

**The East Orcas Water Supply Report and
Recommendations**

October, 2005



Mountain Lake Dam, February 2005

**As adopted by the
East Orcas Water Supply Planning Committee with
Recommendations amended by the
San Juan County Water Resource Management Committee**

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East Orcas Water Supply Report and Recommendations

1. Introduction and background
 - Problem Statement
 - Goals
2. Watershed descriptions
3. Water rights
4. Operation of diversions
5. Water system capacity to serve
6. Recommendations
 - As adopted by the East Orcas Water Supply Planning Committee
 - As amended by the San Juan County Water Resources Committee

Appendix A: Multi-Purpose Surface Water Storage Assessment, WRIA 2. April, 2004

Appendix B: Pages from Report of Examination for Change, for Eastsound Water Users Association, Dept. of Ecology 2004; and Eastsound Water Users Association – 2003, Ground Water Resource Investigation, CR Hydrogeologic Consulting

Appendix C: Cascade Creek Instream Flow Recommendations, Memorandum, September 29, 2005, Dept. of Ecology

Figure A: Eastsound Aquifer Critical Water Resource Area

Figure B: East Orcas Surface Water Systems

Figure C: East Orcas streams, dams, diversions and gauges

Figure D: East Orcas watersheds

Introduction and background:

The East Orcas Water Supply Committee (East Orcas Committee) was established as a subcommittee of the San Juan County Water Resource Management Committee (WRMC) by the Board of County Commissioners in the fall of 2003 (Resolution 106-2003). This planning effort was initiated to address concerns about water supply and service capacity for the designated growth areas at Eastsound and Rosario, and management of the shared surface water sources at Mountain and Cascade lakes. The East Orcas Committee includes representatives from Eastsound Water Users Association (EWUA), Doe Bay Water Users Association (DBWUA), Olga Water Users Inc. (OWU), Moran State Park, and Rosario Utilities, as well as several members representing professional and personal interests in water resource issues. This group held its first meeting in January, 2004.

A Problem Statement and Goals were developed to guide the planning process. Several subcommittees were established to take on the work load, including: water rights, operation of diversions, water conservation and reuse, assessment of water available, and water system boundaries.

During the two years the committee met, some of the outcomes were accomplished, some were incorporated into the Final Recommendations, and some issues were addressed outside of the planning process. The major accomplishments that occurred while planning was underway include the following,

- 1) EWUA and Rosario Utilities entered into an agreement in principal for a sale of Rosario water rights. In order to determine whether the water that had been allocated in Rosario's water rights was really available, the two parties hired RH2 engineering to do a water budget analysis, which concluded that there is sufficient water for both Rosario's and EWUA's needs.
- 2) Olga, Doe Bay, Rosario and Moran State Park began discussions about common concerns and shared management of the dams and operations that control Mountain Lake, Cascade Lake and Cascade Creek.
- 3) The Department of Ecology announced that they would be reviewing new water right applications in San Juan County, including applications in the East Orcas planning area that have been pending for almost 30 years.
- 4) The San Juan County Board of Commissioners declared the Eastsound Aquifer a Critical Water Resource Area, which was supported by the East Orcas Committee, EWUA, the Eastsound Planning Review Committee, and the San Juan County Water Resource Management Committee. This will lead to analysis and protection of the aquifer, as well as coordination of water supply development.

Assessment of water available. This task is the largest, long-term goal of the committee and is needed to determine availability of water for instream flow in Cascade Creek and out of stream uses by applicants for water rights. The

committee recognized that this work will take several years longer than the planning process. Current work for this assessment includes stream and lake level gauges operated by county staff, a water budget analysis by RH2 Engineering, instream flow recommendations by Fish and Wildlife and Ecology, and ongoing studies and field work by conservation organizations. A discussion of existing studies is included in chapter 5, under the section on Source Capacity.

Water rights. The water rights subcommittee met with Paul Fabiniak, from Ecology's Water Resources section, to go over existing water rights in the Cascade and Mountain Lake watersheds. A report on water rights is included in Section 3. At the time this report was approved, Ecology had begun discussions with water right applicants in east Orcas.

Operation of diversions. There are two dams and two instream diversions in the Mountain Lake-Cascade Creek-Cascade Lake area, owned and operated by Moran State Park, Doe Bay Water Users Assn., Olga Water Users Inc., and Rosario Utilities. Water levels in the lakes and stream flow are controlled by operation of these diversions. A report on these operations is included in Section 4.

Water system boundaries. The focus of this planning effort has been the areas served by EWUA and Rosario Utilities. These water systems are required to submit water system plans to the state every six years, which includes identifying their service area boundaries.¹ At the beginning of this planning process, individual wells and small water systems were being developed in both service areas because the water systems could not provide new service connections. During discussions over the last two years, both water systems confirmed their commitment to maintaining their existing service area boundaries, and to taking action needed to provide service. There are continuing efforts to limit new exempt wells and discussions on retiring existing exempt wells within the service areas. These issues will be addressed through the implementation of the Critical Water Resource Area planning for the Eastsound Aquifer, and through Recommendation #4, in Section 6.

Conservation and reuse. This subcommittee never met, but many lively discussions by the group centered on waste-water reuse and conservation. There was a consensus to recommend addressing wastewater recycling as part of Eastsound Sewer District's long-term planning, both for irrigation and possible aquifer recharge. In addition, the committee had a presentation on Limited Impact Development and water conservation methods. The committee unanimously approved the use of Limited Impact Development standards for new development in Eastsound to protect the water quality and recharge for the Eastsound aquifer. The committee also discussed the importance of water conservation in the face of a limited resource and new requirements in state law for water use efficiency. Under RCW 90.03, municipal water systems are now

¹ Rosario Utilities has a water system plan that was approved in May, 2004; EWUA is in the final process of updating their water system plan.

required to meet stringent water-use efficiency standards in order to remain in good standing with their water rights.

Next steps. The East Orcas Water Supply Committee held its final meeting on October 4, 2005, with final changes to the Recommendations in Section 6. The San Juan County Water Resources Committee reviewed the Recommendations on October 19 and made some additional changes to clarify the language and responsibilities for implementation. Once approved by the San Juan County Board of Commissioners, the Recommendations will become County policy and direct state and county decision-making, support grants and studies, and facilitate local, beneficial management of the water resources of eastern Orcas Island.

East Orcas Water Supply Planning: Problem Statement
August, 2004

1. Preliminary reports indicate that the Eastsound groundwater basin and Purdue Lake watershed do not have sufficient recharge to sustain the amount of ground- and surface-water needed to support population projections for the designated Eastsound urban growth area and the surrounding service area of Eastsound Water Users Association.
2. EWUA is the primary provider of water for the designated Eastsound urban growth area, as well as its surrounding service area, and does not have sufficient water rights to satisfy long-term growth projections.
3. EWUA and Rosario Utilities do not currently have sufficient treatment capacity to meet growth projections in their designated service areas.
4. Lack of current service capacity in the Rosario and Eastsound areas has led to individual wells being drilled, further complicating the ability of those water purveyors to provide service.
5. The transfer of demand for water from other neighborhoods throughout Orcas places additional stress on EWUA and Rosario.
6. There is a complete lack of coordinated management of the resource.
7. Additional resource development, as well as infrastructure for treatment and distribution, is critical in order to meet growth projections.
8. Changes to state and county regulations may be required to effectively manage water resources.
9. An evaluation of all water rights, including adjudicated rights, is needed.
10. An analysis of the amount of water required for future growth is needed.
11. An analysis of the amount of water required for instream flow in Cascade Creek, and to maintain water levels in Cascade and Mountain lakes for fish habitat and beneficial recreational uses, is needed.
12. Education of purveyors and consumers in these watersheds is essential to good management of the water resource.

East Orcas Water Supply Planning: Goals and outcomes
Final Working Draft: 9/7/04

1) Conduct an assessment of water available

- Determine data needed for assessment of Mountain Lake/Cascade Lake watershed capacity.
- Develop plan, timeline and budget for acquiring data and analysis.
- Identify funding source and personnel needed.
- Proceed with data collection and analysis.

Timeline: 1 year for first three items, 2-3 years for the last

2) Develop a cooperative management plan for the Cascade/Mt. Lake watersheds

- Establish a committee representing all water right holders in the basin who operate waterworks to manage water levels in the lakes and streams.
- Set up a cooperative management agreement with goals to manage water levels for the greatest benefit for human use, habitat protection, and recreation.
- If necessary, establish a water master program for the watersheds.

Timeline: 1 year

3) Define service area boundaries and responsibility to serve

- Recommend that water system plans must include provisions for timely and reasonable service in a water system's retail service area in order to maintain service area boundaries.
- Recommend that water system plans include provisions for future service areas with realistic timelines, based on viable schedules for expansion.
- Tie the ability to grow into inchoate water rights to a water system's willingness and capacity to expand.
- Base county population estimates for the county's designated growth areas on water systems' willingness and capacity to expand.

Timeline: To be included in the County's implementation plan – 1 year.

4) Review water right allocations

- Estimate the amount of water needed to support growth in the east Orcas area.
- Compare growth estimates (water demand) to existing water rights and water right applications.

- Establish an estimate of the amount of water needed to maintain stream flows and lake levels for Cascade Creek, Moran Creek, Mountain Lake and Cascade Lake.
- Estimate the amount of water available from the Casacade/Mt. Lake watersheds.
- Develop issue paper.

Timeline: 1 year using rough estimates of water available, 2-3 years to finalize water availability element.

5) Develop recommendations for county code revisions to require water conservation measures and low impact development standards.

- For the Eastsound basin recommend that new development utilize water conserving appliances and measures to maximize efficiency.
- For the Eastsound basin recommend that all new development utilize low impact development practices to mimic or enhance the natural hydrologic features of the landscape.

Timeline: 6 months

6) Develop issue papers on the following topics

- Wastewater reuse
- Public Utility Districts
- Collaboration strategies for habitat restoration
- Water right allocations

Watershed characteristics:

Mountain Lake watershed. The Mountain Lake/Cascade Creek basin extends from the top of Mt. Constitution (2,409 feet) through Mountain Lake (914 feet) to Buck Bay. It is approximately five square miles (3,072 acres). Mountain Lake has a surface area of 198 acres and an estimated depth of 100 feet. Mountain Lake is fed by springs and rainfall. In 1905, the original Mountain Lake dam was constructed by Robert Moran. Flows from the lake into Cascade Creek are controlled by two spillway bays, where 4x6 stop logs are placed to retain water in the summer and removed to prevent flooding of park facilities in the winter; and also by a 12" outlet pipe with a gate valve and two 8" gate valves that control the flows for water use by Doe Bay and Olga.

Cascade Creek flows from Mountain Lake approximately $\frac{3}{4}$ -mile to a small dam and diversion owned by Olga Water Users Inc., and then another $\frac{1}{4}$ -mile downstream to a diversion where Rosario Utilities diverts water over to Cascade Lake. The remaining water flows for two more miles, where it passes through a culvert under the county road into Buck Bay. The lower $\frac{1}{4}$ -mile of Cascade Creek is listed as known natural Coho and Sea Run Cutthroat trout habitat by the state Department of Fish and Wildlife.

There are fewer than 50 residences in the lower Cascade Creek area of the watershed, where parcel size is 5 to 40 acres. The designation is forest or rural farm forest, which has a 5-acre minimum size. Approximately 240 acres in the watershed are protected by a conservation easement. The upper two-thirds of the watershed, roughly 2117 acres, is located in Moran State Park. This watershed is primarily heavily wooded with old growth forest. The upper portion is in pristine condition and the lower portion of the stream corridor shows very little disturbance from current development. At the mouth of the creek, recent repairs to the culvert under the county road have resulted in flooding of the uplands and a substantial barrier to fish passage. The estuarine wetland upstream from the culvert no longer has sea water flow during the high tide in winter due to the high constant unidirectional flow through the smaller and longer "temporary" repair, and significant erosion is now taking place.

Cascade Lake watershed. The Cascade Lake basin is approximately 3.5 square miles in area. It extends from Summit Lake to Cascade Bay. Cascade Lake had a natural surface area of approximately 139 acres in September of 1874. With the dam, the water surface area is 172 acres, including Cascade Lagoon. The water level is normally maintained between 347 and 351 feet above sea level. The lake level is controlled by a concrete arch dam, operated by Rosario Utilities for domestic water supply and hydropower, with a spillway and overflow pipe to control high water conditions.

Cascade Lake is fed by four tributary streams, springs, the Rosario diversion from Cascade Creek, and rainfall.

There are fewer than 60 residences in the Cascade Lake watershed, with parcels ranging from less than one acre in the western portion, which is designated as an activity center, with 5 and 10 acres or more in the rural residential and rural farm forest designations. More than one-half of the watershed, 1,464 acres, is in Moran State Park. This area of the park includes campgrounds and day use areas around Cascade Lake, with an average summer camper population of 542 and peak day use of 2230. The upper watershed is pristine old growth forest.

Eastsound aquifer and Purdue Lake watershed. Eastsound Village and the EWUA service area draws on a groundwater aquifer located in glacial deposits in the basin between Buck Mountain and Double Hill and from Purdue Lake, located on the south side of Buck Mountain at an elevation of 1000 feet.

The Eastsound aquifer (Figure A) includes a designated urban growth area (UGA) and activity center. High-density commercial and residential development is concentrated in the UGA. The aquifer area is relatively flat and less than 150-feet above sea level. The aquifer occurs in sand and gravel deposits overlain by silt, clay, silty sand and till. Over 40 individual and small community system wells have been developed in the boundary of the aquifer². Most of these wells are constructed on small lots, which risk of contamination from septic tanks, fuel spills, chemicals, and pathogens.

Purdue Lake is 9.5 acres with a watershed basin of 324 acres (71 acres owned by EWUA), with an average depth of 11 feet. The top of the Purdue Lake watershed is in Moran State Park, and the area adjacent to Purdue Lake is divided into parcels that average 5 acres in size. This area is designated rural farm forest with a minimum lot size of 5 acres, which means that little further subdivision is expected in the watershed. The terrain is very steep and somewhat forested. Fewer than 10 residences are in the watershed above Purdue Lake with a potential for approximately 20 more.

² Report of Examination for Change, Dept. of Ecology, 3/20/04

Water rights:

Cascade-Mountain lakes watersheds. Reports and records show that water from Cascade Creek was used to operate a barrel, box and shingle mill adjacent to the creek as early as 1883. By about 1897 a diversion was completed to take water from Cascade Creek to Cascade Lake for operation of a lumber mill at Cascade Bay. Use of these water sources has been more or less continuous, currently providing for domestic use, irrigation, fire protection, and hydropower.

In 1904 Robert Moran bought the mill properties, diversion works, and water rights for use at his private estate, Rosario. Moran constructed the existing Cascade Lake dam and a hydroelectric plant, as well as the original Mountain Lake dam.

In 1970 the Mountain Lake/Cascade Creek water rights were adjudicated, and in 1978 the Cascade Lake water rights were adjudicated. These water rights constitute the major water sources on Orcas Island and established the legal rights of Moran State Park, Rosario Utilities, Doe Bay Water Users Assn., and Olga Water Users Inc. to use the water in the watersheds.

Water rights are established based on the doctrine that first in time is first in right. The adjudicated rights listed below have priority dates that preclude all other uses in the watersheds. Rosario Utilities has the oldest and largest right. Other water right permits and certificates have been issued since the adjudication, and several applications are pending. In addition, Rosario was granted a water right change, from hydropower to domestic use in 2002.

Rosario Utilities has water rights from Cascade Creek for hydroelectric power and domestic use dating from 1884 which is allocated in the following manner:

Cubic foot per second (cfs) = 449 gallons per minute or 724 acre-feet-year
Acre-feet per year (afy) = 325,861 gallons

3 cfs	November, December, January
2 cfs	October, February, March
1 cfs	April, May, June, September
0.5 cfs	July, August

Total: Approximately 1204 afy

Rosario also has the right to storage and use of water in Cascade Lake as well as use for domestic purposes, hydropower, irrigation, and fire suppression. Several changes to the water right were approved since the adjudication, without increasing the total volume of water allocated. The current allocation³ is as follows:

³ Report of Examination, Dept. of Ecology, 3/21/02

Domestic use:	0.739 cfs; 283 afy
Hydropower:	2.684 cfs; 421 afy from the natural waters of Cascade Lake 2.817 cfs; 1170 afy from stored water (via Cascade Creek to Cascade Lake)
Irrigation:	0.10 cfs; 5 afy
Fire Protection:	as needed
Storage:	1879 afy

In the 1970 adjudication, Doe Bay established water rights for domestic use dating from 1945 and 1946 for a total of .4 cfs or 94 afy. Olga's rights were allocated for .56 cfs or 94 afy with a priority date of 1908. After the adjudication, in 1977, Doe Bay was issued a certificate for an additional 0.5 cfs (87 afy).

Moran State Park (Washington State Parks Commission) holds an adjudicated water right from 1920 for 0.02 cfs (8.4 afy) in the Mountain Lake watershed, and from 1978 for 0.156 cfs (8 afy) in the Cascade Lake watershed.

Eastsound and Eastsound Water Users Assn. service area. EWUA holds a water right certificate for surface water from Purdue Lake with a priority date in 1983 for a total of 72.7 afy. EWUA also utilizes wells in the Eastsound aquifer and with a water right certificate for 72.7 afy. Within the service area of EWUA and within the boundary of Eastsound Village itself, many individual wells and small community water systems have developed over recent years because of delays by EWUA to meet demand for service in their service area. These wells probably have little impact on bedrock setting of Purdue Lake; however, there are a number of wells withdrawing directly from the Eastsound aquifer. Estimates of recharge capacity for the aquifer based on a 2002 study by USGS⁴ raise concerns that the sustainable yield of the aquifer may be close to the amount allocated in EWUAs water right. This raises concern about the long-term capacity of the aquifer if well drilling continues. See Appendix B for excerpts from reports regarding the aquifer.

In order to address these concerns, the committee recommended that the county declare the Eastsound Aquifer a Critical Water Resource Area (SJCC 8.06), with the condition that this leads to study of the aquifer capacity, developing Limited Impact Development requirements for Eastsound, and developing an Abbreviated Coordinated Water System Plan to coordinate development of the water supply in the area. This action was endorsed by the County's Water Resource Management Committee and the Eastsound Planning Review Committee and passed by Resolution 68-2005 by the Board of Health on June 28th, 2005.

⁴ Estimates of Ground-Water Recharge from Precipitation to Glacial-Deposit and Bedrock Aquifers on Lopez, San Juan, Orcas, and Shaw Islands, San Juan County, Washington. US Geological Survey, Water Resources Investigations Report 02-4114

Diversions and operations:

The original Mountain Lake dam was constructed by Robert Moran around 1905 to supply development at Rosario. In 1948, the dam was raised 3-1/2 feet to augment water supply to the communities of Olga and Doe Bay. Robert Moran deeded the land surrounding Mountain Lake to the state as a public park in the 1920s, but retained water rights from the lake. The ownership of the dam was not clarified at the time. By 1990, the dam required considerable repair and improvement and an agreement was reached between Parks, Doe Bay Water Users Assn. and Olga Water Users Inc. to define ownership and share costs. This agreement (utility license) gave ownership of the dam to the Park, with DBWUA and OWUA as licensees of the water lines, valves and appurtenances used to convey water to their water systems. Rosario Utilities was not part of this agreement, but retained ownership of the dam at Cascade Creek. The agreement acknowledges Rosario's senior water right and in no way interferes with it.

The agreement succeeded in its objective of clarifying ownership and funding the dam repairs; however, the ongoing operation of the Mountain Lake dam "and appurtenances to assure the full utilization of the respective water and storage rights of the parties, the tranquility and scenic beauty of Mountain Lake as a recreational resource, and an adequate supply of high-quality potable water to the Licensees pursuant to their existing and future water rights . . ." has not been formalized.

Annual operations at the dam include placement and removal of 4x6-inch stop logs in two spillway bays, control of a 12-inch outlet valve and two 8-inch valves, one feeding Cascade Creek for the benefit of OWUA and one piping directly to DBWUA's treatment plant. Downstream OWUA operates a four-foot high dam and diversion and below that, Rosario Utilities diverts water from the creek through a V-notch weir.

In order to assure that each water user is able to obtain or grow into their annual water right allocation, and that the recreational facilities developed by Moran State Park at Mountain Lake and Cascade Lake are not flooded in the winter, monitoring of water flows and cooperative operations are needed. "Since the supply to Olga and Rosario is operationally dependent on sufficient flow release from Mountain Lake to Cascade Creek, there is a continuing need to adjust the Olga diversion flow (at Mountain Lake dam) to complement any ongoing discharge through the principal spillway so that the combined flow together with downstream runoff contributions will need these needs." (Moran State Park, Mountain Lake Dam O&M Manual)

The agreement calls for DBUA and OWUA to develop a separate agreement to "operate the diversion tap in the Doe Bay Water line which feeds Cascade Creek in order to assure potable water to Olga . . ." and to maintain the appurtenances at the dam. The Park agrees to maintain a lake level gauge at the dam and provide weekly monitoring.

In addition to regular operations in the watershed, section XIV, spells out the parties agreement “to cooperate in seeking and supporting a hydrologic study of Mountain Lake, its tributaries and the Cascade Creek drainage system. Such a study will facilitate and maximize the ability of all parties to effectively manage the water resources . . . for the general benefit of the public and the parties.”

Over the decade since this agreement was finalized the goals of this cooperative approach to managing the watershed have been forgotten. New people have taken on the management of these facilities and operations have become haphazard. Park facilities are suffering from flooding and downstream users continue to be concerned about their ability to grow into their water rights. Monitoring was conducted briefly in the early 1990’s by Rosario and the Park, but not continued. Currently, the County has been maintaining three continuously recording gauges in the watersheds since 2003-4. One each at the Mountain Lake and Cascade Lake dams and one in Cascade Creek below the Rosario diversion.

Water system capacity to serve:

The east Orcas water supply planning area is served by a combination of Group A and Group B water systems and individual wells. Unlike most of San Juan County, the eastern lobe of Orcas Island has an abundant source of surface water in the pristine lakes in Moran State Park. Doe Bay, Olga, Rosario and Moran State Park utilize Mountain Lake, Cascade Creek, Cascade Lake and springs. Eastsound Water Users Assn. (EWUA) uses surface water from Purdue Lake on Buck Mountain and wells that tap the Eastsound Aquifer. In addition, there are 17 Group A and B water systems in the area that use groundwater, and many individual wells.

A water system's capacity to supply service to its existing and future customers is based on several elements. These include: 1) source capacity, 2) water rights, 3) treatment plant production, and 4) storage and distribution system capacity.

The East Orcas Water Supply Committee adopted a problem statement in August of 2004 that identified the capacity limitations that were the basis of this planning effort (See Section 1). Since that time, EWUA has been working actively to acquire additional source capacity and Rosario Utilities is in the process of developing plans for improvements to production. In addition, EWUA and Rosario are in negotiation for the purchase/sale of water rights. The following sections describe existing capacity information and limitations, based on current water system plans and related studies. Additional studies and planning work are underway. This chapter represents current conditions which are in the process of changing.

1. Source capacity.

This planning effort has focused on the surface water supplies located in the Cascade Lake/Mountain Lake watersheds and on the Eastsound Aquifer. We have not addressed the capacity of Purdue Lake, where EWUA obtains half of its current water supply. Assessment of the sustainable yield from this source has been done by EWUA (CDM, 2004), as well as options and costs of increasing this yield. In addition, there has been no analysis of the capacity of the many individual and small community-system exempt wells in the upland, bedrock area, with well yield in the range of 5-10 gallons/minute. At this time, the capacity of these wells appears to be sufficient for the rural development they serve.

For purposes of water system planning, the reliability of source capacity is based on supply during drought conditions. It is expected that occasional droughts (10% occurrence probability) can be managed with conservation measures.

Existing studies and reports, surface water supplies:

The large surface water systems of eastern Orcas were issued adjudicated water rights based on field studies conducted by the Department of Ecology in July of 1968 and May of 1969 with limited stream flow measurements. In 1974,

gauging and analysis was conducted by William Dietrich and others for the 1975 publication, "Geology and Water Resources of the San Juan Islands", DOE Water Supply Bulletin No. 46. This study became the basic science for water supply analysis in San Juan County for the next two decades. It used monthly stream flow measurements to estimate annual runoff characteristics in the county.

In 1997-98, USGS collected data from stations around the county for rainfall (precipitation and precipitation throughfall), stream flow, solar radiation, temperature and atmospheric chloride deposition. This study used automatic data-logging equipment to obtain a more accurate analysis of stream flow measurements. The results were used in the 2002, "Estimates of Ground-Water Recharge from Precipitation to Glacial-Deposit and Bedrock Aquifers on Lopez, San Juan, Orcas, and Shaw Islands, San Juan County, Washington" (USGS, Water-Resources Investigations Report 02-4114).

In 2002, San Juan County Health and Community Services and the Water Resource Management Committee hired consultants to conduct stream gauging in seven priority watersheds, including Cascade Creek, and in 2004 hired Montgomery Water Group (MWG) to assess potential surface water storage sites in the east Orcas area. This assessment, Multi-Purpose Surface Water Storage Assessment for WRIA 2, is included as Appendix A. The assessment presented the following recommendations to EWUA: 1) acquire land suitable for storage sites while it is still affordable; 2) conduct analysis (topography, environmental review, geotechnical investigation) of priority sites; 3) work with Rosario Utilities to sell/lease water, or share diversion and treatment plant locations; 4) apply for water rights from Cascade Creek; and 5) collect additional hydrologic data.

As part of the water right negotiations between Rosario Utilities and EWUA, RH2 Engineering was hired to conduct additional hydrologic analysis of the capacity of the Mountain Lake and Cascade Lake watersheds. The Preliminary Report from June 2005 ("Rosario Water Budget Supply Analysis") uses existing rainfall data to model runoff and concludes that there is substantial operational storage in both Mountain Lake and Cascade Lake, with runoff in the combined watersheds equals 5000 acre/feet/year (1.5 billion gallons) in an average year, and 2000 acre/feet/year (650 million gallons) during a low precipitation year (1-5% frequency), with most of this occurring during winter. The report concludes that there is water available to support Rosario's water rights and supply the needs of both Rosario Utilities and EWUA.

The East Orcas Water Supply Committee requested that Ecology initiate the process to determine instream flow requirements for Cascade Creek, in order to establish the water needed to support native fish habitat. Biologists from the Department of Fish and Wildlife and Ecology conducted measurements of the lower reach of Cascade Creek in June, 2005. Based on the little data that exists, the conclusion of this study indicates that the recommended flow is not available in the creek for salmon spawning and rearing during average years, even without diversions from the creek. In a memo from September 29, 2005, Ecology concludes that existing water rights, storage and diversion

management, and instream resource needs in the Cascade Creek watershed make approval of new water rights unlikely, but coordinated management, conservation and improved data collection could provide additional resource options in the future. (See Appendix C)

Although stream flow in San Juan County is low to non-existent during the summer season, high flows occur during the wet winter months. This is especially evident in the relatively high-precipitation watersheds of Cascade Lake and Mountain Lake. There appears to be sufficient water available in these watersheds to supply infill of the Doe Bay and Olga water systems and the additional growth projected for Eastsound, with careful management. Additional data collection and cooperative management are essential to accomplish this goal.

Existing studies and reports, groundwater supplies:

The Eastsound Aquifer is an important source of water for the Eastsound Village, which is a designated Urban Growth Area (UGA). Currently, EWUA gets half of the water they use from this aquifer. EWUA contracted with CR Hydrogeologic Consulting to develop a study of groundwater conditions, Eastsound Water Users Association, 2003 Ground Water Investigation Report. In this report, well data was used to determine lithology, water levels, groundwater flow direction, and recharge conditions. Earlier reports are referenced. Recharge conditions are also documented in a report developed by Camp Dresser McKee (CDM) for EWUA. In 2003, Ecology issued a Report of Examination as part of a water right change for EWUA. In concluding their analysis of the existing reports, Ecology states that available recharge (capture) ranges from 115 to 287 acre-feet per year, if infiltration from bedrock runoff is not an additional factor. This is close to the amount currently allocated to EWUA in water rights. Excerpts of these reports are included in Appendix B.

2. Water rights.

Water rights are assessed during water system planning based on existing ERU demand (equivalent residential unit demand). Growth projections are used to calculate future demand and compared to existing water rights. The tables at the end of the chapter show current and future demand compared to water rights from water system plans. Water rights are issued for annual and instantaneous quantities (Q_a and Q_i), which means that a water system is limited to an overall annual amount and to a maximum allowed during peak season use.

3. Treatment.

Raw surface water and some groundwater entering into a water system must be treated before it is distributed to customers. The capacity of treatment plants is often reported as an annual amount, but is realistically limited by ability to meet peak demand. For water systems like Eastsound and Rosario Utilities, this peaking factor is a significant element for planning. Peak daily demand for EWUA is 2.5 times the amount for average daily demand.

4. Storage and distribution.

Storage, the size of transmission lines and elevation of pressure zones determine how much water is available to customers for average, peak and emergency use. Fire flow is the greatest demand on a water system, although only EWUA is currently required to provide fire flow through their distribution system. Usable storage capacity is calculated during water system planning based on the need to maintain reserves for emergency situations. The capacity of distribution lines in older water systems is limited where older, small diameter pipe reduces flow.

Water system capacity tables.

The following tables were developed from water system plans for Eastsound Water Users, Rosario Utilities, and Doe Bay Water Users. Olga Water Users is in the process of developing a water system plan, and has supplied some additional information. Moran State Park is not required to develop a plan.

Ideally, this report would include a table of water rights compared to sustainable yield, with projections for buildout demand based on current Equivalent Residential Units (ERUs). However, currently there is no metering of volume withdrawals by the water purveyors and the monitoring and analysis required to accurately determine sustainable yield has not been completed for the watersheds or aquifer.

There are many assumptions to developing water system plans, which leads to a variety of calculations. Peak day demand is as much as 2.5 times an average day, and when calculating treatment plant capacity, peak hourly demand is the bottom line. These tables are intended to give a general idea of capacity of the three water systems. EWUA needs additional source capacity; Rosario Utilities needs additional treatment; DBWU has a nice margin for growth. They all need upgrades to their distribution systems. Only EWUA provides fire flow that meets county code.

Rosario Utilities: Capacity with no change to Resort⁵

	Rights/ capacity	2004 average day demand	Surplus/ (Deficit)	Buildout	Surplus/ (Deficit)
Water right (Qi)	330 gpm	199 gpm	131 gpm	298 gpm	32 gpm
Water right (Qa)	283 a-f/y	128 a-f/y	155 a-f/y	192 a-f/y	91 a-f/y
Treatment Capacity	200 gpm	190 gpm	10 gpm	285 gpm	(85 gpm)
Storage, 4 tanks	352,000 gal	147,150 gal	204,850 gal	293,300 gal	59,700 gal

ERUs approved	ERUs active	ERU gallons/day	Buildout ERUs	Growth rate
456	360	283	573	4.0%

Rosario's treatment plant capacity is currently limited due to the size of the raw water supply pipe. Water main upgrades are needed, as well as additional treatment capacity to meet growth. The system does not supply fire flow.

⁵ Rosario Resort Master Plan, Draft Environmental Impact Statement

Doe Bay Water Users Capacity:

	Rights/ capacity	Existing average day demand	Surplus/ (Deficit)	20 year demand with conservation	Surplus/ (Deficit)
Water right (Qi)	.9 cfs 410 gpm	.65 cfs	.25 cfs	.84 cfs	0.6 cfs
Water right (Qa)	181 a-f/y 58.9 MGY	72.5 a-f/y	108.5 a-f/y	125 a-f/y	56 a-f/y
Treatment Capacity in gallons/day	144,000	68,380	75,620	88,956	55,044
Storage, 3 tanks (gallons)	147,231	68,670*	78,561	95,786*	51,445

*two days storage to cover peak day demand

ERUs approved	ERUs active	ERU gallons/day	2020 ERUs	Growth rate
411	263	260	372	2.5%

The tables above are based on the water system plan DBWU developed in 2000 and may not reflect changes to the system since that time. The raw water intake system and ageing distribution lines are the major improvements needed in the system. The system is not required to meet County fire flow standards.

Eastsound Water Users Association Capacity:

	Rights/ capacity	2004 average day demand	Surplus/ (Deficit)	2025	Surplus/ (Deficit)
Water right (Qi)	235 gpm g/w	130 gpm g/w	105 gpm		
Water right (Qa)	72.7 g/w 72.7 s/w	38.8 g/w 40.2 s/w	11.1 g/w 32.5 s/w	72.2 g/w 159.7 s/w	0 g/w (87) s/w
Treatment Capacity in gallons/day	187,200 g/w 169,920 s/w	187,200	169,920		
Storage, 8 tanks	893,000 gallons	These numbers are being developed and will be available in the new EWUA Water System Plan.			

ERUs approved	ERUs active	ERU gallons/day	2025 ERUs	Growth rate
1260	964	194	1954*	2.1%

*EWUA's water system plan is being finalized and the assumptions and calculations are being revised at this time. The numbers shown in these tables are from the 2004 draft water system plan and discussions with the manager.

EWUA is faced with short and long-term source capacity limitations, with administrative limitations to their ability to sell and provide service to new memberships, and with organizational limitations as a homeowners' association with limited financial and legal authority. Protection of the Eastsound Aquifer and EWUA's ground water rights are a major concern, since maximizing these water rights are critical to meet the next 20 years growth of the system.

**Final recommendations of the
East Orcas Water Supply Planning Committee, as amended by the
San Juan County Water Resource Management Committee,
10/05**

Early action recommendations, in the process of implementation:

Critical Water Resource Area designation for Eastsound aquifer

Designate the Eastsound Aquifer a Critical Water Resource Area (CWRA) under SJCC 8.06 in order to initiate a public process to develop water system coordination, protection standards for the aquifer, and to study long term sustainability.

Eastsound Water Users Assn. and the Group B water systems and individual well owners in the area will develop an abbreviated coordinated water system plan (ACWSP) to assure coordinated development of water supply management and delivery. The committee recommends that the county develop Limited Impact Development standards for the Eastsound Aquifer basin to maximize infiltration and minimize contamination. Eastsound Water Users Association (EWUA), the county and Ecology will partner to conduct a study of the Eastsound Aquifer.

The Board of County Commissioners declared the Eastsound Aquifer a CWRA on June 28, 2005. Initial meetings to begin the planning and study process have been held. A committee representing water systems, well owners and interested parties from Eastsound will be established by November 1, 2005, to develop the ACWSP.

Conduct an instream flow assessment for Cascade Creek

Cascade Creek is tied to the major water rights in the Mountain Lake/Cascade Lake watersheds and includes documented habitat for sea-run cutthroat trout and Coho in its lower reach. In order to evaluate water right applications for additional withdrawal and establish cooperative management goals for flows in the creek, it is essential to understand the flows needed to sustain habitat. At the committee's request, Ecology conducted an instream flow study in the spring of 2005. The recommended instream flows are included in Appendix C.

The recommended instream flows for Cascade Creek are based on a simplified approach, with very little data, to determine the amount of water necessary to sustain salmonid habitat in the creek. Based on preliminary stream gauge data collected during 2003-2004, it appears unlikely that the creek can sustain the recommended flows, even without diversions from the stream, during low water years and summer. The committee expressed concern that the actual sustainable capacity of the

watersheds is not represented by the instream flow determination for Cascade Creek.

The committee would like to see an in-depth study of the creek to, 1) determine whether it should be included in the state's stream catalog (whether it is actually spawning habitat), 2) determine the actual biologic needs for salmonids in a stream of this type (very low summer flow), 3) collect more detailed and lengthy stream flow data , including detail about actual withdrawals and management of dams and diversions.

The committee recommends that the actual potential of the watershed to provide water, in excess of current use and instream flows, be assessed in order to develop a long-term agreement for management of the flows in the basin, as a partnership between the water users and Ecology. This agreement should include an adaptive management program that will utilize ongoing monitoring of conditions to set stream flow goals.

Recommendations for the next phase of water resource management

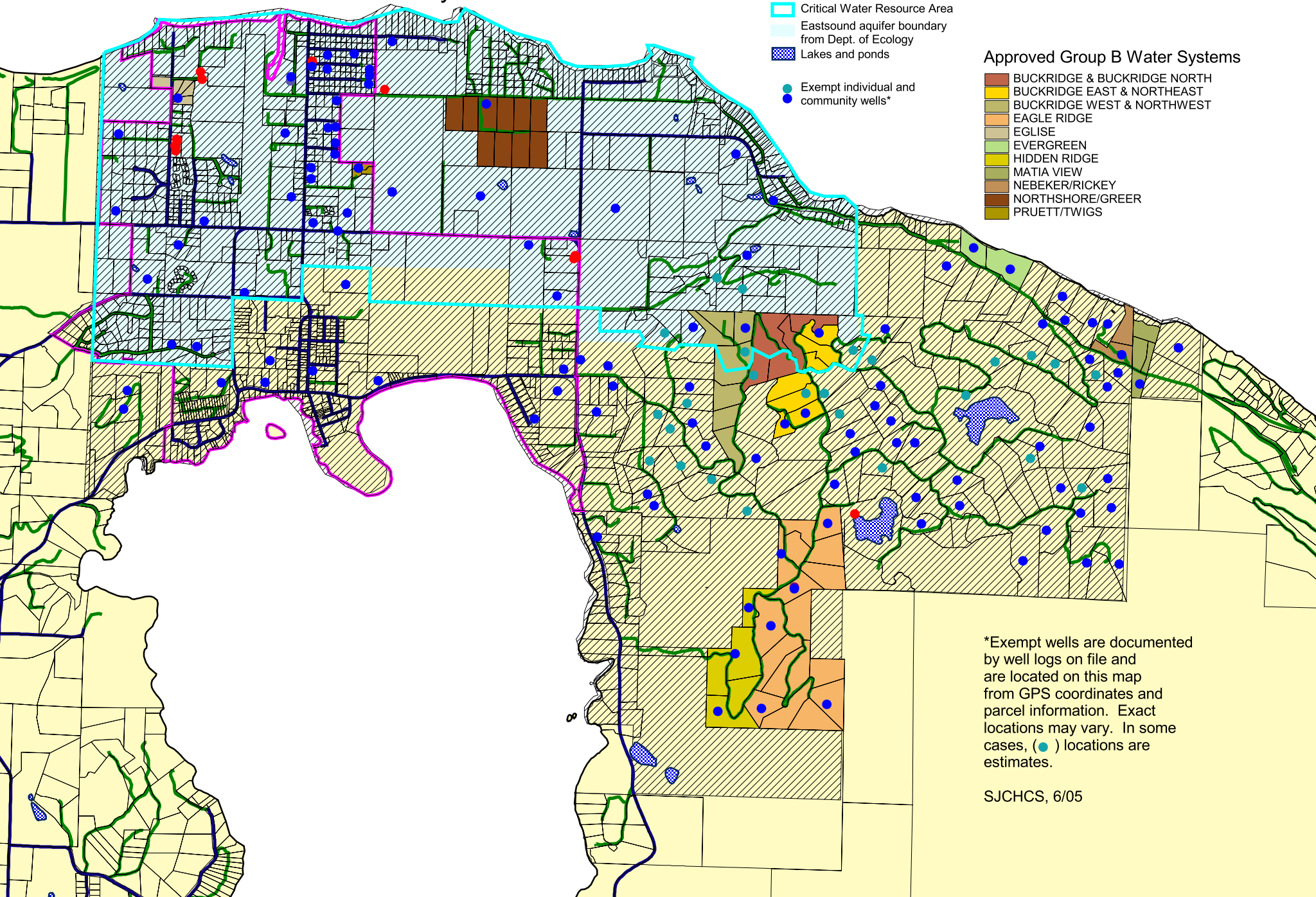
1. Develop a cooperative operations management agreement for water users in the Mountain Lake/Cascade Lake watersheds
 - Build this agreement from the existing agreement between Moran State Park, Doe Bay Water Users Inc., and Olga Water Users Inc. (January 15, 1991). Include management of all diversions and uses of Mt. Lake, Cascade Creek, and Cascade Lake, including Rosario Utilities.
 - Use this agreement to establish the adaptive management protocol for future water right allocations in the basins
 - When developed, require that water system plans include a current version of this agreement and a report on management activities in the basins
 - Support a grant for additional studies of the watersheds that will incorporate existing reports and ongoing monitoring into a comprehensive assessment








2. Collect detailed information for the mutual, beneficial management of the resource in the Cascade Lake/Mountain Lake watersheds
 - Assess the sustainable capacity of the watersheds to provide water for recreation, habitat, fish rearing and spawning, and human consumption.
 - Monitor rainfall, lake level and stream conditions in the watersheds
 - Meter water diversions
 - Meter water use
 - Provide current information on watershed conditions to the public and decision-makers through the internet, newsletters or other media
 - Support a grant for infrastructure needed to improve and meter diversions

3. Recommend **that Ecology implement** the following priorities for existing and new water right allocation
- Recommend that the Cascade Lake/Mountain Lake watersheds and the Eastsound Aquifer be a priority for review of new water right applications by Ecology
 - Include a water right analysis in an agreement with Ecology in order to plan for future water demand and allocation (to be developed in 2006)
 - Use adaptive management to determine future allocations (increment allocation based on best available science)
 - Support a plan that assures the greatest public benefit, including recreation and habitat, and protection for junior water rights during drought conditions
 - Set the highest standard of efficiency and public benefit for existing and new use ~~of water in the community.~~
4. Support requirements for “obligation to serve”
- ~~To meet requirements currently being implemented under the Muni Law, assist the county with realistic concurrency planning, and provide needed reliability of service, municipal water systems in east Orcas should be required* to develop procedures for timely and reasonable service (utility service review procedures) as part of their water system plans~~
 - **Municipal water systems in east Orcas shall be required to develop procedures for timely and reasonable service (utility service review procedures) as part of their water system plans to assist the county with concurrency planning, and provide needed reliability of service.**
 - The County ~~support~~ **facilitate** formation of public utility districts, including the merger of Eastsound Water Users Association and Eastsound Sewer and Water District, through education and grants










*NOTE: The recommendations above were approved unanimously by the East Orcas Water Supply Committee, except in two cases where the representative of Rosario Utilities dissented. The preferred language for the last bullet under 3., to state: “Set the highest standards of efficiency and public benefit for existing and new use of water in the *watersheds*.”; and that 3d bullet under 1, and the second bullet under 4 be worded as more of a recommendation than “should be required”.

Figure A.
Eastsound: aquifer boundary, well locations,
water system boundaries, and proposed
Critical Water Resource Area boundary.



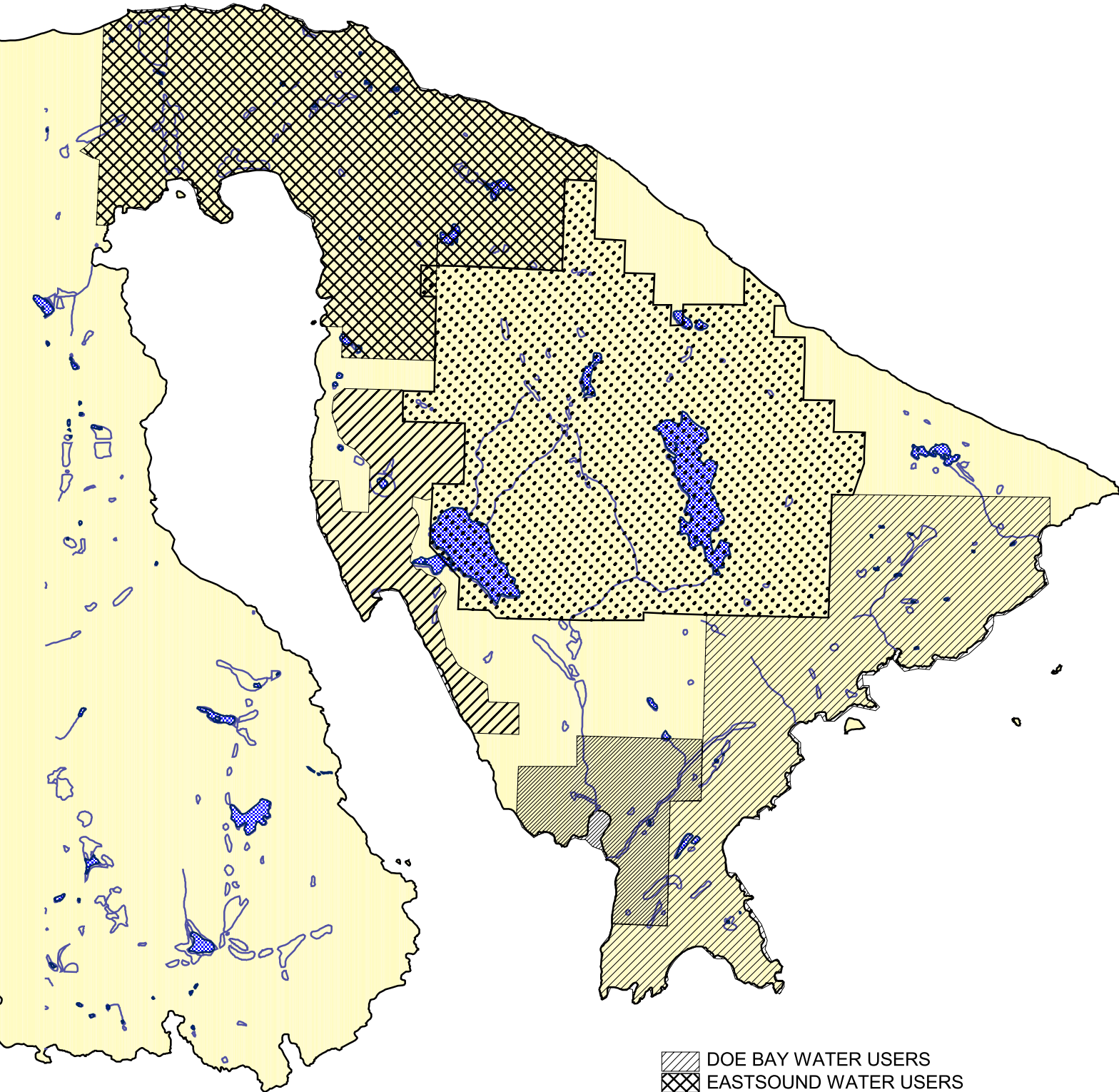
-  Eastsound Water Users Assoc., service area boundary
-  EWUA wells and Purdue Lake
-  Urban Growth Area
-  Critical Water Resource Area
-  Eastsound aquifer boundary from Dept. of Ecology
-  Lakes and ponds
-  Exempt individual and community wells*

Approved Group B Water Systems

-  BUCKRIDGE & BUCKRIDGE NORTH
-  BUCKRIDGE EAST & NORTHEAST
-  BUCKRIDGE WEST & NORTHWEST
-  EAGLE RIDGE
-  EGLISE
-  EVERGREEN
-  HIDDEN RIDGE
-  MATIA VIEW
-  NEBEKER/RICKEY
-  NORTSHORE/GREER
-  PRUETT/TWIGS

*Exempt wells are documented by well logs on file and are located on this map from GPS coordinates and parcel information. Exact locations may vary. In some cases, (●) locations are estimates.

Figure B:
East Orcas
Surface Water Systems
Service Area Boundaries








-  DOE BAY WATER USERS
-  EASTSOUND WATER USERS
-  ROSARIO WATER SYSTEM
-  OLGA WATER USERS
-  MORAN STATE PARK

Figure C:
East Orcas streams, dams, diversions and gauges



Figure D:
East Orcas watersheds

