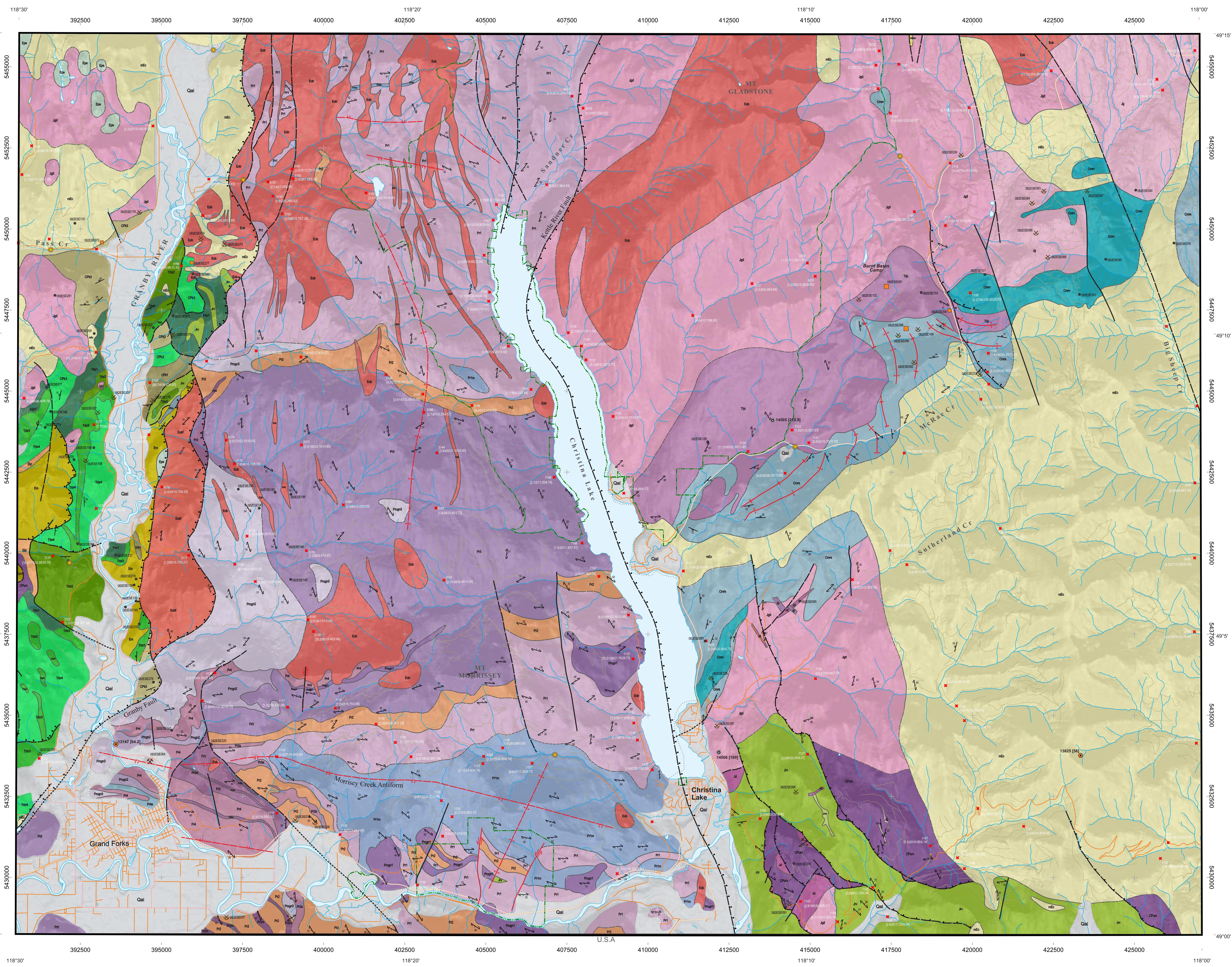


## GEOLOGY of the **GRAND FORKS MAP SHEET**

**NTS 082E/01**
**SCALE 1:50 000**

**Geology and Compilation by Trygve Höy**
**Cartography by Wayne Jackaman**

**CENOZOIC**

- QUATERNARY**
  - Qal: Alluvium, sand, gravel, till
- EOCENE**
  - Epe: Undifferentiated Kettle River and Marron formations; includes conglomerate, grit, felsic tuff and siltstone of the Kettle River Formation and dominantly alkalic volcanic rocks of the Marron Formation
  - Marron Formation: Undivided; porphyric augite-plagioclase andesite, quartz-feldspar porphyry
  - Ekr: Undifferentiated intrusion; diorite, monzonite, syenite
  - Kettle River Formation: Hornblende-biotite gneiss, overlying feldspathic grit, siltstone and rare shale, argillite and felsic tuff
  - mEc: Hornblende-biotite gneiss, overlying feldspathic grit, siltstone and rare shale, argillite and felsic tuff
  - mEm: Monzonite, monzonite, massive to porphyritic
- CORYELL PLUTONIC SUITE**
  - mEc: Undifferentiated syenite and monzonite, massive to porphyritic
  - mEm: Monzonite, monzonite, massive to porphyritic
- PALEOCENE - EOCENE**
  - OKANAGAN BATHOLITH
  - Eob: Granite, locally megacrystic porphyritic; massive, medium to coarse grained granite; biotite-quartz monzonite, granodiorite
  - Eobf: Crushed and mylonitized quartz monzonite and biotite-hornblende leucogranodiorite

**MESOZOIC**

- MIDDLE JURASSIC - (TRIASSIC ?)**
  - NELSON PLUTONIC SUITE
  - Jgd: Granodiorite; less commonly quartz diorite, granite (may include Eob); massive to locally porphyritic
  - Jg: Granite, granodiorite; typically equigranular
  - Jd: Hornblende-pyroxene diorite; locally hornblende granite or feldspar porphyry
  - Jp: Feldspar porphyry; porphyritic granite, granodiorite
- EARLY JURASSIC**
  - ROSSLAND GROUP (ELISE FORMATION)
  - Jrv: Mafic volcanic rocks, volcanic sandstone; ash tuff and minor siltstone and argillite
  - Jva: Argillite, siltstone
- LATE TRIASSIC**
  - Trj: Josh Creek diorite; calcic amphibolite microdiorite, biotite plagioclase schist, garnet-actinolite schist
- MIDDLE TRIASSIC**
  - NICOLA GROUP - BROOKLYN FORMATION
  - Tbr4: Metavolcanic rocks; greenstone, microdiorite
  - Tbr3: Limestone, marble, grey chert
  - Tbr2: Green and maroon tuffaceous sandstone, siltstone, hornfels, argillite and tuffaceous sandstone
  - Tbr1: "Sharpstone conglomerate" - limestone cobble conglomerate, chert breccia, minor tuff and tuffaceous sandstone

**PALAEZOIC**

- PERMIAN TO CARBONIFEROUS**
  - MOUNT ROBERTS FORMATION
  - Cmm: Marble, argillaceous limestone, siltstone
  - Cmr: Mafic volcanic rocks (basalt, andesite); volcanoclastics, tuff
  - Cms: Siltstone, slate, cordierite-biotite schist, calc-silicate schist

**KNOB HILL COMPLEX**

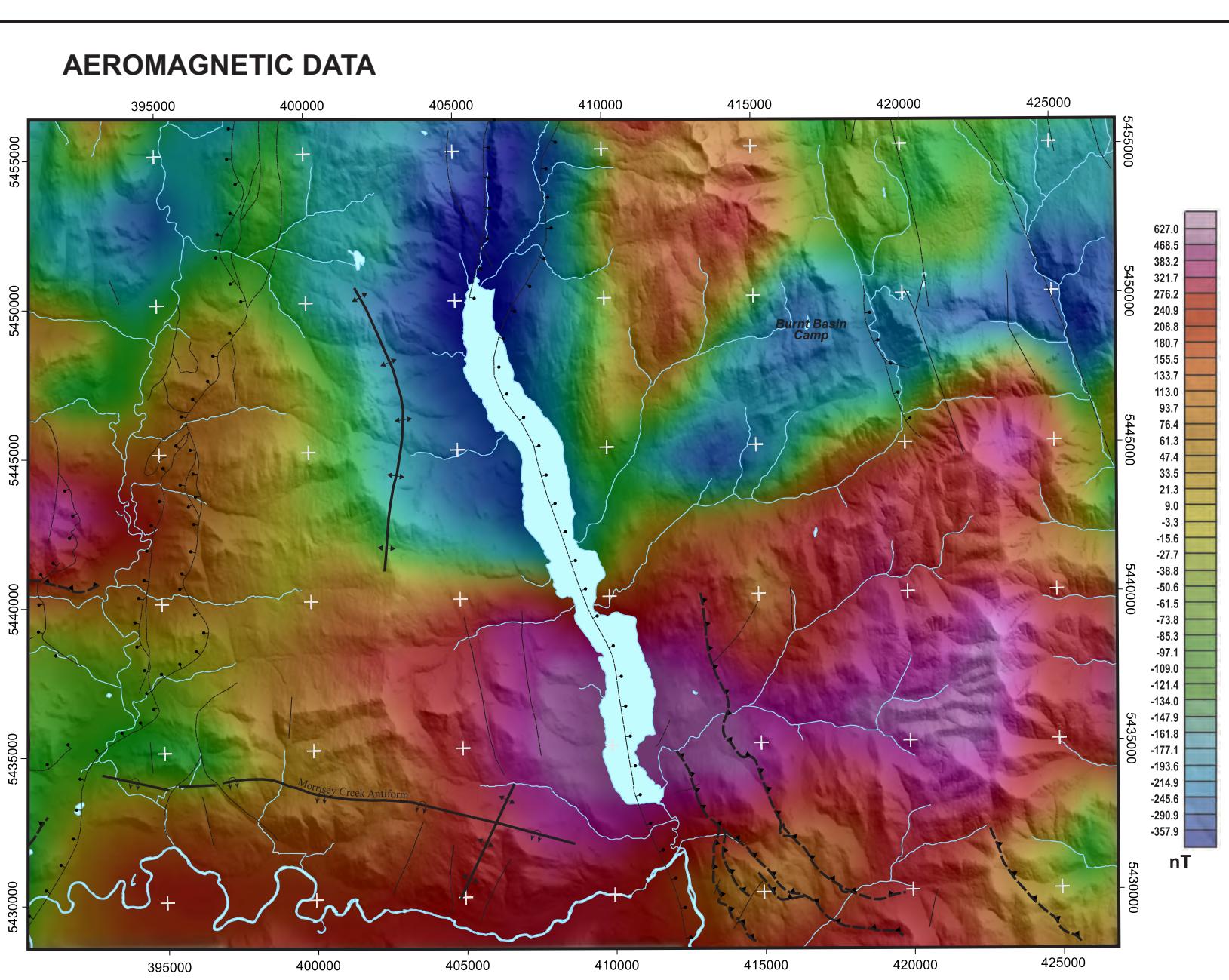
- CPk3: Greenstone; massive and fine grained; volcanic breccia, minor limestone
- CPk2: Siltstone, light grey to green; minor sandstone, phyllite, greenstone, calcareous units
- CPk1: Chert, meta-sandstone, argillite, minor limestone
- CPk4: Amphibolite; greenstone
- CPk5: Serpentinite; amphibolite

**PRECAMBRIAN**
**GRAND FORKS COMPLEX (Modified from Preto, 1969)**

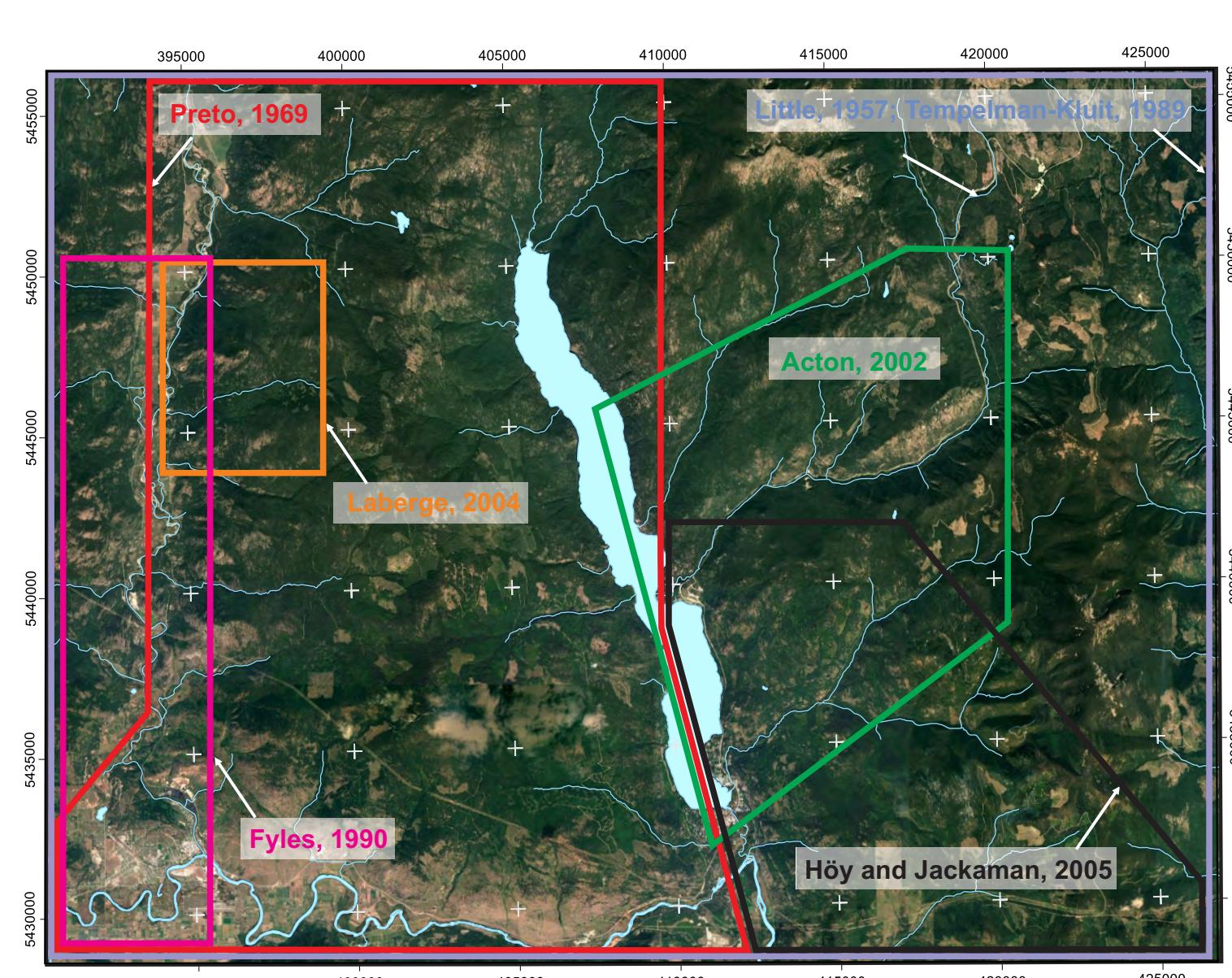
- AGE UNKNOWN**
  - Progn3: Orthogneiss: biotite-hornblende granodiorite gneiss
  - Progn4: Orthogneiss: typically equigranular
  - Progn1: Orthogneiss: granodiorite gneiss
- MESOPROTEROZOIC - NEOPROTEROZOIC (?)**
  - Pr5: Metavolcanic rocks; some minor biotite and staurolite schist
  - Pr4: Amphibolite; amphibolite schist; some marble, calc-silicate gneiss
  - Pr3: Marble, calcareous schist; some marble, calc-silicate gneiss
  - Pr4m: Amphibolite; calc-silicate gneiss
  - Pr3m: Garnet-biotite paragneiss, schist, sillimanite schist; may include pegmatite, marble, calc-silicate gneiss, amphibolite and quartzite
  - Pr2m: Quartzite, thick-bedded; minor sillimanite-biotite schist, paragneiss
  - Pr2m: Marble, calc-silicate gneiss; pegmatite pegmatite
  - Pr1m: Marble and calc-silicate gneiss; pegmatite
- PALEOPROTEROZOIC (?)**
  - Pr1: Paragneiss: sillimanite-biotite paragneiss, biotite-garnet paragneiss and schist, pegmatite, marble, calc-silicate gneiss, amphibolite, quartzite
  - Pr1m: Marble and calc-silicate gneiss, minor calcareous biotite schist, abundant pegmatite

**SYMBOLS**

- CONTACT OF ALLUVIUM
- CONTACT: DEFINED, APPROXIMATE, INFERRED
- FAULT: DEFINED, APPROXIMATE, HIDDEN
- NORMAL FAULT: APPROXIMATE, HIDDEN
- THRUST FAULT: APPROXIMATE, HIDDEN
- ANTIFORM: OVERTURNED
- ANTICLINE FOLD
- SYNFORM: OVERTURNED
- SYNCLINAL FOLD
- BEDDING: INCLINED, VERTICAL, OVERTURNED, INCLINED
- FOLIATION, CLEAVAGE: INCLINED, VERTICAL
- DIKE
- FAULT
- MINERAL OCCURRENCE - PRODUCER
- MINERAL OCCURRENCE - PAST PRODUCER
- MINERAL OCCURRENCE - PROSPECT
- MINERAL OCCURRENCE - SHOWING
- U-Pb AGE DATE (Ma)
- Ar/Ar AGE DATE (Ma)
- K/Ar AGE DATE (Ma)
- PROVINCIAL RGS SILT-SAMPLE SITE
- 2019 BULK SEDIMENT SITE
- HIGHWAY
- SECONDARY ROAD
- FOREST SERVICE ROAD
- STREAM, RIVER, LAKE
- PARK BOUNDARY


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**AGE DATES**

SAMPLE UTM	UTM	ROCK TYPE	UNIT	REFERENCE	DATED BY	METHOD	AGE	ERROR	
13147	393401	5434310	leucosome	Grand Forks complex	Stevens et al., 1984	GSC	K/Ar hb	64.2	2.8
14508	412081	543310	diorite	Rossland Group	Acton et al., 2002	U of Alta	U/Pb Zr	189	8.0
13825	423195	543335	syenite	Acton et al., 2002	U of Alta	U/Pb	147	4.1	
13825	423195	543335	syenite	Baasgard et al., 2003	K/Ar	K/Ar	58	4.0	

**BASE MAP INFORMATION**

NAD 1983 UTM ZONE 11  
TRANSVERSE MERCATOR PROJECTION  
APPROXIMATE MEAN DECLINATION 2021  
FOR CENTRE OF MAP 082E/01  
ANNUAL CHANGE 6.7° WEST

**LOCATION MAP**
