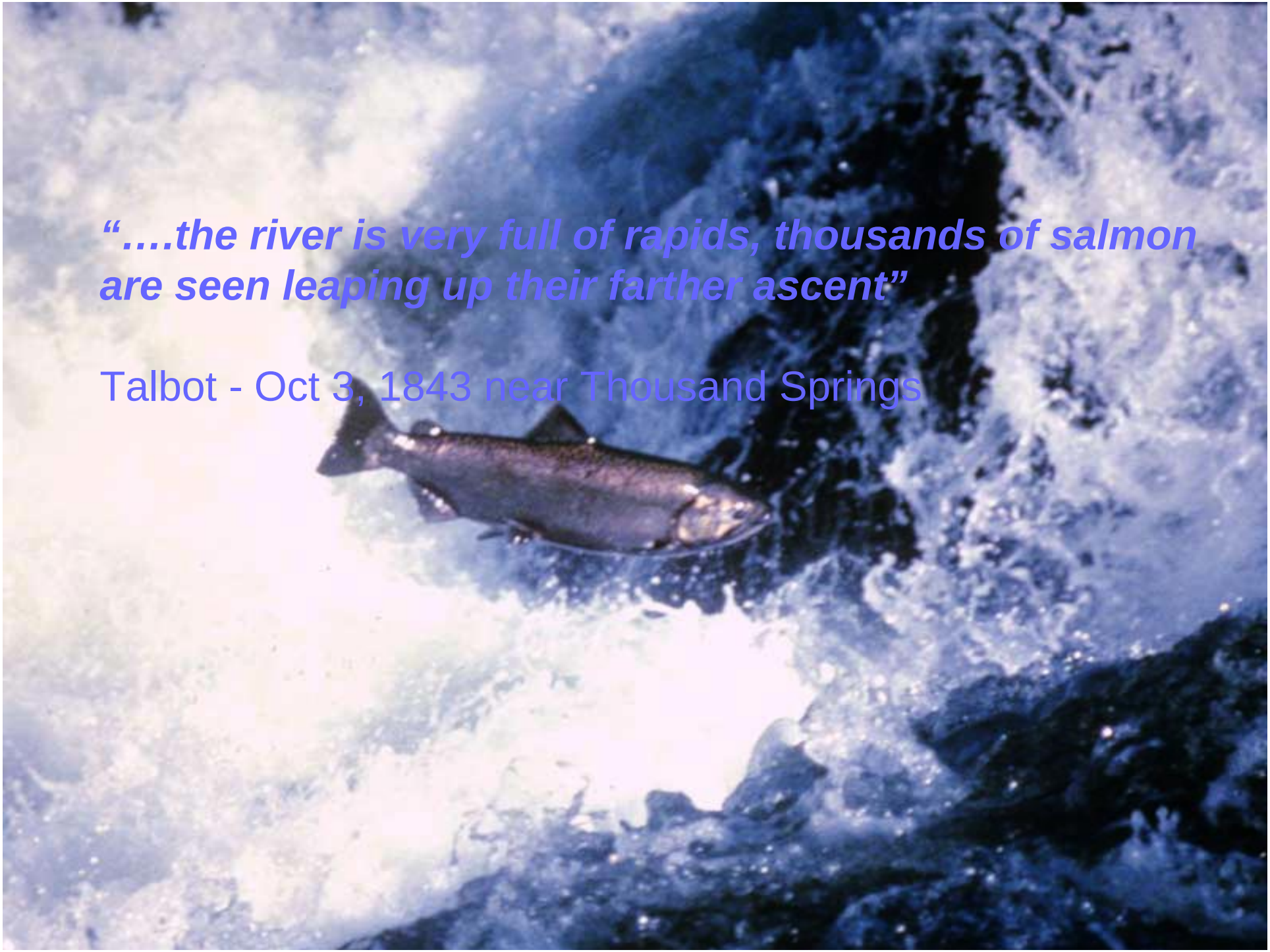
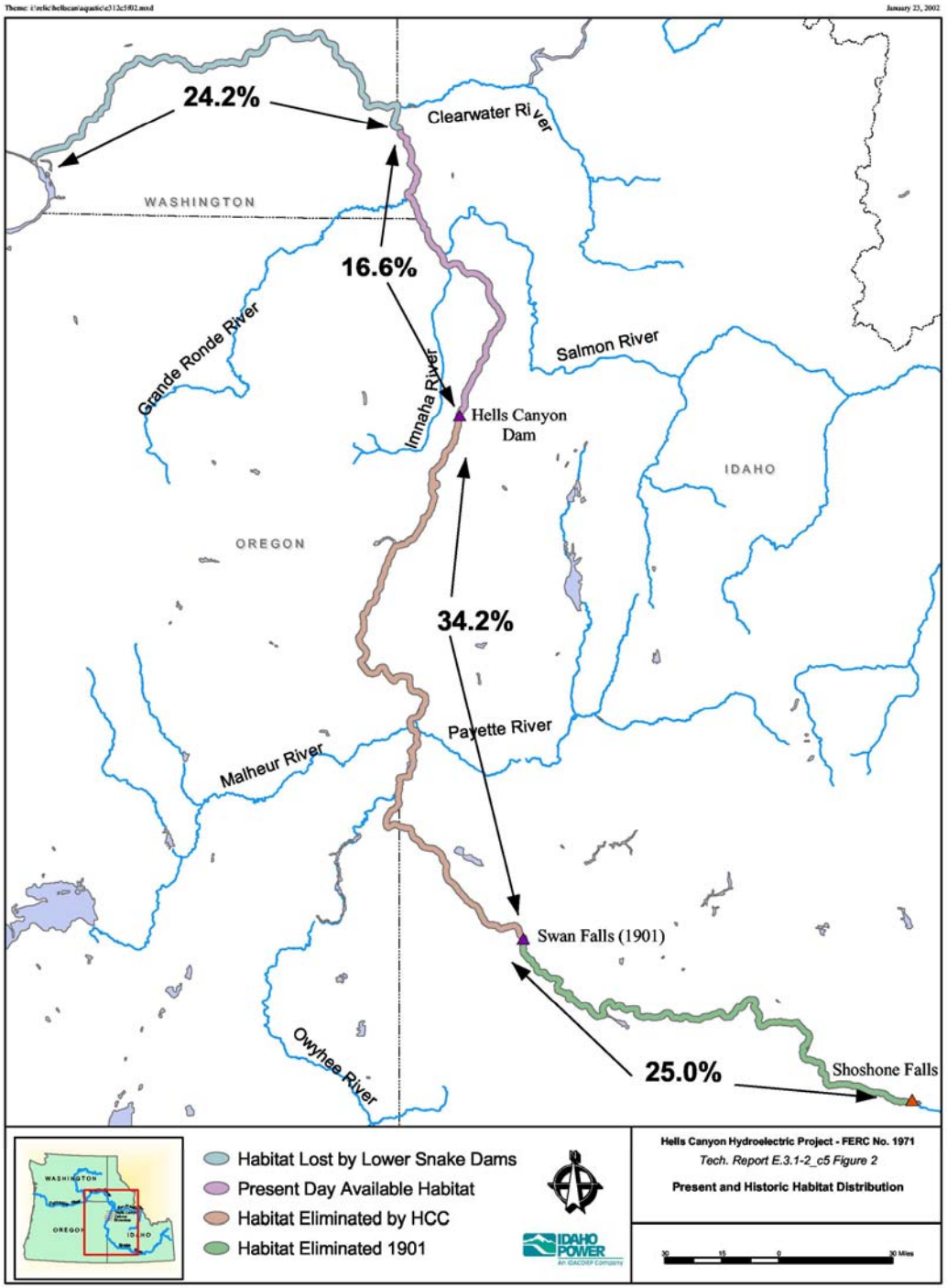
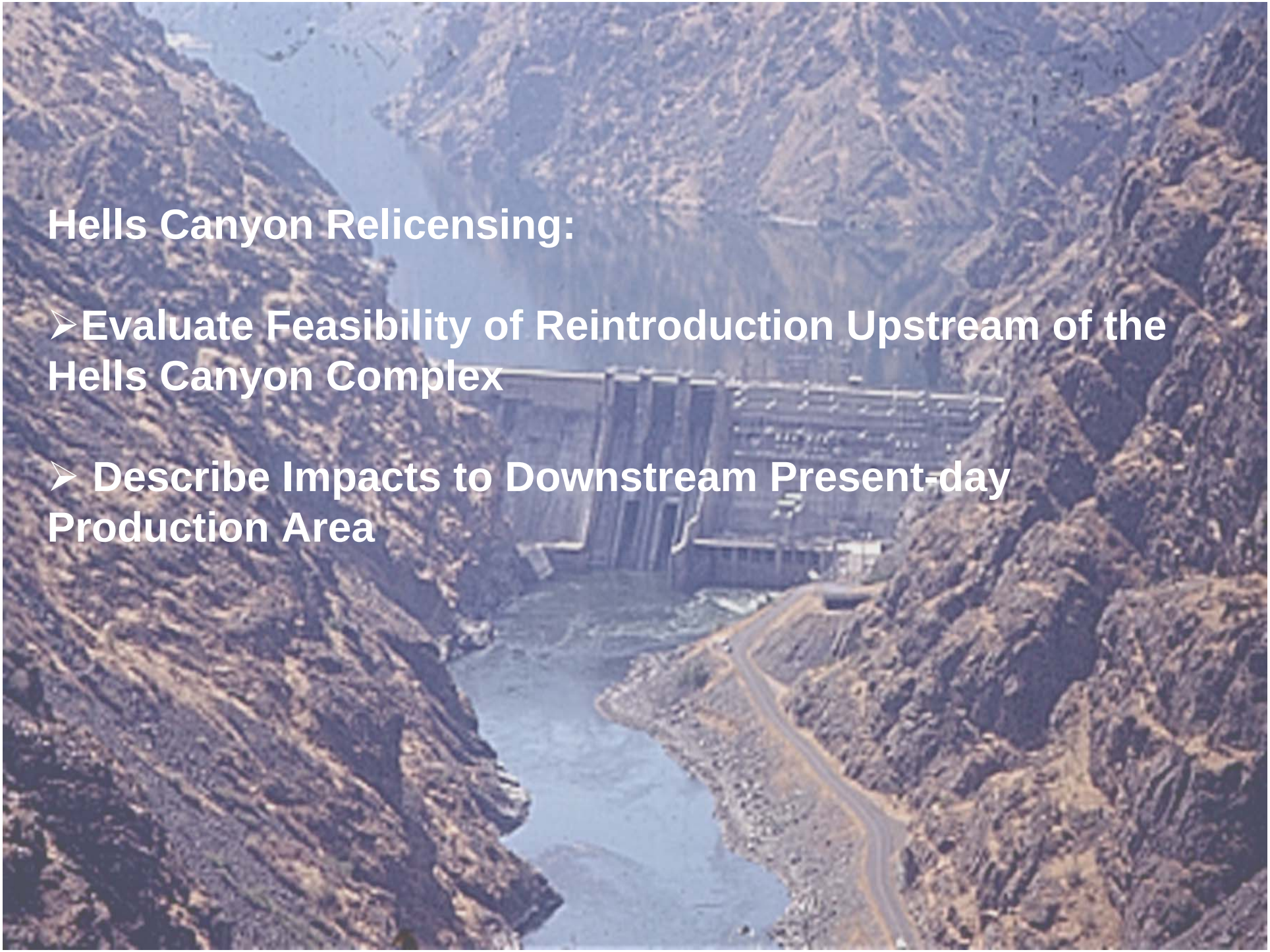

“….the river is very full of rapids, thousands of salmon are seen leaping up their farther ascent”
Talbot - Oct 3, 1843 near Thousand Springs

Swan Falls Dam - 1901





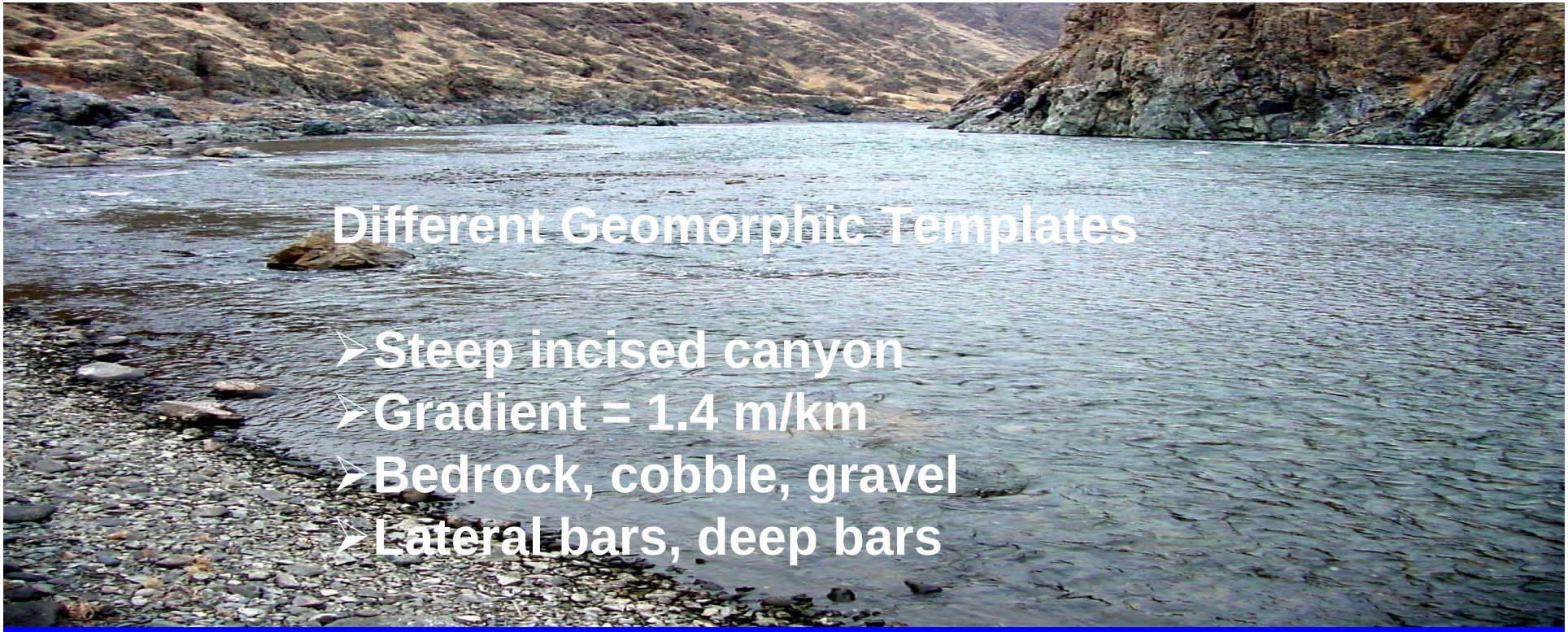
Hells Canyon Relicensing:

- **Evaluate Feasibility of Reintroduction Upstream of the Hells Canyon Complex**
- **Describe Impacts to Downstream Present-day Production Area**

A Comparison of Habitat Quality between historic and contemporary Fall chinook Spawning Habitat in the Snake River, with implications about reintroduction and recovery

James Chandler
Phillip Groves
Jesse Naymik
Idaho Power Company

- Geomorphic Template
- Thermal Regime
- Bed Characteristics
- Hyporheic Environment
- Egg Survival

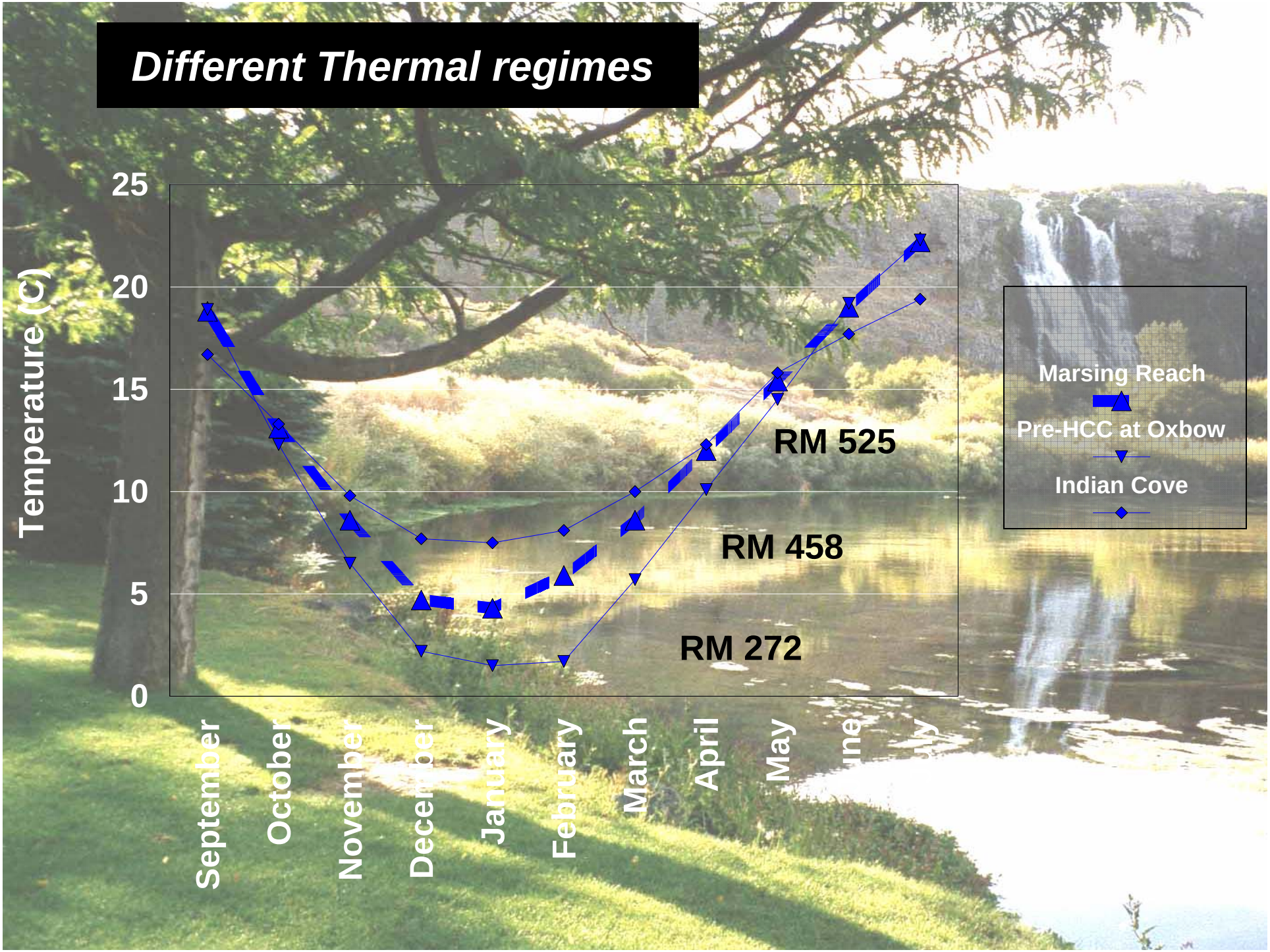


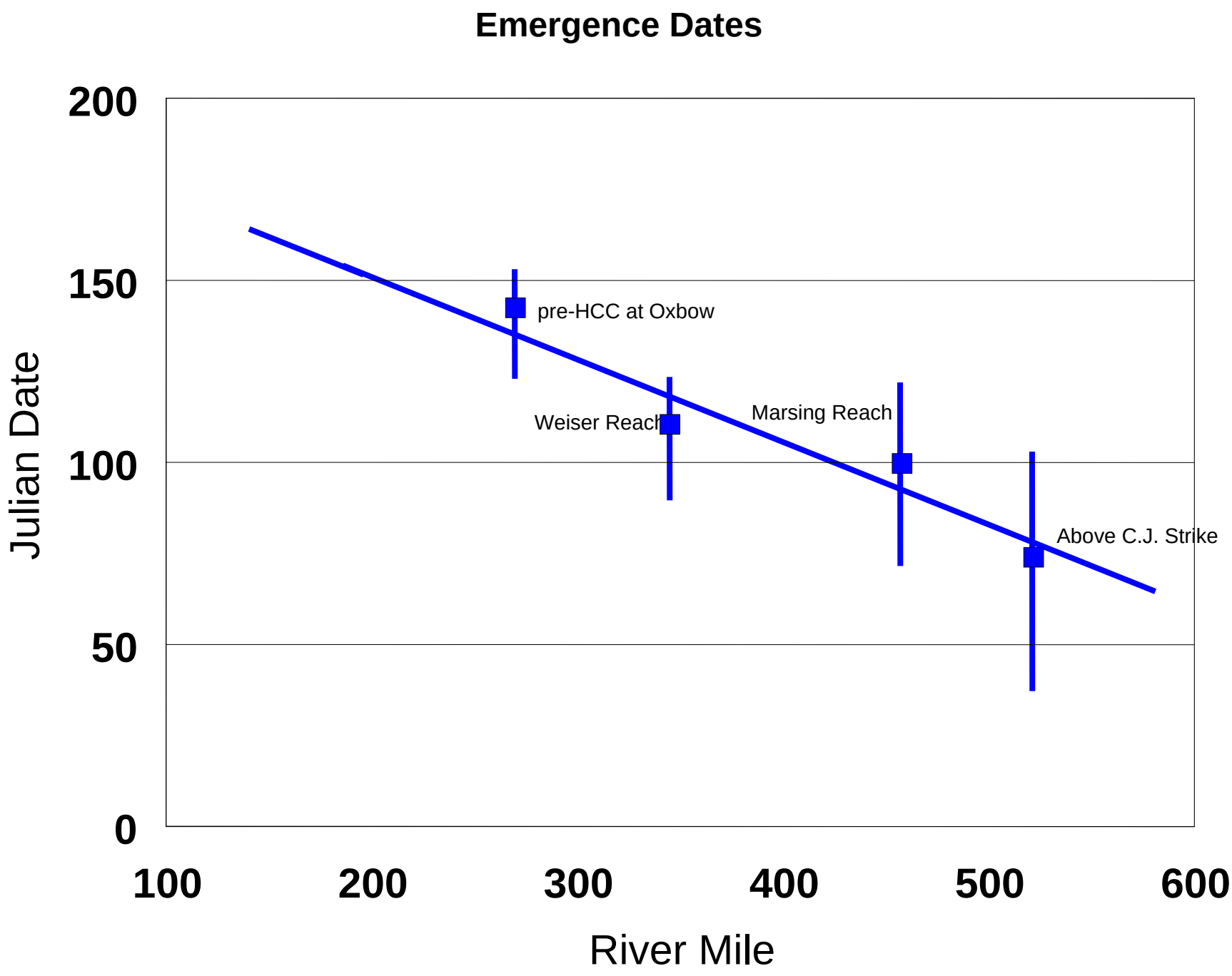
Different Geomorphic Templates

- Steep incised canyon
- Gradient = 1.4 m/km
- Bedrock, cobble, gravel
- Lateral bars, deep bars

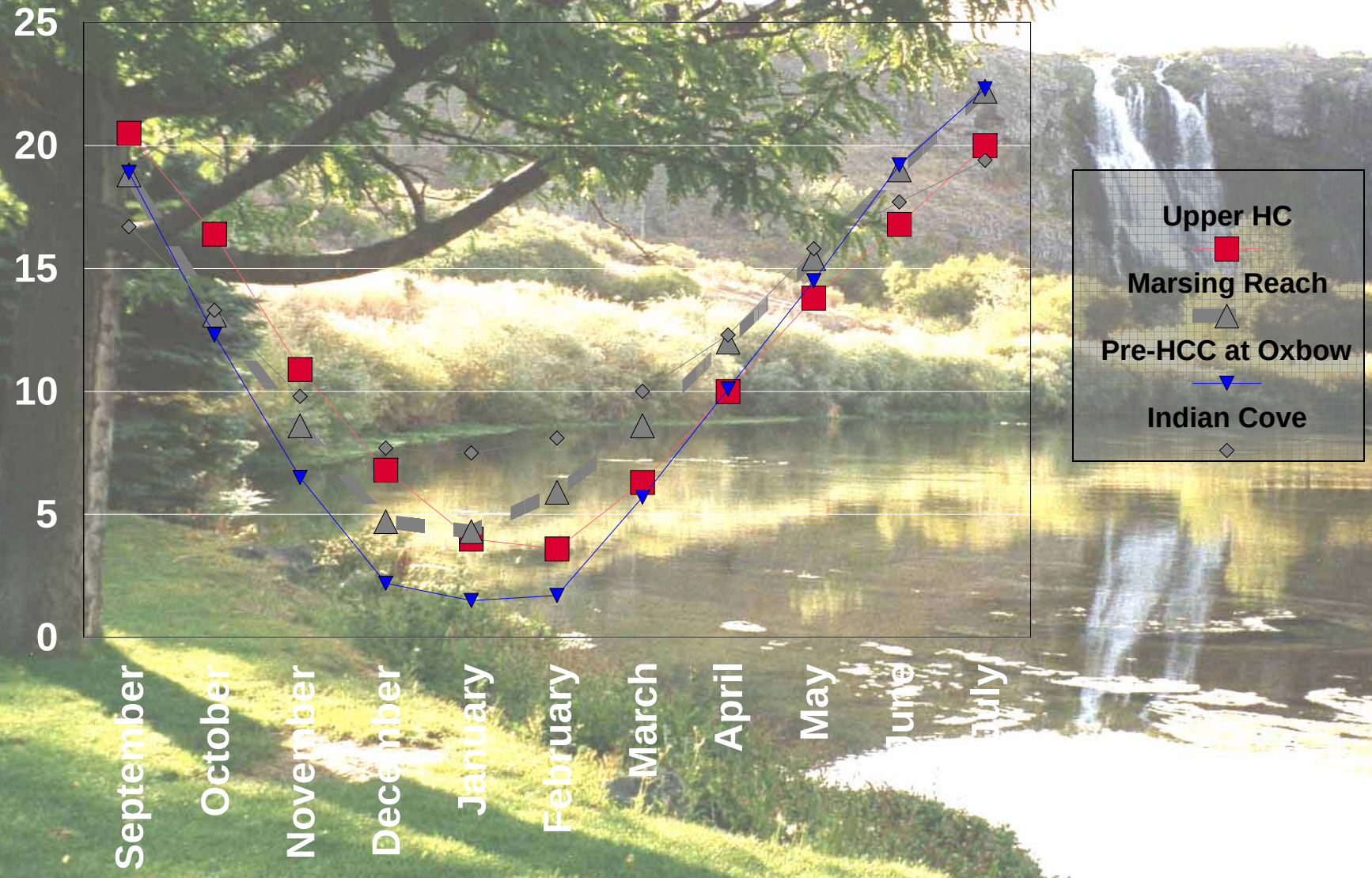
- large alluvial floodplains
- Gradient = 0.5 m/km
- Cobble, unconsolidated alluvium

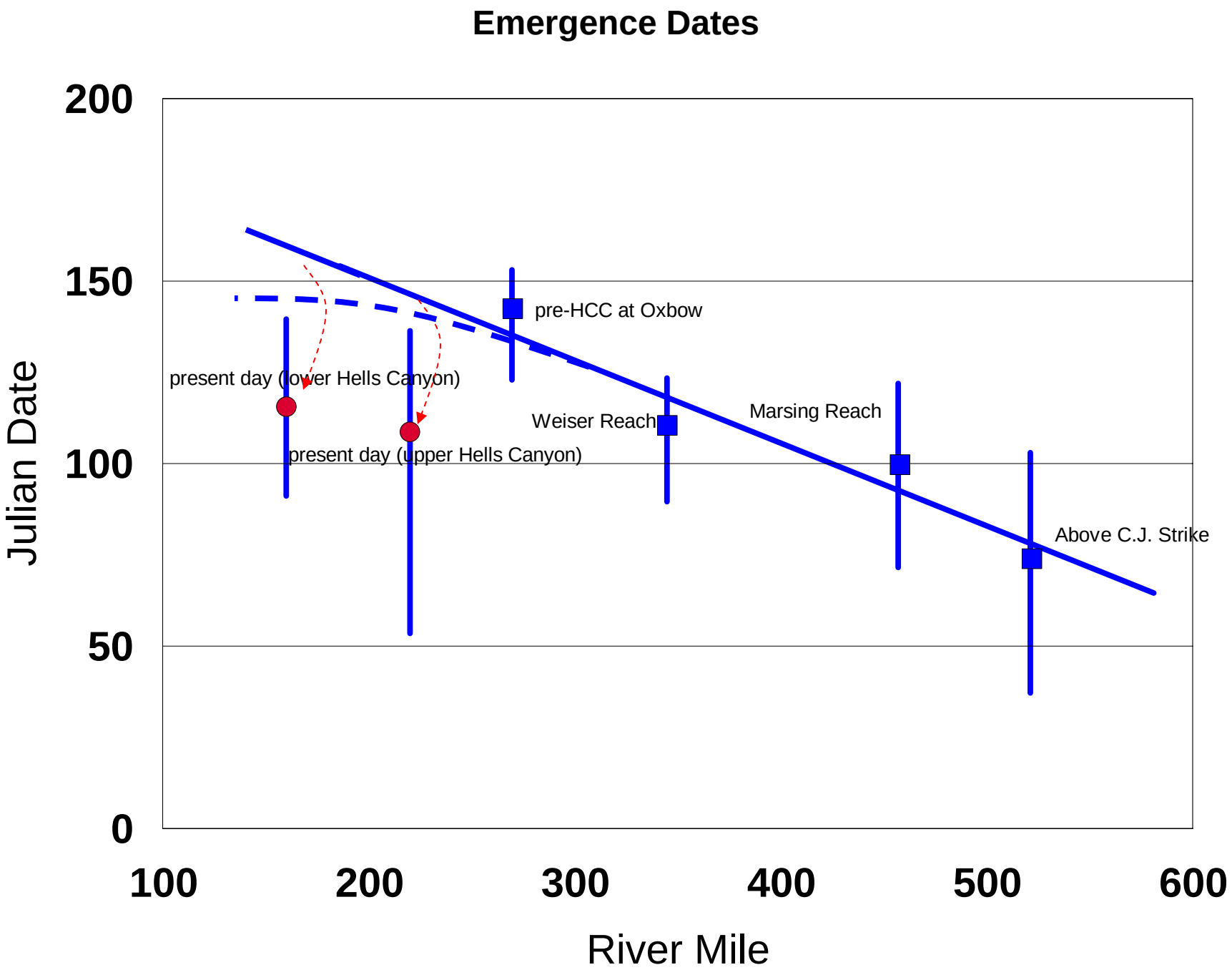
Different Thermal regimes




Emergence Dates
200
150
100
50
0
Julian Date
100
200
300
400
500
600
River Mile
pre-HCC at Oxbow
Weiser Reach
Marsing Reach
Above C.J. Strike

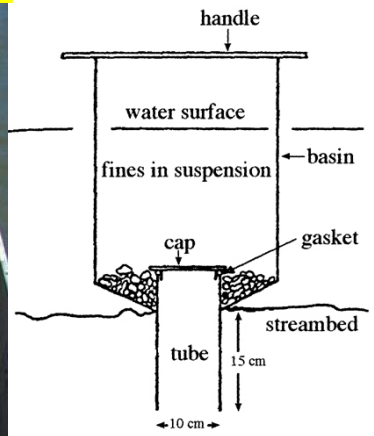
Different Thermal regimes




Emergence Dates
200
150
100
50
0
Julian Date
100
200
300
400
500
600
River Mile
pre-HCC at Oxbow
present day (lower Hells Canyon)
present day (upper Hells Canyon)
Weiser Reach
Marsing Reach
Above C.J. Strike

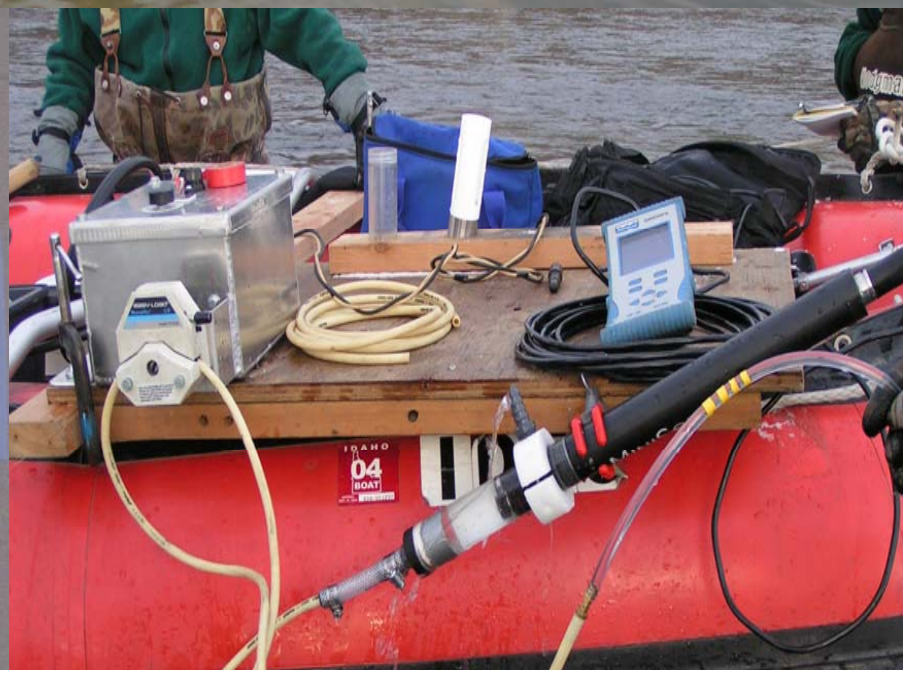
Different Hyporheic and inter-redd environments
- Substrate Quality
- Water Quality (Dissolved Oxygen)

Freeze Core / McNeil Sampler

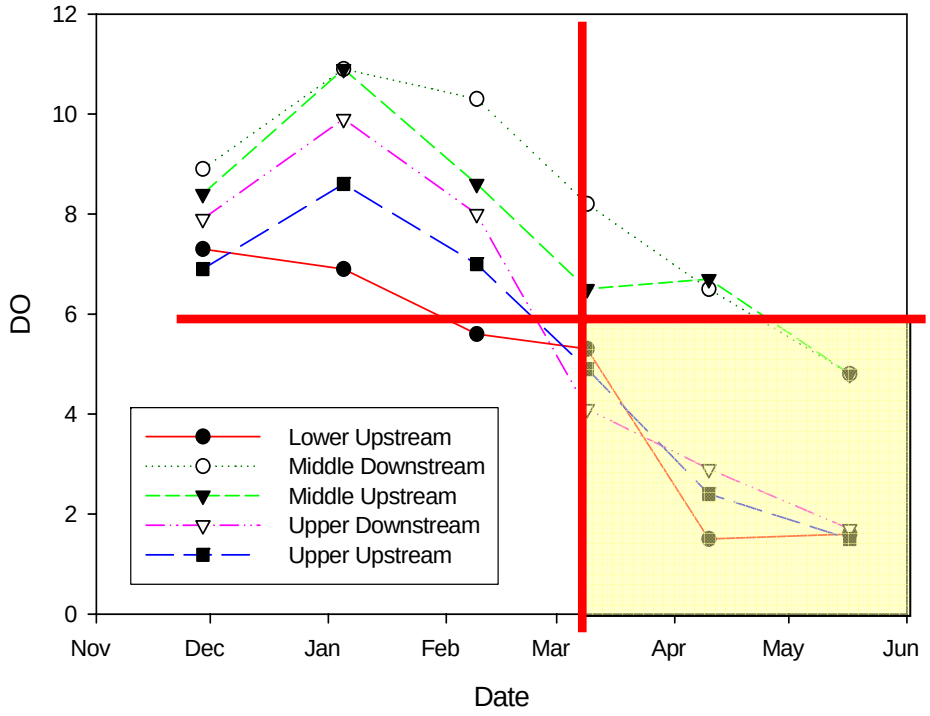


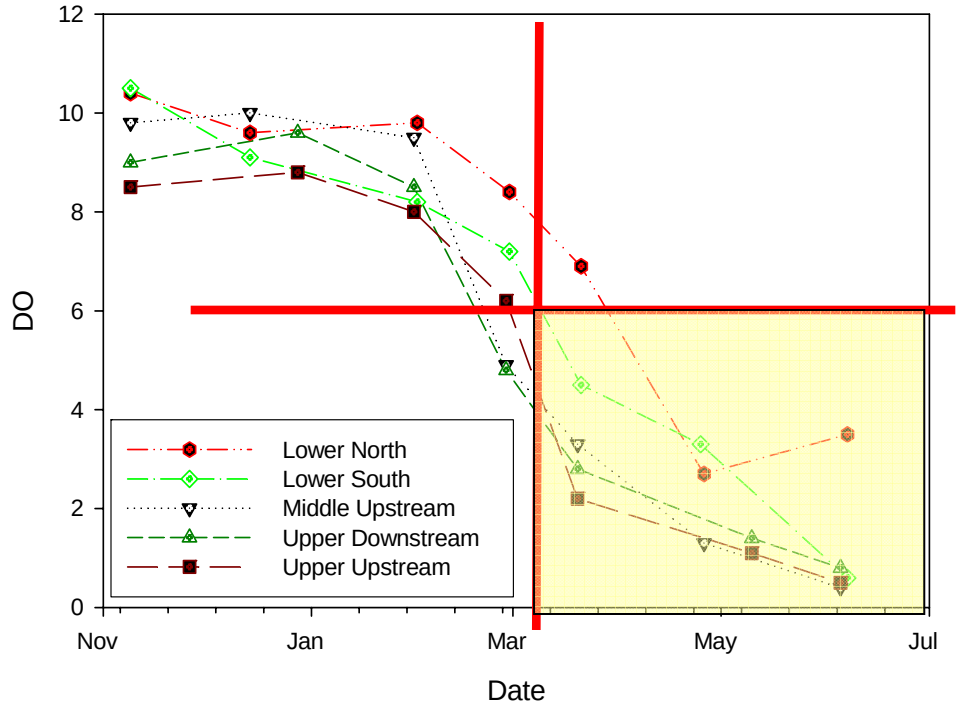
	Swan Falls	Hells Canyon
Percent Fines – Freeze Core (Hanrahan et al. 2001; Arntzen et al. 2001)	7-11%	3-11%
Survival To Emergence (Avg) (Hanrahan et al. 2001; Arntzen et al. 2001)	55.2	59.5 (UHC) 47.4 (LHC)
Percent Fines – McNeil (IPC unpublished data)	22.7%	3.5%

Monitoring Artificial Redds



Dissolved Oxygen Levels in Artificial Redds Below Swan Falls





Year 1
High Flow

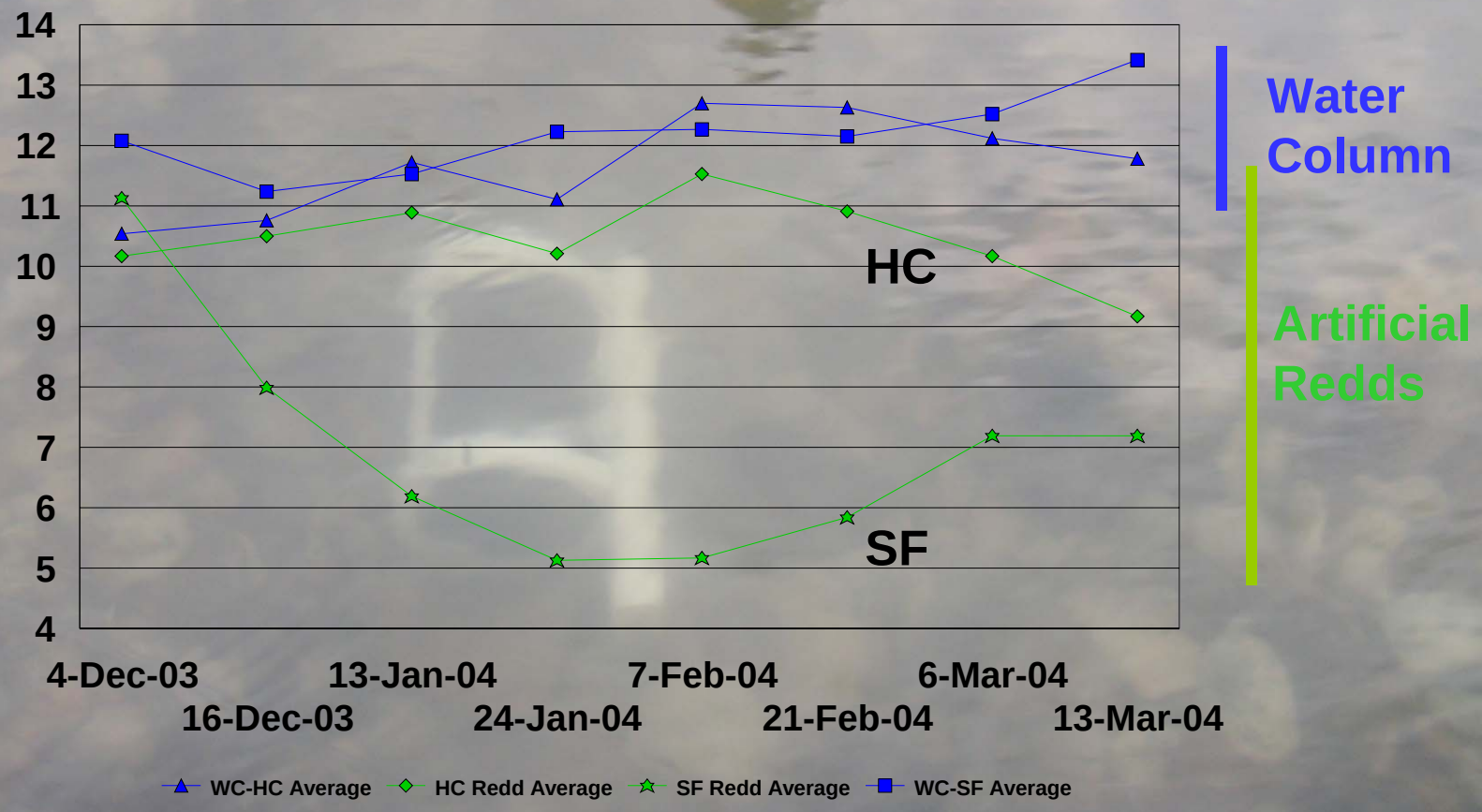
Year 2
Low Flow

Artificial Redds 99-00, 00-01
Groves and Chandler (in press)

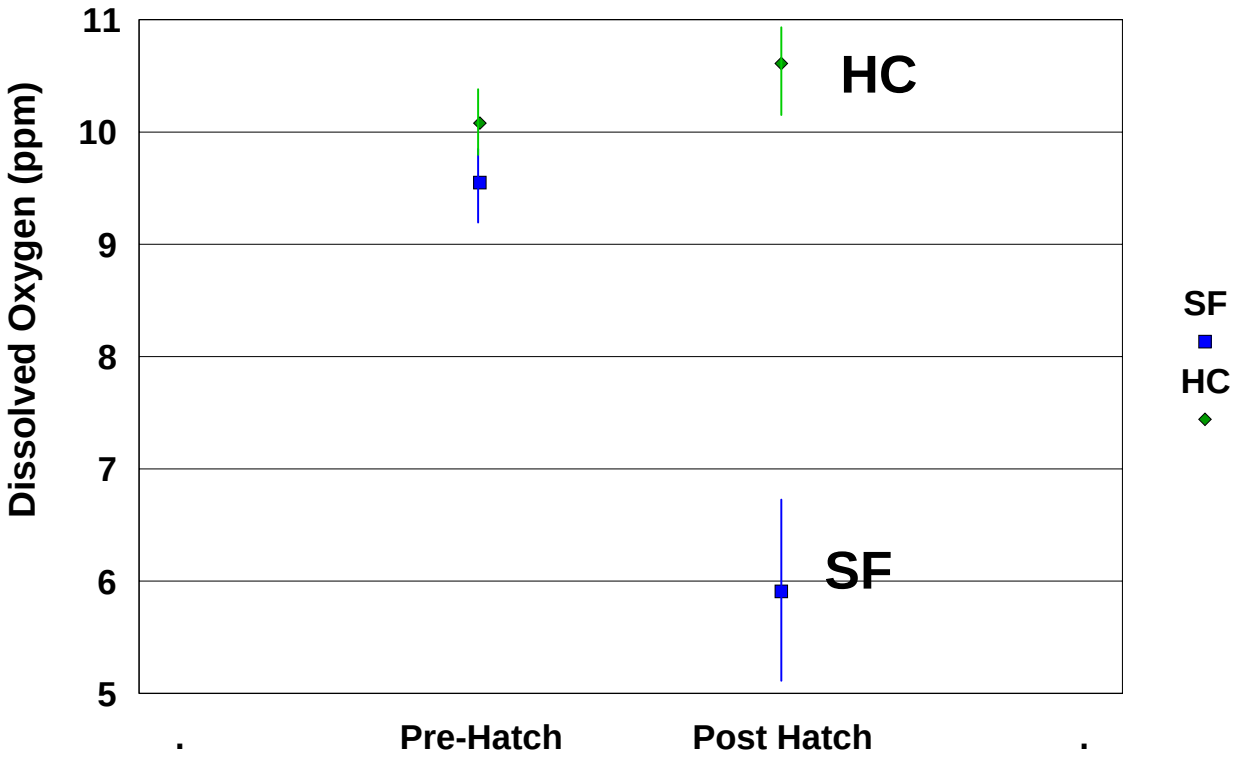
Egg Baskets

- 3 historic spawning sites below Swan Falls Dam – 27 redds
- 6 sites below Hells Canyon Dam – 18 redds

Artificial Redds – 2003-2004
Dissolved Oxygen



Mean DO – Pre and Post Hatch periods



Egg Survival

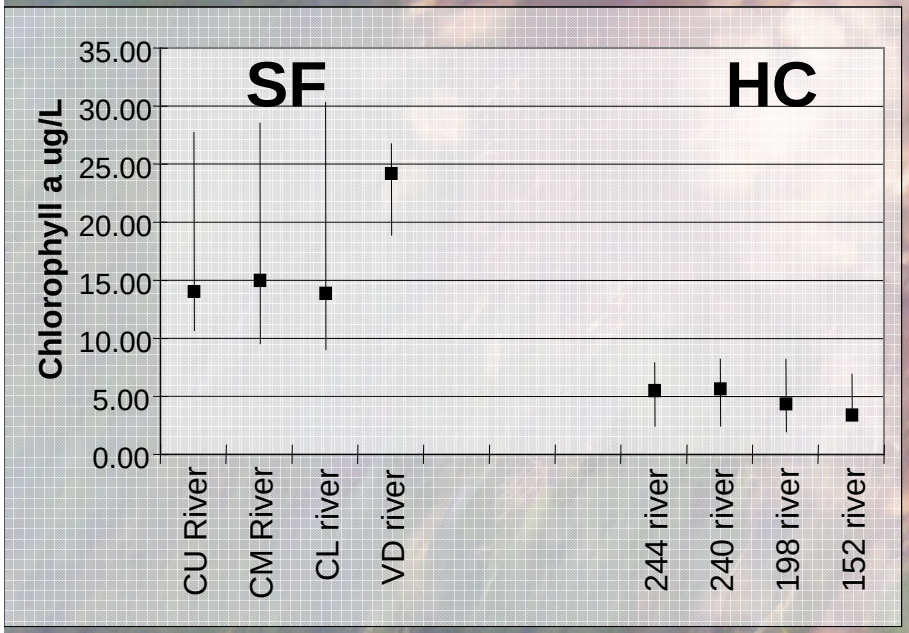
	Swan Falls	Hells Canyon
Accounted For:	55%	93%
Known Survival:	23%	83%

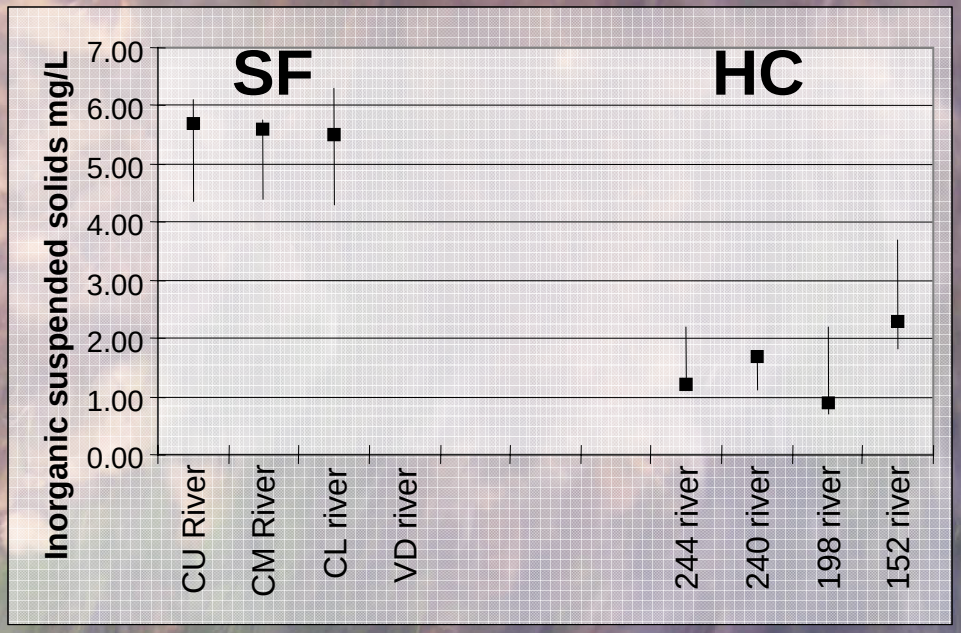
Why Differences in Hyporheic / Redd DO ?

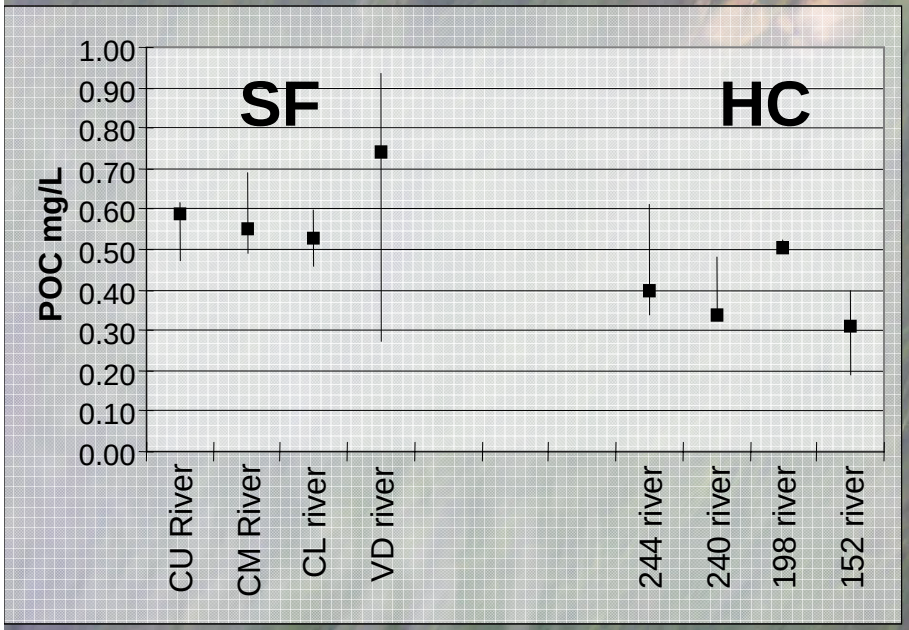
“Ageing” process of redds …

Inorganic Suspended Sediment
Organic Matter / BOD
Nutrients

Water Column Differences







Conclusions:

Today –
Habitat below Hells Canyon Dam more conducive for survival / production of fall chinook salmon than historic areas

Smolt-to-Adult returns still not sufficient to support self-sustaining populations below Hells Canyon Dam

Reintroduction has great potential – if habitat can be improved and factors contributing to low SAR's downstream can be improved