

Modifications to TDG Monitoring and Tracking In Oregon and Washington States

Modification to TDG Monitoring and Tracking Overview

- ◆ The Adaptive Management Team (AMT) process and the results
- ◆ Two modifications to TDG monitoring and tracking
- ◆ The BiOp court case's effect on implementing these changes
- ◆ Effects to the hydrosystem and TDG monitoring

The Adaptive Management Team Question

If the 115% TDG criterion of the state standard and forebay gages are removed, what would be the effects on spill, TDG and fish survival?

The Adaptive Management Team process and the results

Oregon and Washington states worked together reviewing all of the scientific data

The US federal agencies worked together to provide technical information on

- ◆ TDG levels,
- ◆ Spill levels and
- ◆ Fish survival.

Models Used

- ◆ SYSTDG model was used to predict TDG levels and spill volumes
- ◆ HYDSIM model was used to generate the actual flow and spill volumes for COMPASS
- ◆ COMPASS model was used to predict fish survival

Adaptive Management Team

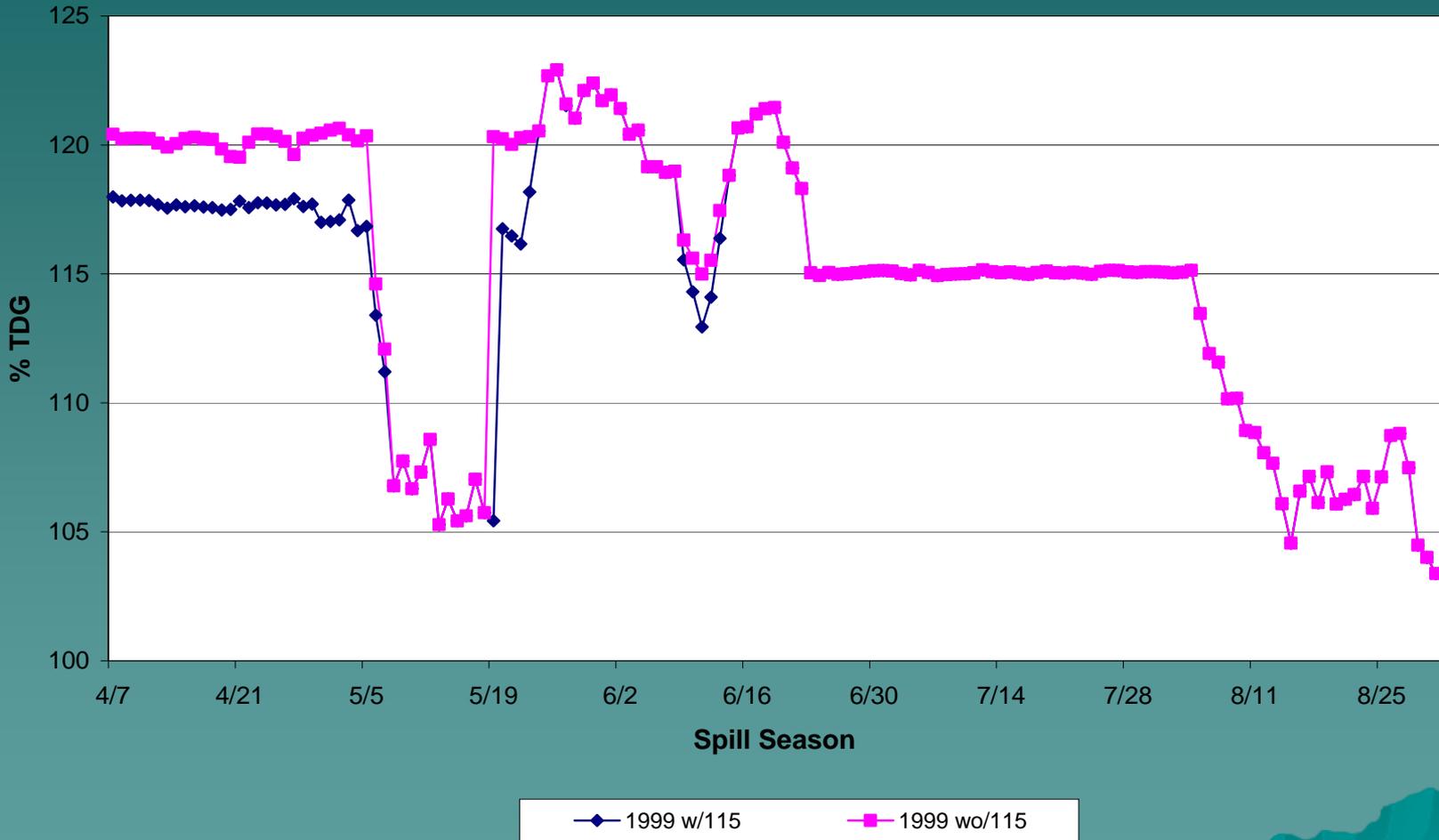
Modeling Assumptions

- ◆ We modeled 2007 as representative of a low WY, 2002 as medium WY & 2006 as high WY
- ◆ 8 dams were modeled: 4 on lower Columbia and 4 on lower Snake Rivers
- ◆ Used the final 2008 Biological Opinion spill operations for the 8 dams
- ◆ Model with and without 115% TDG criterion

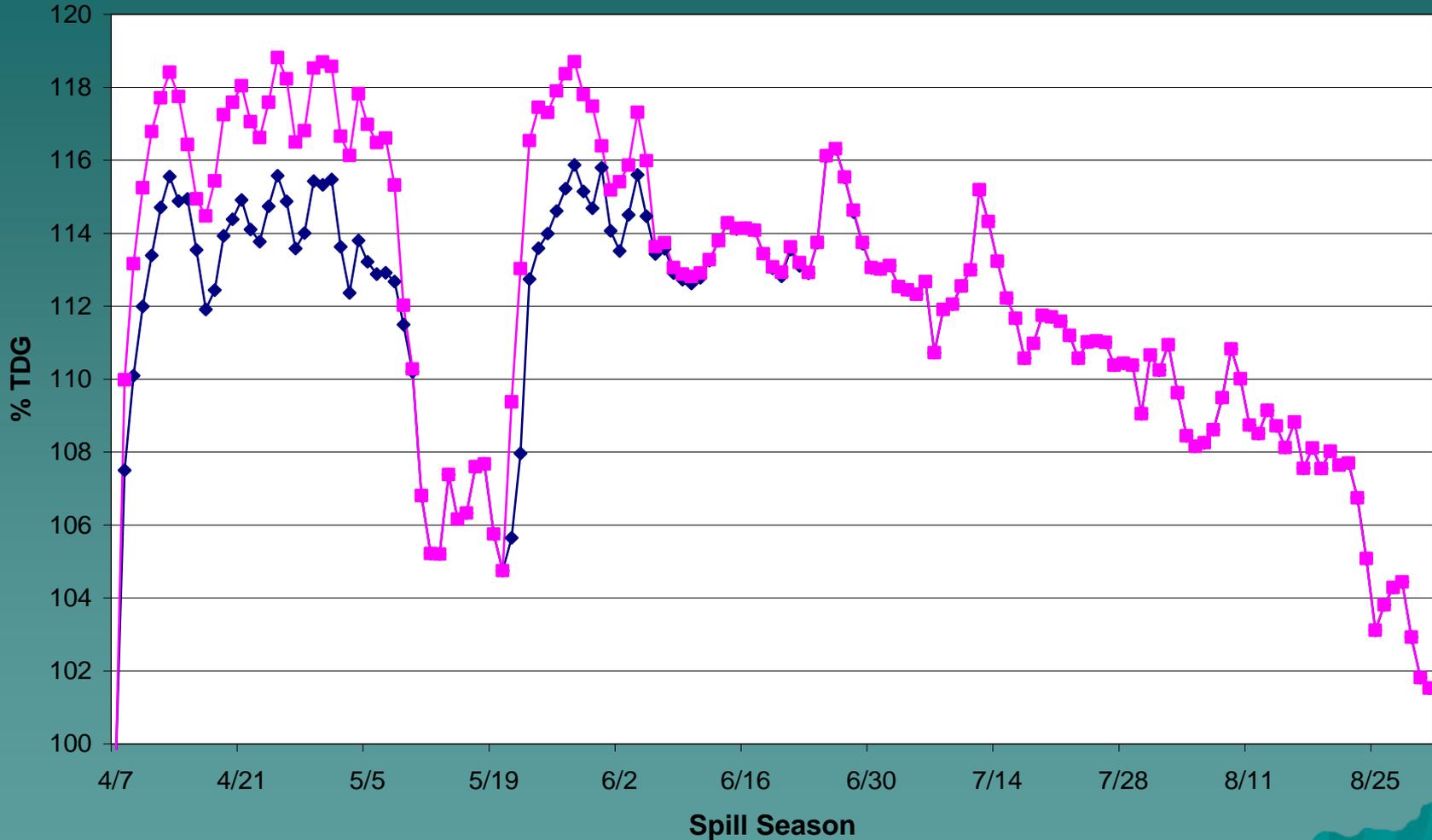
Corps Modeling Results on TDG levels

- ◆ The increases in the monthly TDG levels at Lower Monumental tailwater, the Ice Harbor forebay, Bonneville tailwater and Camas Washougal can persist for one to three months.
- ◆ The largest increase in TDG levels would occur at the Ice Harbor forebay with April through August average for all high 12 hour average TDG levels increasing 0.5% in a low water year; 0.9% in a medium water year; and 3.0 % in a high water year.

Lower Monumental Tailwater % TDG in 1999 (high WY) with and without 115% TDG Standard

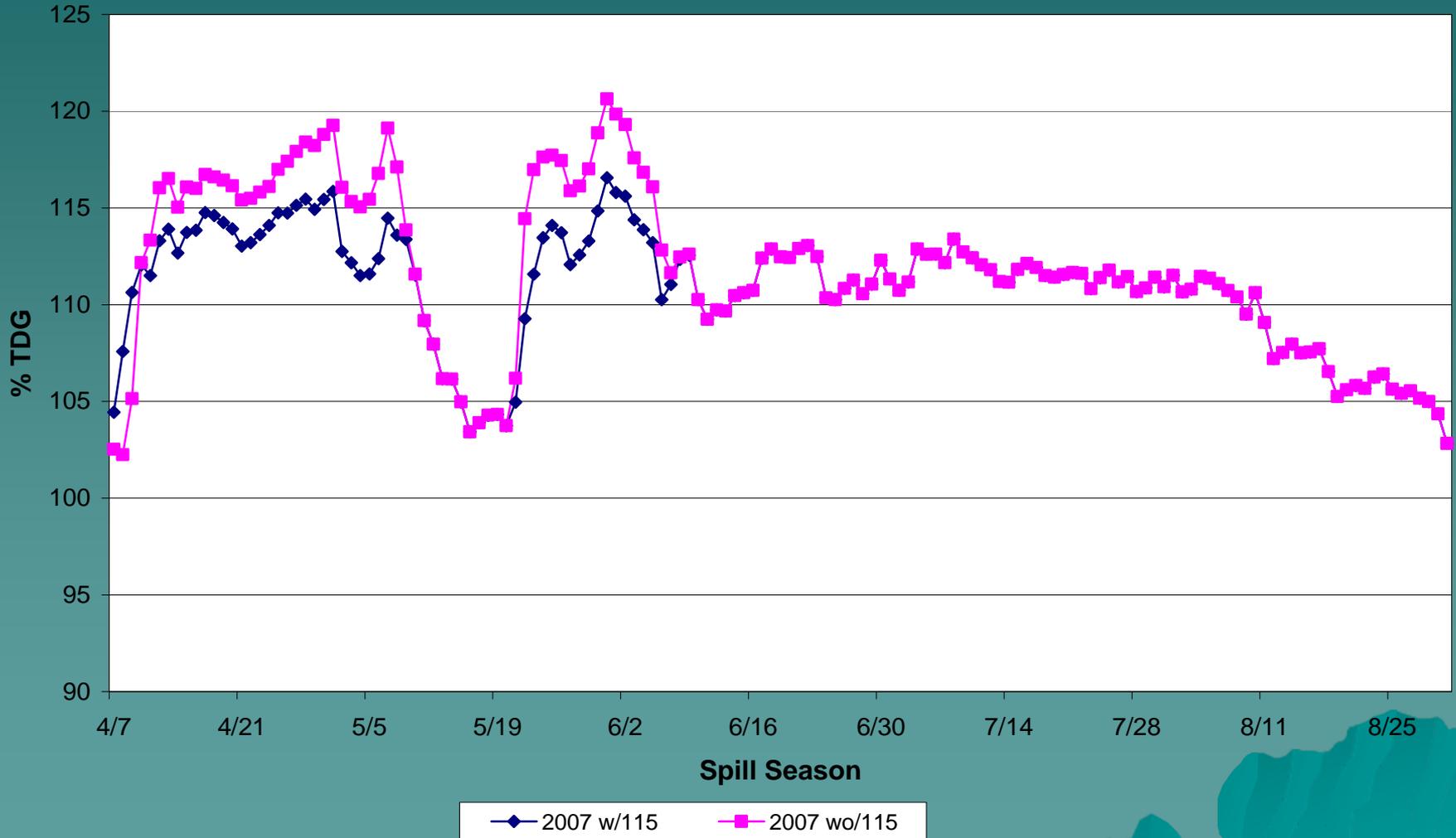


Lower Monumental Tailwater % TDG in 2002 (medium WY) with and without 115% TDG Standard



◆ 2002 w/115 ■ 2002 wo/115

Lower Monumental tailwater % TDG in 2007 (low WY) with and without 115% TDG Standard



Corps Modeling Results

Spill levels

- ◆ If the 115% TDG criterion was removed, there would be 2.3 to 5.9 MAF additional spill
- ◆ Most of the additional spill would come from two dams: Lower Monumental and Bonneville
- ◆ There would be a negative effect on SR steelhead (-1.11%). Other species had very small positive effects on in-river survival.

Additional spill if TDG was managed to 120%

	Low WY	Med Wy	High WY
Projects	Spill Increase in KAF	Spill Increase in KAF	Spill Increase in KAF
Lower Granite	0	0	0
Little Goose	4	68	568
Lower Monumental	1,425	1,333	1,283
Ice Harbor	0	0	0
McNary	0	0	0
John Day	1	203	1,060
The Dalles	11	66	675
Bonneville	1,023	616	2,266
Total spill increase	2,463	2,285	5,852

HYDSIM Model

- ◆ HYDSIM used the SYSTDG spill caps and generated daily flow and spill rates for the COMPASS model.
- ◆ HYDSIM incorporated all of the hydrosystem regulations & requirements.
- ◆ HYDSIM flows and spill rates closely matched SYSTDG, except for high WY.

NOAA Compass Inputs

- ◆ Uses HYDSIM daily flows and spill rates for a 70 years of record
 - ◆ Uses average daily temperatures
 - ◆ Covers only April – June
 - ◆ Covers only lower Columbia and Snake River projects
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- A decorative graphic at the bottom right of the slide, consisting of a silhouette of a mountain range in a teal color, matching the background.

NOAA Compass Outputs

Provides output for 5 ESUs and 2 species

- Snake River spring/summer Chinook
 - Snake River steelhead
 - Upper Columbia spring Chinook
 - Upper Columbia steelhead
 - Mid Columbia steelhead
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- ◆ Currently the model does not address fall Chinook or sockeye
 - ◆ Survival only calculated for four lower Columbia dams using Snake River stocks as surrogates

NOAA COMPASS Model Results

- ◆ 120% TDG and tailwater FMS only operations produced no effect, or very small positive effect on Smolt to Adult Return (SAR) for all species except Snake River steelhead (-1.11%)
- ◆ The negative effect on Snake River steelhead SAR was primarily due to reduced transport numbers
- ◆ Most species experienced a very small, positive effect on in-river survival (<1%)

Mean result for 70- year water Record Analysis (1929-1999)

	In River Survival	destined for transport	FCRPS survival	Whole population LGR-LGR SAR
Snake River Spring/Summer Chinook				
120	60.90%	66.00%	86.00%	0.92%
115*120 cap	60.80%	68.60%	86.90%	0.92%
absolute change	0.10%	-2.60%	-0.90%	0.01%
Relative change from 115*120 cap	0.20%	-3.80%	-1.00%	0.80%
Snake River Steelhead				
120	38.70%	75.30%	84.70%	1.78%
115*120 cap	38.60%	77.20%	85.80%	1.80%
absolute change	0.10%	-1.90%	-1.10%	-0.02%
Relative change from 115*120 cap	0.30%	-2.50%	-1.30%	-1.10%

AMT Meeting Decisions resulting in 1st change to TDG Monitoring Requirements

- ◆ Oregon State decided to eliminate its 115% TDG forebay water quality criterion and that forebay fixed monitoring stations were not necessary to assess acceptable TDG levels in the Columbia River. Therefore, according to the TDG waiver forebay gages are not needed for spill management, including the Camas Washougal gage.
- ◆ Washington State decided to retain the 115% TDG forebay water quality criterion. The state did not believe the overall benefits of additional spill versus additional risk of gas bubble trauma support a rule revision. Therefore the forebay gages are needed for spill management and the Washington standard reflects this.

The Adaptive Management Team Documents

The reports and presentations with more detailed information can be found at:

<http://www.ecy.wa.gov/programs/wq/tmdl/ColumbiaRvr/ColumbiaTDG.htm>
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2nd change to TDG

Monitoring/Tracking Requirements

- ◆ Washington State changed how TDG exceedances are calculated.
- ◆ Instead of the 12 highest hours in a 24 hour day (Oregon Method)
- ◆ The Washington method calculates the 12 highest **consecutive** hours, which means TDG exceedances can span across parts of 2 days.

Implementation of these changes

- ◆ Since the Oregon/Washington border splits the lower Columbia River the Corps will operate to the more restrictive standard. Typically, this is the WA standard but on a few days the Oregon standard is more restrictive at certain locations, so it will be used on those days for that location.

Camas Washougal Forebay Gage

- ◆ The Camas Washougal criterion was removed from the WA water quality standards in 2006.
- ◆ As a result of AMT, the Oregon TDG waiver no longer includes the Camas Washougal gage in the state TDG standard/waivers.
- ◆ But the litigation.....

The BiOp Litigation

- ◆ Since the 2008 Biological Opinion is in litigation, the US federal government operated consistent with the US District Court of Oregon order.
- ◆ This means, the previous TDG monitoring system, with forebay gages and the method for calculating the 12 hour average used in 2007 continued through 2009.
- ◆ It is unknown at this time what the TDG monitoring plan will be in 2010 as the litigations is still pending.

Future Effects of these changes to hydrosystem and TDG monitoring

- ◆ No forebay gages will be physically removed since they are needed for SYSTDG modeling.
- ◆ Both Oregon and Washington methods for calculating the high 12 hour average will be used.
- ◆ The involvement of the Camas Washougal forebay gage in spill management is undetermined at this time.

Future Effects of these changes to hydrosystem and TDG monitoring

- ◆ Based on 2008 and 2009 TDG exceedance tracking, the Washington method resulted in more TDG exceedances, predominately at forebay gages.
- ◆ Since the Washington method for calculating the 12 hour average is more restrictive, it can be expected that less spill will occur when used for spill management.