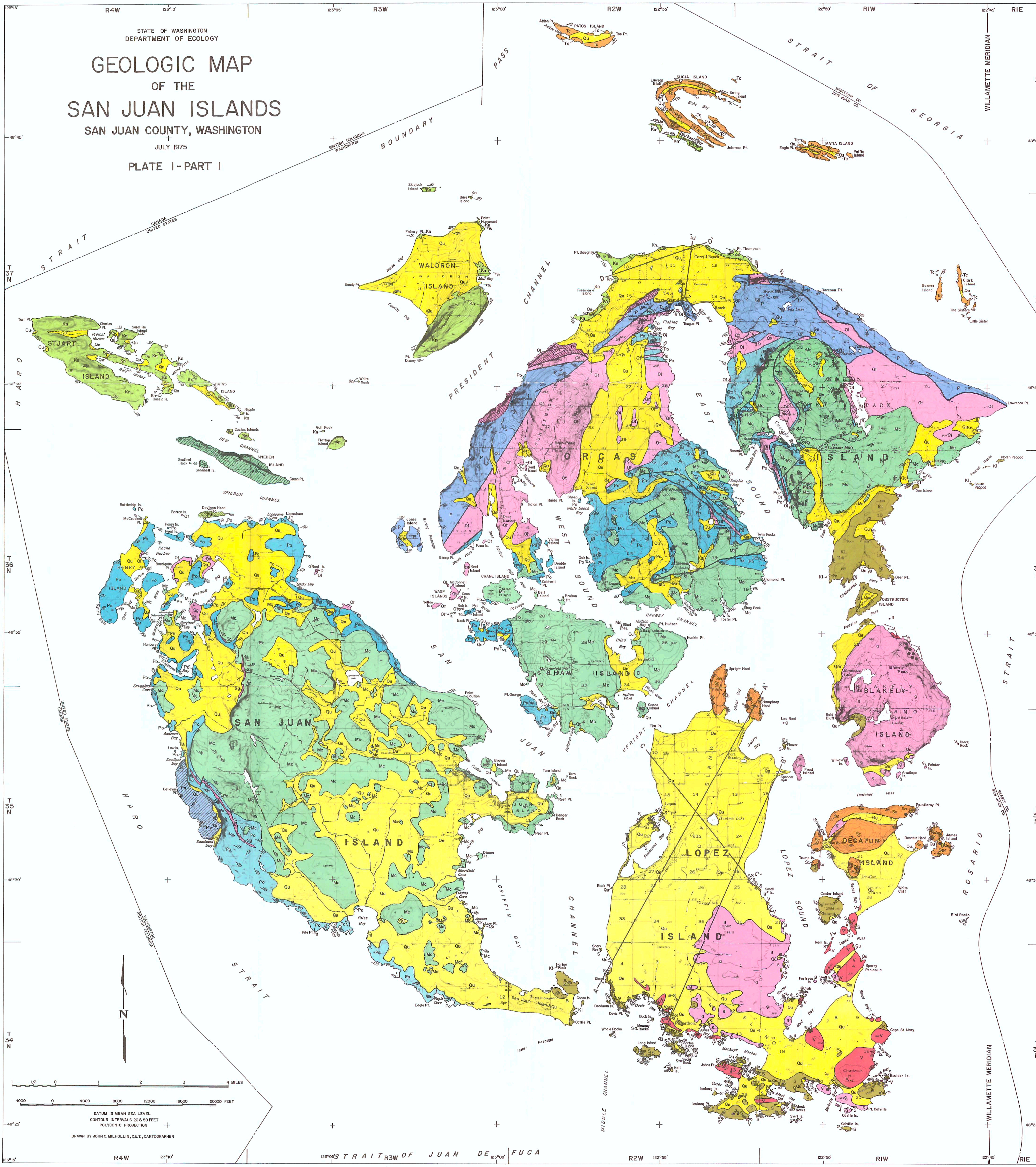

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
GEOLOGIC MAP
OF THE
SAN JUAN ISLANDS
SAN JUAN COUNTY, WASHINGTON
JULY 1975
PLATE I - PART I
R4W
R3W
R2W
RIW
RIE
T 38 N
T 37 N
T 36 N
T 35 N
T 34 N
WILLAMETTE MERIDIAN
HARO STRAIT
STRAIT OF GEORGIA
ROSARIO STRAIT
STRAIT OF JUAN DE FUCA
PRESIDENT CHANNEL
SAN JUAN CHANNEL
EAST SOUND
WEST SOUND
GRIFFIN BAY
MIDDLE CHANNEL
UPRIGHT CHANNEL
HARNEY CHANNEL
LOPEZ SOUND
NEW CHANNEL
SPIEDEN CHANNEL
BOUNDARY
BRITISH COLUMBIA
WASHINGTON
CANADA
UNITED STATES
PATOS ISLAND
SUCIA ISLAND
MATIA ISLAND
WALDRON ISLAND
STUART ISLAND
SPIEDEN ISLAND
HENRY ISLAND
ORCAS ISLAND
SHAW ISLAND
SAN JUAN ISLAND
LOPEZ ISLAND
BLAKELY ISLAND
DECATUR ISLAND
OBSTRUCTION ISLAND
WASP ISLANDS
CRANE ISLAND
Clark Island
Barnes Island
The Sisters
Little Sister
Puffin Island
Ewing Island
Johnson Pt.
Eagle Pt.
Skipjack Island
Bare Island
Point Hammond
Fishery Pt.
Sandy Pt.
Pt. Disney
Turn Pt.
Johns Island
Cactus Islands
Sentinel Island
Gull Rock
Flattop Island
Green Pt.
Battleship Is.
Davison Head
Limestone Pt.
Roche Harbor
Jones Island
Pt. Doughty
Pt. Thompson
Raccoon Pt.
Lawrence Pt.
Freeman Island
Tongue Pt.
Rosario Pt.
Doe Island
Twin Rocks
Diamond Pt.
Foster Pt.
Shag Rock
Deer Pt.
Peapod Rocks
North Peapod
South Peapod
Pt. Hudson
Hankin Pt.
Upright Head
Humphrey Head
Flat Pt.
Frost Island
Leo Reef
Spencer Spit
Black Rock
Pointer Is.
Armitage Is.
Thatcher Pass
Fauntleroy Pt.
Decatur Head
James Island
Center Island
Bird Rocks
White Cliff
Sperry Peninsula
Cape St. Mary
Boulder Is.
Pt. Colville
Castle Is.
Colville Is.
Iceberg Pt.
Long Island
Whale Rocks
Mummy Rocks
Deadman Is.
Davis Pt.
Kings Pt.
Shark Reef
Rock Pt.
Cattle Pt.
Goose Is.
Harbor Rock
Eagle Pt.
Pile Pt.
Bellevue Pt.
Smallpox Bay
Andrews Bay
Low Is.
Kanaka Bay
False Bay
Pt. Caution
Brown Island
Turn Island
Danger Rock
Pear Pt.
Dinner Is.
Jensen Bay
Low Pt.
Pt. George
Canoe Island
Indian Cove
Blind Bay
Hudson Bay
Fisherman Bay
Hummel Lake
Lopez Hill
Mackaye Harbor
Shoal Bay
Swifts Bay
Watmough Bay
Spencer Lake
Blakely Peak
Bold Bluff
Willow Is.
Trump Is.
Ram Is.
Frost Is.
Fortress Is.
N
1/2 0 1 2 3 4 MILES
4000 0 4000 8000 12000 16000 20000 FEET
DATUM IS MEAN SEA LEVEL
CONTOUR INTERVALS 20 & 50 FEET
POLYCONIC PROJECTION
DRAWN BY JOHN C. MILHOLLIN, C.E.T., CARTOGRAPHER

GEOLOGIC EXPLANATION

AREA 1
STRATIGRAPHIC & SEMI-STRATIGRAPHIC MAPPING

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

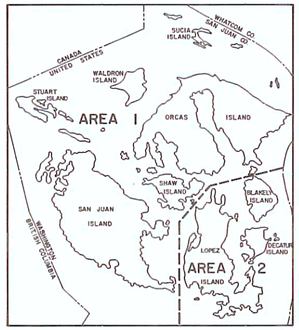
AREA 2
LITHOLOGIC MAPPING

John T. Whetten, University of Washington

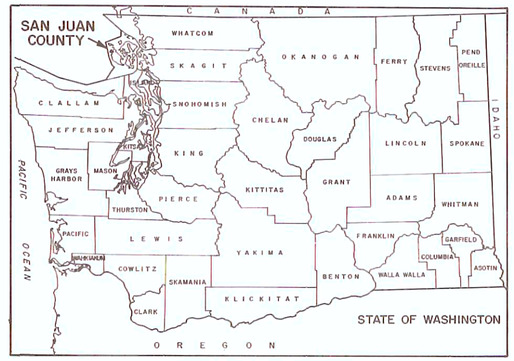
QUATERNARY	Qu	Pleistocene - Glacial deposits include glaciomarine drift, till, stratified outwash and deltaic beds.	Qu — Alluvium, beach deposits, glacial till, advance outwash, recessional outwash, and lake deposits. Pleistocene and Recent. Generally an excellent aquifer (except till and interglacial 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.
TERTIARY	Tc	Chuckanut Formation (?). Eocene (and Paleocene?). Lower Tertiary. Continental sandstone, shale and conglomerate.	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.
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.	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.
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.	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)

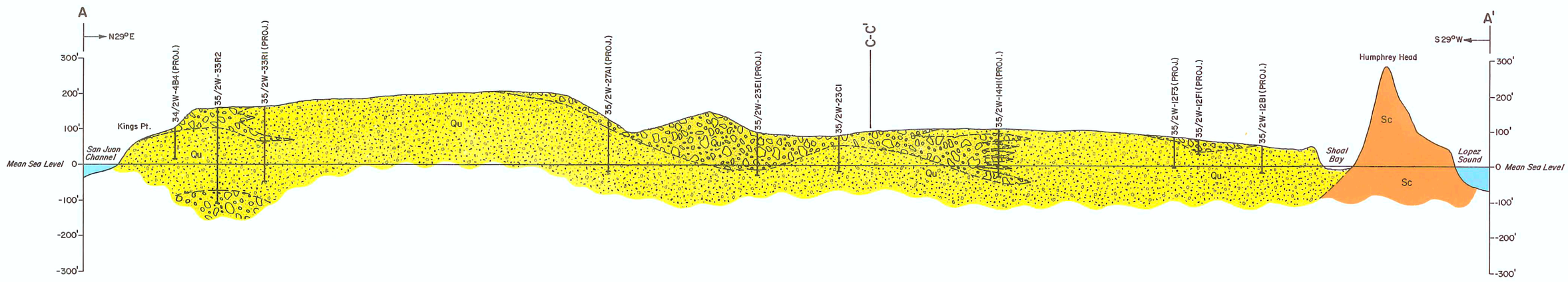
These maps are in process of revision by the U.S.G.S., date of completion unknown.

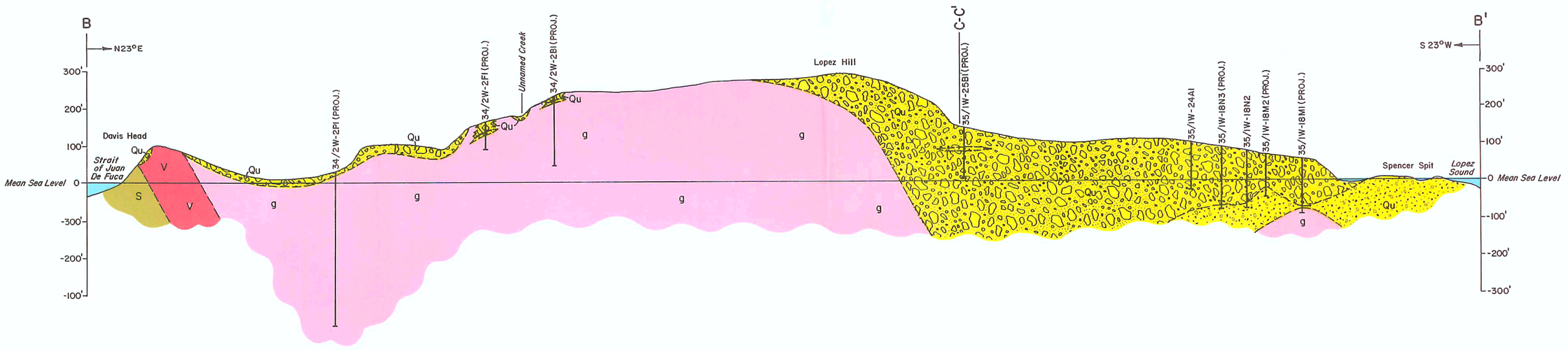
PROJECT SUPERVISOR AND SENIOR GEOLOGIST; ROBERT H. RUSSELL, CPG.

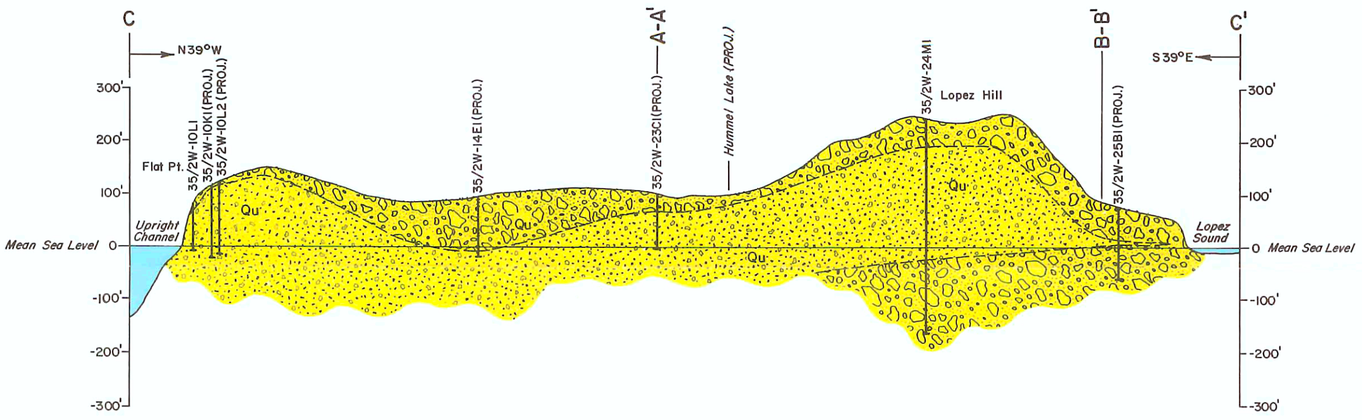
STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
JOHN A. BIGGS, DIRECTOR

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







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

BEDROCK, generally impermeable except for joints and fractures.

All stratigraphic data from drillers well logs

1/2 0 Miles

1000 0 1000 2000 3000 4000 5000 6000 7000 Feet

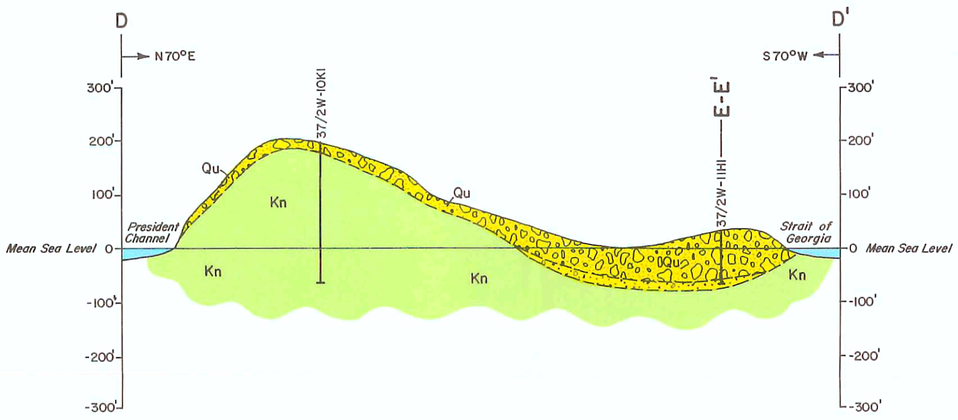
HORIZONTAL SCALES

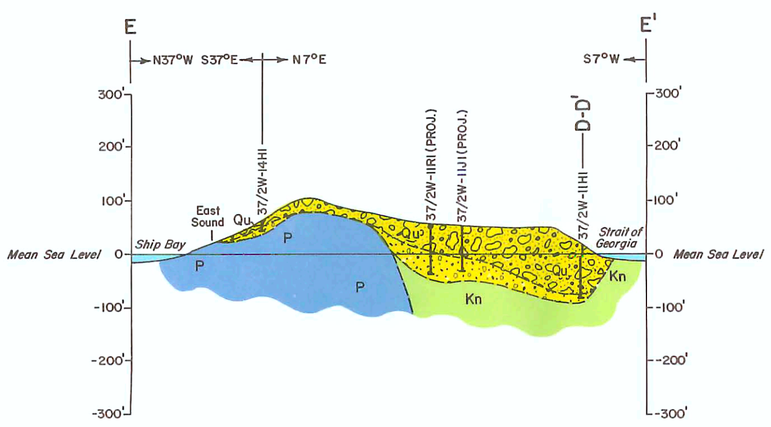
CROSS SECTIONS THROUGH SURFICIAL SEDIMENTS, LOPEZ ISLAND

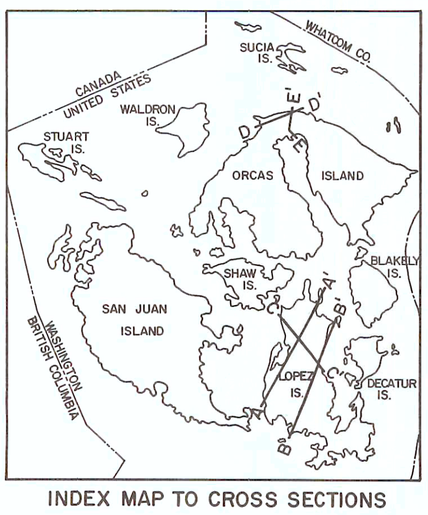
JOHN T. WHETTEN

CROSS SECTIONS THROUGH SURFICIAL SEDIMENTS, ORCAS ISLAND

ROBERT H. RUSSELL







INDEX MAP TO CROSS SECTIONS

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

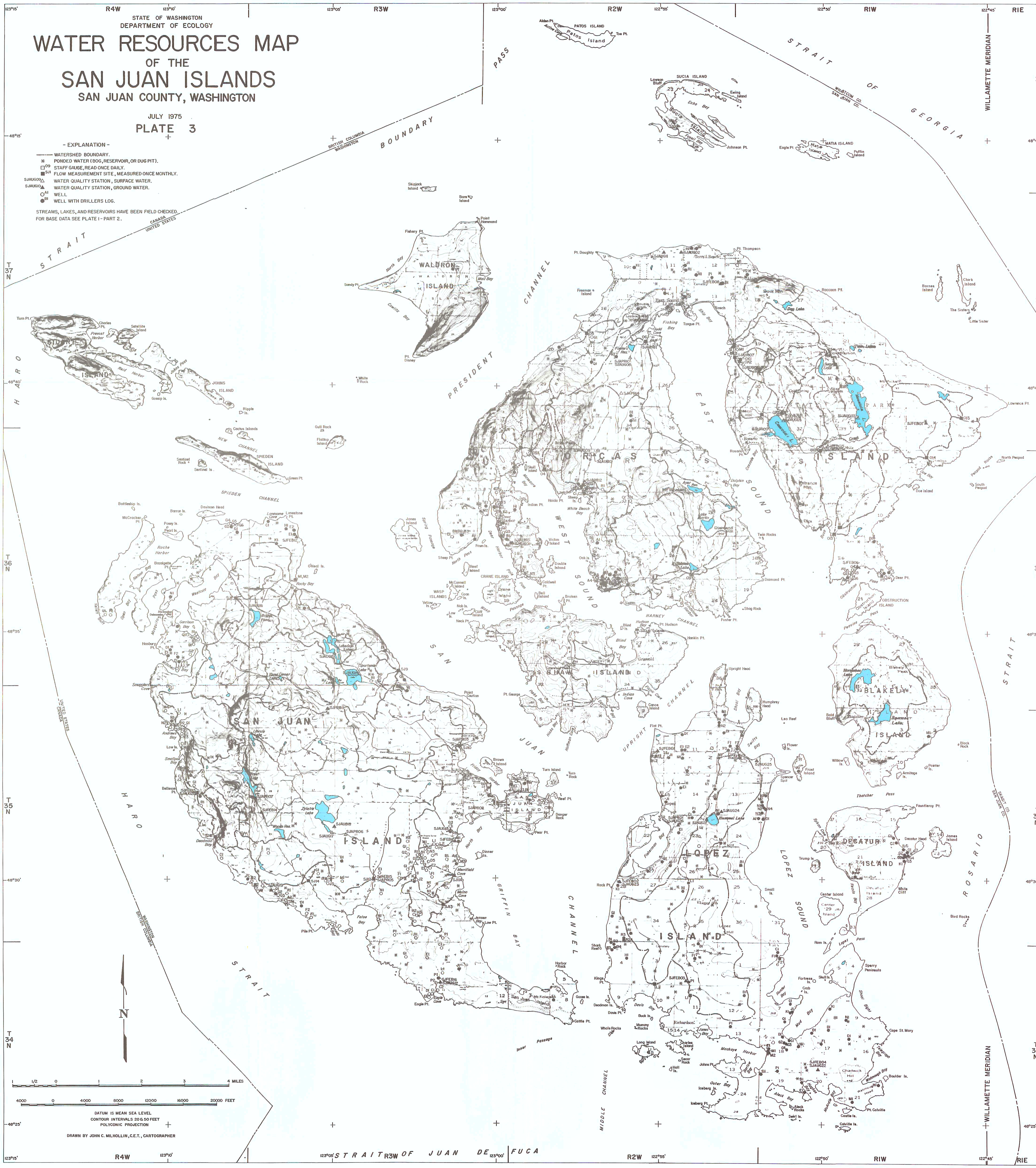
GEOLOGIC CROSS SECTIONS

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.
123°15'
R4W
123°10'
123°05'
R3W
123°00'
R2W
122°55'
122°50'
R1W
122°45'
R1E
48°45'
48°40'
48°35'
48°30'
48°25'
T 38 N
T 37 N
T 36 N
T 35 N
T 34 N
WILLAMETTE MERIDIAN
BRITISH COLUMBIA
WASHINGTON
BOUNDARY
CANADA
UNITED STATES
STRAIT OF GEORGIA
WHATCOM CO.
SAN JUAN CO.
SKAGIT CO.
SAN JUAN CO.
HARO STRAIT
PRESIDENT CHANNEL
PASS
PATOS ISLAND
SUCIA ISLAND
MATIA ISLAND
STUART ISLAND
JOHNS ISLAND
SPIEDEN ISLAND
NEW CHANNEL
SPIEDEN CHANNEL
WALDRON ISLAND
ORCAS ISLAND
EAST SOUND
WEST SOUND
HARNEY CHANNEL
SAN JUAN ISLAND
SAN JUAN CHANNEL
SHAW ISLAND
UPRIGHT CHANNEL
BLAKELY ISLAND
OBSTRUCTION ISLAND
DECATUR ISLAND
LOPEZ ISLAND
LOPEZ SOUND
ROSARIO STRAIT
GRIFFIN BAY
MIDDLE CHANNEL
STRAIT OF JUAN DE FUCA
WASP ISLANDS
CRANE ISLAND
Cascade L.
Mountain L.
Hummel Lake
Zylstra Lake
Sportsman Lake
Spencer Lake
Horseshoe Lake
1/2 0 1 2 3 4 MILES
4000 0 4000 8000 12000 16000 20000 FEET
DATUM IS MEAN SEA LEVEL
CONTOUR INTERVALS 20 & 50 FEET
POLYCONIC PROJECTION
DRAWN BY JOHN C. MILHOLLIN, C.E.T., CARTOGRAPHER