Total Dissolved Gas Adaptive Management Team

Columbia and Snake Rivers

Nov. 1, 2007
Portland, Oregon

www.ecy.wa.gov/programs/wq/tmdl/columbia_rvr/columbia_tdg.html

Today's Agenda

- Introductions and logistics
- Overview of the TDG AMT
- Begin addressing first technical issue
- Information requests
- Schedule future meetings

Introductions

AMT members are:

1. State of Washington (Ecology co-chair*)
2. State of Oregon (ODEQ co-chair*)
3. NOAA Fisheries
4. USACE
5. Save our Wild Salmon
6. Confederated Tribes of the Colville Reservation
7. Columbia River Inter Tribal Fish Commission
8. Grant County PUD
9. EPA
10. NW River Partners
11. USFWS

Meetings are open to the public

* WDFW and ODFW are advising Ecology and ODEQ in the adaptive management process.

Overview of the TDG AMT

Purpose of the AMT

- Help Washington and Oregon answer specific questions regarding the TDG TMDL.
- The AMT is a technical group; will not address policy issues.

Role of AMT Members

- Provide technical information (look for )
- Advise Washington and Oregon on the TDG TMDL
- Comment on proposals
- Deadlines for Technical Input
  - One week prior to the next meeting

Roles of Washington and Oregon

- Make decision using technical input
- Follow state and federal laws and regulations
- Communicate with the AMT
  - Website

Website

www.ecy.wa.gov/programs/wq/tmdl/columbia_rvr/columbia_tdg.html

Columbia and Snake Rivers TDG Information - Microsoft Internet Explorer

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Address http://www.ecy.wa.gov/programs/wq/tmdl/columbia_rvr/columbia_tdg.html

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Topic Index | Contact Us | Search GO

Ecology home > Water Quality > TMDL > TMDLs by Watershed/Ecology Region > Columbia and Snake Rivers > TDG on the Columbia and Snake Rivers

Total Dissolved Gas on the Columbia and Snake Rivers

Total Dissolved Gas

Elevated total dissolved gas (TDG) levels are mainly caused by spilling water at hydroelectric dams on the Columbia and Snake Rivers. Water plunging from a spill entrains TDG at high levels. High TDG can cause "gas bubble trauma" in fish. Some spills are done to meet juvenile fish passage goals (helping them get past the dams).

TMDLs

Oregon and Washington wrote Total Maximum Daily Loads (TMDLs) to address TDG on the Columbia and Snake Rivers. Oregon and Washington have listed multiple reaches of the Columbia and Snake Rivers on their federal Clean Water Act 303(d) lists due to TDG levels exceeding state water quality standards.

The TMDLs included a status review in 2010 on the implementation of the TMDLs. Due to an increase in interest in the TDG requirements we are convening an advisory group comprising representatives of tribes, federal and state agencies, and others to evaluate appropriate points of compliance for this TMDL. This group is called the Adaptive Management Team (AMT).

Links to the TMDLs (Ecology publications):

Lower Columbia River
www.ecy.wa.gov/biblio/0203004.html

Mid Columbia River
www.ecy.wa.gov/biblio/0403002.html

Snake River
www.ecy.wa.gov/biblio/0303020.html

Additional information is available on the Oregon Department of Environmental Quality website:
www.deq.state.or.us/wq/TMDLs/columbia.htm#tdg

Adaptive Management Team

Click here for a complete description (PDF) of the role of the adaptive management team (AMT). The first issue the AMT will address is the need and location of the 115% forebay TDG monitoring requirement.

Columbia (WA/OR) and Snake (WA) Rivers

Two Main Issues for the AMT

1. The need and location for the 115% forebay TDG monitoring requirement.

2. The location of tailrace TDG monitors.

How will a decision be made?

- Based on the best available information
- Using TDG TMDL
- Weighing TDG impacts against fish passage, factoring in uncertainties and data gaps

Timing

- Every attempt will be made to implement decisions prior to the next year's fish passage spill season.
- Any rule change will take longer.

Sequence of Events

1. Review literature regarding biological effects of higher TDG.
2. Review literature or other studies regarding increase survival of fish due to higher spill allowed by removing 115% requirement.
3. Summarize (and compare) #1 and #2, share with AMT.
4. Gather input from AMT.
5. Staff recommendations.
6. ODEQ 30 day public comment period.
7. ODEQ and Ecology make decision.

Overview of Clean Water Act and State Regulations

1972 Clean Water Act

303(d) List

List of Water Quality Limited Waters
State submitted every 2 years to EPA

Provides a way to identify problems, and develop and implement watershed recovery plans

TMDLs

Water Quality Management Plans

Water Quality Standards

Beneficial Uses

- Water quality standards are established to protect beneficial uses of the State's waters.
- When a water quality standard is established, the first step is to identify the beneficial uses sensitive to the parameter.
- Beneficial uses are assigned by basin in the Oregon Administrative Rules for water quality.

Table 101A

Designated Beneficial Uses
Mainstem Columbia River
(340-41-0101)

Beneficial Uses	Columbia River Mouth to RM 86	Columbia River RM 86 to 309
Public Domestic Water Supply[1]	X	X
Private Domestic Water Supply[1]	X	X
Industrial Water Supply	X	X
Irrigation	X	X
Livestock Watering	X	X
Fish & Aquatic Life[2]	X	X
Wildlife & Hunting	X	X
Fishing	X	X
Boating	X	X
Water Contact Recreation	X	X
Aesthetic Quality	X	X
Hydro Power		X
Commercial Navigation & Transportation	X	X

[1] With adequate pretreatment and natural quality that meets drinking water standards.

[2] See also Table 101B for fish use designations for this river.

Table produced November, 2003

Criteria are established based on the levels needed to protect the sensitive beneficial uses. Specifically, the uses typically **most sensitive**

http://www.deq.state.or.us/wq/rules/div041/dbutables/table101a.pdf

Oregon TDG Standards

Oregon Administrative Rules (OAR) 340, Division 41:

http://www.deq.state.or.us/regulations/rules.htm

OAR 340-041-0031

- **110%** applies everywhere at all times, *except* when stream flow exceeds the 10-year, 7-day average flood flows
- **105%** applies in hatchery-receiving waters and other waters of less than two feet in depth

- **340-041-0104**
- Water Quality Standards and Policies Specific to the Main Stem Columbia River

- (3) Total Dissolved Gas. The **Commission may modify the total dissolved gas criteria in the Columbia River for the purpose of allowing increased spill for salmonid migration**. The Commission must find that:

- (a) Failure to act would result in greater harm to salmonid stock survival through in-river migration than would occur by increased spill;
- (b) The modified total dissolved gas criteria associated with the increased spill provides a reasonable balance of the risk of impairment due to elevated total dissolved gas to both resident biological communities and other migrating fish and to migrating adult and juvenile salmonids when compared to other options for in-river migration of salmon;
- (c) Adequate data will exist to determine compliance with the standards; and
- (d) Biological monitoring is occurring to document that the migratory salmonid and resident biological communities are being protected.
- (e) The Commission will give public notice and notify all known interested parties and will make provision for opportunity to be heard and comment on the evidence presented by others, except that the Director may modify the total dissolved gas criteria for emergencies for a period not exceeding 48 hours;
- (f) The Commission may, at its discretion, consider alternative modes of migration.

Oregon TDG Waiver

- 10 day period in March for Spring Creek
- April 1 to August 31 for purpose of fish passage
- 115% forebay
- 120% tailrace
- Measured as 12 highest hourly measurements per calendar day
- AMT component
- Biological and Physical monitoring
- End of year reporting required
- ACOE must provide written notice w/in 24 hrs of any violation of conditions during voluntary spill
- Expires August 31, 2009

http://www.deq.state.or.us/wq/TMDLs/docs/columbiariver/tdg/acoetdgwaiver.pdf

Washington Regulations

Washington Water Quality Standards

- WAC 173-201A 200(1)(f)
- 110% applies everywhere
- Special condition for Columbia and Snake Rivers to aid fish passage

WA Regs con't

Special condition for Columbia and Snake Rivers to aid fish passage:

- TDG <115% in forebays
- TDG <120% in tailraces

(measured as average of twelve highest consecutive hourly readings)

- Requires gas abatement plan

WAC 173-201(A) 200(1)(f)(ii)

Overview of TDG TMDLs

TMDL Requirements

- Three TMDLs covering all Columbia and Snake River Dams
- 7 Q-10 Flood Flows Identified for each dam
- Load Allocation tailrace monitor locations identified for each dam
- Include an “Adaptive Management Team” clause
- Short-term and Long-term implementation schedules
- Purpose is to meet water quality standard of 110%

TDG TMDLs

- Provisions of both Acts must be met

- CWA: primary purpose of TMDLs must be to comply with the Clean Water Act, although finding a means of compliance with both laws is also a goal (consultation).

- ESA: purpose of these standards is to help reverse the downward trend in listed salmon populations and therefore ensure viable salmon resources in the Columbia River Basin.

- The Clean Water Act does not envisage trade-offs of fish passage for TDG; it requires, rather, attainment of water quality standards.

TDG TMDLs

- TMDLs may be used to condition exemptions, modifications, variances, permits, licenses, and certifications.

- Short-term, structural gas abatement solutions may result in higher spills rather than lower TDG levels.

- As new, more effective fish passage facilities are completed and evaluated, their contribution to the attainment of hydrosystem performance standards will hopefully allow spill levels for fish passage and associated TDG levels to be reduced, but only as long as the performance standards are met.

Lower Columbia River TDG TMDL Partners

- The U.S. Army Corps of Engineers (Portland District, Walla Walla District, and Northwest Division) provided extensive technical information for this TMDL. Large tracts of the technical analysis have been quoted or paraphrased from the Corps' Dissolved Gas Abatement Study (DGAS). This TMDL would have been much more difficult without the understanding of total dissolved gas production resulting from the DGAS study.

- The National Marine Fisheries Service provided valuable advice and review. The Biological Opinion issued in December 2000 pursuant to the Endangered Species Act was invaluable in describing the studies that have been conducted to date, and in specifying the effects of total dissolved gas on fish.

- The U.S. Environmental Protection Agency provided financial and technical assistance.

- Tetra Tech and Battelle Northwest Laboratories provided review and technical input.

- The Western Governor's Association played a major role in outreach.

- The Columbia River Inter-Tribal Fish Commission provided invaluable review and coordination. Staff from the Yakama, Nez Perce, Colville, Spokane, and Kalispel Tribes also contributed to the process.

- The Bonneville Power Administration, U.S. Bureau of Reclamation, and Grant County Public Utilities District provided review and input.

Lower Columbia River TDG TMDL

Implementation Goals

Implementation will be achieved through the USACOE Gas Abatement and Degas programs.

The starting point will be the current regime, including the 115/120 percent waivers for ESA fish passage.

Over time this will need to be ratcheted down to the standard.

The Biological Opinion survival goals would be met through fish passage actions other than spilling water.

The ultimate aim is 110 percent of saturation and meet Bi-Op fish performance standards.

Lower Columbia River TDG TMDL

Short-term compliance (till 2010)

FMS stations can continue to be used, or new FMS stations can be established

compliance can remain adaptive and flexible, while long-term compliance remains fixed to firm goals.

Will involve improving water quality, while ensuring that salmonid passage is fully protected in accordance with the National Marine Fisheries Service's Biological Opinion

Maintenance of required spill at the modified standards to allow for fish passage will be as measured at the fixed monitoring stations both in the forebay and the tailrace of each dam.

Lower Columbia River TDG TMDL

Long-term compliance (2010 -2020)

Structural and operational changes to dams to achieve the water quality standards

Monitor at the loading capacity compliance locations in the tailrace

Project	Location
Upstream Boundary	Below Snake River confluence (to be linked to upstream TDG TMDLs)
McNary Dam spill	1000 feet below end of McNary spillway [1]
John Day Dam spill	1700 feet below end of John Day spillway [2]
The Dalles Dam spill	600 feet below end of The Dalles spillway [3]
Bonneville Dam spill	1700 feet below end of spillway [4]

Lower Columbia River TDG TMDL

Long-term compliance cont. (2010 -2020)

Load allocation locations may lend themselves to a permanent remote monitoring setup.

Statistical relationships may be developed between TDG levels at the continuous monitoring location and the compliance location that allow real-time and long-term trend evaluation of compliance.

Correlation to the load allocation compliance point will be necessary

Prior to the initiation of a load allocation monitoring survey, a quality assurance project plan, or equivalent, must be approved by the Washington State Department of Ecology and the Oregon Department of Environmental Quality.

The quality assurance project plan should address the safety and stability of the site to support monitoring equipment and activities when subject to the strong hydraulics below the dams.

Lower Columbia River TDG TMDL

Long-term compliance cont. (2010 – 2020)

Load allocation compliance monitoring will occur following major structural changes or immediately following the end of Phase I and Phase II.

Evaluation of previous and future near-field transect studies at the compliance location (the end of the aerated zone below each dam).

Actions taken in the previous phase will be reviewed for their efficacy, both in improving TDG levels and for protecting salmonid passage

Compliance will be determined by a combination of periodic synoptic surveys, especially after structural changes have been completed, and continuous monitoring, using a statistical relationship between the continuous monitor and conditions at the compliance location.

Lower Columbia River TDG TMDL

Adaptive Management

The process for reviewing the status of implementation of this TMDL will follow the timing and process for the review of the federal Biological Opinion in 2010.

The Washington State Department of Ecology will convene an advisory group comprising representatives of tribes and federal and state agencies to evaluate appropriate points of compliance for this TMDL.

Based on these findings, further studies may be needed, and structural and operational gas abatement activities will be redirected or accelerated if needed.

Issue #1

- The need and location for the 115% forebay TDG monitoring requirement.

Need for 115%

What are the biological impacts (GBT) of eliminating the 115%?

Vs.

How many more fish will pass through the system if we eliminated the 115%?

Literature Review

Evaluation of TDG Biological Effects Research:

Toward assessment of appropriate Washington State Water Quality TDG criteria for the Columbia and Snake Rivers

- Synthesis
- Data Gaps

http://www.ecy.wa.gov/programs/wq/tmdl/columbia_rvr/tdg_study_refs-0807.pdf

What are the biological impacts (GBT) of eliminating the 115%?

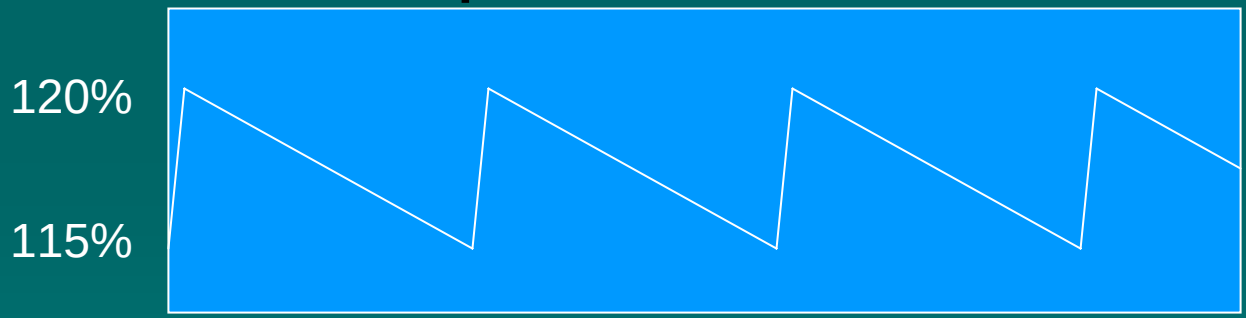
Literature Review:

- Available on website
- Reviewed 150 studies on TDG from 103-120%
- Requesting technical review (missing information in summaries or important studies that are missing)

Biological Impacts Con't

- Anadromous Fish
- Resident aquatic life
- Cumulative Impacts

(includes ***all*** aquatic life – they can be categorized it whatever way makes the most sense)



- Include Methodology

How many more fish will pass through the system if we eliminated the 115%?

Need technical information on:

- How much more spill (and where) would there be if 115% was eliminated?

1999 - 2006 Spill Seasons
Number of TDG Exceedances

AVERAGE HIGH 12 HR %TDG EXCEEDANCES AT FMS FROM 1999 - 2006									
	2006	2005	2004	2003	2002	2001	2000	1999	Totals
Water Quality Gages	Qty.	Qty.	Qty.	Qty.	Qty.	Qty.	Qty.	Qty.	Qty.
Lower Granite Forebay *	0	0	0	0	0	5	2	0	7
Lower Granite Tailwater	28	0	0	15	17	0	4	15	79
Little Goose Forebay *	24	0	3	10	17	0	2	39	95
Little Goose Tailwater	19	0	0	6	6	0	9	6	46
Lower Monumental Forebay *	56	6	1	19	49	0	28	44	203
Lower Monumental Tailwater	29	7	1	10	6	0	12	26	91
Ice Harbor Forebay *	51	3	4	35	24	0	34	44	195
Ice Harbor Tailwater	22	3	2	4	6	0	4	12	53
McNary Forebay - Wa. *	31	8	10	24	43	1	14	22	153
McNary Forebay - Or.	--	11	23	32	45	5	22	19	157
McNary Tailwater	32	1	7	12	31	0	17	50	150

Fish Passage Con't

Need technical information on:

- How many fish (by type) pass through now and how many would pass through if the 115% was eliminated?

- Include methodology

AMT Monthly Meeting Schedule

- Date (Day of week…)
- Time
- Location

Wrap up

- Deadlines for Technical Input
  - One week prior to the next meeting in order for WDOE and ODEQ to consider
- Upcoming Agenda Items
- Next meeting (date / time / location)
- Meeting summary posted to web

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