## Issue Paper Overview

The Partnership requested that the Steering/Technical Committee select the top priority water resource issues in the Chehalis Basin and develop an approach to address each issue. That Committee opted to prioritize the comprehensive list of issues (see page III–12 through III–28) and then to draft a paper for each of the high priority issues. Each paper would include the following information about a particular water resource issue:

- Definition of the Issue
- Background
  - What we know
  - How it came up
  - Parties involved
  - Existing state, federal, local laws & regulations
- Summary of Technical Information
- Existing Conditions
- Discussion of Options for Addressing, Including Management/ Implementation
- Analysis of Options
- Recommendations
  - Jurisdictions
  - Policy or policies needed
  - Resources/funding needed
  - Volunteer options
- Unanswered or Associated Issues
- References/Suggested Reading

## Process for Selecting Issue Papers

The Steering/Technical Committee rated each issue on the comprehensive matrix as high, medium or low priority. These ratings were then totaled, averaged and ranked from highest to lowest priority. The Committee then discussed the list of high priority issues to finalize a suite of issue papers for inclusion in this Plan. The group added or combined where necessary to ensure thorough coverage of water resource concerns in these papers.

Once the list was developed and agreed upon by the Steering/Technical Committee, it was presented to the Partnership for review, discussion, amendment, and approval. Members of the Steering/Technical Committee then

volunteered to draft particular issue papers according to their area of expertise or interest. For most issue papers, a long version was distributed to the Committee for review, comment and discussion. Following revisions, each paper was edited to a concise version for presentation to the full Partnership for discussion and approval. This development consumed a considerable amount of time. Consequently the references to dates may seem out of sequence.

The Partnership recommended that the Steering/Technical Committee review the water resource issues collected during this planning process through various forms of outreach. The Steering/Technical Committee opted to develop Issues Papers that would define the issue, provide background, and offer possible recommendations to address the issue. This work would be viewed as a resource for the Partnership to use in their decision making process.

# Water Quantity Core Issues

## *Chehalis Basin Watershed Planning Issue Paper*

## What is the issue?

The Watershed Planning Act[1] requires that watershed plans address water quantity by undertaking an assessment of water supply and use and developing strategies for future use. Water quantity is the *only required* element in watershed planning; water quality, habitat, and instream flows are optional elements.

The Watershed Planning Act lists the specific components that must be included in the water quantity assessment. These components focus on quantifying water resources and water use; they are itemized below in the "Technical" section of this paper, along with a discussion of the current state of knowledge about each item in the Chehalis watershed.

The fundamental water quantity issue is that no one knows if there is enough water to meet the current and future needs of both fish/wildlife and people. The Washington State Department of Ecology (Ecology) has virtually stopped approving new water rights because the agency has numerous indications that there is not enough water for new uses. However, Ecology has not officially closed much of the basin because many data gaps exist that have so far prevented the agency from making a conclusive determination that the basin should be completely closed to new rights.

The true quantity of water allocated through Ecology water rights is not known because most water rights have not been evaluated for their validity. This is done through a legal process known as adjudication that examines each water right and makes a determination on the validity and quantity associated with each. Tribal water rights, which predate all others in the basin, are a separate type of unquantified water right.

The solutions presented in this paper focus on data gathering to better understand the water resources in the Chehalis Basin and the regulatory activities that quantify water rights/water use and to provide more flexibility for managing water in the Chehalis Basin.

## What is the background to this issue?

The Watershed Management Act was enacted into law by the State legislature in 1998 in an attempt "to develop a more thorough and cooperative method of determining the current water situation in each water resource inventory area of the state and to provide local citizens with the maximum possible input concerning their goals and objectives...." In part, this law was born out

1. Reference Chapter 90.82 Revised Code of Washington.

of frustration with the large backlog of water rights applications submitted to the state and with the perceived inflexibility in existing water law that seems to discourage innovative water use practices.

The water resources in the Chehalis Basin are divided among lakes, streams and rivers, Grays Harbor, precipitation, some snowpack, and groundwater. Water is used by numerous life forms, including fish and wildlife, plants, and humans. These resources and uses are all part of the hydrologic cycle. Water is exchanged between components readily.

One way to look at the hydrologic cycle is to classify components that

- add to the basin (precipitation),
- remove water from the basin (river and streamflow, consumptive water use by humans), and
- store water (snowpack, wetlands, lakes and reservoirs, and groundwater).

Most of these components have been quantified only at a very general level.

## What technical information is available?

The Watershed Management Act lists the required components of the water quantity assessment. These components, and what is currently known about them in the Chehalis watershed, are described below:

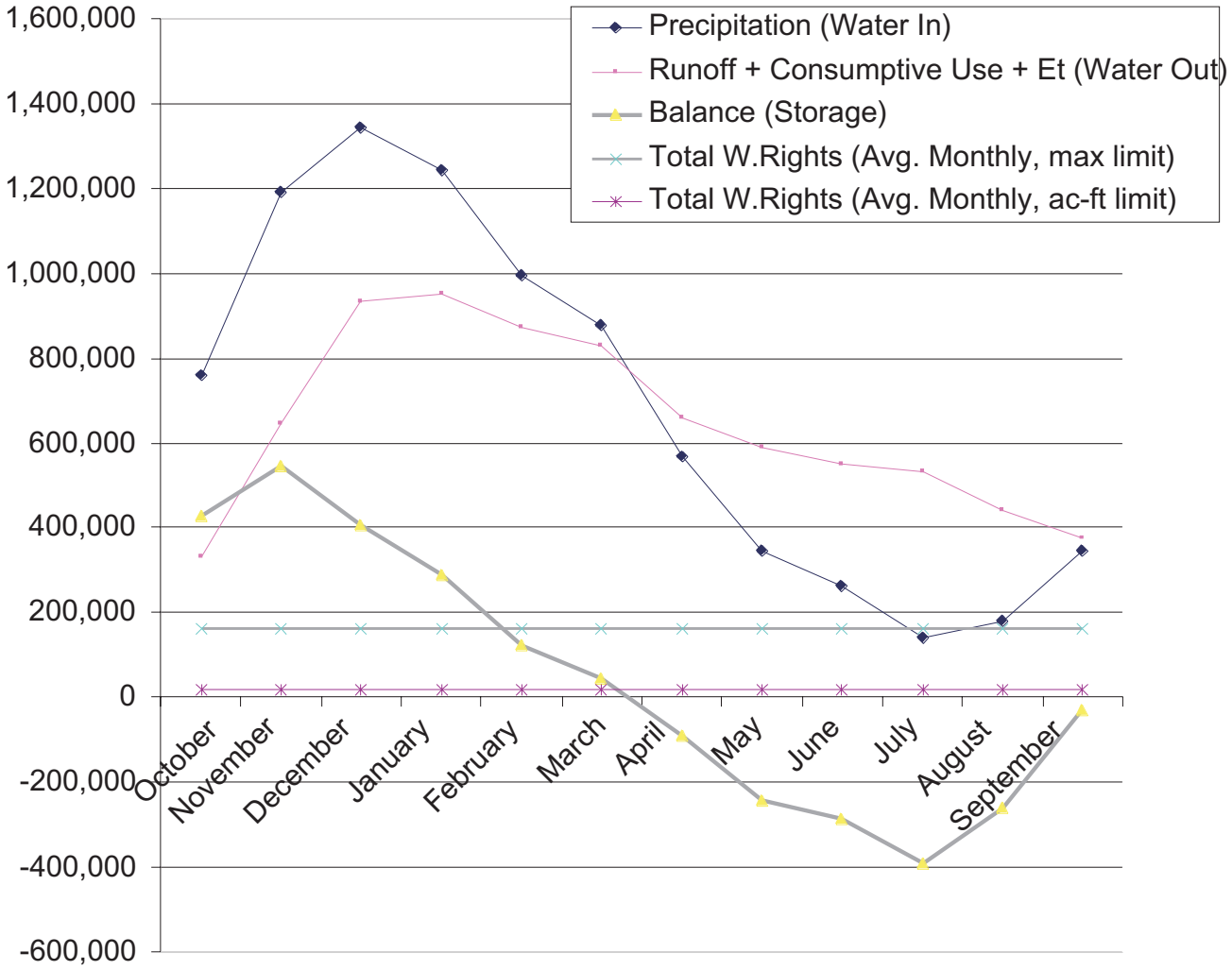
### *An estimate of the surface and ground water present in the management area*

One approach to estimating the surface and ground water present in the management area is through a water balance. The easiest way to understand a water balance is to think of it like a water checking account. The deposits (precipitation) must at least equal the withdrawals (runoff, etc.).

A basinwide water balance gives a general picture of how water is distributed among rivers, groundwater, consumptive water use (such as drinking water), natural plant use (transpiration), and evaporation. The table and figure below show the Chehalis basinwide water balance and how it varies throughout the year. It should be noted that each of the water balance components was estimated based on existing information; these values should not be considered highly accurate, but they do provide some insight.

This analysis shows, first, that during the wet winter months in the Chehalis basin precipitation contributes to water stored in the groundwater and wetland areas. In the dry summer months, groundwater and wetland areas lose water to rivers, plant use, evaporation (in the case of wetlands), and consumptive water uses. Fortunately, the winter rains are usually enough to totally recharge the groundwater and wetlands.

## WRIA 22 & 23 WATER BALANCE CHART




## *Chehalis Watershed Basinwide Water Balance* *(units are acre-feet)*[2]

| *Month* | *Precipitation (Water In)* | *Evapo-transpiration* | *Runoff (Avg Flow)* | *Consumptive Use* | *Total Water Out (ET+R+CU)* | *Storage* |
|---|---|---|---|---|---|---|
| October | 760,459 | 192,000 | 138,000 | 1,000 | 331,000 | 429,459 |
| November | 1,192,513 | 110,000 | 535,000 | 1,000 | 645,000 | 547,513 |
| December | 1,342,277 | 58,000 | 875,000 | 1,000 | 934,000 | 408,277 |
| January | 1,240,782 | 56,000 | 895,000 | 1,000 | 952,000 | 288,782 |
| February | 994,263 | 8,000 | 788,000 | 1,000 | 873,000 | 121,263 |
| March | 876,176 | 145,000 | 683,000 | 2,000 | 830,000 | 46,176 |
| April | 567,812 | 215,000 | 442,000 | 3,000 | 659,000 | -91,188 |
| May | 346,505 | 334,000 | 250,000 | 4,000 | 589,000 | -242,495 |
| June | 263,111 | 406,000 | 137,000 | 7,000 | 549,000 | -285,889 |
| July | 140,067 | 435,000 | 89,000 | 7,000 | 531,000 | -390,933 |
| August | 179,286 | 373,000 | 61,000 | 6,000 | 440,000 | -260,714 |
| September | 346,290 | 309,000 | 63,000 | 3,000 | 376,000 | -29,710 |
| Totals | 8,249,542 | 2,717,000 | 4,956,000 | 37,000 | 7,709,000 | 540,542 |
| | (100%) | (32.9%) | (60.1%) | (0.4%) | (93.4%) | (6.6%) |

2 One acre-foot of water is the volume of water needed to cover one acre of land with a one-foot depth of water. This is a common agricultural unit of measurement. One acre-foot of water equals 325,851 gallons.

Second, the basinwide water balance shows that consumptive water use is a very small percentage of the water balance (0.4). This statistic is somewhat misleading, though, as the impact of consumptive water uses is typically felt most strongly in the immediate area and at the time of withdrawal. Moreover, this bulk percentage says nothing about the **distribution** of water withdrawals.

Third, this basinwide water balance provides information about the bulk volume of water in the Chehalis watershed throughout the year, but it does not provide specific information that is useful for evaluating the surface or ground water present at a particular location. The only way to obtain that information is through detailed subbasin studies, field studies, hydrologic modeling, or a combination of these methods. That sort of work has not yet been done in the Chehalis watershed.

A more detailed, area-specific water balance was conducted for subbasins in the upper Chehalis basin: the Newaukum River, Skookumchuck River, Salzer Creek, and mainstem Chehalis River through the cities of Centralia and Chehalis. This group of subbasins was prioritized for more detailed study because of the high risk to both people and the environment of not having that information.

### *An estimate of the surface and ground water available in the management area, taking into account seasonal and other variations*

This component is difficult to respond to for several reasons. First, what is meant by available? Available for human consumption? Available for optimizing fish and wildlife habitat? For recreational uses? Because of the focus on water supply for human uses in the Watershed Management Act, this component is assumed to be aimed at quantifying water available primarily for out-of-stream uses.

Determining whether, and how much, water is available for out-of-stream water uses leads back to the water balance: there must be a surplus in the water balance that is not needed for other uses, most commonly instream fish and wildlife uses.

The bulk basinwide water balance could not be considered adequate to determine whether or not there is "surplus" water at any particular location in the watershed. That assessment would need to occur at the subbasin level of study, which has not yet been done in the Chehalis Watershed. A water quantity evaluation study currently underway for five subbasins (Skookumchuck, Newaukum, North Fork Newaukum, South Fork Newaukum, Salzer Creek, Chehalis River Middle Reach #2) will provide enough information to make this determination for these subbasins.

The basinwide water balance indicates that, particularly during the wet winter months, more water comes into the watershed (through rainfall) than leaves it. The reverse is true during the summer months when more water leaves the watershed than enters it. This bulk difference between the winter

and summer water balance (which is not unusual) suggests that water storage could be a viable approach to balancing winter/summer water quantity. It should be noted, however, that any alteration of the natural functioning of a stream will have some effect, somewhere.

Although the bulk basinwide water balance shows that a lot of water comes into the Chehalis system during the winter, summer streamflows regularly drop below regulatory minimum flows set in 1976 by Ecology for the watershed to protect instream water uses during the period April through October. This indicates that there is probably not water available directly from streams and rivers for out-of-stream uses during the April through October period if those out-of-stream uses would affect streamflow during this period. Water for beneficial uses could be available if it would not impair streamflows or other water users.

One fairly complex data gap that prevents a solid determination of whether or not water is available is the relationship between surface and ground water. Much of the shallow ground water in the Chehalis watershed is believed to be in close enough connection to the surface water that using ground water affects surface water flows. It may be possible to withdraw shallow ground water at a location far enough away from the river that the effect of withdrawing the water is not felt until the wet season. In theory, this would not be a problem, but in practical terms, it would likely be complex and expensive. This sort of determination has not been done within the Chehalis.

### *An estimate of the water in the management area represented by claims in the water rights claims registry, water use permits, certificated rights, existing minimum instream flow rules, federally reserved rights, and any other rights to water*

There are several ways that water has been designated for a specific use and/or user in the Chehalis Basin, including water right permits and certificates, water right claims, minimum instream flows, and federally-reserved water rights, which in the Chehalis Basin are believed to be primarily tribal water rights (unquantified). Other federally-reserved water rights are likely to be for small quantities associated with Olympic National Park services.

- Water right permits and certificates: 2,524 permits and certificates
- Water right claims: 8,418 claims
- Regulatory minimum flows: 31 control points
- Federally reserved water rights, primarily tribal water rights: unquantified

Water right permits and certificates are issued by Ecology for a specific purpose, location, source, and quantity. Uses in the Chehalis include domestic drinking water, commercial/industrial, irrigation, dairy, stockwater, hydropower, and fish propagation. Most water right permits and certificates specify an authorized quantity of water.

A water right claim is an assertion that a person used water before the state

water code permitting system was in place. The supporting information for most claims is very sketchy; often no water quantity is specified. Water right claims are considered unvalidated water rights, since Ecology has not investigated the specific practices of water use for each claim. A water right claim can become a valid water right during adjudication (the legal process of examining each claim in an area to evaluate its validity).

Regulatory minimum flows are a type of water right that specifies the flow that should remain in the river or stream throughout the year to meet fish needs. In the Chehalis Basin, these flows were set in 1976.

Tribal water rights vary by Indian nation but fall into two general categories: aboriginal that date from "time immemorial" and reservation that date from the establishment of the reservation. Some tribes are guaranteed by treaty to hold aboriginal "usual and accustomed" (U&A) fishing rights for off-reservation areas. The Quinault Indian Nation holds these U&A rights for the entire Chehalis Basin. These water rights are unquantified but are described to be based on the amount of water sufficient to sustain fish runs for commercial, ceremonial, and subsistence purposes. The Chehalis Tribe holds unquantified reservation rights as well as fishing rights within the reservation. Reservation rights are for use of water for various purposes consistent with the purpose of the reservation (domestic supply, agriculture, commercial/industrial) on the reservation.

Other unquantifed federally reserved water rights may exist in the Chehalis for Olympic National Park, national forest service land, national wildlife refuges, as well as any other federal land. Water rights for these lands would be to serve the purpose for their existence, such as domestic supply for tourist facilities in Olympic National Park. These existing or potential water uses are not believed to be substantial.

Accurately assessing the quantity of water legally appropriated is a very complex and uncertain exercise. Of the 8,418 water right claims in the Chehalis, only about 90 specify a quantity. For the remaining 8,328, there is no way of knowing how much water is being used without an individual investigation.

The table below illustrates the potential magnitude of water right permits and certificates compared against the regulatory minimum flow and summer streamflow values. This table presents a simplified approach to identifying subbasins where designated water uses may create a problem for instream flows. This table could be used to prioritize further investigation, analysis, and possible action in subbasins where it appears that water has been overappropriated. An example might be the Black River where this table shows that water right certificate and permits totaling 209.4 cfs exist, compared to streamflow in August 2002 that was only 55 cfs. The following additional considerations apply to the information in the table:

- The total water rights column includes all surface and groundwater permits and certificates. Groundwater withdrawals would not likely have an instantaneous impact on streamflow.

- The total water rights column does not include water right claims, which are essentially unvalidated water rights. There are approximately 8,500 water right claims in the Chehalis Basin. It is currently not known how many of these claims are being used and how much water is being used under individual claims.
- All of these water rights are unlikely to be used simultaneously, which reduces their potential impact on streamflows.
- Some of these water rights (e.g. fish propagation) may only minimally impact streamflows.

# *Appropriated Water Summary*

| *Subbasin (from Level 1 Assessment)* | *Average Streamflow for August/ September1 (cfs)* | *Water Right Permits and Certificates (cfs)* | *Regulatory Minimum Flow for August 15 through September 30 (cfs)* |
|---|---|---|---|
| Chehalis Headwaters | 46.4 (Aug) - 77.5 (Sep) | 8.21 | None |
| Elk Creek | 19.2 (Aug) - 25.1 (Sep) | 12.92 | 14 |
| South Fork Chehalis | 7.1 (Aug) - 18.1 (Sep) | 11.69 | 15 |
| Upper Chehalis | 50.8 - 63.32 | 66.97 | 31 |
| SF Newaukum | 39.0 (Aug) - 51.4 (Sep) | 8.92 | 27 |
| NF Newaukum | 14.4 (Aug) - 12.4 (Sep) | 13.98 | 7 |
| Newaukum River | 54.8 (Aug) - 68.5 (Sep) | 56.34 | 35 |
| Salzer Creek | 0.91 (Aug) - 1.83 (Sep) | 2.41 | 0.05 |
| Skookumchuck River | 80.4 (Aug) - 122 (Sep) | 307.16 | 35 |
| Middle Chehalis #1 (Newaukum to Grand Mound) | 242 (Aug) - 339 (Sep) | 74.09 | 165 |
| Black River | 51.5 - 56.32 | 209.4 | 66 |
| Cedar Creek | 5.9 - 10.12 | 2.71 | 11 |
| Middle Chehalis #2 (Grand Mount to Porter) | 407 (Aug) - 534 (Sep) | 159.55 | 260 |
| Lower Chehalis #1 (Porter to Montesano) | 832 (Aug) - 1,059 (Sep) | 49.71 | 550 |
| Cloquallum Creek | 33.5 (Aug) - 38.0 (Sep) | 16.85 | 24 |
| EF Satsop | 99.0 (Aug) - 92.4 (Sep) | 71.14 | 80-95 |
| Decker Creek | 49.9 - 60.72 | 8.2 | 50 |
| MF Satsop | 27 - 36.92 | 0.94 | 38 |
| Satsop River | 332 (Aug) - 434 (Sep) | 35.76 | 260 |
| Wynoochee River | 199 (Aug) - 334 (Sep) | 1,574.5 | 150 |
| Wishkah River | 34.7 - 51.52 | 38.64 | 47 |
| Hoquiam River | No Data | 64.71 | None |
| EF Hoquiam | 11.3 - 16.12 | 2.39 | 19 |
| Humptulips River | 246 (Aug) - 415 (Sep) | 86.23 | 170 |
| Charley Creek | 2.88 (Aug) - 4.05 (Sep) | 2.1 | 2 |
| Lower Chehalis #2 (Montesano to mouth) | No data | 50.32 | None |
| Grays Harbor | No data | 60.75 | |

1. Average monthly flows from historical gauge data.

2. This is the range of flows measured during August/September, 2002. No historical gauge data exist.

### *An estimate of the surface and ground water actually being used in the management area*

Some work has been done to estimate the amount of surface and ground water actually being used in the Chehalis watershed. The most recent work in this area, the basinwide water balance, is summarized in the table below. These estimates were derived from an evaluation of municipal and agricultural water needs and usage and commercial/industrial allotments. These estimates include ground water usage. As noted above, estimated actual water use is far less than permitted under existing water rights, assuming all water right certificates and permits on record are valid rights. The values shown in the table are believed to be as accurate as possible, given existing information. It is possible that actual water use could be as much as twice the quantities shown in the table. Please note also that exempt well consumption is not included in the table at this time.

As with the other bulk basinwide water balance values, these estimates are of limited use. These values assume that all water users are using water 24 hours a day, at a steady rate. In fact that would probably never be true. In calculating a rate of draw on the river system, it could be more accurate to assume that the daily water use is concentrated during daytime hours. To gain some perspective on the impact to the Chehalis River, it is interesting to compare the estimated use values against Chehalis River streamflows. Average monthly streamflows for the lowermost gauging station on the Chehalis River (Chehalis River at Porter) are included in the table below.

## *Consumptive Water Use Estimates For Chehalis Watershed*

These estimates are drawn from the basinwide water balance (Triangle Associates/Tetra Tech, in press).

| | |
|---|---|
| October through March<br>(lowest average streamflow for this period is 1,257 cfs for October) | 2,000 acre-feet per month, approximately equal to 67 acre-feet per day, or 15,200 gallons per minute, or 21.8 million gallons per day, or 33.7 cubic feet per second |
| April through September<br>(lowest average streamflow for this period is 534 cfs for September) | 3,000 acre-feet per month, approximately equal to 100 acre-feet per day, or 22,600 gallons per minute, or 32.6 million gallons per day, or 50.3 cubic feet per second |
| May through August<br>(lowest average streamflow for this period is 407 cfs for August) | 5,000 acre-feet per month, approximately equal to 167 acre-feet per day, or 37,700 gallons per minute, or 54.3 million gallons per day, or 83.8 cubic feet per second |

### *An estimate of the water needed in the future for use in the management area*

In terms of use categories, 20-year projections for water needed in the future for municipal/domestic supply category — the only use category for which

quantitative estimates of future water needs have been made - have been estimated, based on comprehensive water system plans. They predict a total average daily need of 15.1 mgd for the entire basin. This is equivalent to 23.3. cfs if withdrawn continuously.[3]

### *An identification of the location of area where aquifers are known to recharge surface bodies of water and areas known to provide for the recharge of aquifers from the surface*

The major known aquifer in the Chehalis watershed is the shallow, water table aquifer. This aquifer is present nearly everywhere within the flat-lying lands of the Chehalis watershed. It ranges in thickness from four to ten feet in the upper Chehalis valley near Adna and tends to increase in thickness to the nort, and downstream within the watershed. Near Fords Prairie, northwest of Centralia, the aquifer is 90 feet thick. Near the City of Aberdeen, the aquifer is 200 feet thick, with an upper zone (approximately 100 feet thick) that is less permeable[4] and a lower zone (approximately 100 feet thick) that is more permeable.

A water table aquifer is present in most of the tributary valleys of the Chehalis River. In most cases, this aquifer is thinner and less extensive than in the mainstem Chehalis River valley. The aquifer in the Satsop River valley, for example, ranges between two and 30 feet thick. A notable exception is the major aquifer that exists beneath the prairies of the Black River/Scatter Creek region that averages 100 feet thick.

Recharge to the water table aquifers comes from most areas of the land surface. A portion of rainwater and other water that lands on the surface (including septic tank effluent) percolates down through the soil and into the ground water. Ground water generally moves toward the Chehalis River from the aquifer perimeter. This aquifer is known to recharge surface water bodies throughout the watershed. Studies have shown that ground water flows into the Chehalis River at a rate of 0.5 to 4.5 cfs[5]/river mile in the upper watershed. Actual data on the rate of flow between surface and ground water are not available for the lower Chehalis watershed.

In summary, all land areas in the Chehalis Basin recharge ground water, and all ground water in the basin recharges surface water.

### *An estimate of the surface and ground water available for further appropriation, taking into account the minimum instream flows adopted by rule or to be adopted by rule under this chapter for streams in the management area including the data necessary to evaluate necessary flows for fish*

3. Water needed for power generation and fish propagation has not been estimated. Generally, these are non-consumptive uses; power generation typically has environmental impacts.

4. Permeability is a measure of how easily water moves through an aquifer.

5. Cfs is an abbreviation for "cubic feet per second" a common unit of measurement for streamflow.

Given the present state of (or lack of) knowledge about the validity of existing water rights (including claims), quantification of tribal rights, actual use, and a thorough understanding of the hydrology, and fish and wildlife needs within the watershed, it is not possible to say that any additional water is available for appropriation.

Further evaluation could show that there is water available for appropriation. This availability would likely be limited to water use during the wet season, use of stored water or reclaimed water, or use of water from a confined aquifer determined not to be in close connection to surface water.

## What are some possible solutions?

Alternative solutions to the water quantity core issues are presented below.

1. **Adjudication of Chehalis water rights**. One of the largest data gaps in the Chehalis Basin continues to be the true amount of water that has legally been allocated for use. The main source of uncertainty lies with the 8,500 water right claims in the Chehalis Basin. The only way to quantify the legal water allocation and use attached to these claims is through adjudication.

   Adjudication is a legal process that examines each water right and makes a determination on the validity and quantity associated with each. The following excerpt from the Washington Department of Ecology and the Office of the Attorney General of Washington (2002)[6] describes the general process for adjudication:

   *"The process begins when one or more members of the public or a watershed planning unit petitions Ecology to initiate an adjudication, or when Ecology initiates an adjudication based on its own investigation. RCW 90.03.105 - .110. To commence the adjudication, Ecology is required to file a statement of facts (including a list of all known persons claiming water rights in the basin), and map or plan related to the water source and associated water rights in the appropriate superior court. RCW 90.03.110. After the case is initiated through this filing, the court directs Ecology, in its capacity as plaintiff, to serve summons on all persons and entities who might want to assert water rights in the proceeding. RCW 90.03.120 - .130.*

   *After summons are served, claimants must file statements with the court to assert their claims to water rights. RCW 90.03.140. After claims are filed by the water users, the court is required to refer the proceeding to a referee appointed by Ecology who will hold hearings to take testimony and consider evidence on the asserted water rights. As exemplified in the current Yakima River Basin adjudication . . . the superior court judge may conduct evidentiary hearings. RCW 90.03.160 - 170. After the hearings are conducted, the referee or judge will prepare a report of recommended water rights that is subject to an exceptions process. RCW 90.03.190 -*

6. December, 2002. Streamlining the Water Rights General Adjudication Procedures. 2002 Report to the Legislature. Prepared by Washington Department of Ecology and Office of the Attorney General. Publication No. 02-11-019

*.200. This exceptions process allows both the department and claimants to ask the superior court to make changes to the rulings contained in a referee's or judge's report.*

*When an adjudication is completed, the court issues a decree including a schedule that sets forth the confirmed water rights and their attributes, including a date of priority that is the basis for any subsequent regulation. RCW 90.03.200. Based on the final decree, Ecology is directed to issue certificates to all those whose water rights are confirmed. RCW 90.03.240."*

That report also describes the types of water rights that may be adjudicated:

*"Two key state statues require permitting of water rights: Chapter 90.03 RCW, the Water Code (enacted in 1917), and Chapter 90.44 RCW, Regulation of Public Ground Water (enacted in 1945). State law recognizes five different types of water rights:*

- *Pre-1917 surface water rights*
- *Post-1917 permitted or certificated surface water rights*
- *Pre-1945 ground water rights*
- *Post-1945 permitted or certificated ground water rights*
- *Ground water withdrawals that are exempt from permitting requirements.*

*In addition to determining state-based water rights, a state general water rights adjudication can be used to determine the extent, validity and priority of federal and Indian reserved water rights. . .*

*The water codes required administrative permits for most water uses starting after the effective dates of the codes." (1917 for surface water; 1945 for ground water) "Water uses pre-dating the codes do not require a permit, but in 1967 the legislature required (under Chapter 90.14 RCW) that administrative statement of claim forms be registered with Ecology to report and preserve these pre-code rights. There have been four open periods for filing claims into the registry:*

- *July 1, 1969 through June 30, 1974*
- *June 4, 1979 through December 31, 1979*
- *July 28, 1985 through September 1, 1985*
- *September 1, 1997 through June 30, 1998*

*If a statement of claim was required for the water use and was not registered during one of the claims openings, the right is considered relinquished. There are an estimated 170,00 registered water rights claims statewide, with most remaining unadjudicated." (8,418 in the Chehalis Basin).*

2. **Streamlined adjudication**. One of the main drawbacks of adjudication is how long the process can take. The Yakima River adjudication has been underway since 1977 and is not yet complete. (However, it should be noted that the Yakima River adjudication is considered to be unusually complex.) Partly because of the Yakima River adjudication,

the state has recently examined the adjudication process and published guidance on possible approaches to streamlining future adjudications in Washington State[7]. This document recommended the following nine possibilities for streamlining the adjudication process:

- Within the adjudication process, have Ecology make the tentative determinations on water rights and have claimants present fully documented claims at the outset.
- Independent of the adjudication process, create a new process for Ecology to validate registered water right claims.
- Allow limited special adjudications.
- Have Ecology provide comprehensive background information early in the adjudication proceedings.
- Authorize pre-filed written testimony.
- Utilize information technology more effectively.
- Develop aerial photograph interpretation expertise.
- Expand the use of mediation
- Develop guidance on how to maintain and document a water rights.

One or more of these strategies, or others yet to be identified, could be utilized in the Chehalis Basin to promote rapid and equitable progress on adjudication.

3. **Water banking or trust water rights system**. These are potential tools for people with valid water rights who want to place a portion in trust to return that water to the stream. This system could also serve as a water bank to facilitate exchange of water rights or as a temporary holding mechanism to prevent relinquishment of a water right. The State of Washington has established a water rights trust program that has been used primarily for entities that voluntarily wish to donate a water right to the trust program. This existing trust water rights program could be used, or a customized program could be established to best meet the needs within the Chehalis Basin.

4. **Institution of a conservation allotment for water right changes**. Under the understanding that water delivery and use practices have improved since many older water rights were issued (piped conveyance systems rather than open ditches, drip irrigation instead of flood irrigation), a portion (such as 10%) of each water right undergoing a change of purpose, place, or use would be placed in trust to be returned to the stream.

5. **Watershed mitigation for new or changed water rights**. This alternative would promote flexibility in the water rights permitting process. A water right applicant would have the opportunity to restore, repair, or

7. December, 2002. Streamlining the Water Rights General Adjudication Procedures. 2002 Report to the Legislature. Prepared by Washington Department of Ecology and Office of the Attorney General. Publication No. 02-11-019.

enhance a separate watershed feature (possibly habitat or water quality) to mitigate for the impacts of a new or changed water use.

6. **Recommendation for adequate funding level for water resources management (source to be determined; funding to be distributed to those entities involved in water resources management)**. Inadequate resources for water resources management are a major reason for the lack of active management of water resources in the Chehalis Basin. Additional funding could be used to increase staff at Ecology for water rights evaluations, new policy development, and technical support, to contract more work out to private contractors, or to facilitate changes to administrative procedures. One source of funding could be increasing water right application fees (currently only $10). Adequate program funding could be used for the following purposes:
   - Adjudication in a reasonable time frame
   - More timely water right decisions
   - Technical studies to support decisions on water right applications
   - Technical support to water users in developing alternative water source strategies
   - Policy development, such as how to deal with the discrepancy between paper water rights and actual use. Possible approaches include:
     (1) Use existing law and regulations that specify the need for showing 5 year past beneficial use
     (2) Use 10 year future to show beneficial use with future relini quishment of a portion of right, based on beneficial use
   - Framework on how to address water rights and water use in the Chehalis Basin
   - Better/real understanding of quantities, locations, timing of water rights to assist in management of water resources
   - Think about using "referee system" to sort out water rights, with court confirmation to back it up
   - Possible new water rights adjudication system
   - Increased enforcement of existing laws and regulations

7. **Creating a "water master" program within the Chehalis Basin to work with water users to ensure that water is distributed legally, and equitably**. Water masters have been used successfully in the past throughout the state; their use is authorized by the state surface water code, Chapter 90.03 RCW. Typically their role is to facilitate cooperation among the water users in a particular area, usually an area small enough for the water master to actively attend to. Because of the size of the Chehalis Basin, this job would require more than one person. The staffing level, identification of specific subbasins requiring the assistance of a water master, and the duties of specific water masters would be determined during program development. In addition to coordinating be-

tween water users, a water master could also collect data on water quantity, water use, water right claims, and exempt wells if that were part of his or her job.

8. **Development of a watershed model for the Chehalis Basin**. The goal for this model would be to quantify and describe where water is and how it moves through the Chehalis Basin, thereby providing a tool for evaluating various water quantity needs and possibly for balancing water resource uses. This model would include ground water modeling to evaluate aquifer characteristics, flow directions and rates, recharge/discharge areas (including losing and gaining stream reaches), and hydraulic continuity.

   Models exist and can be developed to focus on all aspects of watershed management. Hydrologic models describe the way water flows through a watershed and are often used to predict streamflows under various land use scenarios. Ground water models describe the underground flow systems and are used to predict how ground water (and ground water pollutants) flows through a watershed. Water quality models describe and predict the impacts of pollutants within the surface water system. Water allocation models describe the input and diversions from a water system, and are used for managing water users.

   The various specialized watershed models can also be combined under a sort of umbrella model. This approach is currently being developed in WRIA 1, the Nooksack River.

   The advantage of a watershed model is that it is a tool that predicts the impact of various activities (play "what-if" scenarios). People often feel more comfortable if they are able to quantify something.

   The limitations and obstacles related to a watershed model include cost and adequacy of data for such a model. Developing a model for the entire Chehalis Basin would be a costly endeavor, probably more than a million dollars for any sort of detailed model. In addition, lack of data to build the model (such as streamflow, precipitation, and groundwater flow system data) could be a limitation to the model's accuracy and effectiveness.

   One strategy that makes sense for the Chehalis Basin is to begin developing models at the subbasin level, building toward a model for the entire basin.

9. **Expansion of the water quantity evaluation conducted for the Skookumchuck, Newaukum, Salzer Creek and the Centralia/Chehalis reach of the Chehalis River to the rest of the basin.**

   The Water Quantity Evaluation was primarily a mapping and investigation of water rights exercise, to provide a better understanding of the location and distribution of significant water rights and their potential impact on their subbasins. The results of this study could be considered a conceptual water allocation model.

10. **Conduct of further evaluation of water storage options.** Water storage could be an important element of water resources management in the Chehalis Basin. An assessment of storage options was conducted in conjunction with development of the Watershed Plan. This assessment concluded that water storage could likely to be a viable approach to meeting the water needs of people and fish in the Chehalis Basin. This study identified specific projects that could be evaluated further and likely implemented.

11. **Evaluation of deep aquifer sources for water.** The Multipurpose Water Storage Assessment, done in conjunction with this Watershed Plan, raised awareness of a possible deep aquifer in the Newaukum region of the Chehalis Basin. This aquifer has not been fully explored or utilized extensively for water supply. This aquifer, or other as yet unidentified deep aquifers, could play a role in meeting the water needs for people and fish in the Chehalis Basin.

12. **Continuation of current monitoring activities and initiation of new monitoring related to water quantity.** The current state of knowledge about many water resources components is too incomplete to serve as the basis for sound management. One example is streamflow. Flow monitoring was conducted for the first time in 15 subbasins during the summer of 2002. This streamflow monitoring is continuing during the summer of 2003, but the monitoring program's future is uncertain beyond November, 2003.

    There are currently almost no data on actual water use, number and water use by exempt wells, and the magnitude of return flows. In addition, there is currently no mechanism to compile, store, and make collected data widely available to Chehalis Basin residents. A centralized clearinghouse for data is recommended by the Chehalis Watershed Monitoring Program Framework (Triangle Associates and Tetra Tech, in press).

13. **Investigation of the magnitude of impact from exempt wells.** See exempt well issue paper.

14. **Increased enforcement of existing laws and regulations.** Under current staffing levels, Ecology conducts very little enforcement in the Chehalis Basin. Enforcement needs include identifying and shutting down illegal water use, identifying and eliminating water wastage, and implementing a program to curtail junior water right usage during periods when river flows are below the regulatory minimum flows.

15. **Developing an "alternative futures" approach to water resources management.** Using the CBP's goals and objectives as a point of departure, develop a concrete vision for the future condition of the watershed from a water resource perspective. This would be a guide for the actions of the water master and others (e.g. Water Conservancy Boards, Ecology Water Resources Program staff) who may be making decisions regarding Chehalis Basin water resources.

16. **Developing and implementing water conservation programs.** See the Water Conservation/Use Efficiency issue paper.

17. **Quantification of Tribal rights.** Tribal water rights are senior to all other rights, but they have not yet been quantified. A major portion of these rights is acknowledged to be tied to the fish resources in the basin. Therefore, it would be important to develop specific knowledge of instream flow needs – especially for tribal "Usual and Accustomed" (U&A) rights. (See also the Instream Flow issue paper).

    In addition, reservation water rights and reservation fishing rights are held by the Confederated Tribes of the Chehalis. The purpose for these water rights is to serve the water and fishing needs of the reservation. These rights are unquantified and have a priority date tied to the Executive Order creating the reservation.

18. **Establishment of a water rights accounting system**

    Shortly after the regulatory minimum flows were established for 31 subbasins in 1976, Ecology used a ledger-type accounting system to record quantity of permitted water use for each subbasin. This system was used as an assessment tool to help determine when subbasins were fully appropriated (no more water rights could be issued). At some point, approximately 15 years ago, Ecology abandoned use of the ledger system because it was determined by staff to be an inappropriate method to accurately evaluate hydrologic systems. The ledger records still exist but have not been updated over the intervening 15 years.

    Since abandonment of the ledger-type water rights accounting system, no formal accounting system has been used to assess the balance of water rights against subbasin streamflows and regulatory minimum flows. This alternative solution would establish some system, whether to reactivate and update the ledger system or to develop a new system.

19. **Developing and recommending changes to the state water code "use it or lose it" provisions.** Currently, state water law states that if water rights (or a portion of a water right) are not used for a period of five years or more, those rights (or the unused portion) may be relinquished back to the State. This provision of state water law promotes water waste because there is a disincentive to conserve water. Since a good water right often adds to the value of land, relinquishing the water right (or a portion) can devalue people's land. Relinquishment of a water right does not happen automatically; it requires a formal action by the state. It is not often pursued, but the possibility is enough to cause water right holders to work to maintain their full water right, which means using all the water allowed to them.

    This alternative solution would pursue flexibility in state water law to encourage water right holders to conserve water without the threat of losing a portion or all of their water right. There are many approaches to achieve this result, including utilizing a water bank, water rights market, or water rights trust program (Alternative #3).

20. **Incorporating a water reuse program into the water resources management in the Chehalis Basin.** Water reuse (also known as reclaimed water) means using highly treated wastewater (sewage) as part of the water supply. Reclaimed water is not used for human consumption (although wastewater can be purified to that level). Typical uses for reclaimed water include irrigation and industrial wash water. Reclaimed water could also be used for aquifer recharge or possibly streamflow augmentation. Water reuse programs do exist in the State of Washington (City of Yelm, others). Currently the City of Chehalis is constructing a water reuse facility as part of its wastewater treatment plant upgrade.

    The integration of water reuse programs and water rights has not been done yet in Washington State. Many people feel that, if a community invests in a water reuse program to satisfy a portion of its water supply needs, it should receive credit somehow through its water right or at least not be penalized (such as through relinquishment of the portion of the water right served by the reclaimed water). Because of the endless possibilities for how a water reuse program could beneficially be part of a region's water supply or water resource management, this alternative solution simply calls for development of flexibility in the regulations governing water reuse activities as well as flexibility within laws and regulations for activities impacted by water reuse.

## What actions are recommended?

All of the activities described above are considered to be valuable. However, the following actions are recommended for highest priority:

1. Request a streamlined adjudication for the Chehalis Basin.
2. Establish a water master program.
3. Recommend adequate funding for water resources management (source to be determined; funding to be distributed to those entities involved in water resources management)
4. Continue to collect data pertaining to water resources. Eventually this body of data will be complete enough to serve as a solid basis for water resource management.
5. Increase enforcement of existing laws and regulations to support voluntary efforts
6. Investigate the magnitude of impact from exempt wells. See exempt well issue paper.
7. Develop and implement water conservation programs. See water conservation issue paper.

# Instream Flows

## *Chehalis Basin Watershed Planning Issue Paper*

## What is the issue?

Instream flows are an optional element under 2514 Watershed Planning. The Chehalis Basin Partnership elected to include the instream flow element in its watershed plan. Because of a number of issues surrounding instream flows in the watershed, the Partnership chose to take advantage of state grant money available to fund instream flow-related work. This grant funding required the Partnership to make some recommendation related to instream flows to Ecology by September 30, 2003.

The basin consists of Water Resource Inventory Areas or WRIAs 22 and 23 (under Chapter 173-522 WAC). These two WRIAS comprise the entire 2,520 square mile Chehalis river watershed.

In 1976, regulatory minimum flows were set for 31 control stations[1] in the Chehalis Watershed. The intent of setting these flows was to ensure that "base flows," or low summer flows (June through late September) would be retained to provide for preservation of fish and wildlife, recreation, and aesthetic (scenic) uses.

The watershed planning process identified the following specific issues concerning instream flows in the Chehalis Basin:

- Stream flow has not been measured regularly at most of the regulatory control points, making it impossible to determine whether regulatory flows are actually being met.
- There is a perception that the actual flows are regularly below regulatory flows at many locations in the watershed.
- Water quality problems (especially temperature) that have been identified in the watershed may be related to low summer flows.
- Habitat studies have identified low summer flows as potentially problematic for fish.

## What questions are we trying to answer?

The watershed planning process identified the following specific issues concerning Department of Ecology's (Ecology) management of instream flows in the basin:

- What do the regulatory minimum flows mean and what was their intended use?

1. A control station is a point on a river or stream where a specific flow requirement is set in the Washington Administrative Code, often in conjunction with a stream gauge. Some means of measurement (staff gauge or recording gauge) must be available at the control point if the flow requirement is to be enforceable.

*Table 1 – WAC 173-522-050*

## *Closures to New Water Right Approval in the Chehalis Watershed*

*May 1 - Oct 31*

Beaver Creek, tributary to SF Newaukum

Beaver Creek, tributary to Black River

Bunker Creek

Dempsey Creek

Dillenbaugh Creek

Hanaford Creek

Hope Creek and Garrard Creek

Kearney Creek

Lincoln Creek

Middle Fork Newaukum River

Mill Creek

Mox Chehalis Salmon Creek

Rock Creek

Scatter Creek

Stearns Creek

Wildcat Creek

Williams Creek

Wynoochee River

*July 1 - September 30*

Black River

Skookumchuck River

South Fork Chehalis River

Salzer Creek

*Note: Affected reach is from mouth to headwaters and includes all tributaries in the contributing drainage area unless specifically excluded*

- Are the regulatory minimum flows being met? Everywhere? If not, where?
- What happens when the regulatory minimum flows are not met?
- In the future should Ecology direct water right holders with water rights issued after the regulatory minimum flows were established to stop diverting water when river flows fall below the regulatory minimum flows (i.e., enforcement)?
- Do the current regulatory minimum flows provide the desired quality of fish habitat, as related to stream flow?
- Should changes be made to the existing regulatory minimum flows?
- What does it mean when a basin is closed?
- Has Ecology implemented the Water Resources Program developed for the Chehalis basin in 1976 (the study upon which the existing regulatory minimum flows are based)? Are there additional management actions Ecology should take?
- Are there any basins where new regulatory flows should be established such that Ecology would be requested not to issue water rights when flows reach a certain level (i.e. threshold)?

The ultimate issue for the Chehalis Basin Partnership is to determine what the Partnership wants to recommend to Ecology concerning instream flows to meet its responsibilities under its 2514 Instream Flow Grant.

## What is the legal background to instream flows?

The Water Resources Act of 1971, Chapter 90.54 RCW, directed Ecology to develop and implement a comprehensive state water resources program to ensure that the waters of the state are utilized for the best interests of the people of the state. Ecology took an initial step to carry out this law in the Chehalis Basin by conducting a study of water rights and stream flows in the basin. The agency published a report of this study in November 1975.[2]

In 1976, Ecology conducted a public rulemaking process that incorporated scientific and policy recommendations from the Chehalis Basin study into state regulations (WAC 173-522). This regulation implements state law and, generally speaking, has the force of law. WAC 173-522 established a "comprehensive water resources program" for the Chehalis Basin.[3] The major elements of this program are as follows:

- It established base flow water rights (commonly known as "minimum instream flows") for 31 Chehalis subbasins with a priority date of 10 March 1976. The purpose of these base flows is to protect fish, game, birds or other wildlife, and recreational or aesthetic values.

2. Water Resources Management Program, Basin Program Series 2, Chehalis River Basin (Ecology, 1975).

3. The specific regulation that applied the Water Resources Act of 1971 and the 1975 study to the Chehalis Basin is WAC 173-522, "The Water Resources Program in the Chehalis River Basin, WRIA 22 and 23."

- It closed some streams and river reaches in the Chehalis basin for issuance of additional consumptive surface water rights based on a determination that there were no waters available for additional withdrawals without impairing base flows. The 23 closed basins are listed in the Table 1 at left.
- It created one exception to the basin closures listed in Table 1. The exception is that, in cases where there is no alternative source of water supply, Ecology may issue new consumptive rights for domestic use (Ecology interprets this to mean in-house use) and for normal stock watering use.
- In basins other than those listed in Table 1, the program assumed that waters would be available for the issuance of new water rights, subject to minimum instream flows.
- The regulation authorizes Ecology to stop or limit withdrawals by those who hold surface water rights issued after 10 March 1976 (called "junior rights"[4]) from withdrawing water when flow falls below the regulatory minimum flows (as the law says "in times of water shortage"). The regulation also provides Ecology with the authority to limit withdrawals beginning with the latest priority date first (the last water right issued) and working backward [until all junior water rights are limited or] the agency is satisfied that flows will be met. The exception to this last-to-first priority system is for domestic uses; that is, Ecology must stop other right holders from withdrawing before asking domestic right holders to limit their withdrawals. Domestic uses include irrigation of lawns and noncommercial gardens not to exceed one half acre and livestock use, excluding feedlot operations.
- It stated that Ecology has no authority to interrupt valid senior water (rights with a priority date prior to 10 March 1976) even during times of water shortage.
- It required Ecology to revise the base flows through a public rulemaking process if the Department of Fish and Wildlife should provide Ecology with information that higher flows than the base flows are needed.

## How was the final adopted regulation different that the proposed program?

Ecology has managed the program in various ways depending on staffing, budget, and political pressure. In addition, there are some differences among the water resources program recommendations in the 1975 Chehalis study and the program as established by the WAC 173-522 regulations. Understanding some of these differences may assist the Chehalis Basin Partnership as it develops the instream flow recommendations to be included in its Watershed Management Plan.

4. In this and other Chehalis Basin Partnership issue papers the term "junior rights" is used as shorthand for rights with a priority date later than instream flows -- that is with a date later than 10 March 1976. Similarly, the term "senior rights" is used for rights with a priority date earlier than 10 March 1976.

Some of the more significant differences are as follows:[5]

- **Restrictions on "Junior Rights":** The 1975 study recommended that all surface water rights issued after 1976 carry the proviso that the holders will stop diverting water when the flows fall below the level necessary to meet the regulatory minimum flow. Ecology has included a proviso in all junior surface water rights and some junior ground water rights issued since 1976 stating that these rights may be interrupted when river flows drop below the regulatory minimum flows, not that the holders will stop diverting.
- **Base Flow Monitoring:** Ecology has not monitored base flows at most regulatory control stations in the Chehalis Basin on a regular basis. Therefore, Ecology does not systematically gather or maintain an information base to use in applying its authority to restrict withdrawals by junior right holders when base flows are not met. (See the previous bulleted point and fifth bullet in previous section.)
- **Use of Available Flow Information:** Although there is no systematic program to monitor actual river flows relative to regulatory minimum flows, Ecology does receive information from time to time indicating instream water rights (i.e. regulatory base flows) are not being met. The agency has not used this information to manage withdrawals to maintain instream flows.
- **No Interruption of Withdrawals to Protect Flows (that is, no enforcement):** Ecology has no program in the Chehalis Basin to use its authority to require junior water right holders to stop diverting water when regulatory base flows are not met. Ecology has implemented such programs in other basins in the state.
- **Informal Closures:** Although Ecology does not systematically monitor flows, the agency is aware that data from mainstream Chehalis flow monitoring stations indicate that actual flows are periodically below minimum regulatory flows. Ecology has recognized the low-flow problem by adopting a cautious policy regarding issuance of new rights in those basins not already closed by the WAC. (See fifth bullet in previous section.) In the Upper Chehalis, Ecology strongly discourages potential applicants from pursuing new water rights and encourages those seeking to satisfy new water needs to acquire existing valid rights. In essence, this policy constitutes an informal closure of the Upper Chehalis Basin to issuance of new rights.
- **Water Ledger:** The 1975 study recommended that Ecology develop and maintain a tracking system, so that all consumptive rights issued after 1976 would be deducted from water available for appropriation. This was intended to place a limit on appropriations in the "open" basins. (See fifth bullet in previous section.) Ecology tracked the amount of water appropriated for each stream reach in ledger book fashion for several years following 1976. Subsequently, they abandoned the tracking system

5. These differences are offered as observations for consideration by the Chehalis Basin Partnership in developing its Watershed Management Plan. They are not intended as criticisms of Ecology management of Chehalis Basin water resources.

after determining that the ledger book approach was not scientifically-based and appropriate for water management.

- **Modification of Base Flows for Fish and Wildlife:** To date, the Department of Fish and Wildlife has not requested modification of the current regulatory instream flows. However, the Instream Flow Incremental Methodology (IFIM) studies currently underway at 12 locations in the basin will provide habitat information that could lead to such recommendations. It certainly will assist the Partnership in determining what flow levels are protective of fish. It should be noted that current state and federal law holds that Indian Tribes retain instream flow water rights to protect reserved hunting and fishing rights with a priority date of time immemorial.[6]

## What technical resources are available relative to instream flows?

The technical data available to assist with evaluation of the Instream Flow issue in the Chehalis Watershed fall into the two categories: "Available Stream Flow Data" and "Fish Needs Related to Low Flows."

### *Available Stream Flow Data*

A minimum 10-year record is desirable to evaluate performance of the stream. However, as mentioned previously, stream flow is not systematically measured at many of the 31 regulatory control points in the watershed.[7] (See Table 2.) More gauging was done historically, but many of these sites were deactivated prior to 1983, making the data from these sites 20 years old. In addition, many of the old gauges were active for just a short time during the 1940-1970 period. The Chehalis Basin Partnership undertook a flow monitoring study during summer 2002 (Tetra Tech/KCM and Triangle Associates, in press) that provided one summer's worth of flow data for 14 control stations, 12 of which had no prior flow data.

Available flow data indicate that actual river flows drop below the regulatory minimum flows at many control stations in the Chehalis Watershed. Ecology documented that for the station on the Chehalis River near Porter, actual river flows have dropped below the regulatory minimum flows regularly (Table 3). Table 3 lists the percentage of days historically when river flows were below the regulatory minimum flow for each time period. This compilation indicates that river flows have been below the regulatory minimum flow nearly half the time from May through July at the Porter station. During the rest

*Table 2*

### *Summary Of Chehalis Watershed Regulatory Control Point Flow Data*

| | |
|---|---|
| Active flow gauge | 8 sites |
| Inactive Gauge, > 10-year record | 4 sites |
| Inactive Gauge, < 10-year record | 7 sites |
| No flow data prior to Summer, 2002 | 12 sites |

6. See Dept. of Ecology v. Yakima Res. Irr. Dist., 850 P.2d 1306, 1320-23 (Wash. 1993) recognizing a Treaty right to water for instream flows for salmon habitat; Dept. of Ecology v. Acquavella, No. 77-2-01484-5, Memo. Op. at 9-10 (Yakima County Superior Ct. (Sept. 4, 1994) explicitly holding that the Yakima Nation's instream flow right extended off the reservation to support fishing rights; U.S. v. Adair, 723 F.2d 1394 (9th Cir. 1983), cert. denied sub nom., Oregon v. U.S., 467 U.S. 1252 (1984) tribes aboriginal water rights to protect fishing and hunting rights necessarily carry a priority date of time immemorial.

7 For a complete discussion of available streamflow records see the following references: Tetra Tech/KCM, in press; Tetra Tech/KCM, 2001, and Envirovision Corporation, 2000.

*Table 3*

### *Percentage Of Time Chehalis River Flows Have Been Below Regulatory Minimums, Chehalis River Near Porter Station[1]*

| | |
|---|---|
| January 1-15 | 8% |
| January 16-31 | 10% |
| February 1-15 | 7% |
| February 16-28 | 2% |
| March 1-15 | 5% |
| March 16-31 | 10% |
| April 1-15 | 15% |
| April 16-30 | 29% |
| May 1-15 | 36% |
| May 16-31 | 45% |
| June 1-15 | 46% |
| June 16-30 | 43% |
| July 1-15 | 38% |
| July 16-31 | 46% |
| August 1-15 | 33% |
| August 16-31 | 15% |
| September 1-15 | 14% |
| September 16-30 | 10% |
| October 1-15 | 12% |
| October 16-31 | 11% |
| November 1-15 | 13% |
| November 16-30 | 12% |
| December 1-15 | 8% |
| December 16-31 | 11% |

*1. Data taken from Ecology, 1995, Initial Watershed Assessment Water Resource Inventory Area 23, Upper Chehalis River (Table 4 on page 20). This data is for the 1952-1991 period.*

of the year, actual river flows have dropped below the regulatory minimums less frequently.

Flow hydrographs for other control stations with available data indicate that actual flows drop below the regulatory minimum flows at other stations as well. For stations with enough flow data to evaluate, the pattern varies by station and throughout the year. Records available for 19 of the 31 control stations indicate that during the low flow season, the actual river flows have been below the regulatory flows up to 50% of the time.[8]

Flow data were collected for the first time during summer 2002 at 12 control stations in the Chehalis Watershed (Tetra Tech/KCM and Triangle Associates, 2003, in press). The results from this gauging program vary by station, but flows dropped below the regulatory minimum flows at most sites by the middle of August and stayed below until early November. This very limited data set is not enough to provide a statistically-valid basis for predicting how often actual flows drop below the regulatory minimum flows at these sites. However, comparing summer 2002 flow data from long-established gauging sites with the historical records for that site provides some context for the seasonal flow pattern experienced in the Chehalis watershed during the summer 2002. This comparison indicates that flows were slightly below average (50%) for the June-July period and then dropped to very low flow levels for the August-early November period.

Ecology and WDFW are currently conducting an instream flow habitat study known as an IFIM study (Instream Flow Incremental Methodology). This study will be specific to six river reaches: Humptulips, Black River, East Fork Hoquiam, Satsop, Skookumchuck, and upper Chehalis River. The study will produce information about ideal flows for fish in those rivers, based on specific information on velocity, depth, substrate, and cover. Results from the IFIM study should be available during fall 2003. In addition, the state will review an earlier IFIM study the then Department of Fisheries conducted on six sites for the Chehalis River between Elk Creek and the Newaukum River, the Newaukum River (South Fork, North Fork and Newaukum River), Cloquallum Creek, and the Wishkah River.

## What are the needs of fish in regards to water and flow?

In a fish species' life history, all flow stages are important: high flow in winter; medium flows in spring to ensure out-migration to the ocean; enough flow in summer for rearing juveniles and flow in late summer/early fall for returning spawning adults.

A flow regime that most benefits fish and aquatic systems is one that, in general, mimics the natural regime. The natural flow regime of the Chehalis River basin is driven by rainfall, which is greatest November through February.

8. The period of record is different for each station, making a direct comparison between stations tenuous.

Saturated soils, limited snow pack in the upper Newaukum, Skookumchuck, Wynoochee, and Humptulips, combined with continued rainfall into spring months keep flows moderately high in early spring, declining in late spring. By summer occasional rain and residual groundwater from winter rain feed the low flows, which gradually decline until the onset of fall rains.

Droughts actually contribute to habitat variability. Natural droughts can have both positive and negative impacts on fish. On the positive side, drought and dry periods favor the encroachment of trees, shrubs, and other organic matter into the streambed, which provides a source of food, cover, and build up of sediment. On the negative side, droughts often disrupt upstream fish migration, increase predation by birds and mammals, and reduce insect production that provides a source of food for fish. It confines fish, crowding them into a smaller space, usually at a time when water is warm. Low flows mean that water volume is reduced, and it heats up faster than a larger water body at the same air temperature. In warmer temperatures fish need more space, not less, as they are cold-blooded and have higher metabolic demands: they need more food and oxygen. Thus, at the higher temperatures fish eventually cease to feed, stop growing, and eventually die.

Low flows, historically, have received the most attention from planning groups, such as the Chehalis Basin Partnership, that have agreed to take on the instream flow issue. Setting a minimum instream flow has likewise been the approach of Washington State to ensure that at least some minimum amount of water remains in the stream for fish returning to spawn while allowing for other out-of-stream uses. Generally, low flow periods of the year are when the greatest conflict is seen between the needs of water users and the needs of fish.

A regime that mimics flows at the essential life stages, that incorporates high flow and low flow elements, and that varies from year to year, as in nature, will most successfully allow fish species to co-exist with other water uses. Using a habitat simulation model which most nearly approximates the needs of fish at various flows and velocities, such as PHABSIM, will help the Planning Unit analyze the impacts of various flow regimes on fish habitat while considering other uses of water.

## What are some potential solutions?

The potential solutions identified in this paper fall into two categories: recommending changes/additions to the existing regulatory flow and proposing management actions that would help put water back into the basin's rivers and streams. As a decision-making tool, the group also proposes a No Action alternative against which to gauge the other solutions. These solutions are listed below, and each alternative is described in the following section.

A. Leave regulatory minimum flows as they are.

B. Amend or add to existing regulatory instream flows (including using IFIM studies to consider setting instream flows for 6-12 additional stream segments).

C. Recommend additional closure(s):

D. Place restrictions on exempt wells in basins already closed;

E. Change the way flows are managed;

F. Implement a non-regulatory flow restoration;

G. Conduct additional studies or monitoring.

## *Analysis of potential solutions:*

**A. Leave minimum flows where they are; no change to regulatory management of minimum flow program.**

This is the status quo alternative from a regulatory perspective. The established regulatory minimum flows would remain as they are now. Those rights that are junior to the regulatory minimum flow could be interrupted during periods when river flows are below the regulatory minimum flows for that reach. Ground water rights can also be provisioned as interruptible if a field investigation determines they have an impact on instream flows.

To date, Ecology has not required junior water right holders to stop diverting water during times when the river flows are below the regulatory minimum flows in the Chehalis watershed, even though Ecology has sometimes taken this approach to regulating regulatory minimum flows in other parts of the state.

By itself, the status quo alternative would not likely result in more water in the streams and rivers during low flow periods, unless Ecology began requiring junior water right holders to stop diverting water during times when the river flows are below the regulatory minimums.

**B. Amend or add to existing regulatory flows**

B1. *Raise or lower the regulatory minimum flow in specific stream reaches*

Raising the regulatory minimum flow could be a possible recommendation if the Partnership believed that the established regulatory minimum flows do not provide adequate protection to instream resources. The Ecology/WDFW team working on the IFIM study will produce flow recommendations for six sites within the watershed and possibly six others where data from the 1987 IFIM study is available. While results from that study are not available yet, it is likely that those flow recommendations will be higher than the existing regulatory minimum flows because the IFIM studies are focused on identifying ideal conditions for fish whereas the regulatory minimum flows were set with less ambitious goals.

If the Partnership concluded that regulatory minimum flows should be higher than currently set, the new recommended flows could be set based on recommendations from the IFIM study or on any additional scientific or reasonable basis that supports raising the regulatory minimum flow.

Any new regulatory flow would carry a "paper" priority date of 1998 if recommended through the watershed plan, and, thus, would be junior to most water right holders. This higher regulatory flow would not result in actual "wet" water, but it could allow Ecology to apply a strict standard to future requests for water. However, based on Indian or federal reserved water rights, the Chehalis Tribe and Quinault Nation retain an instream flow right necessary to protect fishing and hunting rights. The tribal right to instream flows will likely be adjudicated or settled using the same IFIM methodology conducted by WDFW. Most significantly, the Tribal reserved right to instream flows will carry priority date of time immemorial. Thus, the only way to attain actual higher "wet" instream flows through regulatory means based on IFIM studies rests with the assertion of Indian or federal reserved water rights.

While the IFIM study will produce recommendations for six, and potentially 12, sites, recommendations would have to be developed for the remaining 19 to 25 instream flow control stations in the Chehalis. This could be a major undertaking as these studies must be site-specific. Doing a simplified habitat study to develop recommendations for the remaining sites is a possibility, but there is currently no modern-day precedent in Washington State for a simplified approach. One option would be to do a synthesized hydrograph whereby data would be extrapolated to other control points, probably based on watershed area.

B.2. *Set new minimum flows for streams that do not currently have them*

The focus for this could be in urbanizing areas where streams and habitat are at the most risk of degradation. One useful exercise would be to consider setting instream flows in smaller tributaries in areas where future growth is anticipated. Most of the major rivers have flows set on them already. In its review of water rights applications, the state commonly will choose the closest downstream control point to set an instream flow if the proposed water right is located on an upstream tributary that does not have a regulatory minimum flow set. Setting specific instream flows on tributaries would have the advantage of taking into account any individual characteristics of the streams such as groundwater influence. The areas that would be best to consider would be those areas that the Steering/Technical Committee has identified as anticipating growth and population increases.

**C. Closure recommendations:**

C.1. *Closure of basins in addition to those already closed*

Some streams are identified in Chapter 173-522 WAC (Table 1) as closed to any further appropriation. The Partnership may wish to identify additional streams or reaches that should be closed. These might be identified by reviewing historical hydrographs and specifying those streams that have not met minimum flows for a substantial number of years. Any proposed closures should be reviewed closely with WDFW staff to protect fish resources.

C.2. *Seasonal closures on specific stream reaches*
Seasonal closures may be determined to be appropriate on additional stream and river reaches. Identification of these locations would require examination of hydrologic data (flow records, water diversions, upstream dam releases) as well as existing and potential fish habitat information. Where actual stream flows have frequently been below regulatory flows, it is also possible that the original regulatory flows were set at a higher level than elsewhere in the Chehalis Watershed.

C.3. *Amending stream closure periods to address extended fall dry season*
As it stands now, four reaches are closed for a three-month period from July 1 to September 30 and 19 are closed for a six-month period, May 1 to Oct. 31. The Partnership might consider recommending closure of the first four for a six-month period. This year was an abnormally dry November; however, the Partnership could consider extending the dry period to November 15, for instance.

**D. Restrictions on exempt wells**

In some parts of the state, Ecology has closed basins not only to surface water withdrawals but also to any groundwater withdrawal, including exempt wells. An exempt well may draw up to 5000 gallons of water a day although most times a single family home will draw less. However, agricultural and industrial uses are not limited to 5,000 per day. It should also be noted that much of the water is returned to the ground via on site-septic systems

In any basins where water is a critical concern for fish, if hydraulic continuity is established, and if it is shown that exempt wells in a subbasin are affecting instream flows, the Partnership might consider asking Ecology to take action on exempt wells. (See the Exempt Wells Issue Paper for further discussion.)

**E. Leave regulatory minimum flows as they are; change the way Ecology and others manage these flows.**

E.1. *Ecology should change the way it manages flows (regulate junior water users, keep better records, fulfill more of the provisions of the 1975 Program, etc.)*

A possible recommendation is for Ecology to develop and implement a program to interrupt junior water rights during times when river flows drop below the regulatory minimum

flows. Implementing such a program would require the following steps:

1. Identify all junior water right holders and determine the use of each right.
2. Conduct pre-season forecasting to assess likelihood/severity of possible water right use interruptions.
3. Develop system to determine whether flows are above or below the minimum flows for specific stations and how junior water right holders can determine whether it is legal for them to divert or withdraw water. This could involve meters or some other method of measuring water use.
4. Notify junior water right holders of the possibility of water interruptions; provide them with necessary information so they can determine whether or not they can divert water.
5. Conduct field survey work to map and document junior water right holder's water diversion and distribution systems to aid in assessing compliance during times when river flows drop below the regulatory minimum flows.
6. During the low flow season, update flow/interruption information daily.
7. During low flow season, conduct regular (weekly) inspections. Work with individual water right holders to achieve compliance with flow interruptions.

As an example, based on water right records, junior water rights total 198 cfs in the upper watershed (WRIA 23) and 44 cfs in the lower watershed. Average stream flows for the Chehalis River at the Grand Mound and Porter gauging stations for the lowest flow times of the year are in the 200 cfs and 300 cfs range respectively. Therefore, interruption of these junior water rights could significantly help increase base flows.

E.2. *In conjunction with Ecology, develop an approach to integrate groundwater use into instream flow needs. This will require identification of "losing/gaining" stream reaches and better quantification of hydraulic continuity.* Conduct field investigation of the relationship between ground water withdrawals and instream flows in those areas where flows are frequently below regulatory minimums. Possibly do a study of the gaining and losing reaches of the basin to identify areas where interruption of groundwater withdrawals might be an appropriate tool to maintain flows when river flows drop below regulatory minimum flows.

E.3. *Work with other agencies that manage natural resources and implement land management practices to conserve water.*

- Implement land management practices that retain water within the watershed to feed summer base flows (vegetation retention, stormwater management, low impact development practices).

- Work with other agencies active in natural resource management, such as DNR, to include protection of base flows in their management decisions and practices. Consider land use practices that would better manage water, such as conservation toilets, protecting critical aquifers, restricting growth in critical stream reaches, etc.
- Identify and build upstream water storage projects to store water in higher flow times for release in low flow periods. Since stored water is often fairly warm in temperature, and temperatures above about 18 degrees Centigrade can be toxic to fish, this water would probably be best used for agricultural uses such as stock watering and irrigation or for domestic lawn and landscape watering.

**F. Implement a non-regulatory base flow restoration program to formalize the goal of getting more flow back in the river during low flow periods.**

Overall, this alternative would step away from the concept of regulatory minimum flows as a regulatory means to protect and restore fish habitat and would establish a new voluntary program for restoring base flows to the rivers. This system would be founded on the premise that, in most cases, more flow is better for fish habitat, and the program would be focused on getting more base flow into the rivers.

For such a program to be effective at returning flow to the rivers, there would have to be specific actions identified and implemented to increase base flows and tracking systems to facilitate quantification of progress. Ideally, some target flows would be established for each reach, although if the premise behind this alternative is as simple as "more flow is better," it may be unnecessary to expend the effort to develop targets. Instead, this effort could be focused on prioritizing river sections where low flows are the most damaging to fish and working to find ways to increase flows in those reaches.

Tracking the progress of the base flow restoration program would be critical to evaluating and documenting its success. This tracking system would need to quantify the expected water to be returned to the rivers by each action. It would need to include subsequent downstream flow monitoring records to aid in assessing the impact of specific actions. Also very important would be identification of who will be responsible for implementing this program.

This alternative, using a voluntary approach, has good potential to increase base flows if it is implemented. The potential downside to this alternative is that, since it is voluntary, it may not work. It may be difficult to find willing participants for actions that will result in significant river flow increases. Other actions that are more easily implemented, such as riparian corridor protection/restoration, may not produce measurable river flow increases.

An additional complexity of this alternative is that it does not address

Ecology's regulatory minimum flows. The regulatory minimum flows would remain as they are now, with the uncertainty as to whether Ecology will ever regulate against junior water right holders.

It would be possible to modify the minimum flow regulation (WAC 173-522) to address this, perhaps by specifying that Ecology will not regulate against junior water right holders in control sections where those water right holders are cooperating in the base flow restoration program. This modification would be tricky to get adopted and implemented, however, and may delay implementation of the program.

Several options are listed below, all of which would need to be explored and developed more fully before being implemented in the Chehalis Basin.

F1. *Trust Water Rights Program* (ability to transfer water to trust account and avoid relinquishment)

F2. *Acquisition Program* (water leasing and acquisition during drought years-need to have monies spent in our WRIA's) Acquisition and "retiring" active water rights

F3. *Pursue actions to increase base flows* such as the following (more could be identified):

- Transferring active surface water rights to ground water sources that will have a delayed or minimal effect on river flow.
- Dry year leases of water rights or portions of water rights
- Changes in point of withdrawal or diversion; work with landowners to decide what is best for fish but still allows them the water use that they need;

F4. *Water Banking* (perhaps in conjunction with relinquishment)

F5. *Relinquishment* (need "active" relinquishment enforcement not just on complaint)

F6. *Examine the language in the current regulatory minimum flow WAC to clarify its intended use and recommend changes.*

**G. Conduct additional study before committing to changes of the regulatory minimum flows,** such as further monitoring or stream gauging in order to provide data for future management decisions. The components/implications of this alternative would be the following:

- The Partnership believes the regulatory minimum flows should be revised but lacks adequate information to recommend what flows should be.
- Specific additional studies would be recommended such as:
  - Continued flow monitoring.
  - Simulation of "natural" flows (what river flows would be prior to water diversions, groundwater use, and vegetation changes).

– Fish habitat studies, such as IFIM or others, to assess habitat needs and potential as related to flow.
– Specific water right and water use information to better quantify how much water is removed from the rivers. This could include field surveys to locate all diversions, possibly some illegal.
– Groundwater studies to evaluate the impact of groundwater withdrawals and land use activities (such as increasing impervious areas) on river flows.

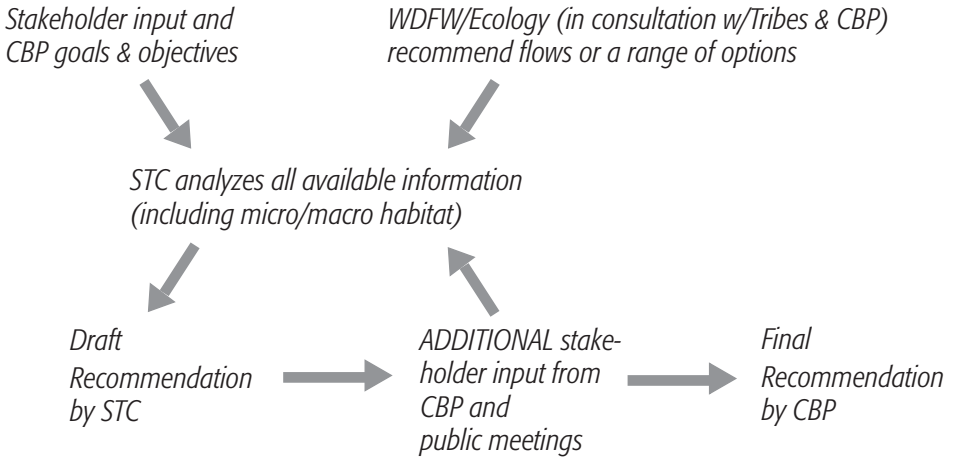
## DRAFT Suggested Interim Instream Flow Approach & Information

### *Introduction: Process*

The STC recommends the process outlined in the flow chart below in forming the final recommendation to the state. There has been some stakeholder input from CBP meetings, publicity and Study Area meetings, but the focus to date has been on habitat and instream needs, technical analysis and recommendations. The CBP feels that for final recommendations to be made, after all information is compiled and analyzed, there must be additional stakeholder input on any final recommendation.

### *Draft Instream Flow Recommendation*

1. Current regulatory flows should be retained; the CBP wishes to preserve the 1976 priority date for those flow levels.




2. After analysis of new and existing information -- see #5 below -- the CBP will consider recommending flow levels for streams with no regulatory minimums or adding incremental flows to existing regulatory minimums. Any new recommendations adopted by the state that are higher would carry a 1998 priority date for the additional flow increment.
3. Request that WDFW/Ecology, in consultation w/Tribes and CBP mem-

bers, recommend instream flow levels for all control stations. In addition to current stream hydrology and IFIM results, both the historic, "natural" stream flow level and flow levels less than 100% optimum for fish should be considered. Those agencies should consider the strategy of dry-year and wet-year flow numbers, as well as the possibility of "target" flows.

4. CBP adopts the following philosophy (possibly as an expansion of its existing mission, goals and objectives) for how to approach setting stream flow levels:
    - Recommended new regulatory minimum instream flows in the Chehalis Basin should represent flows that provide a healthy environment for fish and other aquatic life (related to flow conditions) and that are hydrologically achievable. These flows should strive for the flow levels that occurred in the stream prior to European settlement. Definitions for the two components in this statement (healthy environment for fish and pre-European hydrologically achievable flows) need to be formulated.
    - Based on Indian, or federally-reserved, water rights, the Chehalis Tribe and Quinault Nation retain an instream flow right necessary to protect fishing and hunting rights. The tribal right to instream flows will likely be adjudicated or settled using the IFIM methodology.
    - Keep salmonids in the Chehalis Basin off the threatened and endangered species list.
    - These flows should be measured and monitored. The results will be used to evaluate the effectiveness of the program and make necessary adjustments.
    - A focus should be placed on gauging and increasing summertime flows into the streams and rivers of the basin. Questions to consider (documented responses from agencies/tribes would be beneficial):
        - What is a healthy environment for fish?
        - What flows are hydrologically achievable to meet the needs of people and fish?
        - What flows occurred prior to European settlement?
    - Enforcement of existing laws, rules and regulations would assist greatly in achieving flow levels that are adequate for fish and people.
5. In the implementation stages of the watershed planning process, CBP will consider recommending flow levels for streams with no regulatory minimums or adding incremental flows to existing regulatory minimums, using information from the following:
    - CBP goals and objectives and the above instream flow philosophy
    - Existing flow data

- Out-of-stream uses
- IFIM flow study results
- Estimates of pre-European flows
- Recommendations from Ecology/WDFW, in consultation with tribes
- Possible strategy of dry-year and wet-year flow numbers

6. Ecology/EPA/USGS should monitor flows at all 31 sites:

*Table 1-1.*

## *Summary of Available Data for Chehalis Basin Control Points*

| *Control Point* | *Active USGS Gauge* | *Gauged for This Study in 2002* | *Historical Data* |
|---|---|---|---|
| 1. Black River | | • | 1942-50 |
| 2. Cedar Creek | | • | 1986a |
| 3. Charley Creek | | | 1945-49 |
| 4. Chehalis River at Grand Mound | • | | |
| 5. Chehalis River at Porter | • | | |
| 6. Chehalis River below Confluence with Satsop River | | | 1980-83 |
| 7. Chehalis River | | • | |
| 8. Chehalis River Confluence with Elk Creek | • | | |
| 9. Chehalis River, South Fork | | • | 1942-80 |
| 10. Cloquallum Creek | | | 1942-72 |
| 11. Decker Creek | | • | 1942a |
| 12. Elk Creek | | | 1942-70 |
| 13. Elk River | | | |
| 14. Hoquiam River, East Fork | | • | 1942a |
| 15. Hoquiam River, Middle Fork | | • | 1943a |
| 16. Hoquiam River, West Fork | | • | 1942-43a |
| 17. Humptulips River | | | 1933-79 |
| 18. Johns River | | • | 1942a |
| 19. Newaukum River | • | | |
| 20. Newaukum River, North Fork | | | 1960-66 |
| 21. Newaukum River, South Fork | • | | |
| 22. Newskah Creek | | • | 1945-49 |
| 23. Porter Creek | | | 1942-48 |
| 24. Salzer Creek | | | 1968-71 |
| 25. Satsop River | • | | |
| 26. Satsop River, East Fork | | | 1957-71 |
| 27. Satsop River, Middle Fork | | • | 1942a |
| 28. Skookumchuck River | • | | |
| 29. Wishkah River | | • | 1942-43a |
| 30. Wishkah River, East Fork | | • | 1942a |
| 31. Wynoochee River | • | | |

a. Current-meter measurements

7. The Chehalis Basin Partnership prefers voluntary to regulatory approaches in attempts to make water available for stream flows. Sample voluntary efforts could include the following:

| *Voluntary Effort* | *Expected Results* | *Approaches to Measure Results* | *Comments* |
|---|---|---|---|
| Use volunteers to conduct flow gauging in 2003 and (possibly) beyond at 15 sites | Data acquisition during the 2002 low flow season will be continued and provide an important continuity of data for the basin | Logging of data and placement of this data in a database. | |
| Education/Information | | | |
| Water trusts | | | |
| Conservation | | | |
| Others?? | | | |
| *NOTE: This plan will attempt to gauge the success of voluntary efforts and consider added measures to achieve water resource goals and needs.* | | | |

8. An important focus of watershed plan recommendations and implementation should be to make more water available for instream uses, especially in the time period from roughly April through October. Most important are the months from July through October.
9. (Placeholder): The new flows that should be established by rule are as follows:

| Stream/River | Segment | Control Point | Recommended Flows/ Time Periods | Comments |
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10. (Placeholder): The CBP recommends that Ecology close the following basins from further surface water withdrawals at certain times during the year, as indicated. The CBP does desire, however, that water rights be issued for groundwater applications if the applicants can show that their withdrawals would not impact stream flows from August through October, through timing or consumptive use.

| Basin | Dates of Closure | Rationale | Comments |
|---|---|---|---|
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## Additional

stakeholder input from CBP and public meetings

WDFW/Ecology (in consultation w/Tribes & CBP) recommend flows or a range of options

### *Draft*

Recommendation by STC

### *Final*

Recommendation by CBP

Stakeholder input and CBP goals & objectives

STC analyzes all available information (including micro/macro habitat)

# Hydraulic Continuity

## *Chehalis Basin Watershed Planning Issue Paper*

## What is hydraulic continuity?

Hydraulic continuity is a scientific term that describes how easily water flows between ground water and surface water (streams, rivers, lakes, and wetlands).

When hydraulic continuity is high, water flows easily between ground water and surface water. This impacts how water should be managed because anything done to the ground water (such as, pumping from wells or pollution seeping into the ground water) will affect the surface water, and vice versa.

## Why is hydraulic continuity an issue in the Chehalis watershed?

In the Chehalis watershed, most of the ground water currently being used is believed to be in close hydraulic continuity with surface water. This ground water is drawn from the shallow water table (aquifer). Most wells are less than 100 feet deep.

While this close hydraulic continuity is important for many reasons, the topic arises most frequently in relation to consumptive water use. Concerns about too much water being allocated, low summer stream flows, and water quality concerns have prompted Ecology to stop issuing new water rights that would consume water from the streams and rivers. As a result, Ecology will basically not approve new applications for ground water use because of its guidelines that the ground water and surface water should be considered as virtually one connected system, unless site specific studies show otherwise.

When hydraulic continuity is high, ground water pumping can affect streamflows in two ways. First, if a well is close enough to the stream, it is possible to actually suck water from the stream toward the well. Second, wells may intercept ground water that would otherwise have contributed to streamflow. This can be true even for wells that are far away from the stream.

## What is known about hydraulic continuity in the Chehalis Watershed?

Previous studies have indicated that hydraulic continuity is high in most areas of the Chehalis. Data from one study suggest that the speed of ground water flow is rapid, averaging 16 feet per day[1]. Another study indicates that water flows into the Chehalis and Black Rivers from the ground water at a

1. Garrigues, R.S., Sinclair, K., and Tooley, J. 1998. *Chehalis River Watershed Surficial Aquifer Characterization*. Washington State Department of Ecology Publication No. 98-335.

rate of between 1.8 and 3.1 cubic feet per second (cfs) per river mile[2]. At this rate of inflow, ground water is adding up to 30 cfs to the river over a ten-mile length. This is very significant, considering that a typical August streamflow in the Chehalis River at Grand Mound is 242 cfs.

## What does this mean for people who want to drill new wells and begin to use ground water?

This means that Ecology will likely not approve any new applications for ground water use because of its management guidelines, approach that assumes new ground water use will impact surface water, unless proven differently. Individuals can still drill wells for personal use, under the exempt well provision[3].

It may be possible, through site specific field studies, for people wanting to get approval for a new ground water use to show that the desired use would not harm streamflows. This would require a field study and policy approval from Ecology.

## Is there adequate information to understand hydraulic continuity in the Chehalis Watershed?

No. Currently, there is enough information to indicate that hydraulic continuity is likely to be high throughout the watershed. There are some actual data to quantify hydraulic continuity for the Black River/Scatter Creek region of the watershed. What is needed is a determination of aquifer characteristics for the entire shallow aquifer, both along the length of the Chehalis River and across the width of the valley.

## What are some possible solutions?

Some possible approaches/solutions for the hydraulic continuity issue are as follows:

1. Status Quo — no new actions related to hydraulic continuity. This is the "business as usual" alternative. The results are likely to be the following:
   - No new ground water rights will be approved.
   - Existing ground water use will continue to impact streamflows.

2. Conduct a ground water study that provides the information necessary to address the hydraulic continuity issue. This study would provide specific information about the character of the ground water

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2. Sinclair, K.A. and Hirschey, S.J., 1992. *A Hydrogeologic Investigation of the Scatter Creek/Black River Area*, Southern Thurston County, Washington State: The Evergreen State College, masters thesis.

3. Numerous other issues related specifically to exempt wells are discussed in the *Exempt Wells Issue Paper*.

throughout the Chehalis watershed. This information would allow decision-makers to better evaluate whether an individual water right application would impact streamflows. This study would also provide the information to evaluate whether a strategic ground water pumping schedule could be developed for a particular site that would delay the impact on the river until the high flow period.

Such a study would require extensive field testing to determine aquifer properties throughout the watershed. This study would include delineations of river sections that lose water to ground water and river sections that gain water from ground water.

## What actions are recommended?

**Recommend that Ecology develop a new hydraulic continuity policy (statewide or for the Chehalis) that allows water right applicants to employ more flexible strategies for meeting their water needs given the issue of hydraulic continuity.** These strategies could include identifying areas of no hydraulic continuity (could be new ground water sources), identifying areas where the timing of pumping ground water could be managed to eliminate any negative impact on streamflows, or transferring surface water rights to a ground water withdrawals to lessen the impact on streamflows.

# Municipal Water Supply

## *Chehalis Basin Watershed Planning Issue Paper*

## What is this paper about?

Serving the domestic water needs of people is a significant consumptive water use in the Chehalis Basin. A major portion of this water use is provided to people by entities called water purveyors. Water purveyors may be municipalities like the City of Chehalis; water districts, such as Boistfort Valley Water District or Grays Harbor Water District #2; or community water systems that typically serve smaller residential areas. Collectively, these organizations are referred to as "municipal water purveyors." Residents who do not get their water from water purveyors usually rely on a personal well or spring to supply their domestic needs.

Water purveyors face some unique challenges in fulfilling their mission of providing safe drinking water to residents within their service areas. These challenges involve striking a balance between serving the immediate needs of the current population and planning for future populations. Working within the framework and requirements of the various regulations adds to this challenge.

## What basic knowledge about municipal water system planning is needed to understand its place in the Watershed Plan?

The Washington Department of Health (DOH) regulates the development of new drinking water sources and the design, operation, and construction of water treatment, storage and transmission facilities. (See Chapter 246-290 WAC.) All water purveyors are required to prepare some sort of Water System Plan. Purveyors with 1,000 or more connections must use a minimum 20-year planning horizon, and update their plan every six years. Water System Plans identify present/future water needs and how the purveyor plans to meet those needs. These needs include both physical capacity and the adequacy of water rights. Smaller water purveyors may prepare an abbreviated version of the Water System Plan, called a Small Water System Management Program. There are no regular update requirements for small water purveyors.

The planning considerations for a water purveyor include both physical and regulatory items including the following:

- Physical capacity of their system versus current demand (both instantaneous and annual)
- Physical capacity of their system versus projected future demand (both instantaneous and annual)

- Location of their water source and distribution facilities versus location of projected future demand
- Current demand versus water right authorization (instantaneous and annual)
- Future demand versus water right authorization (instantaneous and annual)
- Uncertainty of commercial/industrial demand (both quantity and location)
- Current and future water right authorization incongruencies associated with location of water use, size of service area, number of connections, etc.

Water System Plans are reviewed and approved by DOH, but the Plans are also reviewed by the Washington Department of Ecology (Ecology) for adequacy of water rights issues since Ecology administers the water right program. Ecology's review of Water System Plans is the agency's main opportunity to identify potential problems with municipal water rights.

Municipal water purveyor's water rights are more complex by nature than most other water rights. Most municipal water purveyors have several water rights. These water rights often pertain to several water sources, such as several wells. Often, the more recent water rights are tied to the earlier water rights, so that the Ecology and the water purveyors essentially manage these rights as a package. In addition, some rights may be provisioned as supplemental, meaning they can only be used if the water source authorized under the other rights (considered primary) is not available. Fortunately, since water purveyors almost always meter raw water diversion as well as customer's water use for billing purposes, actual water use data are available to help assess the water needs and use of municipal water purveyors.

## What issue does this paper address?

One of the major issues facing water purveyors is the interaction between those entity's water rights and planning for future growth. Water rights for water purveyors are a little different from other types of water rights. Just like everyone else, a water purveyor is subject to the state water code and, therefore, must have a water right (permit or certificate) to authorize water use. For most other water rights, a permit is issued to authorize the applicant to begin using the water; then, once the water is in full use (project is complete), a water right certificate is issued. In contrast, water purveyors have often received certificates for their water rights before they have fully put the water to beneficial use. The reasoning behind this difference is to give the water purveyor a water right to "grow into" or allow community's population and economic growth.

The portion of a municipal/domestic water right that is not yet in service is called the inchoate portion of the water right. These inchoate portions have

created controversy, administrative and court rulings, and new legislation that took effect on September 9, 2003:

- Because water rights are tied to a particular location for use, if a water purveyor increases its service area size, it must obtain approval from Ecology for a change to its water right before serving the new area. During that water right change process, Ecology has attempted to "downsize" municipal water rights as part of the change when it determines that the water right is larger than necessary to serve the projected needs of the water purveyor.
- Ecology has also attempted to limit the number of connections, area served, and purpose of use. [There is often some commercial use (usually unquantified in the water rights) associated with municipal water rights.]
- A Washington State Supreme Court case in 1998[1] shed more uncertainty on municipal water rights with a ruling that a privately-owned water supplier was not entitled to receive a water right certificate until the water was actually in use in homes connected to the water system. Historically, a water right certificate may have been issued once the water supplier had constructed the basic diversion and conveyance system ("pumps and pipes"). This ruling also applies to publicly-owned systems.
- Many municipal/domestic water rights may actually be much larger than needed to serve projected populations, since many of these water rights were issued before Ecology critically evaluated this.
- Municipalities are faced with conflicting requirements: Growth Management Act, zoning, and critical areas and stormwater regulations may require them to cluster residential areas more closely together or in areas not anticipated under their water rights.
- Many entities are keenly interested in the inchoate portion of these water rights. This appropriated but unused water provides water for population growth, but it could instead, or in the interim, be used to provide protection for instream flows. It could potentially also be sold to another entity, such as another water purveyor or a commercial/industrial enterprise, for an out-of-stream use. Any new use of the inchoate portion of a municipal water right would likely be a new drain on the instream flows in the river or stream associated with the water right.
- The Washington State Legislature passed legislation in June, 2003 (HB 1338, HB 1336) that seeks to clarify and provide more certainty around municipal water rights. This controversial legislation went into effect on September 9, 2003.

1. Dept. of Ecology v. Theodoratus, 135 Wn2d 582 (1998)

## What is known about the future water supply needs of Chehalis Basin water purveyors?

Water system information was compiled from Water System Plans for all major purveyors in the Chehalis Basin. A population threshold of 1,000 or more was selected for this compilation, which corresponds to approximately 400 service connections. This threshold was selected because it represents a logical breakout of purveyors and facilitates a targeted assessment.[2] Table 1

### *TABLE 1 – MAJOR WATER PURVEYOR SUMMARY*

| *Water Purveyor* | *Current Annual Demand* | *Current Water Rights* | *Current Surplus* | *Estimated 20-Year[1] Surplus/Deficit* |
|---|---|---|---|---|
| | *(ac-ft)* | *(ac-ft)* | *(ac-ft)* | *(ac-ft)* |
| Aberdeen | n/a[2] | n/a[2] | n/a[2] | n/a[2] |
| Bucoda | 54.9 | 157.0 | 102.1 | 98.8 |
| Centralia | 2,710.4 | 3,808.0 | 1,097.6 | -1,971.2 |
| Chehalis | 2,195.2 | 10,371.0 | 8,175.8 | 7,425.4 |
| Cosmopolis | 280.0 | [3] | n/a[2] | 3 |
| Elma | 571.2 | 672.0 | 100.8 | -448.0 |
| Hoquiam | 1,456.0 | 12,452.0 | 10,996.0 | 10,660.0 |
| McCleary | 250.0 | 1,633.0 | 1,383.0 | 1,258.0 |
| Montesano | n/a[2] | n/a[2] | n/a[2] | 0.0 |
| Napavine | 143.4 | 168.0 | 24.6 | -131.0 |
| Tenino | 211.7 | 270.0 | 58.3 | 25.8 |
| Ocean Shores | 851.2 | 4,355.0 | 3,503.8 | 2,910.2 |
| Westport | 828.8 | 1,120.0 | 291.2 | -380.0 |
| Boistfort V. | 295.7 | 662.0 | 366.3 | 301.4 |
| Grays Hbr.WD #1 | n/a[2] | 745.0 | n/a[2] | n/a[2] |
| Rochester | n/a[2] | n/a[2] | n/a[2] | n/a[2] |
| Scott Lake | 212.0 | 247.0 | 35.0 | 0.0 |
| Central Park | 427.1 | 1,098.0 | 670.9 | 1,098.0 |
| | | | | |
| Totals | 10,487.5 | 37,758.0 | 26,805.5 | 20,847.3 |

1. These values are the annual withdrawal demand for each water purveyor, as reported in their Water System Plan. These values do no represent actual water use or consumption. That value would be a lesser amount for each purveyor, depending on the inefficiencies (water losses) within their diversion, treatment, and distribution system.
2. These values were taken/calculated based on each water purveyor's WSP, using their 20-year planning horizon. Therefore the 20-year period is benchmarked off the date of the WSP, and that date varies between 2015 to 2023
3. Water System Plan currently being updated.
4. Cosmopolis receives its water supply from the City of Aberdeen.

2. It should be noted that there are approximately 450 water purveyors in the Chehalis Basin, 18 of which were included in this assessment. The remaining water purveyors are small community systems that may have no further capacity or intention to expand water service. In the Deschutes Watershed, the water rights held by these small purveyors have been found to be significantly larger than believed necessary based on their service connections and geographic limitations on expansion. This "unused" and "unperfected" portion of community water system water rights has been determined to be a significant water right allocation in the Deschutes Watershed. A similar evaluation of smaller community water system water rights has not been done for the Chehalis.

summarizes what is known from compiled information about the current and projected future annual demand versus water rights and the current and future surplus/deficit related to authorized water rights. All communities have adequate water rights to cover current annual demand. In the future however, Water System Plans show that four communities (Centralia, Elma, Westport, and Napavine) will not have adequate water rights to accommodate projected future annual demand.

## Is there a problem for communities facing a predicted deficit?

There may be a problem for communities predicting a deficit, but each situation is unique. The City of Napavine is seeking to purchase additional water rights to cover its needs. The City of Elma plans to address its deficit by reducing water losses within its distribution system. For the City of Westport, the projected deficit is for annual demand only, not instantaneous. A deficit in instantaneous demand may occur if planned additional service areas come on line. The City of Centralia intends to address its deficit by gaining water right approvals from Ecology for three pending ground water water rights applications.

## What about water purveyors that project a surplus?

In many cases, the current and projected surplus is the inchoate portion of the water purveyor's water rights. Because of the complexities described above, each water purveyor's situation would need to be studied individually to determine the precise quantity of inchoate rights. In general terms, however, Table 1 indicates that there are currently inchoate water rights in the Chehalis Basin totaling approximately 26,800 acre-feet per year. If communities continue to grow and access the inchoate portion of their water rights, this inchoate portion will be approximately 20,800 acre-feet per year by around 2015.

## How will the new water legislation affect municipal water supply in the Chehalis?

Legislation passed during the 2003 legislative session that affects municipal water purveyors is contained primarily in HB 1338 and, to a lesser extent, HB 1336. HB 1338 amends several existing statutes and rules, including the Surface Water Code (90.03 RCW), the Watershed Planning Act (90.82 RCW), and the Water Resources Act of 1971 (90.54 RCW).

This legislation has three major focal points that will affect water purveyors:

1. Revises the definition of municipal water supply purposes to mean service to 15 or more residential service connections and to include nonresidential uses served by a municipal water purveyor (such as commercial/industrial or fish/wildlife/water quality/instream flow uses).

2. Attempts to clarify the relationship between the Water System Plans developed by water purveyors and water rights. The bill places more clout on the Water System Plan, stating that when discrepancies occur between a Water System Plan and water rights (in terms of area served, etc.) that the Water System Plan will take precedence. It also attempts to limit Ecology's authority to examine municipal water rights except during the course of a Water System Plan review and/or a water right change requested by the water purveyor.
3. Sets forth specific requirements for municipal water supply conservation programs, including the nature of required activities, schedule, and accountability requirements. It also states that water purveyors may not access the inchoate portion of their water rights unless and until they have shown that it is not possible to meet new demand through conservation efforts.

HB 1336 requires that a Detailed Implementation Plan be developed for each Watershed Plan. HB 1338 outlines the requirements related to municipal water supply for the Detailed Implementation Plan as follows:

1. " The timelines and interim milestones in a detailed implementation plan . . . must address the planned future use of existing water rights for municipal water supply purposes . . . that are inchoate, including how these rights will be used to meet the projected future needs identified in the watershed plan, and how the use of these rights will be addressed when implementing instream flow strategies identified in the watershed plan.
2. The watershed planning unit . . . shall ensure that holders of water rights for municipal water supply purposes not currently in use are asked to participate in defining the timelines and interim milestones to be included in the detailed implementation plan.
3. The department of health shall annually compile a list of water system plans and plan updates to be reviewed by the department during the coming year and shall consult with the departments of community, trade, and economic development, ecology, and fish and wildlife to : (a) Identify watersheds where further coordination is needed between water system planning and local watershed planning under this chapter; and (b) develop a work plan for conducting the necessary coordination."

As this new legislation goes into effect, recommendations contained in the 2514 Watershed Plan, as well as actions of individual communities and the regulatory agencies responsible for municipal water supply regulation will determine the real effect on the Chehalis Basin.

## What are some alternative actions to address the municipal water supply issue?

1. **Adjudication/streamlined adjudication.** (See the Water Quantity Core Issues Paper.) An adjudication could be a forum to examine all water

rights, including municipal water supply water rights, to determine the extent of their validity. If unneeded water rights exist, such as for built-out community water systems, these water rights could be compelled to be relinquished through an adjudication process.

2. **Transfer of surface water rights to ground water rights.** (See the Water Quantity Core Issues Paper.) This alternative could be utilized to lessen the impact of water withdrawals on instream flows. The North Fork Newaukum River is an example where both the Cities of Chehalis and Centralia hold surface water rights for large withdrawals.
3. **Implementation of a water master program.** (See the Water Quantity Core Issues Paper.) This local program could help facilitate daily water needs between water users, including municipal suppliers.
4. **Use of interruptible water rights for a portion of water supply.** Under this alternative, municipal suppliers could be requested to discontinue use of the interruptible portion of a water right during drought years or low flow periods. This would result in customers needing to cut back on water use for ornamental landscaping and other discretionary uses.
5. **Water conservation programs.** (See the Water Conservation and the Water Quantity Core Issues Papers.) The requirements for municipal water conservation programs will become more stringent under HB 1338. This includes both conservation on the part of the users and fixing water losses within the withdrawal and distribution system.
6. **Water rights trust program.** (See the Water Quantity Core Issues Paper.) A statewide water rights trust program exists but has not been used very much, largely because of a lack of perceived benefit. A water rights trust program could be used to dedicate an unneeded portion of municipal water rights to instream flows or as a water rights banking system to facilitate water rights marketing between entities.
7. **Integration of the use of reclaimed water.** (See the Water Quantity Core Issues Paper.) Reclaimed water (treated wastewater of high enough quality to be used for many non-human-contact purposes) plays a small, but increasing role in water resources in Washington State. Most communities, like the City of Chehalis, have constructed water reclamation facilities as a means to dispose of wastewater. A few have also found opportunities to use the reclaimed water as part of their municipal supply. Use of reclaimed water could be an opportunity to serve additional water needs without withdrawing additional water. However, there are also concerns that this use could actually increase consumptive water use because the treated wastewater would have otherwise been returned to the river or stream system. Currently, communities are not given any sort of credit on their water rights for using reclaimed water. Clearly this is an area of policy and infrastructure development that is very dynamic.
8. **Relinquishment of unused, unneeded water rights.** Water rights analysis would likely reveal many water rights, and portions of water rights, that could be relinquished. Relinquishment of these water rights would help reconcile the quantity of water used versus the higher quantity of water appropriated through water rights. However relinquishment is

almost always viewed as a taking of property to the entity who holds the right.

9. **Addressing requirements of Phase 4 Watershed Planning Related to Municipal Water Rights.** New legislation in 2003 (HB 1338) identifies specific requirements that must be addressed during Phase 4 Detailed Implementation Plan development related to municipal water rights:

   *" The timelines and interim milestones in a detailed implementation plan . . . must address the planned future use of existing water rights for municipal water supply purposes . . . that are inchoate, including how these rights will be used to meet the projected future needs identified in the watershed plan, and how the use of these rights will be addressed when implementing instream flow strategies identified in the watershed plan. (HB 1338)*

10. **Encouraging a return of water to the rivers and streams.** (See also the Instream Flow Issue Paper.) Encouraging the return of water to the rivers and streams to benefit instream flow needs should be pursued whenever possible. This could be done initially through small dedications of unneeded water rights to instream flows, hopefully leading to larger dedications. These dedications could be promoted as mitigation for approval of new water rights or water right changes.

11. **Implementation of water storage projects to serve municipal water supply needs without impacting instream flows.** The Multipurpose Water Storage Assessment, conducted as part of this Watershed Plan, identified several viable options for further evaluation. These include incorporating water supply needs into the design for the proposed modification of Skookumchuck Dam and aquifer storage and recovery in the Newaukum area.

12. **Watershed mitigation.** (See the Water Quantity Core Issues Paper.) Watershed mitigation, or doing a project to create environmental benefit elsewhere in the watershed could be part of resolving the municipal water supply situation.

13. **Regional water supply or coordinated water system planning.** It could be very beneficial for the communities, particularly in the Centralia/Chehalis and Aberdeen/Hoquiam areas, to convene a regional planning group to facilitate regional water supply planning.

14. **Connecting water supply planning to growth management or comprehensive planning.** Any area designated for urban or suburban development should have the ability to be served by some sort of municipal water system. There is currently no mechanism to ensure that this occurs, since water rights are administered by Ecology, Water System Plans are approved by the DOH, and land use planning is adopted at the local (county or city) level. Changes to regulatory procedures should be implemented to connect these three functions. The new legislation (HB 1338) takes a first step by designating DOH and Water System Plans as the prevailing agency and document in designating/approving water system service areas, number of connections, etc. This does not entirely solve the problem, however, because there is still no strong link

to ensure the presence and validity of water rights for lands designated for urban/suburban development at the local level.

### *What actions are recommended?*

The following actions are recommended as an outcome of this paper:

- Address Requirements of Phase 4 Watershed Planning Related to Municipal Water Rights (#9 above)
- Develop a toolbox for municipal water purveyors to assist them in meeting their water supply responsibilities while also contributing to protection of instream baseflows. Municipal water purveyors have traditionally attempted to obtain new water rights to meet increased water supply demand that exceeds their current water rights. New water right approvals have become increasingly difficult to obtain, a situation that is not likely to change in the future. This recommendation provides a toolbox for municipal water suppliers to help them meet their responsibilities through numerous, varied approaches. Implementing this recommendation will require increased flexibility from Ecology and other regulatory agencies such as the DOH, in evaluating proposed water use practices. This toolbox could include the following alternative actions:
  - Transfer of surface water rights to ground water rights
  - Implementation of a water master program
  - Use of interruptible water rights for a portion of water supply
  - Water conservation programs
  - Water rights trust program
  - Integration of the use of reclaimed water
  - Encouraging a return of water to the rivers and streams
  - Implementation of water storage projects to serve municipal water supply needs without impacting instream flows.
  - Watershed mitigation
  - Regional water supply, or coordinated water system planning
  - Connecting water supply planning to growth management or comprehensive planning

# Exempt Wells

## *Chehalis Basin Watershed Planning Issue Paper*

## What is the Issue?

The issue is the use and impact of exempt wells on water resources in the Chehalis Basin.

## What are some important laws, rules, and opinions, and court decisions related to exempt wells?

### *Washington State's Groundwater Code, RCW 90.44.050:*

This law requires anyone who wants to withdraw public groundwater to apply for a permit through the State Department of Ecology (Ecology). The Code allows exceptions for certain specific uses:

- Stock watering *(Note: Amounts used for this purpose may exceed 5,000 gallons per day.)*
- Watering a lawn or non-commercial garden not exceeding one-half acre in area
- Single or group domestic uses of up to 5,000 gallons per day[1]
- Industrial use not to exceed 5,000 gallons per day

Additionally, the Code states that:

- Water used under this exemption must regularly be used beneficially.
- Ecology may require the water user to furnish information as to the means for and the quantity of that withdrawal.

Wells drilled under this provision are commonly referred to as "exempt wells." The exempt well statute provides a means by which landowners may access water for domestic purposes, including small-scale irrigation and industrial purposes, without applying for and obtaining a water right through Ecology. The exemption saves the appropriator of "small withdrawals" the trouble and expense of applying for a permit where the impact of the withdrawal is slight and saves the state the trouble and expense of processing applications for "small withdrawals" that would have little effect on water availability.

While small withdrawals are exempt from the requirements that an application be made and a permit received from Ecology prior to withdrawal of public groundwater, they are not exempt from any of the other substantive provisions of the Ground Water Code. For example, small withdrawals

1. "Attorney General Issues New Guidelines on Exempt Wells," The Confluence, Ecology Newsletter, Winter/Spring 1998.

- Cannot affect surface water rights
- Must be beneficially used.
- Are subject to the same system of priorities as all other appropiators (that is, where another right is first in time, it is first in right)

### *Attorney General's Opinion:*

In the 1990s, the Departments of Ecology and Health requested the opinion of the Washington State Office of the Attorney General regarding exempt ground water withdrawals to settle differences of opinion among various parties about the intent and meaning of the exemption. The resulting Attorney General's opinion states that a project that will use more than 5,000 gallons of water per day will need a permit, regardless of the number of wells that would be tapped.[1]

### *Campbell & Gwinn Supreme Court Decision*

The Washington Supreme Court supported this opinion in its 2002 decision that housing developments that would be served by multiple drinking-water wells need a water-right permit before construction begins if the wells together would withdraw more than 5,000 gallons a day. The court ruled that when homes are part of a development they should be treated as one group under the exemption. In its decision, the court said, "The Legislature did not intend unlimited use of the exemption for domestic uses, and did not intend that water appropriation for such uses be wholly unregulated."

### *The Chehalis Instream Resource Protection Program (IRPP) rule WAC 173-522-040*[1]

This rule states, in part, that "Rights for domestic use, including irrigation of lawn and noncommercial garden not to exceed one-half acre, and livestock use excluding feedlot operation, shall be superior to all other consumptive and non-consumptive uses." This appears to conflict with the1945 Groundwater Law provision that small withdrawals cannot affect surface water rights and that exempt wells are subject to the same system of priorities as all other appropriators. This important conflict needs to be resolved in the Chehalis Basin.

## Why are exempt wells a concern?

Exempt wells affect water quantity, a required element of watershed planning. They can also impact the three remaining elements in the Chehalis Basin Watershed Plan: water quality, habitat, and instream flows. The concern is that the proliferation of exempt wells could reduce the total amount of water available in the Chehalis Basin. In particular, exempt wells and the associated uses can reduce

- water available to senior water right holders,

1. "Attorney General Issues New Guidelines on Exempt Wells," The Confluence, Ecology Newsletter, Winter/Spring 1998.

- the amount of water available for aquifer recharge, and
- instream flows.

By withdrawing ground water, exempt wells can also negatively affect water quality and habitat.

Ground water pumping affects the relationship between ground water and surface water sources. It may intercept water otherwise available to recharge a stream or capture water from the stream itself. A watershed assessment conducted by Ecology in 1995 confirmed the hydraulic continuity between ground and surface water in the Chehalis Basin and concluded that a large portion (if not most) of the ground water allocated since 1975 directly affected surface water flows. The construction of exempt wells in aquifers that are in hydraulic continuity with flow impaired surface waters will directly result in further depletion of surface water flows.

While water quality can be a concern in all wells, it can be of particular concern in exempt wells because they tend not to be maintained regularly and because they often take water from the shallowest aquifer, the aquifer most likely to be contaminated from surface impacts.

Studies conducted by the U.S. Geological Survey and Ecology, coupled with data from local governmental agencies, reveal the following health concerns associated with exempt wells:

- Exempt wells can be contaminated by withdrawal of water from contaminated aquifers.
- Pumping can cause saltwater intrusion along the coast.
- Nitrates from agriculture can contaminate the groundwater.
- Exempt wells are also quite susceptible to contamination from wastewater, typically septic tank/leach field systems.

What is the effect of exempt wells on water quantity in the Chehalis Basin? At present, information related to the number of exempt wells in the Chehalis Basin is limited. However, technical work completed as part of the watershed planning process provided estimates of the number of households on exempt wells, the amount of average annual daily water use per household and associated consumptive use (that is, water that is not returned to ground water after use), and the overall impact of exempt wells on water quantity and instream flows in the basin. GIS information indicates high concentrations of exempt wells in areas where stream flows already do not meet regulatory minimums; these wells may have an impact on stream flows.

*Figure 1. Exempt Well Consumptive Water Use* illustrates the amount of water typically used for various household activities. It also illustrates the amount of water that is consumed, or does not make it back to groundwater after use, by a household that draws water from an exempt well and returns water through

a septic system and drain field. This daily household water use estimate was based on the assumptions that indoor and outdoor water use represent 59% and 41%, respectively, and that 87% of the indoor water use and 57% of the outdoor water use make it back into the groundwater.

The consumptive water use illustration is an estimate of the average water used by rural households in the basin. (Because data are not available, this estimate does not include water used for irrigated agriculture, stock watering, or industry.) In general, indoor water use remains consistent throughout the year. Households typically do not use water for irrigation in the winter but they do in the summer. The numbers in the illustrations are based on year-round usage; that is, over a 12-month period, the low winter usage is averaged with higher summer usage.

Exempt well usage and its impact on stream flows is a complex hydrogeologic issue. There is little information available about the specific impact of exempt wells on stream flows. To fully understand the dynamic, site-specific studies and analysis would be necessary.

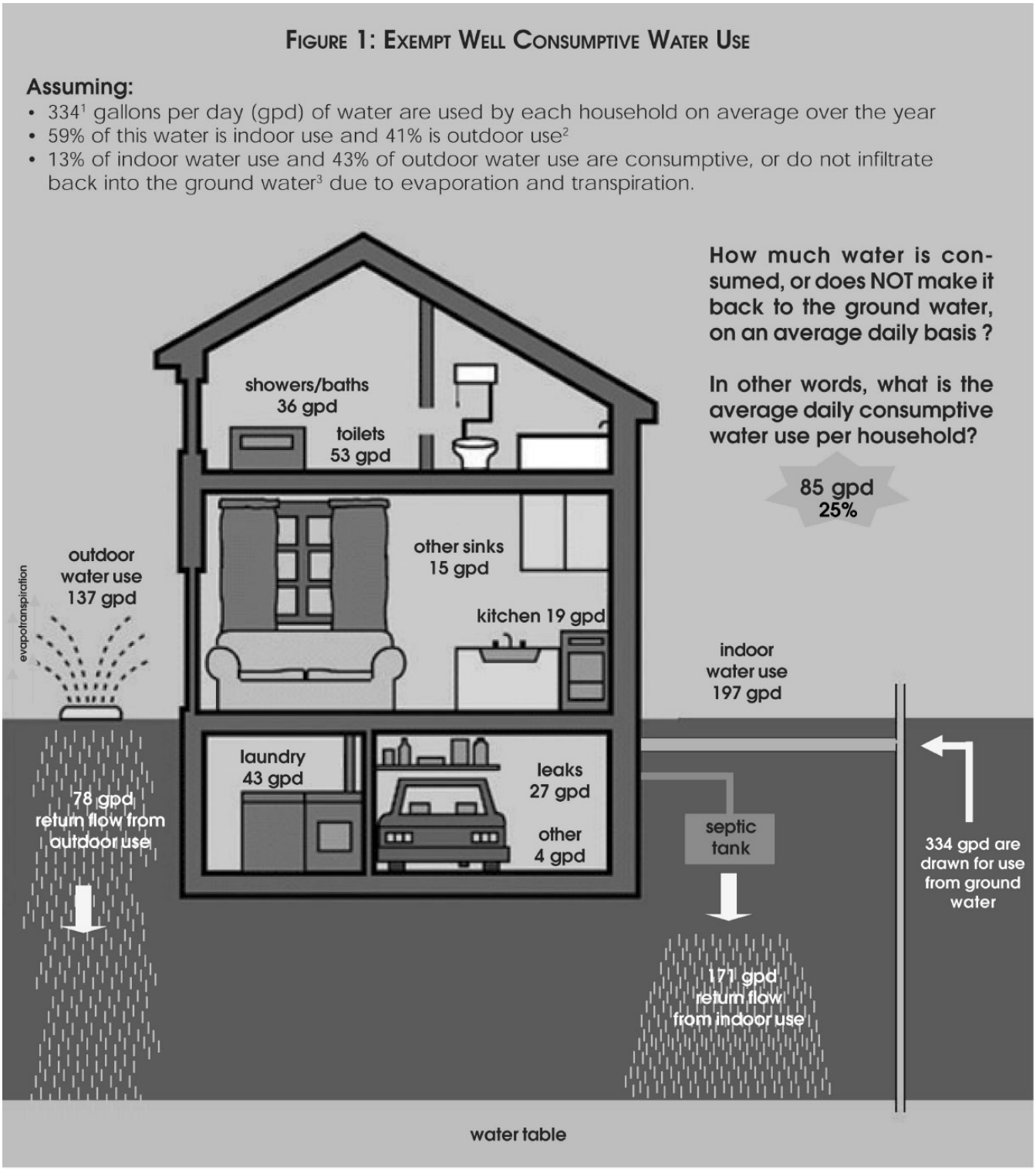
*Figure 2. Map of Distribution of Exempt Wells in Chehalis Basin* shows the boundaries of the public water systems and a range of numbers of households on exempt wells in each sub-basin.

The number of households on exempt wells was estimated by WRIA and sub-basin in the following manner:[2] For regions outside water purveyor service areas, the population was estimated on a density per acre basis; this estimated population was divided by 2.5 persons per household to determine the number of households per sub-basin not on a public water system. For these households outside of water purveyor service areas, an estimate was made of the number of households that have an Ecology-issued water right. Then, this number was subtracted from the total number of unserved households to develop an estimated number of households on exempt wells.

2. The following sources were used in the process described above:

- GIS maps from Lewis, Thurston, and Grays Harbor Counties and hard copy maps from a number of water districts. Where boundary information was not available, estimated boundaries were developed based on incorporated area, urban growth area, or aerial photographs.
- Water Rights Application Tracking System (WRATs) data, section and sub-basin GIS maps, shape files of priority one group rights, and other base map shape files from EPA
- 2000 Census GIS maps from the State Department of Health and State Office of Financial Management
- Maps of wells from Department of Health and Lewis County.
- Level 1 Assessment report information

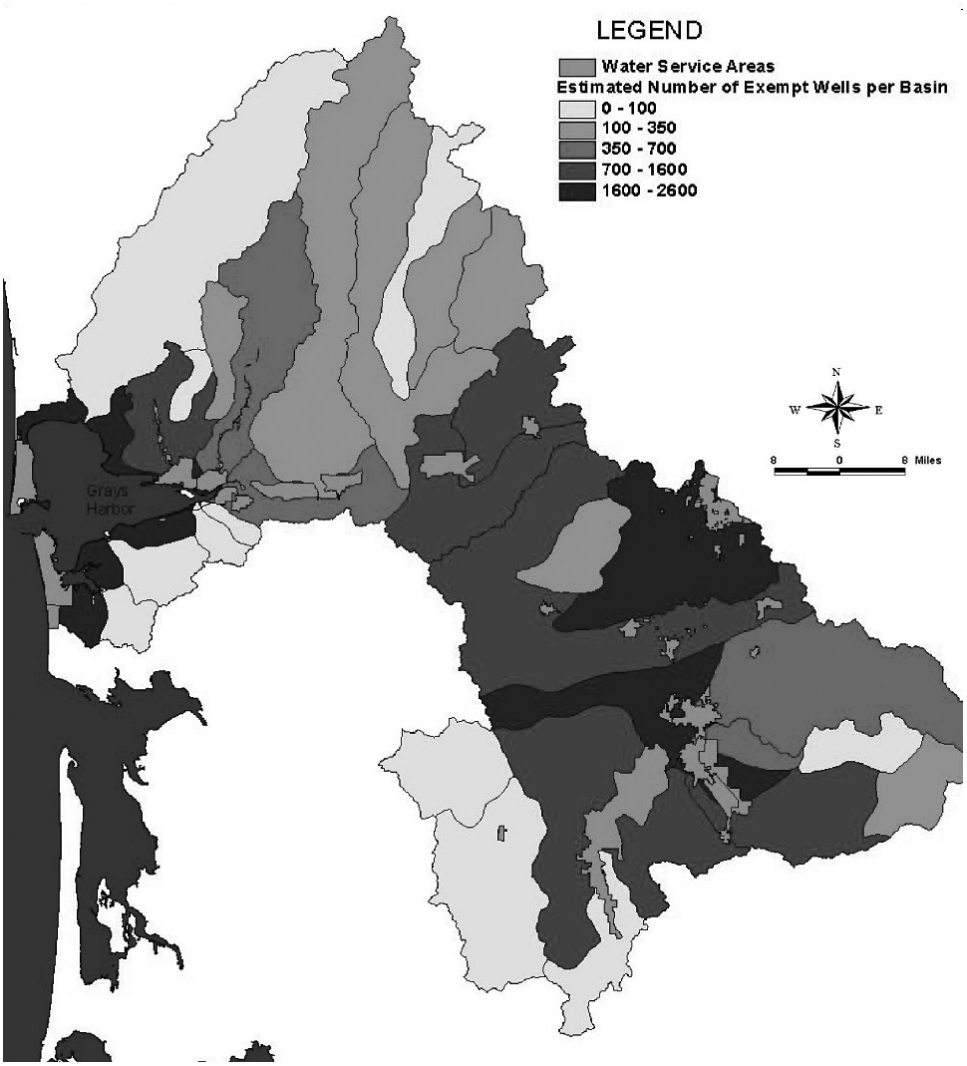
## *FIGURE 1: Estimated Consumptive Water Use of Household on Exempt Well* [3]




The figure above illustrates approximately how much water is actually consumed (i.e. does not make it back to groundwater after use) by households that draw water from exempt wells and return water through a septic system and drainfield.

[1] Chehalis Basin Watershed Level 1 Technical Assessment (an average of the amounts identified for WRIAs 22 and 23)
[2] *Nature of Residential Water Use and Effectiveness of Conservation Programs,* James P. Heaney, William DeOreo, Peter Mayer, Paul Lander, Jeff Harpring, Laurel Stadjuhar, Beorn Courtney, and Lynn Buhlig (Figures for Eugene, Oregon)
[3] Solly, W. B., Pierce, R.R. and Perlman, H.A. 1993. Estimated Use of Water in the United States in 1990: U.S. Geological Survey Circular 1081.

*FIGURE 2: Exempt Well Distribution in Chehalis Basin*




## Estimated Households on Exempt Wells and Related Water Use in Chehalis Basin

An estimated 16,947 households draw water from exempt wells in the Chehalis Basin. (See Table 1.)

## Average amount of water use per household

Estimated across the entire Chehalis basin over the course of a whole year, an average residential household uses approximately 334 gallons per day (gpd) of water on an annual basis. However, average daily use can rise to unknown amounts of water. Based on Department of Health figures, however, it is assumed that total household summer use might rise to the range of 700 gpd of water (period of highest use).

## Amount of consumptive water use per household

For households on exempt wells, approximately 85 gpd (of the 334 gpd used) or about 25% of the average water used, is estimated not to return to the aquifer. This 85 gpd is often called consumptive water use. This means that, on average, 85 gpd of the water drawn from the exempt well does not return to the water source (ground or surface water).

## Amount of household water use and consumptive water use from exempt wells in Chehalis Basin

The 16,947 households on exempt wells in the Chehalis Basin use an estimated 5,660,298 gpd (8.25 cfs) of water, of which, 1,440,495 gpd (2.23 cfs) or 25% is consumptive water use. PLEASE NOTE: this estimate does not include agricultural, industrial, commercial or stock watering uses. This quantity may appear insignificant when looking at the basin as a whole, especially considering that the Chehalis River summer flow is in the 300 to 400 cfs range. However, impacts of exempt well usage on specific subbasins can be significant, as shown by the following two examples:

- In the Salzer Creek subbasin, average daily Salzer Creek flows in August drop to the 0.033- 0.085 cfs range, meaning the creek is nearly dry. There are an estimated 310 exempt wells in the Salzer Creek subbasin. Assuming that these exempt wells would be used for indoor and outdoor domestic supply during this period and that an estimated 700 gpd of water would be used during the higher usage months of the summer, the resultant total withdrawal rate would be equivalent to 0.33 cfs from exempt wells, 10 times the lowest average daily flows. If consumptive water use is looked at, this would equate to 0.08 cfs, still a high percentage of the streamflow in the subbasin.
- In the Black River subbasin, average Black River daily flows in August and September range from 10.4 – 21.2 cfs. There are an estimated 2,400 exempt wells in the Black River subbasin. Using a 700 gpd (higher summer water usage amount) withdrawal per exempt well would equate to a withdrawal rate of 2.6 cfs. Using a simplistic comparison approach, the estimated exempt well withdrawal rate is equal to between 10 and 25% of the average Black River flow during this period. For consumptive water use amounts, this would equate to 2.5 to 6.0% of the average Black River streamflow. Note that the Black River flow information is from a gauging station located 10 miles upstream from the bottom of the basin.

## *Table 1: Estimated Population and Households Served by Public Water Systems, Water Rights and Exempt Wells*

| | *Lower Chehalis* | *Upper Chehalis* | *Lower/Upper Chehalis* |
|---|---|---|---|
| ***Estimated Total Population*** | 62,452 | 78,779 | 141,231 |
| • Estimated Population Served by Public Water System | 36,427 | 38,064 | 74,491 |
| • Estimated Population Not Served by Public Water System | 26,025 | 40,715 | 66,740 |
| • Estimated Households Not Served by Public Water System | 10,844 | 16,965 | 27,809 |
| • Estimated Households Served by Water Right | 3,013 | 7,849 | 10,862 |
| • Estimated Households Served by Exempt Wells | 7,831 | 9,116 | 16,947 |

## *Table 2: Streamflow – Water Use Comparison Table*

| Example River Segments | Summer Stream Flow (in cfs) | Exempt Well Water Use - Whole Basin (Using 700 gpd high summer use volume) | | Exempt Well Water Use - Salzer Creek Basin (Using 700 gpd high summer use volume) | | Exempt Well Water Use - Black River (Using 700 gpd high summer use volume) | |
|---|---|---|---|---|---|---|---|
| | | *Total Use* | *Consumed* | *Total Use* | *Consumed* | *Total Use* | *Consumed* |
| ***Chehalis*** | 300-400 | 17.29 cfs (average of 5% of stream-flow) | 4.67 cfs (average of 1.3% of streamflow) | NA | NA | NA | NA |
| ***Salzer*** | 0.033 - 0.085 | NA | NA | 0.33 cfs (average of 600% of stream-flow) | 0.083 cfs (average of 166% of streamflow) | NA | NA |
| ***Black*** | 10.4 – 21.2 | NA | NA | NA | NA | 2.6 cfs (average of 5% of streamflow) | 0.65 cfs (average of 4% of streamflow) |

The results of Table 2 indicate that, while the total Chehalis Basin's exempt well water use is fairly small compared to the Chehalis River flow, the estimated exempt well use in some subbasins could be a much more significant percentage of the subbasin streams. For instance, it is a very significant factor in Salzer Creek but less of a factor in Black River. Consequently, use of exempt wells in specific subasins may need to be considered in terms of their impact on instream flows, both now and in the future.

## What are possible solutions?

The CBP evaluated the following options related to exempt wells, arrayed from least to most complex to implement.

| *Alternative Solutions* | *Expected Outcomes* | *Comments* |
|---|---|---|
| 1. Status Quo | • Continued use of existing exempt wells,<br>• Proliferation of new exempt wells,<br>• Lack of focus on community systems | |
| 2. White Paper on proliferation of exempt wells vs. community systems | Providing policy makers with information on the impacts of exempt wells, especially on ability to manage growth | |
| 3. Study of the quantity of water loss<br>Collect data to refine consumptive use estimates and assess the effect on the timing of use. | Development of understanding of consumptive use levels of exempt wells to better understand impacts on base flows | |
| 4. Request that Ecology address the exempt well issue on a statewide basis | Statewide consistency in addressing exempt wells, both existing systems and future wells | |
| 5. Allow exempt wells with conditions. Some suggestions to consider include:<br>• Set basin-wide standard for number of houses allowable per exempt well<br>• Reduce exemption amount from 5,000 gpd, since most homes use only 3-400gpd (WA Dept. of Health allotment is 800 gpd for development)<br>• Require septic tank/leach field discharge back to aquifer<br>• Conserve water<br>• Limit numbers to one septic field or equivalent residential unit per exempt well<br>• Define allowable consumptive use<br>• Require exempt wells to connect to deep aquifers OR allow connection to shallow ones if study is done to show no negative impact on stream flows<br>• Others? | Ability to use exempt wells but with conditions that will lessen losses of water and depletion of stream flows | The real question remains: How do we encourage new residents to use purveyor systems instead of exempt wells when new residents cannot get onto a purveyor system in a reasonable time frame (i.e. planned and coordinated growth, including impacts on environment) |
| 6. For exempt well problem areas, identify/develop mitigation (e.g. convert to public water system) | Lessening of impact on stream flows | |
| 7. Identify a density trigger where exempt wells are not allowed above a certain level (What level is trigger?) | Control of number of exempt wells and therefore shifting of focus to community systems | Relate to stream flow levels? |
| 8. Prohibit exempt wells in closed basins | • Assurance that exempt wells will not negatively impact stream flows | |
| 9. Do not allow new exempt wells through regulatory approach or stipulation that UGA's/Growth areas would not allow exempt wells | • Focus on community systems<br>• Better focus on drinking water quality<br>• Better focus on growth controls | Property takings would be an issue |

## What actions are recommended?

1. Until the steps below are taken, maintain the status quo with regard to exempt wells.

2. The CBP believes that exempt wells are a statewide issue, caused in part by many inconsistencies and conflicts in existing laws and requirements and the Attorney General's 1998 opinion on exempt wells, as well as a lack of enforcement. The CBP therefore recommends that State/Ecology address the exempt well issue on a statewide basis following the existing laws, rules, and opinions.

   - Regulations:
     1. State should enforce current regulations, including addressing any excessive uses of exempt wells and situations that conflict with the Attorney General's opinion
     2. Evaluate current regulations on exempt wells for adequacy in protecting surface waters (quantity and quality)

   - Clarify and resolve the science around the impacts of exempt wells on surface water

   - If local governments are to have a role in managing exempt wells, State resources must be allocated for this purpose.

   - The CBP recommends the following actions for Ecology to consider in its evaluation of the exempt wells statewide:
     1. Ecology should conduct its evaluation in an open process involving stakeholders
     2. Ecology should sponsor subregional and regional workshops on exempt wells, leading to a Statewide Workshop/Forum/Task Force on exempt wells to better quantify technical aspects of exempt wells and to identify policy and cost factors related to exempt wells
     3. Ecology should develop an educational program related to the use of exempt wells and their potential impact on instream flows and water quality
     4. Ecology should develop criteria for when it will require use of deeper aquifers as a source of exempt well water. If deeper aquifers are used for household use, shallow aquifers would be available to supplement stream flows.
     5. Ecology should address the timing of withdrawals and the possibility or requirement that withdrawals minimize impacts on stream flows

3. The CBP believes that the Department of Health should prepare a white paper that compares use of exempt wells per parcel vs use of community water systems (Class B). In particular, it should address the benefits that Class B community water systems have from a water quality perspective.

4. In the Chehalis Basin, the CBP believes that a conflict exists among the 1945 Groundwater Law, the Attorney General's opinion, and the Chehalis IRPP as to whether small withdrawals can affect surface water rights and whether they are subject to the same system of priorities as all other appropriators. The CBP recommends that Ecology or the Attorney General's office address this conflict in the Chehalis Basin.

5. The CBP has discussed exempt wells and its members have widely divergent opinions on whether or not exempt wells are a concern in the Chehalis Basin. Some believe that exempt wells have minimal impact while others believe that exempt wells have or will have an impact, especially on stream flows. Nonetheless, based on the data evaluation that shows that there may be concerns with exempt wells in certain subbasins and from the belief that future conditions may give rise to concerns in other subbasins, the CBP has agreed to recommend the following specific statement and recommendation regarding exempt wells in the Chehalis Basin:

| | |
|---|---|
| ***Statement of the Concern Related to Exempt Wells in the Chehalis Basin*** | 1. The CBP believes that exempt wells may be a problem in specific subbasins of the Chehalis Basin where rural development and/or hydrogeologic and/or streamflow conditions create cause for concern.<br>2. The CBP further believes that exempt wells may be a potential future problem in other subbasins where future rural development combined with existing hydrogeologic and/or existing or future streamflow conditions may create cause for concern |
| ***Recommended Actions Related to Exempt Wells in the Chehalis Basin*** | • Prioritize subbasins in the Chehalis Basin based on concerns about exempt wells and conduct specific hydrogeologic studies and evaluations to identify specific problem areas. Areas of higher concern are those that have substantial human development now or projected in the future, poor hydrogeological conditions and/or hydraulic continuity, or low stream flows.<br>• Pursue funding sources for investigating possible solutions for identified subbasin problem areas in order to:<br>– Focus on these subbasins and areas within these subbasins in developing alternative options for exempt wells, for example, providing water purveyor service, using deep aquifers where supplemental water may improve streamflow conditions, and/or considering means to influence the timing of withdrawals to benefit stream flows;<br>– Develop educational materials and program for informing basin/state residents, agriculture and businesses on how to use exempt wells and to lessen their impact on the environment. |

# Flooding in the Chehalis River Basin

## *Chehalis Basin Watershed Planning Issue Paper*

## Issue

The Chehalis River Basin is unique in western Washington. It has the largest drainage area of all rivers on the west slopes of the Cascade Range. In addition, it does not adjoin the crest of the range, and contains very little high elevation terrain. Hence, snowmelt plays only a small role in its runoff patterns. Rather, the basin responds directly and relatively quickly to rainfall events, the largest of which occur typically in the fall and early winter months. Flooding – both the benefits and damages associated with flooding occur during this rainy season.

The cities of Chehalis, Centralia, and surrounding communities in Lewis and Thurston Counties, Washington have a long history of flooding and flood damages to private and public property and periodic closure of critical transportation routes. These problems have been acknowledged and studied for many years. More recently, heightened environmental awareness and the potential listing of area aquatic species as threatened and endangered have resulted in a need for increased focus on development of flood control alternatives that minimize environmental impacts and that incorporate environmental features to mitigate any adverse impacts to fish and wildlife communities and habitats.

## Definition

Rivers and streams flood because of prolonged heavy rainfall, a rapidly melting snow pack or a combination of the two. Historically, it must rain an average of 2-5 inches per day for two or three days in a row for flooding to occur in the Chehalis Basin. The actual duration and rainfall amounts needed to cause flooding depend on the condition of the river or stream, groundwater conditions, and run off conditions. However, once the conditions are right, water within the river or stream channel overflows onto normally dry land and the area floods.

In the Chehalis Basin, flooding and conditions conducive to flooding generally occur in the fall and winter months as a result of heavy rainfall. The effect of flooding is intensified within the basin by the general north-south alignment of the river basin and the location of the Olympic Mountains. Storms move up the Chehalis Valley and push moisture-laden clouds against the mountains, where it is released as heavy rainfall. Winter storms also cause tidal surges that can result in even higher flooding at cities located in the lower watershed, at the confluence of major rivers or streams.

Localized flooding occurs throughout the basin for a myriad of reasons that range from lack of capacity of some cities storm/sewer systems to undersized culverts under private and public roads.

Although there are no requirements in 2514 for flooding, it is recognized that water quantity, habitat, and water quality are all intimately correlated to flooding which affects all these things.

## Background

Flooding within the Chehalis River Basin has occurred and been recorded almost yearly since settlers first acquired lands by squatter's rights and donation land claims in the mid 1800's. Damaging severe floods in the Centralia and Chehalis areas have occurred almost once every ten years since records began being kept in the early 1900's. Areas subject to flooding in the lower watershed are reclaimed tidelands along the lower Chehalis, Wishkah, and Hoquiam River estuaries. The cities of Aberdeen, Hoquiam, and Cosmopolis lie at the confluence of these estuaries in Grays Harbor. The combination of large river discharges, high tides and storm conditions cause flooding on a regular basis in these areas. Filling in tidelands, establishment of urban and suburban areas along tidal estuaries, and continued development of the floodplains of the Chehalis River and major tributaries has escalated flood damage costs over time, and increased the likelihood that flooding will damage commercial or personal properties. Flooding may last as long as one week in some areas. Most of the remaining floodplain is devoted to agricultural or related purposes.

Flooding is a reoccurring incident throughout the Chehalis Basin. It occurs with frequency each year. Urbanized areas experience high flows and damage to structures and buildings and property. In rural areas, bank erosion is predominantly the issue.

Bridge construction causes some obstruction to flood flows, as do railroad trestles. Road construction within the floodplain has sometimes created low levees throughout the basin. Levee construction has been proposed and in some cases, constructed on the Chehalis River, Skookumchuck River, Newaukum River, and Salzer and China Creeks. Levees occur throughout the basin, both constructed by public entities and built by private property owners.

The Wynoochee and Skookumchuck dams were built in the upper watershed of their respective rivers for water supply, irrigation and to try to limit damage by flooding over time.

The Corps of Engineers has studied flooding within this basin a total of 26 times from 1931 to present. These studies included river surveys, cost estimates, floodplain information, hydraulic studies, Environmental Impact Statements (EIS), flood warning systems, dam modifications, levees, flood mapping, and alternative means to control flooding.

Numerous modifications to river channels (i.e., bank protection, dredging, etc.) have occurred throughout the basin, which in some cases, speeds river flows to downstream areas, which are in turn inundated more frequently than before. Land use practices over time, including forest harvest practices, have reduced resident time of water on the land and increased the likelihood and frequency of flash flood conditions throughout the basin which exacerbates erosion and increases flood damage.

Artificial alterations of flow regimes affect aquatic biodiversity. One reason is that aquatic species have evolved their life history strategies in response to the natural flow regime, as it existed prior to European settlement. Altering flows out of synchrony with the natural hydrological cycle may result in fish species which have adapted to certain flows becoming less successful in reaching spawning grounds, in incubating their eggs to hatching, in rearing, or in migrating downstream, and subsequently those species' numbers may decline.

Periodic flooding is important to the ecology of a stream. Flood flows maintain the natural hydrology of a river by allowing the river to meander unconstrained and thereby creating off-stream channels. Coho and other fish species then utilize these channels for over winter rearing. The Olympic mudminnow (Novumbra hubbsi) is a fish whose entire world distribution is centered in the Chehalis Basin, with a few isolated populations extending to Lake Ozette and Puget Sound. It thrives in flooded wetlands of low gradient streams and vegetated oxbow lakes in the Chehalis Basin.

High flows also increase the amount of available habitat (because streams are wider) and tend to enhance the availability of food (because insects fall from trees and shrubs). Rivers that are bank full up to the vegetated riparian zone provide needed cover for spawning fish and for juveniles who need rearing cover as protection from predators.

Coho salmon production in the Chehalis Basin increases following high flows during spawning migrations because spawners can get to spawning habitat that is otherwise inaccessible in the upper reaches of the tributaries. Thus their offspring have more space to grow in, resulting in more fish.

Steep and undercut banks that provide excellent rearing habitat for juvenile salmon and trout are maintained by erosion at high flows. High flows move sand and silt, keeping spawning gravel loose enough for fish to move them and permeable enough that oxygen-rich water can flow among the incubating eggs.

It should be noted here that while the above details advantages of floods, unnatural floods due to urban development or unmitigated land clearing could cause problems that are not advantageous to the environment.

Encroachment on floodplains, whether by structures or by fill material, reduces the flood-carrying capacity of the river, increased the flood heights and

velocities, and increases the flood hazards in areas outside of the encroachment.

Floodplains are areas that are frequently covered by water when rivers overflow their banks. Floodplains are also defined as low-lying area of land formed by river channels as the channels have occupied portions of the river valley over time. The lateral movement of channels and depositing of sediment raises or lowers the overall elevation of the river valleys by aggradition or erosion.

The channels of rivers meander across floodplains as they flow downstream. Channel bends reduce the amount of energy or velocity of flowing water. The degree of meander can vary, from almost straight channels, which migrate laterally slowly, to fully developed meander patterns, to braided patterns were a stream or river is characterized by mid-channel islands and unpredictable channel changes.

How rivers transport gravel is determined by water depth and surface slope. Gravel and sediment transport ability increases as depth and water volume increase and as river incline increases. It is not uncommon for most annual gravel movement to occur during one or several storm events.

Most gravel travels along the channel bed and onto bars on the inside of bends. The deposition of gravel on the inner bank and the undermining of the outside bank can lead to a lateral shifting of the entire channel. As the river moves away from the inner bank, it leaves behind outward accreting deposits, which become gradually capped by a successively thicker accumulation of fine sand and silt settling from the suspended load during over bank floods. With time plants grow on the surface. The surface built up by the processes is called the floodplain.

Slope erosion, soil creep, bank erosion and riverbed erosion contribute to a mixture of gravel silt and debris to rivers. Once the material reaches the rivers, it is rinsed and sorted by flowing water. The heavier material settles to the bottom. This heavier material is transported downstream by sliding, rolling and bouncing along the riverbed. Material that stays within three inches of the riverbed is referred to as bed load.

There are two general types of gravel movement in rivers. One is accretion on point bars associated with erosion of the opposite bank and shifts in the river channel at a particular meander. The other is general movement of gravel from steeper, upstream areas to the flatter, lower reaches of the river.

The slope of many rivers is reduced as they descend into the lowlands. This causes the coarse portion of a rivers load to be deposited on gravel bars. Where the deposition is most rapid and intense, gravel bars are formed in mid-channel, as well as on point bars along the inside banks of bends, causing the river channel to braid. Point bar deposits force the river to divert around the bar and toward a bank, causing lateral migration of the channel.

In some cases, there is a noticeable buildup of gravel on the riverbed called aggradation. This typically results from the combination of a reduced channel incline and a large discharge of coarse bed material into the river from sources not far upstream.

The greatest amount of bed load movement occurs during high flows. At these times, river depth is greater and available energy is increased, which increases the size and amount of gravel transported. A few peak flows may transport the majority of the bed load for a single year.

A typical river erodes in the headwaters due to steeper slope and energy, deposits near the mouth due to excess bed load, and meanders through transitional areas.

Mining gravel from a river can change the rivers physical balance and cause unwanted effects. A new balance may require adjustments by the river degrading the bed, meandering and bank erosion, or bringing gravel from new channel sources upstream. Gravel removal can affect patterns of bank erosion and change the elevation and form of the riverbed. These changes can also affect fish and wildlife habitat, flooding, and development. The relationship of mining gravel from rivers and reduced flood risks is a relationship of forces and time. Whether mining excess gravel from rivers can reduce flood risks depends on how it affects the balance between the flow, available channel capacity, and amount of gravel carried by the rivers.

## Solutions & Toolbox

A. Flood Hazard Management Plans exist for three of the eight counties within the Chehalis Basin [Thurston, Lewis and Grays Harbor Counties]. The most recent, *Grays Harbor County Comprehensive Flood Hazard Management Plan* was completed in 2001. This document distinguishes between structural and nonstructural methods to reduce flood hazards within the basin.

   Structural alternatives for flood hazard management tend to address problems that already exist that have been identified. Nonstructural measures refer to land use regulations and policies that exist or may be adopted to reduce damages related to flooding. The recommended nonstructural measures that can be taken to improve flood management capabilities include the following:

   - Continue enforcement of existing land use regulations and permitting processes. This alternative includes ensuring that existing land use regulations and permitting processes continue to be strictly enforced. Floodplain management regulations, land use regulations and subsequent permitting processes can be used to ensure that development occur in a manner that not only protects citizens and property from flooding, but also does not contribute to increased flooding.

- Evaluate revisions to FEMA mapping. This alternative includes revising the existing FEMA mapping. Accurate floodplain rate maps allow the County to regulate new development in flood prone areas and assist landowners in assessing the risk of flooding to their property and the need for flood insurance.
- Continue inter-jurisdictional coordination. For effective flood hazard management, it is important to coordinate flood hazard planning and regulatory enforcement with other jurisdictions within the same watershed to ensure consistency.
- Develop floodplain conservation easement program. Floodplain conservation easement programs are a cost effective means of protecting land within the floodplain from property losses and damages.
- Provide educational material on flood hazard management. Developing posters, maps, pamphlets, and other materials to inform residents of the flooding issues throughout the basin helps property owners understand land use regulations and permitting processes for development activities within the floodplain.
- Improve flood monitoring system. Installing new water gauges on several major rivers within the basin would improve the river monitoring system that notifies the National Weather Service and NW River forecast Center of impending floodwaters.
- Use new design, construction and maintenance standards. Utilize environmentally sensitive design elements in river repair projects (i.e., bank stabilization projects).
- Join the National Flood Insurance Program Community Rating System Program. By joining this program, more homeowners and renters in flood-prone areas can purchase flood insurance, and this may also reduce flood insurance by 5 to 45 percent.
- Provide flood proofing guidance to residents.
- Develop home elevation and buyout program. Elevation and buy out and relocation projects provide a permanent, cost-effective alternative to repetitive maintenance. The properties can be improved for environmental enhancement and can reduce the danger of flooding of homes and businesses downstream. Properties that are bought out can be left as permanent open space.

The recommended structural measures that can be taken to improve flood management capabilities include the following:

- Biostabilization and other engineered solutions. Use existing guidance manuals for using biostabilization techniques to stabilize embankments.
- Consider capital projects in areas with repetitive damages.
- Move vulnerable activities out of the floodplain.
- One of the best ways to reduce damages related to flooding and to protect human life and property is to ensure that development activities take place outside the floodplain of rivers in the basin.

Consider moving people out of the floodplain if a cost-benefit analysis shows repeated flooding is more costly than moving people. Industrial, commercial, and residential development in the floodplain should be restricted by local planning or development authorities and types of land use that are more appropriate to frequently flooded areas (agriculture, for example) should be encouraged.

- Cluster densities outside of the floodplain, instead of within the floodplain.
- Functioning floodplains, complex stream channels, wetlands, and riparian areas all contribute to retaining runoff locally and/or improving the infiltration of precipitation, which reduces the flashiness of flood waters. Local jurisdictions should make it their goal to contribute to the protection and restoration of these natural systems. Natural flood storage areas should be identified and protected. Where the connection between the river and its floodplain has been severed through levees or berms, opportunities should be examined to open up flood storage areas through levee setbacks or removal. An analysis of areas within the basin, which historically had wetlands should be undertaken to determine if restoration or creation of wetlands in these areas might help increase natural flood storage. Riparian vegetation, which helps with infiltration of precipitation, should be protected where it exists and restored where it has been removed. Large woody debris and numerous logjams historically acted to create complex, meandering stream channels that could hold more water than simplified, channelized streams. Large wood should not be removed from streams and rivers.
- Further analysis within the basin should be done to determine positive restorative actions that might be taken to improve the natural functioning of floodplains, wetlands, and riparian areas, including reconnecting rivers to their historic floodplains, streambank rehabilitation and conversion of land uses (i.e., buyouts, easements, etc).
- Actions that would help retain storm runoff in the upper and middle watershed would include removal of agricultural drain tiles, wetland restoration and creation, and the addition of large woody debris and log jams. In addition, opportunities exist to remove levees throughout the basin or to set existing levees back to allow more flood storage.
- Local jurisdictions should work with the state and federal authorities to develop floodplain management plans that integrate land use planning, current knowledge of the extent of flooding, and an understanding of naturally functioning rivers and floodplains. Areas with a history of flooding should be identified and protected to provide valuable flood storage, ecological values, and potential restoration. These areas should be targeted for buyouts, easements, or other programs that offer incentives to landowners.

B. *Thurston County* completed a *Comprehensive Flood Hazard Management Plan* in 1999. It was identified in this plan that Thurston County residents are faced with a variety of different flood hazards. These include: flooding and erosion from urban stormwater runoff; river valley flooding that destroys roads, homes, farm buildings and erodes miles of shoreline; seasonally high water table areas which flood foundations and access roads isolating these areas for weeks; and areas located outside of designated flood area which can be destroyed by excessive streambank erosion during flood events.

A type of stream flooding characterized by a quick rise and fall of water level is the flash flood. Flash floods generally result from intense storms dropping large amount of rain within a short period of time onto watersheds that cannot absorb or slow the flow. The natural terrain of Thurston County helps to reduce the potential for flash floods. However, many smaller streams react in a "flashy" manner, making them more difficult to forecast. As development continues, increasing the distribution and proportion of impervious surfaces, the threat from flash floods will increase.

Groundwater flooding occurs whenever there is a high water table and persistent heavy rains. The situation is caused in areas where an upper, thin layer of permeable soils overlays an impermeable layer of hardpan soils. As the ground absorbs more and more rainwater, the groundwater table rises and shows itself as flooding in areas where the land surface is below the water table. This condition has historically been most severe in the second and subsequent years of consecutive wet years.

The Skookumchuck Dam on the Skookumchuck River in Thurston County is identified as a potential high hazard dam, which could fail and potentially cause significant economic loss and environmental damage.

Dam failures can be caused by nature, such as flooding or an earthquake, but mostly they are caused by human error such as poor construction, operation, maintenance or repair. There are many effects of a major dam failure: loss of life, destruction of homes and property, damage to roads, bridges, power lines, and other infrastructure; loss of power generation and flood control capabilities; disruption of fish stock and spawning beds; and the erosion of stream and river banks.

Lands within Thurston County flow both to the Pacific Ocean and to Puget Sound. Approximately 43% of the County flows into various drainage's within the Chehalis Basin (Chehalis River, Black River, Skookumchuck, and the Black Hills) to the Pacific Ocean.

The long term objectives of Thurston County's Plan include:

- Protect the public from natural hazards.

- Minimize the need for emergency rescues.
- Protect the unique, fragile and vulnerable parts of the environment.
- Minimize the cost of replacing public facilities.
- Alert the public to these critical areas.
- Recognize that water quantity, quality and instream habitat is related.
- Avoid the public subsidy of private developments.
- Encourage voluntary efforts to restrict development within hazardous areas.
- Work in concert with other land use regulations.
- Coordinate efforts with adjacent jurisdictions.

The short-term objectives of the Plan include:

- Provide the highest degree of flood protection at the least cost by working with natural systems and using prevention as a first priority.
- Design the entire flood plan to address the program needs of the National Flood Insurance Program, Community Rating System.
- Improve existing development regulation implementation by providing more accurate mapping (i.e., 100-year floodplain, high groundwater and wetlands).
- Reconstitute the multi-development county flood mitigation team to implement the flood plan.
- Rely upon a combination of state or federal grants and locally generated funds (for the required grant match) to implement the flood plan.
- Work with adjacent jurisdictions to resolve common flooding issues.

The *Thurston County Flood Hazard Management Plan* recommends a combination of projects and activities needed to achieve the goals of the overall strategy for flooding. These include:

- Apply to FEMA to be included into the Community Rating System (CRS Program) as a part of the National Flood Insurance Program.
- Secure funding for flood related projects within the 20-year Stormwater Capital Facilities Plan.
- Expand the Thurston County stormwater utility rate boundary to include all unincorporated areas.
- Thurston County should continue to be actively involved in the multiple jurisdictions flood hazard reduction efforts within the Chehalis River Basin.

- Place flood elevation poles and staff gauges along major rivers and within chronic groundwater flooding areas.
- Create a countywide Water Resources Data Base.
- Develop a system to track flood elevation certificates for individual homes.
- Prepare a public information program, which focuses on the consequences of floods.
- Provide a set of all flood management documents for each Timberland library within the county.
- Mail flood insurance information to residents and property owners who live in a floodplain and the real estate offices.
- Remap floodplains using new 2-foot contour data for all rivers and submit the changes to FEMA for map revisions.
- Remap the location of streams using the new 2-foot contour data.
- Map high quality riparian habitat, river reaches for all rivers and including the extent of historic meander belts along the Nisqually River.
- Map 190 square miles of wetlands in Nisqually, Chehalis, Black and Skookumchuck watersheds.
- Develop mapping protocols to archive all flood maps and data sets so they can be reused at a later date.
- Reevaluate land uses and zoning bases upon new floodplain maps.
- Adopt development regulations for high groundwater areas.
- Revise shoreline regulations to encourage "shoreline protective structures" to be bioengineered.
- Work with other to determine the width and conditions of forested corridors along river and stream shorelines.
- Draft a comprehensive plan policy, which encourages the creation and use of wetland mitigation banks.
- Amend the Stormwater Ordinance (TCC 15.05) to allow for enforcement capabilities.
- Prepare new drainage basin plans in priority areas such as Salmon and Yelm Creeks.
- Draft a prioritized list of which floodplain residences the county would acquire (buyout) if state and federal monies were available.
- Draft a priority list of which residences the county would help elevate above the 100-year floodplain, if state or federal monies are available.
- Work with landowners and others to establish reforested corridors along river and stream shorelines.

- Encourage research into bioengineering and other techniques which provide streambank protection an improve fisheries through the use of large woody debris. Support local demonstration projects, which could provide such research.
- Develop a warning system for the Skookumchuck River dam with its property owner, the Dept of Ecology, the downstream communities and the Skookumchuck Valley residents.

C. *Lewis County* completed a *Flood Hazard Management Plan* in December 1994. Three major watersheds are located in Lewis County, the Chehalis, Nisqually, and Cowlitz River watersheds. The Nisqually and Cowlitz Rivers originate in the Cascade Mountains within the eastern part of Lewis County. Floods on these two rivers tend to be heavily impacted by the snow pack conditions in the Cascades. The headwaters for the Chehalis River are in the foothills south and east of the city of Chehalis. Snow pack is not normally a factor in Chehalis River flooding because of the low elevation headwaters. The river is extremely prone to flooding from heavy precipitation events that regularly occur during the fall and winter.

This plan addresses flood issues on the Chehalis, Nisqually, and Cowlitz Rivers. The major focus for the plan is on the Chehalis/Centralia region where flooding has historically caused millions of dollars in damages. Specific flood issues and problem areas were analyzed, and recommendations made for alleviating these problem situations. Flood problems on the Nisqually and Cowlitz Rivers were examined in less detail. For these two rivers, specific problem sites were inventoried, and flood control efforts were documented.

Extreme floods on the Chehalis River and its tributaries have caused considerable damage. The 1990 and 1996 floods were the largest recorded on the Chehalis River during the period of record. The floods caused millions of dollars in damages throughout the watershed.

Because flooding has been a chronic problem in the Centralia/Chehalis region for so long, much effort has been spent historically on developing flood control solutions. The U.S. Army Corps of Engineers (COE) has been particularly active in analyzing and proposing flood control solutions. Most of the COE-proposed solutions have involved large flood control structures. Construction of large flood control structures is the only alternative that will actually prevent flooding from occurring in the Centralia/Chehalis region, but to date none of these structures has ever been built.

One of the results of the many studies conducted on flooding in the watershed has been the Corps/Lewis County recommendation to construct the Centralia Flood Damage Reduction Project. A study of the flooding in the Centralia/Chehalis area commenced in 1998 and ended in 2002 with a recommendation to build a series of setback levees within

the Chehalis River floodplain and along the lower Skookumchuck River, and make modifications to Skookumchuck Dam. The Army Corps of Engineers suggests that the Centralia Flood Damage Reduction Project will make significant and measurable improvements in the ecosystem and flood damage protection for the cities of Chehalis and Centralia. The study area includes the main stem Chehalis River, its floodplain and tributaries from the South Fork Chehalis River confluence to Grand Mound, and includes the cities of Centralia and Chehalis, in Lewis County, Washington. Tributaries entering the study area include the Skookumchuck and Newaukum rivers, Salzer, China, Coal, Bunker, and Lincoln creeks, among others. Studies along the Skookumchuck River extend upriver of Skookumchuck Dam and include the town of Bucoda in Thurston County. A detailed cost estimate was developed for the selected plan to construct setback levees and modify Skookumchuck Dam. The project cost estimate is $94,000,000 and includes design and construction costs, mitigation costs[1], operation and maintenance costs, real estate acquisition costs, contingency, and interest during construction.

The following principles are fundamental to *Lewis County's Comprehensive Flood Hazard Management Plan* strategy:

- Respect the river's natural hydrologic processes. Traditional flood control efforts have focused on controlling the river's natural tendencies of channel shifting and over bank flow during floods. It is often more cost-effective in the long term and more environmentally sound to accommodate these natural river processes, rather than attempting to control them.
- Focus on the cause of flood damage. Flood damage can be related to upstream land management and development in flood-prone areas. Recognizing that flooding is a natural process, and only becomes a problem when people develop in areas that flood, is an important concept.
- Consider the entire watershed, not just local conditions. Because watersheds do not respect political boundaries, local flood management activities impact downstream jurisdictions.
- Incorporate public participation and coordinate among all affected agencies. Because flood hazard reduction affects most people in the county and overlaps with the responsibilities of other governmental agencies, it is necessary for these groups to be involved in the planning process. Without involvement from these groups, it is nearly impossible, in the end, to get support from them.
- Examine all the issues. In the past, many flood control efforts have taken place immediately following a flood. Usually, there is

1. The mitigation costs are estimated on the impacts of a 35 percent design of the project; further minimization of the impacts will be conducted in further studies, thus reducing the costs. This is consistent with the EIS process. During design of the project mitigation costs tied specifically to the minimized impacts will be identified and the appropriate portions of the plan will be utilized.

not enough time to consider flood causes and alternative solutions when planning is done in this crisis mode. True comprehensive planning for flood hazard reduction must be carried out in a manner, which allows thorough examination of the issues and solutions.

- Incorporate other resource protection goals. Coordinating flood hazard reduction measures with other resource protection programs is obviously the best use of financial resources.
- Coordinate between public works, planning, and building departments, and other department activities. Because of their differing mandates and responsibilities, these departments can sometimes work at cross-purposes in the area of comprehensive flood hazard reduction. Each department must remember to look past their daily permitting decisions to the ultimate goals of the county or city in flood hazard reduction.
- Incorporate comprehensive planning solutions. Flood hazard reduction should be part of the county or city's overall comprehensive plan. When flood control structures are necessary, recreation and public access might be integrated into the project.

During the planning stages of the flood hazard management plan, long-term goals and short-term objectives were developed. The overall long-term goals of this CFHMP are to:

- Reduce flood hazards and
- Reduce long-term flood control costs to Lewis County.

These goals are to be accomplished through the following short-term objectives:

- The emphasis of the CFHMP will be on the populated areas along the Chehalis River and its major tributaries. Most of the detailed analysis of flood hazard reduction strategies focuses on this region.
- The CFHMP will focus on nonstructural measures that will help prevent the worsening of flood impacts in the future. Research completed through October 1992 documented that numerous major structural flood control measures have been proposed since 1935, but none of them has ever been built. Because it is unlikely that financing for such structures will be easier to obtain in the future, it was agreed that the CFHMP should not reconsider major structural measures to prevent flooding from occurring in the Centralia/Chehalis area.
- The emphasis for the Cowlitz and Nisqually River basins is to identify potential flood hazards in the parts of these drainage that lie in Lewis County. A complete analysis of flood hazard reduction measures will not be attempted.

- Public education was identified as an important element of this CFHMP. This objective was met by prioritizing public awareness and public education on flood hazard reduction alternatives.
- Lewis County expressed the desire to be a good neighbor to downstream residents on the river covered by this plan. Impacts to downstream jurisdictions of the various actions evaluated in this plan were analyzed.

Since 1935, the Corps and other agencies have proposed numerous structural flood control measures to prevent flooding in the Chehalis River valley. These measures include:

- Modification of Skookumchuck Dam
- Flood-proofing structures
- Construction of several multipurpose storage projects (Ruth Dam, North Fork Newaukum Dam, South Fork Newaukum Dam, Boistfort Dam, Meskill Dam, and Skookumchuck Dam)
- Small headwater dams
- Channel clearing
- Channel excavation
- Urban area levees
- Pump stations
- A combination of the flood control measures listed above

It is generally understood that flood prevention in Centralia/Chehalis area can only be accomplished with major structural flood control measures. However, it was also recognized that none of the major structural flood control measures investigated during the past 60 years have ever been constructed and therefore it was concluded to focus this CFHMP on nonstructural flood hazard management measures. In accepting that flooding will continue during extreme flood events, this CFHMP has focused on:

1. How to minimize the impacts of flooding in those areas of the flood plain that are already developed
2. Preventing development or other activities that will create a new flood hazard for themselves or increase the flood hazard for others

The recommended nonstructural flood management measures address both of these concerns. These measures include:

- Ongoing improvements in flood warning and emergency response procedures;
- Flood-proofing of individual structures;
- Conducting flood audits for residential and commercial buildings on the flood plain;

- Modifying the flood damage prevention ordinances of Centralia, Chehalis, and Lewis County to achieve consistency in the valley; using best available historical flood records to assess flood hazards; and modifying Federal Insurance Rate Maps (FIRMs) so that they represent flood hazard areas based on the actual flood inundation history. An inherent characteristic of nonstructural solutions for flood hazard management is the difficulty in addressing very specific flood problems. In general, nonstructural recommendations are more procedural or policy-oriented and, therefore, do not usually focus on a specific flood location. Although the flood hazards in the Chehalis/Centralia valley are general in nature, it was possible to identify specific urgent problem areas where flooding is particularly troublesome or expensive to residents. These specific flood hazard areas are addressed in the CFHMP.

The recommendations in the *Lewis County CFHMP* include:

*Flood warning and emergency response:*

- Install additional river gauging stations. Current river monitoring provides flow information for a large portion of the Chehalis River; however, flood responsiveness could be increased with additional gauge sites. Flood preparation lead time would be increased with gauge installation within the upper reaches of the Chehalis drainage. Additional telephone-linked gauges would reduce personnel needed to visually inspect river levels. New gauges are recommended for the ungauged sections of the upper Chehalis River, the South Fork of the Chehalis River, and for major tributaries in the Centralia/Chehalis region. The Newaukum gauge near Chehalis should be updated to provide telephone-linked capabilities.
- Establish regional coordination on flood forecasting. Lewis County, Chehalis, and Centralia currently each have independent efforts for flood forecasting. Combining resources for flood forecasting is recommended.
- Formalize and update road closure database. This information could be linked to river stages adding more predictability and lowering response time to road closures.
- Increase distribution of flood information materials. Lewis County should expand the distribution of flood information.

*Flood-Proofing:*

- Distribute flood-proofing fact sheets and reference materials to citizens residing in flood prone areas.
- Acquire the Corps of Engineers flood audit program. Lewis County should continue the flood audit program themselves.
- Establish elevation and relocation as the preferred flood-proofing method for the Centralia/Chehalis area.

*Ordinance Interpretation and Enhancements:*

- Revise ordinances for consistency. Lewis County, Chehalis and Centralia's flood hazard ordinances should be modified to be consistent.
- Pursue revision of the FIRMs. Lewis County should submit the COE Flood Warning Map to FEMA along with a request for a "Letter of Map Revision* to the FIRM in the Centralia/Chehalis area.
- Update local flood elevation database. This CFHMP recommends that Lewis County compile a database of historical flood elevations and areas of inundation. Where these data show flooding beyond the limits shown on the FIRM, Lewis County should require applicants for development to elevate their structures accordingly.
- Add compensatory storage requirements to the Flood Damage Prevention Ordinance to minimize the cumulative effect of fill material in the flood plain.
- Establish a forum for coordination between Lewis County, Chehalis, and Centralia flood officials. These officials should meet regularly to discuss flood issues. Through this forum they can maintain consistency among all flood programs and share ideas and resources.
- Increase public disclosure. Lewis County should include notification of flood plain status with all county permitting for land development, and purchase and sale of property. In addition, it should develop a method for ongoing notification to existing landowners, such as through a notice sent with tax mailings.
- Upgrade critical facilities. The county should inventory the existing critical facilities for conformance with its Flood Damage Prevention Ordinance. A remedial plan should be developed for nonconforming facilities.
- Pursue FEMA community rating system. FEMA's Community Rating System is a program that allows communities to lower their flood insurance rates by engaging in activities that will lessen flood hazard. Since many of the COE activities discussed in this plan would count for credit in the Community Rating System, Lewis County should apply for inclusion.
- Implement rigorous administration of variances. Variances should be granted very infrequently.
- Adopt stormwater management ordinance and technical manual. These stormwater management tools will help Lewis County deal with its stormwater more effectively
- Lewis County should create a countywide surface water management utility to assist with funding for flood projects.
- Once it has created a surface water management utility, Lewis County should undertake basin planning. Using a basin plan-

ning approach, the county will plan for entire watersheds, resulting in the most successful surface water management.

## Analysis

Certain commonalities exist among the three flood hazard management plans. These are tantamount to recommendations and are as follows:

- Evaluate FEMA Mapping, remap areas (if necessary), and apply for Community Rating System Program, part of National Flood Insurance Program. Reevaluate land use and zoning bases using this new information and revise, amend or create new regulations based on findings.
- Continue Inter-Jurisdictional Coordination. Be a good neighbor to downstream jurisdictions. Modify floodplain development regulations so they are consistent throughout the basin.
- Educate the public about flooding – develop materials that inform residents of flooding issues within the basin and land use practices and regulations affecting development within the floodplain. Additionally, inform them of consequences of development in the floodplain and applicable flood insurance rates/restrictions and flood proofing techniques. Provide flood management documents/information to all libraries within the basin.
- Improve flood monitoring/warning/forecasting and emergency response procedures within the basin. Flood elevation poles, staff gauges should be placed along major rivers and within chronic groundwater flooding areas. Existing (and new) gauges should be updated to provide telephone-linked capabilities. Conduct flood audits for residential and commercial structures within the floodplain.
- Accommodate rivers natural hydrologic processes. Protect areas (i.e., wetlands, floodplains, stream corridors, riparian areas, etc) that naturally absorb floodwaters via conservation easements; and move structures (i.e., buyout or elevate homes) that are repetitively damaged out of harms way. Resist development efforts to place fill or structures within the floodplain and minimize the need for emergency rescues by using prevention as the first line of defense against flooding. Recognize that flood prevention represents the highest level of flood protection at the least cost by working with the basins natural systems.
- Identify areas within the basin that contribute to natural flood storage. Protect areas still intact, restore areas degraded by development or other activities, and create areas that will store floodwaters in the winter and can be used to augment stream flows during low flow conditions.
- Utilize nonstructural measures to prevent or lessen flooding whenever possible. If structural measures are needed, utilize bioengineering or environmentally sensitive methodologies to reduce flood hazards.

Further review by the Chehalis Basin Partnership led to additional recommendations:

- Encourage all participating counties in the basin to apply to FEMA for the Community Rating System.
- Ensure that local floodplain management plans are updated to include new structures within the Chehalis floodplain and the overall philosophy and guidelines of the Watershed Management Plan, and to promote consistency related to floodplain management across jurisdictions.

## Political/policy factors

The U.S. Congress established the National Flood Insurance Program (NFIP) with the passage of the National Flood Insurance Act of 1968. The NFIP is a Federal program enabling property owners in participating communities to purchase insurance as a protection against flood losses in exchange for State and community floodplain management regulations that reduce future flood damages. Participation in the NFIP is based on an agreement between communities and the Federal Government. If a community adopts and enforces a floodplain management ordinance to reduce future flood risk to new construction in floodplains, the Federal Government will make flood insurance available within the community as a financial protection against flood losses. This insurance is designed to provide an insurance alternative to disaster assistance to reduce the escalating costs of repairing damage to buildings and their contents caused by floods. Information on Flood Insurance Rate Maps from FEMA can be found on the following website: http://www.fema.gov/mit/tsd/

The Washington State Department of Ecology has recently remapped potential flood hazard zones in Washington State. The maps for the Chehalis Basin can be found at: http://www.ecy.wa.gov/services/gis/maps/wria/flood/flood.htm. The flood maps on this site are a general purpose, watershed area view of potential flood hazard zones and are not intended for the detailed identification of local property, insurance claims, or emergency needs (Figures 1 & 2).

## Unanswered questions

- Will the synthesis of the current Comprehensive Flood Hazard Management Plans for the three dominant jurisdictions in this basin lead to a revision of the existing documentation?
- How will the local authorities ensure that areas of the basin that currently provide flood storage will be preserved or restored?
- How can we accommodate the rivers natural hydrologic processes and require that development activities within the floodplain are restricted?
- How will the different jurisdictions in this region revise and enforce floodplain regulations in the future?
- How will the Lewis County/Corps Centralia Flood Damage Reduction Project (if constructed) affect the rivers natural processes? How will we ensure that future floodplain development doesn't threaten the integrity of this large structural project?

## References/Suggested Reading

*Thurston County Flood Hazard Management Plan*, 1999. WA State Dept. of Ecology.

*Grays Harbor County Comprehensive Flood Hazard Management Plan*, 2001. CH2MHill.

*Comprehensive Flood Hazard Management Plan for Lewis County*, 1994. ENSR Consulting and Engineering in Association with KCM, Inc., Applied Environmental Services, Inc., and Shapiro and Associates, Inc.

*Gravel Removal from Rivers for Reducing Flood Risk*. Washington State Department of Ecology and Washington State Department of Natural Resources.

*Centralia Flood Damage Reduction Project General Re-evaluation Report*. 2003. US Army Corps of Engineers Seattle District.

*Centralia Flood Damage Reduction Project Environmental Impact Statement*. 2002. US Army Corps of Engineers Seattle District.

*Freshwater Gravel Mining and Dredging Issues.* 2002. Prepared for Washington Department of Fish and Wildlife; Department of Ecology and Department of Transportation by G. Mathias Kondolf, Matt Smeltzer and Lisa Kimball [Center for Environmental Design Research, Berkeley, CA].

# Water Quality Impairment

## *Chehalis Basin Watershed Planning Issue Paper*

## What is the issue?

The water that flows through the Chehalis Basin is used by many people for many purposes. Each of those uses relies upon having ample supplies of suitable quality water. Some uses require water of very high quality; other uses can make do with water of lower quality. State and federal laws require that water quality be protected or restored to ensure that all water-dependant uses are supported.[1]

Surface waters that do not meet state water quality standards are considered to be "impaired" - a term that comes from section 303d of the federal Clean Water Act. The list of impaired waters is sometimes referred to as the "303d list." Under federal law, a water that is identified as impaired **must** receive special attention with the goal of restoring its quality so that it meets state standards. The Clean Water Act has a process for applying this special attention — it is called a Total Maximum Daily Load (TMDL). TMDLs are not optional. TMDLs start with a detailed study of the problem and result in specific clean-up strategies. Federal regulations are specific about what results must be accomplished under TMDLs, but there is some flexibility in how those results are accomplished. In Washington State, the settlement of a federal court case specified how the state will work towards completing TMDLs for all impaired waters within 15 years. This paper describes what is meant by water quality impairment, the purpose of water quality standards, and federal requirements when water bodies are identified as impaired. TMDLs are discussed in detail in a separate issue paper.

## What is the background to this issue?

The Chehalis Basin Partnership established the following water quality goals for the Chehalis Basin Watershed Plan: to prevent degradation of and/or to improve water quality to have clean water (as defined in the Washington State Water Quality Standards) for all fish, wildlife and human uses.

State surface and groundwater quality standards have been developed to protect designated 'beneficial uses' including the following: in-home domestic use, livestock watering, supporting different species and life stages of fish, irrigation, industrial use, primary contact recreation (swimming), and secondary contact recreation (boating, fishing).

- Surface water quality monitoring data show that some areas of the Chehalis River and some tributaries meet current state surface water quality standards, but others do not. Some areas do not meet state

1. This paper does not currently address drinking water and drinking water quality standards which are overseen by the Washington State Department of Health.

water quality standards because they are too warm, or the level of dissolved oxygen is too low, or there are too many fecal coliform bacteria present. Other possible causes of impairment include high nutrient levels, pH levels that are too high or too low, sediment, and invasive aquatic plants.

- Water that is identified as impaired must receive special attention with the goal of restoring its quality so that it does meet the state standards. The process for bringing water quality back up to meet standards is called a TMDL. TMDLs are most often prepared by the Washington State Department of Ecology (Ecology) but they may be done by others as long as they meet EPA approval.
- Although unseen, ground water is a vital resource to the citizens, economy, and environment of Washington State. Ground water supplies more than a quarter of the total state water demand and is estimated to provide at least 65% of the drinking water for the state's residents. As a fundamental component of the hydrologic cycle, ground water also plays a critical role in sustaining stream and river base flow and maintaining the quality of riparian and wetland ecosystems. Because surface water is already extensively allocated in many areas, ground water will undoubtedly supply an increasing percentage of our water needs as our population grows. Ground water data show that nitrate concentrations are a concern in some areas.
- Surface and ground water quality monitoring data are limited, and we may be unaware of areas that do not meet state surface or groundwater quality standards because they have not been monitored.

## What are some possible solutions?

1. **Continue implementing existing programs with existing resources (status quo)** - This alternative will result in outcomes similar to those seen to date. Ecology is responsible for identifying impaired waters and initiating clean up activities (TMDLs). Ecology will continue to carry out this role using available resources. Public involvement in Ecology-led processes includes the opportunity to comment on proposed revisions to state water quality standards and on TMDL priority setting processes and priority lists. The public can also participate in the development and implementation of TMDLs.
2. **Basin-wide comprehensive monitoring plan** - Implementation of a basin-wide comprehensive monitoring plan being developed as part of the watershed plan for the Chehalis Basin will identify improvements in areas with impaired water quality and identify additional areas that may be impaired. Monitoring data will also help prioritize areas for cleanup and protection.
3. **Protection of areas of healthy water so that they do not become impaired** - This alternative is the subject of an issue paper on its own. Briefly, preventing impairment is much less time consuming and expensive than cleaning up impaired waters and results in fewer regulated outcomes. "Protection" in the context of this alternative for this

issue paper is defined broadly and includes the option of protection through voluntary actions. One example of voluntary actions would be the development and implementation of a farm conservation plan through the local conservation district. Protection in the context of this alternative does not mean recommending additional regulations to prevent normal use of private lands. It does mean that water quality standards will be met, a requirement that already exists under existing laws and/or regulations.

4. **Proactive water quality clean up of impaired waters before TMDLs are developed** - The goal of the Clean Water Act is protecting the quality of waters that meet or exceed water quality standards and restoring those that do not. While the Clean Water Act contains tools such as TMDLs for restoring water quality, it recognizes restoration or cleanup that occurs as a result of other processes. The key is to study the situation enough to understand the causes of degradation, to identify practices that will effectively halt the degradation, to implement those practices, and to track (monitor) results.

   Programs to clean up impaired waters can be implemented at the local level without waiting for state or federal intervention. Effective tools that can be used within the context of a coordinated effort to clean up impaired waters include local or site specific resource planning, implementation of best management practices (agriculture, forestry, stormwater), local land use controls (density, buffers, Critical Area Ordinances, buffers), etc.

   The benefit of this approach is that problems can be resolved without federal or state oversight, using processes and practices that are supported at the local level. To be successful, this approach requires local leadership, local support, and the resources to implement it.

5. **Recommend use-based water quality standards for the Chehalis Basin** - The proposed new water quality standards for Washington State contain a provision for water quality criteria based on the actual use of a specific water body. For example, under the current standards, unless a water body is specifically classified as being "class AA," "class B," or "class C," the default is for the water body to be classified as "class A" water. All "class A" waters in the current water quality standards are assumed to support salmonid spawning and rearing and to have a dissolved oxygen criterion and temperature criterion designed to support those uses whether or not salmonids are actually present. Use-based standards, on the other hand, would first determine the actual uses in various portions of the basin and then set the water quality criteria based on those actual uses.

6. **Regional (basin) water quality management district** - A regional water quality management district could assume oversight of water quality in the basin. This alternative may require state legislative action to allow delegation of water quality protection from Ecology to the local board. It would certainly require funding support and would result in the need for on-going coordination. If this alternative were considered, additional research would have to be done on existing laws and authorities.

## What actions are recommended?

**#2 Basin Wide Water Quality Monitoring Plan**

**#3 Protect areas of high-quality water so that they don't become impaired**

**#4 Proactive water quality clean up of impaired waters before TMDLs are developed**

**#5 Recommend Use-Based Water Quality Standards for the Chehalis Basin**

## How can the recommendations be implemented?

The experience of relying upon TMDLs to restore water quality in the Chehalis Basin has not been a pleasant one for any of the parties involved. What has been learned from that experience is that TMDLs are time consuming and expensive; they leave people feeling they have been forced into implementing actions they are not convinced will have real and positive effects on water quality.

Effective management of impaired water quality will require a coordinated effort among all jurisdictions and interest groups. The water quality element of the watershed plan can provide a framework for that coordinated effort. If a locally-controlled water quality program is to be successful, each jurisdiction will have to contribute. The difficulty is that every one of the jurisdictions that has a role in protecting or restoring water quality faces the same problem — limited resources and competing demands for those resources. Unless preventing additional water quality impairments and voluntary clean up of identified impaired waters are made priorities for everyone involved, the chances are good that, by default, TMDLs will continue to be the tool the state is forced to use to clean up impaired waters.

To effectively implement the four recommendations above, the watershed plan should achieve the following results:

- Establishment of a joint local coordinating body with limited authority to provide continued oversight, direction and mid-course corrections as needed.
- Formal agreement that identifies the actions each participant commits to undertake. This agreement would probably have to be revised at least annually to address new conditions.
- Local and state commitment to participating in a comprehensive, basin-wide monitoring effort designed to identify areas that meet, do not meet, or are at risk of not meeting, state water quality standards. This will have to be an on-going program.
- Local oversight of new and existing land uses to ensure that water quality is not degraded.

- Local implementation programs with the ability to clean up waters that have been identified as impaired. These programs will have to include schedules for achieving results and a follow-up monitoring program to document results.
- State acceptance of this locally-controlled program and a commitment to support local priorities and provide a fair share of the necessary funding.
- Local sources of funding.

These actions will be controversial. The pay-off for taking on this responsibility is more local influence on the outcome. The result of not taking it on will be more TMDL-driven outcomes.

## What are significant data gaps?

- The quality of water where monitoring has not been done
- The effects on water quality of invasive exotic plants or animal species.
- The effects of pesticides used to control invasive aquatic or terrestrial plants and animal species on water quality.
- The effects of seals on water quality in Grays Harbor
- The quantified effects of individual sources of water quality impairment such as: septic systems, stormwater runoff, livestock wastes, etc.
- A map of impaired waters and contaminated ground water that is legible at a scale that can be included with this issue paper.

# Protection of Existing Areas with High Quality Waters

## *Chehalis Basin Watershed Planning Issue Paper*

## What is the issue?

Areas with high water quality are those which meet or exceed existing Washington State Water Quality Standards. The Chehalis Basin enjoys some of the highest quality waters in the State of Washington. The Watershed Planning Act does not specifically require protection of areas with high quality waters. The Washington Water Quality Standards Anti-degradation provisions afford some protection to waters that are of higher quality than the applicable criteria and also allow a lowering of water quality in such waters under some circumstances. Prevention of water quality degradation is one of the Chehalis Basin Partnership goals, and the issue was raised in the planning process because of its importance, cost effectiveness, and the opportunity for success through voluntary efforts.

## What is the background to this issue?

It is much easier and less costly to protect high quality waters than it is to clean up waters that are already polluted. In most watersheds, there are at least a few and sometimes many areas of high water quality. These areas are generally associated with areas of intact, high quality habitat. In a cost effective strategy, the highest priority should be to identify these areas, understand why they support high quality water, and protect them from deterioration.

To address related habitat issues, including fish habitat, a further goal is to begin restoring "connectivity" between those strongholds to enlarge them and to provide refuges in the event an existing stronghold is severely damaged by a storm or other severe event. This concept is based on the premise that damaging effects of storm events tend to be confined to relatively small geographic areas, so if such a storm event wipes out a stronghold area, there will be another in adjacent lands that can serve as refuges while the original recovers or is restored.

More intensive land uses tend to increase the amount of pollution from runoff and lessen the amount of water recharged to groundwater and streams. The percentage of impervious surface (pavement, roofs, etc.) increases as land use becomes more intensive. Intensive land uses not only increase pollution but also have adverse affects on stream flow. As flows decline, stream temperatures increase and temperature standards are exceeded; this can lead to fish mortality and sublethal effects.

A major obstacle in promoting non-degradation as a priority is overcoming the fairly widespread belief that environmental standards are totally protective, i.e., many believe that there are no, or few, downsides to allowing degradation of high quality waters provided they do not degrade below standards or destroy these resources.

## Existing Law and Regulations:

The Clean Water Act's National Pollutant Discharge Elimination System (NPDES) permit system provides significant protection to water quality from point sources. This program has generally been effective, and as a result most of the remaining threats to water quality come from nonpoint source pollution (runoff).

Clean Water Act Section 404 regulations are intended to ensure that materials placed in waters or other aquatic resources like wetlands will not have a negative impact on the overall water resources within a region.

State Water Quality Standards (WQS) regulations, which are issued pursuant to the Federal Clean Water Act, require an anti-degradation policy as part of state Water Quality Standards. The Confederated Tribes of the Chehalis have their own water quality standards.

Nonpoint source pollution is largely a function of land use. Land use is regulated primarily by county and city government.

## What does the available science indicate?

CBP Level 1 Analysis, (Appendix C – Water Quality) included a review of water quality data by subbasin and concluded that there were very few subbasins with poor water quality.

In cooperation with Ecology, EPA conducted field sampling in the upper Chehalis (WRIA 23) during 1997 to assess the status of ecological resources in the basin and to examine the association between ecological conditions and natural and human influences. This study concluded that many of the sites examined exhibited good environmental conditions, including indicators representative of water quality and habitat.

Other resources that may provide information on areas of high quality water include the following:

- **Ecology Water Quality Data**: Much of the data was gathered for the TMDL program. This program focuses on water quality problems, but some of its data could be used to identify areas with good water quality.

- **Chehalis Basin Education Consortium Monitoring**: Ecology made a total of about 50 thousand dollars in grants to help and the U.S. Fish and Wildlife Service helped to fund water quality monitoring by students (ages 6 thru 18) in throughout the Chehalis Basin. This involved two small grant awards in 2000 and 2001
- **Land Trusts**: Several environmental land trusts operate in counties that are at least in part in the Chehalis Basin.
- **Public Lands**: There are extensive public lands in the basin. These include local, state, and federal entities. These entities may have special protection and/or monitoring programs for their lands and may be able to provide data on high quality waters.
- **Private Forest Lands**: As a broad rule of thumb, forestlands produce higher water quality than other land uses; however, the degree to which this is true depends on the particular forest management practices followed. There are very extensive private forestlands in the Chehalis Basin. These are subject to a variety of historical and current management practices which may be expected to produce diverse water quality conditions. Areas that are subject to up-to-date, science-based practices would be expected (eventually) to produce good water quality – for example, lands governed by a Habitat Conservation Plan prepared under the Endangered Species Act.

## What are possible alternatives?

- **No Action Alternative/Status Quo**: Maintain the current focus on water quality problems. State Water Quality Cleanup Plans (or TMDLs) will continue to be the dominant approach to water quality issues in the Chehalis, no special efforts would be made to protect high quality waters/habitat.

  *Analysis*: Presumably water quality would continue to deteriorate in response to population growth and economic development in the basin.
- **Proactive Voluntary Approach**: To be recognizably different from Status Quo, a proactive voluntary approach must be more than general encouragement to take those actions that may improve water quality and to refrain from those that do not. To be effective, a proactive voluntary approach should include at least the following general elements:
  1. Identify and inventory areas with high quality waters beyond those identified in Level 1 Assessment
  2. Assemble and publicize information on those locations where water quality is high
  3. Assess existing protections that these high quality waters have and understand how and why they support high quality waters
  4. Identify areas where existing protection programs are not likely to be effective

5. Identify voluntary mechanisms and incentives which can improve protection where needed
6. Obtain resources to implement voluntary approaches
7. Provide technical assistance
8. Publicize successful voluntary efforts/recognize successful individuals and institutions
9. Monitor to assess success
10. Apply adaptive management to make improvements where needed

- **Enforcement of existing regulations**: The existing Washington Water Quality Standards (WQS) regulations contain anti-degradation provisions that should serve to protect high quality waters. Long term benefits of protecting high quality waters through enforcement of existing laws will likely outweigh the short term costs to stakeholders of such enforcement, though a cost-benefit analysis would be difficult.
- **New Regulations**: New regulations to protect high quality waters (that go beyond the anti-degradation provisions in WQS regulations) could work in theory but probably not in practice. It would require a combination of legislative action, technical resources, and administrative resources. Costs could be significant, and the political will to legislate, fund, and implement such an initiative would be difficult to muster as long as other alternatives can demonstrate progress.

  *Analysis*: The state has anti-degradation provisions in its existing WQS regulations and is proposing revisions to these regulations. The agency certainly would want to complete its current revision of WQS/anti-degradation before considering further changes. Above all, a new regulatory initiative in this area would not be consistent with the Chehalis Basin Partnership's preference for voluntary efforts.

## Analysis:

**Cost Effectiveness**: Generally the most cost effective strategy and therefore the highest priority should be to identify areas of high water quality/habitat value and to protect them from further deterioration.

Political/Policy Factors: Some individuals have perceived the identification and subsequent protection of their lands as an infringement of their rights. They fear that this identification and protection will limit what they can do on their land. This is a legitimate concern, which must be addressed as a key element in any successful effort.

Identifying areas where water quality is high is challenging because there are limited funds for water quality monitoring and because much of the monitoring is driven by concerns about poor water quality. As a result, existing data tends to document water quality problems. A water quality monitoring program designed to represent the entire basin would be expensive and could compete for clean up and prevention efforts for funding. Nevertheless such

an effort is essential to monitor trends and measure success.

**Technical Issues**: Design of comprehensive monitoring to support a good water initiative would require effort, but there are ample precedents available and some monitoring efforts underway. These could form the basis for a "Comprehensive Chehalis Basin Monitoring Program."

**Proactive Voluntary Compliance**: Support for a proactive voluntary approach is consistent with enforcement of existing regulations. In fact, appropriate enforcement of regulations is essential to the success of a voluntary approach. Most individuals will not make voluntary changes to protect the environment at their own expense if they believe that others who are subject to legal or regulatory pollution abatement requirements are allowed to violate them with impunity.

## Recommendations:

**Reject the status quo approach** because it does not provide sufficient focus on the protection of high quality waters.

**Reject the additional regulatory approach** as inconsistent with the Chehalis Basin Partnership's goals and objectives, too costly, lacking in public acceptance, inconsistent with Ecology's current revision of their anti-degradation policy, and politically unrealistic.

**Implement the proactive voluntary approach** outlined above in Alternatives and as discussed further below.

**Management strategy**: The initial step should be to create an inventory of high quality waters — we must know where such waters are located if we are to be able to protect them. This should begin by launching a "Good Water Initiative." Select a lead entity. Begin by identifying areas of high water quality. Follow up on the information sources identified above under "Technical – Available Science" to develop and maintain a database of good waters. Expand the initiative to include other elements listed under Voluntary Approach included above in "Alternatives/Toolbox." Tap the local knowledge base and sound science to understand why certain areas support high quality waters. Coordinate with agencies involved in habitat protection by developing and implementing strategies to promote connectivity between high water quality areas.

**Jurisdiction**: Expand the scope of the Chehalis Basin Partnership Water Quality Committee beyond its current focus on TMDLs to add a "Good Water Initiative." The Chehalis Basin Partnership Water Quality Committee would be an ideal group to assist in developing and carrying out such an initiative. It would work closely with institutions with the authority and responsibility to protect water quality. Specific partner agencies would depend on land ownership and the actions needed to overcome threats to particular water bodies.

**Policy or policies needed**: At present, water quality management is driven by pollution problems that are addressed by the TMDL program. The Clean Water Act presumes that good water quality will be protected through state water quality standards programs, particularly anti-degradation. However, these provisions of the Clean Water Act have not generated programs to protect high quality waters that are as aggressive as those developed to clean up waters that are impaired. This is particularly true where the impairment results from nonpoint source pollution.

The critical first step would be to develop an inventory of such waters in the Chehalis Basin and to determine which governmental entities (local, state or federal) are responsible for and best able to provide the required protection. A second step would be to raise public consciousness regarding the importance of protecting high quality waters, and to increase its priority among governments at all levels (local, state, and federal). Subsequent steps would involve working with specific jurisdictions to strengthen protection accorded to the specific waters identified and others as discussed above under "Alternatives/ Toolbox – Voluntary Approach."

**Resources/funding needed**: TBD — Resources would be needed for

1. Developing a database on high quality waters
2. Assessing existing protections and developing programs to upgrade any that are deficient
3. Developing an understanding of how and why certain areas support high quality waters
4. Providing technical assistance4
5. Publicity and recognition
6. Monitor high quality waters
7. Adaptive management7
8. Overall responsibility for management of the initiative

Data and ideas to protect high quality waters are available. Resources would be needed for pulling these together into a program that would motivate people and institutions in the Chehalis Basin to support a Good Water Initiative in a meaningful way.

## Unanswered Questions/Issues:

- Resources for operating the program and for developing an inventory of areas with high water quality.
- Potential success of voluntary efforts.
- Knowledge of how and why certain areas support high quality waters.
- Responsibility for carrying out the program.