WILLAMETTE BASIN TMDL

EXECUTIVE SUMMARY

INTRODUCTION AND PURPOSE:

- The Willamette Basin Total Maximum Daily Load (TMDL) is:
  - A pollution analysis to determine why certain waterbodies in the Willamette Basin do not meet water quality standards.
  - A strategy to return those waterbodies to a healthy status.
- TMDLs are essentially a pollution budget which determines:
  - How much pollution a stream can receive and still meet water quality standards.
  - How much excessive pollution is in the stream. (This represents how much pollution must be removed from the stream to meet water quality standards.)
  - Who is responsible for reducing pollution.
  - A framework and commitment for those actions needed to reduce the pollution.
- This TMDL is a series of such studies across much of the Willamette Basin, addressing primarily bacteria, mercury and temperature. These pollutants are known to be problematic in much of the Willamette Basin. (Warm temperatures are considered a water quality pollutant.)
- The Willamette Basin consists of 12 separate subbasins and the mainstem Willamette River which starts near Eugene and flows north to the Columbia River.
- This executive summary provides:
  - A description of how the TMDL document is organized.
  - An overview of the TMDL.
  - Specific information for bacteria, mercury, and temperature.
- Each part includes information on key issues, findings, and what will happen as a result of this TMDL.

WILLAMETTE RIVER TMDL DOCUMENT ORGANIZATION:

- This TMDL document has been structured to accommodate multiple users ranging from the U.S. Environmental Protection Agency (which reviews and approves the TMDL), permitted sources of pollution, management agencies that will be called on for implementation of the TMDL, technical reviewers, and readers with a general interest.
- The document is structured to provide a focus on the mainstem Willamette River and nine of the 12 subbasins.
- It contains the following chapters:
  - An overview of the Willamette Basin.
  - Specific chapters on the three primary parameters of concern: bacteria, mercury and temperature. These three chapters contain detailed analyses for each pollutant and focus primarily on the mainstem Willamette River. For bacteria and temperature, these chapters also provide summaries of the Subbasin-level analyses.
  - Specific chapters have been created for each of the nine subbasins that were the focus of detailed monitoring and analysis. These provide a local focus of all the TMDL-related issues within a geographic region.

- A water quality management plan (WQMP) is included which provides a framework for the implementation of the TMDL. While the TMDL analysis determines what pollution reductions are needed to achieve water quality standards, the WQMP indicates the strategies needed to make the reductions happen.
- Technical appendices have been included to provide detailed assumptions, analyses, and other supporting information. These appendices have been designed to enhance the readability of the main chapters by placing much of the detailed technical information in the appendices rather than in the main chapters.

Overview:

- The Willamette is ODEQ's first attempt at a basinwide TMDL; previous TMDLs completed by ODEQ focused on single subbasins.
- The Willamette Basin consists of 12 individual subbasins.
- Temperature, mercury and bacteria are three main pollutants presenting widespread problems in the Basin. These parameters are addressed for specific subbasins.
- Several additional pollutants including dissolved oxygen, turbidity, and toxics (DDT, aldrin, dieldrin) were addressed for specific waterbodies.
- The scale of the analysis varies depending on the pollutant:
  - Mercury –
    - Applies to the entire basin (all 12 subbasins).
  - Temperature –
    - Applies to 9 subbasins, with a major effort on the mainstem Willamette River.
    - Tualatin TMDL completed in 2001; Yamhill and Molalla-Pudding were deferred.
    - The 9 individual subbasins were covered in a manner consistent with previous temperature TMDLs.
    - Mainstem system represents a major modeling effort; largest single piece of TMDL.
  - Bacteria –
    - TMDL applies to 4 subbasins that have a higher proportion of urban and agricultural land uses (Lower Willamette, Middle Willamette, Upper Willamette, and Clackamas).
    - Bacteria planning targets apply to other five subbasins that have no 303(d) (impaired waterbody) listings yet but have the potential for similar problems. This approach is proactive in nature and will put protections in place to hopefully prevent future 303(d) listings.
- Stakeholder Outreach
  - The Willamette River TMDL Council, comprised of more than twenty stakeholder representatives, focused on mainstem temperature and mercury issues. This group provided direction and review throughout the TMDL process.
  - Other outreach has occurred, to watershed councils, state and federal agencies, specific entities and other interested parties.
- Designated Management Agencies (DMAs)
  - DMAs implement nonpoint source TMDL pollutant reductions. It is likely that more than 100 jurisdictions in the Willamette Basin will be designated as DMAs. These DMAs include 92 cities and 8 counties, plus special entities such as U.S. Army Corps of Engineers (USACE).

- USEPA Involvement/Issues
    - Numerous discussions and briefings have occurred with staff from the USEPA to discuss the methodology and findings of these TMDLs.

Bacteria:

Key Issues:

- Bacteria problems have been identified on the 303(d) list of water quality impaired waterbodies in the urbanized and agricultural portions of the Lower Willamette, Middle Willamette, Upper Willamette, and Clackamas subbasins. These problem areas have been specifically addressed as part of this TMDL.
- Bacteria can affect water contact recreation usage by increasing the risk of pathogen-induced illness (typically gastrointestinal, respiratory, eye, ear, nose, throat and skin diseases) through skin contact or ingestion of water.
- Bacteria are typically carried into streams and rivers as part of stormwater runoff in urban and agricultural areas.
- Very little bacteria originate in forested areas.
- Lower Willamette is affected by the Portland Combined Sewer Overflow (CSO) problems:
    - Portland CSO agreement with ODEQ and the Oregon Environmental Quality Commission (EQC) assumes exceedence frequencies of one every 3 summers and 4 every winter (see Amended Stipulation and Final Order (ASFO, 1994).
    - Modeling of the Willamette River in the region of the Portland CSO area indicated that allocated reductions upstream, in combination with reductions from the implementation of the ASFO, will result in elimination of human health criteria violations throughout the river.
- Wastewater treatment plants have permit limits that minimize their contribution of bacteria and ensure they meet water quality standards prior to discharge.
- Permits for larger confined animal feeding operations are issued by Oregon Department of Agriculture (ODA). These permits prohibit discharge resulting from specific aspects of livestock operations.
- Bacteria problems have not been specifically identified in the North Santiam, South Santiam, McKenzie, Middle Fork, and Coast Fork Subbasins. However, the potential is very high for future bacteria problems to develop. As a result, bacteria reduction targets are being provided for these subbasins as a planning tool to allow local cities and watershed managers the opportunity to reduce the likelihood of future problems with bacterial contamination.

Findings:

- Much of the Mainstem of the Willamette River meets water quality standards most of the time. Violations are most common in the lower reach of the river in areas undergoing active remediation, and presumably near the confluences of major tributaries.
- Bacteria levels are highest in urban areas. This finding is attributed primarily to stormwater runoff. Likely sources include animal wastes (including pet waste), leakages and equipment failures in sanitary sewer systems, failing septic systems, and fecal waste from wildlife such as ducks and geese. Needed bacteria reductions for urban areas are in the 60-90 percent range.
- Bacteria levels are also high in several largely agricultural tributaries to the Willamette River. Operations that involve livestock and livestock fertilizers tend to provide the most

significant contributions. Other likely sources include failing septic systems and fecal waste from wildlife. Needed bacteria reductions for agricultural/rural areas are in the 60-80 percent range.

- Combined Sewage Overflows (CSOs) are another major source of bacteria in the City of Portland. This occurs when larger rainstorms overwhelm the combined stormwater and sewage system resulting in the release of untreated sewage into the Willamette River. These combined systems are fairly typical of older, large cities. The "Big Pipe" construction project in Portland is being built to virtually eliminate such problems.

What Will Happen:

- Cities with populations of 50,000 and larger are required to have stormwater permits (Phase 1 and Phase 2 municipal stormwater (MS4) permits) to minimize bacteria and other pollutant runoff. These permits will be updated to reflect new information from this TMDL and may require the implementation of more stringent controls for bacteria as necessary.
- Cities less than 50,000 will need to develop stormwater strategies to minimize the amount of bacteria that will enter streams and rivers. Though these cities will not have permits, their plans will be reviewed and approved by ODEQ.
- The City of Portland will meet the terms of its Amended Stipulation and Final Order to control CSO overflows by 2011.
- Agricultural lands are under the jurisdiction of the Oregon Department of Agriculture. Existing Agricultural Water Quality Management Area Plans are updated every two years. The findings of this TMDL will be incorporated into these plans.

Mercury:

Key Issues:

- The Oregon Health Division has posted fish consumption advisories for the Willamette River, Cottage Grove Reservoir and Dorena Reservoir due to high concentrations of mercury in certain fish species. These advisories discourage the consumption of these fish.
- The fish consumption advisories have triggered this mercury TMDL. The goal of this TMDL is to determine how to reduce the amount of mercury in the river so that mercury levels in fish will drop to an acceptable level. The ultimate objective is to eliminate the fish consumption advisory for mercury so fish are safe to eat. The mercury TMDL is not due to the violation of in-stream water quality standards.
- Initially, it was thought that most mercury in the Willamette comes from old mercury and gold mines located in the mountains of the Coast Fork Subbasin. That does not appear to be the case based on the analysis and the data considered in this study.
- This is the first mercury TMDL in Oregon.

Findings:

- Mercury comes from many sources in the Willamette:
    - Mercury naturally occurs in the soils of the Willamette Valley. The excess erosion of these soils from agricultural, forested, and urban lands contribute to mercury in the river.
    - Mercury is deposited onto the land and water from numerous air pollution sources. These include certain industries in the Willamette Valley; the burning of

fossil fuels by cars, trucks, trains, boilers, etc; fires; and sources outside the United States.
    - Small quantities of mercury are discharged into the river by wastewater treatment plants and certain industries.
        - Wastewater treatment plants receive mercury through disposal of consumer products (lights and switches) and from dental amalgams (tooth fillings).
        - Mercury occurs in native trees and is released during processing wood pulp and paper.
    - Abandoned mines represent a small contribution of the mercury problem in the Willamette River though they are a significant source of mercury in the Cottage Grove and Dorena Reservoirs.

- A 27% reduction in mercury pollution in the mainstem Willamette is needed to eventually remove the fish consumption advisory.
- Incremental TMDL in 2 phases:
    - The Phase 1 TMDL will set allocations by sectors (e.g. wastewater treatment plants; industrial dischargers; urban, agricultural, and forested lands);
    - Path Forward/Phase 2 - ODEQ and stakeholders have committed to increase monitoring and take action now to reduce mercury discharges.
    - ODEQ will develop a second mercury TMDL in 2011 that will likely have revised targets, reduction requirements, and may include individual permit limits for sources.

What Will Happen:

- Sources of mercury pollution will be required develop mercury reduction plans and reduce the amount of mercury released into the environment. Examples of areas to be addressed include:
    - Reducing mercury in wastewater discharges.
    - Controlling soil erosion in urban, agricultural, and forested lands to minimize the movement of mercury particles into waterways.
    - Minimize mercury from abandoned mines.
- ODEQ and stakeholders are working to design a plan for data collection and the future analyses needed. Additional mercury data will be collected with funding from EPA and the wastewater dischargers;
    - Characterizing levels in waterbodies.
    - Characterizing levels from wastewater discharges.
    - Monitoring levels of airborne mercury deposited within the Willamette Valley.
    - Analyzing and modeling mercury in water and fish.

Temperature:

Key Issues:

- The Willamette Basin is home to a number of threatened and endangered species of fish; warm water temperatures are a factor in their decline.
- Temperatures frequently exceed biological criteria for rearing and migration and exceed spawning criteria during portions of the spawning period.
- The Willamette River and many of its tributaries have been greatly altered hydrologically by dams, urbanization, and stream channelization activities.
- TMDL addressed temperature in 9 of 12 Willamette Subbasins, including the entire mainstem river.
- Significant input was received from the Willamette River TMDL Council on the mainstem effort.
- Individual subbasins were addressed separately (typical TMDL approach).
- Implementation of new temperature standard was a big challenge for this TMDL due to the timing of the standard's approval (March, 2004), the lack of developed implementation guidance, and the scope and complexity of the Willamette Basin TMDLs (the most ambitious and complicated TMDL developed in Oregon to date).
- Stakeholders assisted with analytical plan development, data collection and analysis as part of a collaborative approach. Significant contributions were made by the Association of Clean Water Agencies, United States Army Corps of Engineers and Northwest Pulp and Paper Association.
- Very comprehensive data collection and TMDL analysis effort (model developed to examine period of critical conditions for 2 years). This was a collaborative monitoring and modeling process involving Portland State University, the US Geological Survey (USGS), the Bureau of Land Management (BLM), the United States Forest Service (USFS) and ODEQ.
- Allocation framework reflected input from TMDL Council.
- Reserve Capacity is available on mainstem and in subbasins and is unique compared to most previous TMDLs. Reserve capacity represents some heat allocation that has been set aside to accommodate future growth and development rather than allocating it to existing sources.
- The impact of heated discharges upstream of the Santiam River is greatest near the City of Albany.
- TMDL based on current USACE reservoir operations rather than natural flow and temperature regimes.
- Meeting standards for protecting salmon as they migrate up the river will require protection of cold water refuges (habitat).
- Restoration in tributaries will provide the greatest benefits to water quality and habitat.

Findings:

- TMDL analysis demonstrates the river naturally exceeds standards for protecting salmon during warmest months. When this occurs, this natural condition is used to set pollutant limits;
- Impacts of major dams, reservoirs and loss of riparian vegetation are the major sources of river warming;
- Other potential causes of river warming include loss of wetlands, channel modifications, and flow modifications;

- Oregon temperature standard allows human increases of 0.3ºC over protective temperature limits. The TMDL allows point sources up to 0.20 ºC increase in the lower river, and up to 0.23 ºC to sources in the upper river.
- Several point source discharges are limited during part of the year by these wasteload allocations;
- TMDL allows increases in point source heat load relative to current levels, though generally less than allowed under existing permits;
- Waste load allocations are flow-based and increase as river flow, and therefore load capacity, increases.
- TMDL requires reductions in nonpoint sources, but allows a portion of the human use allowance to be applied to nonpoint sources. This is a new policy for nonpoint sources and will require the development of implementation guidance.

What Will Happen:

Mainstem:

- All point sources of pollution (industrial and waste water treatment plants) receive unique permit limits based on real time river conditions.
  - Permits for sources from the Santiam River southward on the average hold pollution impacts at current levels with some growth available to most. Some sources (particularly industrial) have reduced pollutant limits.
  - Permits for sources northward of the Santiam River will allow some increase above current operations, but less than allowed in current permits.
- USACE will be required to analyze impacts of dams on temperature and develop temperature management plans to minimize effects;
  - Will consider operational changes.
  - May result in more costly structural modifications such as the selective withdrawal project at the Cougar Dam in Lane County.
- Nonpoint Pollution Sources (urban, agricultural, forestry) will be required to restore natural riparian (streamside) vegetation:
  - Even though trees will not substantially shade the mainstem river, streamside shading provides localized cool water refugia for fish.
  - Restoration and protection will be managed through implementation plans that already exist (Agriculture and Forestry) or through those developed by other designated management agencies.
- Some heat load has been held back to provide for future growth.
  - One half of this reserve capacity will be available for allocation when the TMDL is issued;
  - The second half will be available when USACE has completed analysis of effects on temperature in the Willamette River.

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Subbasin:

- Limits on point sources in subbasins may restrict operation or growth due to relatively smaller stream flows.
- Nonpoint Sources (urban, agricultural, forestry) will be required to protect or restore natural riparian vegetation.
  - Effectiveness of shading increases as stream width narrows. Much of the critical fish habitat is found in the foothill reaches

Overall:

- ODEQ will include new permit limits with renewal of wastewater permits;

- Senate Bill (SB) 1010 Plans will be updated to reflect TMDL.
- Oregon Forest Practices Act will govern for non-federal forest lands.
- Northwest Forest Plan and federal water quality restoration plans will govern federal forest lands.
- For urban and rural/non-agricultural lands, Designated Management Agencies (DMAs) will be required to develop TMDL Implementation Plans within 18 months of the issuance of the TMDL. This requirement includes the USACE for dams.

Water Quality Management Plan:

- The Water Quality Management Plan (WQMP) is the framework for implementing the TMDL. It provides information regarding:
    - Who is responsible for which activities to ensure that water quality improvements will be achieved over time:
        - Permitting activities are typically managed by ODEQ.
        - Designated Management Agencies (DMAs) are cities, counties, and other jurisdictions, such as the US Army Corps of Engineers, that have authority to implement water quality improvements. These DMAs will be required to develop TMDL Implementation Plans to address TMDL allocations within their jurisdiction.
        - TMDL Implementation Plans are due within 18 months from the date of the Notification Letters that ODEQ sends to DMAs, permitees, and other affected parties. The Notification Letters are to be sent out by ODEQ within 20 days of the TMDL being issued as an Order by ODEQ. The Implementation Plan due date is not dependent on USEPA's approval of the TMDL.
        - Oregon Department of Agriculture has responsibility for water quality improvements on agricultural lands. This is implemented through the Senate Bill 1010 process.
        - Oregon Department of Forestry has responsibility for water quality improvements on non-federal forest lands. This is implemented through the state Forest Practices Act.
        - Federal land managers (Bureau of Land Management and US Forest Service) have responsibilities for water quality improvements on federal lands. This is implemented through Water Quality Restoration Plans.
    - A general timeframe estimating when water quality standards for each parameter (e.g., temperature, bacteria) are expected to be met.
- Oregon uses an adaptive management approach to implementing TMDLs. This approach compares TMDL implementation activities to the success of water quality improvements. When the implementation activities appear to be successful through monitoring and reporting by DMAs, no changes would be proposed. When water quality improvements are not apparent, implementing agencies and ODEQ would consider alternative options to achieve water quality improvements.