Bedrock Geology of the Northern Portion of the Bass Harbor Quadrangle, Maine

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This map supersedes a portion of the B-38 Bedrock Geology map.

EXPLANATION OF UNITS

INTRUSIVE ROCKS

Devonian(?) [D]

Dse — **Seawall Granite.** Reddish gray to light gray, fine-grained to medium-grained biotite granite with sugary texture. Red hematite grains are common. Irregular veins of coarse-grained to pegmatitic granite containing abundant quartz and locally amazonite. (Revised from "Seawall Metafelsite" of Chadwick, 1944)

Silurian [S]

Diabase dike or sill. Dark gray to greenish gray, fine-grained to medium-grained diabase with ophitic texture, commonly with secondary chlorite and epidote. Line dashed where continuity is uncertain.

Felsite dike. Pinkish gray to light gray to tan, very fine-grained felsite to fine-grained homogeneous granite, with few visible mafic grains.

Stf — **Tremont Felsite**. Pinkish gray to light gray, very homogeneous, very fine-grained felsite to fine-grained biotite granite, with few visible mafic grains. Intrusive contact with the Cranberry Island Volcanic Series with blocks of ignimbrite and volcanic breccia surrounded by felsite near the contact. Was previously considered to be the upper part of the Cranberry Island Volcanic Series.

STRATIFIED ROCKS

Silurian [S]

Cranberry Island Volcanic Series. Extrusive equivalent of the Southwest Harbor Granite and early part of the Cadillac Granite (Seaman and others, 1999; Wiebe, 1994).

Scm2 — **Basaltic lava and tuff.** Dark gray, locally pillowed and vesiculated, fine-grained basaltic lavas discontinuously interbedded with dark gray, layered, fine-grained basaltic tuffs and thin layers of fine-grained, rippled, epiclastic tuff. The basalts contain fine-grained labradoritic plagioclase, epidote, hornblende, biotite, actinolite, chlorite, quartz, and locally garnet.

Scm1 — **Basaltic tuff.** Laminated green, red, and white water-lain tuffs with larger fragments disrupting the lamination. Grain size is silt to sand sized. Green layers contain epidote, hornblende, and/or actinolite (~70%), plagioclase (~20%), and chlorite (~10%). Red layers contain biotite (~75%), and plagioclase (~25%). White layers contain quartz (~90-95%) and plagioclase (~5-10%). Green and red layers show delicate cross-bedding and ripple structures. The unit is interpreted to be pyroclastic fallout and flow deposits.

Scf6 — **Rhyolitic ignimbrite, tuff, and breccia.** Gray, pumiceous, crystal-rich, rhyolitic, plagioclase-quartz-sanidine ignimbrite and volcanic breccia with brown discontinuous fine-grained clay-rich layers. Pumice clasts, typically 1 to 2 centimeters (cm) across, become less common upward in the unit, while rounded, dark gray mafic enclaves become more common. Breccia clasts are typically a few centimeters to tens of centimeters across.

Scf5 — **Andesitic ignimbrite.** Pinkish to reddish brown, fine-grained, crystal- and lithic-poor, dacitic to andesitic ignimbrite with undulatory and rippled bedding. It has an aphanitic, clay- and chlorite-rich matrix with abundant 1-3 millimeter (mm) phenocrysts of plagioclase and rare larger plagioclase and quartz phenocrysts (to 10 mm). Clusters of medium gray, small (~3 mm to 3 cm), rounded mafic enclaves consist of hornblende and/or epidote and minor plagioclase with white plagioclase-rich rims. There are also light gray, irregular, ellipsoidal rhyolitic segregations up to 1 meter (m) across with clusters of the small white-rimmed mafic enclaves.

Scf4 — **Pumiceous rhyolitic ignimbrite.** Dark gray, fine-grained, crystal- and lithic-poor rhyolitic ignimbrite with abundant flattened pumice lenses. There are two subunits, each showing an upward increase in the size of pumice fragments from a few centimeters at the base to 25 cm at the top.

Scf3 — **Rhyolite lava flows.** Light to medium gray high-silica rhyolite flows or sills, intricately flow banded and microporphyritic with small (~1 mm) plagioclase phenocrysts. The outcrop surface is ribbed due to more resistant quartz and feldspar layers alternating with less resistant quartz and hematite layers.

Scf2 — **Rhyolitic ignimbrite and tuff.** The lower part of the unit consists of gray epiclastic layers with graded bedding, scour surfaces, and truncated cross-bedding. The upper part of the unit consists of gray, fine-grained, lithic-poor rhyolitic ignimbrite interbedded with discontinuous tan-brown fine-grained layers containing broken euhedral crystals (< 1 mm) of quartz, plagioclase, and potassium feldspar in a matrix of clay minerals and biotite.

Scf1 — **Rhyolitic ignimbrite and breccia.** Light to medium gray, very fine-grained, lithic-rich rhyolitic ignimbrite interbedded with clast-supported volcanic breccia. The very fine-grained ignimbrite is characterized by broken, euhedral, pink potassium feldspar phenocrysts (~2 mm) in a matrix of 60-65% interlocking quartz and sanidine crystals (0.01 to 0.02 mm), secondary muscovite (10-15%), biotite and hornblende (10%), and blocky opaque minerals (10%). Abundant lithic fragments as large as a few centimeters across consist of brown siltstone, pink rhyolite, gray or pink granite, and basalt. Dark gray, rounded to lobate basaltic enclaves a few centimeters across are locally common. In places breccia layers grade into clast-free material 100 m or so along strike of the layering.

Cadillac Mountain Plutonic-Volcanic Complex

EXPLANATION OF LINES

Contact between rock units, of stratigraphic or intrusive origin (well located, approximately located, poorly located).

EXPLANATION OF SYMBOLS

Note: Structural symbols are drawn parallel to strike or trend of measured structural feature. Barb or tick indicates direction of dip, if known. Annotation gives dip or plunge angle, if known. For most planar features, symbol is centered at observation point; for joints, observation point is at end of strike line opposite dip tick. For linear features, tail of symbol is at observation point. Multiple measurements at a site are represented by combined symbols. Symbols on the map are graphical representations of information stored in a bedrock database at the Maine Geological Survey. The database contains additional information that is not displayed on this map.

- Outcrop of mapped unit.
- Outcrop of non-foliated plutonic rock.
- Xenolith in igneous intrusion.
- Dike, mafic (occurrence, strike only, inclined).
- Dike, granitic (occurrence, inclined).
- Bedding in sedimentary or volcanic rocks, tops unknown (inclined, vertical).
- Foliation, metamorphic (vertical).
- Shear zone orientation.
- Quarry, inactive.

REFERENCES

Braun, Duane D., 2018, Bedrock geology of Mount Desert Island: Maine Geological Survey, Geologic Map 18-16, map, scale 1:30,000.

Chadwick, George Halcott, 1944, The geology of Mount Desert Island (Acadia National Park) [Maine]: New York Academy of Sciences, Transactions, series 2. v. 6, no. 6, p. 171-178.

Gilman, Richard A., and Chapman, Carleton A., 1988, Mount Desert Bedrock Geology Map: Maine Geological Survey, Bulletin 38.

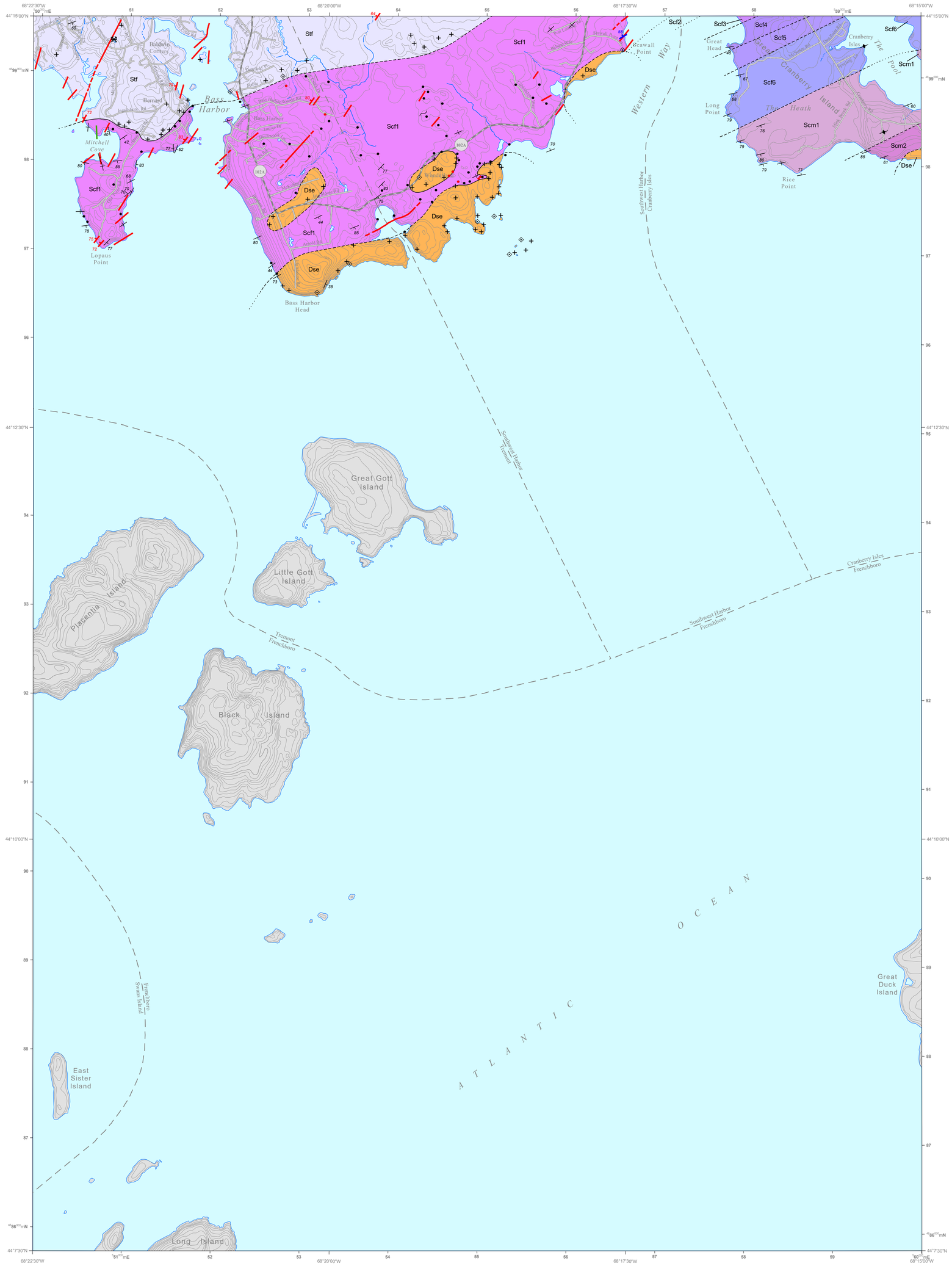
Seaman, Sheila J., Scherer, Erik E., Wobus, Reinhard A., Zimmer, Jonathan H., and Sales, J. Gregory, 1999, Late Silurian volcanism in coastal Maine; the Cranberry Island Series: Geological Society of America, Bulletin, v. 111, no. 5, p. 686-708.

Wiebe, Robert A., 1994, Silicic magma chambers as traps for basaltic magmas; the Cadillac Mountain intrusive complex, Mount Desert Island, Maine: Journal of Geology, v. 102, no. 4, p. 423-437.

GEOLOGIC TIME SCALE

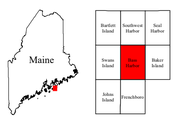
Geologic Age	Absolute Age*
Cenozoic Era (Cz)	0-66
Mesozoic Era (Mz)	
Cretaceous Period (K)	66-145
Jurassic Period (J)	145-201
Triassic Period (Tr)	201-252
Paleozoic Era (Pz)	
Permian Period (P)	252-299
Carboniferous Period (C)	299-359
Devonian Period (D)	359-419
Silurian Period (S)	419-444
Ordovician Period (O)	444-485
Cambrian Period (Ꞓ)	485-541
Precambrian time (pЄ)	Older than 541

* In millions of years before present. (Walker, J.D., Geissman, J.W., Bowring, S.A., and Babcock, L.E., compilers, 2012 Geologic Time Scale v. 4.0: Geological Society of America, doi: 10.1130/2012.CTS004R3C.)



SOURCES OF GEOLOGIC INFORMATION

Field work by Duane D. Braun, 2011 - 2013.
Published work by Gilman and Chapman, 1988.



SCALE 1:24,000

1 Mile 0.5 0
1000 0 1000 2000 3000 4000 5000 6000 7000 Feet
1 Kilometer 0.5 0

CONTOUR INTERVAL 10 FEET

Base map features from Maine Office of GIS - 1:24,000 USGS contour lines, E911 roads, 1:24,000 National Hydrography Dataset, USGS GNIS placenames and 1:24,000 political boundaries. Map projection Universal Transverse Mercator, North American Datum, 1927.

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