Introduction and Background

Water Resources of Island County

Water resources are critically important to the residents of Island County. The availability of safe drinking water is an issue that will guide Island County's growth, development, and resource protection measures into the future.

Groundwater is Island County's main water source. Seventy-two percent of Island County residents rely on groundwater. As such, groundwater quantity and quality are the driving reasons for our water resource management efforts.

Island County's groundwater geology is highly complex. Its aquifers are made up of multiple layers of unconsolidated sand and gravel capable of supplying water to wells. Mixed between these aquifers are layers of silt and clay that pass water more slowly (aquitards). From place to place in Island County, aquifers and aquitards vary in thickness, width, and depth below surface (see Figure 1). There may also be several aquifer layers present, each with different characteristics (recharge, pressure, capacity, etc.).

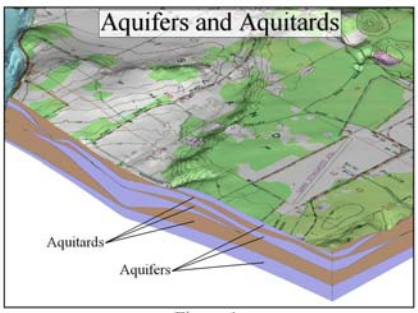

Figure 1.

Islands in marine waters pose unique challenges for groundwater management. All of Island County's groundwater aquifers are recharged only by rainfall infiltrating through land surfaces. Due to the rain-shadow effect of the Olympic Peninsula Mountains, areas of Island County vary in precipitation from 17 inches to 40 inches annually (see "Island County Annual Precipitation Map", Appendix I). Some of the county's aquifers (such as those at or below sea level near the shorelines) are connected to the saltwater of Puget Sound. Portions of these aquifers may contain saltwater. Seawater intrusion, the movement of marine saltwater into freshwater aquifers, is a serious issue in some areas of the county.

Will We Have Enough Water?

As water supply needs increase, it will be increasingly important for Island County residents to live within their water supply "means."

The variability and complexity of our groundwater geology makes the question of, "how much water do we have?," difficult to answer. Water resource management on islands requires very good information and detailed review at a

Sole Source Aquifer Status

Island County was federally designated as a Sole Source Aquifer in 1982. This means that when federal funding is used for a project, high levels of review ensure that local aquifers will not be impacted. It does not mean that Island County has only one aquifer.

Sole Source Aquifer status is authorized by Section 1424(e) of the Federal Safe Drinking Water Act when groundwater is the principal drinking water source for the area, which if contaminated would create a significant public health hazard.

small scale. (Note: Surface water is limited within Island County and not utilized as a drinking water source, so its availability is much less important in terms of long-range planning efforts.) Groundwater is not uniformly distributed or necessarily available for use, and so county-wide estimates are not useful in land-use planning. Instead, site-specific analysis is required to evaluate specific aquifers and points of withdrawal associated with land use proposals. Practical questions to ask are, "where is the water relative to where people want to live, and is it of good quality?"

Through the 2514 Watershed Planning process, the Island County Health Department (ICHD) conducted an analysis of Island County's groundwater resources to evaluate site-specific water availability, especially in relation to the potential for seawater intrusion. This analysis used water level elevation in groundwater wells to identify where water resources are abundant and where they may be tenuous (see the Seawater Intrusion section beginning on page 7, and the "Phase 2 Water Resource Assessment Final Report" in Appendix D).

2514 Watershed Planning

The State Watershed Management Act (ESHB 2514) was passed in 1998. This legislation provided a framework for local citizens, interested groups, and government agencies to collaboratively identify and solve water-related issues at a local level.

Island County's Water Resource Management Plan development has been supported through State funding.

For a full description of the 2514 Watershed Planning process, see Appendix A.

It is possible to estimate the total amount of groundwater that is theoretically available within Island County's aquifers. Data from a recent U.S. Geological Survey (USGS) study can be utilized to provide an estimate of the total groundwater available ("Estimating Ground-Water Recharge from Precipitation on Whidbey and Camano Islands, Island County, Washington, Water Years 1998 and 1999," Sumioka and Bauer, USGS 03-4101, 2003). This data cannot be used with any degree of certainty to define or determine the relationship between availability and use in any given region of Island County. Site-specific analysis continues to be the best methodology to derive such relationships. The USGS study estimated the recharge rate for Island County to be approximately 6 inches per year (5.71 inches per year for Whidbey Island and 5.98 inches per year for Camano Island). Based upon an area of 210 square miles, approximately 22 billion gallons of water reaches Island County aquifers from precipitation each year.

To estimate the amount of groundwater resources available for future use, it is first necessary to determine the current use of the resource. Through the 2514 Watershed Planning process, ICHD made an assessment of Island County's total groundwater resources. Water use was calculated using existing water use data for some uses and estimated for other uses based upon extrapolated values from various sources:

- Residential water use was calculated based upon actual water use data from 68 public water systems covering a total of 348 years of usage. Average water use per connection was determined to be 230 gallons per day. The 2000 Census reports the average household size in Island County to be 2.2 persons per house resulting in an

average water use of 105 gallons per person per day. Extrapolating the average usage across the county, total annual residential use is estimated to be 2.8 billion gallons. Since the City of Oak Harbor and the Whidbey Naval Air Station (NAS-Whidbey) utilize 500 million gallons per year of water that is derived from a source outside the county, the corrected annual residential use of groundwater within Island County is estimated to be 2.3 billion gallons (as of 2004).

- Commercial and agricultural uses of water were estimated based upon existing water uses extrapolated across the population. Retail and commercial water use is estimated to be 230 million gallons per year (as of 2004). Livestock watering is estimated to account for 36 million gallons per year while irrigation uses, including golf courses, accounts for an additional 350 million gallons per year (as of 2004). Total non-residential uses are estimated to add an additional 616 millions gallons of annual demand to domestic, potable uses (as of 2004).

Combining all of the water use estimates results in an annual demand of 2.9 billion gallons of water (as of 2004). An evaluation of existing water rights indicated an annual water use of 4.1 billion gallons (see the Water Rights section beginning on page 14). The estimate calculated from the water use data likely represents a more accurate estimation of water use since data from the water rights review is implied rather than reported.

Given an estimate of 22 billion gallons of water annually recharging aquifers within Island County and an annual water use of 2.9 billion gallons, 19.1 billion gallons of water remain within groundwater aquifers. Not all of this water is available for future appropriation, however. In our groundwater aquifer system, seawater may replace freshwater if it is over-extracted, and so some quantity of (fresh) groundwater must remain in aquifers in order to maintain pressures sufficient to maintain equilibrium. As identified previously, this situation lends itself to management strategies that involve site-specific evaluations of resource availability.

The best estimate of available groundwater resources for future appropriation is found in the "Phase 2 Water Resource Assessment Final Report" (see Appendix D). This analysis used water level elevation in groundwater wells to identify where water resources are abundant and where they may be tenuous. Since estimates of water resources for the entirety of Island County do not provide relevant information for growth planning, or project-specific or site-specific withdrawal proposals, future resource allocation decisions must rely upon estimations of site-specific aquifer capacities.

So far, Island County has generally had an adequate supply of groundwater to support its population and economic growth. There are isolated areas where supply has been limited or dewatered, and/or subject to seawater intrusion. With careful management we will be able to protect the future of Island County's water resources.

Population Distribution

Despite its rural character, Island County is the fastest growing and most densely populated rural county in Washington State. The county has been subject to a significant increase in population since the 1960s, when population was 19,638. Population increased from 44,000 to 66,000 between 1980 and 1990, and to over 70,000 in 2000. According to estimates by the State Office of State Financial Management, there are currently (2005) 74,800 people residing in Island County, and by 2025 we can expect 100,000. Population growth over time is shown in Figure 2.

More than half of Island County's population resides on North Whidbey Island, primarily in and near the City of Oak Harbor. The Whidbey Naval Air Station (NAS-Whidbey) is also located on the north end of Whidbey Island. Central Whidbey Island supports agricultural land use, with its population concentrated near Coupeville. South Whidbey Island is primarily residential with approximately two-thirds of Whidbey's seasonal population. Whidbey Island business centers are located in the Cities of Oak Harbor and Langley, the Town of Coupeville, and the Freeland and Clinton areas.

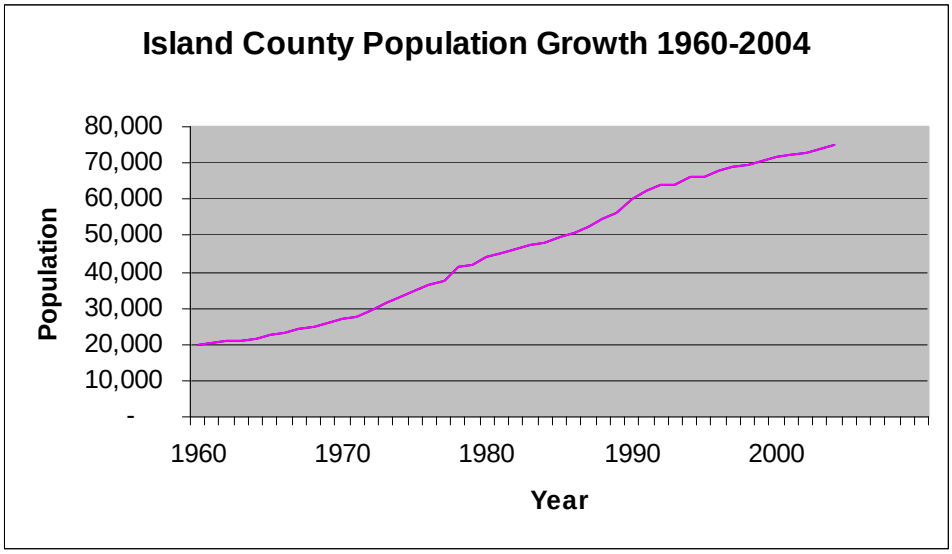

Figure 2.

Camano Island makes up approximately 15% of the county's total full-time population. Camano's population doubles seasonally. Camano Island has a more rural character than that of Whidbey, with most commercial activity occurring off-island (out of county) in the Town of Stanwood.

Water System Types

Water system rules and regulations vary greatly by type of water system. Island County has a diverse range of water system types.

In general, public water systems have two or more connections. These are multi-party systems that serve the broader public, and as such are regulated to protect public health. Public water systems, unless owned by a governmental entity like a city, town or district, are owned and operated by private individuals groups of private individuals, or community organizations.

Individual wells have only one connection, are privately owned and operated, and are not considered "public." The Island County Health Department (ICHD) requires submittal of pump test and water quality sampling results, and installation of an individual meter, at the time of a residential building permit application (water availability verification). These wells are not required to conduct or report routine water sampling. Individual wells have a pollution control radius of 100 feet, in which septic systems or confined animals are not permitted.

An "exempt well" is a groundwater withdrawal not required to obtain a water right permit through the State Department of Ecology (DOE). Exempt wells withdraw less than 5,000 gallons per day. Individual wells for residential use are exempt wells. "Six-packs" are public water systems of six connections, the maximum number of connections allowed for residential use on an exempt well.

Public water systems fall into two main categories. Group A water systems have 15 or more connections and are monitored by the State Department of Health (DOH). Group B water systems have 2-14 connections and are monitored by ICHD. Two-party wells are a unique Group B category that is approved and monitored by ICHD, with minimum requirements after approval. Group B systems have significantly fewer sampling and reporting requirements than Group A systems. The pollution control radius around both Group A and Group B is 100 feet. Other than the well house, no structures are allowed within this radius (there is some leniency for Group B systems; two-party wells are permitted on a case-by-case basis).

The recently passed State Municipal Water Law (ESHB 1338, 2004) defines "municipal systems" as those public water systems serving 15 or more residential customers. The Municipal Water Law provides greater certainty and flexibility for water rights held by public water systems, and more closely ties water system planning and engineering approvals by DOH to water rights administered by DOE. Although specific implications of the Municipal Water Law are yet unknown, the new law will require DOH to change many of the processes and procedures it uses to approve water system plans.

Water Resource Management Planning

Due to Island County's unique groundwater geology, county residents and local government have taken water resource management seriously. Island County has implemented progressive policy and programs. Island County plans and successes are discussed in Appendix H. The Island County Water Resource Management Plan builds upon past and present successes.

The goal of Island County's Water Resource Management Planning is to determine the availability of the county's groundwater resources and to comprehensively ensure safe and adequate water supplies. Surface water, aquatic habitat, and instream flow issues are also addressed.

The formal Planning Unit for Island County's Water Resource Management Plan includes Island County's Water Resource Advisory Committee (WRAC), the Cities of Langley and Oak Harbor, the Town of Coupeville, and the State Department of Ecology. Other entities actively involved are the Whidbey and Snohomish Conservation Districts, and the State Department of Health. The Island County Health Department provides staffing support. Public input was elicited through all phases of Plan development. (For a more in-depth description of the WRAC and Plan development, see Appendix A, "2514 Watershed Planning.")

Island County's Water Resource Management Plan is a dynamic working document for ongoing and future water management. Its recommendations are realistic and doable. The effectiveness of Plan recommendations are expected to be periodically evaluated, as needed, by the WRAC and implementing entities. Changing conditions may include improved information (Best Available Science) or changes in population patterns, recharge rates, or precipitation. Most of the Plan's recommendations are conceptual in nature, with details to be worked out during Plan implementation.

Issue Summary

Island County is faced with complex challenges related to effective management of its water resources. The following discussion outlines the inter-related issues involved in these challenges. Issues are discussed in more detail in the Topic Papers found in Appendix F. Topic Papers contain full background and technical information, with recommendations to address water resource management challenges.

Seawater Intrusion

Seawater intrusion is the movement of marine saltwater into a freshwater aquifer. The marine waters of Puget Sound surround Island County and as a result, all of the aquifers of the county that extend below sea level may be at risk for seawater intrusion. The high mineral content (primarily salts) of marine waters causes these waters to be unsuitable for many uses including irrigation and drinking water, and causes corrosion of well pumps and pipelines. If seawater intrusion problems become extreme, they can render an aquifer and any wells in that aquifer unusable.

Island County's groundwater geology is highly complex. Some of the county's aquifers (such as those below sea level near the shorelines) are connected to the saltwater of Puget Sound. Portions of these aquifers may contain saltwater. Freshwater "floats" on top of saltwater when both are present in an aquifer. The boundary between the freshwater and the saltwater zones is not sharp but instead is a gradual change over a limited distance. This is the saltwater interface (or zone of diffusion / mixing), where saltwater is continually moving into the freshwater zone. In any aquifer, the depth to saltwater can be estimated based on the thickness of the freshwater above sea level. This estimation is possible due to the density difference between saltwater and freshwater, and is based on the Gyben-Herzberg relation (see Figure 3). The depth to seawater is important, because it indicates the amount of pressure in the freshwater zone (the pressure keeps seawater from intruding into the freshwater). Susceptibility to seawater intrusion can therefore be evaluated by measuring an aquifer's water level elevation above sea level. For example, an aquifer with water level elevations well above sea level is not at risk for intrusion, while an aquifer with water elevation near sea level may be at risk.

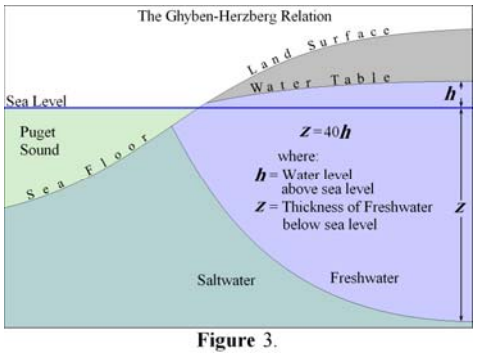

Figure 3.

In Island County, all of our groundwater aquifers are recharged only by precipitation infiltrating through our land surfaces. This method of recharge creates pressure differences within our aquifers: highest in the center of the islands and lowest close to the shorelines. These pressure differences create downward flow in the aquifers near the center of the islands. Closer to the shoreline, water flows outward through the aquifers, towards the shore. This flow through the aquifer sweeps mixed saltwater out of the freshwater zone, toward the shoreline where it discharges back into marine waters. (See Figure 4.)

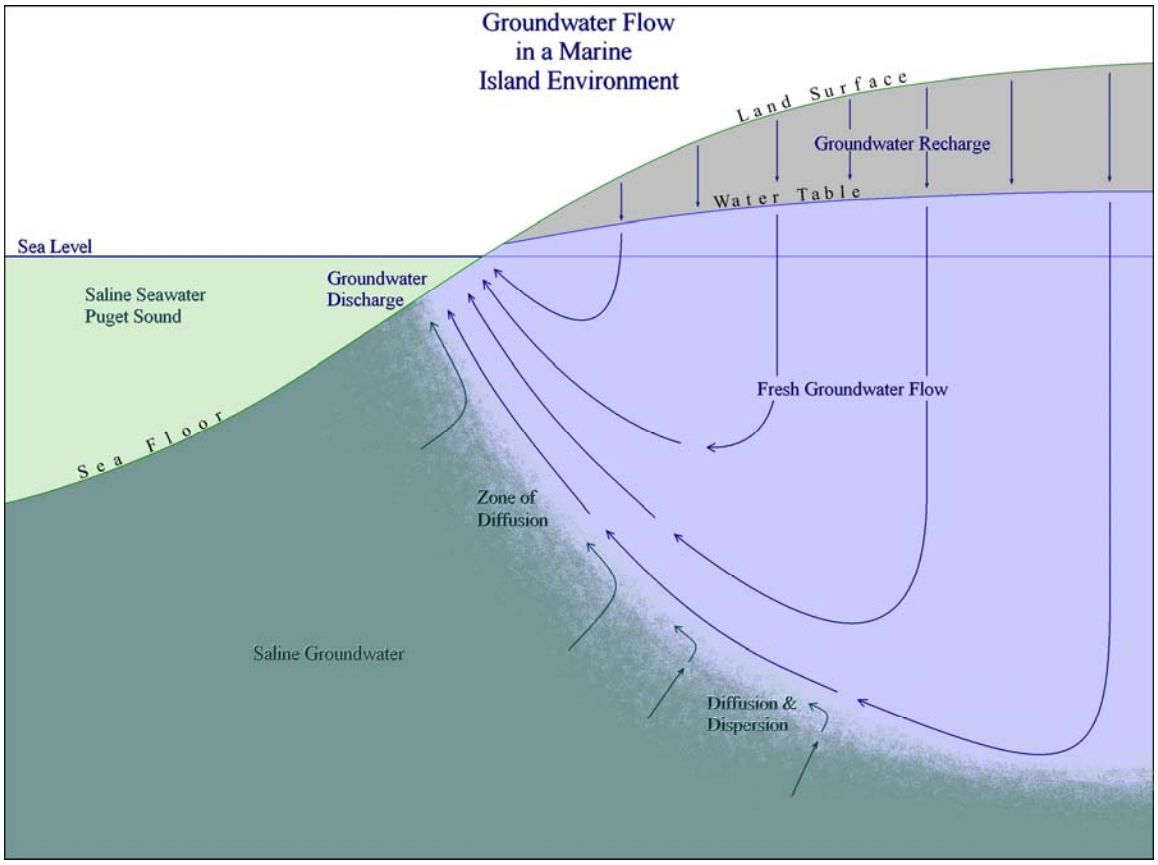

Figure 4.

The processes of recharge, flow, mixing and discharge all work in unison to hold the saltwater interface in a roughly stationary position. A change to one or more of these processes can result in a change in the position of the saltwater interface (for example, recharge rates can be affected by alterations to land surface). "Lateral seawater intrusion" is said to occur when the saltwater interface boundary moves inland.

When a well is pumped, water levels in the vicinity of the well are lowered (creating a "drawdown cone"). If a saltwater zone exists in the aquifer beneath the well, saltwater will be pulled up toward the well screen. This rising up of saltwater is known as "upconing" and is another type of seawater intrusion. (See Figure 5.)

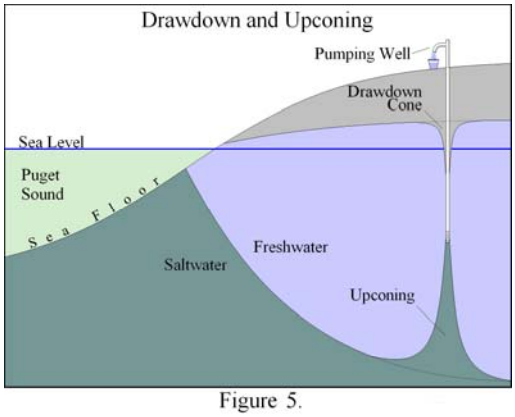

Figure 5.

Within any single aquifer, hydraulic characteristics can vary significantly from one location to another. It is this variability and complexity of our groundwater geology that makes the question of "how much water is there?" so difficult to answer. As a result, Island County's water resource planning and management efforts have primarily relied on review of water use

proposals on a case-by-case basis. The scope and detail of project review has relied on a triggering mechanism known as the Island County Seawater Intrusion Policy (1991). The adoption of this policy represented a significant step toward the goal of protecting our aquifers. Fifteen years later, significant new scientific information has become available, and the limitations of this policy have become evident.

Through the 2514 Watershed Planning process, the Island County Health Department has developed a proposal to improve the Seawater Intrusion Policy (1991). These changes would add the use of water level elevation data to chloride levels currently used. Modification of the current Seawater Intrusion Policy will provide security for those systems not at risk for intrusion, and give direction for those seeking a more adequate water supply. (Further discussion can be found in the Seawater Intrusion Recommendations Section beginning at page 31, and in Appendix F within the Seawater Intrusion Topic Paper.)

Figure 6 shows water level elevations of Island County aquifers. Virtually all the red, orange and yellow data points (lower water level elevations) are located along the shorelines, while the green and blue data (higher water level elevations) are located inland. Lower elevation data are almost always clustered in groups, indicating that these areas have reduced water level elevations.

Advantages of including water level elevations include the elimination of false positives (elevated chlorides in areas where no risk for intrusion exists) and false negatives (failure to identify risk until after intrusion occurs). Several shoreline areas on South Whidbey and Western Camano have relatively low water level elevations (red and orange data points), but as of now have not experienced any chemical indications of intrusion. These areas can be interpreted as being at risk for intrusion, although intrusion has not yet begun to occur. Larger project proposals in these low water level elevation areas could be evaluated from the perspective of seawater intrusion. Chloride data alone cannot provide this advance warning of pending intrusion problems, but instead can only react after intrusion actually begins to occur.

An additional benefit of using water level elevation to evaluate seawater intrusion risk is the ability to define areas where intrusion is unlikely to be an issue in the foreseeable future. Areas in Figure 6 with blue data points have water level elevations more than twenty feet above mean tide. These areas are unlikely to suffer from seawater intrusion, even when substantial withdrawals and drawdown occur.

For a full "seawater intrusion" discussion, see the Seawater Intrusion Topic Paper in Appendix F.

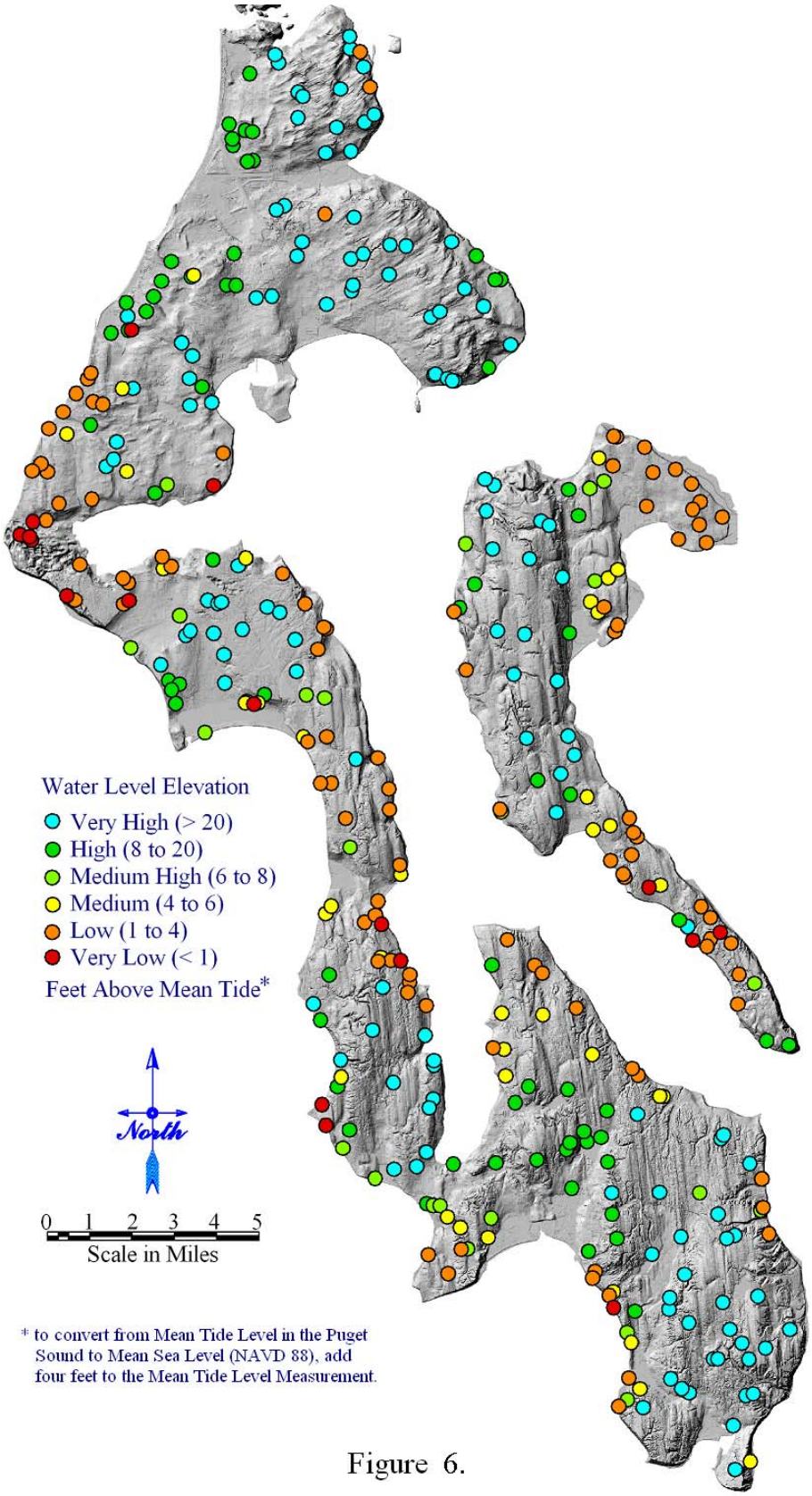
Water Level Elevation
Very High (> 20)
High (8 to 20)
Medium High (6 to 8)
Medium (4 to 6)
Low (1 to 4)
Very Low (< 1)
Feet Above Mean Tide*
North
0 1 2 3 4 5
Scale in Miles
* to convert from Mean Tide Level in the Puget Sound to Mean Sea Level (NAVD 88), add four feet to the Mean Tide Level Measurement.

Figure 6.

Groundwater Recharge

Island County's groundwater aquifers are recharged by local precipitation. (See "Island County Annual Precipitation Map", Appendix I.) Understanding recharge rates and processes is key for managing groundwater quality and quantity.

Rainwater percolates downward through soil and underground layers of sand, gravel, clay and rock. Some land areas of the county have higher natural recharge rates than others based on surface soils, underground stratigraphy, precipitation, and vegetation type. Recharge is generally higher in areas of coarse-grained deposits (gravel and sand) than in areas of fine-grained deposits (silt and clay), which limit water infiltration.

A recent U.S. Geological Survey (USGS) study estimated that 20-34% of the rainwater falling on Island County is available to recharge its groundwater aquifers ("Estimating Ground-Water Recharge from Precipitation on Whidbey and Camano Islands, Island County, Washington, Water Years 1998 and 1999," Sumioka and Bauer, USGS 03-4101, 2003). Remaining precipitation runs off the surface of the land, evaporates, or percolates to the root zone and is used by plants.

Through the 2514 Watershed Planning process, the Island County Health Department developed a new "Combined Critical Aquifer Recharge Areas (CARA)" map (see Figure 7). This map brings Island County's existing CARA map up-to-date using Best Available Science. The new CARA map identifies areas of "limited," "moderate" and "high" susceptibility to groundwater contamination. For a description of the development of the new CARA map, see the Groundwater Recharge Topic Paper in Appendix F.

Groundwater quantity is dependent upon maintenance of adequate groundwater recharge rates. Human activities can greatly decrease groundwater recharge rates. As an area develops, natural rainwater percolation rates can be maintained by using "Low Impact Development" (LID) methods. These include minimizing grading and clearing, minimizing amounts of paved/impervious surfaces, and retaining surface water runoff for onsite percolation.

Managing surface contaminants is vital for maintaining groundwater quality. Surface contaminants can enter groundwater aquifers through the groundwater recharge process. Contaminant sources include roads, septic systems, agriculture, and residential lawns. In high recharge rate areas, surface water may move through soil and subsurface layers too rapidly for adequate removal of contaminants. Where groundwater aquifers are shallow, rainwater may not move through enough soil and sub-surface material to filter out contaminants. Source protection is the most practical approach to prevent contamination, particularly in areas where surface water may percolate too rapidly for adequate filtering of contamination. Here are a few groundwater recharge protection strategies:

- Setting design standards for on-site wastewater treatment systems, to ensure adequate treatment and disposal of domestic wastewater,

- Utilizing Best Management Practices (BMPs) for agricultural nutrient and chemical applications, to protect aquifers from concentrated sources of contamination,

- Siting appropriate land uses in areas with susceptible sub-surface geology,

- Retention of nonpoint pollution sources in areas with susceptible sub-surface geology. "Low Impact Development" (LID) practices retain water runoff on a site so that contaminants are treated in the soil root zone, and

- Identification of wetlands, and protection of their functions.

Nitrates are a contaminant of concern in some areas of Island County. Nitrate sources include septic systems and agriculture. Nitrates are not typically present in groundwater (well samples should be less than 0.5 mg/L). Septic systems are currently designed to use the root zone of the upper soil layers to filter out nitrates. With inadequate design, operation or failure, however, nitrates may not be removed from septic systems and are free to migrate downward to aquifer supplies. The presence of nitrates indicates that other contaminants may soon be present: ammonia, total dissolved solids, nitrites, chloride, iron, lead, manganese, mercury, and fecal coliform bacteria.

Nitrate levels in groundwater of 1-3 mg/L indicate a developing problem, especially if levels are increasing over time. The maximum contaminant load (MCL) for nitrates is 10 mg/L. (Drinking water exceeding the nitrate MCL may be hazardous for human consumption, especially for pregnant women and children under one year of age.) At nitrate levels of 5 mg/L, public water system regulations require increased monitoring action. Group A systems are required to monitor nitrate levels once each year, and quarterly if nitrates exceed 5 mg/L. Group B systems are required to monitor nitrate levels once every three years. However, many private domestic wells in Island County have never been tested for nitrates. Prior to 1990, there were no sampling requirements for individual wells. Since then, in response to State Growth Management Act requirements, all individual wells must be tested for nitrates prior to building permit approval.

Pharmaceuticals can be introduced into Island County's aquifers through our septic systems. This is an emerging issue that is being widely researched at the national level. The widespread effect of these manmade organic compounds on human biology is not yet understood. Current reports indicate that neither bodily biochemistry nor standard anaerobic septic systems can adequately break down these materials.

For a full "groundwater recharge" discussion, see the Groundwater Recharge Topic Paper in Appendix F.

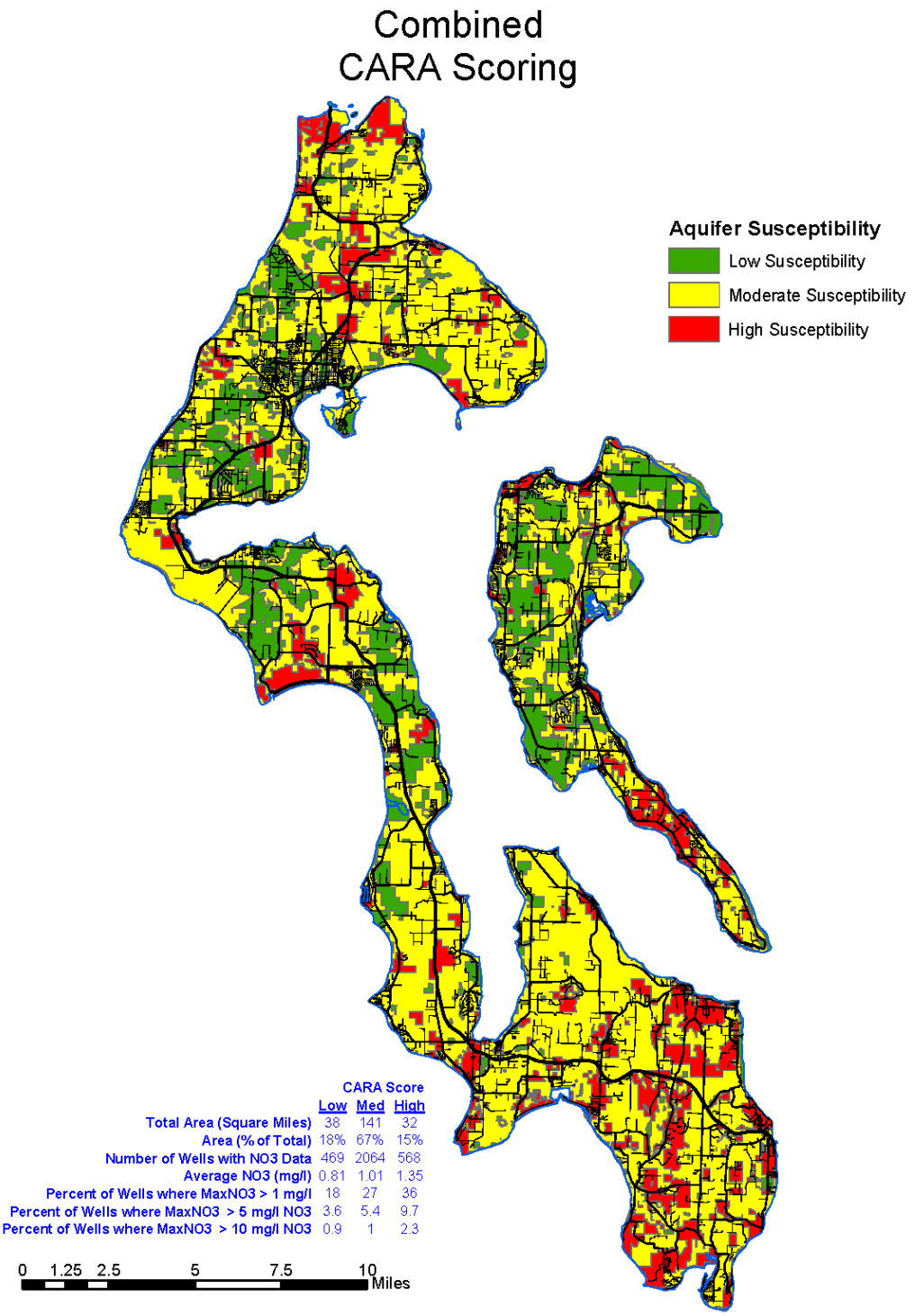

Figure 7. Critical Aquifer Recharge Area Map showing Susceptibility to Contamination

Short-Term Drought

The majority of aquifers in Island County are 200 to 300 feet deep. These aquifers are generally overlain with significant amounts of low permeability material (silts, clays, and hardpans). In this situation, the travel-time between when a raindrop hits land surface and when it reaches the aquifer is on the order of several decades. However, high permeability areas have travel-times less than a year (these areas are at high risk for contamination). Long travel time has the effect of buffering or smoothing out short-term (one or two year) droughts.

Surface water supplies can be significantly impacted by short-term droughts. Water can become quite limited after even a few months of lower than average rainfall.

Island County aquifers are susceptible to seasonal impacts of drought. This is generally due to over-pumping of wells, not to reduced aquifer recharge. When the weather is dry, people tend to increase their lawn and landscaping watering. The increased groundwater withdrawals associated with that watering can (and does) impact our aquifers. Aquifers and wells that are marginally capable of supplying water during normal use can begin to show lowering of water levels and /or seawater intrusion. In fact, most wells in the county that do suffer from dewatering and/or seawater intrusion tend to get worse in the summer and better in the winter.

Water Rights

Washington water law is based on the premise that water is a natural resource held in common for the public good. Therefore, individuals do not own water, but may have the right to use it. The right to use water is primarily based on the western water law concept of "first in time, first in right." This means that the first individuals to use water have senior rights. Junior users may only use water after the senior users' rights are satisfied. Washington's water codes were first established in 1917, and extended to groundwater in 1945. Washington's water law can only be changed by the State legislature.

A water right is a legal authorization to use a certain amount of water for a specific beneficial purpose. Water rights come in the form of permits or certificates, granted by the State Department of Ecology (DOE). A permit is the right to develop a water use on a specified schedule with reasonable progress and due diligence and with certain conditions such as protection of senior water right holders. A certificate is granted once all water has been put to use and all permit conditions have been satisfied.

Water right applications currently undergo both technical and legal review by DOE. Applications can be for a new water right or change to an existing water right. Applications must contain information such as intended place of withdrawal or diversion, place of use, purpose of use, and number of people to be served or acres irrigated.

A water right typically stays with the property and is passed from owner to owner so long as the water is continuously put to use as specified in the permit. Water rights can be transferred to other properties or uses which typically requires a change in the permit. In 2001 the State legislature allowed the State Department of Ecology (DOE) to begin processing water right changes on a separate track from new applications. In Island County, a Conservancy Board was established to process water right change applications and issue initial decisions on change requests. The Conservancy Board consists of three local citizen members appointed by the County Commissioners. Conservancy Board decisions are subject to DOE technical and legal review.

A claim is an assertion that water was used prior to the establishment of the water codes. A claim is not a water right authorized by the State, rather it is a statement of belief that a water right exists. A claim is determined to be valid through a court process called adjudication. Between 1969 and 1974 approximately 2,764 claims were filed in Island County. The State accepted the information on claims as reported by the claimants. Because adjudication is the responsibility of the courts, no efforts were made by State agencies to review the validity of the claims.

Water Rights Adjudication

A process where all those claiming the right to use a water source are joined in a single legal action to determine the rights and priorities for the use of that water.

Adjudication confirms how much water is allocated, who has the right to use it, and priority of water rights. This is a difficult, costly, and time-consuming process that has not been undertaken in Island County.

In 2002, through the 2514 Watershed Planning process, the DOE estimated the amount of water represented in "paper water rights" already granted in Island County (see the "Estimation of Recorded "Paper" Water Rights and Claims in WRIA 6" Memo, in Appendix B). Paper rights are the water rights, water certificates, and water claims recorded on paper. The estimated paper record of water rights in Island County represents an annual quantity of 15 billion gallons (40,000 acre-feet) per year. There are an estimated 22 billion gallons of water recharging aquifers within Island County (discussed further on pages 2 and 3). The paper record is of uncertain validity and precision, but must be considered by 2514 Watershed Planning efforts and the State when making decisions on water management and allocation. Regardless of the degree of accuracy of these documents, the paper record suggests that a significant portion of Island County's water resources have already been allocated by DOE or claimed by the public.

In the past, the water right backlog in Island County has resulted in application wait-times of up to fourteen years. This backlog has been significantly reduced by the implementation of the Early Action Plan (see discussion on page 16). Currently (May 2005) there are 60 pending new water right applications in Island County, and no backlog of water right change applications. At current staffing levels, DOE is able to process a maximum of 20 new applications per year (county-wide).

Water right applications are generally processed in the order received. Applications can also be processed on a cost-reimbursement basis where the applicant pays the State Department of Ecology (DOE) processing costs as well as every other application ahead of them in the same water source.

The cost of a water right permit application was set in 1917 by State law as $10 (not including additional permit development costs such as providing technical information and public notice). The Washington Legislature recently enacted an increase in the fee to $50 effective July 1, 2005 (ESHB 2309). It costs the DOE an average of over $7,400 to perform the technical and legal review of the application. The cost of having a water right considered through cost-reimbursement payments to a consultant is on average about $21,800, with no cost to the State. Change applications cost an average of a little over $500 to the applicant (Conservancy Board fees); additional review costs the DOE an additional $3,700. It should be emphasized that these only include costs of the review and consideration of the application (i.e., not subsequent fees if denied applications are legally challenged).

The Island County Water Resource Advisory Committee (WRAC) prepared an "Early Action Plan" (EAP) during the first stages of Watershed Planning (see Appendix C for the full EAP document). The EAP facilitates timely processing of water rights and directs DOE efforts to the highest priority areas in Island County. The EAP divides the county into a number of hydrologically independent areas, and prioritizes those areas for water rights processing based on two tracks. The first track gives oldest applicants first priority. The second track supports local priorities, giving priority to areas of high growth, agricultural demand, evidence of seawater intrusion, and/or greater water availability. The EAP was developed in cooperation with DOE, which has used it to guide their processing of water rights in Island County. As of May 2005, water right processing in Island County based on the EAP has successfully yielded the following actions:

- Maintenance of 1 full time DOE employee working on Island County water rights,
- Processing of 65 water right applications (new applications),
- Elimination of the entire backlog of change applications, and
- Completion of water rights processing in the highest priority areas of Island County; of the 33 priority areas, 9 areas have been completed and 5 are close to completion.

At the current rate of processing, it will take DOE approximately three years to eliminate Island County's water right backlog. DOE staffing to support EAP implementation is subject to legislative and agency changes. Once the water right backlog is eliminated and implementation of the Island County Early Action Plan is complete, DOE staff efforts may focus on other areas of the State.

For a full "water rights" discussion, see the Water Rights Topic Paper in Appendix F.

Exempt Wells

An "exempt well" is a groundwater withdrawal exempt from requiring water right permits through the State Department of Ecology. Washington's water code exempts small withdrawals of groundwater of less than 5,000 gallons per day for domestic use or irrigation of ½ acre or less (RCW 90.44.050). Exempt well water must be used for beneficial purposes.

Exempt wells have become an accepted method of ensuring water supplies, and serve unique needs in rural settings. The Island County Health Department has supported property owners through utilizing exempt wells as a water supply option. However, exempt withdrawals have the potential to negatively impact groundwater resources and/or public health. Positive aspects of exempt wells should also be kept in mind. While exempt wells do not pose an immediate threat, the potential negative impacts of further development based primarily upon such sources should be reduced as much as is possible, and solutions employed to address specific situations.

Exempt well development in Island County has far exceeded the development of other water sources since the late 1980s (see Figure 8). Population growth is a factor but it appears to be only partially responsible for the shift away from other water sources. Island County population increased from 44,000 to 66,000 between 1980 and 1990, and to over 70,000 in 2000.

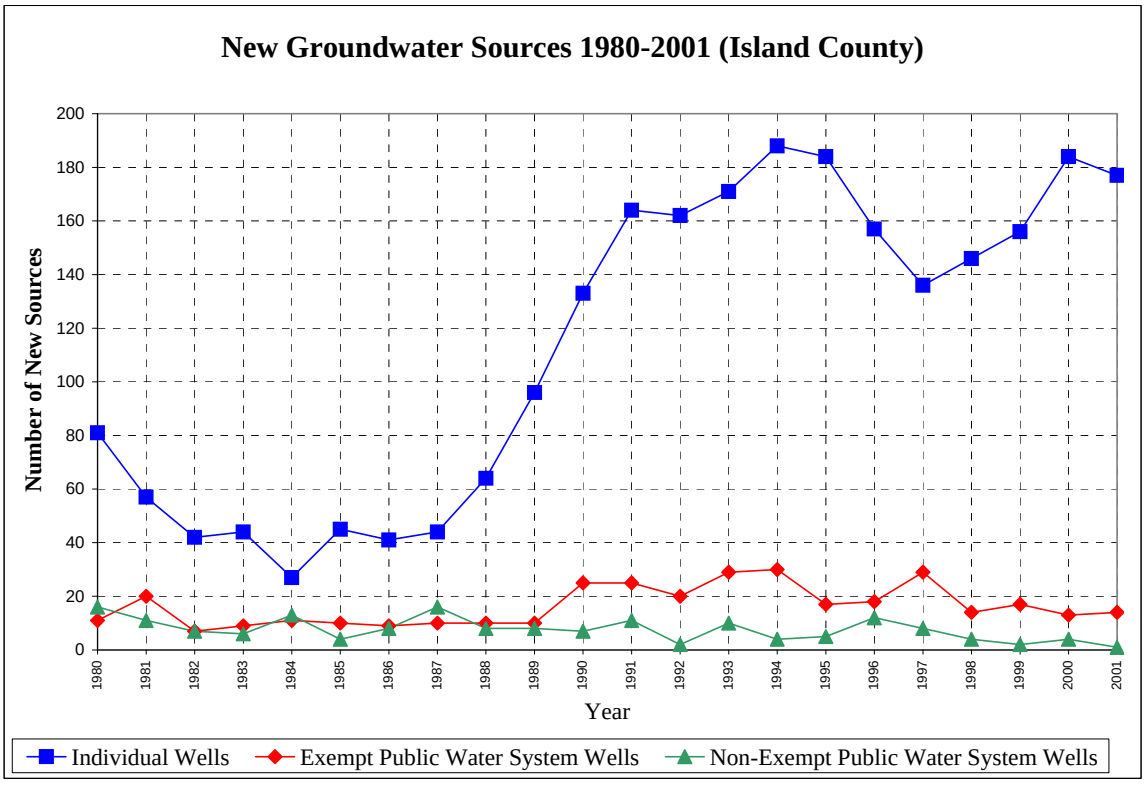

Figure 8.

The increase in exempt well development may correlate with an increase in population from 1980 to 1990, but other factors were in effect between 1990 and 2000. The proliferation of exempt wells in Island County may be due to a combination of several factors:

- The State Growth Management Act (GMA) requires larger rural lot sizes (5 acre minimums outside of Urban Growth Areas) than is economical for water system development. This is unfortunately contrary to the GMA goal to direct growth to urban centers and/or existing infrastructure,

- The water right application backlog is a result of external forces since the early 1990s that have decreased State Department of Ecology (DOE) ability to process water right applications, and

- Aspects of the Island County Coordinated Water System Plan (adopted 1990) have not been enforced. These have allowed water systems to declare moratoriums on future water hookups, instead of upgrading to meet new water needs. Exempt wells then become the only water source for individuals or small systems developing adjacent to or within the larger system. (Note: The recently passed Municipal Water Law, ESHB 1338, may change the requirements for a water system's duty to serve.)

It is recognized that exempt wells are sometimes needed to meet rural water supply needs. For individual rural properties, exempt wells may support development where public water is not available. For small developments, exempt wells can provide an economic method for supplying a small development with water (regulatory protections and infrastructure needs are less for small systems). When water rights cannot be obtained due to DOE water right processing backlogs, exempt wells are also the principal alternate method of providing water to multiple properties. Finally, multiple exempt wells may be an appropriate method to address seawater intrusion in areas where single large volume withdrawals can induce upconing of saltwater.

Exempt well proliferation may have negative impacts to public health. Any new well increases the potential opportunity for groundwater contamination. Since routine water quality sampling is not required from individual exempt sources, drinking water may be contaminated and cause detrimental health effects.

Exempt well proliferation has forced county-wide water resource management and planning efforts to account for exempt withdrawals without the availability of use data. These wells are not subject to rigorous tests of water availability, and so have the potential to significantly affect resource quality and quantity. Following construction, an exempt well drilled for a non-drinking water purpose is not subject to oversight from any public agency (i.e., for oversight of use, flow, etc.). Exempt withdrawals have the ability to cumulatively contribute to seawater intrusion or de-watering in areas where resources are limited – without any way to evaluate withdrawals. As there is no review of impairment at the time of development, exempt wells have potential to impair existing senior rights and may reduce instream flows of adjoining surface water. Each new public water system using exempt wells increases workload and burden of the Island County Health Department and the State

Department of Health, as all public systems must be permitted and monitored. Larger, non-exempt systems present a more efficient economy of scale.

Single exempt sources are allowed within the service area boundaries of public water systems. This limits the water resource management and service planning efforts of public water systems. The proliferation of exempt public water systems is contrary to the goals of the Island County Coordinated Water System Plan (CWSP, adopted 1990). The CWSP is a policy framework for ensuring the reliability of the county's water resources and to prepare for future needs in an efficient manner. Financial viability, water use monitoring, and implementation of conservation programs are better accomplished by larger systems with competent water system management.

Figure 9 shows the annual impacts of new exempt wells on the groundwater resource. The graph shows the number of households served by new systems, by system type: individual, exempt public water system wells, and non-exempt public water system wells.

For a full "exempt wells" discussion, see the Exempt Wells Topic Paper in Appendix F.

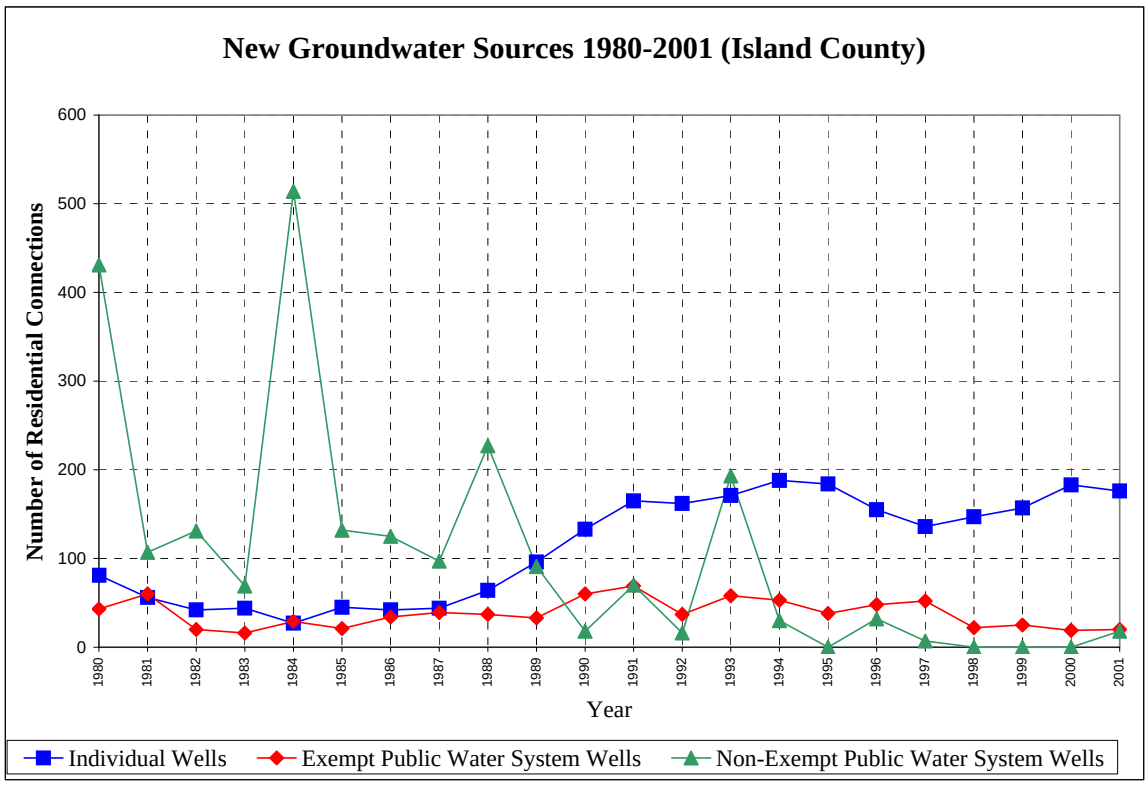

Figure 9.

Instream Flow

The Watershed Planning Act (1999, HB 2514; RCW 90.83) directs Island County to identify strategies for ensuring water supplies in the management area. These strategies are designed to address both human and natural habitat needs.

Island County has chosen not to pursue the instream flow and habitat assessment elements in the 2514 Watershed Planning process, due to the county's planning focus on groundwater quantity assessment. However, identifying ways to maintain adequate groundwater contributions to wetlands, lakes, streams, estuaries, and nearshore areas is important for comprehensive water resource planning. These natural systems help maintain high water quality levels, provide flood control, provide aquatic habitat, and provide opportunities for recreation and aesthetic appreciation. (Note: It is recognized that the health of these natural systems depends on much more than just stream flows. Other factors include land use patterns, land cover changes, water quality and storm water routing.) Streamflow studies are currently being conducted in other programs administered by Island County Public Works in their localized watershed programs.

In a very limited number of cases in Island County, water right applications have been examined on a case-by-case basis for impacts to stream flows (e.g., Maxwelton). Only one creek, an unnamed creek north of Strawberry Point on northeast Whidbey Island, has formal stream flow protection. This creek was added to the State Department of Ecology (DOE) Surface Water Source Limitation list in 1952.

Two other types of stream flow protections are not currently in place in Island County:

- Minimum instream flows are water rights that specify the amount of water to be maintained at a specific time and place in a stream. These rights are established and held by DOE and are subject to the same rules as all water rights. Minimum instream flow rules can greatly restrict future water right allocations (including groundwater) in affected watersheds (allocations are the quantity of water assigned to a particular water use), and

- A stream may have a closure that conditions or prohibits future water rights in an area (stream or groundwater) for all or part of a year. Closures are established in State rule similar to a minimum instream flow and are generally based on evidence that a stream has been over-allocated.

For a full "instream flow" discussion, see the Streamflow and Aquatic Habitat Topic Paper in Appendix F.

Water System Coordination

Water system coordination contributes to improvements in public health, groundwater resource management, and resource protection and planning. Coordination is an ongoing and dynamic process. There are three main reasons for promoting coordination between water systems:

- Ensure safe and reliable water supplies. Groundwater is a limited public resource that must be protected,
- Improve interactions between water systems and regulatory agencies, and
- Enable water systems to jointly address current and future water supply issues, based on local needs and resources.

In 1985 a Preliminary Assessment of Island County water system issues identified threats to the delivery of safe, efficient and reliable water sources. Due to variety and depth of these problems and concerns, the Board of Island County Commissioners identified the entire county as a "critical water supply area." A critical water supply service area has problems related to inadequate water quality, unreliable service, or lack of coordinated planning. The entirety of Island County is contained within one critical supply service area, and therefore is covered by one Coordinated Water System Plan. Island County began implementation of the State Water System Coordination Act (WAC 246-293) at this time. The Coordination Act provides a framework for coordinated water system planning.

The Island County Coordinated Water System Plan (CWSP) was approved in 1990. (The Groundwater Management Plan, approved in 1992, was intended to work in tandem with the CWSP). The CWSP represented a major step forward in groundwater resource management in Island County, and its recommendations are still relevant and applicable today. The CWSP guides water utilities so that water supply management and development can be accomplished through coordinated rather than piecemeal efforts. The CWSP assessed water demand forecasts and supply alternatives. Redistribution of groundwater was its highest recommendation (see Water Supply Options discussion, beginning on page 23).

Island County Groundwater Management Plan (1992)

The Groundwater Management Plan established methods to properly monitor and protect the quality and quantity of the groundwater resource, meet future resource needs, and integrate State and local policies.

As a result of Plan recommendations, the county hired a full-time staff hydrogeologist in 1996 and adopted a Water Resources Element as part of the 1998 Comprehensive Land Use Plan.

Public water systems are required to develop water system plans. The State Department of Health oversees this process. Water system plans provide a uniform process for water purveyors to demonstrate the system's operational, technical, managerial and financial

capability, demonstrate how the system will address present and future needs, and to establish eligibility for funding.

For a full "water system coordination" discussion, see the Water System Coordination Topic Paper in Appendix F.

Water System Consolidation

Water system consolidation is considered to be a long-term solution for addressing future water supply needs. Consolidation involves encouraging larger systems to develop and also to encourage existing water systems to develop inter-tie connections.

Consolidation is an important component for improving water system management. It offers public water systems the opportunity to decrease their operational and development costs. A higher economy of scale is reached with an increased number of connections and shared resources. Also, large water systems provide higher levels of public health and groundwater resource protection than a proliferation of smaller systems.

The Island County Coordinated Water System Plan (CWSP, 1990) contains recommendations for Group A and Group B water system consolidation. "Inter-tied systems will become a significant or primary supply to all or portions of the water service areas due to limited groundwater resources. In some instances, inter-ties will be the standby or backup between two water service areas that are expected to be relatively self-sufficient. … In all cases, the inter-ties should increase reliability of the water systems" (CWSP, 1990; p. VII-17).

A possible example of future water system consolidation is the City of Oak Harbor. The future boundary of Oak Harbor's water system service is the Oak Harbor Urban Growth Area. Several smaller water districts lie within this boundary. It is not known whether these systems will continue to operate independently or if they will request to merge (consolidate) with the Oak Harbor water system. Inter-ties would enable small adjacent water systems and the Oak Harbor water system to supply well water to each other in times of need. The practicality of connecting small system wells into the City of Oak Harbor water system would need to be addressed on a case-by-case basis.

For a full "water system consolidation" discussion, see the Water System Coordination Topic Paper in Appendix F.

Water Supply Options

A key outcome of the 2514 Watershed Planning effort is to assess current groundwater use and to identify options to meet future growth. Island County's groundwater resources are experiencing increasing demand, and in some areas are expected to be inadequate for the future.

Planning for future water supply needs requires projecting demand for both short and long-term periods, and adapting to unexpected changes. To determine future needs, a reasonable and conservative estimate must be made of the number and type of customers served. Island County is the fastest growing rural county in Washington State (fifth fastest growing county overall). Information collected during development of the Island County Coordinated Water System Plan (CWSP, 1990) indicated an average water demand of about 90 gallons per person per day (in similar areas in the northwest United States, daily per person demand is between 80-120 gallons). Through the 2514 Watershed Planning process, water use analysis indicated an average water demand in Island County of about 105 gallons per capita per day (see pages 2 and 3 for further discussion of this water use analysis).

Island County currently has two water supply sources: groundwater wells and imported water. Seventy-two percent of Island County residents currently rely on local groundwater wells for their water supply. The county does not have any significant streams or other surface water sources. Its finite water supply is drawn from a complex system of aquifers recharged by rainfall.

The City of Oak Harbor is the largest water purveyor in the county, with over 3,700 connections and a yearly demand of 826 million gallons. Ninety-five percent of the water used by Oak Harbor is purchased wholesale from the City of Anacortes. The remaining 5% of Oak Harbor water is obtained from emergency back-up wells. Oak Harbor also supplies wholesale water to the Whidbey Naval Air Station (NAS-Whidbey), North Whidbey Water District, and Deception Pass State Park. Anacortes holds a water right for Skagit River water. The quantity of water sold to Oak Harbor is limited by the terms of the Water Supply Agreement between the two cities. The 2002 amendment provided up to 970 million gallons annually.

The two pipelines for the water supply to the City of Oak Harbor and NAS-Whidbey run under Deception Pass Bridge. The "City of Oak Harbor 2003 Water System Plan" (approved May 2004) recommends that alternate water sources be identified. The Oak Harbor water system and NAS-Whidbey do have their own emergency back-up wells, and have inter-tie connections in case of emergency.

Additional pipeline connections from out-of-county are unlikely. Pipeline construction is cost-prohibitive, as each mile of off-island pipeline costs a minimum of $1 million. Also, new water rights from large rivers on the mainland may be difficult to obtain.

Redistribution of groundwater has been identified as the most viable supply option for meeting future water supply (CWSP, 1990). The future quantity and/or quality of

groundwater resources are expected to be inadequate for future demands in some areas of Island County. Areas susceptible to seawater intrusion will be particularly impacted (e.g., near-shore and shoreline areas preferred for residential development). Long-distance transmission from areas with high volume and quality could deliver adequate groundwater to where it is needed. Voluntary agreements and connections between water systems could be developed. At present very few water systems have inter-tie connections with adjacent systems.

Short-term emergency water supply could include hauled water to storage cisterns, either by truck or boat. In poor water quality situations, bottled water could be approved for small amounts of drinking water.

In the future, demand may outgrow current water supply options. It is expected that county residents will have to consider alternate water supply sources including the following:

- Conservation measures leading to increased water efficiency can increase available water supply. See water conservation discussion on page 25,

- Desalination is energy intensive, high cost, and produces a high salinity waste product that needs proper marine or landfill disposal, and

- Reclaimed water can presently be used for non-potable uses: outdoor irrigation, groundwater recharge, and dual plumbing (commercial only). Using reclaimed water in areas of limited water supply may help ensure future adequacy of domestic water supplies as well as replenish groundwater aquifers. Sources include gray-water, treated sewage, and rainwater (see Rainwater Catchment discussion, below).

For a full "water supply options" discussion, see the Water Supply Alternatives Topic Paper in Appendix F.

Rainwater Catchment

Rainwater can be used as a supplemental non-potable water supply in areas with limited water supply options. Rain is collected from a catchment area, usually a rooftop, then stored in cisterns or tanks. Rainwater used as potable water requires at least the same level of treatment as other surface water sources, and is costly (economic and liability) for the user and regulatory agencies.

Non-potable uses of rainwater include irrigation and dual plumbing (commercial only). Use of retained water for on-site irrigation is a "Low Impact Development" (LID) method that reduces groundwater withdrawals, especially during peak withdrawal periods during dry summer months.

State water codes require a water right permit to use any surface water source –including captured rainwater – for beneficial purposes such as irrigation or household water supply

(RCW 43.27A.020). State codes do not currently provide for water right exemptions for small surface water sources.

Due to the historical backlog of water right applications, any individual's goal to obtain a new and separate water right for individual rainwater harvesting has been unrealistic. However, the State Department of Ecology has advised Island County that new approaches for rainwater catchment are possible. A general permit could be developed to provide State authorization for a local process that permits individual rainwater harvesting systems.

Given the groundwater recharge interests of an island community, and the possible contributions of rainwater catchments to groundwater recharge, this regulatory change would be an opportunity to facilitate on-site storage of rainwater, reduce overall drainage infrastructure costs, increase groundwater infiltration, and improve the water quality of storm water runoff.

For a full "rainwater catchment" discussion, see the Rainwater Catchment Topic Paper in Appendix F.

Water Conservation

Water conservation, or water efficiency, can be defined as a reduction in regular, long-term uses of water. Although conservation can be approached in many ways, it should reflect the goals of the community for short and long-term water supply. Conservation programs should focus on where the greatest gains will be made for the least effort, lowest cost, and least disruption in people's lives.

Conservation has the potential to increase the availability and reliability of present water sources. The Island County Coordinated Water System Plan (1990) recommends that conservation be considered an immediate priority because of the limitation of the water resource and the cost of alternative supplies.

Numerous large water systems in Island County have effectively implemented conservation measures leading to significant reduction in water use and long-term savings for their users. Conservation allows water systems to downsize planned water system expansions and lower operating costs. Two noted examples are the Town of Coupeville and Penn Cove Water District:

- Since 1992, the Town of Coupeville's water usage has reduced by nearly 30% due to a new efficiency (tiered) rate structure and summer surcharge (to discourage excessive outdoor watering). The Town's leak detection program has resulted in unaccounted water loss of only 8%, well below State Department of Health standards.

- In 1997 the Penn Cove Water District became a utility local improvement district. This enabled the community to fully upgrade and replace water lines over a two year

period and establish a leak detection program. By 1999, an efficiency (tiered) rate system was also in place. These combined activities reduced water usage by 25% and significantly reduced summer peak water use. (See Figure 10.)

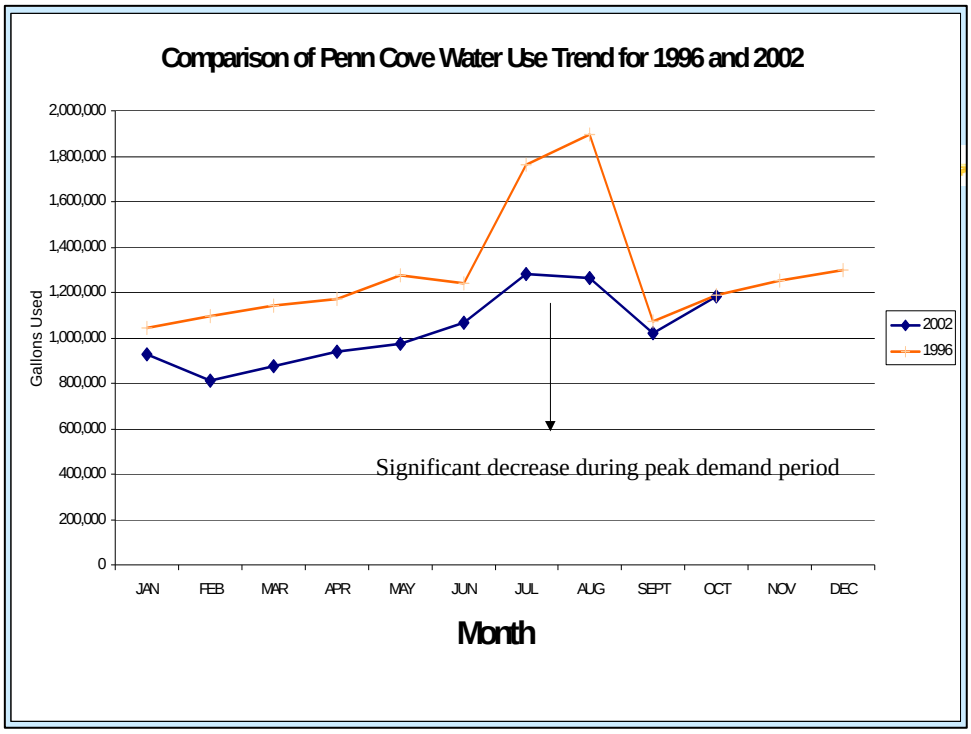

Figure 10.

Water systems employ water conservation measures largely due to economics (reduced capital and operational costs), limited water supply (or unknown water availability), and risk of aquifer de-watering and/or seawater intrusion. Other factors that encourage and enable water conservation actions are State Department of Health requirements for water system planning, employment of professional water system managers, and low interest loans from the State (currently available to Group A systems only) for infrastructure improvements.

A significant step in water conservation took place in the early 1990s with revision to the State Uniform Plumbing Code, requiring the use of water saving plumbing fixtures for new construction or remodeling that involves replacement of plumbing fixtures. New toilets are limited to 1.6 gallons per flush and showerheads, faucets, and replacement aerators are limited to a flow of 2.5 gallons per minutes (RCW 19.27.170).

Despite the proven benefits of conserving water, the "use it or lose it" aspect of water rights continues to be a disincentive. Water purveyors are afraid of losing their rights to the full amount of water they are currently permitted to use.

New and expanding Group B water systems and all Group A water systems are required to submit plans that include water conservation measures. The water conservation element

included within Group A Water System Planning includes guidelines for water use reporting. State rules are vague as to how conservation measures should be implemented. Individual and two-party well systems have virtually no conservation requirements. Most are not metered, and those that do have meters are rarely monitored. Although the State Department of Health requires new or expanding Group A and B systems to install meters, there are currently no regulatory requirements for water use reporting. (Note: Water use reporting requirements will be in place by December 2005 through the Municipal Water Law, ESHB 1338.)

Overall, small water systems lack the funding and staff support for conservation incentives. Significant water waste occurs with poorly maintained infrastructure. Record keeping may be erratic. Billing systems also vary, with many charging a nominal flat yearly rate for any amount of water used. Low interest loans to cover the costs of infrastructure upgrades and metering are not available from the State for individual wells, two-party systems, or Group B public water systems.

For a full "water conservation" discussion, see the Conservation Topic Paper in Appendix F.

Data Collection and Management

Comprehensive data collection and management efforts are foundational for Island County's water resource management efforts. Without ample high quality data, management efforts may fail to provide adequate protection, allowing degradation of resources. Conversely, without good data, management efforts can be overly restrictive and place unnecessary burdens on applicants or projects.

Island County has put significant time and effort into data collection and management, and as a result has one of the most effective data management systems in Washington State.

Other State agencies are involved in ongoing data collection related to water resources in Island County. The State Department of Ecology (DOE) has several ongoing data collection efforts, including issuing water rights, as well as numerous short-term projects. DOE is the primary water resource agency for the State. Unfortunately its data system is limited and inefficient, making it difficult to obtain updated DOE data. The State Department of Health (DOH) collects water quality sampling data from public water systems. This data is available, and DOH is in the process of upgrading and streamlining this database.

The Island County Groundwater Management Plan (1992) identified the following categories of data collection and management. Ongoing efforts are described as follows:

- Well Inventory: The Island County Health Department (ICHD) has a groundwater database that allows for easy retrieval and analysis. Updated information is gathered from DOE, DOH, U.S. Geological Service, Washington Department of Water Resources, and individual well owners. The database is also updated as drilling

records and Water Availability Verification applications are submitted to ICHD. (Note: there are indications that not all well drilling is reported.)

- Groundwater Level Monitoring: ICHD has a groundwater monitoring network of 44 wells throughout the county. These wells are monitored for water quality, water level and water use data. The long-term plan is to expand this monitoring network to 100 wells. Collection of depth-to-water from individual or public water system wells is complicated by the fact that water level may not be fully stabilized at the time of sampling.

- Stream Flow Monitoring: In conjunction with a State Centennial Clean Water Fund grant in 2002, ICHD established stream gauges in 12 streams (Chapman, Crescent, Cultus, Deer, Dugualla, Glendale, Kristoferson, Lone, Maxwelton, North Bluff, Old Clinton, and Swantown) throughout the county. Gauge data will be used to refine water budget analyses, and to assess groundwater withdrawal impacts on Maxwelton, Glendale and Chapman creeks. Island County Public Works has also obtained grant funding to do some stream flow monitoring.

- Lake / Wetland Monitoring: There are no lake or wetland monitoring stations in Island County at this time.

- Groundwater Usage Monitoring: Although water meters are required for new residential connections to any wells drilled in Island County, no reporting requirements exist unless they are associated with a specific State Department of Ecology (DOE) water right. Meter readings from wells on Island County's groundwater monitoring network are entered into the groundwater database. A significant amount of water use data was collected as part of the 2514 Watershed Planning Assessment (see the "Phase 2 Water Resource Assessment Final Report" in Appendix D).

- Water Quality Monitoring: Island County's groundwater monitoring network wells are tested each April and August for 11 water quality parameters. The Island County Seawater Intrusion Policy requires semi-annual testing of public water systems falling in medium or high-risk categories for seawater intrusion. The State Department of Health has water quality sampling requirements for the 700 public water systems in Island County. DOE occasionally includes sampling requirements in water right permits.

- Weather Data Collection: This data is important for developing water budget models to better refine groundwater recharge estimates. The Island County groundwater recharge report conducted by the U.S. Geological Survey (USGS) established weather stations across the county ("Estimating Ground-Water Recharge from Precipitation on Whidbey and Camano Islands, Island County, Washington, Water Years 1998 and 1999," Sumioka and Bauer, USGS 03-4101, 2003). The Island County Extension Service collects precipitation data from around the county, and

the Island County Health Department is developing an automated precipitation, temperature, and soil moisture network.

- Runoff Data Collection: The U.S. Geological Survey established six stream gauges within Island County to collect data for its 2003 Groundwater Recharge Report.

For a full "data collection and management" discussion, see the Data Collection and Management Topic Paper in Appendix F.

Education and Outreach

The success of Island County's Water Resource Management Plan depends upon a well informed public. It is important to encourage public awareness and involvement in water related issues, so that citizens and local policy-makers can make informed decisions. A primary role of the Plan's recommendations is to support and encourage community groups in undertaking educational efforts related to water management.

For a full "education and outreach" discussion, see the Education and Outreach Topic Paper in Appendix F.

Recommendations

The Island County Water Resource Management Plan is a dynamic working document for ongoing and future water management. Its recommendations were developed in a series of Topic Papers over a three year period (see Appendix F for a compilation of all Topic Papers). Most of the Plan's thirty-one recommendations are strategies for comprehensively ensuring safe and adequate water supplies. Recommendations are conceptual in nature, with details to be worked out during Plan implementation. Effectiveness of Plan recommendations should be periodically evaluated, as needed, by Island County's Water Resource Advisory Committee (WRAC) and implementing entities.

All of the Water Resource Management Plan's recommendations are considered important. Some recommendations are considered higher priority based on effectiveness, public acceptance, ease of implementation, and costs. Recommendations are ranked as "High Priority," "Medium Priority," or "Low Priority." Recommendations are realistic and doable, and represent creative compromise between "best case scenarios" and reality.

- High Priority Recommendations: These actions have high effectiveness, low cost, high public acceptance, and high ease of implementation (i.e. are "low-hanging fruit"). They may already be in process of being implemented, and may build on existing Island County's operations and programs.

- Medium Priority Recommendations: Island County recognizes the value of these actions. Their effectiveness is such that it is a matter of when, not if, to implement. In some cases, their effectiveness may not be high enough to justify costs. In other cases, an action may have high effectiveness (such as outreach and education) but require a commitment to ongoing funding.

- Low Priority Recommendations: Although these actions may be effective, they may have high cost, low public acceptance, or low ease of implementation. Island County recognizes that additional cost-benefit analysis should take place before allocating resources for implementation. If funding for an action became available, the WRAC or appropriate implementing agency should reassess priority.

A "Recommendation Ranking Table" is found in Appendix G. This table shows the priority of each Water Resource Management Plan recommendation, and the issue(s) related to each.

Seawater Intrusion Recommendations

Recommendation #15A **High Priority:** Modify Island County's Seawater Intrusion Policy (1991) to include the use of water level elevation data, and to simplify and streamline the use of the policy. Modification of the current Seawater Intrusion Policy will provide security for those systems not at risk for intrusion, and give direction for those seeking a more adequate water supply. Advantages include the elimination of false positives (elevated chlorides in areas where no risk for intrusion exists) and false negatives (failure to identify risk until after intrusion occurs). A drawback is the cost to the applicant, as surveying well elevations represents additional expense.

The modified Seawater Intrusion Policy would define "Risk Categories" as follows:

Risk Category	Water Level Elevation [1]	Chloride Concentration [2]
Low	Greater than 8.4	Any [3]
Medium	Less than or Equal to 8.4	Less than 100
High	Less than or Equal to 8.4	Between 100 and 250
Very High	Less than or Equal to 8.4	Greater than 250

The current Seawater Intrusion Policy defines risk areas by placing ½ mile radius circles around wells with elevated chloride concentrations. Utilizing circles has worked reasonably well and is easily implemented. The new policy would maintain this strategy, utilizing ½ mile circles around wells with low water level elevations, and wells with elevated chloride concentrations. The combined overlay of the chloride and water level elevation maps will be used to define risk areas.

A preliminary map generated using the above criteria is presented in Figure 11. Of particular interest on this map are the green and yellow areas. Green areas are areas with elevated chloride concentrations but high water level elevations, previously described as "false positives," such as Central Whidbey Island south of Coupeville. Yellow areas represent areas with low water level elevations, but without elevated chlorides. These areas are considered to be "false negatives" or areas where intrusion risk is present but intrusion has yet to be identified based upon existing data.

[1] Water Level Elevation in feet above Mean Sea Level (MSL) NAVD 88. +4 feet MSL = 0 feet relative to Mean Tide Level in the Puget Sound. For example, 8.4 feet MSL = 4.4 feet above Mean Sea Level

[2] Chloride Concentration in mg/L

[3] Where water level elevations are greater than 8.4 feet, chloride concentrations are irrelevant

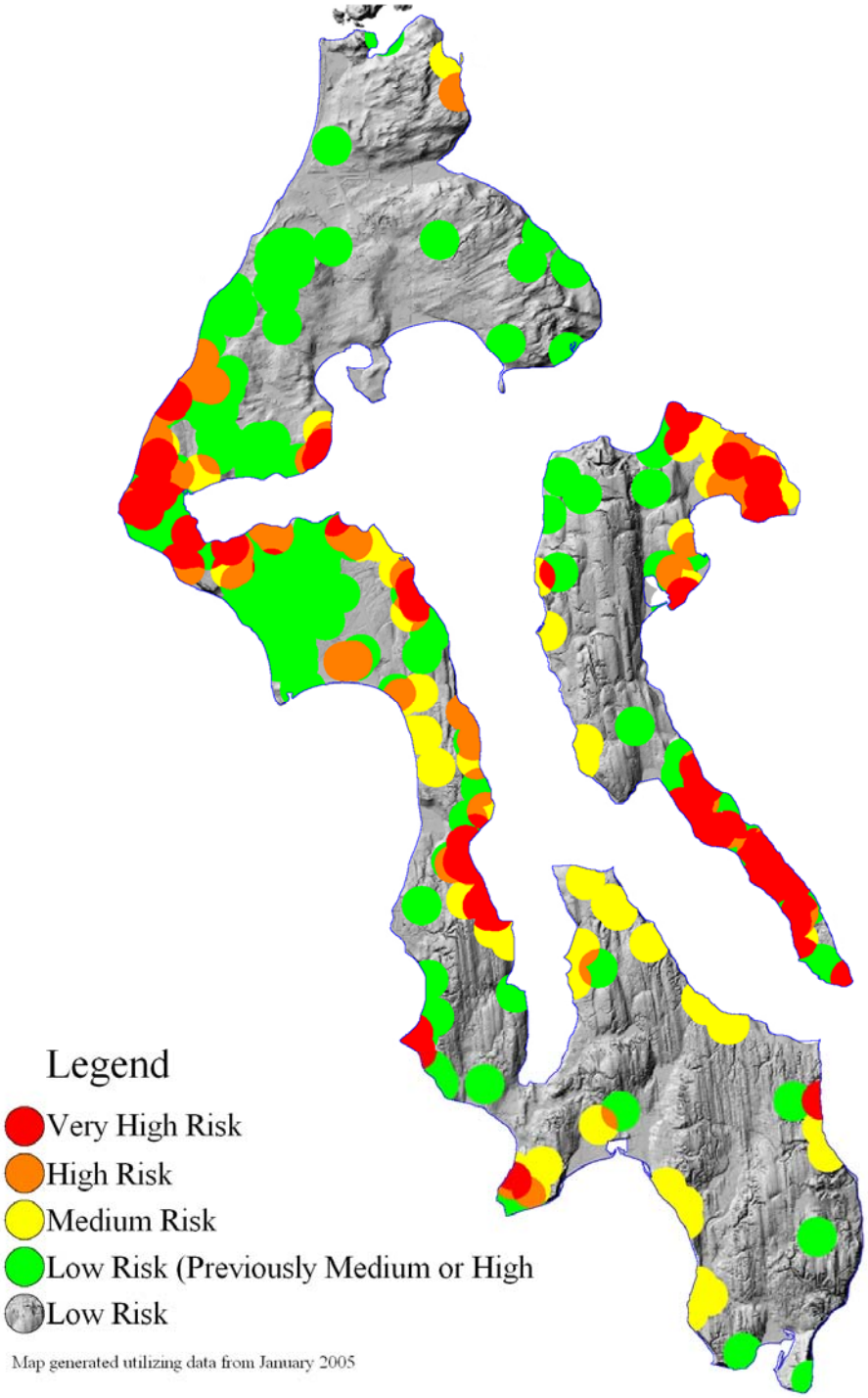

Figure 11. Preliminary Map of Revised Seawater Intrusion Policy, Utilizing Water Level Elevation and Chloride Data

Under the modified Seawater Intrusion Policy, a proposal triggering the need for review would require the set of actions shown in Figure 12.

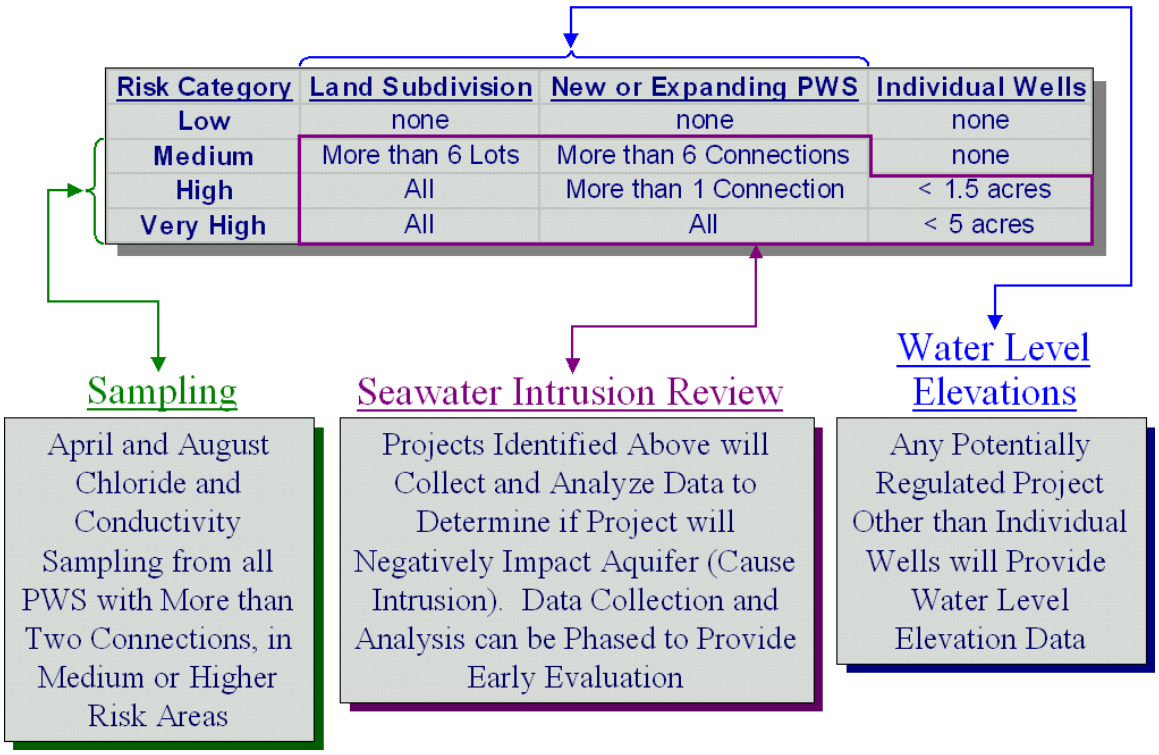

Figure 12. Proposed Set of Actions Required for Proposals Triggering Need for Review (PWS = Public Water Systems)

Review standards and actions required by the current Seawater Intrusion Policy (1991) can be found in Appendix E. Further details of proposed modifications to the current Seawater Intrusion Policy (1991) can be found in Appendix F, within the Seawater Intrusion Topic Paper.

Recommendation #15B **High Priority:** Island County's Seawater Intrusion Policy should be applied uniformly to all water system developments. The Island County Health Department (ICHD) currently reviews individual wells, Group B water systems and land subdivision proposals. The State Department of Health (DOH) provides oversight of Group A systems, while the State Department of Ecology (DOE) reviews all water right permit applications. ICHD, DOH, and DOE need to formally address how seawater intrusion protection strategies will be applied to developing Group A systems. A proposed mechanism would be as follows: ICHD would maintain the seawater intrusion maps that identify risk areas; DOH would utilize these maps to evaluate what water system actions were needed for seawater intrusion review; when need for review was triggered, DOE would provide technical review and regulatory authority.

Recommendation #16 **High Priority (over long-term):** Develop incentives and regulations for managing withdrawals within sustainable yields, for developing and existing systems. Island County aquifers are recharged by local rainfall, and so it is important to manage withdrawals so that they do not exceed sustainable yield. To support this goal, Island County should develop valid and verifiable thresholds as indicators that water withdrawals are exceeding recharge. To reverse such possible depletion, the county should develop incentives and regulations to implement water use reductions. These would prevent further depletion and return the aquifer to a maintainable water balance. Due to legal and cost barriers, this recommendation is not feasible at the current time. This recommendation should be considered in the future, and worked towards gradually over the long-term.

Groundwater Recharge Recommendations

Recommendations #14A & #14B **High Priority:** Use the newly developed "Critical Aquifer Recharge Areas" map (see page 13) to identify areas of "limited," "moderate" and "high" susceptibility to contamination. In areas of "high" susceptibility, Island County should continue its current levels of review for groundwater protection. Examples of projects or activities that would receive a high level of review should be included in Island County Code (Chapter 8.09). Areas of "limited" or "moderate" susceptibility should be removed from unnecessary review, and the public should be informed of the review requirement differences between "limited," "moderate" and "high" susceptibility areas. This would enable applicants to make informed development decisions prior to the application process.

Recommendation #14C **High Priority:** Island County should encourage, but not require, the use of "Low Impact Development" (LID) methods that help maintain groundwater recharge rates. Special attention should be paid to high recharge areas.

Water Right Recommendations

Recommendations related to water right processing issues focus on the following goals:

- Water right processing should be timely: the processing backlog should be eliminated and new water applications should be processed as they come in,

- Water right processing should be efficient: the application process, the information required of applications, and the State Department of Ecology review time should be clear to applicants, and

- Water right processing should more closely reflect true costs: cost to the applicant should reflect the true cost of review, and be coupled with an assurance of timely, efficient review.

Recommendation #11A **High Priority:** Improve water right processing and fees. The State Department of Ecology (DOE) should have adequate staffing for working through the water right backlog and keeping up with new applications. Fees should reflect current processing costs. The cost of protesting a water right should also reflect costs of addressing protests. This would be a recommendation by the Island County Commissioners to the legislature, to change water law and fund DOE staff.

Recommendation #11B **High Priority:** The Island County Early Action Plan provides order and priority of water right processing. This guidance should be updated based on emerging information from the 2514 Watershed Planning process, and used as policy guidance by the State Department of Ecology.

Recommendations #12A & #12B **High Priority:** Island County's water resource management capacity should be used to assist water right applicants to develop required technical information. Work accomplished in advance would reduce the State Department of Ecology (DOE) time required for water right review, and facilitate water right processing. It may also be possible through State rule making to give priority to county-reviewed water right applications. Funding possibilities for the county's additional workload include charging fees, obtaining grant funding, or requesting legislature to fund county efforts.

In addition to regular water right application assistance, Island County should help administer the DOE cost reimbursement program. Water right applicants may currently elect to pay DOE for full application cost and any senior applications. County government should facilitate cost reimbursement through conducting preliminary technical and legal analysis, and/or encouraging groups of applicants to collectively fund water right review. This would be possible within existing water law.

Recommendation #12C **High Priority:** The Island County Water Conservancy Board has shown its capacity to effectively process water right change applications in a timely manner. It is important to maintain this capacity and role for Island County. The Conservancy Board should be moved from an independent institution into county government so that liability insurance could be covered through the county's Risk Pool insurance. If moved into county government, it would be important to maintain the Conservancy Board's independent advisory-capacity to the State Department of Ecology.

Instream Flow Recommendations

Recommendation #13 **Low Priority:** Seek additional scientific information to support current and future allocations of instream water resources. Additional information would include:

- Further assessment of water withdrawal impacts on stream flows,
- Enhanced Island County Early Action Plan recognition of instream flow importance, and
- Analysis of what the county could do to establish minimum instream flow recommendations.

Adequate instream flows are important to all aspects of Island County's water resources. Groundwater resources, streams, wetlands, lakes, and nearshore areas are hydrologically connected. Stream flow is important to support both stream and nearshore fish populations.

Water System Coordination Recommendations

Recommendation #1 **High Priority:** Support and partner with the Camano Water Systems Association and the Whidbey Island Water Systems Association, to provide education for water operators and managers. Water Systems Associations help systems help each other. Systems increase their efficiencies when they share resources and information. Water operator and purveyor education is an important aspect of better water system management. Both the Camano Water Systems Association and the Whidbey Island Water Systems Association are models of encouraging communication between purveyors. Their successes include educational workshops, disseminating informational materials, and identifying industry and governmental sponsors for offering workshops.

Recommendation #6A **Medium Priority:** Update and implement the Island County Coordinated Water System Plan (CWSP, 1990). This would enable water purveyors and regulatory agencies to better manage and develop public water supplies. The CWSP process can be a highly effective enforcement tool. Financing for review may be available through the State Community Development Block Grant program.

Water System Consolidation Recommendations

Recommendation #7B **High Priority:** Minimize regulatory disincentives for consolidation. Steps in the consolidation process should be streamlined to reduce the burden of shifting to Group A regulations. Group A system size (the difference, for example, of 20 versus 200 connections) should be taken into consideration when determining system planning requirements. Also, Island County Health Department (ICHD) and State Department of Health (DOH) regulations for adding connections and inter-ties should be reviewed for increased flexibility of interpretation. A memorandum of understanding between ICHD and DOH would formalize DOH flexibility of interpretation in specific cases.

Recommendation #7C **Medium Priority:** Add value to State Revolving Fund for consolidating systems. Increasing funding options may encourage systems to consider consolidation. The State Revolving Fund has been a reliable funding source for Group A system upgrades. The State Department of Health should consider expanding the definition of "water system improvements" to include consolidation with other systems. This would change the scoring system to add value for systems wanting to consolidate.

Recommendation #6B **High Priority:** Require individuals to make a "request for existing water service" before drilling new wells. State Department of Ecology (DOE) well drilling guidelines should include checking for existing water service prior to drilling. DOE would then notify the nearby public water systems, the Island County Health Department (ICHD), and the State Department of Health (DOH).

Exempt wells drilled within or adjacent to service areas pose potential resource management and public health threats to water systems. To better manage their groundwater resources, public water systems need to be informed – prior to drilling – of wells drilled within and adjacent to their service areas. This notification would enable water systems to review potential impacts on their local groundwater resource. Notification would enable ICHD and DOH to work with water systems to enforce protections for their service areas, and to encourage sanitary setbacks and water quality inspections.

Water Supply Option Recommendations

Island County's main water supply is groundwater (72% of county residents rely on local groundwater wells). Although local groundwater wells are currently a feasible water supply, the following two recommendations (#4B and #4F) are high priorities that should be worked towards gradually, over the long-term.

Recommendation #4B **High Priority (over long-term):** Redistribute groundwater from areas with high quality and quantity to impacted areas (most likely shorelines). This recommendation supports water system consolidation and infrastructure improvements and standardization.

Recommendation #4F **High Priority (over long-term):** Utilize reclaimed water for non-potable uses: outdoor irrigation, groundwater recharge, and dual plumbing (commercial only). Sources include gray-water, treated sewage, and rainwater.

Recommendation #4C **Low Priority:** Import water from the mainland. The City of Oak Harbor and Whidbey Naval Air Station currently rely on pipelines using Skagit River water.

Recommendation #4D **Low Priority:** Utilize hauled water for emergency or short-term water supply. Water could be hauled by truck or boat. Bottled water could be used to mitigate water quality for small amounts of drinking water.

Recommendation #4E **Low Priority:** Permit desalination of seawater for water supply. This is identified as a backup measure for unique circumstances only.

Rainwater Catchment Recommendations

Recommendation #5 **High Priority:** Allow rainwater catchment systems of up to 25,000 gallons per site. This would be allowed through a "blanket water right permit" for Island County, granted by the State Department of Ecology through a general permit process or reservation. This water source would be for non-potable uses: outdoor irrigation, groundwater recharge, and dual plumbing (commercial only).

Water Conservation Recommendations

Recommendation #2 **Medium Priority:** Petition the State to extend low interest loans to Group B water systems. These loans would fund infrastructure and water use efficiency improvements, and could require tiered rate structures (this income would enable systems to raise funds for loan payments).

Data Collection and Management Recommendations

Recommendation #8A **High Priority:** Data collection and management efforts should continue to be a priority. Give clear direction to policy makers regarding the necessity of data collection and management.

Recommendation #8B **High Priority:** Island County should maintain its hydrogeologist staff position. Increased growth may require an increase in staff support and capacity in the future.

Recommendation #8C **Medium Priority:** Secure stable funding source for ongoing surface water quality and quantity monitoring efforts.

Recommendation #9A **High Priority:** Improve data streamlining and exchange between the State Department of Health and the State Department of Ecology. Well log data should be linked to water right and water quality information. Issues related to well locations should be resolved. Monitoring requirements for water rights should also be linked into this system.

Recommendation #9B **High Priority:** Data should be central and accessible to those who have need of it, at State and county levels.

Recommendation #10 **High Priority (long-term):** Obtain additional dedicated monitoring wells for addition to the Island County Health Department (ICHD) monitoring network. These wells would enable accurate static water level sampling, a key element of the proposed Seawater Intrusion Policy. Wells would improve data quality, with higher detection of trends in water level or chemistry. Dedicated monitoring wells could be obtained by drilling new wells. More feasible (lower cost) methods of obtaining dedicated monitoring wells would be to utilize soon-to-be abandoned wells or wells no longer in use due to low water quality. Due to high costs, adding to the ICHD network of dedicated monitoring wells should be worked towards gradually over the long-term.

Education and Outreach Recommendations

Obtaining long-term funding for education and outreach efforts has always been difficult. As such, the Water Resource Management Plan proposes high effectiveness and low cost recommendations.

Recommendations #3B, #3A & #3D **High Priority:** Develop a comprehensive public outreach and education program. This program should incorporate the following actions:

- Develop partnerships with existing community groups. Partnership would support their effectiveness and outreach efforts, as well as increase the coordination and dissemination of the Plan's key messages. Local groups have established programs and communication networks that reach a broad audience of people. Local groups include the Whidbey Island Conservation District, the Snohomish Conservation District, the Island County/WSU Extension (Waste Wise, Beach Watcher, and Master Gardener programs), the League of Women Voters, and the Camano Water Systems Association and Whidbey Island Water Systems Association. Other informal groups include water purveyors, realtors, teachers, homeowner associations, and service groups. Education and outreach opportunities may also exist through existing regulatory points-of-contact (e.g., when water system plans are submitted for approval or review).

- Implement a public education program for water system managers and homeowners. Topics could include conservation (efficiency rate structures, household conservation methods), infrastructure management (point-of-use leak detection, capital improvement plans), water resource information, and financial management.

- Develop key messages for educational materials (brochures, newsletters, presentations) and outreach methods (mailings, media coverage, partnerships with community groups).

Recommendation #3C **Low Priority:** Develop an "education and conservation" liaison, either within Island County or a partner agency or community group. This would provide a point-of-contact and coordination for conservation education, including identifying funding sources for improved water efficiencies.

Policy Guidance Recommendations

Recommendation #7A **Medium Priority:** The Island County Water Resource Advisory Committee (WRAC) should comment on county and State resource policy and program development. The following are examples to monitor and track:

- Conservation legislation on the "use it or lose it" potions of the State water code,
- Conservation legislation that encourages water conservation and/or eliminate the sections currently creating disincentives to conservation,
- Conservation programs that increase water conservation and efficiency measures for all public water systems;

- Water system coordination programs that increase the financial viability of small and large water systems,
- Water system coordination programs or legislation that increase the number of Group B systems entering into agreements with satellite management agencies,
- Development of an effective public water system schedule for Island County;

- State Department of Health review of Group B system water quality monitoring requirements and compliance.