STATE OF WASHINGTON
**DEPARTMENT OF ECOLOGY**
***REPORT OF EXAMINATION***
TO APPROPRIATE PUBLIC WATERS OF THE STATE OF WASHINGTON

☒ Surface Water (Issued in accordance with the provisions of Chapter 117, Laws of Washington for 1917, and amendments thereto, and the rules and regulations of the Department of Ecology.)

☐ Ground Water (Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the Department of Ecology.)

| PRIORITY DATE | APPLICATION NUMBER | PERMIT NUMBER | CERTIFICATE NUMBER |
|---|---|---|---|
| June 19, 2001 | S2-30006 | | |

NAME
Steve and Karen Gray

| ADDRESS (STREET) | (CITY) | (STATE) | (ZIP CODE) |
|---|---|---|---|
| 3509 Sandridge Road, P.O. Box 399 | Seaview | Washington | 98644 |

**PUBLIC WATERS TO BE APPROPRIATED**

SOURCE
Unnamed Lake

TRIBUTARY OF (IF SURFACE WATERS)

| MAXIMUM CUBIC FEET PER SECOND | MAXIMUM GALLONS PER MINUTE | MAXIMUM ACRE FEET PER YEAR |
|---|---|---|
| 1.77* | | 91** |

* Qi is additive to S2-28851 and S2-28852. ** Qa is non-additive to S2-28851 and S2-28852.

QUANTITY, TYPE OF USE, PERIOD OF USE

Non-additive to S2-28851 and S2-28852

| | | |
|---|---|---|
| 36 acre-feet per year | Cranberry irrigation | May through October |
| 33 acre-feet per year | Cranberry harvesting | October through November |
| 22 acre-feet per year | Frost/Heat control | Year round as needed |

26 acres of cranberry bogs

**LOCATION OF DIVERSION/WITHDRAWAL**

APPROXIMATE LOCATION OF DIVERSION--WITHDRAWAL

Approximately 950 feet south and 2,540 feet west of the northeast corner of Section 28.

| LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION) | SECTION | TOWNSHIP N. | RANGE, (E. OR W.) W.M. | W.R.I.A. | COUNTY |
|---|---|---|---|---|---|
| NW 1/4, NE 1/4 | 28 | 10 | 11 W | 24 | Pacific |

**RECORDED PLATTED PROPERTY**

| LOT | BLOCK | OF (GIVE NAME OF PLAT OR ADDITION) |
|---|---|---|
| 64 | 108 | Third Addition to Seaview |

**LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED**

Beginning at a point 50 feet east of the southeast corner of Block 108 of the third addition to Seaview, according to the plat thereof on file in the Plat records in Volume D-1 of Plats, page 34, records of the Auditor of Pacific County, Washington, thence north 544 and 3/8 feet, thence west 442 feet, thence south 198 and 1/8 feet to the place of beginning, being a portion of the northwest quarter in Section 28, Township 10 North, Range 11 West of W.M., excepting there from the portion thereof appropriated. For right of way for drainage ditch in Drainage District No. 3 of Pacific County, Washington.

Commencing at a point which is south 1309 feet and 3931 feet west from the section corner common to Sections 21, 22, 27 and 28, Township 10 North, Range 11 West of W.M., thence north 277.7 feet, thence south 89° 43' east 1586.9 feet, thence south 16° 15' west 140.8 feet, thence south 12° 22' west 143.4 feet, thence south 89° 56' west 220.3 feet, thence south 0° 42' 44" east 5.5 feet, thence north 89° 16' west 1296.8 feet to the point of beginning.

Also commencing at a point which is south 1031.3 feet west and 3931.6 feet from the corner common to Sections 21, 22, 27 and 28, Township 10 North, Range 11 West of W.M., thence north 264.1 feet, thence south 89° 41' east 1675.8 feet, thence south 13° 27' west 6.9 feet, thence south 16° 41' west 276.3 feet, thence north 89° 43' west 1586.9 feet to the point of the beginning.

## DESCRIPTION OF PROPOSED WORKS

Steve and Karen Gray have applied for an additional appropriation of public surface water to increase the instantaneous diversion rate from an existing unnamed lake for use in cultivating cranberries (including irrigation, frost/heat control, and harvest). The additional rate is intended to allow increased use of the existing infrastructure, including an electric 60 horsepower (hp) and a 40 hp pump. The pumps are connected to distribution mains supplying 864 sprinklers used for bog irrigation.

A water right permit (S2-28851) was previously issued for the diversion from the subject unnamed lake, authorizing a Qi of 1.5 cfs and a Qa of 91 afy. In addition, the Qa is non-additive to permit S2-28852, which authorizes a Qi of 2.22 cfs from an additional pond located on the west side of the cranberry operation.

## DEVELOPMENT SCHEDULE

| BEGIN PROJECT BY THIS DATE: | COMPLETE PROJECT BY THIS DATE: | WATER PUT TO FULL USE BY THIS DATE: |
|---|---|---|
| Complete | Complete | June 2012 |

## REPORT

# BACKGROUND

On July 19, 2001, Steve and Karen Gray filed an Application for Permit (S2-30006) with the Washington State Department of Ecology (Ecology) for a water right permit to appropriate public surface water. The applicant requested authorization for an instantaneous diversion (Qi) of 1.77 cubic feet per second (cfs), with no increase in the total annual diversion volume (Qa). The requested Qi would be additive to existing water right S2-28851 and would use the same point of diversion. The point of diversion under S2-28851 is currently authorized for a Qi of 1.5 cfs and a Qa of 91 afy.

Planned use of the appropriation is for cultivation of cranberries, including irrigation, frost/heat control, and harvesting. The appropriation will allow increased use of the existing infrastructure to serve the current cranberry operation occupying 26 acres.

The project site is located near the southern end of the Long Beach Peninsula, within the state's Water Resource Inventory Area (WRIA) 24. Notice of the proposed appropriation was published in the *Chinook Observer* of Long Beach, Washington, on May 11 and 18, 2005. No protests were received by Ecology.

Based on the provisions of RCW 43.21A.690 and RCW 90.03.265, this application has been processed by Aspect Consulting, LLC (Aspect Consulting) under Ecology Cost-Reimbursement Backfill Assignment No. ASP3 (master contract No. C0500006).

# INVESTIGATION

In consideration of this application, Aspect Consulting reviewed available documents pertaining to the application's site conditions, historical water use, projected water demand, and the potential effect on existing water right holders. This included the information submitted by the applicant and pertinent Ecology records including well logs, water rights records, and well construction reports. The review also included reports from multiple investigations detailing the hydrogeology and water quality of the Long Beach Peninsula. Most notably, a 1995 United States Geological Survey (USGS) report, Ground-Water Flow and Water Quality in the Sand Aquifer of Long Beach Peninsula, Washington (Thomas 1995), provided a comprehensive water balance and examined groundwater recharge, movement, and quality along the peninsula.

An initial site visit was performed on June 3, 2005, with an additional site visit on June 10, 2008. Tyson Carlson of Aspect Consulting visited the site, including inspection of the point of diversion and place of use and an interview with the applicant.

Pacific County Department of Public Works provided a copy of the Surface Water Management Plan (Pool 1985) describing the peninsula's major drainages and methods of controlling and conveying storm water, surface water, and groundwater. Supplemental data on water quality and groundwater elevations over time were obtained from the Pacific County Department of Community Development. Also, information and data associated with water use and cranberry production were provided by Dr. Kim Patten, manager of the Washington State University's Long Beach Research and Extension Unit.

Using this information, Aspect Consulting evaluated water availability and potential effects of the proposed appropriation on existing groundwater and surface water rights. Each of the four requirements specified in RCW 90.03.290 were individually examined and are presented below.

### Project Description

The Application for Permit for Steve and Karen Gray seeks an increase to the current authorized instantaneous water right to divert from an unnamed lake, currently permitted under S2-28851. The proposed purpose of use is for cultivation of 26 acres of cranberries.

### Site Description

The proposed point of diversion is located just outside of the City of Seaview, in the northwest quarter of the northeast quarter of Section 28 in Township 10 North, Range 11 West Willamette Meridian. The unnamed lake was constructed for explicit use as a source of water for the cranberry operation. Surface water from the unnamed lake is diverted by either a 60 hp or 40 hp electric pump into a ten-inch or six-inch distribution main, feeding two-inch lines supplying water to 864 sprinklers for bog irrigation. The 60 hp pump primarily supplies sprinklers in the southern and middles bogs, while the 40 hp supplies the northern bogs with irrigation water. Based on revised pump curve analysis completed by the applicant, it is estimated that the pumps are capable of pumping upwards of 800 gpm (40 hp) and 1,300 gpm (60 hp).

In addition to the water diverted under permit S2-28851 the cranberry operation also uses water diverted under permit S2-28852 from an additional pond located on the western portion of the property. The pond is inter-tied with Pacific County's South Main Drainage Ditch by a small canal. Water is diverted from the pond with a mobile six-inch diesel powered pump capable of pumping several hundred gallons per minute (gpm). The purpose of the diversion is primarily for flooding of bogs during harvesting. The cranberry bogs are interconnected and graded in elevation to facilitate reuse of water. Return flow from the bogs is either directed back to the unnamed lake or pond via a trench system and a return pipe, creating a closed loop, or discharged back to the South Main Drainage Ditch.

Through inter-ties, drainage laterals, and side channels, water is routinely moved between the unnamed lake, pond, and the South Main Drainage Ditch to satisfy the cranberry operation's water demand depending on the time of year.

In summary, the applicant currently has two water right permits. Permit S2-28851 authorizes withdrawal from the unnamed lake for 1.77 cfs (Qi) and 91 afy (Qa). The Qa to S2-28851 is non-additive to permit S2-28852 which authorizes an additional Qi of 2.22 cfs from the unnamed pond. The total authorized Qa for cranberry cultivation under all water rights appurtenant to the property is limited to 91 afy.

**Hydrogeologic/Hydrologic Assessment**

The Long Beach Peninsula is located in the southwest corner of Washington State, just north of the Columbia River delta. Approximately 27 miles long with an average width of 1.5 miles, the Long Beach Peninsula is surrounded by seawater on three sides. The surface topography is the result of a series of north-south trending sand dunes. Interior surface elevations are typically 25 feet above mean sea level (MSL), but can reach upward of 50 to 70 feet MSL on foredune features found in the northwestern part of the peninsula. The average annual precipitation is 80 inches/year over a 40-year record (1954 to 1992).

The geology of the Long Beach Peninsula is dominated by the depositional environment created by longshore currents transporting sediment, predominantly from the Columbia River, along the Washington coast. Over thousands of years, several hundred feet of unconsolidated sediment have accumulated to shape the peninsula. The thickness of these deposits increases from south to north, as the underlying basal bedrock dips away from its surface outcropping south of Seaview, eventually reaching thicknesses of 1,400 feet toward the northern end of the peninsula. Although the peninsula hosts a widely heterogeneous mixture of unconsolidated sediment (reflecting the ever-changing depositional environment), the upper 100 feet is dominated by sand, underlain by a series of discontinuous lenses of sand and silt/clay.

Groundwater on the Long Beach Peninsula primarily occurs as a lens of fresh water atop saline water from the flanking Pacific Ocean and Willapa Bay. The USGS refers to this fresh water lens as the "sand aquifer", which is a water table aquifer with depth to water typically less than 10 feet below ground surface (depending on surface elevation). Groundwater movement within the sand aquifer is typically perpendicular to the length of the Long Beach Peninsula, from the peninsula axis to the east and west. The actual location of the groundwater divide between eastward- and westward-flowing groundwater is slightly offset to the Pacific side (west), resulting in a greater volume of groundwater discharge to Willapa Bay than to the Pacific Ocean. The silt/clay lenses may locally act as confining units restricting vertical groundwater movement in some areas, but the USGS did not document any regionally continuous confining layer within the sand aquifer (Thomas 1995). A generalized cross section of the Long Beach Peninsula is presented in Figure 1, adapted from Thomas (1995).

Surface water occurs in topographic lows, primarily in troughs between dune features. Typically an expression of shallow groundwater, surface water features generally follow a north-south drainage pattern except where altered by man-made canals, drainage ditches, or culverts. There are no instream flow or lake level minimums defined for surface water bodies on the peninsula or anywhere within WRIA 24. Consistent with the major agricultural economy of the area, numerous cranberry bogs occupy the lowlands. Cranberry bogs often reside in converted wetlands, but may be located in upland locations as well. Permitting of native wetlands for use as cranberry bogs is federally regulated under Section 404 of the Clean Water Act and is enforced by the United States Army Corps of Engineers (Corps).

Hydraulic continuity between surface waters and the shallow sand aquifer is well documented. Thomas (1995) compared groundwater and surface water elevations near eight major drainage channels along the peninsula. In 75 percent of the measurements, groundwater elevations were higher than the adjacent surface water body – indicating groundwater discharge to surface water. For the period of one month (January 1992), an estimated 7,700 acre-feet of groundwater discharged to surface waters across the peninsula. The same analysis suggests that from June through September, when groundwater elevations are at their lowest, there is no net groundwater discharge to surface water – indicating a net losing surface water condition. Thomas (1995) states that many of the lakes and marshes have thick deposits of low permeability organic sediment along their bottoms, but hydraulic continuity with surrounding groundwater is maintained through the lakes' upper margins where less of the low permeability material has accumulated.

Pacific County's Surface Water Management Plan (Pool 1985) illustrates the major drainages of the peninsula and describes methods for controlling stormwater, surface water, and groundwater. Historically, the peninsula has been plagued with numerous flooding problems associated with the transmission of surface water runoff to the receiving water bodies. These problems are typically associated with seasonal and long-term flooding and insufficient retention capacity. Solutions to these problems have included construction of primary drainage courses, periodic maintenance to reopen clogged drainage courses, and improvement/installation of control structures, outfalls, and tide gates (Pool 1985).

The South Main Drainage Ditch collects water from approximately 804 acres before discharging to the Pacific Ocean. The drainage basin consists of a relatively narrow swath, bounded by the Pacific Ocean (west) and Sandridge Road (east), extending from just east of the city of Long Beach, from 68th Place (north) to just south of Holman, before draining west along 30th Street to the ocean. Water discharged through the South Main Drainage Ditch is predominately stormwater runoff and discharge from catch basins servicing County roads. Moreover, some groundwater seeps into the ditch prior to discharging to the Pacific Ocean, but exact quantities have not been estimated to date.

In addition to the South Main Drainage Ditch, other significant surface water bodies in proximity to the proposed point of diversion include adjacent Cranberry Marsh to the east and Black Lake located approximately 2,900 feet south-southeast. However, both water bodies are located outside of the South Main drainage basin. Numerous small unnamed lakes and ponds are also present scattered throughout the area.

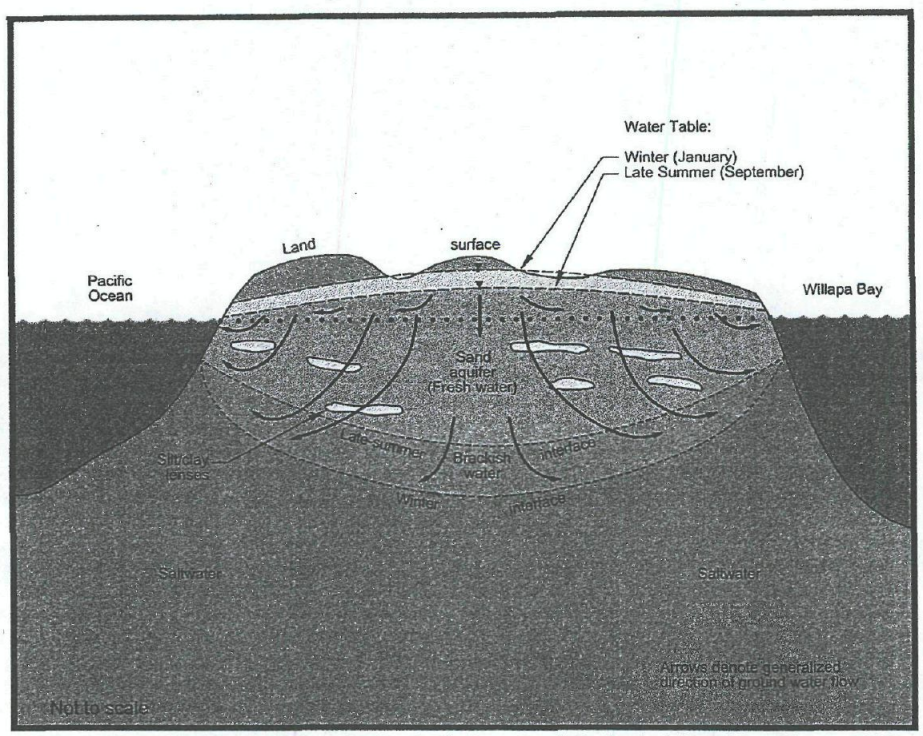


**Figure 1.** Generalized Geologic Cross-Section for the Long Beach Peninsula (adapted from Thomas 1995).

Long Beach Peninsula Water Balance

The Long Beach Peninsula exhibits a classic maritime climate – temperate year-around temperatures with 75 percent of the annual rainfall occurring between October and March. The high infiltration capacity of the surface soils affords an estimated 58 inches of recharge annually, equating to an estimated 111,000 acre-feet/year across the entire peninsula (Thomas 1995). The thickness of the groundwater lens in the sand aquifer fluctuates seasonally with precipitation. Precipitation is the sole source of aquifer recharge, with peak groundwater elevations of approximately 15 feet above MSL and the seasonal low of approximately 10 feet MSL (Thomas 1995). The Ghyben-Herzberg principle (Freeze 1979) states that a 1-foot change in fresh water elevation above sea level results in a 40-foot change (opposite direction) in the elevation of the fresh water/saline water interface below sea level. Application of this principle implies that the freshwater lens can approach 400 to 600 feet thick near the center line of the peninsula. The thickness of the freshwater lens will decrease (at a theoretical ratio of 40:1) with distance east and west from the groundwater divide in the peninsula center as the aquifer head decreases toward sea level.

As of 1992, groundwater withdrawals on the peninsula were classified into five categories (Thomas 1995): public supply, domestic supply, irrigation, livestock, and cranberry processing. Approximately 90 percent of the potable water supply on the peninsula comes from large water purveyors, with the remaining 10 percent originating from shallow privately owned wells. In 1992, the total annual volume of groundwater withdrawn for public and domestic supply was approximately 775 acre-feet. Comparatively, groundwater withdrawals for irrigation, livestock, and cranberry processing were relatively minor at 7.7, 0.6, and about 1.0 acre-feet, respectively. Cumulatively, the total groundwater withdrawals for 1992 accounted for approximately 782 acre-feet.

The major use of surface water on the peninsula is for the cultivation of cranberries, primarily diverted from lakes, ponds, canals, and drainage channels. In 1992, cranberry irrigation, frost/heat control, and harvesting for 605 acres utilized nearly 1,850 acre-feet of water (Thomas 1995). Typical water usage for the cultivation of cranberries includes summer irrigation of approximately 1.0 inch/week (Hattendorf 1996) for the 17 week irrigation season (equal to 1.4 acre-feet of water per acre), flooding of cranberry bogs during fall harvesting (equal to 0.75 acre-feet per acre), and winter frost and summer heat control (equal to 0.84 acre-feet per acre). Cumulatively, the typical annual water demand for cultivating cranberries is approximately 3.0 acre-feet per acre. For this application, the water duty does not take into account the significant amount of water reuse achieved by staggered bog elevations, coupled with plumbed inter-ties, and a return pipe to the unnamed lake. It is estimated that the volume of water recycled can exceed 50 to 70 percent of the total allocation (Kim Patten, verbal communication, June 2005). No cranberry water demand data were available in the State of Washington Irrigation Guide (USDA 1985).

Demands for freshwater on the Long Beach Peninsula are highly seasonal. In 1992, the flux of summer tourists nearly doubled the population of the peninsula, increasing the average monthly water usage from 55 acre-feet per month to over 100 acre-feet per month (Thomas 1995). Similarly, the irrigation season for turf and cranberry bogs primarily occurs during the summer months, immediately followed by the acute water requirements for cranberry harvest and processing in early Fall as detailed above.

Long-Term Trends in Water Levels and Water Quality

Thomas (1995) determined that elevated dissolved iron in the sand aquifer is the primary drinking water quality issue on the peninsula. Groundwater quality did not appear to have been adversely impacted from agricultural activities, but some above-background nitrate concentrations attributed to septic systems were observed in areas of higher population density.

Thomas (1995) also found that there has been no substantive change in groundwater quantity or quality in the sand aquifer between the early 1970s and 1992. Groundwater levels were stable between 1974 and 1992; chloride concentrations and specific conductance values (indicators of saline water intrusion) were also stable between 1968 and 1992. In general, groundwater quality of the Long Beach Peninsula is good, although localized elevated concentrations of iron have been reported (approximately 30 percent of water samples exceed the 0.3 mg/L state secondary maximum contaminant level based on aesthetics). However, no significant problems due to groundwater withdrawals, agricultural activities, or septic were identified.

Since the USGS study was published in 1995, Pacific County Department of Community Development has been collecting groundwater quality data from a 24 monitoring well network along the entire Long Beach Peninsula. Pacific County's more recent data from the immediate area of the subject application do not indicate water quality impacts, based on measured chloride or nitrate levels, or a discernable change in groundwater elevations. In the 24 well network, reported chloride concentrations ranged from 0.3 mg/L to 99.2 mg/L (excluding one anomalous well, No. 98, which had only one reported reading equal to 290 mg/L) and a average chloride concentration of 16 mg/L.

## APPLICATION EVALUATION

This Report of Examination (ROE) evaluates the application based on the conceptual model presented above. To approve the application, Ecology must issue written findings of fact and determine that each of the following four requirements of RCW 90.03.290 has been satisfied:

(1) The proposed appropriation would be put to a beneficial use;
(2) Water is available for appropriation;
(3) The proposed appropriation would not impair existing water rights; and
(4) The proposed appropriation would not be detrimental to the public welfare.

This ROE addresses these subjects in the above referenced order. Fulfillment of the four requirements determines the decision of Ecology.

### Source of Water Proposed for Appropriation

The applicant seeks to divert water at an increase rate from a man-made unnamed lake located in the northwest quarter of the northeast quarter of Section 28, Township 10 North, Range 11 West. The hydrogeologic regime of the Long Beach Peninsula is analogous to that of an island, with precipitation infiltrating on the uplands, recharging the sand aquifer, and flowing laterally within the aquifer to discharge to seawater at the marine boundaries. No regionally extensive confining unit has been identified to indicate distinct aquifer zones within the sand aquifer, i.e., the sand aquifer is considered a single continuous aquifer system beneath the entire peninsula and to the maximum depth of fresh water occurrence. Surface water bodies on the peninsula are typically an expression of the water table in the sand aquifer; however, surface water features may become perched as groundwater elevations seasonally decline.

In view of the hydraulic continuity linking surface water and groundwater and by virtue of their shared source of recharge, we consider that the source of water proposed for appropriation in this application comprises the entire hydrologic system described above (the sand aquifer, which expresses itself as surface water features in low lying areas). Consequently, all of the senior water right applications (based on priority date) are competing for the same source of water - inclusive of surface water and groundwater across the entire length of the Long Beach peninsula.

### Beneficial Use

In accordance with RCW 90.54.020(3), the proposed appropriation for cultivation and harvest of cranberries represents a beneficial use of water. This proposed appropriation, together with the applicant's two permits (S2-28851 and S2-28852), are the only sources of water for the cranberry operation. As detailed on the Application for Permit, the point of diversion is supported by the necessary infrastructure to deliver water to approximately 26 acres of cranberry bogs at an increased rate. The water would be used at rates consistent with standard agronomic practice for this area and would include substantial water reuse.

### Availability

No administrative or regulatory closures are identified that affect the availability of water requested under this application. The shallow sand aquifer is the most widely used source for groundwater on the Long Beach Peninsula and it is relatively well understood with respect to its water balance. Based on 1992 data, the USGS estimated that groundwater withdrawal from the sand aquifer across the peninsula is approximately 780 acre-feet/year, or 0.7 percent of the aquifer's annual recharge (111,000 acre-feet/year; Thomas 1995). Although highly sensitive to precipitation and seasonality, long-term water level trends in the aquifer have been evaluated in a number of detailed investigations. In the most recent assessment, Thomas (1995) concluded there are no discernable trends to water levels or water quality indicators of saltwater intrusion over the 20 to 25 years preceding 1992. No new water rights have been appropriated by Ecology since the time of the USGS' assessment; therefore, we expect little change to the hydrologic situation they documented. This is substantiated by more recent data collected by the Pacific County Department of Community Development and is consistent with the limited pumping stress on the sand aquifer relative to the annual recharge.

The unnamed lake is a direct expression of the surrounding groundwater conditions. The lake, which covers approximately 0.32 acres with an estimated volume of 3 acre-feet, was constructed by excavating a large amount of sand; then the water level was allowed to equilibrate to the adjacent groundwater elevation. Lake water levels fluctuate up to 5+ feet annually in response to seasonal groundwater elevations. As water is withdrawn from the lake, groundwater seepage replenishes depleted storage. The lake has been used for water supply for some time, and is regularly maintained and dredged to ensure adequate volume for peak water demands.

Pacific County Department of Public Works, the governing body in charge of operation and maintenance of many of the peninsula's drainage courses, was contacted about diverting water out of the South Main Drainage Ditch. Public Works indicated that the water in the ditch is in excess, in route to be discharged to the Pacific Ocean, and they do not anticipate any problems with appropriating water from the ditch for beneficial use.

Based on the collective information, we conclude that the quantity of water requested for use in this application is available for appropriation.

### Potential for Impairment

RCW 90.03.290 and RCW 90.44.060 require a determination that a new appropriation will not impair existing rights. Based on the results of the distance-drawdown analysis presented below, consideration of permits, certificates, and claims within a 0.5-mile radius of the proposed diversion were considered conservatively inclusive of all potentially affected senior rights. Twenty five water right permits and certificates lie within 0.5 mile of the subject application's proposed point of diversion. Thirteen of these water rights are groundwater rights and 12 are surface water rights. The water rights vary in quantity and utilize either surface water or the shallow sand aquifer. Table 1 lists the water rights and describes the water quantities allocated as well as the location of use.

| Water Right Number | Name | Purpose | Priority Date | Qi | Qa in afy | Point of Diversion/Withdrawal |
|---|---|---|---|---|---|---|
| S2-65022JWRIS | Alsaker , Jacob & Mart | IR | 1/1/1909 | 4 cfs | 117 | S1/2 NE1/4, T10N R11W Section 28 |
| S2-65027JWRIS | Brateng, N.I. & M.E. | IR | 1/1/1909 | 2 cfs | 73 | SE1/4 NE1/4, T10N R11W Section 28 |
| S2-65026JWRIS | Brateng, E.T. & L.H. | IR | 1/1/1909 | 2 cfs | 58 | T10N R11W Section 28 |
| S2-65035JWRIS | McPhail, Malcom E. | IR | 1/1/1909 | 3 cfs | 88 | T10N R11W Section 28 |
| S2-CCVOL1-2P149 | McPhail, Malcolm | IR | 1/1/1909 | 3 cfs | 88 | T10N R11W Section 28 |
| S2-65018JWRIS | Ostgaard , J.R. & J.E. | IR | 1/1/1910 | 3 cfs | 107 | N1/2 NW1/4, T10N R11W Section 28 |
| S2-65040JWRIS | Charron, J.E. & Marian | IR | 1/1/1910 | | 7 | T10N R11W Section 21 |
| G2-65001JWRIS | Stamp, T.L. & D.F. | DS | 1/1/1934 | 9 gpm | 1 | SW1/4 SE1/4, T10N R11W Section 21 |
| G2-65057JWRIS | Kirkman, R.M. & Ceceli | DS | 1/1/1934 | 9 gpm | 1 | SW1/4 SE1/4, T10N R11W Section 21 |
| G2-65067JWRIS | Kirkman, Robert M. | DS | 1/1/1934 | 9 gpm | 1 | T10N R11W Section 21 |
| G2-65033JWRIS | Glenn, F.O. & M.M. | IR | 1/1/1935 | 1,688 gpm | 122 | SW1/4 SE1/4, T10N R11W Section 21 |
| G2-*00362SWRIS | Kauttu, D.C. et al. | IR | 11/15/1944 | 200 gpm | 5 | SE1/4 SE1/4, T10N R11W Section 21 |
| S2-*07289CWRIS | Brateng, E. | IR,FR | 6/27/1946 | 2 cfs | | T10N R11W Section 28 |
| G2-65023JWRIS | Alsaker , Jacob & Mart | IR | 7/22/1957 | 500 gpm | 50 | SE1/4 NE1/4, T10N R11W Section 28 |
| G2-*04651CWRIS | Alsaker, J. | IR | 7/22/1957 | 500 gpm | 50 | T10N R11W Section 28 |
| G2-65065JWRIS | Ruuttila, E.W. & G.A. | DS | 1/1/1961 | 9 gpm | 1 | SW1/4 SE1/4, T10N R11W Section 21 |
| G2-65036JWRIS | Tilden, D.R. & F.E. | IR | 1/15/1964 | 800 gpm | 14 | T10N R11W Section 28 |
| G2-*06983CWRIS | Tilden, D. | IR | 1/15/1964 | 800 gpm | 14 | T10N R11W Section 28 |
| S2-*18893CWRIS | Brateng, E. | IR | 3/9/1965 | 1 cfs | 36 | T10N R11W Section 28 |
| S2-*20769CWRIS | Ostgaard, J.R. | IR | 2/26/1968 | 5 cfs | 44 | T10N R11W Section 28 |
| G2-65041JWRIS | Charron, J.E. & Marian | DS | 1/1/1969 | 9 gpm | 1 | SE1/4 SE1/4, T10N R11W Section 21 |
| G2-65017JWRIS | Stehman, R.L. & Nellie | DS | 1/1/1971 | 9 gpm | 1 | SW1/4 SE1/4, T10N R11W Section 21 |
| G2-24569CWRIS | Thissell, D. | IR,FP | 5/2/1977 | 500 gpm | 117 | T10N R11W Section 28 |
| S2-24555BWRIS | Faddis, G.L. ET UX | IR,DS | 5/20/1977 | | 23 | T10N R11W Section 28 |
| S2-65062JWRIS | Ruuttila, E.W. & G.A. | ST | | | | S1/2 SE1/4, T10N R11W Section 21 |

**Table 1.** Water Right Permits and Certificates within a 0.5 Mile Radius of Proposed Point of Diversion.

In addition, a total of 67 claims to vested water rights were identified in an area of 0.5-mile radius from the proposed point of diversion.

The point of diversion is located near the southern end of the unconsolidated sediment of the Long Beach Peninsula. Bedrock outcrops to the south, forming Cape Disappointment, and to the east as the landmass connecting the peninsula to the mainland. As a result, not only does the shallow sand aquifer receive recharge from precipitation, but also from runoff and interflow off the neighboring bedrock hills. The point of diversion is situated just east of the groundwater divide running along the north-south axis of the peninsula (Thomas 1995); this area represents the thickest part of the fresh groundwater lens. However, the depth to bedrock may be less than the thickness prescribed by the Ghyben-Herberg ratio; thereby, locally limiting the lower boundary of the fresh groundwater lens. If true, the entire extent of the sand aquifer in this area, from near ground surface to the top of the basal bedrock, would be fresh groundwater.

Due to the great thickness of the fresh groundwater lens in this area, diversion of surface water from near the groundwater divide is not likely to significantly impact the cumulative thickness of the sand aquifer freshwater lens. Any change in head caused by the diversion is not expected to be discernable relative to the seasonal groundwater fluctuations. The relatively shallow depth to bedrock and the limited thickness of saline water (if present) beneath the freshwater lens limits the potential for saline water upwelling in response to drawdown in the freshwater lens. Lateral saline intrusion from the shoreline is of limited concern because the point of withdrawal is located on the east side of the groundwater divide with Willapa Bay over four miles away. Any depression in groundwater elevations would be quickly attenuated by neighboring (fresh) surface water bodies, including the adjacent Cranberry Marsh.

Review of the Ecology well log database indicates that the deepest well within a 0.5 mile radius of the proposed diversion is 25 feet below ground surface. Even during the late summer - when groundwater levels are at their lowest – we estimate that more than 400 feet of fresh groundwater could theoretically remain at the point of maximum water table drawdown (if depth to bedrock is sufficient). This thickness should be more than adequate to prevent the proposed surface water appropriation from impairing neighboring senior wells.

In addition to certificated, permitted, and claims to water rights, there are a number of exempt wells in a 0.5-mile radius from the proposed point of diversion. The Ecology database was queried for well logs within a 0.5-mile radius of the subject application, resulting in 4 possible exempt water supply wells (excluding one resource protection well). As mentioned above, a review of the well logs for these wells indicated that all of the wells are completed at a depth less than 26 feet. Impairment of these exempt wells due to upconing or lateral intrusion of saline water is not expected to occur.

Considering the high degree of continuity between surface water and groundwater, the point of diversion can be theoretically considered equivalent to a large well pumping from the sand aquifer. Using the total increased diversion rate of 3.27 cfs (1.77 cfs under S2-28851 plus 1.5 cfs under the current request), and applying the Theis assumptions (Theis 1935) with correction for water table conditions, no discernable (greater than 0.01 foot) drawdown is calculated to occur further than a 200 foot radius from the point of diversion at the requested increased rate after eight hours. The calculation assumes average hydraulic parameters for the sand aquifer presented in Thomas (1995). Irrigation schedules vary, but typical don't exceed eight hours in a 24 hour period.

Nearly all of the water rights within a 0.5-mile radius of the subject application are withdrawing from surface water bodies, drainage channels, or from the sand aquifer - all of which are in close hydraulic connection with the point of diversion. However, the subject applicant has reportedly been diverting from the unnamed lake for more than 15 years. No adverse impacts from neighboring water right holders have been reported during that period.

Based on the collective information, impairment of existing rights is not anticipated with full use of the requested quantity.

**Public Welfare**
No protests to the application were received. The proposed appropriation will support the agricultural economy of the area, and no detriment to the public welfare was identified.

## CONCLUSIONS

The conclusions based on the above investigation are as follow:

1. The proposed appropriation for cranberry irrigation is a beneficial use of water.
2. The increased rate of diversion requested for use in this application is available for appropriation.
3. The proposed appropriation will not impair senior water rights.
4. The proposed appropriation will not be detrimental to the public interest.

## RECOMMENDATION

I recommend an approval of application S2-30006 and issuance of a permit to allow appropriation of surface water from the unnamed lake at a maximum instantaneous withdrawal rate (Qi) of 1.77 cfs. This rate is additive to permit S2-28851 and S2-28852, increasing the total authorized rate of diversion from the unnamed lake from 1.5 to 3.27 cfs. No additive annual quantity to permits S2-28851 or S2-28852 is authorized. The period of use will be May through October for irrigation, October through November for harvesting, and as needed for frost/heat control.

The amount of water granted is a maximum limit that shall not be exceeded and the water user shall be entitled only to that amount of water within the specified limit that is beneficially used and required.

The permit shall be subject to existing rights and the following provisions:

1. An approved measuring device shall be installed and maintained for each diversion/withdrawal of the sources identified by this water right in accordance with the rule "Requirements for Measuring and Reporting Water Use," Chapter 173-173 WAC.

   Water use data shall be recorded weekly and maintained by the property owner for a minimum of five years. The maximum monthly rate of diversion/withdrawal and the monthly total volume shall be submitted to the Department of Ecology by January 31st of each calendar year.

   Reported water use data shall be submitted via the Internet or by using the enclosed forms. To set up an internet account, access Https://fortress.wa.gov/ecy/wrx/Meteringx/. If you have questions or need additional forms, contact the Southwest Regional office.

   Department of Ecology personnel, upon presentation of proper credentials, shall have access at reasonable times, to the records of water use that are kept to meet the above conditions, and to inspect at reasonable times any measuring device used to meet the above conditions.

   WAC 173-173 describes the requirements for data accuracy, device installation and operation, and information reporting. It also allows a water user to petition the Department of Ecology for modifications to some of the requirements. Installation, operation and maintenance requirements are enclosed as a document titled "Water Measurement Device Installation and Operation Requirements". http://www.ecy.wa.gov/programs/wr/measuring/measuringhome.html

2. The water user is advised that quantities recommended, and the number of acres to be irrigated, may be reduced at the time of issuance of a final water right commensurate with the capacity of the installed system, and the number of acres actually irrigated.

REVIEWED BY: Phil Crane Date: 10/27/08
Phil Crane

## FINDINGS OF FACT AND DECISION

Upon reviewing the above report, I find all facts, relevant and material to the subject application, have been thoroughly investigated. Furthermore, I find water is available for appropriation and the appropriation as recommended is a beneficial use and will not be detrimental to existing rights or the public welfare.

Therefore, I ORDER a permit be issued under Surface Water Application Number S2-30006, subject to existing rights and indicated provisions, to allow appropriation of public surface water for the amount and uses specified in the foregoing report.

Signed at Olympia, Washington, this 30th day of October, 2008.

Thomas Loranger

Thomas Loranger
Water Resources Supervisor
Southwest Regional Office

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