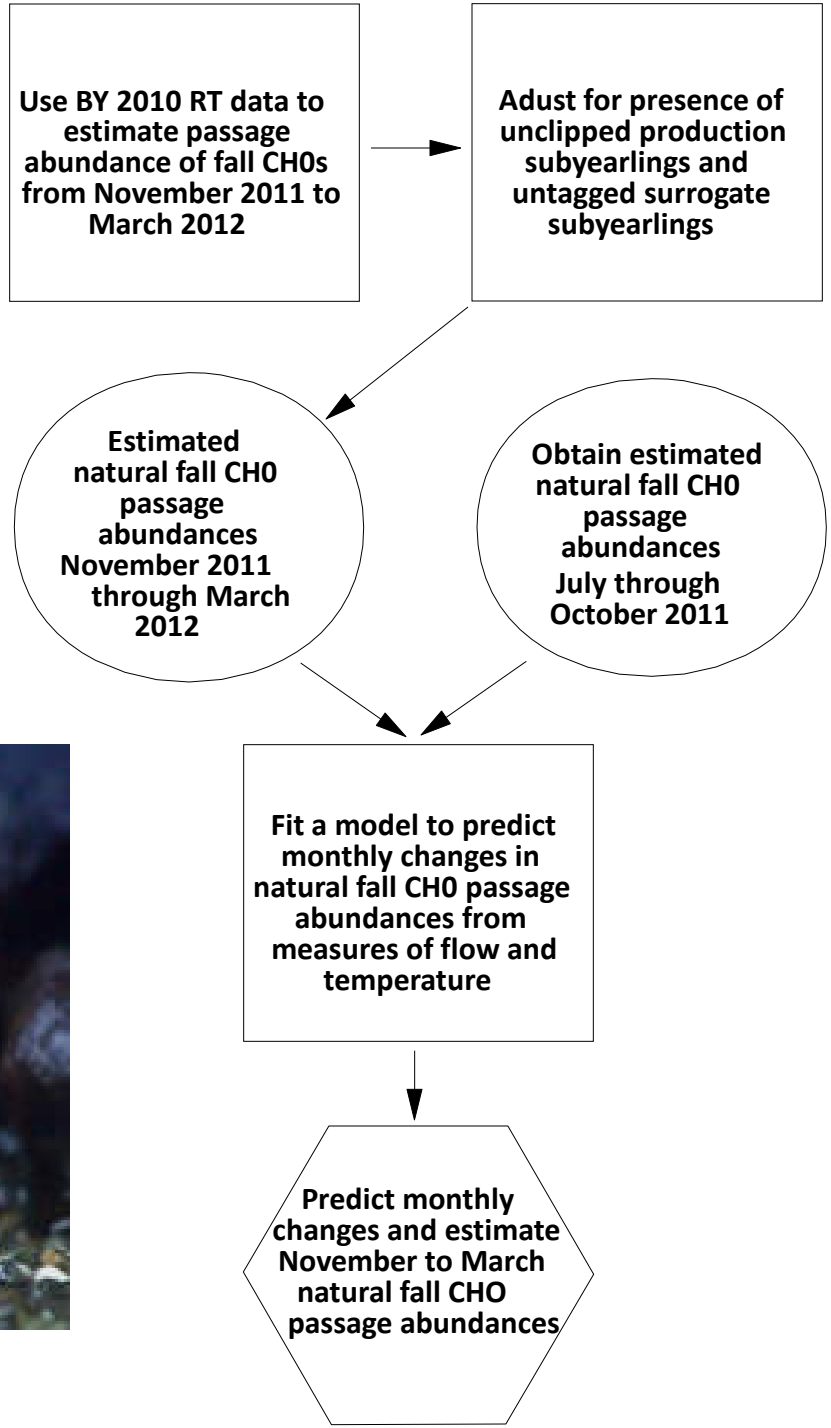
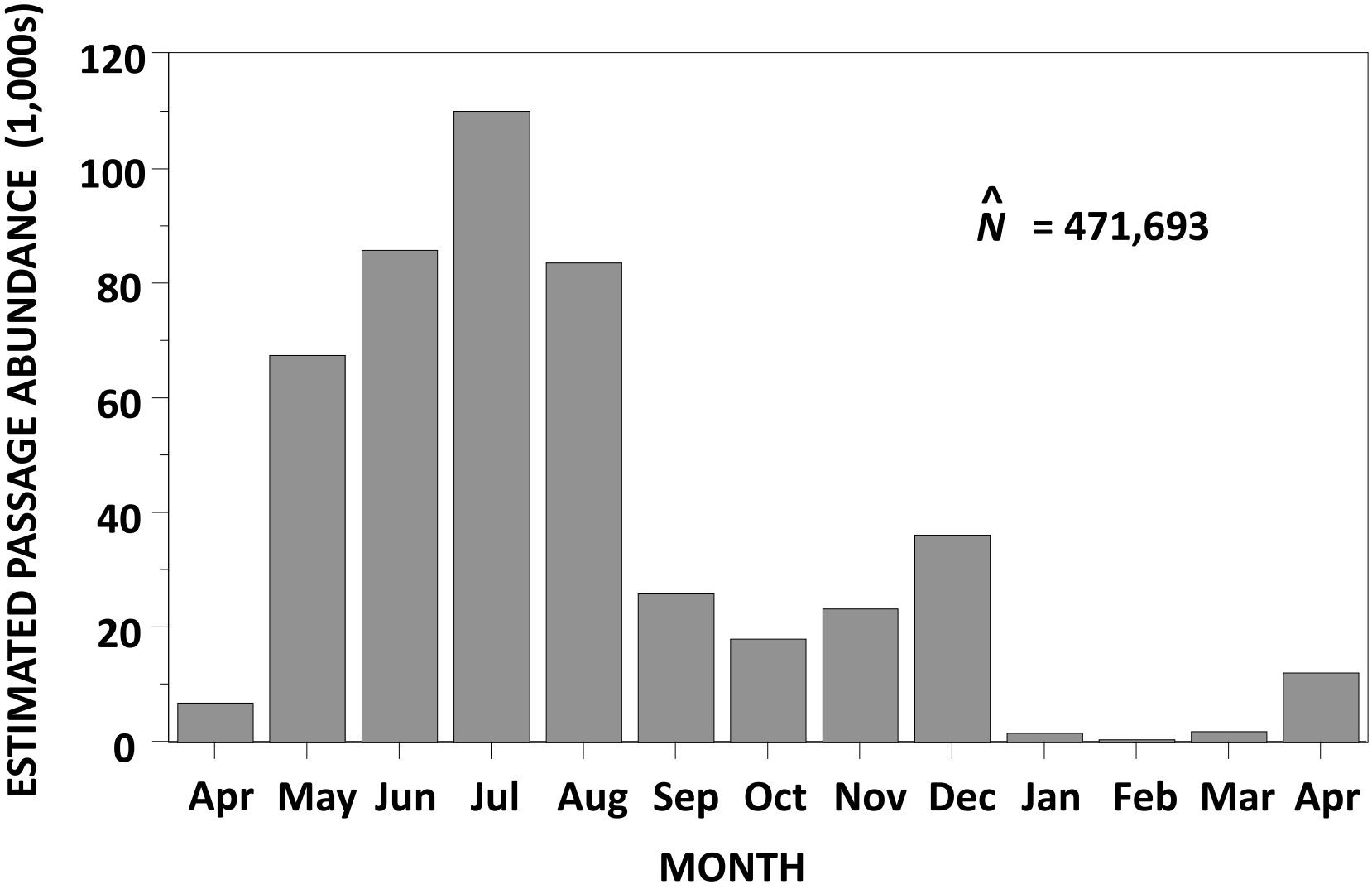
(TAFS 140:21-30)

SOME NATURAL SUBYEARLINGS PASS LOWER GRANITE DAM (AND OTHERS) WHEN THE BYPASS IS NOT OPERATED.




PIT-tagged natural subyearlings 2011
Snake River upper reach $\hat{N}_{PIT}$ = 402 + ? + 0
Snake River lower reach $\hat{N}_{PIT}$ = 589 + ? + 4
lower Clearwater River $\hat{N}_{PIT}$ = 119 + ? + 24
Bypass dewatered (98 d)
ESTIMATED WEEKLY PASSAGE
200
150
100
50
0
4/1
5/13
6/24
8/05
9/16
10/28
12/09
1/20
3/02
4/13
5/25
DATE

RECONSTRUCTING THE JUVENILE RUN WHEN THE BYPASS WAS NOT OPERATED



RUN RECONSTRUCTED FOR NATURAL JUVENILES
(BROOD YEAR 2010; MIGRATION YEARS 2011 AND 2012)