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Base from U.S. Geological Survey
Orcas Island, Richardson 1:62:500, 1957,
Sucia Island, 1973, Stuart Island, 1953,
Waldron Island, 1954, Roche Harbor, 1954,
Friday Harbor, 1954, False Bay, 1:24,000.
1954.

OCCURRENCE, QUALITY, AND USE OF GROUND WATER IN ORCAS, SAN JUAN, LOPEZ, AND SHAW ISLANDS, SAN JUAN COUNTY, WASHINGTON

Specific Capacities of Wells

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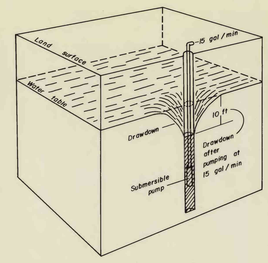
The specific capacity of a well provides a general guide to the short-term capacity of the well to provide water. Specific capacity is determined by dividing the rate at which water is pumped from a well by the water-level drawdown; it is usually reported in gallons per minute per foot (gal/min/ft) of drawdown (fig. 1). Specific capacity is a function of several related factors, including aquifer permeability and storage characteristics, duration of pumping, the depth of penetration into the aquifer, and the construction and development of the well itself.

Specific-capacity data for a well can be used to determine the depth at which a pump should be placed. For example, if a well has a specific capacity of 5 gal/min per foot and the owner plans to pump at 50 gal/min, he should allow for 10 feet of available drawdown in the well column. These data can be very important in an area where excessive drawdowns of water levels are permitting seawater intrusion to occur (sheet 7). However, it should be noted that because of the number of interrelated and varying factors listed above, the specific capacity calculated for one well cannot be generalized to estimate the specific capacity of adjacent wells.

Specific capacities calculated for wells in the study area were determined from drillers' records of well-yield tests, which are usually made upon completion of the well. However, because the tests vary in duration and method, the resulting calculations obviously do not provide directly comparable data. Of 279 wells for which well-test data are reported in drillers' records, 90 were pump-tested, 89 were bail-tested, and 100 were either air-tested or the method was not reported.

The most reliable method for determining specific capacity is the pump test, which allows both an accurate measure of the pumping rate and frequent measuring of the water-level drawdown during pumping.



Specific capacity = gallons per minute per foot of drawdown
= 15 gal/min
10 ft
= 1.5

Figure 1. Example calculation of specific capacity.

Drift wells

The specific capacities calculated for the drift wells indicate that they can generally provide adequate water for domestic needs. As shown on the map, specific capacities of most drift wells exceed 1 gal/min per foot, many are in the range of 5-50 gal/min per foot, and seven have capacities of more than 50 gal/min per foot. Most drift wells are drilled only deeply enough to provide for drawdowns of 5 to 10 feet

In some areas where the drift aquifer contains considerable clay, silt, and fine sand, as in the Eastsound area of Orcas Island, some problems have been encountered in the clogging of well screens and a resulting reduction of well yield.

Bedrock wells

The low specific capacities of bedrock wells, even when combined with large drawdown available in the deeper wells, indicate that most of the wells are barely adequate for single-unit domestic supplies, which are usually satisfied by a pumping rate of only a few gallons per minute. During yield tests of many of the wells, the water levels were drawn down to well bottom within an hour or two. Although most bedrock wells are drilled deeply in anticipation of intercepting additional water-yielding fracture zones, the occurrence of fractures generally decreases with depth, and the added depth only provides a greater storage capacity from which to draw water. Only about a dozen of the recorded bedrock wells had specific capacities exceeding 0.20 gal/min per foot, a value considered very low when compared with that of drift wells.

An attempt was made to relate the locations of bedrock wells with larger specific capacities to fracture zones, as represented by the lineaments shown on sheet 2. There appears to be no clear correlation, however; the fractures providing the larger yields apparently are of only local extent. Also, an insufficient number of bedrock wells are situated on lineaments to allow a meaningful analysis.