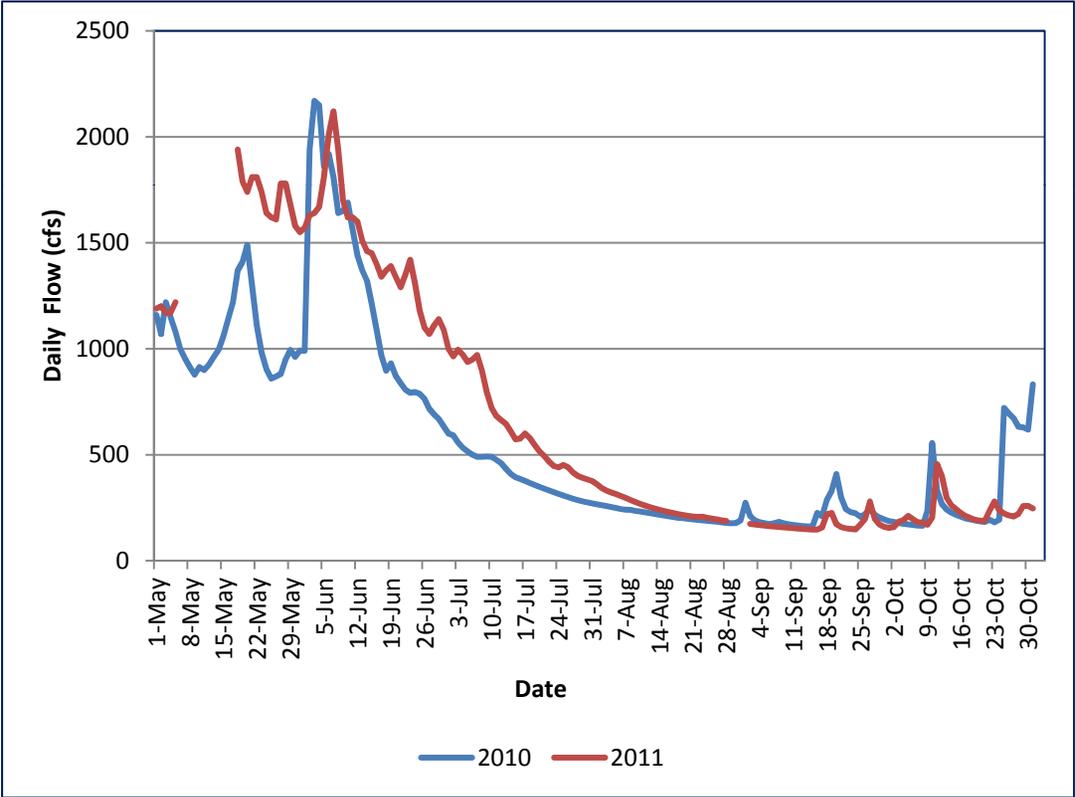


2011 upper Lewis River Bull Trout Investigations

Jim Byrne

WDFW

2010 & 2011 Muddy River spring, summer and fall flow regimes



Consequences of higher flows

Could not net effectively in our routine locations, resulting in additional netting (12 trips vs. the normal 10 in past).

Forced a later start to begin snorkels (limited to 3 rather than usual 4 snorkels)

Portions of the upper section of Rush Creek were unsafe to snorkel

PIT tag weir and antenna positioning was problematic and hydro-generator produced excessive electronic interference “noise”

More difficult to recruit sufficient snorkelers for complete snorkel coverage

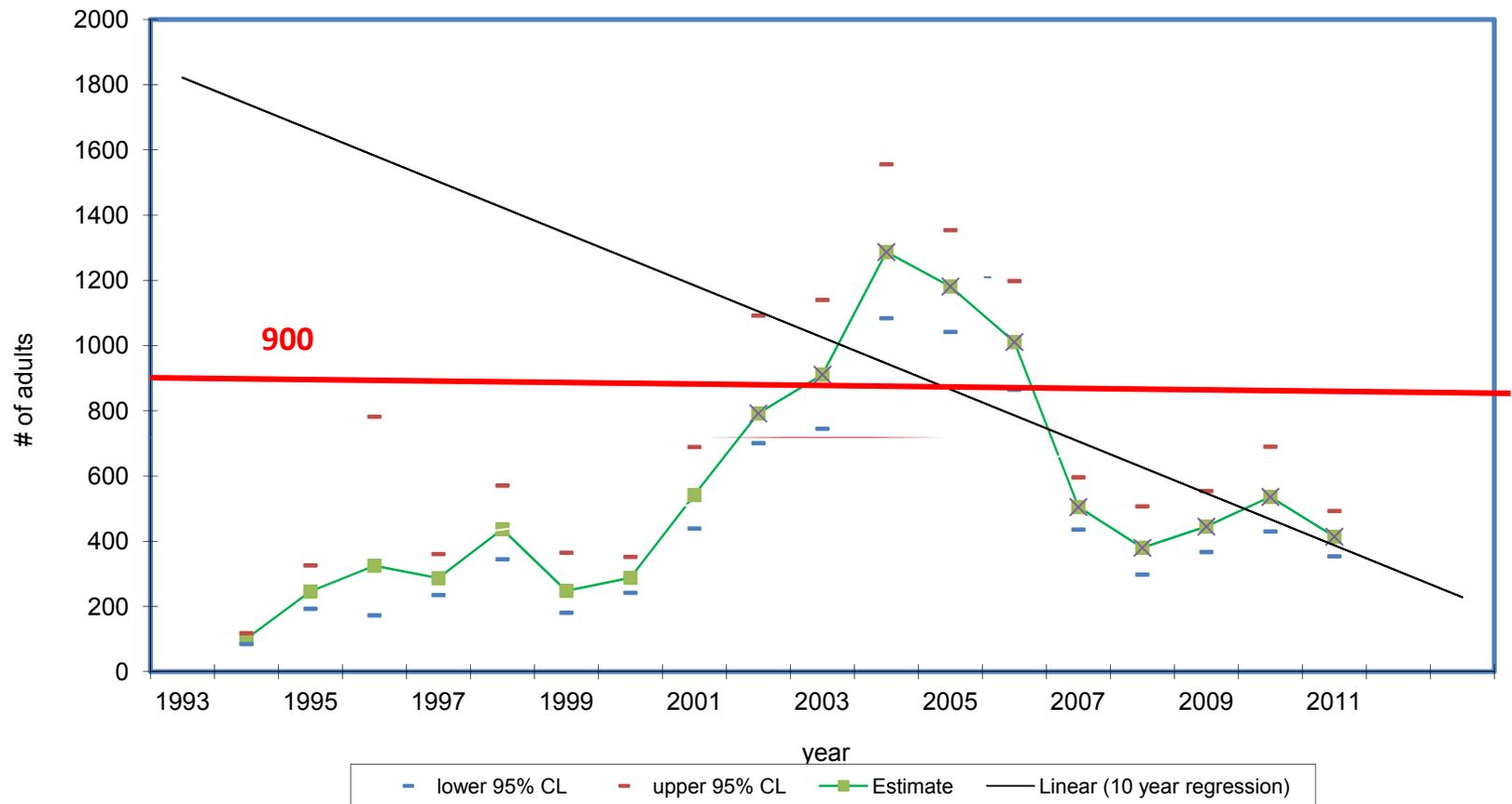
NoRemark Estimate Results

NoRemark Surveys	df	Low C.I.	difference	Estimate	difference	High C.I.	≈ C.V.
Tributary	5	278	86	364	138	502	15
Confluence & Tributaries	13	354	60	<u>414</u>	79	493	<u>8</u>
Confluence	7	362	74	436	103	539	10

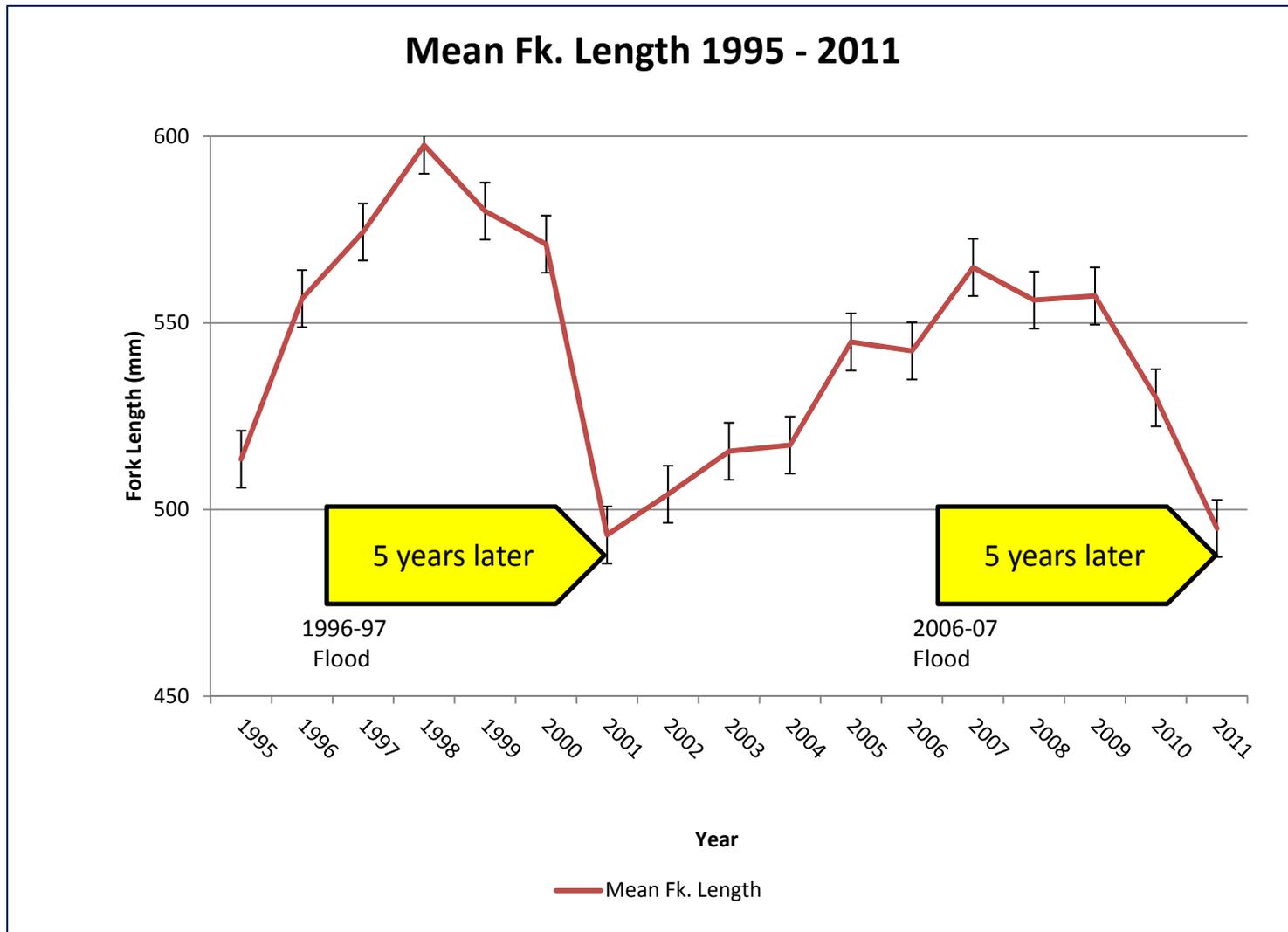
Data was analyzed three ways. By combining confluence and tributary snorkel counts, we increased our degrees of freedom and reduced the size of our Confidence intervals. χ^2 says we can do this. (See difference & ≈ C.V. columns.) Confluence counts only may exaggerate the number of fish considered to be spawners.

Unresolved question – what are we monitoring; all bull trout, migrants, adults or spawners only? Do all fish in tributaries represent spawners? What about fish in confluence holes - are they all spawners? Probably not.

Upper Lewis River Migratory Adult Estimate.

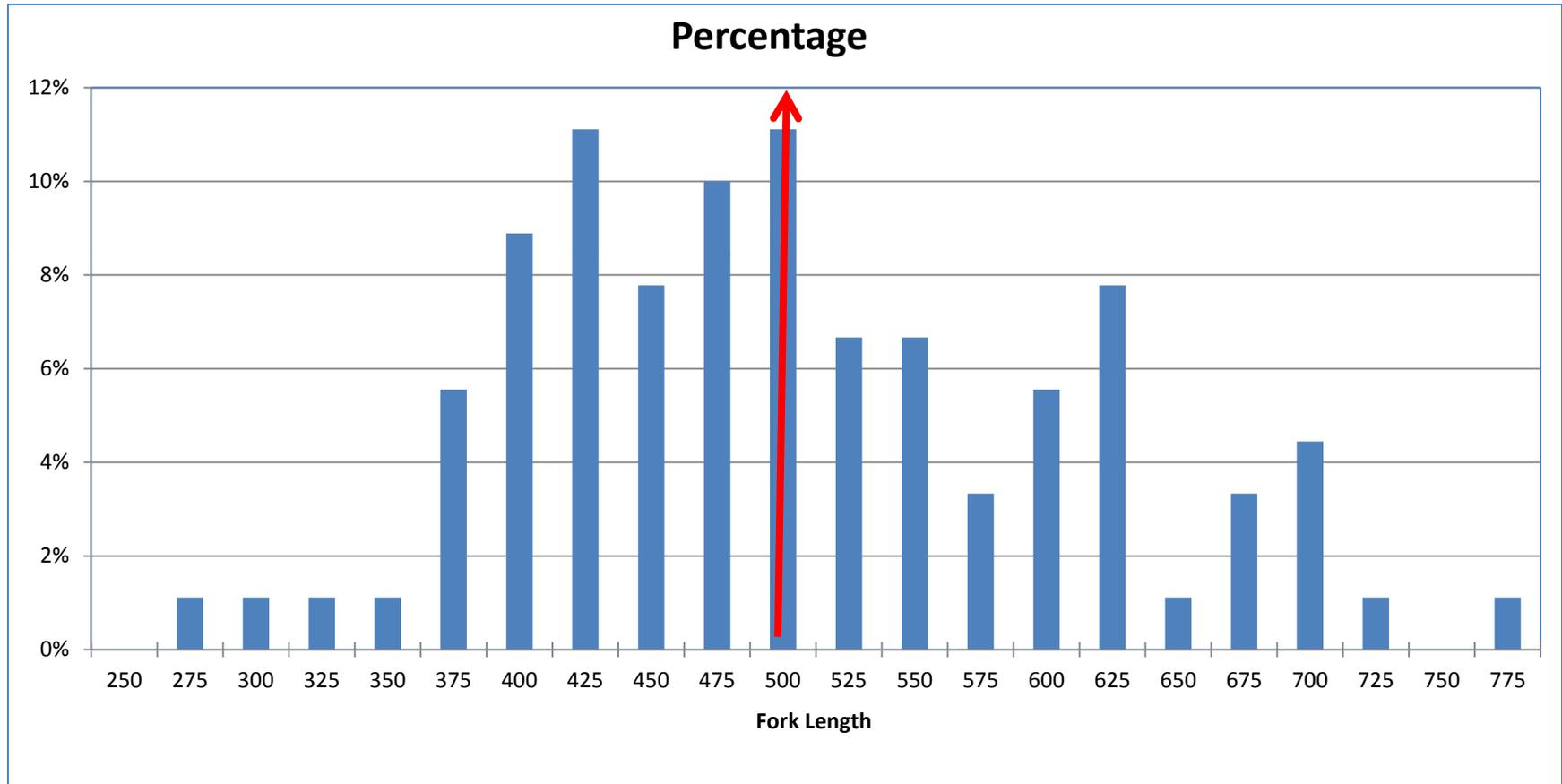


Last five years estimates were similar. A low plateau of 380-550 fish. 2011 represents less than one third (32.2 %) of 2004's peak. The USF&WS 5- Year review recommends, "Maintain a ten year combined average of 900 spawning migratory adults . . . no significant decrease in Adult abundance level is observed over a ten year average". A statistically significant decrease over the past 10 years presently exists ($r = 0.72$, $r^2 = 0.51$, $df = 9$, $p = 0.02$).



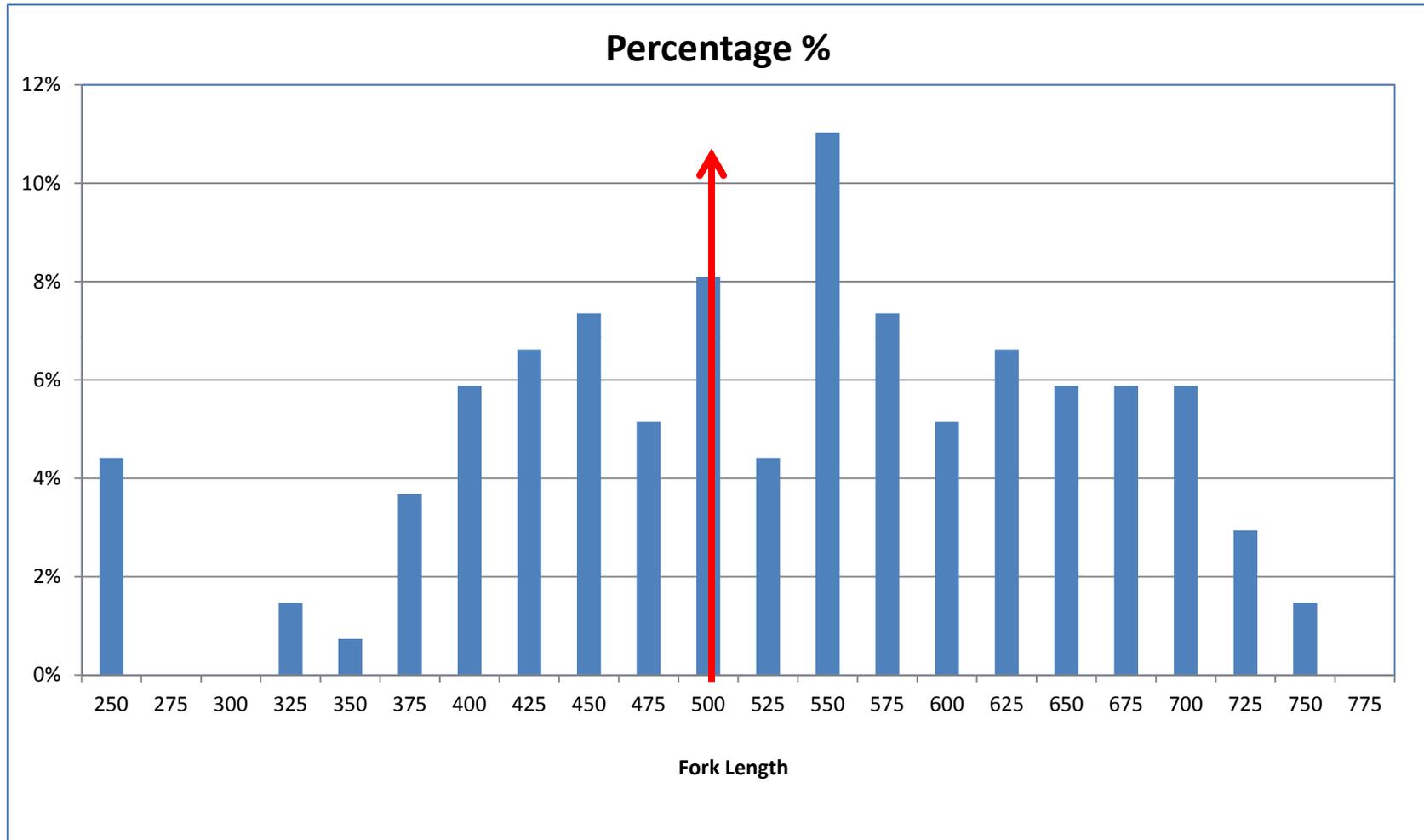
Lowest mean fork lengths recorded 5 years after major flood events. Larger older fish disappearing, a large young cohort is entering our fishery, reducing mean fork length.

2011 Fork lengths as Percentages



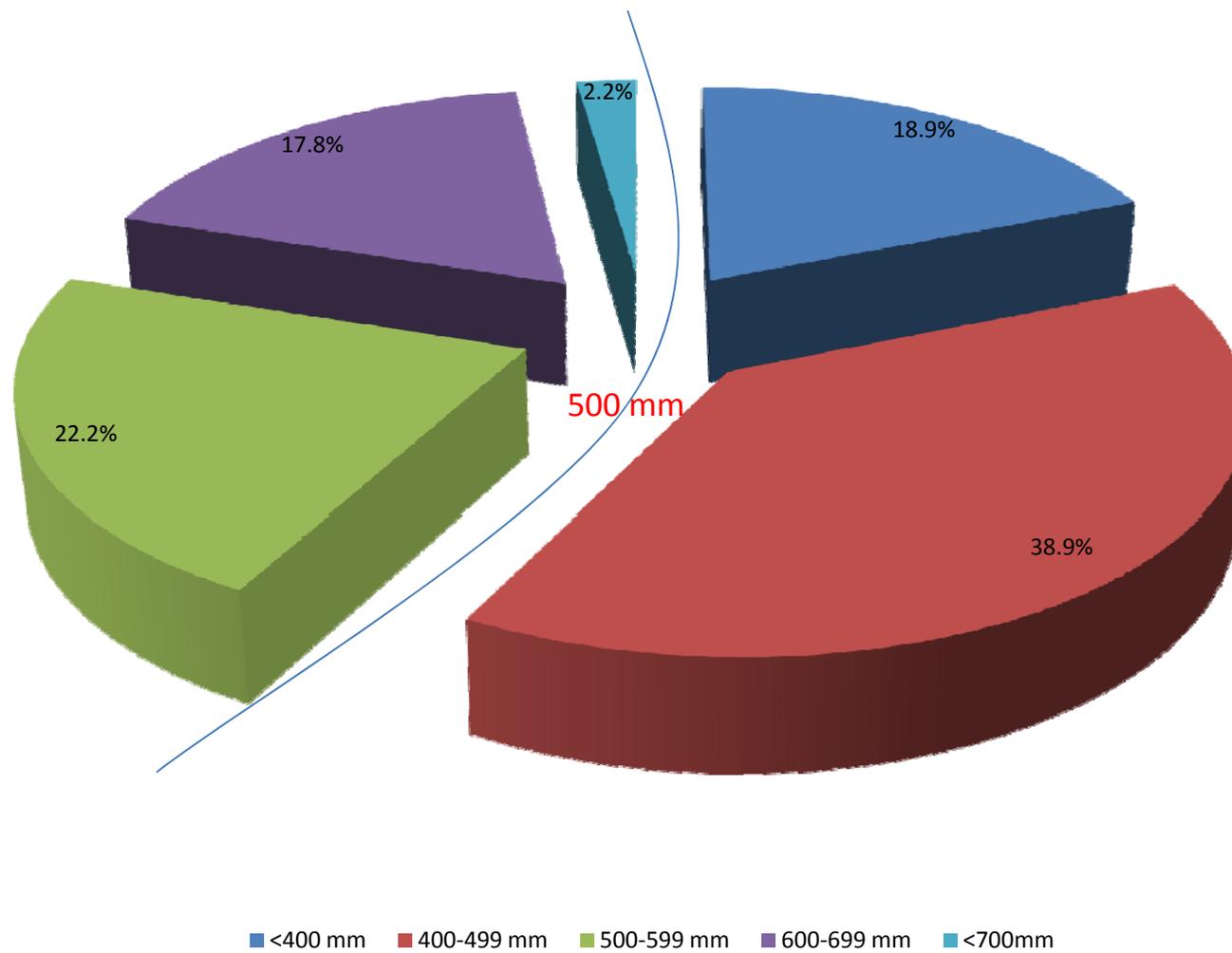
58% of 2011 fish below 500 mm fork length

2004 Fork lengths as Percentages



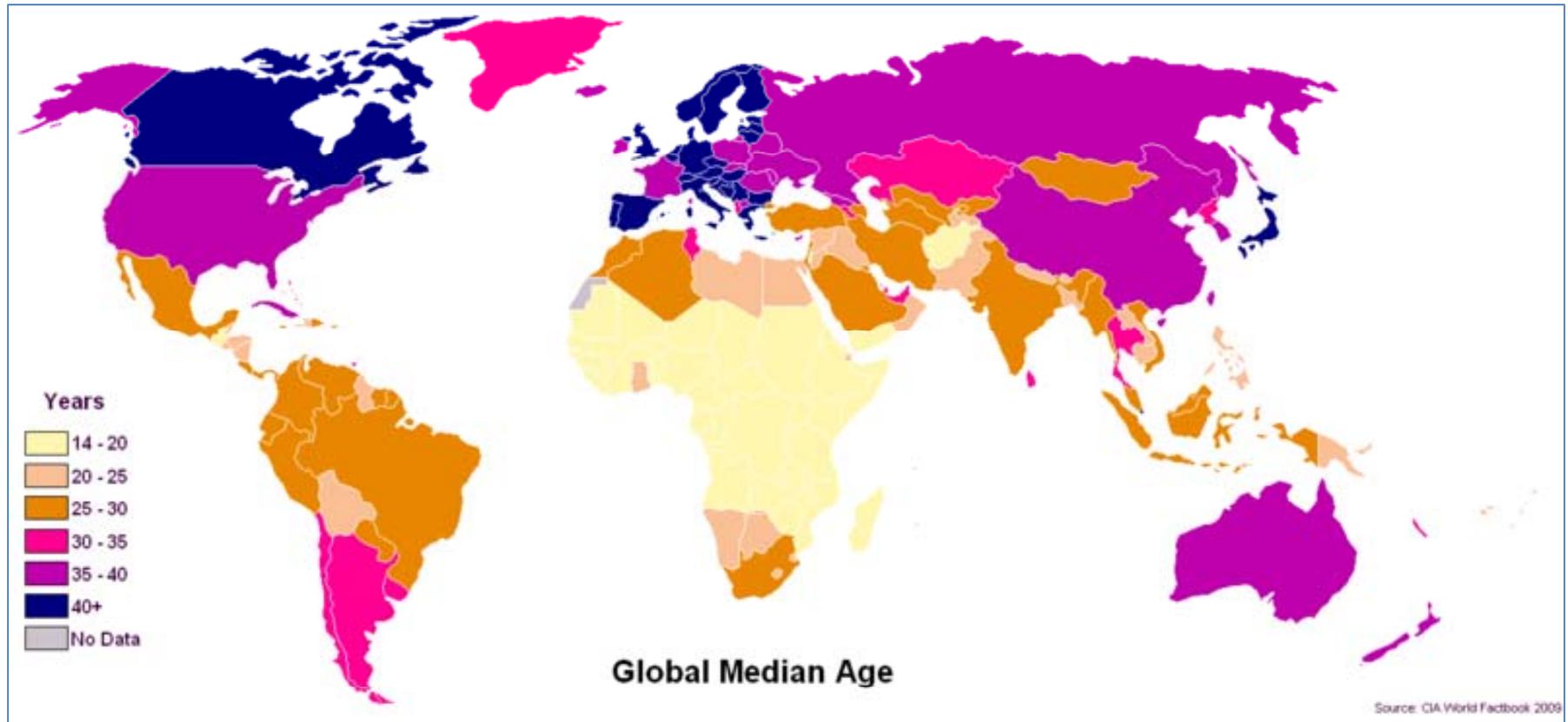
Only 35% of 2004 fish were below 500 mm fork length. This was year with the largest estimate and year most fish captured. Should represent broadest size distribution.

2011 Fork Lengths as Percentages



Most fish less than 500 mm fork length. - Atypical from most years. What does this mean?

Age distributions in human terms.



This is a file from the [Wikimedia Commons](https://commons.wikimedia.org/).

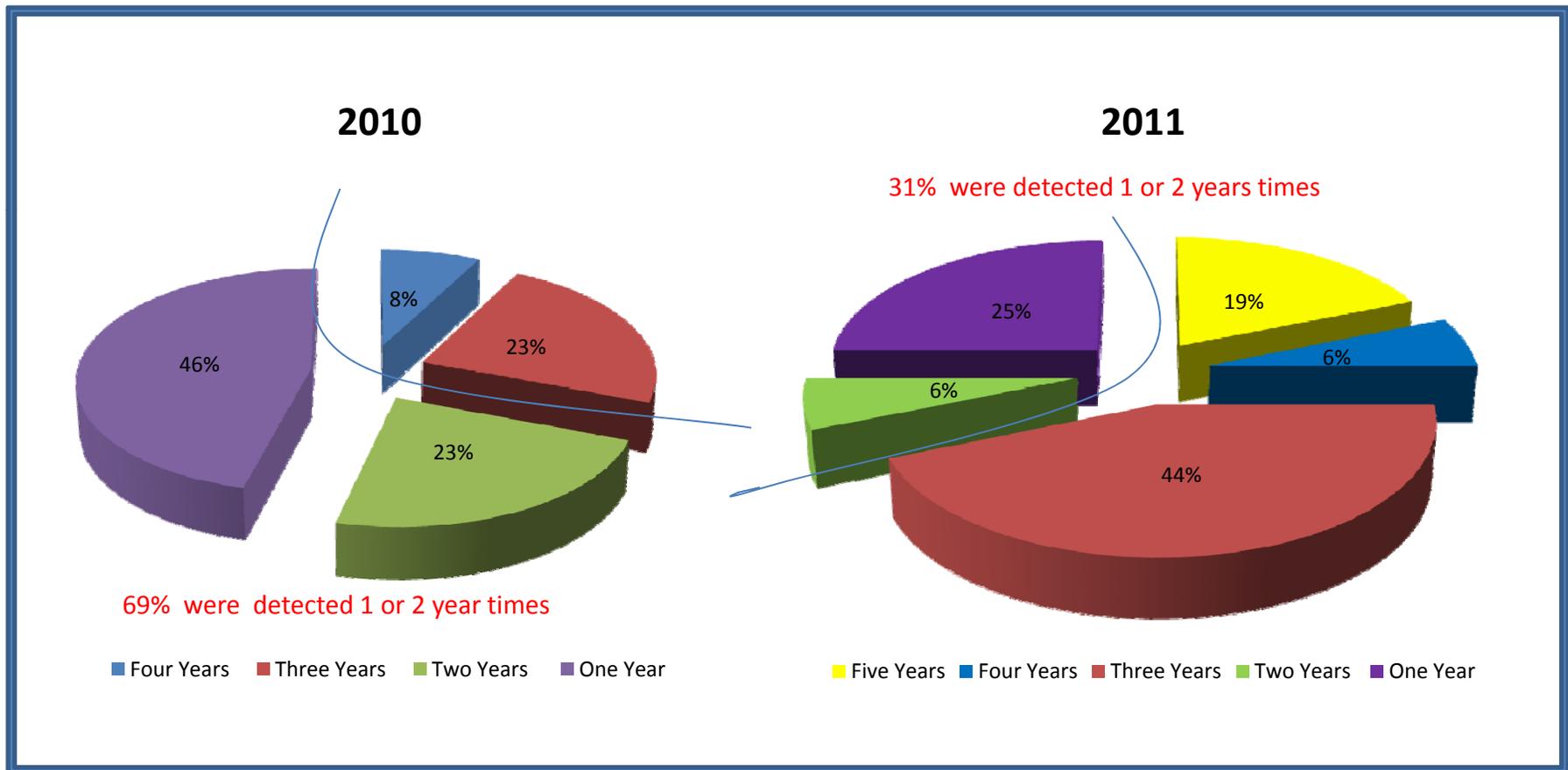
2011 Rush Creek PIT Tag Detections (FDX and HDX combined)

PIT Tag Numbers	Initial tag date & Size (mm)	This year's detection date	# Spawns and Years
3D9.1BF24058C0	6/27/06 @ 335	08/22/2011	Five - 07, 08, 09, 10, 2011
3D9.257C6A6115	6/21/06 @ 491	10/14/2011	Five - 06, 08, 09, 10, 2011
3D9.1BF2404AF4	6/23/05 @ 469	10/15/2011	Five - 06, 07, 09, 10, 2011
3D9.1BF23C6EC7	5/29/07 @ 419	10/15/2011	Four - 08, 09, 10, 2011
3D9.257C6A3BE5	7/12/06 @ 330	09/08/2011	Three - 08, 09, 2011
3D9.257C66AEB8	7/5/06 @ 365	09/09/2011	Three - 09, 10, 2011
3D9.257C66A55A	7/12/06 @ 490	10/14/2011	Three - 07, 09, 2011 **
3D9.1C2C488F33	6/11/08 @ 510	08/07/2011	Three - 09, 10, 2011
A0F655D	6/19/07 @ 614	08/22/2011	Three - 09, 10, 2011
A0F6554	7/05/06 @ 365	08/07/2011	Three - 09, 10, 2011
A0F6545	7/12/06 @ 330	09/07/2011	Three - 08, 09, 2011
3D6.00053FD7E0	7/11/07 @ 428	08/23/2011	Two - 2010, 2011
A0F655F	6/17/11 @ 754	Not provided	One 2011
A0F655C	6/24/09 @ 427	08/18/2011	One 2011
A0F656D	6/23/11 @ 670	Not provided	One 2011
A89AF3E	8/08/11, no length	Not provided	One 2011

**Alternate Year
spawner

Numbers were down due to high flows. Clearly most fish can spawn annually if sufficient food in reservoir. Some bull trout may spawn up to five and possibly more times. Might this reduce effective population size" (N_e), since the same fish can contribute its genes multiple times.

Comparison of 2010 and 2011 Rush Creek PIT tag data indicating the number of years individually tagged fish have appeared in Rush Creek



There has been a shift to older 3, 4, 5 appearance fish.

General Observations

Overall - fish were smaller. There seemed to be a greater number and percentage of fish < 500mm. Most larger fish were older with 3-5 Rush Ck annual appearances. Major flood events may exert some influence on size.

Much of the 2011 spawning was done by larger older repeat spawners. May have an effect on genetics as one individual may pass on its genes over multiple years, reducing “effective population size” (N_e). Three fish spawned at least five times. Does this contribute to inbreeding?

There was a reduction in redds and spawners in observed in Rush Creek compared to the last three years. Fewer redds were observed.

We have monitored a significant ten year decline in bull trout numbers. When is it time to begin to act proactively, to institute measures to actively increase bull trout abundance? At a minimum, we need to set a numerical threshold to institute recovery actions (e.g. hatchery supplementation etc).

Reduced staff allowed for less survey activities. We completed less snorkels and redd surveys. Bull trout were observed upriver in the Lower Falls plunge pool.