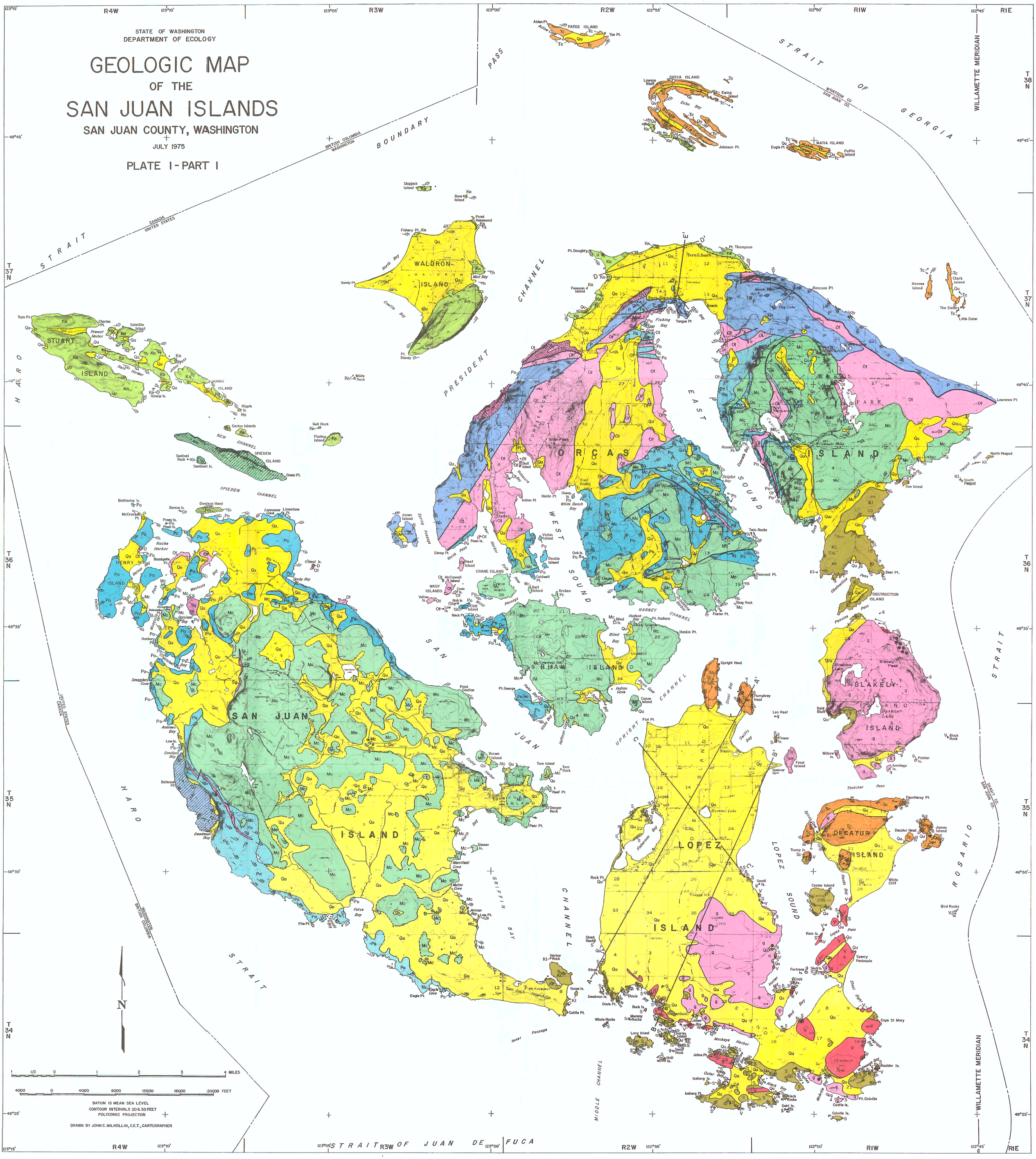
STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

GEOLOGIC MAP OF THE SAN JUAN ISLANDS

SAN JUAN COUNTY, WASHINGTON

JULY 1975

PLATE I - PART I



GEOLOGIC EXPLANATION

AREA 1
STRATIGRAPHIC & SEMI-STRATIGRAPHIC MAPPING

Bedrock - Joseph Vance, University of Washington
Quaternary Sediments - Paul Eddy, Geologist, Department of Ecology

QUATERNARY

Qu — Pleistocene - Glacial deposits include glaciomarine drift, till, stratified outwash and deltaic beds.

TERTIARY

Tc — Chuckanut Formation (?), Eocene (and Paleocene?). Lower Tertiary. Continental sandstone, shale and conglomerate.

CRETACEOUS

Kn — Nanaimo Formation. Upper Cretaceous. Marine and continental shale, siltstone, sandstone and conglomerate.

Ks — Spieden Formation. Lower Cretaceous. Marine pebble conglomerate, with siltstone and sandstone interbeds.

Kl — Lummi Formation. Cretaceous (?). Turbidite sediments. Graywacke siltstone, shale and minor conglomerate.

MESOZOIC

Mc — Constitution Formation. Mesozoic. Massive siltstones, and shale, highly deformed locally. Contains subordinate graywacke, tuff, basalt and ribbon chert. Conglomerate locally present at the base of the unit on western San Juan Island.

TRIASSIC

Rh — Haro Formation. Upper Triassic. Well bedded to massive volcanic sediments, chiefly siltstone, sandstone and angular to rounded volcanic conglomerate. Local calcareous beds.

PERMIAN

Po — Orcas Formation. Middle Permian. Gray ribbon chert with interbedded green tuff lava and limestone. Occurrences of Lower and Upper Permian rocks on northern Orcas Island are also shown as Orcas.

Pv — Middle Permian volcanic rocks. Basaltic tuff, breccia and pillow lava with subordinate ribbon chert and limestone on western San Juan Island.

PENNSYLVANIAN

P — Lower Pennsylvanian. Marine beds of stratified to massive andesitic pyroclastic rocks and volcanic sediments; chiefly breccia, lapilli-tuff and dark siliceous tuff. Interbedded limestone.

DEVONIAN

D — Late Middle Devonian. Clastic sediments and pyroclastic volcanic rocks with limestone lenses.

SILURIAN

Sg — Garrison Formation (?). Silurian or Early Devonian. Greenschist, epidote amphibolite, and quartzite.

ORDOVICIAN

Ot — Turtleback Complex. Late Ordovician. Gabbro, diorite quartz diorite. Minor pyroxenite and serpentinite. Locally intruded by silicic dikes which may be much younger.

AREA 2
LITHOLOGIC MAPPING

John T. Whetten, University of Washington

Qu — Alluvium, beach deposits, glacial till, advance outwash, recessional outwash, and lake deposits. Pleistocene and Recent. Generally an excellent aquifer (except till and interglacial sediments) capable of providing adequate water to several residences from a single well. Coastal deposits are sometimes vertical to nearly vertical cliffs which are highly unstable and subject to frequent slumping and landsliding. Areas underlain by till tend to be marshy or swampy.

Sc — Conglomerate, sandstone, and shale in decreasing order of abundance. Generally contains evidence of plant matter and, occasionally coal. Clasts consist of chert, plutonics, volcanics, metamorphics, limestone, sandstone, and shale. May be in part non-marine or deltaic. Age unknown. These rocks are generally impermeable, but large fracture zones are common and usually contain very adequate water supplies for single-family residences. At the coastline, rocks of this unit usually form very steep slopes which are relatively stable.

V — Volcanic rocks, primarily pillow lavas, but including also some flows, diabase dikes, tuffs, breccias, and jaspers. Age unknown. These rocks are impermeable but are normally sufficiently fractured to provide marginal to adequate water supplies to single-family residences. Exposures vary from steep, high cliffs (Chadwick Hill, Davis Head) to gently rolling slopes.

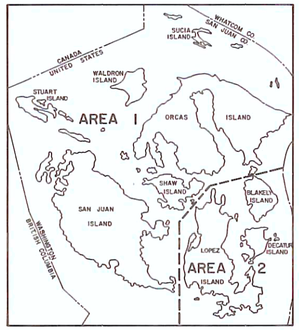
S — Flysch-type rocks consisting of moderately well-sorted sandstones, shales, and conglomerates; chert; and rare limestone. Rocks characteristically appear black or blue-gray. Clastic rocks commonly have graded bedding suggestive of a turbidite origin. Clasts consist mostly of chert and volcanic fragments. Age unknown. These rocks are impermeable; their potential for water depends upon fracturing which is highly variable. At best, adequate water for single-family residences can be obtained. Areas underlain by these rocks are usually gently rolling, with steep cliffs generally absent.

g — Greenstones. A tectonic breccia consisting primarily of diabase and plutonic rocks ranging from gabbros to quartz diorites. Includes rocks of the Turtleback Complex on Blakely Island. Lenses of sedimentary rocks (primarily shales and limestones) and pillow lavas sometimes found within the greenstones; it is not known whether they are part of the greenstone complex or are related to units described above. Age is unknown. Although these rocks are impermeable, wells drilled in this unit consistently produce adequate water from fractures to single-family residences. Outcrops of greenstone tend to be massive and bold; some coastal exposures are extremely steep (Blakely Island).

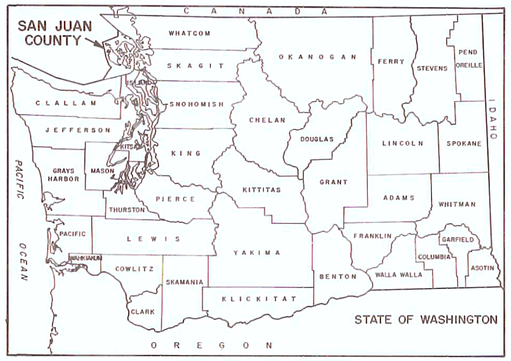
● — Serpentinite. Smooth, shiny blue-gray rock usually exposed in fracture zones. Age and water-bearing characteristics are unknown. Serpentinite is easily eroded and tends to form small valleys and swales.

GEOLOGIC SYMBOLS

- Contact - dashed where inferred
- Fault
- Strike and Dip of beds
- Strike and Dip of overturned beds
- Strike of vertical beds
- Strike and Dip of cleavage or foliation
- A ——— A' Lines of cross section, see Plate 2.



INDEX MAP TO GEOLOGY



INDEX MAP TO COUNTIES

BASE DATA

Enlargements (15 minute series) and reductions (7.5 minute series) of U.S. Geological Survey topographic quadrangle mapping series. These enlargements and reductions have been screened 50% to provide land net, cultural, and topographic features. Bathymetric contours removed to accentuate the land masses.

7.5 minute series (scale 1:24,000);

Stuart Island (1953), Waldron Island (1954), Roche Harbor (1954), Friday Harbor (1954), False Bay (1954).

These maps were photoinspected by the U.S.G.S. in 1972, no major culture or drainage changes.

15 minute series (scale 1:62,500);

Orcas Island (1941-57), Richardson (1941-57), Anacortes (1940-51)

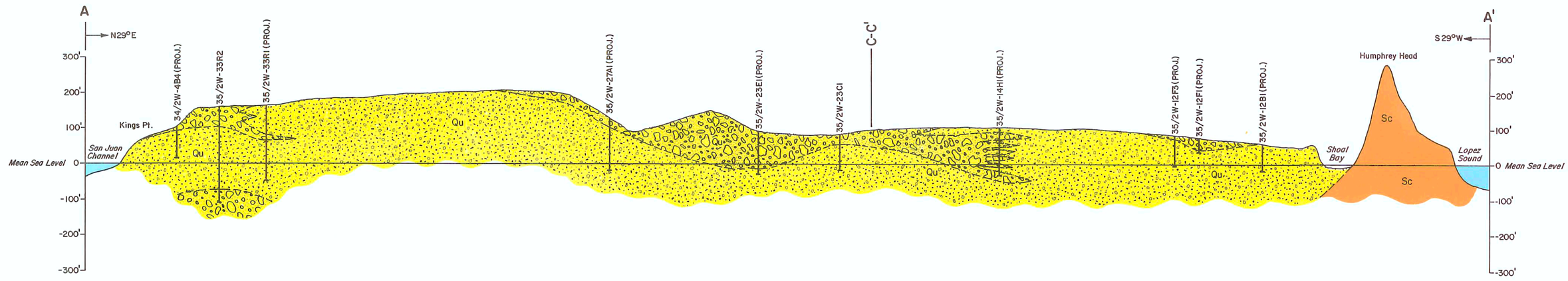
These maps are in process of revision by the U.S.G.S., date of completion unknown.

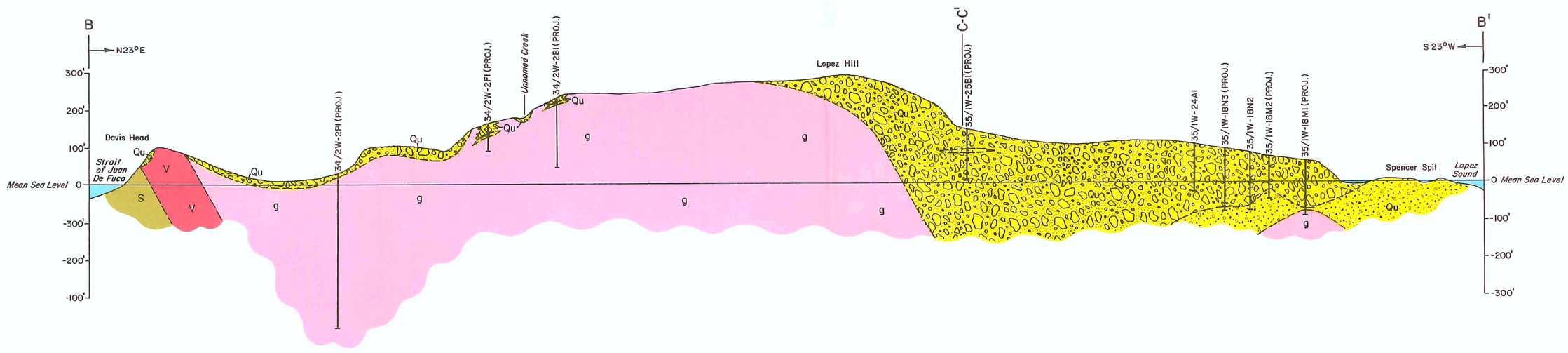
PROJECT SUPERVISOR AND SENIOR GEOLOGIST; ROBERT H. RUSSELL, CPG.

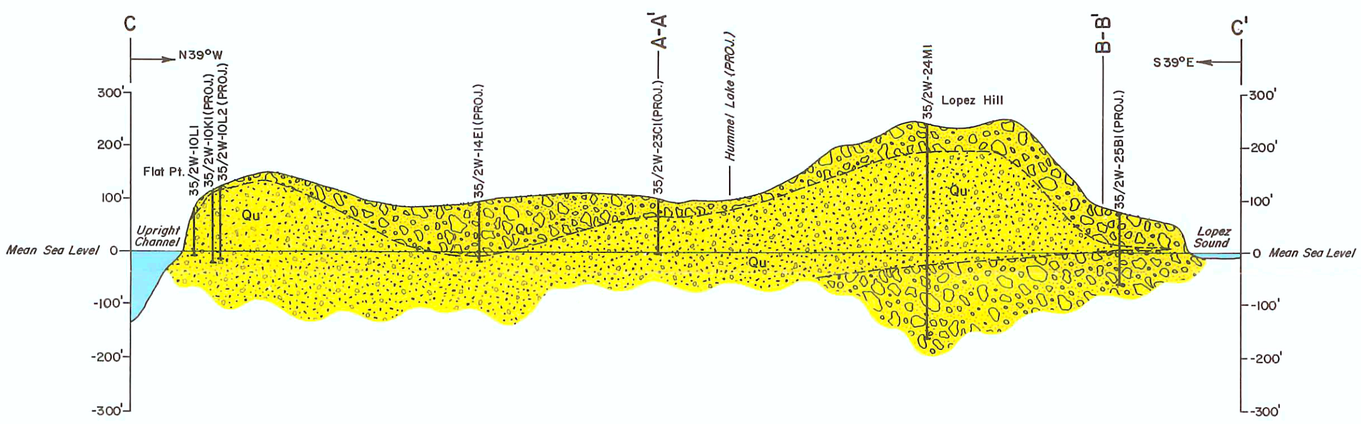
STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
JOHN A. BIGGS, DIRECTOR

GEOLOGIC LEGEND
OF THE
SAN JUAN ISLANDS
SAN JUAN COUNTY, WASHINGTON

SCALE: NO SCALE	DATE: JULY 1975
BY: JOSEPH VANCE and JOHN T. WHETTEN, UNIVERSITY OF WASHINGTON PAUL EDDY, GEOLOGIST, DEPARTMENT OF ECOLOGY	
DRAWN BY: JOHN C. MILHOLLIN, C.E.T., CARTOGRAPHER	PLATE 1-PART 2





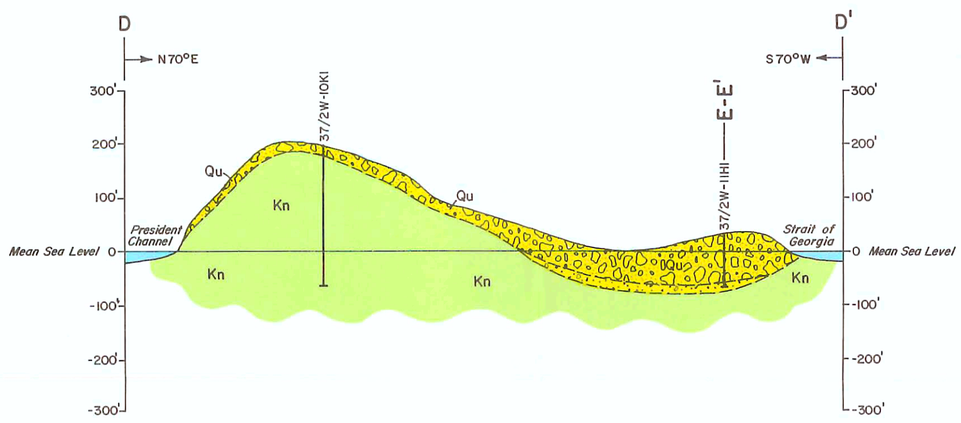


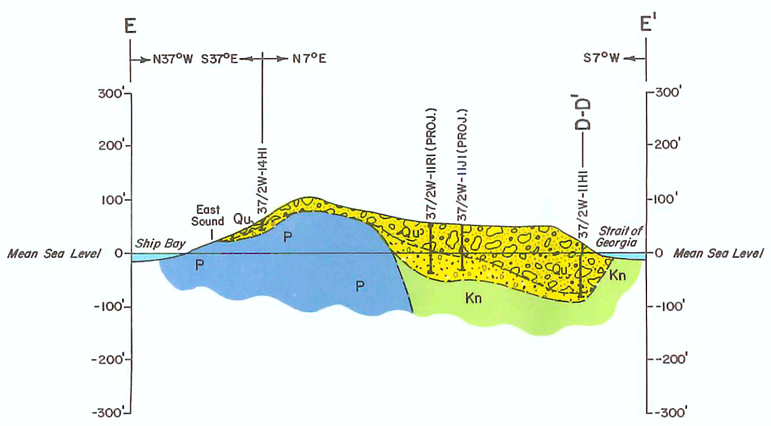
CROSS SECTIONS THROUGH SURFICIAL SEDIMENTS, LOPEZ ISLAND

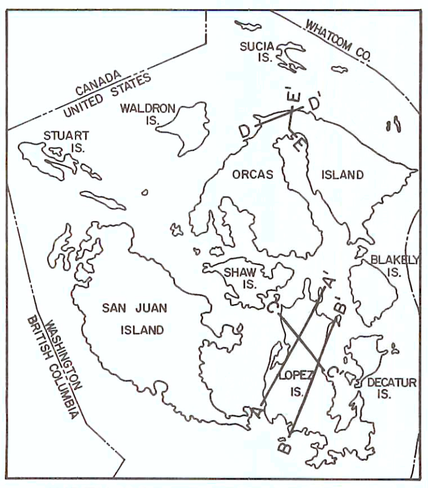
JOHN T. WHETTEN

CROSS SECTIONS THROUGH SURFICIAL SEDIMENTS, ORCAS ISLAND

ROBERT H. RUSSELL







INDEX MAP TO CROSS SECTIONS

GEOLOGICAL EXPLANATION

SEE PLATE 1 - PART 2 FOR COMPLETE UNIT EXPLANATION

- Qu — Alluvium, IMPERMEABLE SEDIMENTS, till, silt, clay, hardpan, blue clay, brown clay.
- Qu — Alluvium, PERMEABLE SEDIMENTS, advance outwash, sand, gravel, sandy gravel, sandy silt.

BEDROCK, generally impermeable except for joints and fractures.

- Sc — Conglomerate
- V — Volcanic rocks
- Kn — Nanaimo Formation
- S — Flysch-type rocks
- P — Lower Pennsylvanian
- g — Greenstones

All stratigraphic data from drillers well logs

1 1/2 0 1 Miles

1000 0 1000 2000 3000 4000 5000 6000 7000 Feet

HORIZONTAL SCALES

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
JOHN A. BIGGS, DIRECTOR

GEOLOGIC CROSS SECTIONS OF THE SAN JUAN ISLANDS

SAN JUAN COUNTY, WASHINGTON

SCALE: HORIZ. 1:24,000 (2,000 feet per inch) - VERT. 200 feet per inch	DATE: JULY 1975
BY: JOHN T. WHETTEN, UNIVERSITY OF WASHINGTON, AND ROBERT H. RUSSELL, C.P.G., SENIOR GEOLOGIST	
DRAWN BY: JOHN C. MILHOLLIN, C.E.T., CARTOGRAPHER	PLATE 2

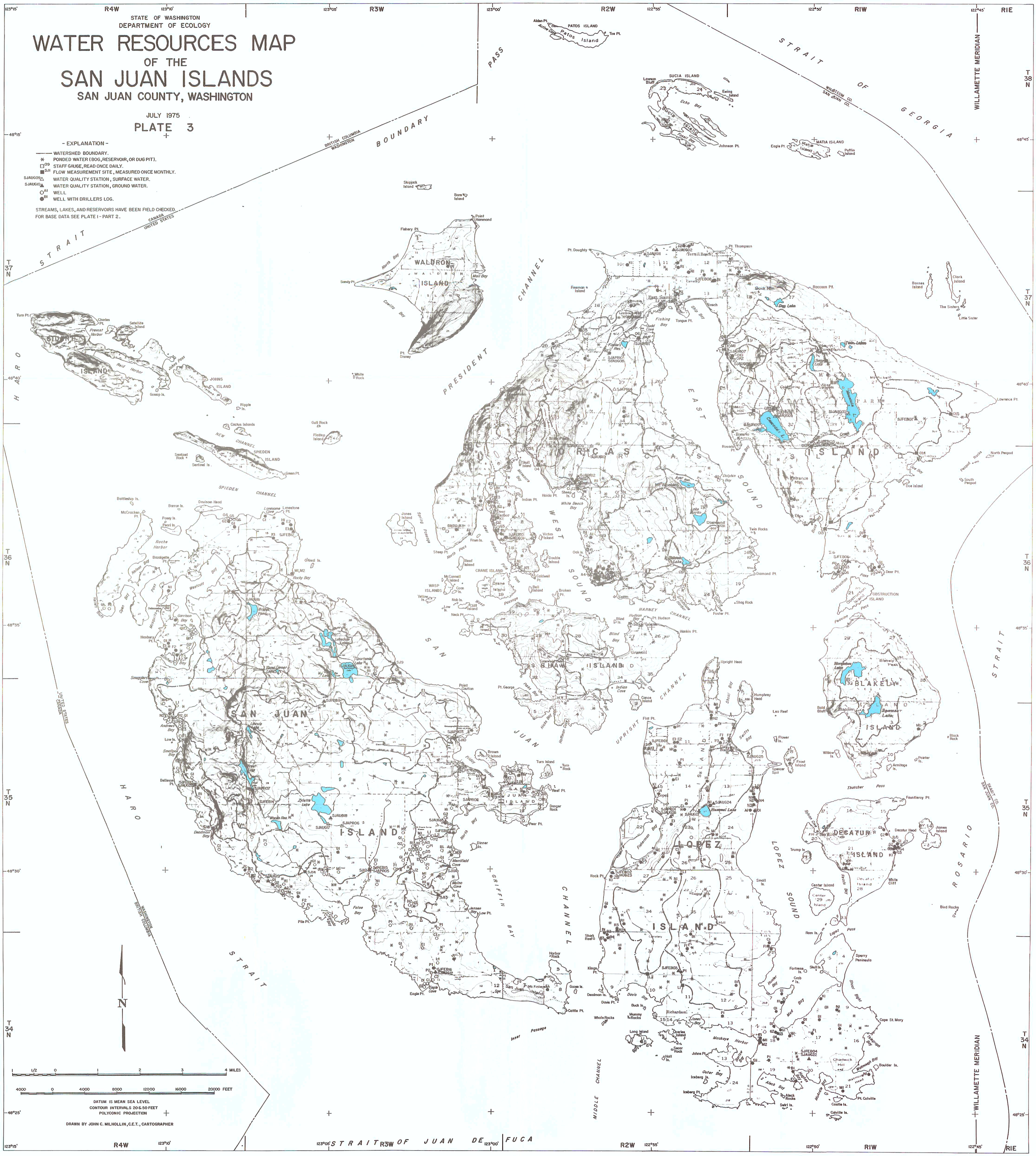
STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

WATER RESOURCES MAP
OF THE
SAN JUAN ISLANDS
SAN JUAN COUNTY, WASHINGTON

JULY 1975

PLATE 3

- EXPLANATION -

- WATERSHED BOUNDARY.
- PONDED WATER (BOG, RESERVOIR, OR DUG PIT).
- 09 STAFF GAUGE, READ ONCE DAILY.
- SJ1 FLOW MEASUREMENT SITE, MEASURED ONCE MONTHLY.
- SJAUG09 WATER QUALITY STATION, SURFACE WATER.
- SJAUG10 WATER QUALITY STATION, GROUND WATER.
- A1 WELL.
- B1 WELL WITH DRILLERS LOG.

STREAMS, LAKES, AND RESERVOIRS HAVE BEEN FIELD CHECKED.
FOR BASE DATA SEE PLATE 1 - PART 2.