Spill–Transport in Low Flow Years

ODFW Presentation to ISAB
March 12, 2010

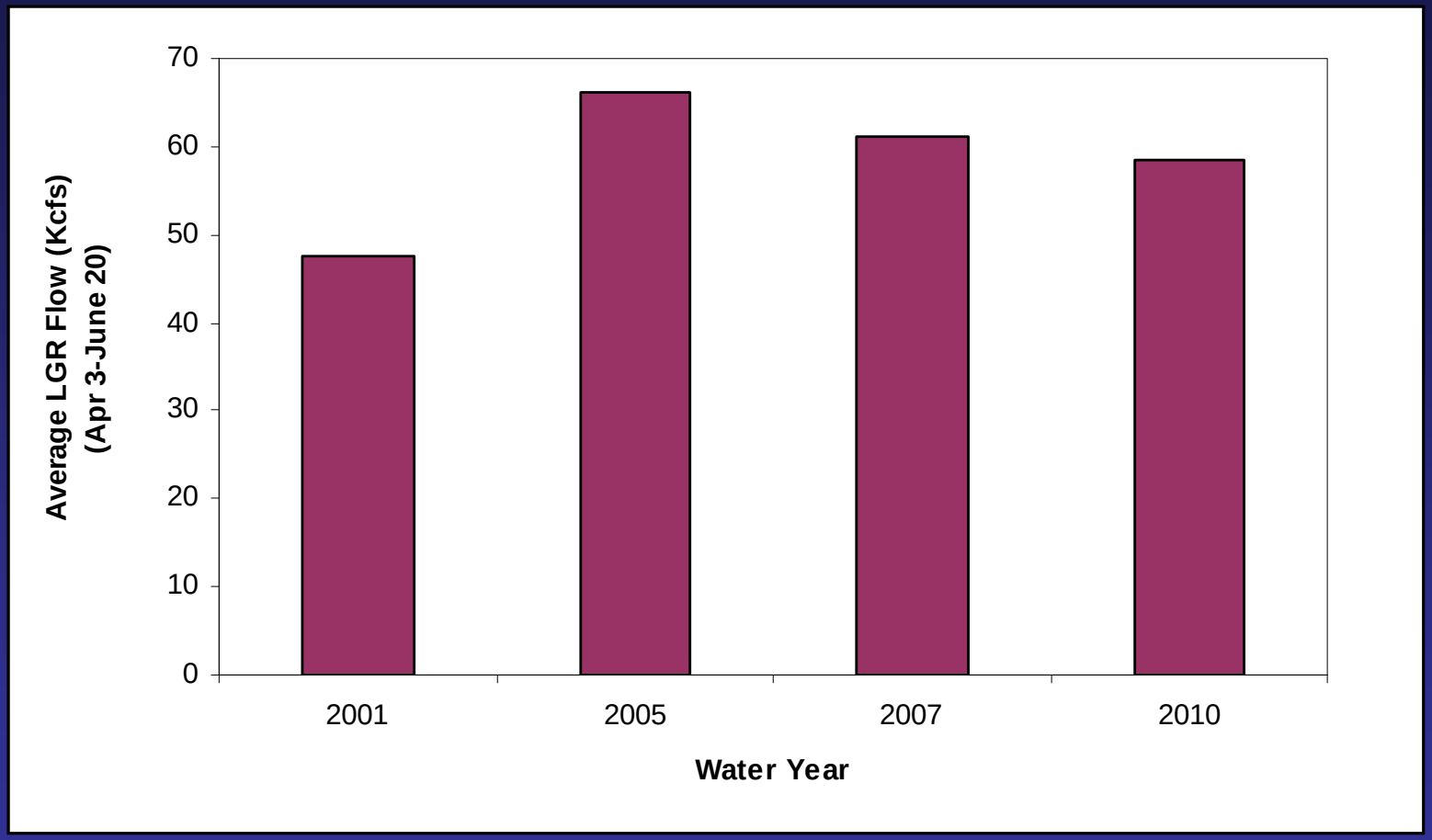
Outline

- Background context
- What have we learned about spill in low flow years?
- Mixed stock effects and unintended consequences
- Research and experimental management opportunities
- Balancing risk in low flow years

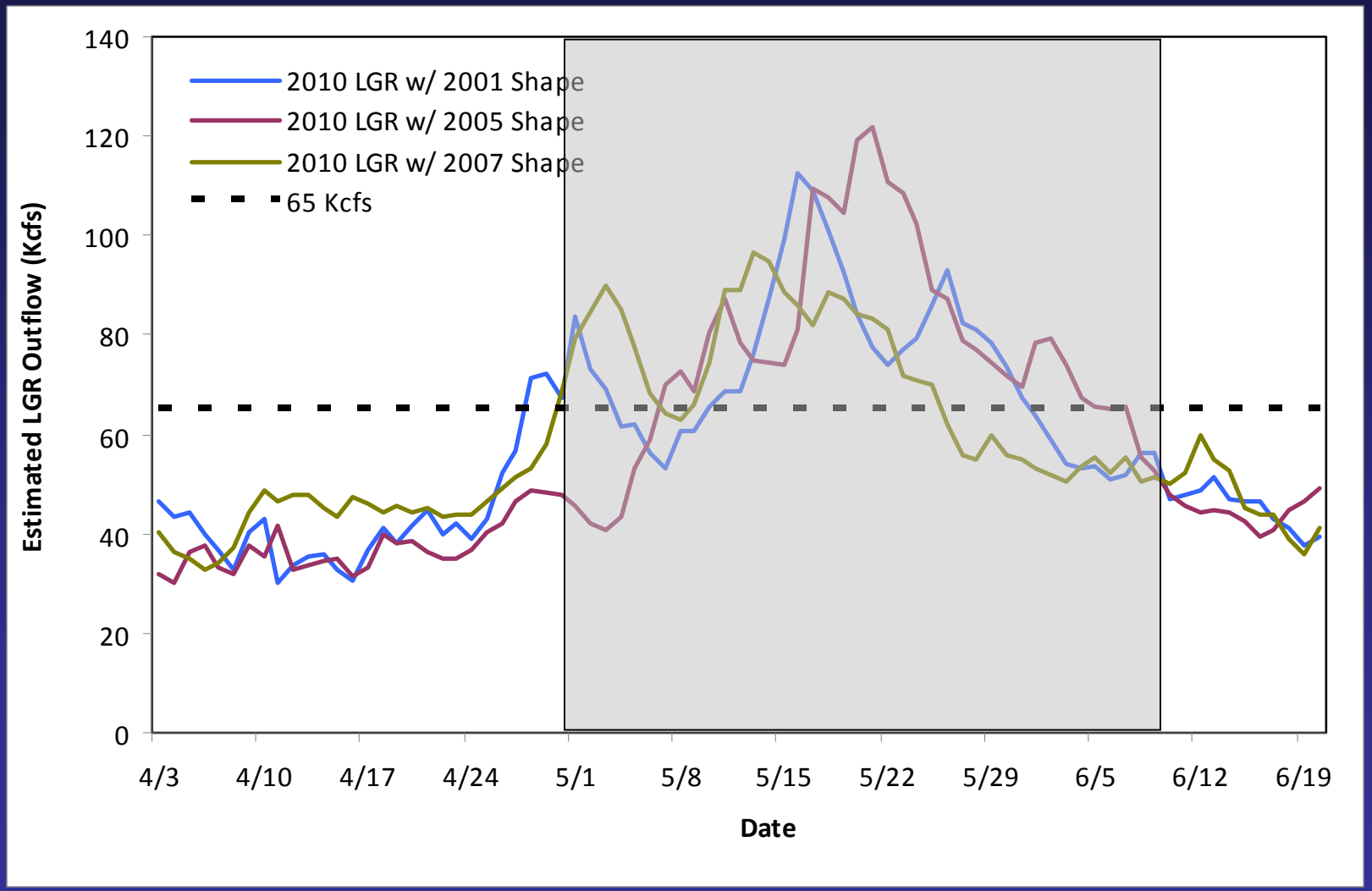
Background Context

- **2008: NOAA proposal to eliminate spill at collector dams in May and early June**
  - **ISAB: No**
    - **Continue spread the risk when river allows**
    - **Get more info and learn**
    - **Use spill as the default operation against which others are measured**
- **2010: NOAA back again w/similar question for low flow year**
  - **Max transport May-early June, no spill at collector dams**
  - **No consideration of augmenting flow or using spill as a tool to mitigate for low flow**

Average Seasonal LGR Flows in 2001, 2005, 2007, and Estimated 2010



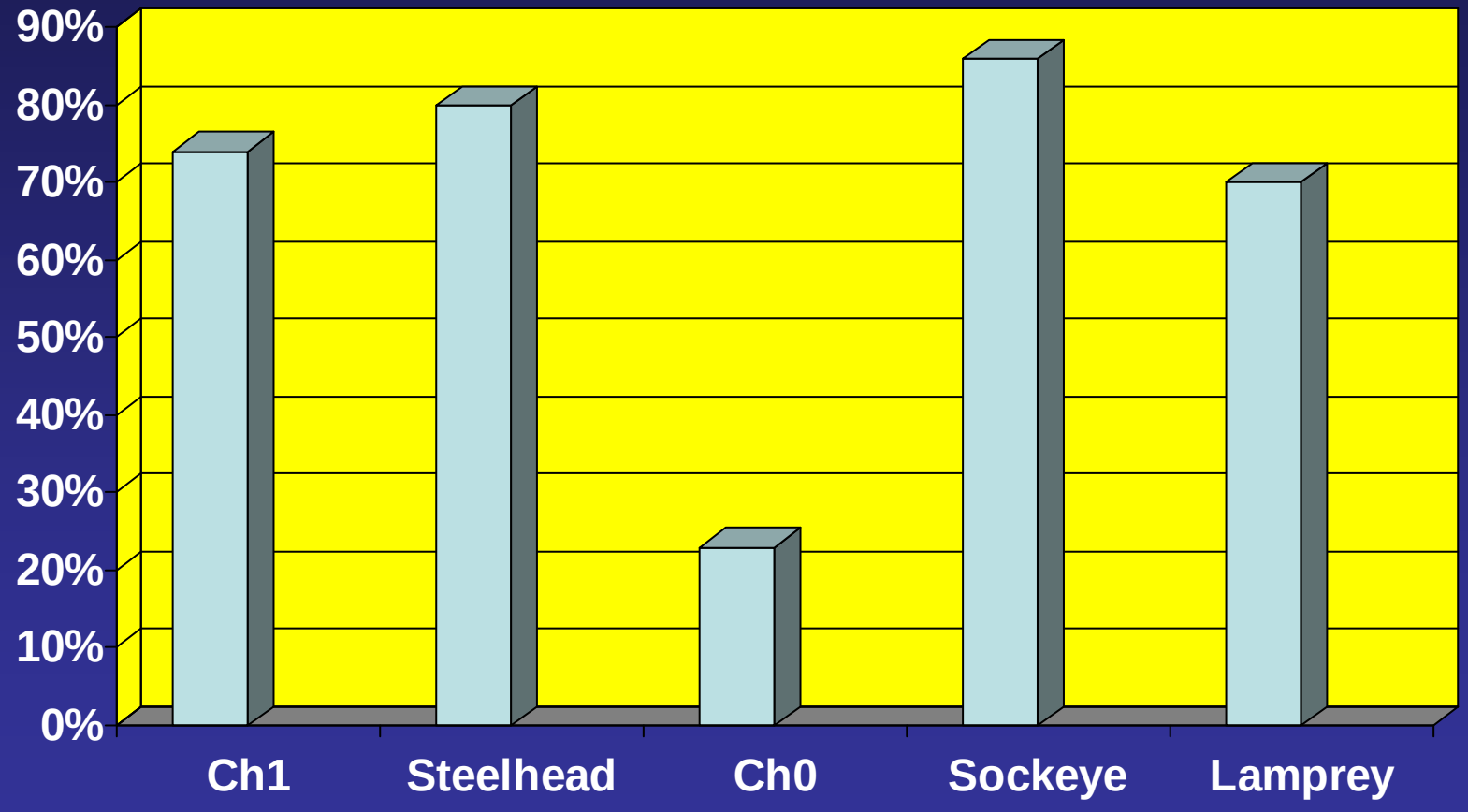
Estimated Hydrograph of LGR Flows Assuming 2001, 2005, and 2007 Runoff Shapes



Estimated Seasonal Average Outflows for 2010 are 58.5 Kcfs for all three scenarios

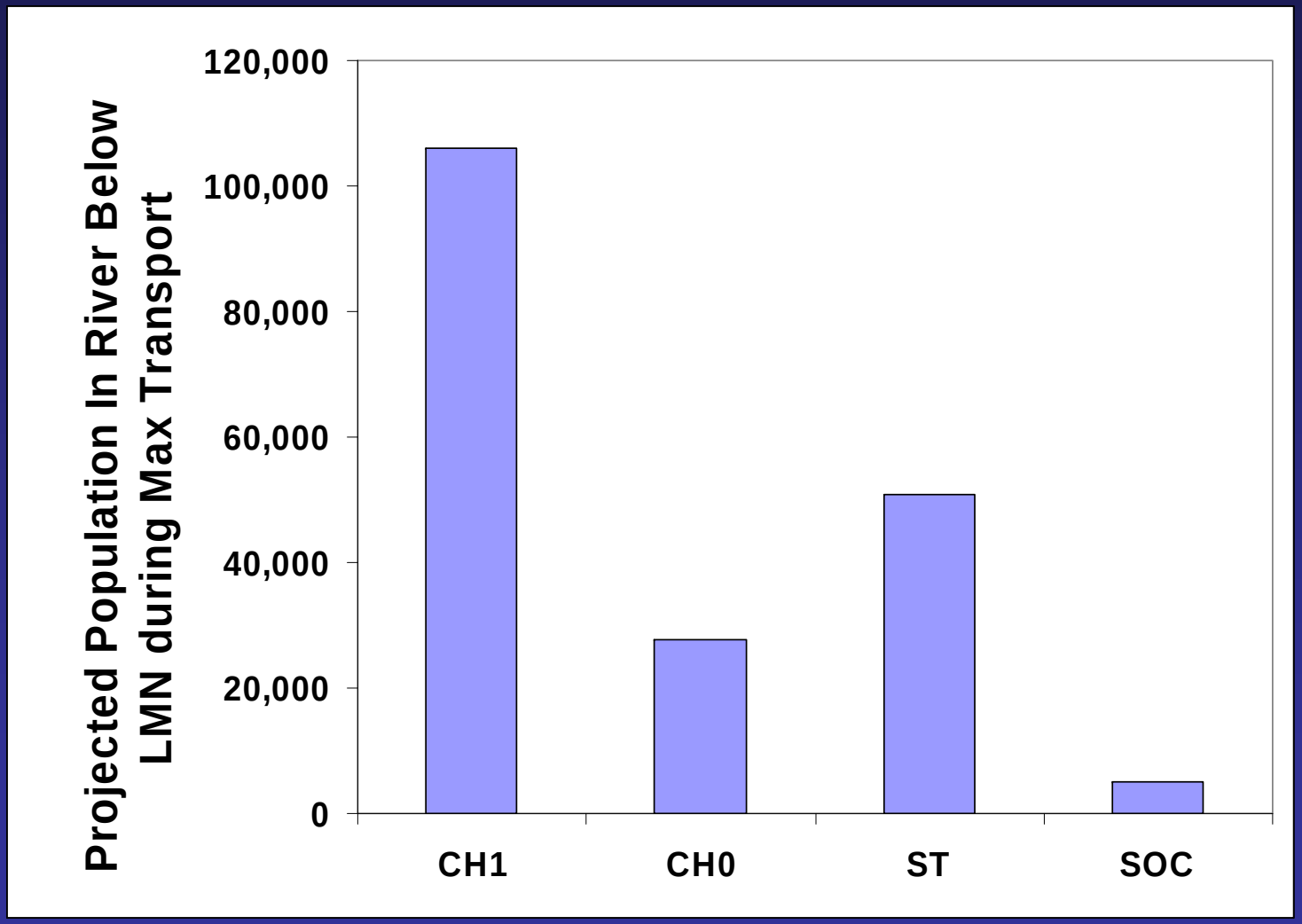
Estimated passage during proposed max transport and no spill period

(based on 1998-2009 passage timing)

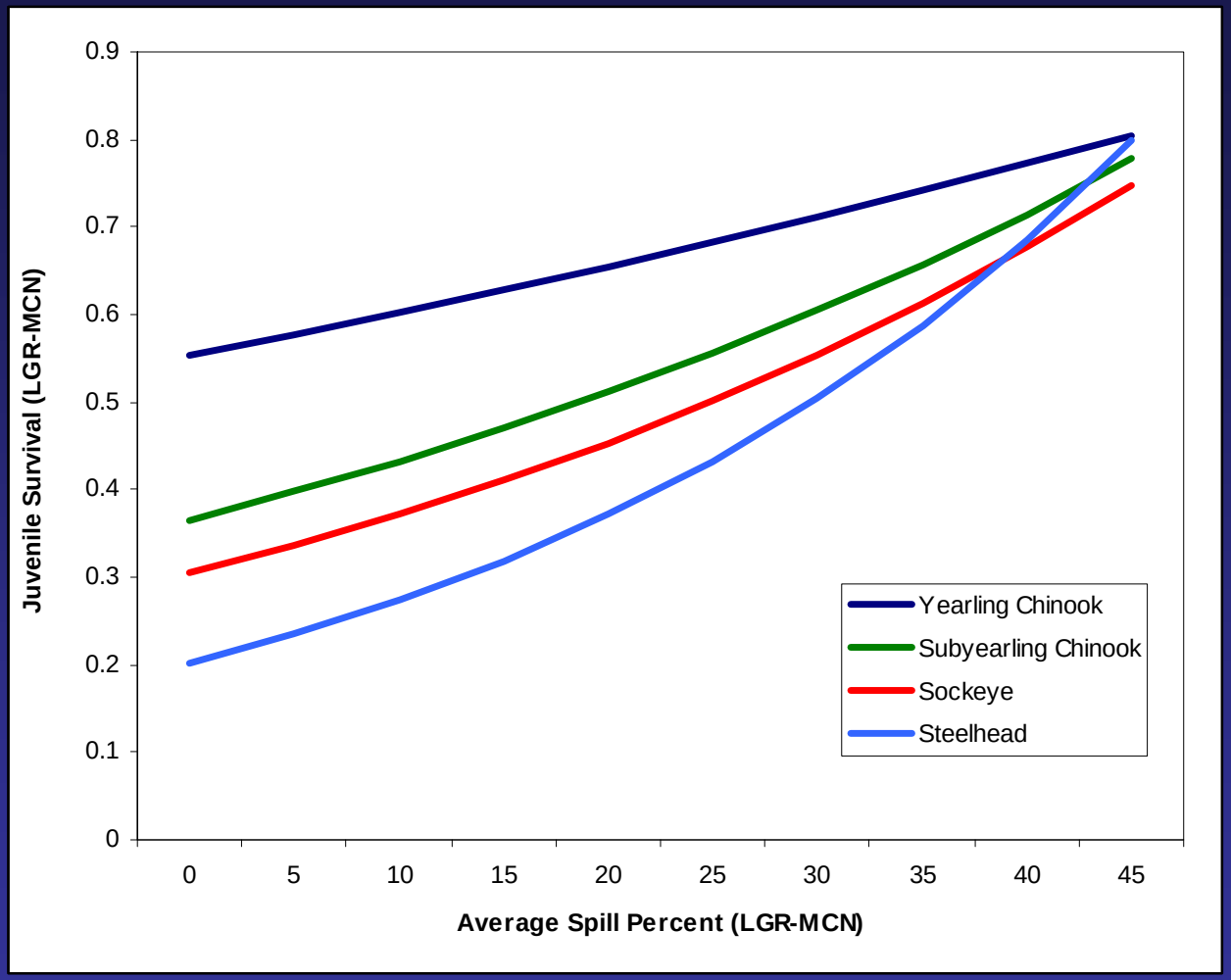


Estimated fish in-river during max transport window

(based on NOAA projections of 2009 populations arriving at LGR and detection probabilities from 2001)



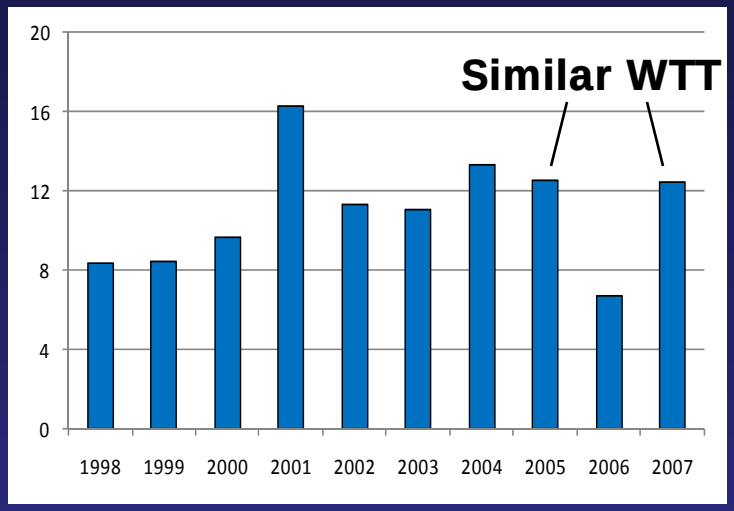
Average Percent Spill and Juvenile Reach Survival (LGR-MCN) for Snake River Steelhead, Yearling Chinook, Subyearling Chinook, and Sockeye



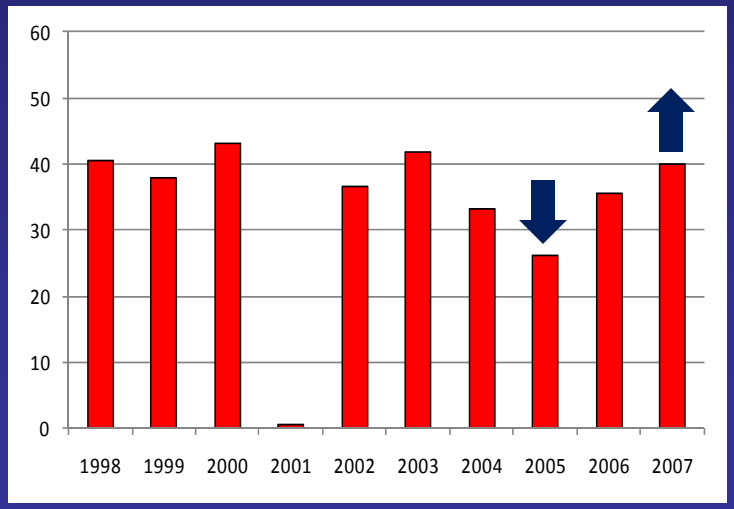
Sockeye (1998-2009)	Steelhead (1998-2008)	Yearling Chinook (1998-2008)	Subyearling Chinook (1998-2009)
ln y = 0.02x – 1.191	ln y = 0.0306x – 1.6017	ln y = 0.0083x – 0.5901	ln y = 0.0168x – 1.0074
Adj. R^2 = 0.32	Adj. R^2 = 0.65	Adj. R^2 = 0.60	Adj. R^2 = 0.65
p = 0.04	p = 0.0000	p = 0.0000	p = 0.0000

Lower Granite to McNary Reach

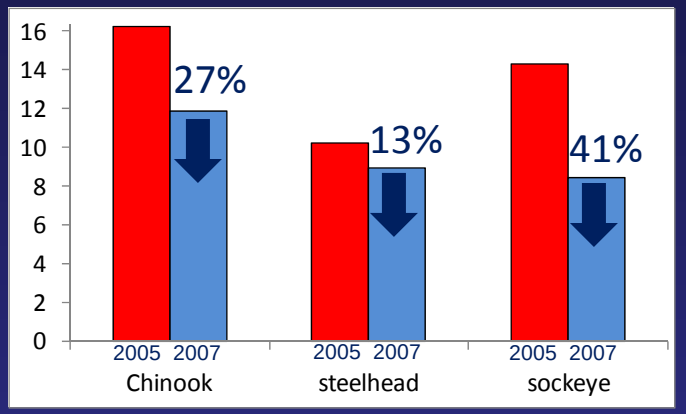
WTT (Days)



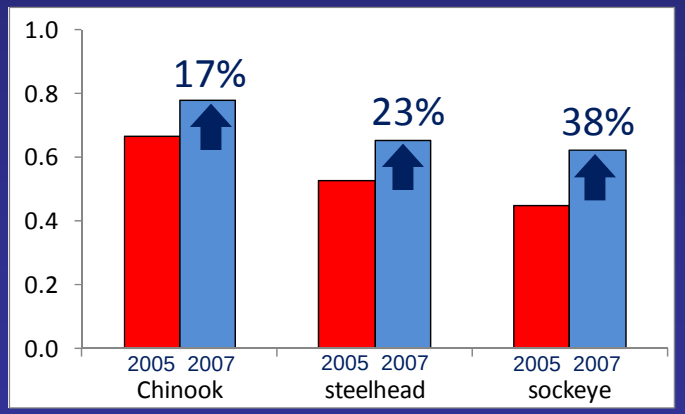
Spill (%)



Smolt Travel Time



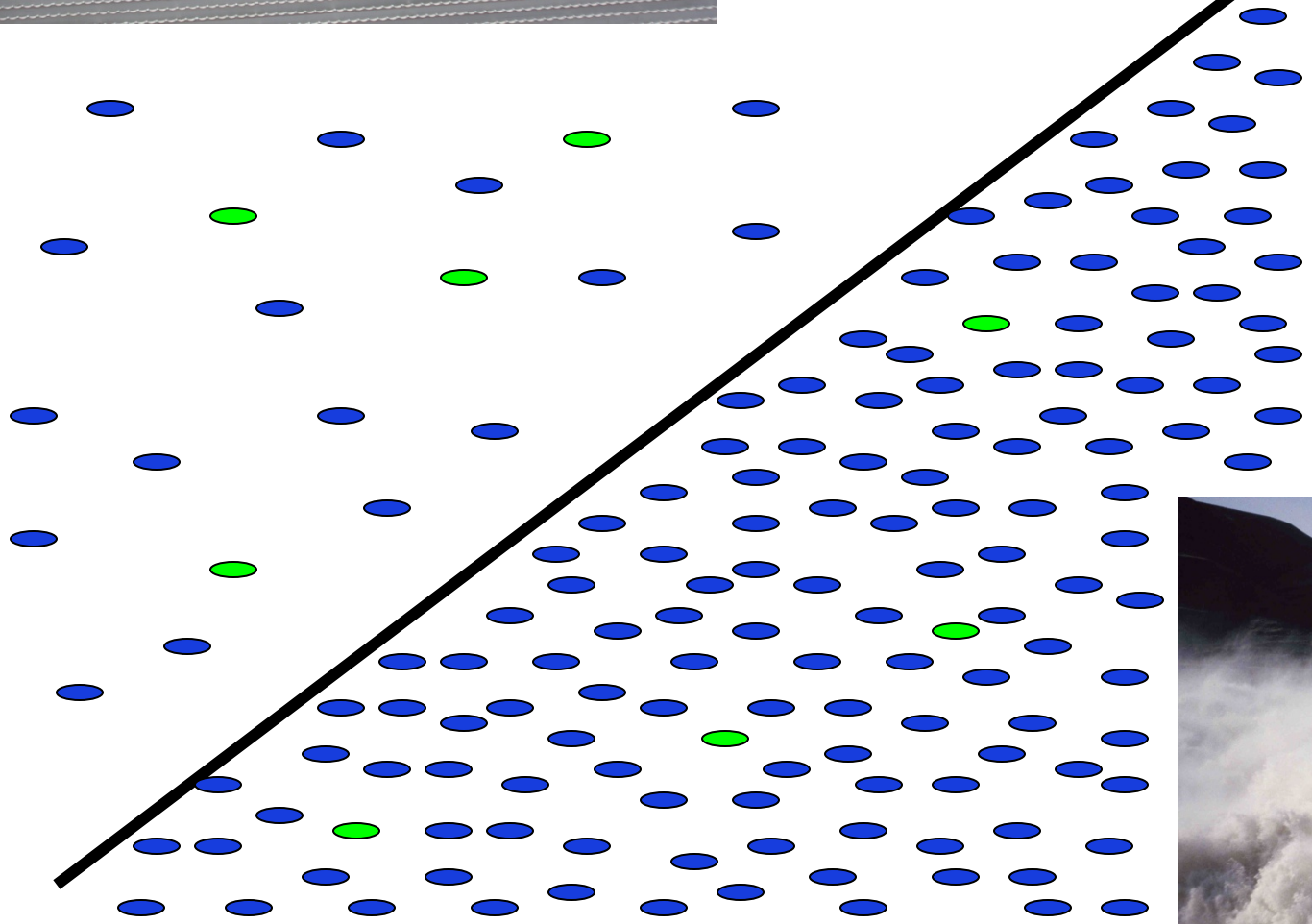
Smolt Survival



Other Unintended Consequences:

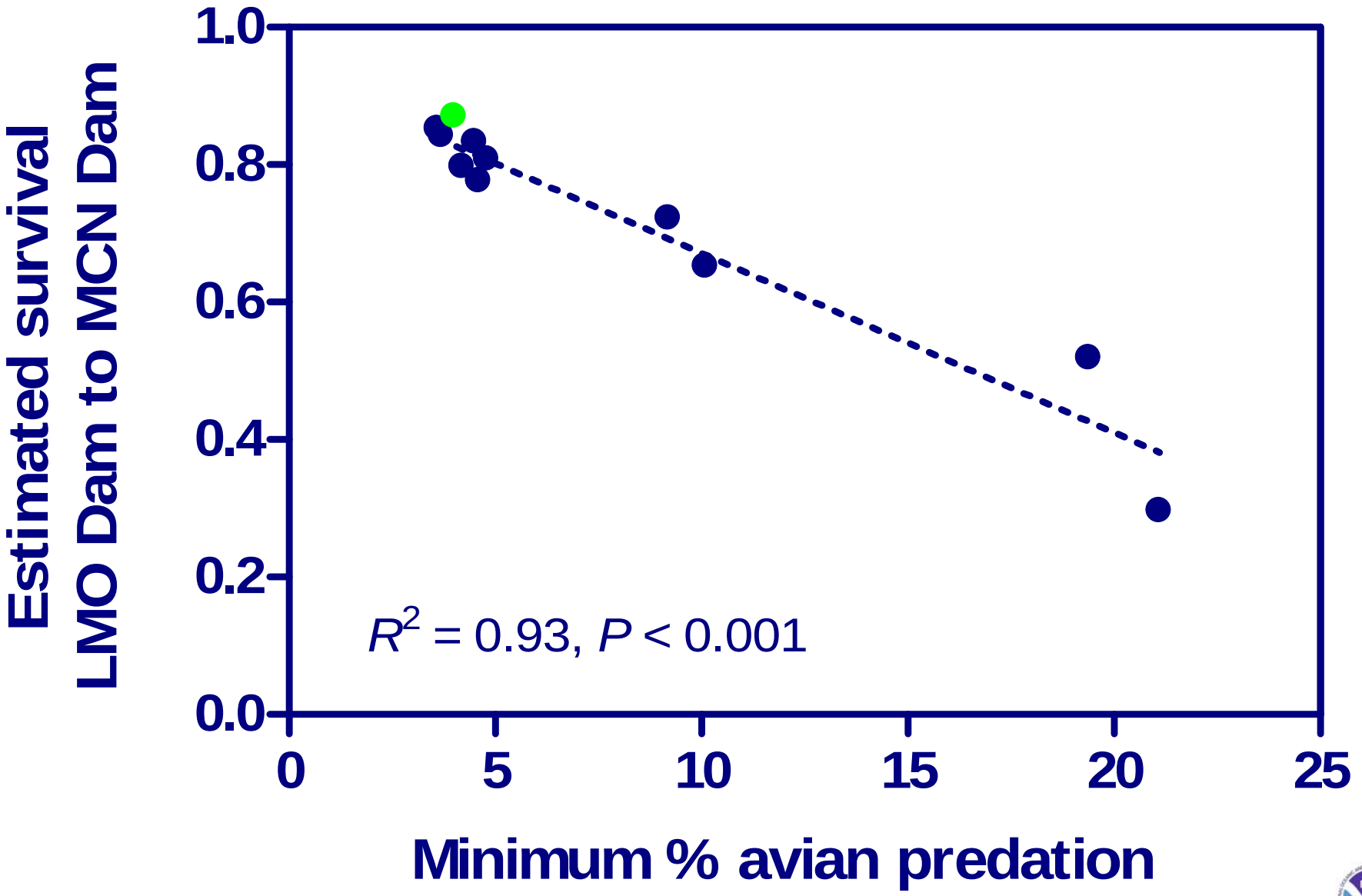
Elevated predation rates for all in-river migrants

Maximum transport

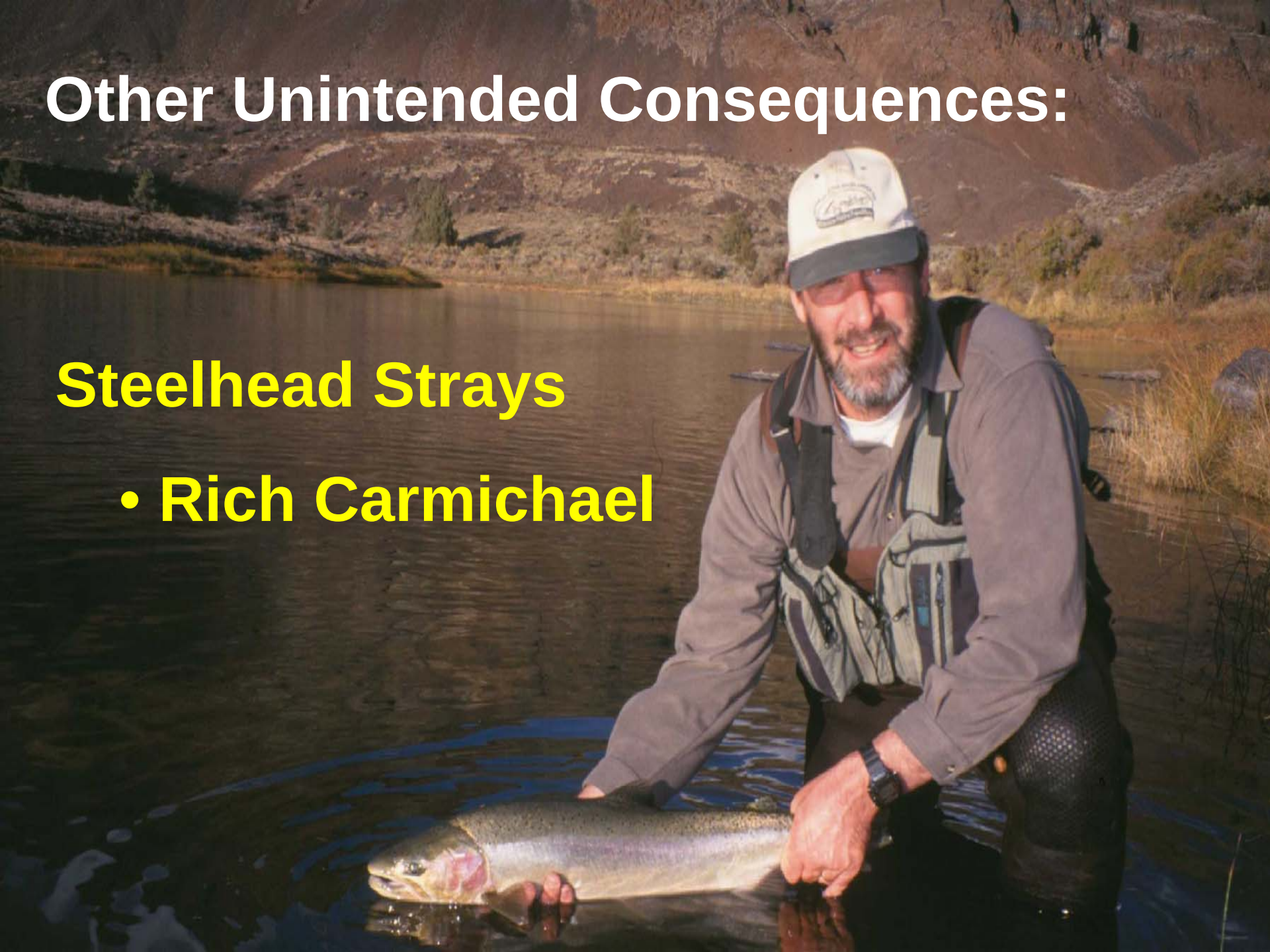


Transport with spill

Steelhead


Estimated survival
LMO Dam to MCN Dam
1.0
0.8
0.6
0.4
0.2
0.0
0
5
10
15
20
25
$R^2 = 0.93$, $P < 0.001$
Minimum % avian predation

Other Unintended Consequences:



Steelhead Strays

- Rich Carmichael

Other Unintended Consequences:

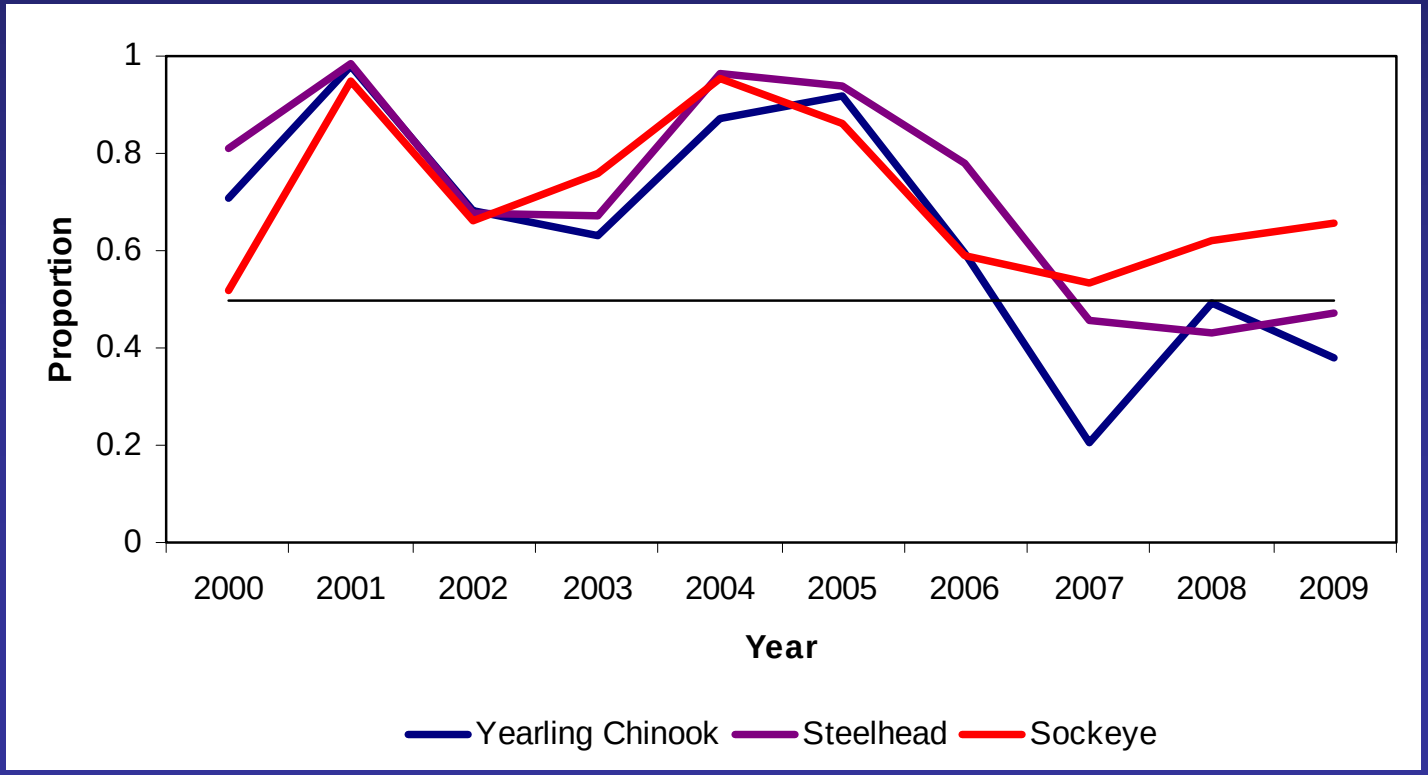
- 70% lamprey migrating during no spill window

Research and Experimental Management Context

- ISAB recommendations
- Lack of complete returns
- Inability to tease out within season effects on true in-river migrants
- Many yrs of max transport
- Only one yr of spill w/ low flow (2007)
  - Much better results than expected
- Key opportunity: see if 2007 results hold true
- Key opportunity: spill mitigating low flow

Summary

- **2010 tough year for fish**
- **Risky times mandate diverse portfolio**
  - **ISAB recommendation: spill and transport**

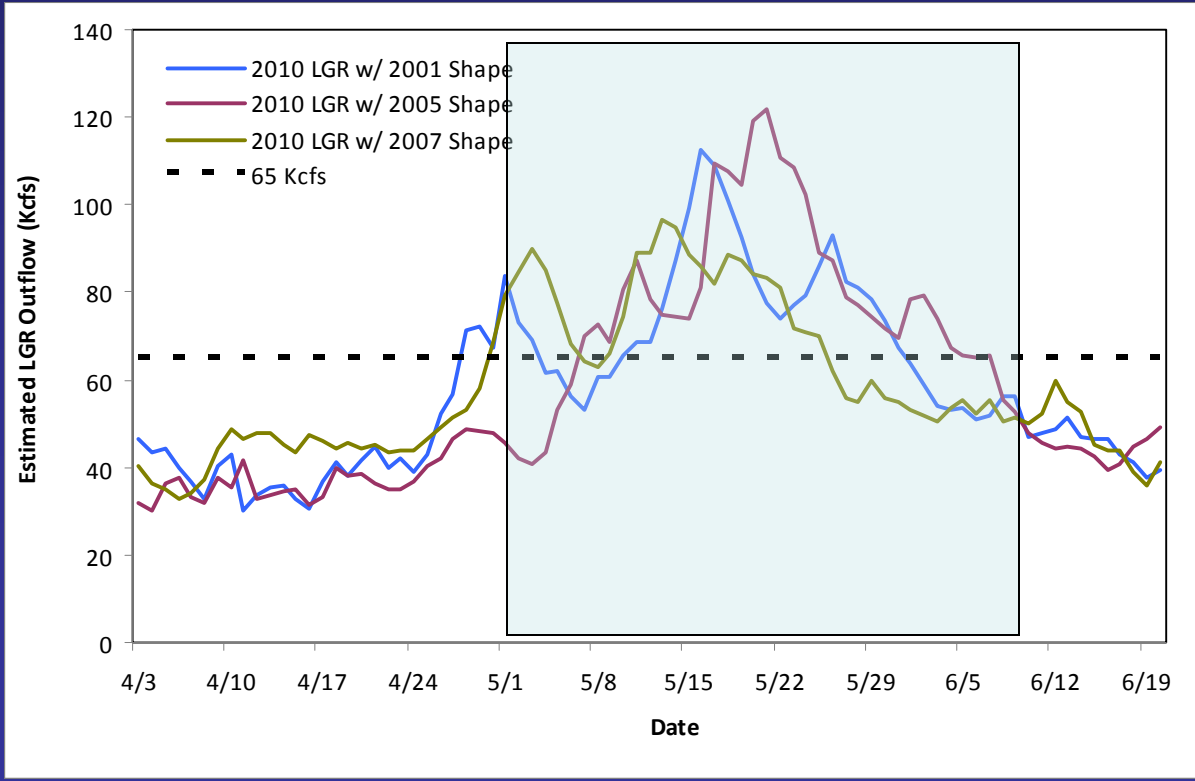


Summary (continued)

- Avoid further degrading river
  - Slower travel time
  - Higher dam passage mortality
  - Longer exposure to predators and much higher predation rates
- Avoid other unintended consequences
  - Increased steelhead stray rates
  - Increased lamprey mortality
- Partially mitigate for low flow with spill
  - Emerging data very encouraging
  - Spill may help compensate for low flow
- Valuable opportunity to learn
  - Determine if 2007 results hold true

Summary (continued)

- **Contrast w/ NOAA proposal for low flow**
  - **No attempt to improve river**
  - **Max transport during best flows**

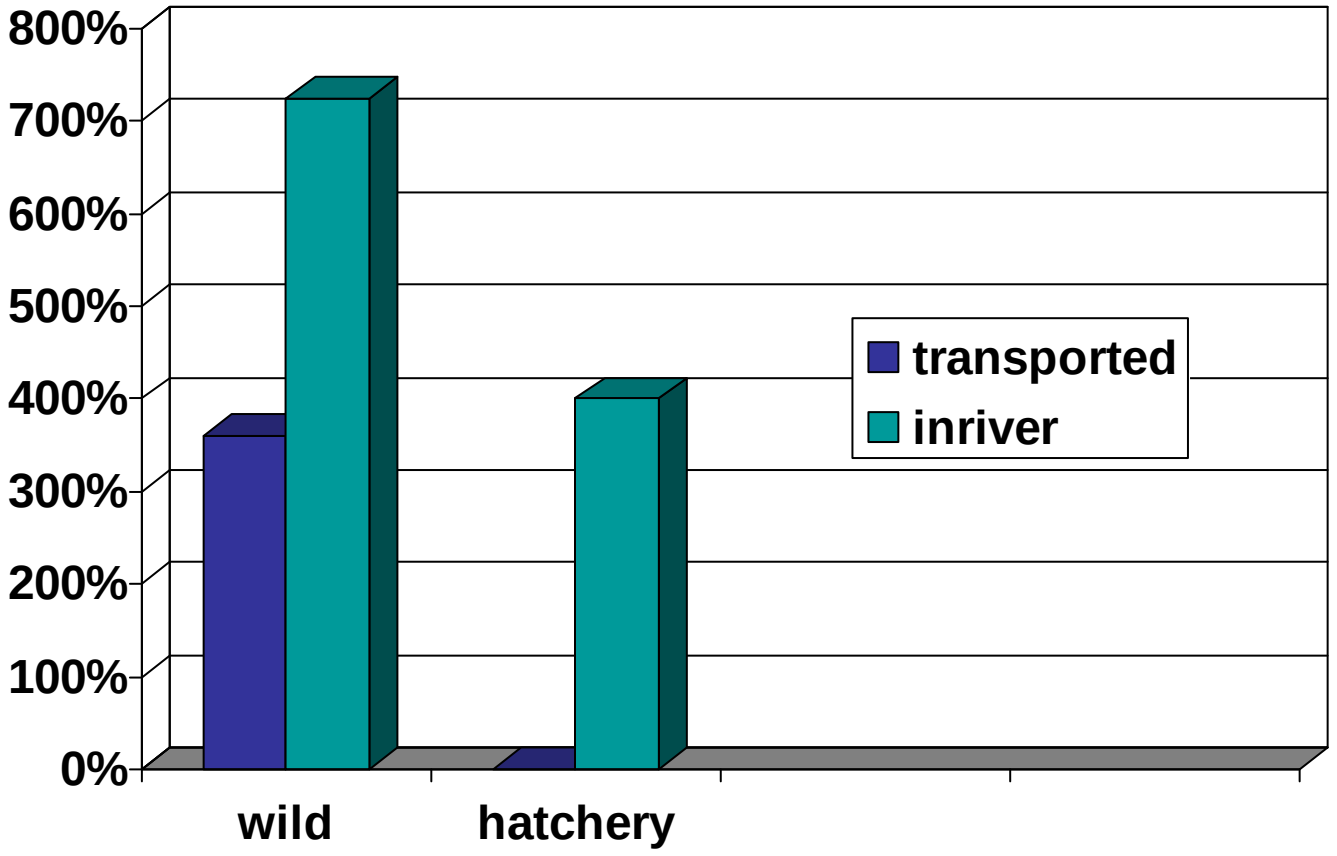


Summary (continued)

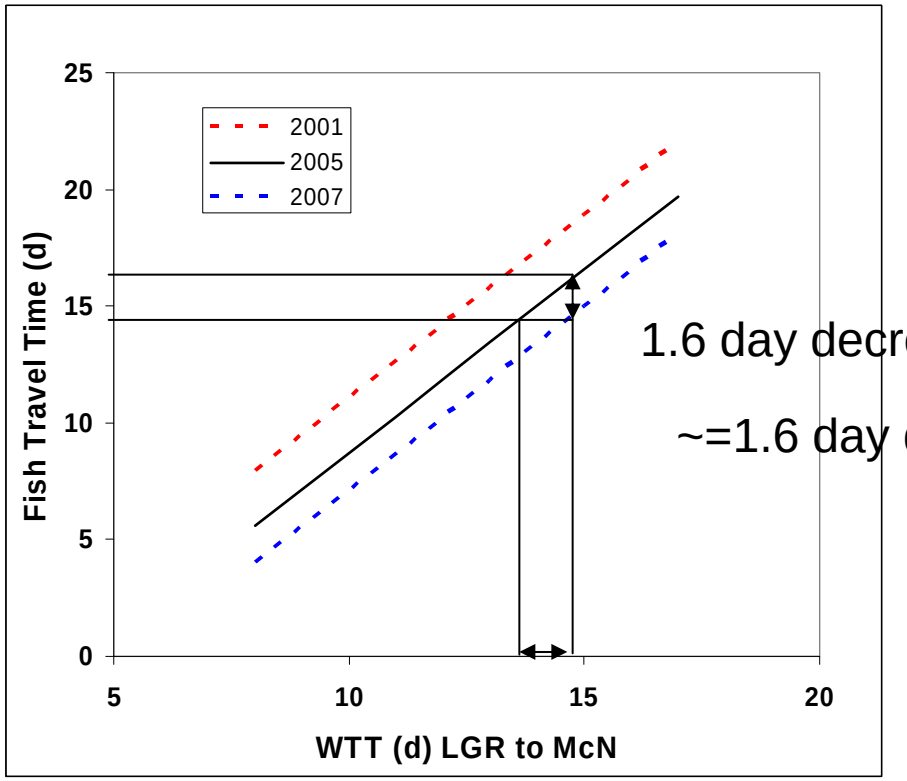
- Contrast w/ NOAA proposal for low flow
  - No attempt to improve river
  - Max transport during best flows
  - Further degrade river
    - Travel time, predation rate, dam passage
  - Ignore mixed stock / unintended effects
    - Lamprey, sockeye, ch0, steelhead strays
  - Lost opportunity to verify 2007 results


Questions?

Steelhead: Percent improvement in SAR between 2005 and 2007



Impact of Spill on Steelhead Travel Time (FTT) in Low Flow Years



1.6 day decrease in FTT

~=1.6 day decrease in WTT

- FTT decrease 1.6 d
- WTT decrease 1.6 d
- Aproximately 7 kcfs Snake Flow increase needed
- Increase equates to about 1.1 MAF

Improvement to In-river Conditions

Year	RSW	SPILL	McN	JDA	TDA	BVL
2007	LGR & IHR	14 Day GC at LGO	TSW test	0 day/ gas cap night	40% spill with 6 spillbays	Flat 100 K (or less), no BGS
2008	LGR, IHR and LMN	14 Day GC at LGO	TSW test	TSW spill 24 hours 30%vs40%, avian issues	40% spill with 6 spillbays	Flat 100 K BGS
2009	LGR, IHR and LMN and TSW at LGO		40% or higher spill with split TSW	TSW spill 24 hours 30%vs40%, avian issues	40% spill with 6 spillbays	Flat 100 K BGS
2010	LGR, IHR and LMN and TSW at LGO		Return TSW to 2008 configuration	New Deflector, improved spill pattern, extensive avian wiring, robust hazing 30%vs40%	Spill wall completed, expected survival improvement	Flat 100 K BGS, new PH1 sluiceway