

Smolt Abundance in Redwood Cr and Prairie Cr in YR 2011 and Trends in Abundance in Upper and Lower Redwood Cr

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 - Fisheries Restoration Grants Program

Current Fish Studies

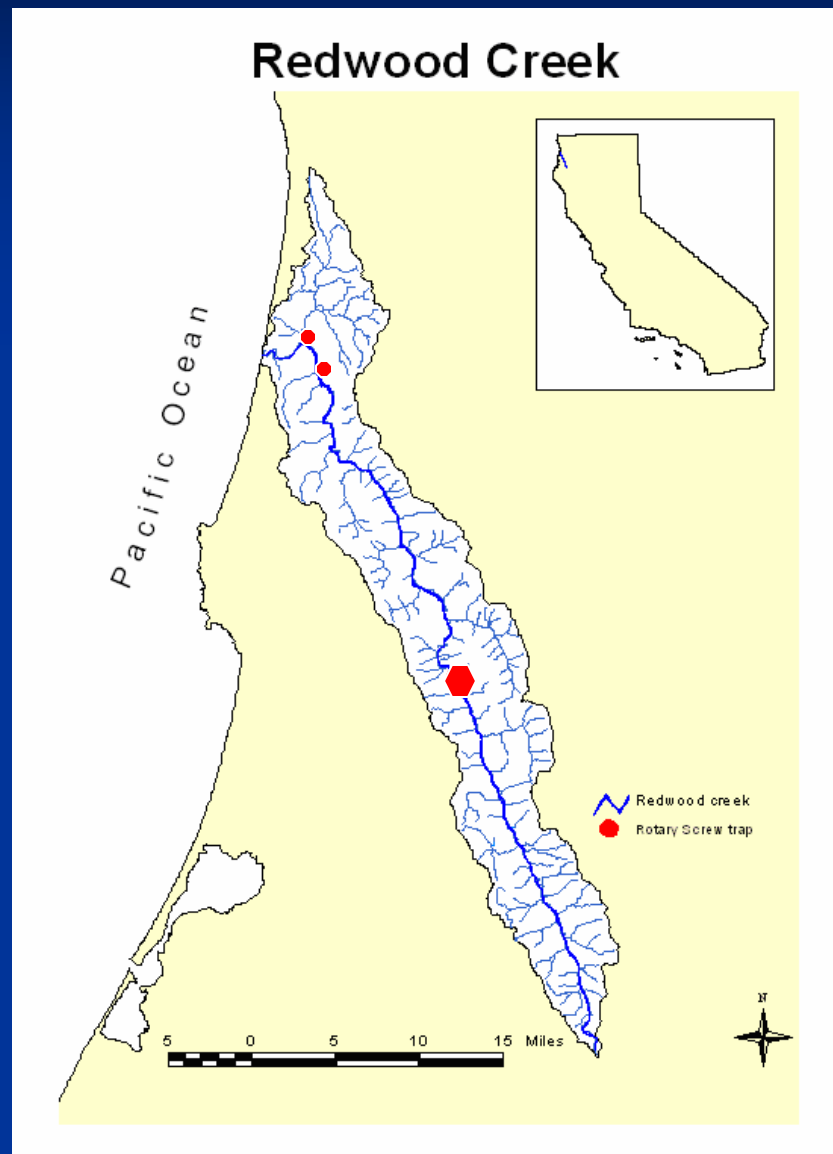
■ Adults

- Redd counts in Prairie Cr and Redwood Cr.
- DIDSON counts of adult fish in lower RC.
- Scale analysis pattern of adult steelhead trout.

■ Juveniles/Smolts

- Long term smolt abundance study in upper RC and lower RC.
- Smolt abundance study in lower PC*.
- Long term study of juveniles in RC estuary.
- Late summer/fall electro fishing of juveniles in PC.

Study Sites for Smolt Work



Upper RC Rotary Screw Trap (RM 33)



Lower Flow Period



Lower Redwood Cr RST (RM 4)



Lower Flow Period



Prairie Creek RST (RM 0.25)



Lower Flow Period



PC RST



Trap Operations (Brief)

- Trap runs 24 hrs/day, 7 days a week from late March to August/September.
- Operated to maximize catches and trapping efficiencies.
- Checked 1-2 times a day (morning and evening).
- Evening check to remove debris/release efficiency trial fish.

Mark/Recapture

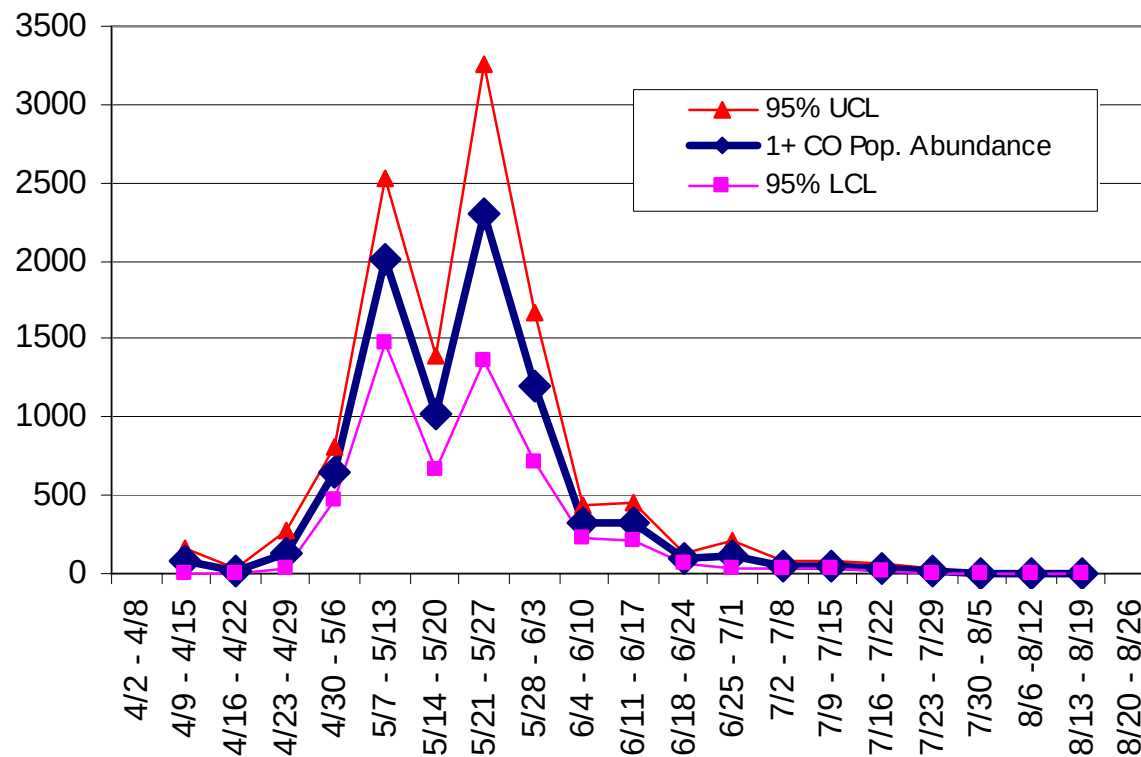
- Partial caudal fin clips for the mark.
- We mark and release fry (Chinook, Coho) and smolts (Chinook, Coho, Steelhead, Cutthroat) 3-5 times each week.
- Sample sizes vary from 3 – 100 fish each trial, depending upon trap catches.
- Every captured fish is observed for marks.

Population Model

- Carlson et al. (1998) is the model we favor.
 - Improved version of a Peterson.
 - Produces population estimates by week and season.
 - **Tested in the field for accuracy** with a smolt trap and downstream counting fence (weir).
 - Favorable peer review by CDFG Biometrician.

The Perfect Distribution

1+ Coho Salmon Population Abundance YR 2011



Species of Interest



0+ Chinook Salmon



1+ Chinook Salmon



0+ Steelhead Trout



1+ Steelhead Trout



2+ Steelhead Trout Smolts



Cutthroat Trout



Adult CT's



0+ Coho Salmon



0+Steelhead, Chinook, and Coho Fry

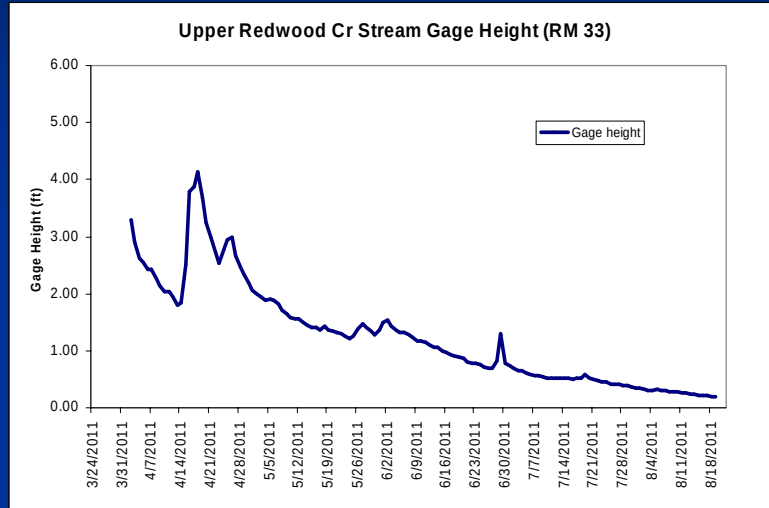


1+ Coho Salmon

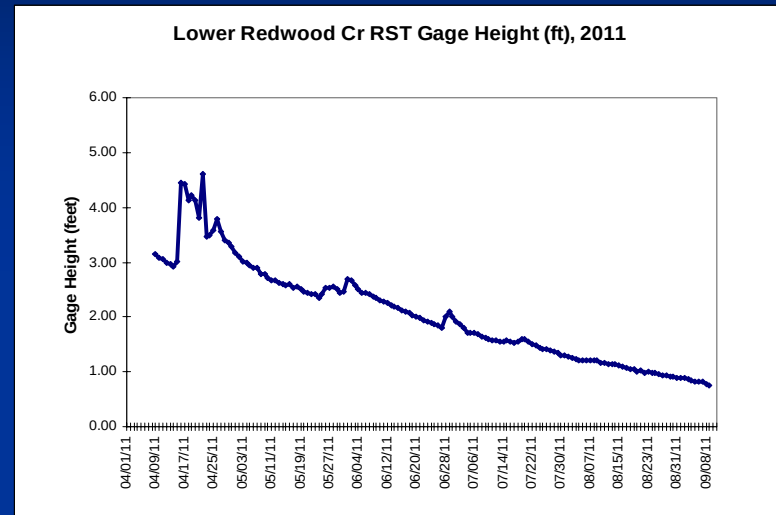


Hydrographs

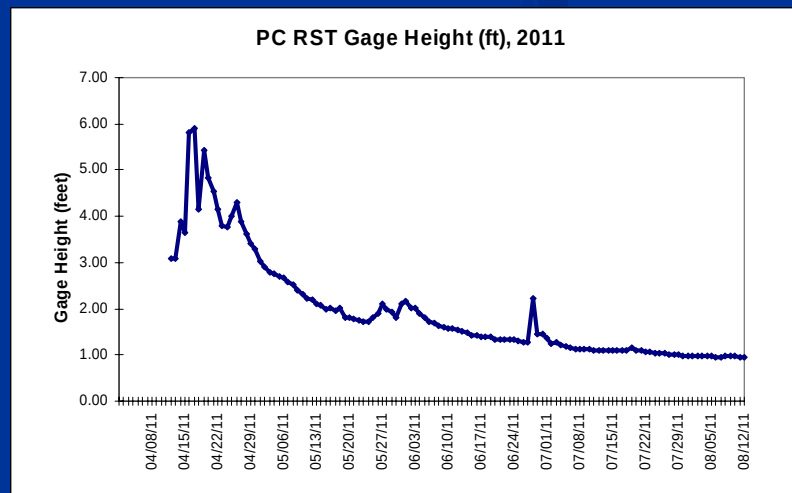
Up. RC



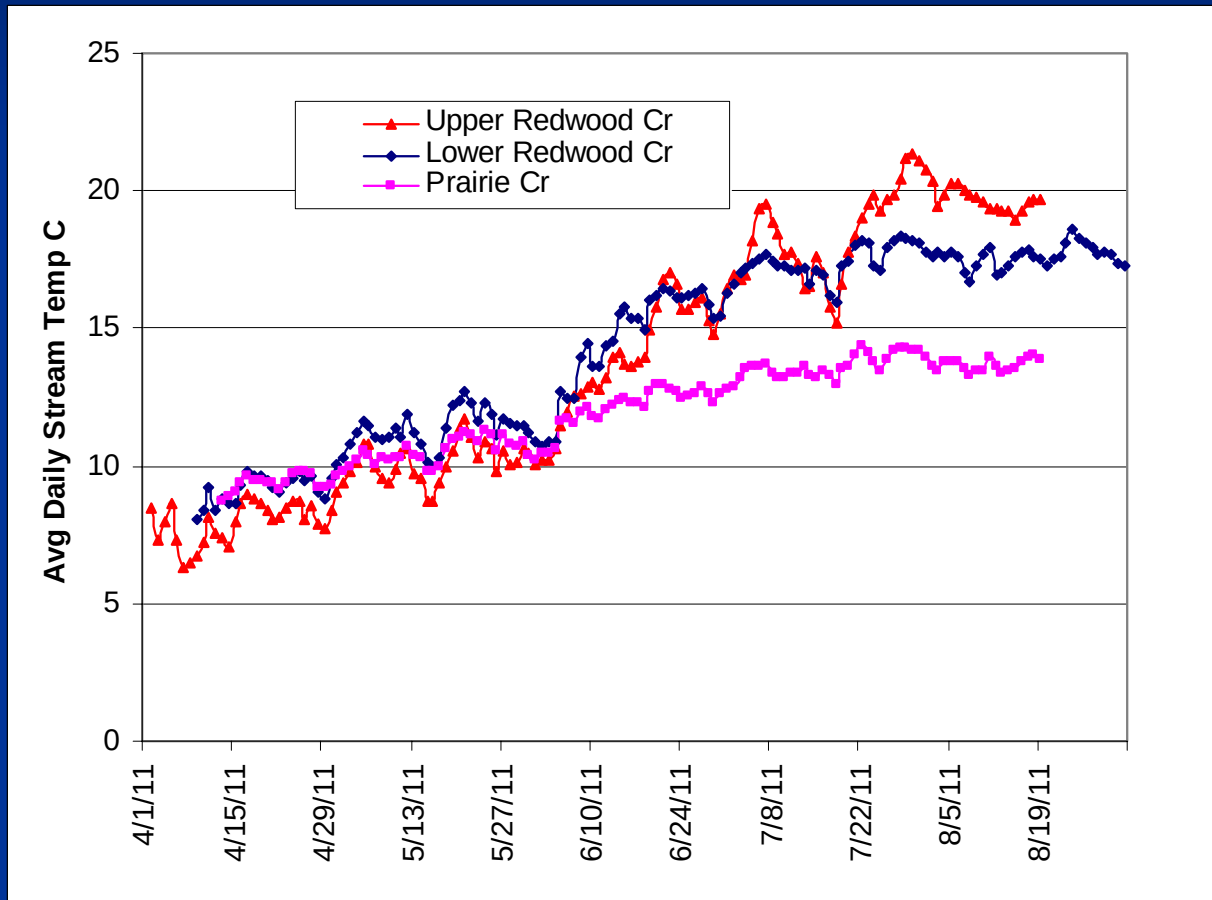
Low. RC



PC



Stream Temperatures



Results

Period of Operation in YR 2011

- Upper RC RST:
 - April 2nd – August 19th (140 d)
 - Missed total of 4 days.
- Lower RC RST:
 - April 9th – September 9th (154 d)
 - Missed total of 5 days.
- Prairie Cr RST:
 - April 12th – Aug 19th (130 d)
 - Missed total of 4 days.

Trap Catches YR 2011

	Upper RC	Lower RC	Prairie Cr
0+ Chinook	47,580	56,706	7,649
1+ Chinook	0	11	2
0+ Steelhead	35,852	9,855	1,223
1+ Steelhead	4,550	2,622	768
2+ Steelhead	381	691	279
Cutthroat Tr.	4	52	1,212
0+ Coho	0	226	198
1+ Coho	0	24	2,449
0+ Pink	1	0	0
Total:	88,368	70,187	13,928

Average Size (FL mm)

	Upper RC	Lower RC	Prairie Cr
0+ Chinook	51	64	65
1+ Chinook	N/A	115	N/A
0+ Steelhead	36	57	44
1+ Steelhead	85	93	99
2+ Steelhead	144	147	149
Cutthroat*	219	191	142
0+ Coho	N/A	68	49
1+ Coho	N/A	107	109

* Smolts only

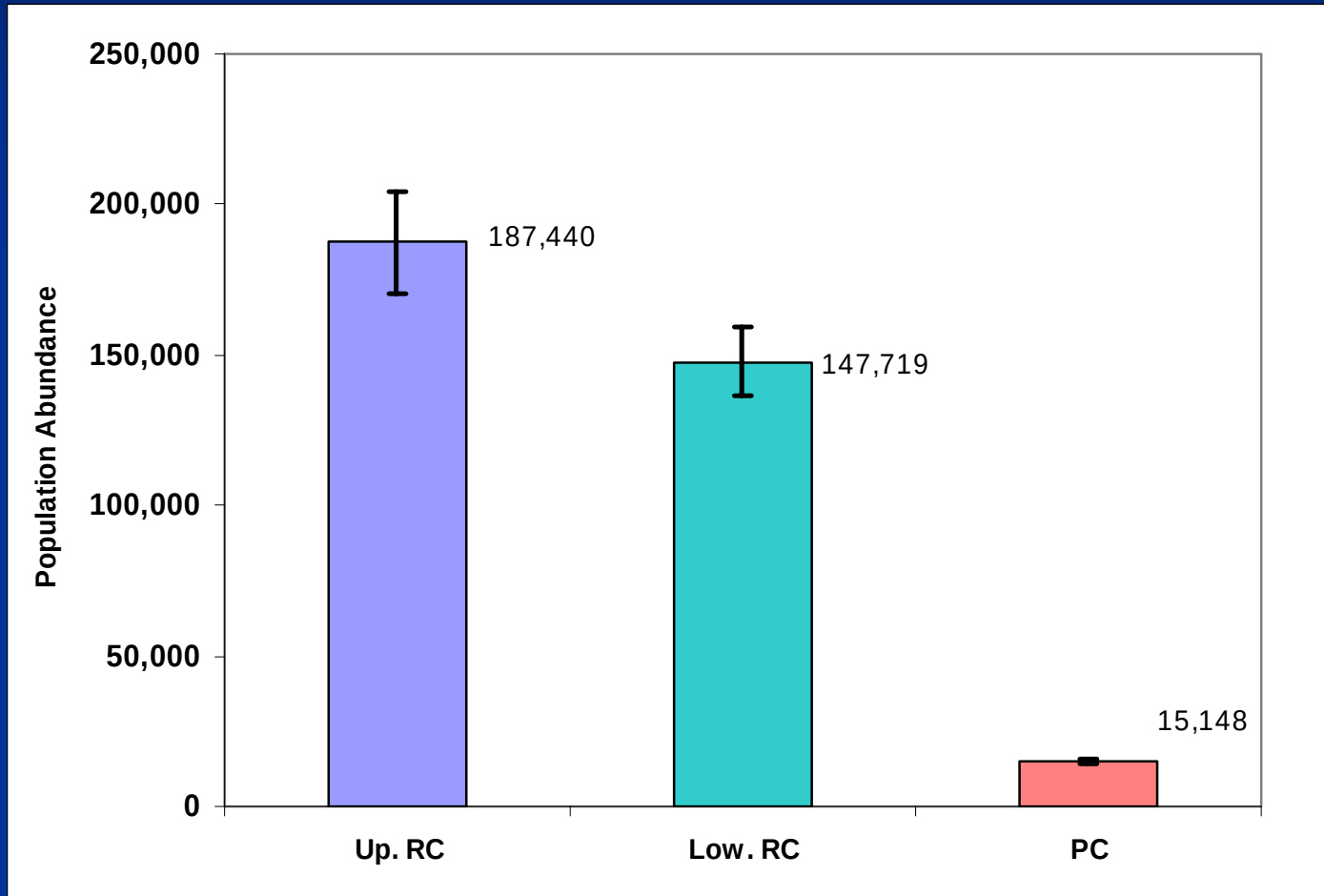
Trapping Efficiencies*

	Upper RC	Lower RC	Prairie Cr
0+ Chinook	30%	35%	50%
1+ Chinook		38%	
1+ Steelhead	21%	14%	23%
2+ Steelhead	17%	9%	22%
0+ Coho		22%	29%
1+ Coho		3%	35%
Cutthroat Tr.	In progress	In progress	35%
*Avg. wkly.			

Population Abundances

YR 2011

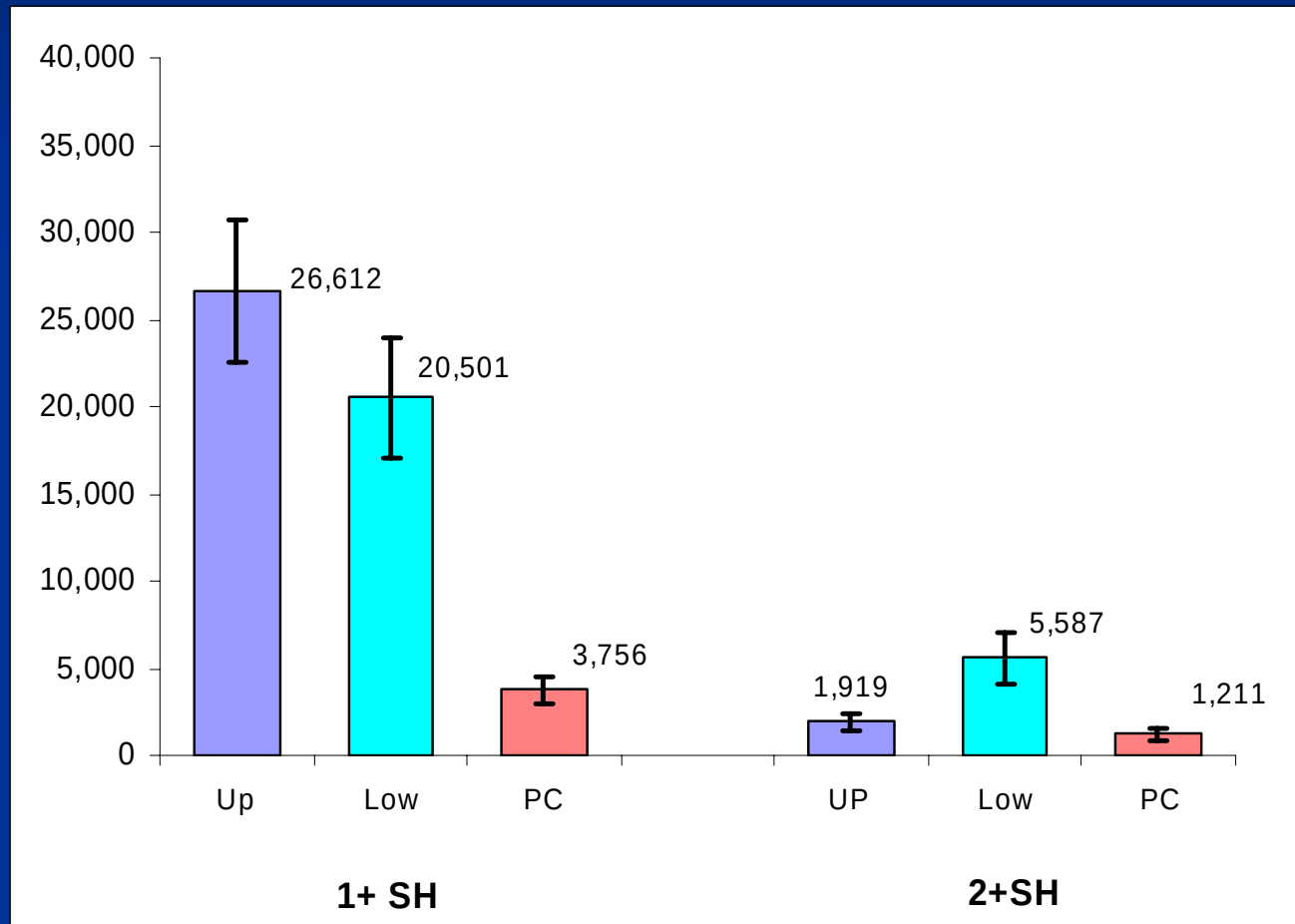
0+ Chinook Salmon



Percent fry and smolt

0+ Chinook	Upper RC	Lower RC	Prairie Cr
% Fry	62	19	8
% Smolt	38	81	92

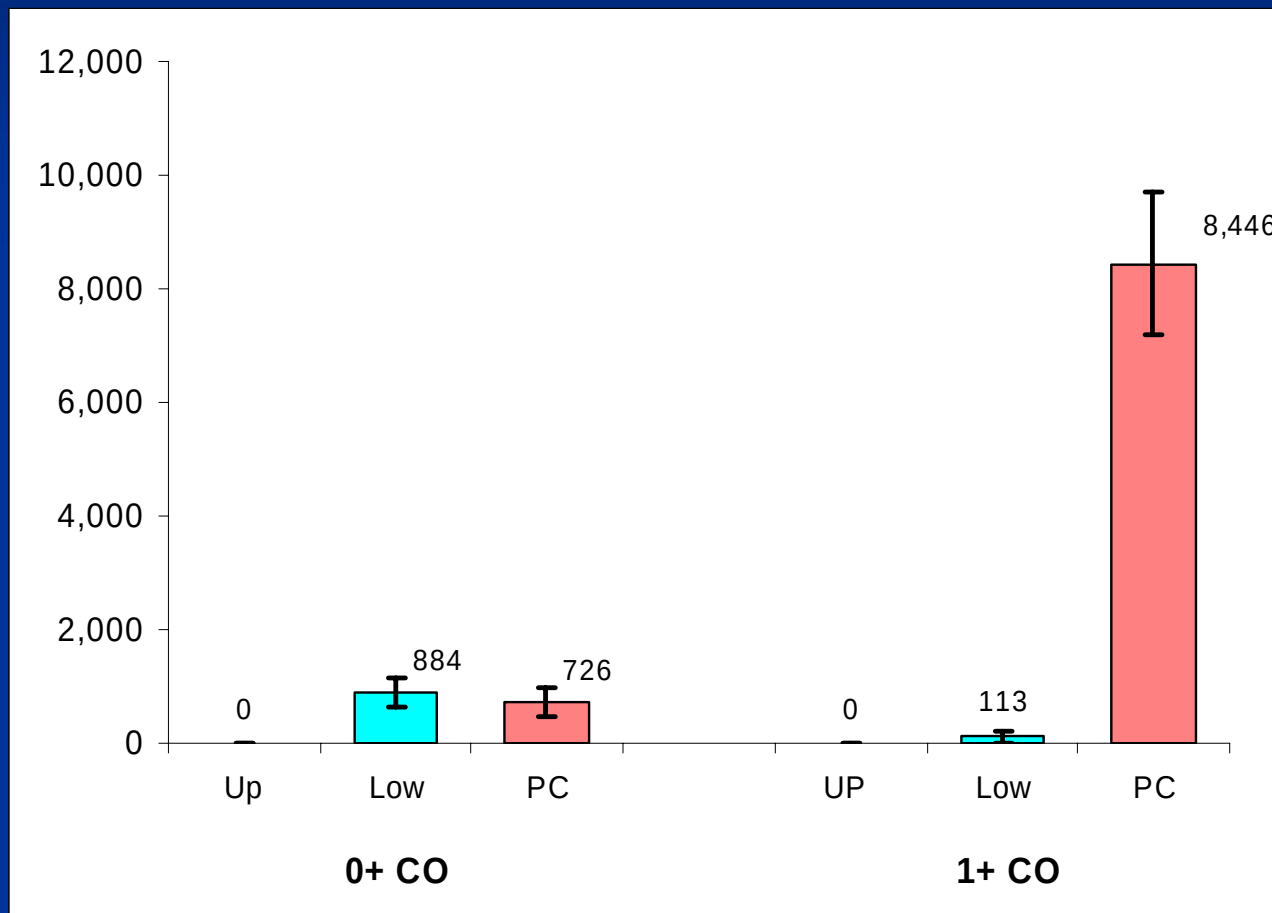
1+ and 2+ Steelhead Trout



1+ SH : 2+ SH

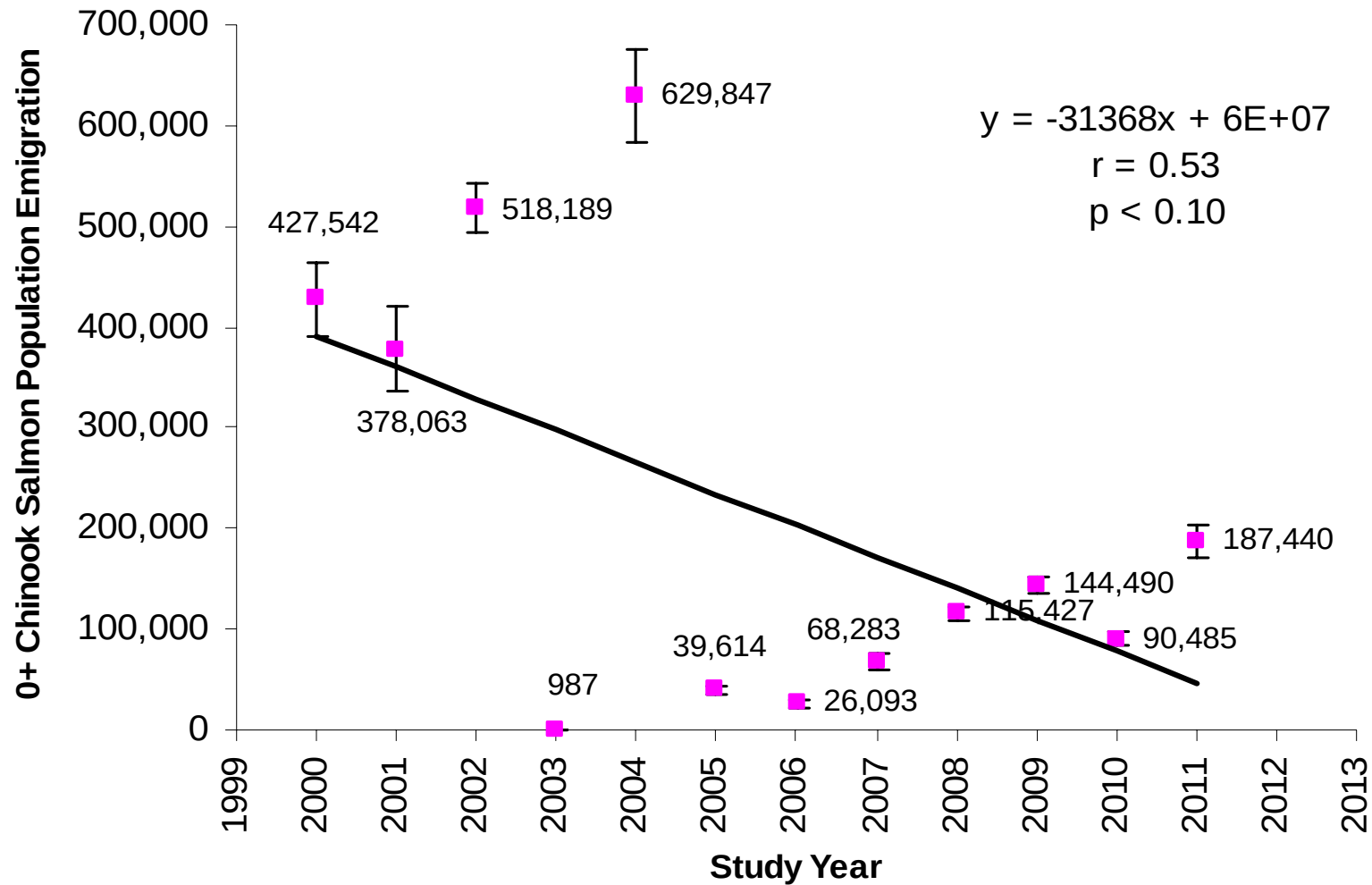
Upper RC	Lower RC	Prairie Cr
14:1	4:1	3:1

0+ and 1+ Coho Salmon

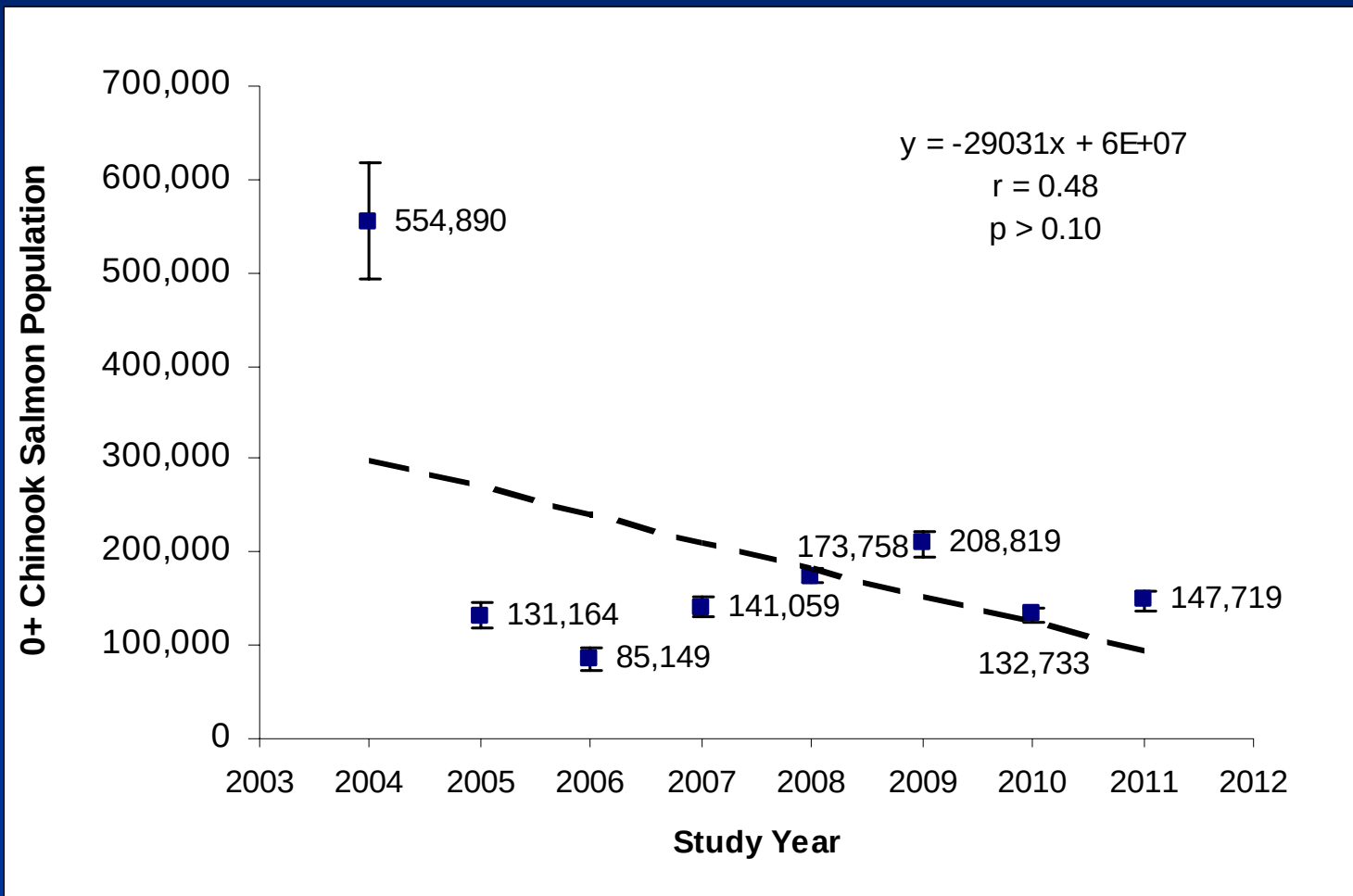


Trend Analysis in Upper and Lower RC

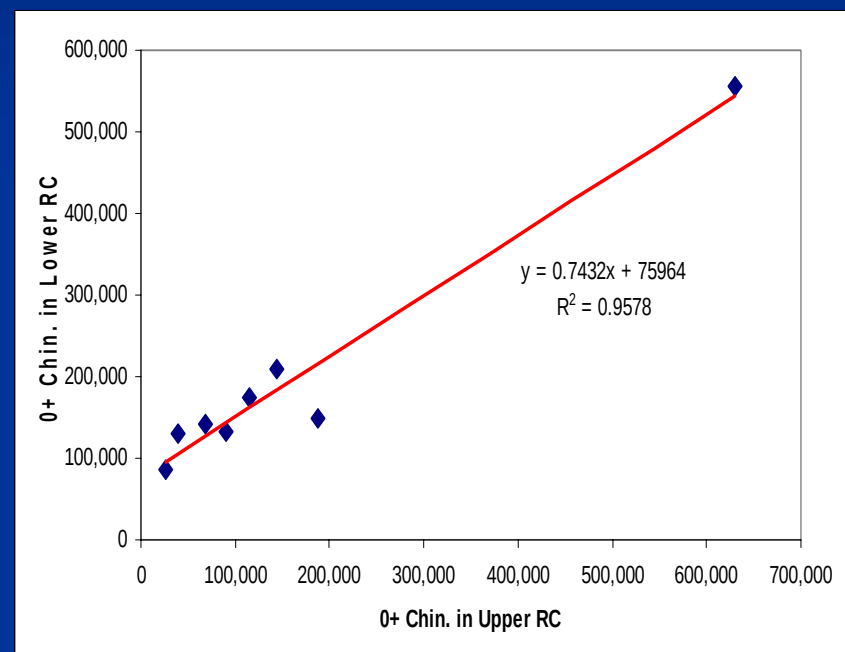
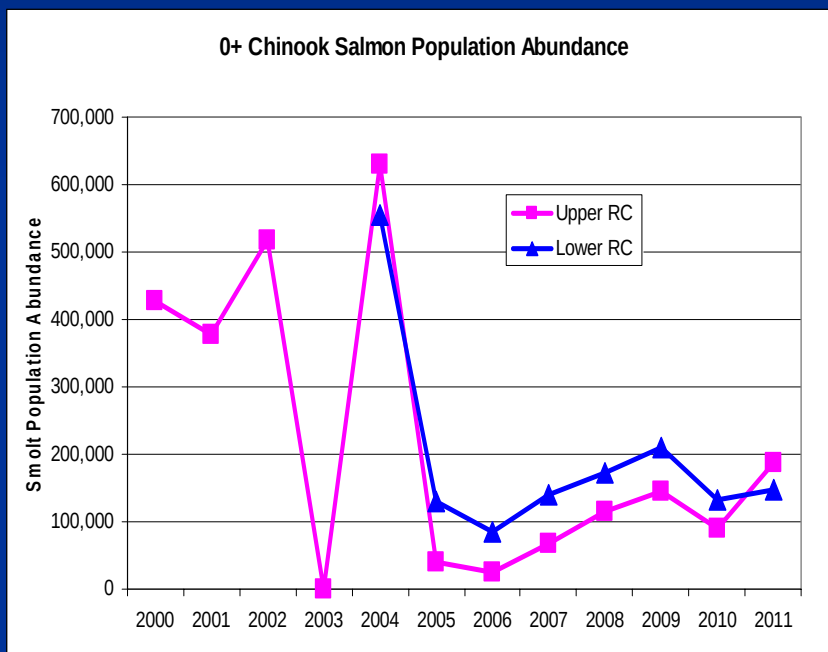
0+ Chinook Salmon: upper RC



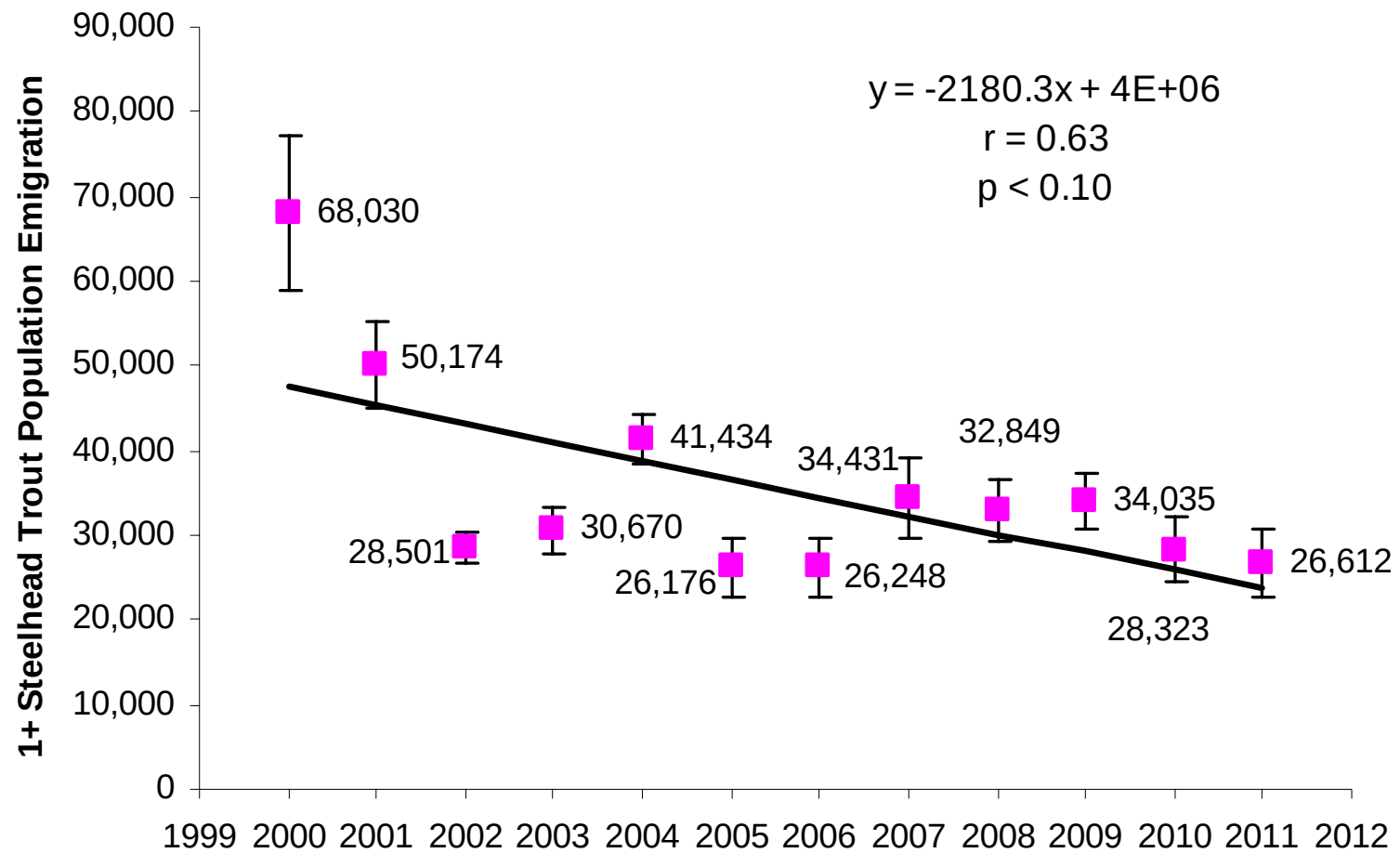
0+ Chinook: lower RC



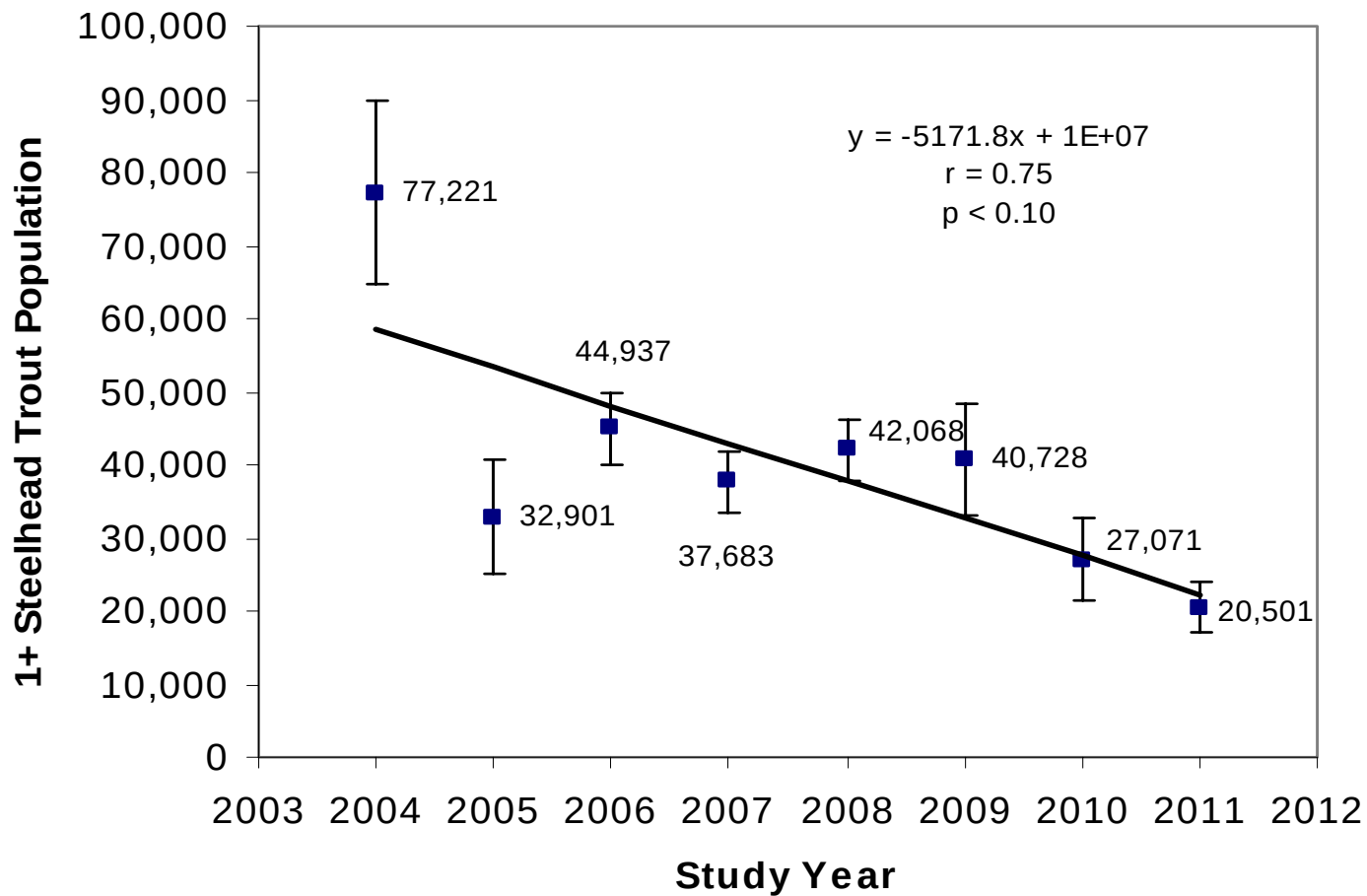
0+ Chinook Population



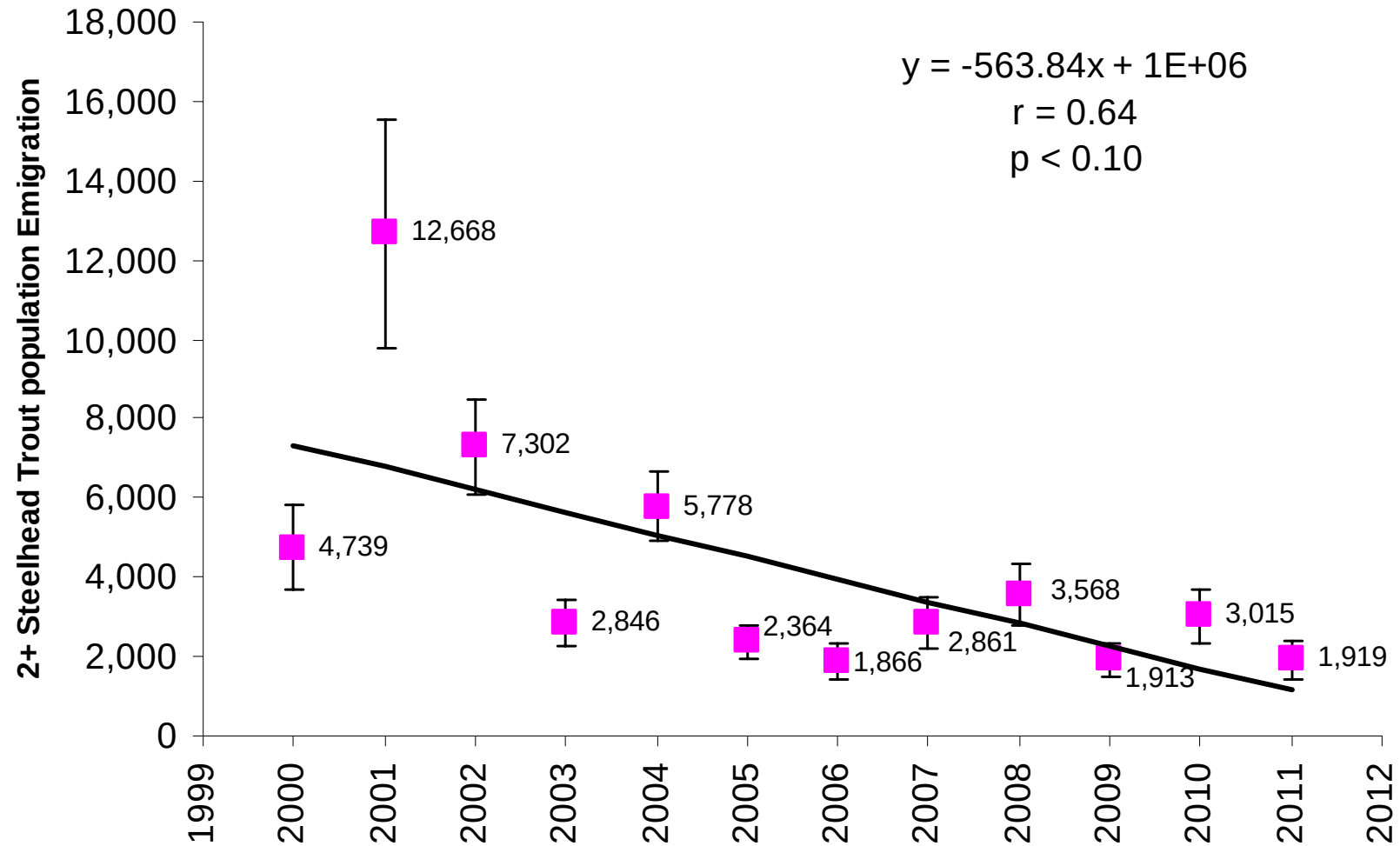
1+ Steelhead: upper RC



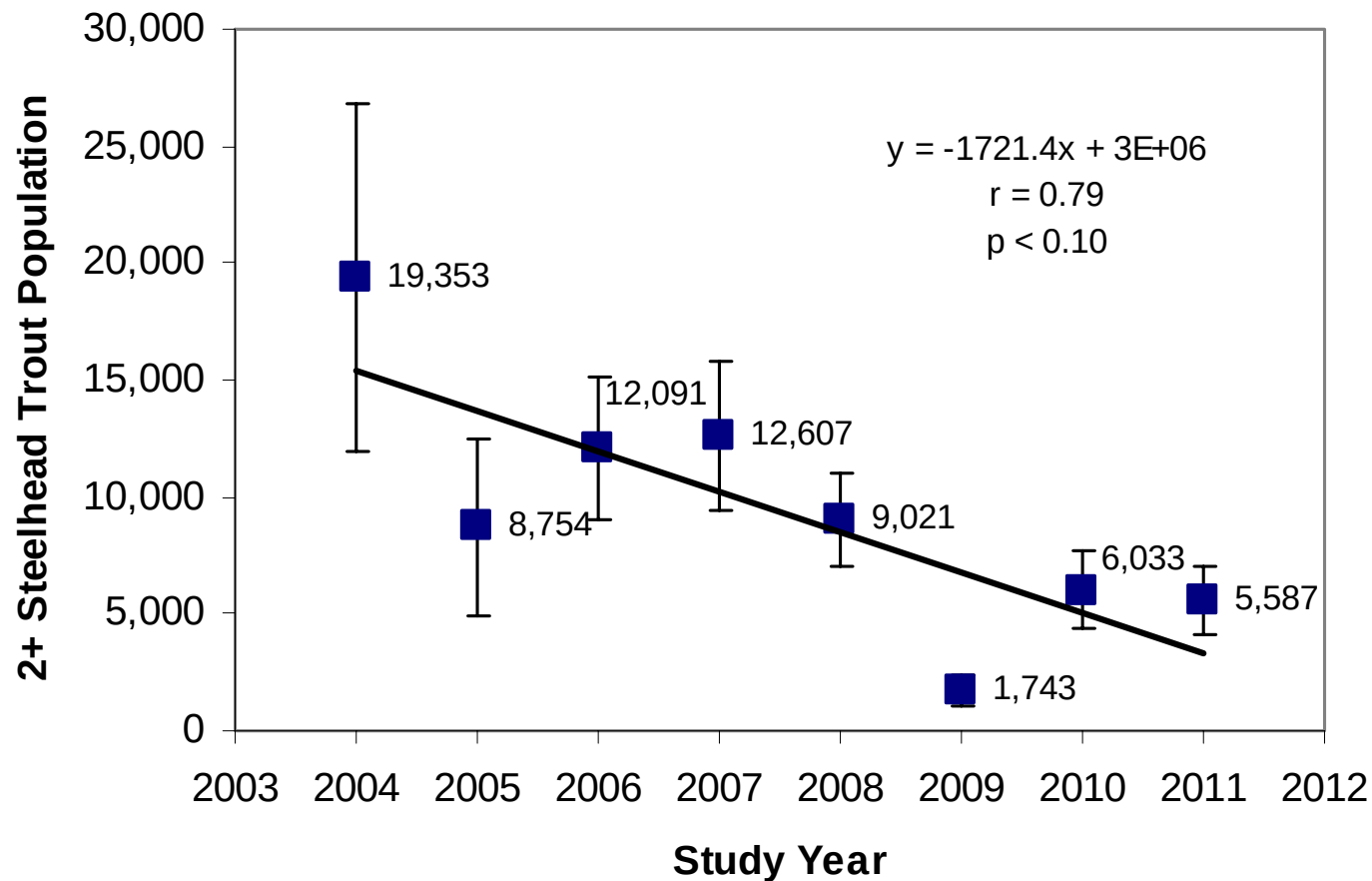
1+ Steelhead: lower RC



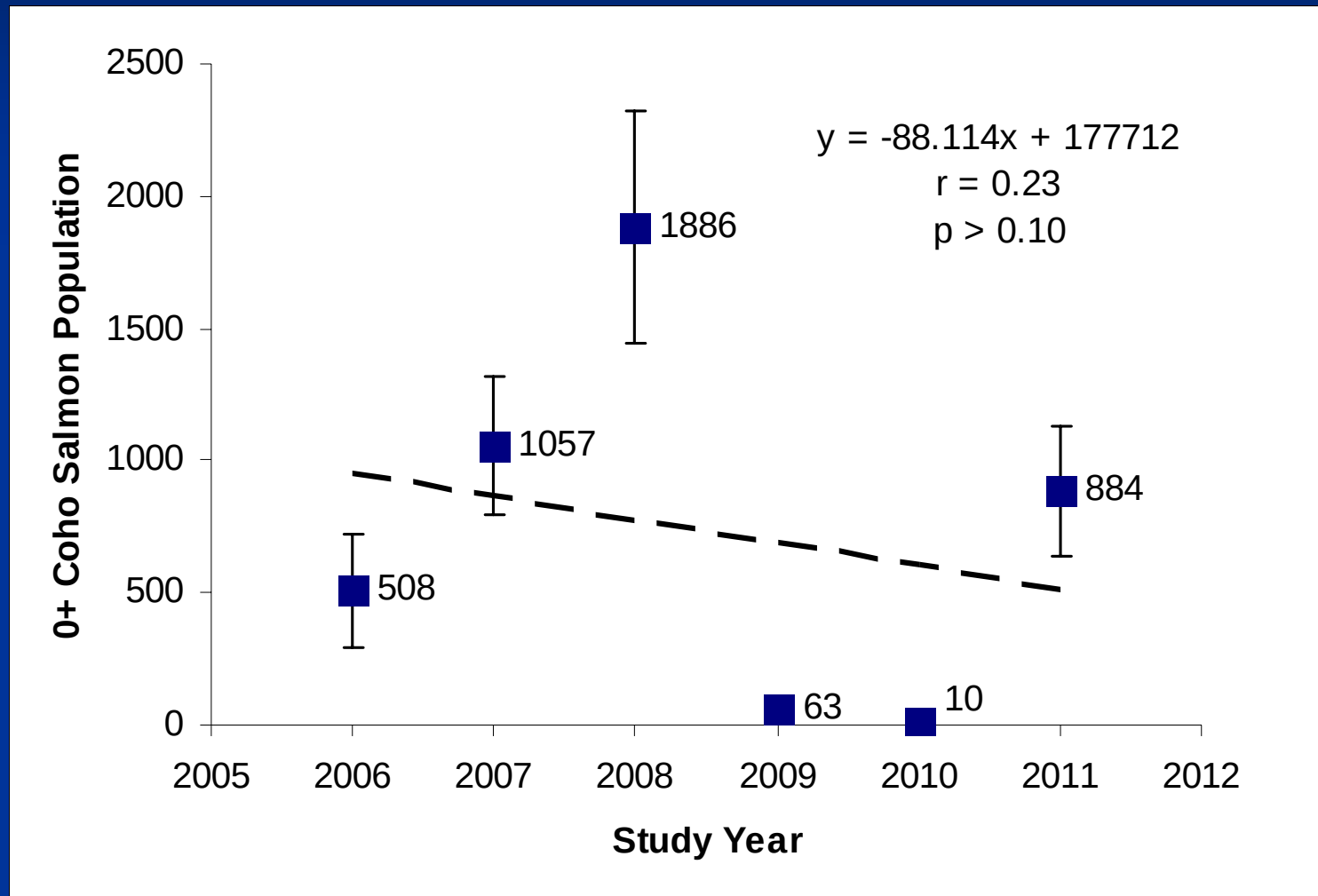
2+ Steelhead Trout: upper RC



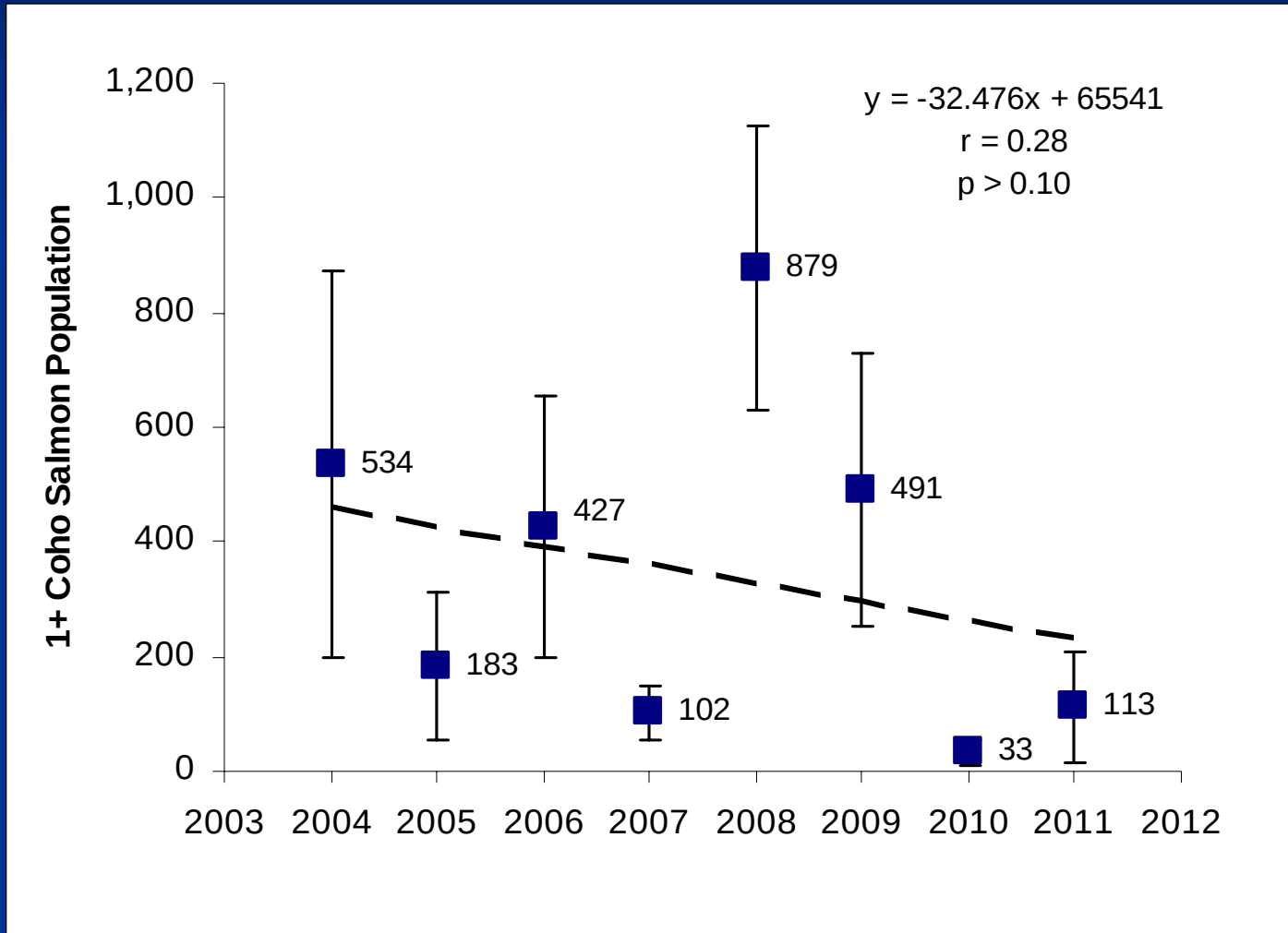
2+ Steelhead Trout: lower RC



0+ Coho Salmon: lower RC



1+ Coho Salmon: lower RC



Conclusions

- We successfully determined population abundances for each species at age in YR 2011.
- More 0+ Chinook salmon emigrated from upper RC compared to lower RC and PC in YR 2011.
 - Higher population of fry in upper basin supports our hypothesis that the mid to upper basin is important for adult Chinook salmon reproduction.
 - Data indicates that abundance in lower Redwood Cr is strongly tied to abundance in upper RC, and whether or not there were flood flows in upper Redwood Cr.

0+ Chinook

- 12 yr trend in abundance in upper RC is significantly negative, and flood type flows have a significant, negative impact upon production.
- 7 yr trend in abundance in lower RC is significantly negative when flood type flows were added to the trend model.

0+ Steelhead Trout

- Far more 0+ steelhead trout were captured in upper RC in YR 2011.
- Similar to 0+ Chinook, the mid to upper basin is very important for adult steelhead trout reproduction.
- Some of these fish will move to lower RC based upon 4 years of experiments.

1+ Steelhead Trout

- Higher numbers emigrated from upper RC compared to lower RC and PC.
- Highest ratio of 1+SH : 2+SH in upper RC (14:1), nearly equal ratio for lower RC (4:1) and PC (3:1).
 - High ratio may be influenced by habitat quality.

1+SH

- Trends in abundance in upper RC (n = 12 yrs) and lower RC (n = 8 yrs) were significantly negative.

2+ Steelhead Trout

- Least numerous of steelhead smolts in upper RC, lower RC, and PC.
- Highest numbers emigrated through lower RC in YR 2011.
 - Surprise that abundance in PC was only 38% less than abundance in upper RC.

2+SH

- Trends in abundance in upper RC (n = 12 yrs) and lower RC (n = 8 yrs) were significantly negative.
- Large numbers of smolts emigrating at age-1 may limit the number that emigrate at age-2.
 - Could be due to degraded habitat quality.

0+ Coho Salmon

- Zero were captured in upper RC, and nearly equal numbers were captured in lower RC ($n = 226$) and PC ($n = 198$) in YR 2011.
- Population abundance in lower RC ($N = 884$) and PC ($N = 726$) were nearly the same in YR 2011.
- Six year trend in abundance in lower RC was non-significantly negative.

1+ Coho Salmon

- Zero were captured in upper RC, and exponentially more were captured in PC compared to lower RC.
- Population abundance in YR 2011 was exponentially higher in PC ($N = 8,446$) compared to lower RC ($N = 113$).
 - Obviously PC is a stronghold for coho salmon abundance in the Redwood Cr basin.
- 8 yr trend in population abundance in lower RC was non-significantly negative.

Future Work

- Relate smolt numbers to adult numbers and redd counts.
- Continue the smolt work forever.....
- Install a DIDSON at the upper trap site!

Thank You!

