A New Agreement for Protection of Hanford Reach Fall Chinook

September 8, 2004

Background

- WPPSS 1976 Low-Flow Test
- Vernita Bar Complaint
- 1979-1982 Studies by Mid-Columbia PUDs
- 1988 Vernita Bar Settlement Agreement
- 1997-2003 Studies Funded by BPA and Grant PUD performed by WDFW
- Summary Report of 7 years of Studies (Technical Appendix E-4.N to PRP FLA)

Agreement Calendar

- **Spawning-October and November**
  - **Reverse Load Factoring or Structured Min. Flows**
- **Pre-Hatch-November and December**
  - **Minimum Flow Maintained from 50-70 kcfs**
- **Post-Hatch-December to March**
  - **Minimum Flow Maintained from 50-70 kcfs**
- **Emergence-March to May**
  - **Minimum Flow Maintained from 50-70 kcfs**
- **Rearing-March to June**
  - **Flow Fluctuations Limited with 4 Weekends of Min. Flow**

River Operations

- **Upstream Releases by BPA for Minimum Flows**
- **BPA Reductions on Saturday, Sunday and Holidays**
- **Grant, Chelan and Douglas PUD Drafting and Refill**
- **Adverse Water Conditions**

BPA Operations

- On Weekdays, BPA Provides CHJ Flows that are not less than Designated Minimum Flow minus Sideflows
- On Weekends, BPA Provides CHJ Flows that average up to 19 kcfs less than the Minimum Flow minus Sideflows
- When BPA reduces flows on weekends must release additional water on Monday-Wednesday of next week

Grant, Chelan and Douglas PUD Operations

- **Mid-Columbia Projects use CHJ Discharge and Sideflows to maintain Minimum Flow**
- **If CHJ+Sideflows are Insufficient:**
  - **Grant Drafts up to 3 ft from PRD**
  - **Grant Drafts up to 2 ft from WAN**
  - **Chelan Drafts up to 1 ft from RRH**
  - **Douglas Drafts up to 1 ft from WEL**
  - **Grant Drafts up to 0.7 ft from PRD**

Adverse Water Conditions

- **If March 1, Jan-Jul Forecast Runoff Volume at GCL is < 42.6 MAF, then:**
- **Parties Meet to Discuss Options**
- **Minimum Flow Can Be Reduced**
- **Reductions limited to no more than 15% and cannot go below 50 kcfs**
- **Used in May of 2001**

1997 and 1998 Stranding Studies

- Initial scoping and habitat identification in 1997
- Flow modeling of ¼ mile x-sections
- Only 1,130 fall chinook fry sampled with high flows of 1997
- Descriptive data on physical habitat, entrapments, temperature, fry and flow conditions in 1998
- 31,495 fall chinook sampled in 1998
- Detailed bathymetry collected for 35 km stretch of Hanford Reach in 1998

Experiments to Develop Rearing Period Operations

- **Provide Protection for Rearing Fall Chinook Fry**
- **Maintain Load-Following Capability**
- **Reduce Daily Fluctuations (20-80 kcfs limits)**
- **Quantified by Stratified Random Sampling**
- **If Possible, Stabilize Seasonal Flow Fluctuations**
- **1999-2003 Annual Modifications and Improvements**

Study Results Summary

	Able to Meet Constraints (%)	Standardized Mortality Estimate	Total HR Estimate/Fry Population (% impact)
1999	91.6	93,943	323,026/48,228,140 (0.7%)
2000	82.7	45,487	155,073/46,314,879 (0.3%)
2001	94.8	2,013,638	6,864,851/64,879,934 (10.6%)
2002	73.7	67,409	229,809/65,436,444 (0.4%)
2003	73.6	154,853	527,922/116,874,715 (0.5%)

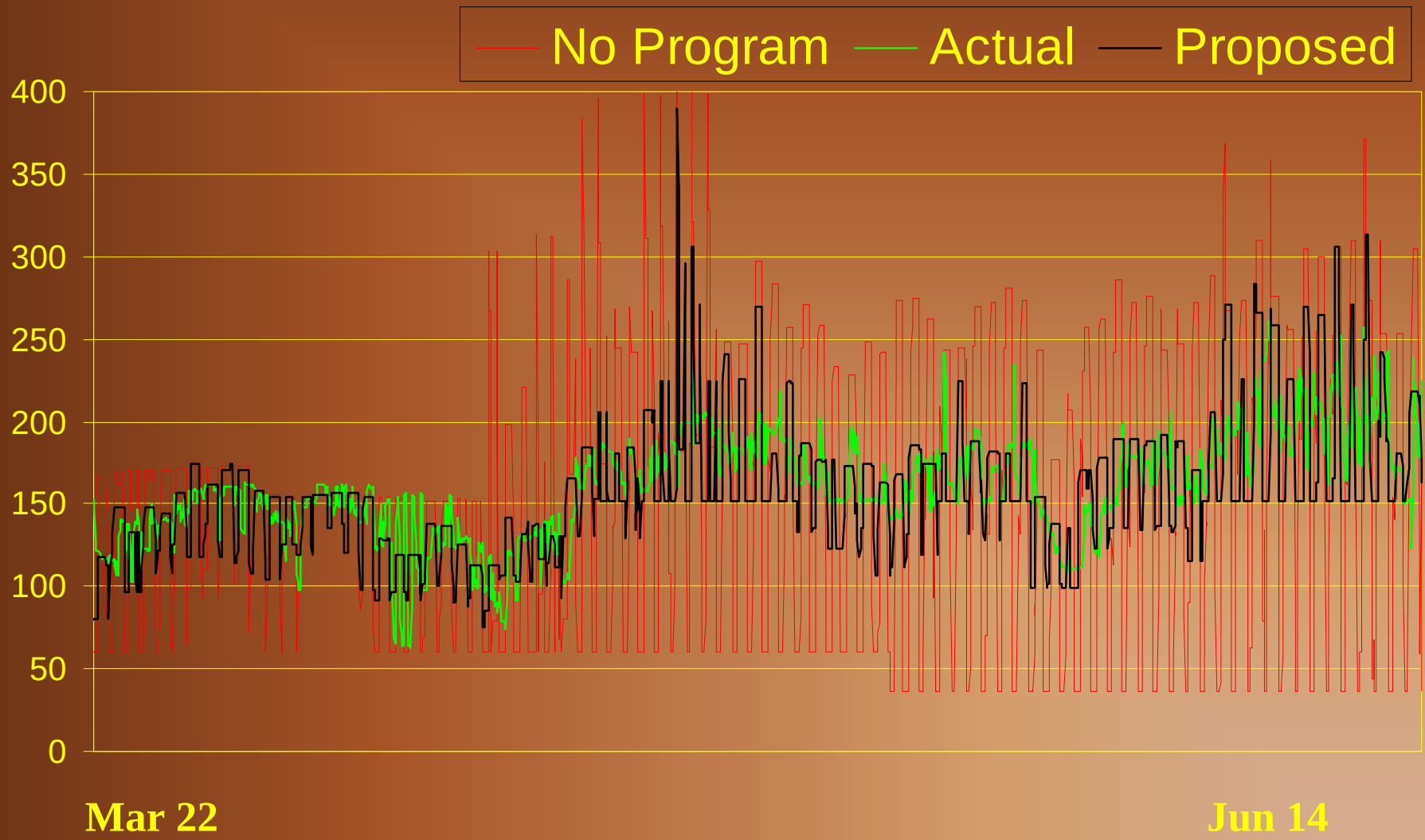
Modeling

- **Habitat Modeling Using MASS1 and MASS2**
- **Estimate Dewatered and Entrapped Habitat Effects from Operational Scenarios**
- **Operational Modeling for 1999-2002**
  - **No Program (maximize peak power production)**
  - **Proposed Program**
  - **Actual Flows**

Stranding Studies

in the Hanford Reach of the Columbia River

1999 Water Year Simulations



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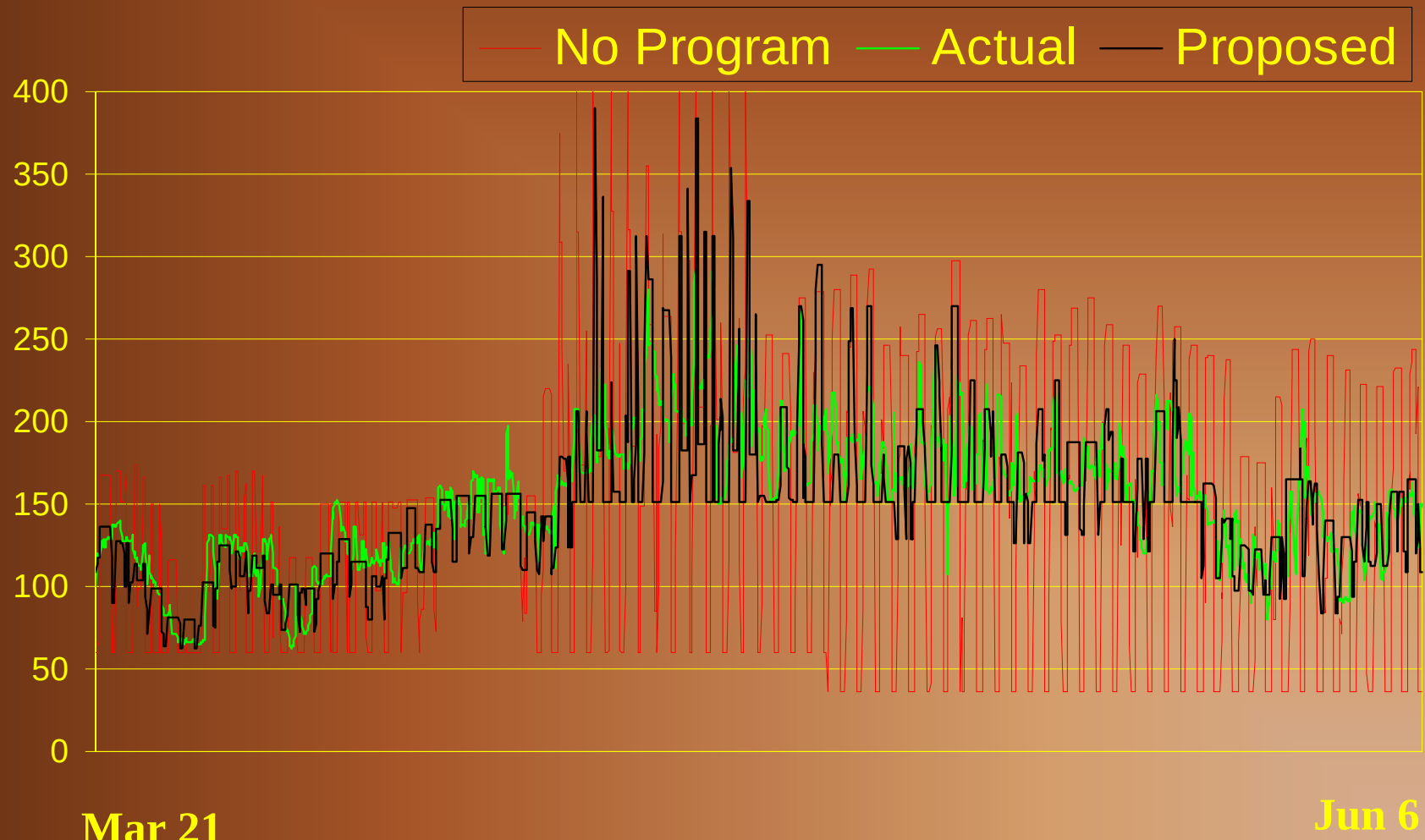
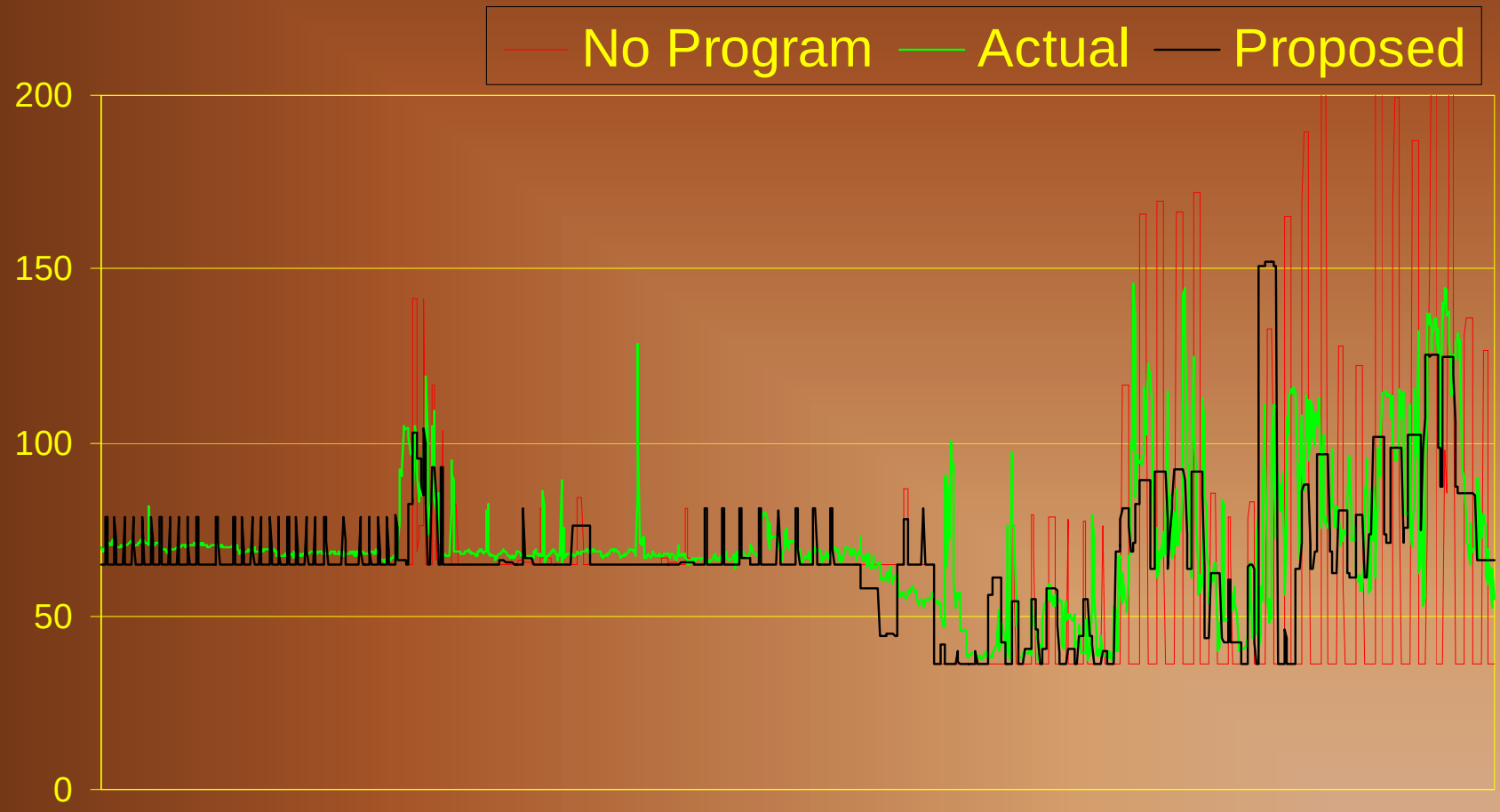
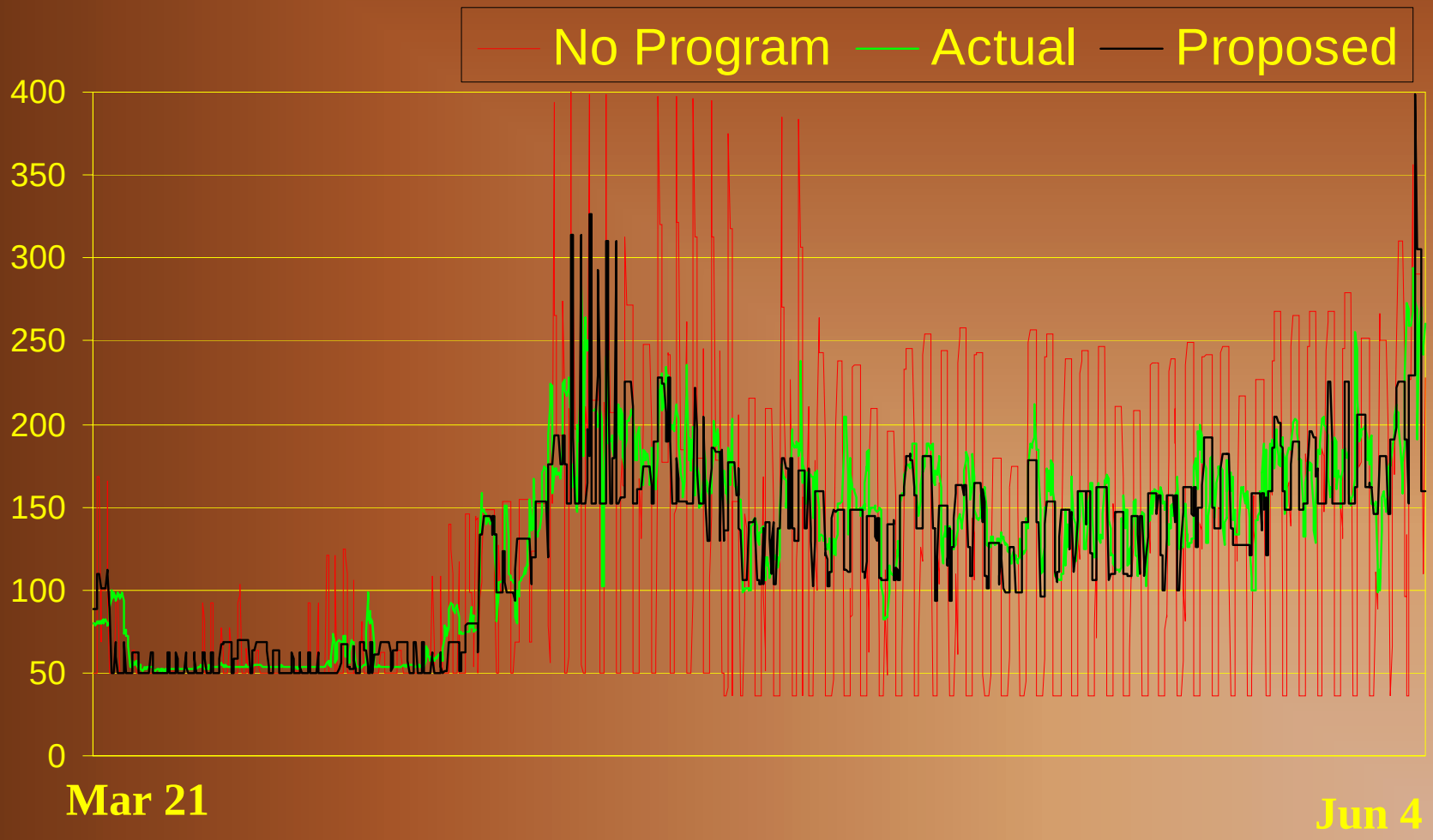


2001 Water Year Simulations



2002 Water Year Simulations



Habitat Effects

	No Program	Proposed	Actual
1999	90,240	26,800	11,130
2000	81,110	22,810	11,910
2001	34,430	16,750	16,250
2002	74,020	17,530	13,440
Avg.	69,950	20,973	13,183

Habitat modeling shows that program is conservative and reduces habitat impacts by up to 80% compared to unrestricted operations.

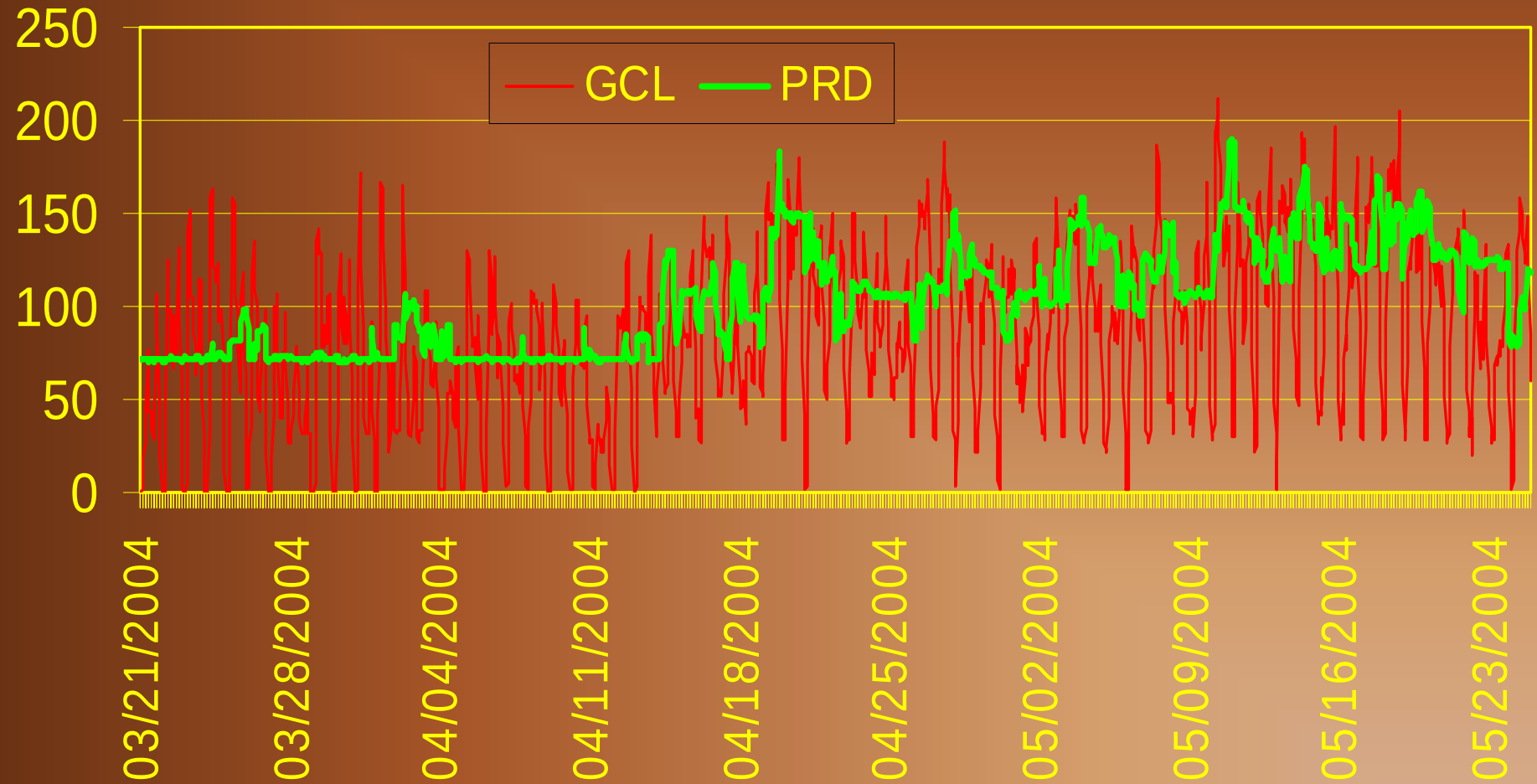
Hanford Reach Fall Chinook Protection Program

- Adds Rearing Period to Vernita Bar Agreement
- Grant, Chelan, Douglas PUDs, BPA, NOAA Fisheries, WDFW, Colville Confederated Tribes have signed
- Rearing Period Operations Address Fry Stranding and Entrapment using Flow Fluctuation Limits and Weekend Minimum Flows
- Flows controlled by coordinated operation of 7 dam system
- Continues redd counting and temperature-based timing criteria, with detailed M&E program in last 3 years
- Executed 4/05/04 with re-opener possible after 10 years

Rearing Period Elements

- If PRP inflow is from 36 and 80 kcfs, limit daily PRD ouflow delta to 20 kcfs, weekend limited to 20 kcfs
- For inflows 80-110 kcfs, limit PRD delta to 30 kcfs
- For inflows 110-140 kcfs, limit PRD delta to 40 kcfs
- For inflows 140-170 kcfs, limit PRD delta to 60 kcfs
- For inflows >170 kcfs, maintain PRD minimum flow of 150 kcfs
- During peak Emergence provide 4 weekends of PRD minimum flows based on weekly average
- Starts with beginning of Emergence (March/April) ends 400 TUs after end of Emergence (June)

Example of Re-shaping Accomplished in 2004



Summary of 2004 Rearing Operations

- Started March 21 ended June 12
- Weekend Min. Flows In Place Apr 24-May 16
- Constraints Effectively Met 80 of 84 days (95%)
- On Hourly Basis Constraints Met Over 97% of time
- Detailed Report was Distributed in June

Redd Protection

	VB Redd Count	# Redds at Risk (%)
1994	208	11 (5.4%)
1995	121	10 (8.3%)
1996	461	**19** (4.1%)
1997	587	13 (2.2%)
1998	201	8 (4.0%)
1999	145	15 (10.3%)
2000	399	9 (2.3%)
2001	42	1 (2.4%)
2002	**638**	12 (1.9%)
2003	483	7 (**1.4**%)

Hanford Reach Escapement