

Adaptive Management Team

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History

- Spill adopted as primary strategy to improve fish passage at dams (1995 NMFS BiOp)
- GBT Monitoring Program and Gas Bubble Trauma Research Plan initiated in 1995
- Research Plan designed to determine:
 - effectiveness of GBT Monitoring
 - relevance of GBT signs
 - range of TDG in river where fish migrate
- Research Plan concluded in the late 1990s
 - Critical uncertainties most crucial to implementation of voluntary spill program were addressed

History (cont)

- Voluntary spill to 120% included in the NMFS 2000 BiOp
 - estimate juvenile survival through mainstem hydrosystem increased by 4-6% over spill to the 110% level

Monitoring for Juvenile Salmonids

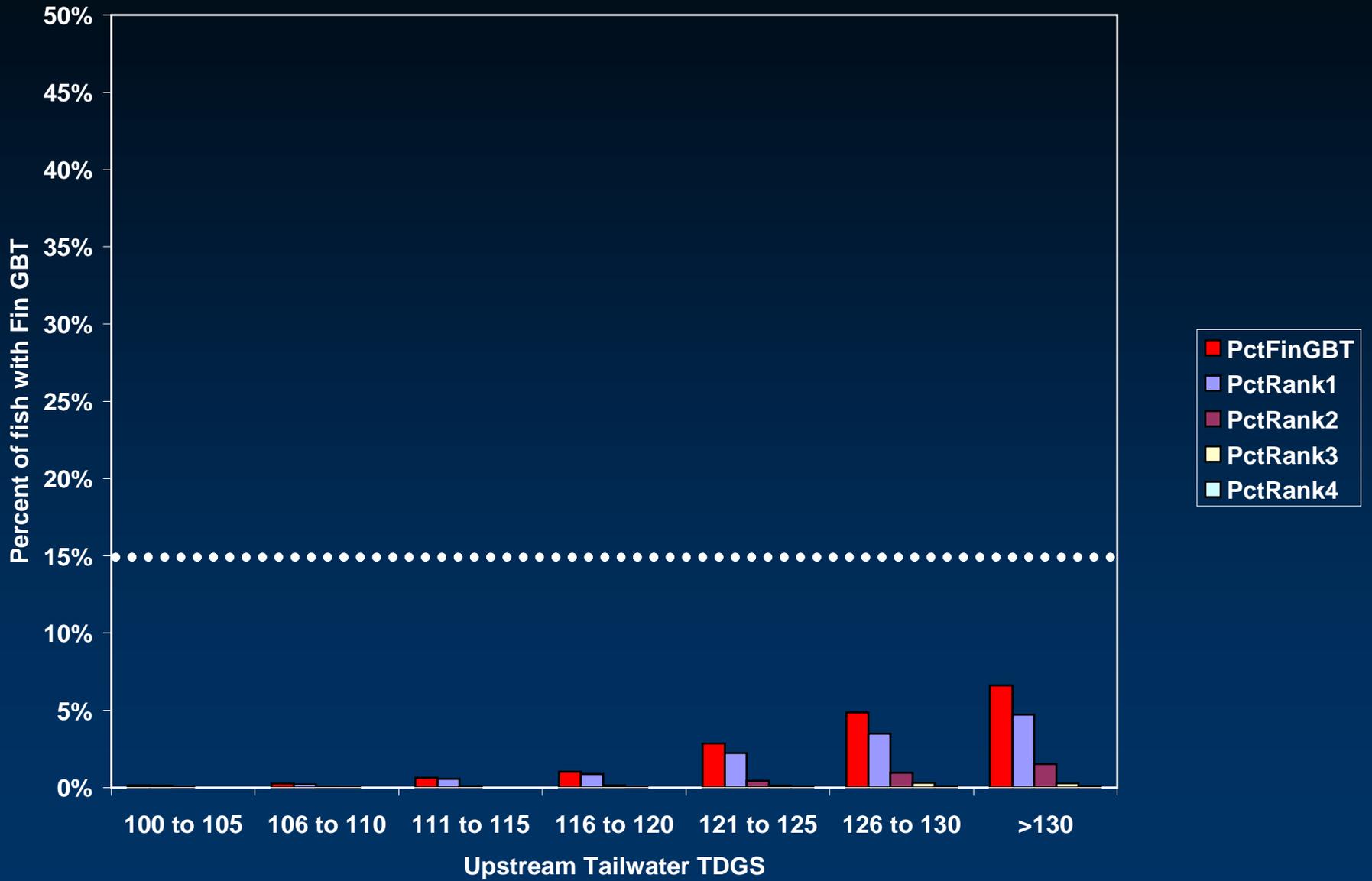
Juveniles

- fish monitored at mainstem projects since 1994
- protocol developed - it is reproducible and consistent
- Since 1995 juvenile monitoring data has been collected over a wide range of TDG concentrations
 - <120% from voluntary spill
 - >120% from uncontrolled spill

Highest Daily Percentage GBT Observed In Each Year

	LGR	LGO	LMN	MCN	JDA	BVL	RIS
1996	1.4	10.0	28.0	18.2	20.6	36.0	66.0
1997	3.5	10.6	39.0	9.0	12.3	17.5	68.2
1998	1.2	1.5	8.3	5.1	7.0	5.4	6.6
1999	0.7	0.0	3.0	5.5		2.8	3.8
2000	0.0	4.3	0.9	0.0		1.0	6.4
2001	1.9	0.0	0.0	0.0		0.0	1.2
2002	2.0	2.7	27.4	0.0		0.0	4.8
2003	0.0	5.0	10.0	3.0		0.0	4.0
2004	0.0	0.5	0.0	0.0		1.0	2.0
2005	NA	NA	NA	1.1		0.0	2.0
2006	2.2	11.5	12.1	0.0		10.0	9.0
2007	11.1	38.9	5.0	0.0		7.5	2.0

Sample size > 95



Monitoring Results for Juvenile Salmonids

Results

- TDGS < 120%
 - few signs of GBT found in migrating juveniles.
- TDGS > 120%
 - signs begin to increase in incidence and severity (as seen in 1996 & 1997)

Conclusion:

- Monitoring effective; research related signs of GBT to mortality providing the basis for the monitoring program
- After 14 years of monitoring, the potential for gas impacts is not a concern until tailrace TDG exceeds 120% due to uncontrolled spill

Monitoring Results for Adult Salmonids

Adult

- Monitoring conducted over several years at Bonneville and Lower Granite dams

Results

- As TDGS increases, signs increase

Conclusion

- monitoring can be routinely conducted, however, as with juveniles no management action is usually possible when signs increase (i.e., uncontrolled spill)

*Adult monitoring discontinued as per recommendation of DEQ