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2006 TMDL Workload Assessment

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2006 TMDL Workload Assessment

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Washington State Department of Ecology
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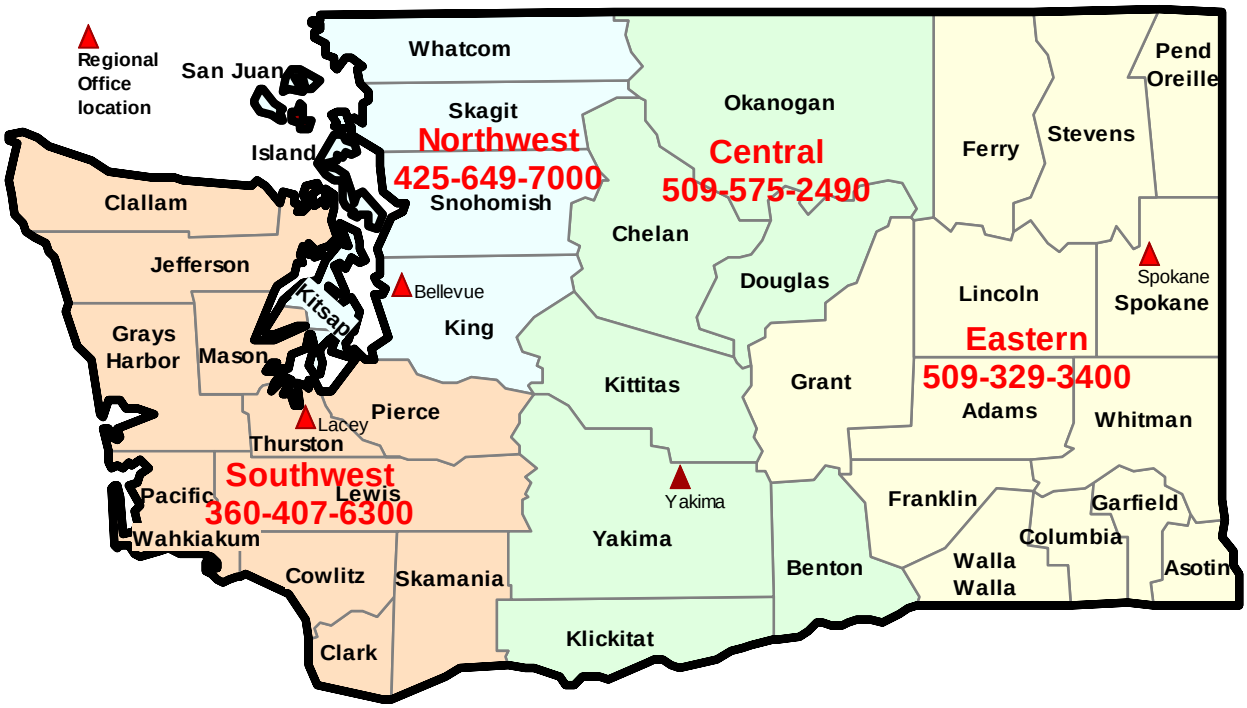

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Introduction

In 2004 and 2005, the Department of Ecology compiled and assessed statewide water quality data to get an up-to-date picture of the overall status of water quality in Washington's waters. The results of the assessment, Washington's Water Quality Assessment, satisfy the requirements of sections 303(d) and 305(b) of the federal Clean Water Act. The Water Quality Assessment divides waters into five categories. Category 5 represents the state's 303(d) list of impaired waters.

The Clean Water Act generally requires that a TMDL, or Water Quality Improvement Report, be prepared for each of the water bodies on the 303(d) list and that each listing be addressed within 13 years. States may also use alternative approaches to get to clean water. Therefore, for each new Water Quality Assessment, Ecology must decide how and when to address the Category 5 listings.

In 2001, the Water Quality and Environmental Assessment Programs produced an assessment of the workload to meet the 15-year schedule in our memorandum of agreement with EPA and to address the polluted waters on the 1998 303(d) list. In addition to setting out a TMDL production schedule, the 2001 workload assessment made several assumptions about other processes expected to address listings. It was hoped that these processes would make it unnecessary for Ecology to prepare TMDLs for every listing on the 1996 and 1998 lists. The 2001 workload assessment also proposed some changes to the TMDL program to improve efficiency.

This 2006 workload assessment describes the process we used to estimate the staff resources needed and the time it will take to address the 2678 Category 5 listings on the 2004 list. It also discusses the assumptions and recommendations made in the 2001 workload assessment.

We assessed the workload to address the 2004 listings using these steps:

- Water Quality Program (WQP) TMDL staff in each Ecology region worked with Environmental Assessment Program (EAP) staff to group the listings in their geographic jurisdictions into logical projects.
- Working with EAP staff, WQ TMDL staff estimated the time it would take to complete each TMDL project (or to complete an alternative approach to a TMDL), projected the approximate start and end date for each project, and estimated the number of staff it would take to complete and implement each project. Our intent is to be as accurate as we can about the future timing and workload for the next three to five years; however, we suspect that our estimates will have a larger margin of error the farther out into the future we project them to be.
- We also made our best estimate of what resources would be needed to implement each TMDL.

The 2006 workload assessment below is organized into the following sections.

- Evaluation of recommendations and assumptions made in the May 2001 workload assessment
- Assumptions built into Table 5 of the 2001 workload assessment
- Staff and funding resources needed to address 2004 listings
- Staff and funding needs to implement TMDLs
- Other costs of implementation
- Conclusions and recommendations

Evaluation of recommendations and assumptions made in the May 2001 workload assessment

The first TMDL workload assessment was done in 1998. The 1998 assessment estimated the total program cost to produce TMDLs for all of the impaired waters on the 1996 303(d) list. Based on the 1998 assessment, Ecology redirected existing staff and asked for additional resources from the state legislature and EPA. In 2001, Ecology re-examined the TMDL program to see if we could identify operational efficiencies and refine the workload estimates.

The 2001 workload assessment made several assumptions and recommendations. Each of these is described below, along with an evaluation of its accuracy and/or effectiveness. Sections in italics are quotes from the 2001 workload assessment.

> *1. "Single entry into the watershed*
> *We now plan to comprehensively address all 303(d) listings within a given geographic area, to the extent possible. The TMDL submittal report to EPA will contain "chapters" addressing different parameter types. This will allow greater efficiencies in public involvement, implementation, and the overall TMDL process. It will also gain some efficiency in sampling and technical analyses; however, separate technical studies for different parameters will still be needed in most cases."*

We believe this is still a good idea because it demonstrates the inter-relationship of pollutants and gives the public a single, comprehensive look at their watershed, which can help them to understand how all the actions going on in a watershed can combine to affect water quality. It also addresses a large number of listings at the same time. However, we underestimated the amount of time needed to complete the technical work for multi-parameter TMDLs. The increased size of the data sets alone extends the analysis period. The outreach work also takes more time because the information being presented is more complicated than if we were dealing with only one pollutant. There may also be more stakeholders involved because different groups tend to focus on different pollutants, and because the TMDL may cover a large geographic area.

In the future, we should be deliberate about the areas we choose to attempt a single entry TMDL and should set our work schedules to accommodate the longer amount of time they will take. Some factors to evaluate when considering doing a multi-parameter TMDL are:

- Do people in the local area want to deal with all the water pollution issues at once?
- How many point sources of pollution are there? More point sources will make the TMDL more complicated.
- Are the land uses mostly homogenous? The more fragmented the land uses, the more complicated the TMDL.

2. "Larger geographic areas
We now realize that to address all of the listings statewide in the remaining 12 years, projects covering larger geographic areas will be necessary. The most common scale will be about one-half to one-third of a Water Resource Inventory Area, although sizes will vary by geographic area and complexity of the situation..."

This recommendation is related to Number 1, above. Often, to address all the 303(d) listings in a watershed, it is necessary to define a fairly large area. Covering a larger geographic area with a TMDL has many of the same advantages as doing a multi-parameter TMDL. It can deal with a watershed in a comprehensive way. It addresses multiple listings simultaneously. It can also take more time because it may take multiple community meetings to cover the entire geographic area, and there may be multiple stakeholder groups associated with sub-areas of the watershed.

We continue talking about this approach (since 2001), and one idea being considered is the possibility of doing a statewide or ecoregion-wide temperature TMDL. A large-scale approach might also work well for toxics listings that we believe are mostly legacy pollutants or are mostly due to atmospheric deposition.

We believe that trying to capture larger geographic areas is a good idea. Some factors to consider when delineating the geographic scope of a TMDL include:

- Does this geographic area make sense because the 303(d) listings are all for the same pollutant or related pollutants or sources?
- Does it make sense because the solutions for all of the pollutants identified will require implementation at a watershed scale and will use the same array of BMPs?
- Does it make sense because the area is a logical political division, which may help with implementation?

3. "Maximize use of existing data
We plan to take full advantage of all water quality studies that have been performed in the areas of interest. Where sufficient data exist to complete a TMDL or de-list a water body, no additional data collection will be undertaken."

WQP staff in both the Northwest and Central Regional Offices has used existing data in TMDLs they've produced. The WQP Watershed Management Section has used data collected by the Forest Service to produce TMDLs for Wenatchee and Colville National Forests. It is standard operating procedure in EAP to look at existing data if there is time. However, it can be difficult to find existing data and sometimes it does not satisfy the model needs, isn't credible, or is too old to use.

The Water Quality Program tried to use existing data to produce lake TMDLs, which we thought could be produced without collecting any additional data. Completing 40 lake TMDLs was identified as a priority in the 2001 workload assessment (this is also discussed in #10 workload prioritization, below.) We found, however, that many existing lake management plans did not include enough data for us to complete a TMDL.

We should continue using existing data in our TMDLs as long as it meets our data quality requirements and helps us complete the TMDL more quickly. This is consistent with the way we use data for the Water Quality Assessment.

> *4. "Match level of technical rigor to study objectives*
> *For point source TMDLs, pollutant-control implementation measures are directly related to the technical study findings. The cost of implementation is sensitive to the final allocation quantities. The level of technical rigor of these studies is necessarily high.*
>
> *For nonpoint TMDLs, the implementation measures tend to be relatively insensitive to the exact load allocation. For example, for bacteria TMDLs, the implementation measures will tend to be similar whether the TMDL calls for a 60% or 30% reduction in loading. Therefore, a very high level of technical rigor may not be necessary to meet the TMDL objectives for nonpoint sources. More emphasis will be placed on follow-up monitoring.*
>
> *The success of nonpoint TMDLs is tied directly to the commitment of local parties to implement the necessary control measures. Local commitment is usually greater if there is local involvement in the technical study: for example, through collaborative data collection. This collaborative approach may sometimes result in lower technical rigor. For nonpoint TMDLs, we recognize that local involvement is often more important than a high level of technical rigor."*

Our thinking regarding this recommendation has changed since 2001. It continues to be true that local involvement in TMDL production helps to ensure commitment to implementation. However, we have had to be careful that we do not give the impression that a scientific document may be altered by non-scientific comments. This has been a problem in some controversial TMDLs.

When dealing primarily with nonpoint pollution, we have found that the same suite of best management practices is recommended over and over again, for instance for fecal coliform pollution or temperature. This led us to the conclusion that we should spend less money on rigorous technical studies to prove the same thing over and over, and more money on implementing BMPs. This is still an approach we would like to get to eventually. However, rigorous technical studies can help persuade people to implement BMPs by identifying problems in their own backyard and by showing how much better the water could potentially be.

In general, we are more likely to be successful with a less rigorous study in a watershed where citizens are actively interested in improving water quality, and more likely to need a rigorous study where there is active opposition to admitting to a problem and accepting responsibility for correcting it. In the future, we should consider whether or not we really need to perform a rigorous study or whether an abbreviated approach could work as well. Ideally, this decision should be made during each region's annual TMDL scoping workshop. Some factors to consider are:

- Is the pollution problem well documented and do local citizens acknowledge that they are part of the problem and should help to fix it?

- Are we able to document that this watershed is very like another one with the same problems so that we can use what we learned somewhere else?
- Does an organized stakeholder group exist in the watershed that either supports or opposes our TMDL work? How strong do we anticipate the support or opposition to be?

> *5. "Standardized, streamlined technical approaches*
> *To date, Ecology's TMDL program can be characterized as being in a development phase. We now have enough experience to move into more of a production mode for TMDLs. To that end, we are developing standardized approaches for temperature, bacteria, dissolved oxygen, and nutrients. This will allow the projects to be conducted more efficiently.*
>
> *By assigning more people for a shorter time period, the project duration for complex TMDL technical analyses is expected to be shorter than many past projects. The assumed duration for complex TMDLs is reduced to about two years, after the completion of a preliminary "assessment and design" phase. The assumed duration of most other types of technical analyses is one year."*

We have not found that assigning more people makes a complex TMDL go faster. Rather, we have found that complex TMDLs can take far longer to complete than we originally thought. The idea of developing standardized technical approaches to dealing with some pollutants is still viable, and we have done this for toxics listing verification studies. NWRO began to apply a standardized approach for bacteria TMDLs using existing local data for several watersheds, but efficiencies were reduced by the requirement for complex stormwater wasteload allocations. However, standardized approaches for other pollutants are still works in progress.

> *6. "Pragmatic decisions*
> *We recognize that TMDLs are often controversial, with many policy and technical issues associated with each study. To meet our settlement agreement, pragmatic decisions will need to be made to stay on schedule. We will need to make reasonable decisions and move on."*

The thought in 2001 was that we were going to be able to complete TMDLs even in areas where there was opposition. The intent was to keep moving no matter what happened. This has not always been possible, and in retrospect, it may not have been a good approach in every situation, since in some watersheds, opposition to a TMDL became so intense and political that we were unable to continue.

In the future, we intend to take a strategic look at each watershed for which we are considering a TMDL to determine what we know about the political situation, whether there is active support for or opposition to a TMDL, whether outside interest groups are likely to be concerned with issues that will be addressed in a TMDL, etc. This will help us to gauge the level of effort we might have to invest in technical rigor and public outreach, and might help us to more accurately predict how long it will take to complete a TMDL. By thinking through these issues ahead of time, we may be able to avoid some of the pitfalls we've encountered in a few watersheds in the past. It will also help us to schedule TMDLs that we suspect will be controversial and difficult at

times when we have the staff available to concentrate on them. This last benefit will apply to some regions more than to others. The Central Regional Office, for instance, has fewer TMDLs left to complete than the other regions, so does not have the luxury of scheduling them when the region has the most resources. Instead, CRO staff assumes that every TMDL will create controversy and plan their work to stay on schedule with their TMDL production goals.

> *7. "Organizational efficiencies*
> *To improve efficiency, the TMDL technical work will be more specialized than at present. Teams of technical staff will conduct TMDLs using standardized approaches. The initial teams are proposed to consist of 1) Temperature, 2) Complex/medium, 3) Simple Nonpoint, and 4) Toxics. Each team will produce a chapter of the final technical TMDL report for a given watershed (not all elements will be needed for each watershed). In addition, tasks and essential functions for staff in both EAP and WQP will be matched to appropriate job classifications."*

The Environmental Assessment Program actually re-organized the Watershed Assessment Section around these categories, and we did gain some efficiencies by doing so. In retrospect, we probably should have put more resources into doing temperature TMDLs because we have a large number of temperature listings; and temperature TMDLs require intensive modeling.

The EPA requirement for quantified wasteload allocations for municipal stormwater (Wayland & Hanlon, 2002) added complexity to most TMDLs and underlined the need to coordinate TMDL development with stormwater permitting.[1] In the future, we should establish closer working relationships between TMDL and stormwater staff in the Water Quality Program to help integrate waste load allocations and actions recommended in TMDLs into stormwater permits.

> *8. "Administrative efficiencies*
> *The following administrative efficiencies have been identified:*
> - *Boilerplate quality assurance project plans (QAPPs) and reports. A set of QAPP and report templates will be established for different types of TMDL projects (e.g., temperature, bacteria)*
> - *Data analysis spreadsheet tools will be developed for common analyses, including standard quality assurance calculations and the bacteria statistical "roll-back" approach.*
> - *The EAP technical report will contain all appropriate text for the submittal report, in the form of an executive summary or other section. Therefore, Ecology regional staff will not need to do any summarizing or rewriting of the technical elements. This will result in substantial time savings, based on recent experience."*

[1] Wayland, R.H. and J.A. Hanlon, 2002. *Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for Stormwater Sources and NPDES Permit Requirements Based on those WLAs*, U. S. EPA, Office of Water, Memo to Water Directors EPA Regions 1 – 10, Washington, D.C., November 22, 2002, 6 pp.

Standardization of some data analysis tools did occur. However, the other recommendations about boilerplate QAPPs and executive summaries were not implemented. The recent TMDL redesign made the same recommendations and we are now beginning to implement them.

> *9. "New and redirected staff resources*
> *The Water Quality Program (WQP) and Environmental Assessment Program (EAP) will receive approximately $1.24 million in new Clean Water Act Section 106 funds for next fiscal year. The two programs have agreed to allocate 10 additional full-time employees (FTEs) for EAP and 3.5 additional FTEs for WQP. This decision was based on the assumption that limited EAP resources (for technical analyses and data collection) are currently the primary obstacle to producing TMDLs.*
>
> *The WQP has examined the work of a wide range of staff and determined that a number of these individuals are engaged in activities that contribute to TMDLs. For the purposes of this effort, these activities are being re-directed toward long-term TMDL objectives. Examples of this change are forestry staff working with the U.S. Forest Service on their TMDL requirements, and coordination of agricultural technical assistance efforts to correspond with local TMDL efforts. These re-directs and additional new resources are reflected in the workload and productivity estimates that follow."*

The additional TMDL staff has helped us complete TMDLs and meet deadlines. Attempting to redirect the work of other staff has not been so successful. For example, the legislature directed Ecology to eliminate two positions working on implementation of Ecology's memorandum of agreement with the Forest Service. Most of our livestock staff went away with transfer of the dairy program to the Department of Agriculture; and Ecology Salmon Recovery staff that was focused on nonpoint was also cut. The work of other staff may incidentally help with TMDL implementation; however, that is not their main focus. To be successful, we need staff dedicated to TMDL implementation.

> *10. "Workload prioritization*
> *WQP and EAP have evaluated the workload for the next two years and identified a specific set of projects for the FY02 and FY03 time periods. In particular, the programs are concerned about meeting their first "balloon payment" due under the Settlement Agreement MOA in FY03.*
>
> *With this in mind, high priority will be given to completing TMDLs for approximately 40 lakes. Management plans have been completed for these lakes; we will use these plans as the basis for load allocations and implementation planning. We will also focus attention on approximately 50 303(d) listings for toxic compounds. Due to changes in analytical methods and questionable*
> *sampling protocols, we intend to re-sample and determine if any of these should be de-listed. In addition, other TMDLs will be developed in FY02-03 as part of our current ongoing project list."*

Our re-evaluation of toxics listings, which we call *toxics verification studies*, resulted in approximately 130 de-listings. Our strategy of using lake management plans to quickly complete

TMDLs did not work so well. We found that many existing lake management plans did not include enough data for us to complete a TMDL without having to collect additional data. In addition, many of the lake plans were deficient in not addressing the entire watershed, but instead focusing only on in-lake solutions, and in many cases, the solutions they recommended had not been implemented. All of these issues made producing lake TMDLs much more complicated, controversial, and labor intensive than we had expected. Since the 2001 workload assessment, we have completed only one lake TMDL. It may be better to defer this work and to focus our limited TMDL resources on other projects.

> *11. "Columbia Basin TMDLs*
> *We have recently reached agreement with Oregon and Idaho on a commitment to develop TMDLs for dissolved gas and temperature in the mainstem Columbia and Snake rivers. We have allocated 1.6 FTEs (one from EAP and 0.6 from WQP) to participate in the technical and policy aspects of the process. The WQP position will also oversee TMDL work in the Columbia Basin and help develop an agreement that would delegate TMDL development for the area to the U.S. Bureau of Reclamation (0.4 FTE).*
>
> *In addition, Washington, Idaho, and Oregon asked the Western Governor's Association to facilitate the agreements needed to complete these TMDLs. The Western Governor's Association agreed to do this and has assigned a staff person to the project."*

The Columbia TMDLs have turned out to be difficult and time-consuming. We did finish the total dissolved gas TMDLs in cooperation with the states of Oregon and Idaho. EPA took the lead on the temperature TMDL in collaboration with Oregon and Washington, and after completing the technical study, stopped work on it due to political issues. We have evaluated the listings related to irrigation districts in the Columbia basin and have determined that for some of the irrigation canals, it is more logical to do a Use Attainability Analysis (UAA) than a TMDL. We had been consulting with EPA and the irrigation districts about how to design a UAA, but those talks have ended and we are not currently proceeding with this idea.

> *12. "New accountability measures*
> *In association with EAP and EPA, the WQP has recently completed a review of TMDL accountability procedures within Ecology. We acknowledge the need to manage flow of information and to work in a more structured fashion, especially among Ecology programs and EPA. We will incorporate this plan into Ecology TMDL development guidelines.*
>
> *These changes address the responsibilities of the lead organization and management accountability. We will establish formal coordination among EAP, WQP, and TCP. We will make organizational improvements within each of the various WQP sections working on TMDLs. Teams (led by WQP Leads) will become the primary internal coordination unit for each TMDL. They will include members of WQP, EAP, EPA, local watershed planning leads, and other programs if appropriate. We will reconfigure data systems to improve tracking of 303(d) listings and TMDL development milestones."*

We now work on TMDLs in teams. The Water Quality Program regional TMDL coordinator is the lead and the team includes technical staff from the Environmental Assessment Program, a regional public involvement person (if available), and EPA (if the TMDL is identified as one in which we want high involvement by EPA.) We also invite local tribes to participate as team members. A staff person from the Toxic Cleanup Program (TCP) is not generally included on the TMDL team because we do not do TMDLs for contaminated sediments. Rather, we rely on TCP's clean up efforts to address contaminated sediment listings. However, it can be important to coordinate with TCP because a TMDL and a cleanup effort may affect each other.

The Central Regional Office has its own team approach. It has set up a regional TMDL team, whose members engage in scoping and workload evaluations each year. They also share information about TMDL successes and challenges. New TMDLs will be assigned to teams of at least two people, which should help to ensure the work keeps moving despite vacation schedules and personnel changes.

The TMDL Accountability Team (A-Team) meets quarterly, and coordinates TMDL issues between the WQ and EA Programs and the regional offices. The members are the WQ Program regional section managers, the EA Program Watershed Ecology section manager, and the chair is the WQ Program Watershed Management section manager. The group deals with policy questions and tracks progress completing and implementing TMDLs.

We are presently in the midst of developing a combined Watershed Assessment Tracking database.

> *13. "Coordination with Watershed Planning Act*
> *The WQP has been concerned about the duplication of efforts and the confusion associated with multiple watershed processes underway in Washington. To bridge the gap between the WQP TMDL efforts and Ecology's implementation of the Watershed Planning Act (HB 2514), lead staff from both programs identified several ways to improve coordination.*
>
> *The 2514 Watershed Leads will help create opportunities for TMDL Leads to coordinate with various watershed planning units. The objective of this coordination is to engage the planning units in identifying priorities and concerns, and to assist with the issues related to implementation. The WQP hopes that these needs and findings will ultimately become part of local watershed (2514) plans. In turn, the WQP will strive to provide technical assistance needed to address the water quality issues in the planning unit areas."*

Whenever possible, we coordinate our TMDL work with 2514 watershed planning, and even use the 2514 committee as the TMDL stakeholder group when appropriate. Sometimes this has worked well. For example, the Wenatchee Watershed Planning Unit has adopted the implementation activities from the Wenatchee temperature TMDL into its watershed plan. For the most part, however, the different objectives and operating procedures used in the two programs do not work well together and can cause confusion with roles and responsibilities. The 2514 groups are focused primarily on water quantity issues, and dealing with water quality is

optional for them. They also operate by consensus, which is not necessarily the way TMDL groups work. TMDLs must be written to meet the requirements of the federal Clean Water Act and state water quality standards, and this is not the case with 2514 plans. These differences can create a barrier that prevents integrating the two programs successfully.

Despite these problems, it is still a good idea to coordinate TMDLs with watershed planning as much as possible, since many pollution problems are affected by water quantity, and combining these two programs is one of the only ways we have to address water quantity and quality at the same time.

> 14. *"Public involvement*
> *Over the last year, the WQP has added public involvement staff in each Ecology region and headquarters. This team has been participating in TMDL activities throughout the state and has recently completed a plan for improving the public involvement process associated with TMDLs. This plan will be incorporated into the TMDL guidelines."*

It has been valuable to have public involvement staff helping with TMDL process issues and helping communicate better with the public. The Water Quality Program Public Involvement Team continues to be valuable to the program. Suggestions from its members about ways to improve the TMDL program led to the recent TMDL redesign project. Public Involvement Team members also served on several redesign committees.
Unfortunately, some of the regional public involvement positions were transformed into TMDL leads. The result was an overall loss in the amount of public involvement assistance available for TMDLs.

Assumptions built into Table 5 of the 2001 workload assessment

The 2001 workload assessment contained a table that established a proposed schedule for TMDL production to comply with our memorandum of agreement with EPA. This table assumed that in most years we would produce TMDLs at a steady rate, but there were three "balloon payment" years during which we expected to produce more or to have others produce them for us. We also assumed that other processes might address some of the listings so that we would not have to produce TMDLs for those. Some of these assumptions turned out to be correct and some did not.

Lake TMDLs

We had hoped to be able to do abbreviated lake TMDLs, using data from old Phase 2 lake restoration plans. The 2001 workload assessment assumed that by 2003, we would have produced 31 lake TMDLs. In fact, as noted above, we found that many existing lake restoration plans did not include enough data for us to complete a TMDL and turned out to be much more labor intensive than we had expected. So far, we have had only one lake TMDL approved by EPA.

U.S. Navy

Working in a formal partnership with Ecology and EPA, Puget Sound Naval Shipyard conducted extensive sampling in Sinclair and Dyes Inlets during 2002—2005, particularly focusing on stormwater impacts to these marine waters. The Navy has developed and verified a model that simulates stream and stormwater inputs of bacteria from various intensities of land development throughout the watershed. The Navy is currently running the model at the critical conditions Ecology has specified for the TMDL. Ecology expects to complete the technical study by June 2007 and to submit the TMDL to EPA by December 2007. This TMDL addresses 18 stream listings and one marine bay listing for fecal coliform bacteria in Category 5 of the 2004 Water Quality Assessment.

King County DNR

King County offered to do much of the technical work necessary to address 65 listings by collecting sampling data on numerous water bodies, placing that data into water quality models, and providing Ecology with this work to develop load allocations and prepare TMDLs. This offer was part of the county's plan to integrate TMDL program work into broader water quality goals and efforts. We were hopeful that King County's efforts would save work for our technical staff. King County's preliminary data collection and modeling efforts, while quite extensive, were undertaken largely independent of Ecology input and, upon analysis by EA Program staff, have been judged to be of a somewhat limited use to TMDL development. Since 2003, however, Ecology staff has worked closely with King County and has jointly established a new, clear sense of TMDL priorities and activities. King County recently helped organize and collect significant water quality data to support two major TMDL projects. County scientists are also providing input/review of Ecology's associated modeling efforts. We now anticipate that TMDLs will result.

U.S. Forest Service

Our assumptions about Forest Service TMDLs actually exceeded our expectations. The 2001 workload assessment anticipated that we would do 28 Forest Service TMDLs by 2011. In fact, we have been working on TMDLs that cover entire National Forests, so have already addressed 50 temperature and fecal coliform listings in the Colville National Forest. We have also completed the technical analysis for the Wenatchee National Forest, but did not produce a separate TMDL for the forest. This technical work is being incorporated into the TMDLs for the separate watersheds that include parts of the Wenatchee National Forest. We have also started talking with EPA and the Forest Service about doing a Westside Forest Service TMDL, which would cover all of the national forests west of the Cascades.

Toxics verification studies

Our assumptions about toxics listings verification studies also exceeded our expectations. In 2001, we decided to focus some attention on approximately 50 303(d) listings for toxic compounds. These listings had depended on different analytical methods and sampling protocols, and we decided to re-sample and determine if any of these should be de-listed. In fact, we have evaluated 170 listings through verification projects, and have recommended approximately 130 for de-listing.

Forest and Fish agreement

Finally, we had deferred addressing approximately 154 listings associated with forest practices until after 2009 to allow the adaptive management program in the forest practices rules enough time to assess whether the rules were working or not. In 2001, we had assumed that we would address these listings, if necessary, in 2011. At this time, it is not possible to say whether or not implementation of the forest practices rules has achieved improvement in water quality. However, production of TMDLs for waters affected solely by forest practices remains a low priority since we have forest practices rules in place intended to achieve compliance with the state water quality standards. We consider that it is a higher priority to produce TMDLs for listings caused by practices for which no regulatory structure is in place.

Staff and funding resources needed to address 2004 listings

Ecology's TMDL program has three major components:

- Technical analysis—this is the monitoring, data-gathering, modeling, and other analysis necessary to produce a TMDL. It is usually performed by the Environmental Assessment Program, but sometimes by staff in the Water Quality Program.
- Planning and public involvement—this is the process of developing the actual TMDL document, done by Water Quality Program staff. It involves initial public outreach efforts to explain what we're doing and why, formation of an advisory committee to work on the TMDL, integrating the technical work into the final document, and working to develop the Water Quality Implementation Plan once the TMDL has been approved.
- Program administration—the 2001 workload assessment included a wide variety of tasks in this category, including management of the 303(d) list and public involvement in the listing process, TMDL program coordination, technical review of TMDL documents, coordination of TMDL public involvement, development of groundwater and lakes TMDLs, and legal support for TMDL appeals and the MOA.

This assessment concentrated on the first two components. Our assumption is that we have adequate staff to administer the program. The TMDL redesign did increase the workload for headquarters staff because of the new requirement for a policy peer review of most TMDLs. However, this is balanced by the decreased role headquarters is playing in TMDL public involvement—this is being done mostly in the regions for individual TMDLs—and by the decision to stop doing lake TMDLs.

To assess the staff and funding needs for the technical analysis and planning required to address the 2004 listings, Water Quality Program (WQP) TMDL staff in each Ecology region worked with Environmental Assessment Program (EAP) staff to group the listings in their geographic jurisdictions into logical projects to address. We considered several factors to do the grouping:

- Are the pollutants logically related, for example, nutrients and dissolved oxygen?
- Would the same management practices address all the pollutants?
- Is the TMDL study area an entire watershed?
- Is the study area logical because it's controlled by a single jurisdiction?
- Is the group of pollutants to be addressed or the study area logical for some other reason?

We also agreed that some isolated listings might not get grouped into a TMDL project at all.

Using this method, the 2,678 listings on the 2004 list were grouped into 312 projects. Water Quality Program staff then estimated the approximate start date for each project and estimated how long each would take to complete. After this step, the two programs worked separately to develop estimates of the number of FTEs required to do the work in a ten-year timeframe.

Water Quality Program needs

We did our best to ensure that all regions were using the same set of assumptions about TMDL timing and number of FTEs required to do TMDLs of different geographic areas and levels of complexity. Our initial analysis of the numbers indicated that we would be short of Water Quality Program staff to address the 2004 listings. However, we were not certain that our estimates were consistent across all regions. To check our accuracy, we decided to do two things. First, using best professional judgment and our experience with past TMDLs, we standardized the amount of time and number of FTEs it would take to complete different types of TMDLs, and used those assumptions to re-evaluate the estimates made by each region. Our assumptions are summarized in Table 1, below.

Table 1. Regional Office TMDL development/DIP completion FTE estimates

Type TMDL	Total Years	Year 1	Year 2	Year 3	Year 4	Year 5	DIP	Total FTE
Simple	3	.3	.1	.5			.5	**1.4**
Complex	4	.3	.1	.2	.5		.5	**1.6**
Watershed	5	.3	.1	.2	.4	.5	.5	**2.0**
Other/Defer /Isolated	0							**.1**

Using these assumptions, we re-evaluated the projects proposed by each region and came up with the following FTE needs by region:

CRO: 25.8
ERO: 55.42
NWRO: 65.30
SWRO: 64.70
Total: 211.22 ÷ 10 years to complete work = 21.1 FTEs per year

This analysis resulted in an estimated need of approximately 211 FTEs over ten years, or 21 FTEs per year. The Water Quality Program presently has 15 full-time FTEs working on TMDL production, which means we have a shortfall of six. To make sure that we had not underestimated the amount of time it takes to do a TMDL, we also reviewed all the TMDLs we've done since 1998 and determined the average time it took to complete them. The average time was three years and three months, which gave us confidence that our standardized estimates were correct.

Environmental Assessment Program needs

The Environmental Assessment Program estimated FTE and lab dollars needed to complete the 312 projects using the following steps.

- Staff sorted the projects into project type—temperature, bacteria, oxygen-pH-nutrient, and toxics.
- For each project type, we estimated a typical or average cost per project (FTE and lab funds) based on past experience.

- We assumed that ten percent of all TMDL projects would be streamlined and that these would cost half of a typical project.
- We added in a very small cost for providing technical assistance on the non-EAP projects (generally for projects for which Water Quality Program staff do the technical work).
- We multiplied the projects by costs to come up with a total workload estimate for the 2004 list.
- We divided the total by ten to get the annual cost for addressing the 2004 listings in ten years.

This resulted in an estimated need of 20 FTEs and $7,954,000 for laboratory analyses over the 10-year period. EA Program presently has 18 staff working on TMDL production, so there is a shortfall of two FTEs. The lab dollars work out to a need of $795,000 per year. The EA Program presently has $300,000 per year for lab costs, which makes a shortfall of about $500,000 per year for the next ten years.

These are the best estimates of the two programs for what is needed to address the 2004 listings up to, but not including implementation. However, every time we do a new list, the amount of work we have to do will change.

Staff and funding needs to implement TMDLs

Estimating what we need to implement TMDLs proved to be far more difficult than estimating what we need to produce them. This is partly because we don't have much experience with completely implementing a TMDL, especially a TMDL with a large nonpoint component, so it is difficult to estimate how long it would take or what level of effort would be required.

Our major challenge is implementing the nonpoint component of TMDLs. In theory, the point source part is relatively easy because we just turn the wasteload allocation into a permit limit. However, even this is not as easy as it sounds, for instance, sometimes wasteload allocations are written in a way that is difficult to express as a permit limit. More communication between TMDL leads and permit writers could help alleviate this kind of problem. Even if the permit limit is easy to translate from the TMDL, it may not be easy to implement because it may require a discharger to install a new and expensive treatment system or the treatment technology may be unproven or unknown.

Implementing a nonpoint TMDL is even more difficult. Why?

- Some people simply deny that they are part of the problem or refuse to cooperate. To get over this hurdle, we need strong public outreach and must be willing to take enforcement action.
- Others in a community continue to debate the science used to establish load allocations.
- Then, there's the matter of uncertainty. Even with a willing implementer, what exactly does he or she implement? If there is an array of best management practices to use, which one do we choose? How many do we choose? When do we know that we've done all we can to fix the problem? Will this work meet water quality standards?
- Nonpoint implementation takes a long time. Restoring riparian areas, for example, takes years. We can designate a protected area, can plant native trees and shrubs, take care of them while they get established, and see no improvement for years.
- Measuring water quality improvement due to implementation of nonpoint BMPs is difficult because there is no end-of-pipe discharge to measure and the effect of implementation is often obscured because of other polluting activities going on in the same watershed. This makes it hard to get momentum going to fuel further implementation, since it's hard to show people the good effects of their efforts.
- We are encountering organized opposition to our implementation efforts from various interest groups.

TMDL staff had been talking about these issues for some time, and had made many suggestions about ways to improve the TMDL program. During the winter and spring of 2004/2005, four work groups composed of TMDL staff from the Water Quality and Environmental Assessment Programs and EPA, worked together to implement some of those improvements. The work groups tackled five separate program components:

- TMDL format and content—this group created a new report template, gave the TMDL documents new names, and generally focused on making our documents easier to read and understand.
- Advisory committees—this group worked to produce a brochure for prospective advisory committee members to clarify roles and responsibilities. The group also produced an internal guidance document about how to work with advisory committees.
- Standardized language—this group worked to produce a standard glossary of terms used in TMDLs, and wrote standardized language about the water quality criteria, the Clean Water Act and TMDL processes, and other topics that should be described consistently in every TMDL.
- Peer review—this group established a policy that requires both a technical and a policy peer review of every TMDL produced. It also produced a form to use for each type of review.

In the fall of 2005, TMDL staff attended an all-hands meeting to roll out the redesign and to discuss other potential improvements to the program. Three major themes emerged as needs to help us succeed at implementing TMDLs.

1. Maintaining a continuous presence in the watershed.
2. Using enforcement for persistent or egregious nonpoint polluters.
3. Measuring what we've accomplished, both because we're accountable for the money and time we spend, and because demonstrating that implementation matters will encourage other people to implement.

Continuous presence

We spend a lot of time during TMDL production working with local groups and forming relationships with local citizens. These partnerships are important because when local people work with us to identify water quality problems, they are more likely to feel ownership of both the problem and the solution, and are therefore more likely to implement the TMDL. However, when the Ecology staff person has to run off to the next TMDL, it can send a message that we are not interested in helping with the most important part of the work—the implementation. Our presence in the watershed makes a difference, by lending support and by acting to a certain extent as a watchdog who will notice if implementation efforts get stalled or stop. TMDL staff believes strongly that we need to maintain a continuous presence in watersheds where we've done TMDLs. This is something we are not able to do consistently.

We have prepared a 2007-09 biennial budget request asking for four new Water Quality staff, four new Environmental Assessment staff, and $200,000 per year for laboratory analytical work, to make a start at maintaining a continuous presence and measuring what we've done. Staff from both programs would be placed in the regional offices. The WQ staff would focus on implementing TMDLs and the EA staff on monitoring the effectiveness of what we've implemented. In this way, we can begin to give a clear message about the importance of implementation and of using adaptive management to make sure we meet standards. However, we know that the resources we've requested in this budget package will not be enough.

Enforcement

If we really intend to implement a high proportion of nonpoint best management practices, we will have to be willing to use enforcement when necessary. This traditionally has been a last resort for nonpoint polluters because it's time-consuming and can be politically costly. However, when incentives and good citizenship fail, this is the option we have left. Enforcing on just a few particularly egregious polluters will help persuade those people who are not convinced to do their part any other way. A few visible enforcements will also send a general message that nonpoint pollution is real and will not be tolerated.

If we decide to support TMDL implementation by using enforcement, we may be able to start with existing enforcement staff, and then reassess whether we need more staff and for how long after we've taken a few enforcement actions. We will probably always need some level of TMDL-related enforcement, but a focus on it for a few years may be all we need to get the implementation momentum going.

Water Quality Program estimated staff needs

Water Quality Program staff were cautious when discussing the staff needs to implement TMDLs. We have been very successful at implementing a few of our TMDLs. However, implementation has not been the focus of our TMDL program, so staff did not believe they had enough experience with implementation to help us draw firm conclusions. However, once we got started talking about what a perfect TMDL world would look like, people came up with some good ideas.

Our high estimate of the number of people we would need to implement TMDLs was one per Water Quality Management Area, or 23. This would be ideal because every WQMA would have a person watching over it. Then we wondered if this might not be overkill. Another suggestion was that we have three FTEs per region specifically implementing TMDLs. This could be three whole positions working entirely on implementation, or parts of TMDL leads moving their own TMDLs into implementation. No one was certain that three new positions per region would be enough, but all were certain that they did not want to get more than three at a time because of the increased management demands.

It is interesting to note the different ideas people had about how they would use three new positions. One regional unit supervisor said that he would try to re-invigorate the nonpoint program. He was more interested in hiring people with skills at dealing with nonpoint pollution and have those people help implement TMDLs. His idea is that TMDLS and nonpoint are connected issues and we should tie them together. He also thinks generalists have the most valuable skills because we can use them to work on a wide array of issues. Another unit supervisor said that he would hire one technical person to help with study designs and interpreting data and would use the other two to bird dog groups that have been identified as responsible for helping implement TMDLs.

Everyone agreed that we do not just need more TMDL staff; we need to target the skills we need and hire the right kind of people. We need to beef up our nonpoint and enforcement programs and use those people to help implement TMDLs. We also need technical people assigned to the regions. This is necessary because as we increase emphasis on implementation, the regions will want to be assured that we will actually do effectiveness monitoring on their TMDLs.

At this point, it is difficult to develop a firm estimate of the number of staff we need to implement TMDLs. The four requested by the Water Quality Program in the current budget proposal are not enough. To meet the minimum number discussed by program staff, we would need eight more. This number would also not meet the estimated long term need, but before we try to estimate out more than a couple of years, we should consider what it would take to create pro-active nonpoint and enforcement programs that could be used to help implement TMDLs.

Environmental Assessment Program estimated staff needs

The EA program assessed the workload to conduct effectiveness monitoring for all of the TMDL projects on the 2004 list, plus all of the TMDLs that have already been completed. The steps used were similar to those used to assess the workload associated with TMDL production.

- Sorted the TMDL projects into project type—temperature, bacteria, oxygen-pH-nutrient, and toxics.
- For each project type, estimated a typical or average cost per project (FTE and lab funds) based on past experience.
- Multiplied the projects by costs to come up with a total workload estimate for the 2004 list.
- Divided the total by ten years, which was the timeframe used in this assessment.

Following this process, the program estimated that it would take ten (10) staff people and $230,000 in lab funds per year to accomplish the work by 2014. The EA Program presently has two staff people and $80,000 per year for effectiveness monitoring. This translates into a shortfall for effectiveness monitoring of eight (8) FTEs and $150,000 in lab funding per year.

Other costs of implementation

We rely heavily on grant and loan funds to implement TMDLs. For point sources, financial help is important because the cost of upgrading a wastewater treatment plant can be very high, especially if it is necessary to install advanced treatment systems. As long as the state's population continues to grow, we will need to get continually better and better at treating our wastewater. At one time, we thought it would be good enough to get everybody up to a secondary treatment standard, but this level of treatment is not protective enough for some of our receiving waters, and this problem will only get worse as we generate more wastewater.

For nonpoint sources, grants and loans are important because there is generally no base of ratepayers to help bear the costs as there is for wastewater facilities. Also, in spite of years of education and outreach about nonpoint pollution, there is still fairly widespread resistance from landowners to installing best management practices (BMPs) if they will have to pay for the practices themselves.

Our financial assistance programs can help fund nonpoint BMPs on private property if we can show that the benefit to the public is greater than the benefit to the landowner. By funding these kinds of projects, we have helped to improve water quality in many watersheds across the state. However, the costs for these projects have been highly variable, and it has not always been obvious that the most effective BMPs were the ones being installed. To ensure that we are spending public funds in the most cost effective way possible, we should establish guidelines

about which practices we will fund and how much they should cost. This will prevent funding the wrong BMPs or paying too much for the right BMPs.
The Water Quality Program Financial Management Section is currently producing a list of eligible BMPs. It would be a good idea if the same group also established a range of reasonable costs for those practices.

Conclusions and Recommendations

TMDL process

We should use the existing TMDL scoping process to strategize the best tool to achieve clean water in each watershed. In many cases, this will be our usual TMDL approach. In other cases, however, we may be more successful doing a less rigorous technical study—a streamlined TMDL. We may also be able to go straight to implementation or to use some other strategy. This will require us to evaluate conditions in the watershed and to make decisions about how to proceed based on some of the issues discussed earlier in this report. These include:

- Whether the pollution problem is well documented and whether local citizens acknowledge that they are responsible to help to fix it.
- Whether we are able to document that this watershed is very like another one with the same problems so that we can use what we learned somewhere else.
- Whether an organized stakeholder group exists in the watershed that either supports or opposes our TMDL work.

Considering these issues before we start work in a watershed should help us to choose the tool most likely to work, which in turn should help to ensure that we actually clean up the water.

Staff and funding

Based on the results of this assessment, the Water Quality and Environmental Assessment Programs do not have sufficient staff resources or funding to produce TMDLs for all the listings on the 2004 list within ten years. We also do not have sufficient staff or funding to implement TMDLs.

The Water Quality and Environmental Assessment Programs should request the FTEs and funds needed to fully implement the TMDL program. This could happen over time, but we need to be clear that we will not be able to meet our goals if we continue to be understaffed and under funded. The budget request that we have made this year will help, but it is only part of what we need.

At the same time, both programs must be strategic about using the resources we have in the most efficient and effective way. This means choosing the right tool to get to clean water in a watershed, whether that tool is a traditional TMDL, a streamlined technical approach, going straight to implementation, using enforcement, or some other strategy we haven't thought of yet. We should try to coordinate our TMDL work with other program and agency activities to ensure that we are all working together to meet our clean water objective. This could mean working more closely with permit writers to make sure load and wasteload allocations from TMDLs are accurately expressed in permits. It could mean using nonpoint staff to help implement TMDLs. Whatever we do, our overall strategy should be to get to clean water as quickly and as inexpensively as possible.

Finally, to manage public funds responsibly, we should remember that our objective in offering grants and loans is to buy as much clean water as possible with every dollar. To do this, we should be sure we are funding the most effective and practical solutions and that we are not paying too much for them.