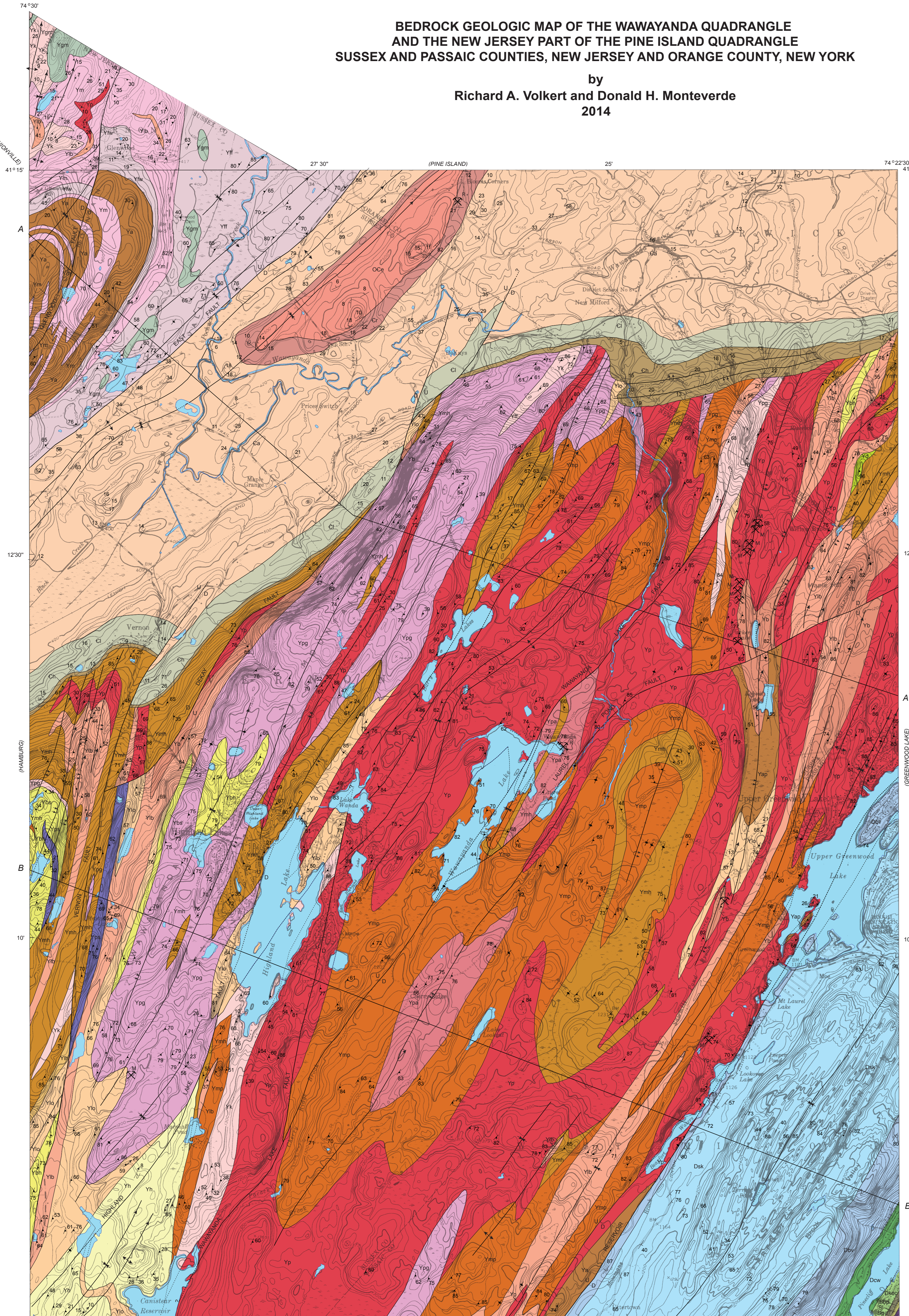
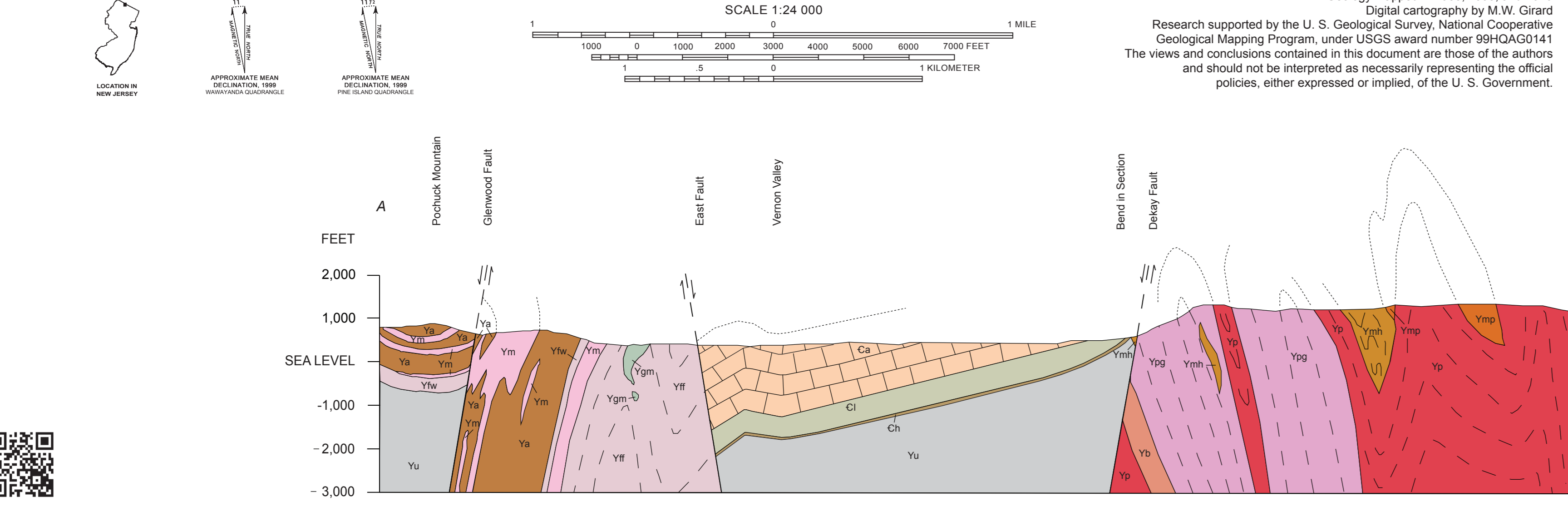


BEDROCK GEOLOGIC MAP OF THE WAWAYANDA QUADRANGLE AND THE NEW JERSEY PART OF THE PINE ISLAND QUADRANGLE SUSSEX AND PASSAIC COUNTIES, NEW JERSEY AND ORANGE COUNTY, NEW YORK

by
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2014



Wawayanda, N.J., - N.Y. base map from U.S. Geological Survey, 1954.
Pine Island, N.Y., - N.J. base map from U.S. Geological Survey, 1969.



U.S. GEOLOGICAL SURVEY NATIONAL GEOLOGIC MAPPING PROGRAM

DESCRIPTION OF MAP UNITS GREEN POND MOUNTAIN REGION

- Stunnum Conglomerate (Middle Devonian)** (Darton, 1894) - Grayish-purple to grayish-red, thin- to very thick bedded, locally cross-bedded, polygenic conglomerate and sandstone containing clasts of white vein quartz, red and green quartzite and sandstone, red and gray chert, and red shale, interbedded with medium- to thick-bedded sandstone and conglomerate, cross-bedded, graded, and represented with black to gray scale. Sandstone is grayish-buff to grayish-buff, mud-cracked shale. Conglomerate and sandstone matrix is primary hematite and microcrystalline quartz. Conglomerate cobbles are as much as 8.5 m long, and sandstone cobbles as large as 1.4 m. Lower contact is conformable and gradational as described by Kimmel and Walter (1952). Unit is about 3,000 ft. thick.
- Bethels Sandstone (Middle Devonian)** (Bethels Flags of Darton, 1894; Walker, 1937) - Upper beds are grayish-red to light gray-purple sandstone containing quartz pebbles as large as 1 in. in diameter. Lower beds are light olive-gray to yellowish-gray and greenish-black siltstone to medium- to medium-thick gray, very thin to very thick bedded siltstone and sandstone, cross-bedded, graded, and represented with black to gray scale. Sandstone more common in upper beds and is finer and lower contact conformable with the Cornish Shale and upper beds are thicker and volume of shale and siltstone is about equal. Unit is 1,700 to 2,000 ft. thick.
- Cornwall Shale (Middle Devonian)** (Harragill, 1917) - Black to dark-gray, very thin to thick bedded, siltstone and shale, interbedded with medium-gray to light-gray to yellowish gray, laminated to very thin bedded siltstone that is more abundant in upper part. Lower contact with Kanouse Sandstone probably conformable. Unit is about 500 ft. thick.
- Kanouse Sandstone, Espous Formation, and Connelly Conglomerate, undivided (Lower Devonian)** - Kanouse Sandstone (Kimmel, 1908) - Medium-gray, light brown, and grayish-red, fine to coarse-grained, thin to thick bedded sandstone and pebble conglomerate. Black conglomerate is interbedded with siltstone and contains well-sorted, subangular to subrounded, light and white quartz pebbles as much as 1 in. in diameter. Lower contact with Espous Formation gradational. Unit is about 48 ft. thick.
- Epous Formation (Herrnstein, 1942; Bouck, 1959)** - Light to dark gray, laminated to thin-bedded siltstone interbedded with dark-gray to black mudstone, dusky-blue sandstone and siltstone, and yellowish-gray, fossiliferous siltstone and sandstone. Lower contact probably conformable with Connelly Conglomerate. Unit is about 180 ft. thick.
- Berkshire Valley and Posino Island Formations, undivided (Upper Silurian)** - Berkshire Valley Formation (Barnett, 1970) - Yellowish-gray weathering, medium-gray to pinkish-gray, very thin to thin bedded fossiliferous limestone interbedded with gray to greenish-gray calcarenaceous siltstone, medium-gray to light-gray dolomite, dolomitic conglomerate, and grayish-black finely laminated shale. Lower contact conformable with Posino Island Formation. Unit ranges in thickness from 90 to 125 ft.
- Posino Island Formation (White, 1882; Barnett, 1970)** - Very thin to medium-bedded sequence of medium-gray, greenish-gray, or yellowish gray, mud-cracked dolomite, light-green, siltstone, and medium-grained calcareous sandstone, siltstone, and argillaceous concretion containing gray dolomite and quartz pebble conglomerate containing angular boulders, garnet, sillimanite, and magnetite. Unit is well exposed in the northwest part of the map area.
- Microcline Gneiss (Mesoproterozoic)** - Tan to pinkish-white weathering, light-gray to pinkish-gray, fine to medium-grained, layered and foliated rock composed primarily of microcline, oligoclase, and quartz. Commonly contains accessory minerals include biotite, garnet, sillimanite, and magnetite. Unit is well exposed in the northwest part of the map area.
- Biotite-quartz-feldspar gneiss (Mesoproterozoic)** - Gray weathering, locally rusty weathering, gray, tan, or greenish-gray, medium to coarse-grained, moderately layered and foliated gneiss containing microcline, microcline, oligoclase, quartz, and biotite. Locally contains garnet, sillimanite, graphite, and opaque minerals. Commonly contains thin layers of quartzite that may contain garnets and biotite. Unit is most abundant north of Upper Greenwood Lake.
- Hornblende-quartz-feldspar gneiss (Mesoproterozoic)** - Pinkish-gray to buff weathering, pinkish-gray or pinkish-gray, fine to medium-grained, moderately layered and foliated gneiss composed of microcline, quartz, oligoclase, and hornblende. Locally contains garnet, magnetite, and biotite. Unit occurs throughout the map area.
- Clinopyroxene-quartz-feldspar gneiss (Mesoproterozoic)** - Pinkish-gray or pinkish-buff weathering, white, pale-pinkish-white, or light-gray, fine to medium-grained, moderately foliated gneiss composed of quartz, microcline, oligoclase, clinopyroxene, and trace amounts of biotite, sillimanite, and opaque minerals. Commonly contains accessory minerals include biotite, garnet, sillimanite, and magnetite. Unit is well exposed in the northwest part of the map area.
- Pyroxene gneiss (Mesoproterozoic)** - White or light-gray weathering, greenish-gray, medium-fine to medium-grained, layered and foliated gneiss containing oligoclase and clinopyroxene. Quartz content is highly variable. Contains sparse amounts of epidote, biotite, scapolite, or calcite. Commonly interlayered with pyroxene amphibole or marble. Unit is abundantly exposed throughout the map area.
- Marble (Mesoproterozoic)** - White or light-gray weathering, white, grayish-white, or less commonly pinkish-orange, thin to coarse-grained, calcitic to locally dolomitic marble with accessory graphite, chlorite, chloritoid, and clinopyroxene. Contains pods and lenses of clinopyroxene-garnet, hornblende garnet, and clinopyroxene-rich rock. Divided by Hague and others (1956) into an upper Franklin marble (F7) and an upper Whitfield marble (W7) separated by a layered sequence of gneiss. Locally contains rock mass features in the form of bedrock pinnacles and solution joints and openings. Unit is best exposed in the northeastern part of the map area in Vernon Valley.
- Amphibolite (Mesoproterozoic)** - Grayish-black, medium-fine to medium-grained, foliated rock composed of hornblende and andesine. Some amphibolite also contains abundant clinopyroxene (F7). Unit is associated with most Mesoproterozoic rocks in the map area. Amphibolite associated with the Louse Lake in the Vernon Supersuite and that associated with supracrustal rocks may be metakalcanic or metametavolcanic in origin. All types are shown undifferentiated on the map. Unit is best exposed on Pochuck Mountain. It locally contains red siltstone structures (Hague and others, 1956) and forms a broad sequence of volcanic rocks with microcline gneiss.
- Magnetic Arc Rocks**
 - Louse Metamorphic Suite (Drake, 1884; Volkert and Drake 1999)**
 - Quartz-oligoclase gneiss (Mesoproterozoic)** - White weathering, light greenish-gray, medium to coarse-grained, moderately layered to foliated gneiss composed of oligoclase and andesine, quartz, and local hornblende, biotite, and clinopyroxene. Commonly contains thin, conformable layers of amphibolite. Best exposed north and west of Canbyer Reservoir.
 - Biotite-quartz-oligoclase gneiss (Mesoproterozoic)** - White or light-gray weathering, medium-gray to greenish-brown, medium to coarse-grained, layered and foliated gneiss composed of oligoclase or andesine, quartz, and biotite. Some outcrops contain garnet or hornblende. Locally interlayered with amphibolite. Best exposed in the eastern part of the map area.
 - Hornblende-quartz-oligoclase gneiss (Mesoproterozoic)** - White weathering, light greenish-gray, medium to coarse-grained, layered gneiss containing oligoclase or andesine, quartz, and local hornblende, biotite, and magnetite. Crops out in the small body southwest of Highland Lake.
 - Hypersthene-quartz-oligoclase gneiss (Mesoproterozoic)** - Gray or tan weathering, greenish-gray or greenish-brown, medium to coarse-grained, massive, foliated rock containing andesine or oligoclase, clinopyroxene, hornblende, and hypersthene. Commonly contains thin mafic layers or schlieren having the composition of amphibolite. Crops out in one small body in Orange County, New York.
 - Diorite (Mesoproterozoic)** - Gray or tan weathering, greenish-gray or greenish-brown, medium to coarse-grained, massive, foliated rock containing andesine or oligoclase, clinopyroxene, hornblende, and hypersthene. Commonly contains thin mafic layers or schlieren having the composition of amphibolite. Crops out in one small body in Orange County, New York.
 - Undifferentiated rocks (Mesoproterozoic)** - Shown in cross section only.

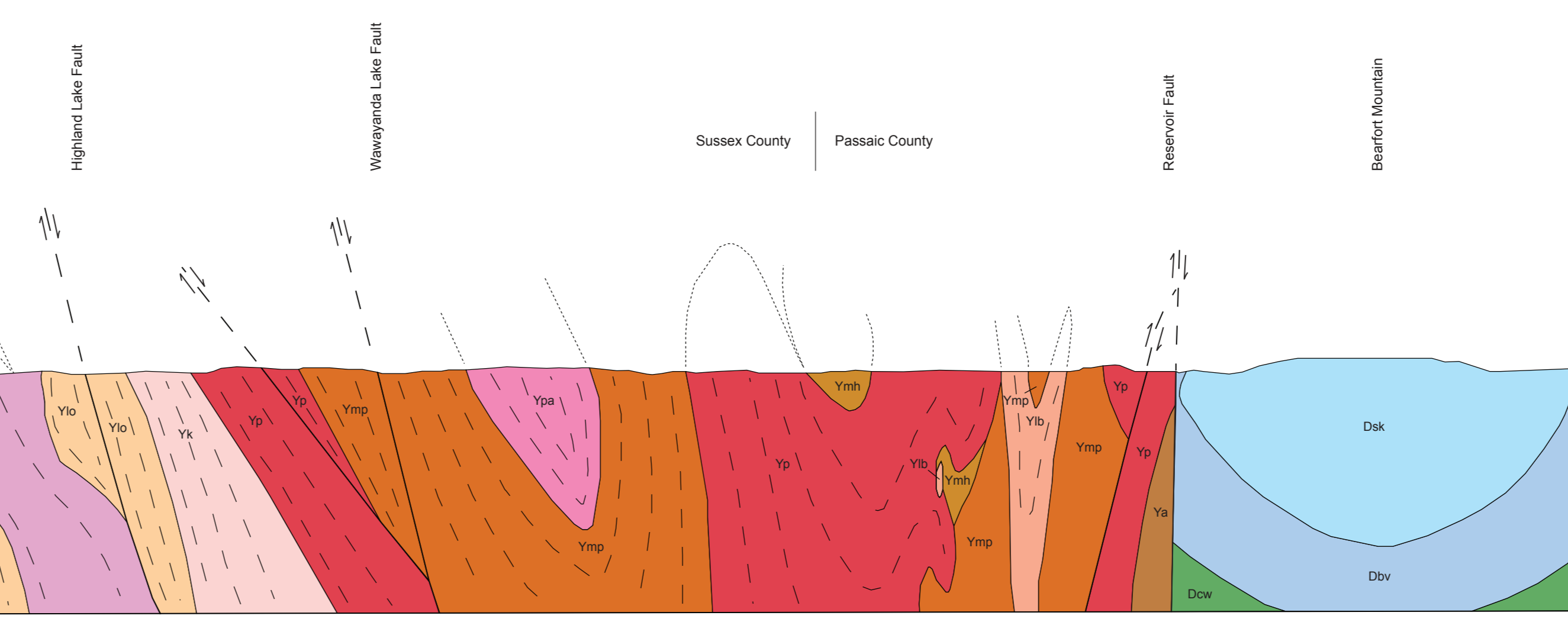
EXPLANATION OF MAP SYMBOLS

- Contact - Dotted where concealed
- Faults - Dotted where concealed, Quoted where uncertain
 - Normal fault - U, upthrown side; D, downthrown side
 - Reverse fault - U, upthrown side; D, downthrown side
- Folds
 - Folds in Protozoic rocks showing trace of axial surface, direction and dip of limbs, and direction of plunge
 - Antiform
 - Synform
 - Overturned antiform
 - Overturned synform
 - Minor asymmetric fold
 - Folds in Paleozoic rocks showing trace of axial surface, direction and dip of limbs, and direction of plunge. Folds are in bedding
 - Anticline
 - Syncline
- PLANAR FEATURES
 - Strike and dip of crystallization foliation
 - Inclined
 - Vertical
 - Strike and dip of mylonitic foliation
 - Strike and dip of beds - Ball indicates top of beds known from sedimentary structures
 - Inclined
 - Vertical
 - Overturned
 - Strike and dip of spaced cleavage in Paleozoic rocks
- LINEAR FEATURES
 - Bearing and plunge of mineral lineation in Protozoic rocks
 - Bearing and plunge of intersection of bedding and cleavage in Paleozoic rocks
- OTHER FEATURES
 - Abandoned magnetite mine
 - Abandoned quarry

NEW JERSEY HIGHLANDS Other Rocks

- Mount Eve Granite (Mesoproterozoic)** - Pinkish-gray or buff weathering, pinkish-white or light-pinkish-gray, medium to coarse-grained, massive, uniform-textured granite composed primarily of microcline, microcline, quartz, oligoclase, hornblende, and biotite. Locally contains xenoliths of foliated quartzite. Includes bodies of pegmatite too small to show on map.
- Vernon Supersuite (Volkert and Drake, 1999)
Byram Intrusive Suite (Drake and others, 1993b)**
 - Hornblende granite (Mesoproterozoic)** - Pinkish-gray or buff weathering, pinkish-white or light-pinkish-gray, medium to coarse-grained, foliated granite and sparite granite composed primarily of microcline, quartz, oligoclase, hornblende, and biotite. Some variants are quartz granites or quartz monzonites. Locally contains clinopyroxene where in contact with rocks of the Lake Hopatcong Intrusive Suite. Includes small bodies of pegmatite too small to show on map.
 - Hornblende monzonite (Mesoproterozoic)** - Tan or buff weathering, pinkish-gray or pinkish-gray, medium to coarse-grained, foliated gneiss containing andesine or oligoclase, microcline composed of microcline, microcline, oligoclase, hornblende, and magnetite. Locally contains quartz. Sparse to moderate amounts of clinopyroxene may be present where in contact with rocks of the Lake Hopatcong Intrusive Suite.
 - Lake Hopatcong Intrusive Suite (Drake and others, 1993)**
 - Pyroxene granite (Mesoproterozoic)** - Light gray, buff, or white weathering, greenish-gray, medium to coarse-grained, massive, foliated granite composed of microcline to microcline, perthite, quartz, oligoclase, and clinopyroxene. Commonly contains biotite, magnetite, scapolite, and garnet. Sparse to moderate amounts of hornblende may be present where in contact with rocks of the Byram Intrusive Suite. Includes small bodies of pegmatite too small to show on map.
 - Pyroxene alaskite (Mesoproterozoic)** - Light-gray or tan weathering, greenish-buff or light pinkish-gray, medium to coarse-grained, massive, foliated gneiss composed of microcline to microcline, oligoclase, and quartz. Commonly contains accessory minerals include biotite, garnet, sillimanite, and magnetite. Occurs in a zone of bodies east of Highland Lake.
 - Pyroxene monzonite (Mesoproterozoic)** - Gray, buff, or tan weathering, greenish-gray, medium to coarse-grained, massive, foliated rock composed of microcline to microcline, oligoclase, clinopyroxene, biotite and quartz. Locally contains hornblende where in contact with rocks of the Byram Intrusive Suite. Crops east and west of the Vernon fault.
- Back-Arc Supracrustal Rocks**
 - Potassic feldspar gneiss (Mesoproterozoic)** - Light-gray or pinkish-buff weathering, pinkish-white or light pinkish gray, fine to medium-grained, moderately foliated gneiss and greenish-gray calcarenaceous siltstone, medium-gray to light-gray dolomite, dolomitic conglomerate, and grayish-black finely laminated shale. Lower contact conformable with Posino Island Formation. Unit ranges in thickness from 90 to 125 ft.
 - Plauso Island Formation (White, 1882; Barnett, 1970)** - Very thin to medium-bedded sequence of medium-gray, greenish-gray, or yellowish gray, mud-cracked dolomite, light-green, siltstone, and medium-grained calcareous sandstone, siltstone, and argillaceous concretion containing gray dolomite and quartz pebble conglomerate containing angular boulders, garnet, sillimanite, and magnetite. Unit is well exposed in the northwest part of the map area.
 - Microcline gneiss (Mesoproterozoic)** - Tan to pinkish-white weathering, light-gray to pinkish-gray, fine to medium-grained, layered and foliated rock composed primarily of microcline, oligoclase, and quartz. Commonly contains accessory minerals include biotite, garnet, sillimanite, and magnetite. Unit is well exposed in the northwest part of the map area.
 - Biotite-quartz-feldspar gneiss (Mesoproterozoic)** - Gray weathering, locally rusty weathering, gray, tan, or greenish-gray, medium to coarse-grained, moderately layered and foliated gneiss containing microcline, microcline, oligoclase, quartz, and biotite. Locally contains garnet, sillimanite, graphite, and opaque minerals. Commonly contains thin layers of quartzite that may contain garnets and biotite. Unit is most abundant north of Upper Greenwood Lake.
 - Hornblende-quartz-feldspar gneiss (Mesoproterozoic)** - Pinkish-gray to buff weathering, pinkish-gray or pinkish-gray, fine to medium-grained, moderately layered and foliated gneiss composed of microcline, quartz, oligoclase, and hornblende. Locally contains garnet, magnetite, and biotite. Unit occurs throughout the map area.
 - Clinopyroxene-quartz-feldspar gneiss (Mesoproterozoic)** - Pinkish-gray or pinkish-buff weathering, white, pale-pinkish-white, or light-gray, fine to medium-grained, moderately foliated gneiss composed of quartz, microcline, oligoclase, clinopyroxene, and trace amounts of biotite, sillimanite, and opaque minerals. Commonly contains accessory minerals include biotite, garnet, sillimanite, and magnetite. Unit is well exposed in the northwest part of the map area.
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CORRELATION OF MAP UNITS GREEN POND MOUNTAIN REGION



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Figures 1-5: Rose diagrams of bedding strikes in Lower Paleozoic rocks of the Kittingany Valley sequence.

