

# DIGITAL MAPPING TECHNIQUES 2019

The following was presented at DMT'19  
(May 19 – 22, 2019 - Montana Technological  
University)

The contents of this document are provisional

See Presentations and Proceedings  
from the DMT Meetings (1997-2019)

<http://ngmdb.usgs.gov/info/dmt/>

## **Successes in leveraging nontraditional funding or support for geologic mapping**

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The Idaho Geological Survey has had success over the past few years in requesting nontraditional funding partners to support geologic mapping in the state. Funding partners have included Idaho Transportation Department, Idaho Department of Emergency Management, UI Biology Department/EPSCOR grants, and private mining companies. Our keys to success are knowing the states economy, mineral resources, counties, knowing funding sources, university/social/professional networking, and watching the market. Open a discussion: I would like to hear from other surveys and/or geologists about their successes in leveraging external support for geologic mapping.



# Successes in leveraging nontraditional funding or support for geologic mapping

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**IDAHO**  
GEOLOGICAL SURVEY



# Idaho Geological Survey Mapping

- ▶ Priority areas determined by population, transportation corridors, hazards, minerals, oil and gas, and scientific.
- ▶ Goal cover state with modern digital geologic mapping
  - ▶ 100k quadrangles (30'x60') at a scale of 1:24,000k
    - ▶ 7.5' quadrangles
    - ▶ Compile where possible
- ▶ As of 2019 ~39% complete

Idaho Geological Survey  
Geologic Mapping Advisory Committee

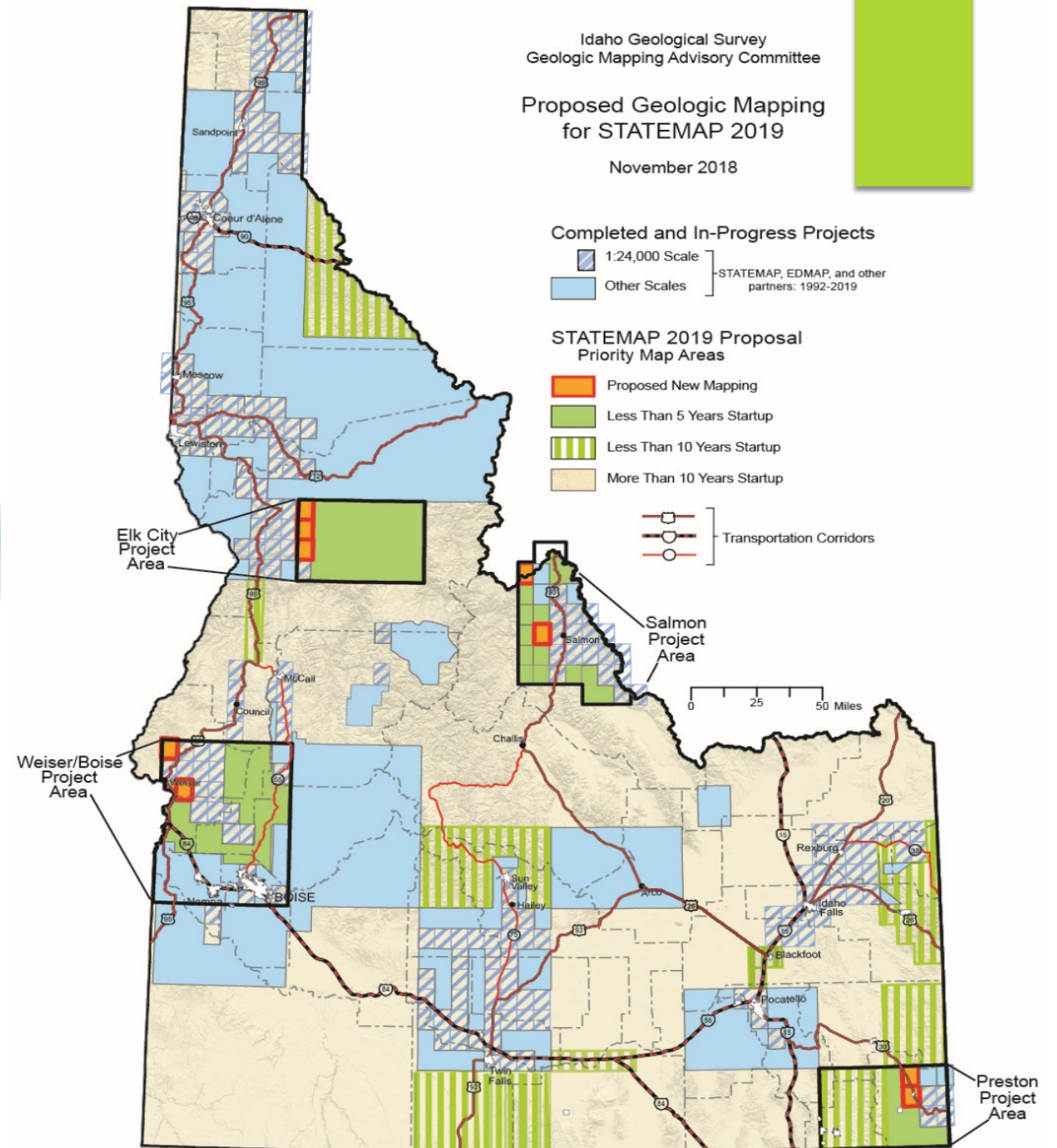
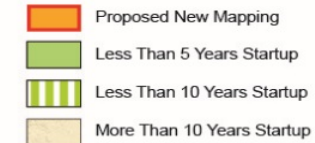
## Proposed Geologic Mapping for STATEMAP 2019

November 2018

### Completed and In-Progress Projects



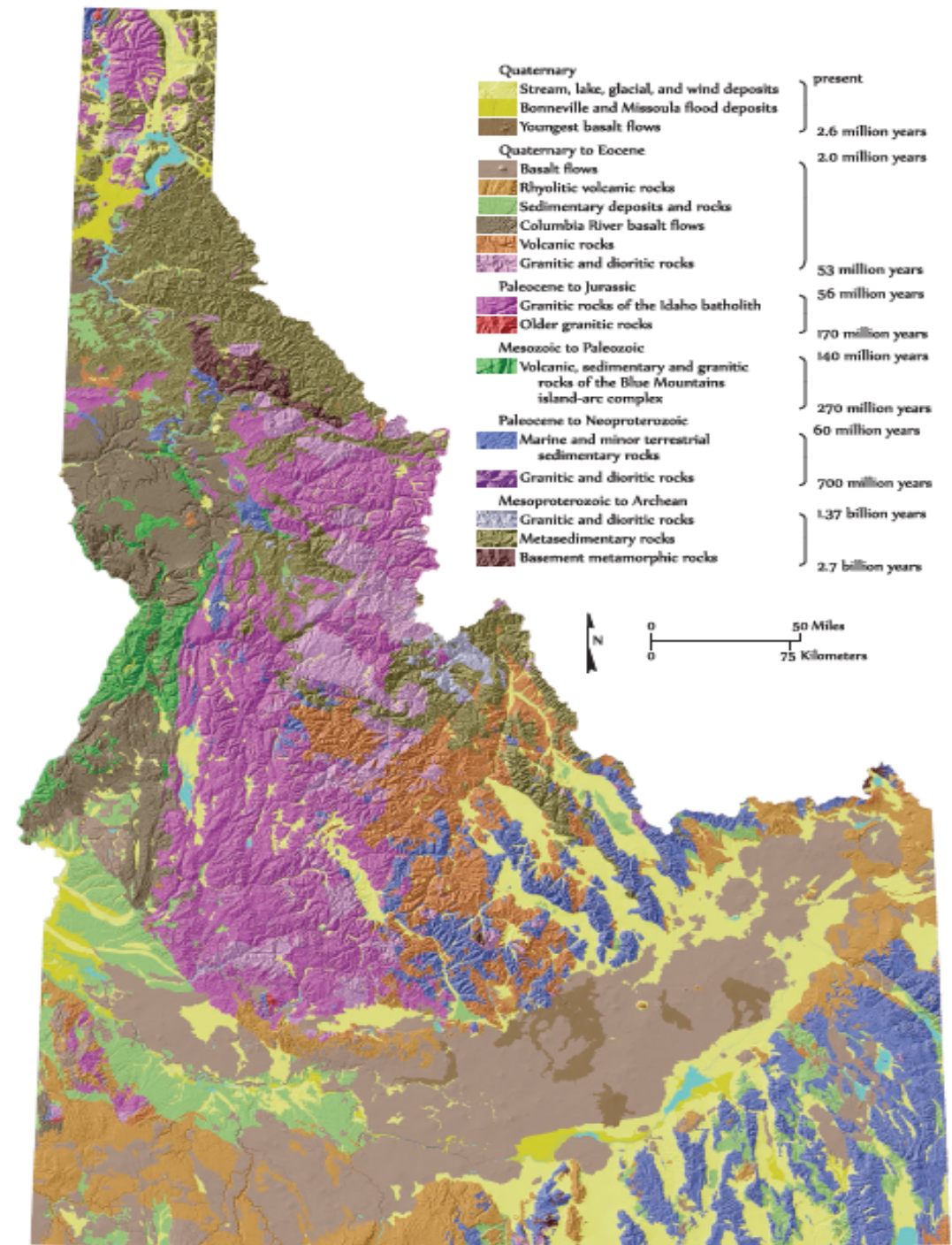
### STATEMAP 2019 Proposal Priority Map Areas





# Public funding for mapping

- ▶ STATEMAP/EDMAP/FEDMAP
- ▶ 1 time funds Earth MRI/Earthscope/etc...
- ▶ Department of transportation (\$\$\$)
  - ▶ 5-7.5' quads in recent years
  - ▶ Landslide maps
- ▶ Water resources (\$\$\$)
- ▶ Department of Emergency Management (\$\$\$)
  - ▶ 5 liquefaction and susceptibility maps
- ▶ University research- (-\$\$\$\$)
  - ▶ Snail maps- 1 7.5' quad (potentially 2 more)
- ▶ Environmental quality (\$\$)
- ▶ Department of Natural Resources- Forestry (\$\$)
- ▶ National Parks (\$\$)
- ▶ State Parks (\$)





# Private funding for mapping

- ▶ Museums/Endowments (\$-\$\$\$)
- ▶ Oil and gas companies (\$\$\$)
- ▶ Mining companies (\$-\$\$\$)
- ▶ Aggregate companies (\$\$)

## GOOD AND THE BADS

### ▶ GOOD

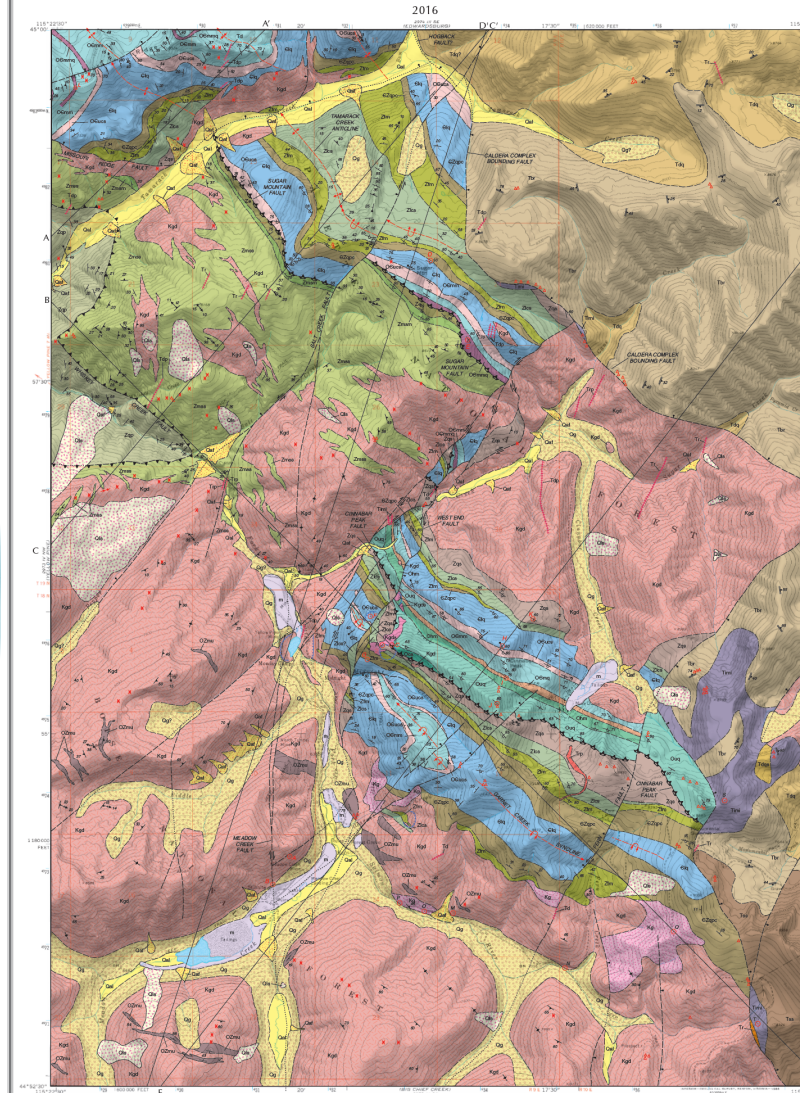
- ▶ No match
- ▶ No restrictions
- ▶ Agreements can be tricky
- ▶ Often willing to share proprietary data

### ▶ BAD

- ▶ Scale or spatial limitation
- ▶ Can get mired in details only they may be interested.
- ▶ Ensuring all data produce is public

## GEOLOGIC MAP OF THE STIBNITE QUADRANGLE, VALLEY COUNTY, IDAHO

David E. Stewart, Eric D. Stewart, Reed S. Lewis, Kerrie N. Weppler, and Vincent H. Isakson



**Table 1. U-Pb zircon ages for igneous rocks and detrital zircons in the Stibnite quadrangle and Pacific Creek area.**

Map Sample	UTM	UTM	UTM	Unit	Age	Notes
Label	Zone	Easting	Northing	Location	Ma	Remarks
A	18QUC	44830	115130	42510	47.9 ± 0.7	Granite, 100% zircon, 100% concordant
B	18QUC	44840	115130	42510	47.9 ± 0.7	Granite, 100% zircon, 100% concordant
C	18QUC	44830	115130	42510	47.9 ± 0.7	Granite, 100% zircon, 100% concordant
D	18QUC	44830	115130	42510	47.9 ± 0.7	Granite, 100% zircon, 100% concordant
E	18QUC	44830	115130	42510	47.9 ± 0.7	Granite, 100% zircon, 100% concordant
F	18QUC	44830	115130	42510	47.9 ± 0.7	Granite, 100% zircon, 100% concordant
G	18QUC	44830	115130	42510	47.9 ± 0.7	Granite, 100% zircon, 100% concordant
H	18QUC	44830	115130	42510	47.9 ± 0.7	Granite, 100% zircon, 100% concordant
I	18QUC	44830	115130	42510	47.9 ± 0.7	Granite, 100% zircon, 100% concordant
J	18QUC	44830	115130	42510	47.9 ± 0.7	Granite, 100% zircon, 100% concordant
K	18QUC	44830	115130	42510	47.9 ± 0.7	Granite, 100% zircon, 100% concordant
L	18QUC	44830	115130	42510	47.9 ± 0.7	Granite, 100% zircon, 100% concordant
M	18QUC	44830	115130	42510	47.9 ± 0.7	Granite, 100% zircon, 100% concordant
N	18QUC	44830	115130	42510	47.9 ± 0.7	Granite, 100% zircon, 100% concordant
O	18QUC	44830	115130	42510	47.9 ± 0.7	Granite, 100% zircon, 100% concordant
P	18QUC	44830	115130	42510	47.9 ± 0.7	Granite, 100% zircon, 100% concordant
Q	18QUC	44830	115130	42510	47.9 ± 0.7	Granite, 100% zircon, 100% concordant
R	18QUC	44830	115130	42510	47.9 ± 0.7	Granite, 100% zircon, 100% concordant
S	18QUC	44830	115130	42510	47.9 ± 0.7	Granite, 100% zircon, 100% concordant
T	18QUC	44830	115130	42510	47.9 ± 0.7	Granite, 100% zircon, 100% concordant
U	18QUC	44830	115130	42510	47.9 ± 0.7	Granite, 100% zircon, 100% concordant
V	18QUC	44830	115130	42510	47.9 ± 0.7	Granite, 100% zircon, 100% concordant
W	18QUC	44830	115130	42510	47.9 ± 0.7	Granite, 100% zircon, 100% concordant
X	18QUC	44830	115130	42510	47.9 ± 0.7	Granite, 100% zircon, 100% concordant
Y	18QUC	44830	115130	42510	47.9 ± 0.7	Granite, 100% zircon, 100% concordant
Z	18QUC	44830	115130	42510	47.9 ± 0.7	Granite, 100% zircon, 100% concordant

### CORRELATION OF MAP UNITS

The correlation chart shows the following units from top to bottom:

- Quaternary:** Alluvial Deposits, Recent Deposits, Recent Deposits.
- Cenozoic:** Recent Deposits, Recent Deposits, Recent Deposits.
- Tertiary:** Recent Deposits, Recent Deposits, Recent Deposits.
- Mesozoic:** Recent Deposits, Recent Deposits, Recent Deposits.
- Paleozoic:** Recent Deposits, Recent Deposits, Recent Deposits.
- Precambrian:** Recent Deposits, Recent Deposits, Recent Deposits.

### INTRODUCTION

The Stibnite quadrangle is underlain by metamorphosed igneous rocks of Neoproterozoic and Mesozoic age within the Stibnite and Silver Lake Segments of the Snake Range. These units have been extensively mapped by the Idaho Geological Survey (IGS) and are described in detail in the Idaho Geological Survey Bulletin 100 (Stewart et al., 2016). The map shows the distribution of these units and their relationships to other geological features in the area.

### SYMBOLS

- Contact: dashed where approximately located.
- Normal fault: dashed with bar on downthrown side; dashed where approximately located; dashed where concealed.
- Three fault: fault on upper plate; dashed where approximately located; dashed where concealed.
- Obstructed fault: fault with a direction of dip; dashed where approximately located; dashed where concealed.
- Right-lateral strike-slip fault: dashed where approximately located; dashed where concealed.
- Reactivated right-lateral strike-slip fault: fault on downthrown (reactivated) segment; dashed where approximately located; dashed where concealed.
- Reactivated left-lateral strike-slip fault: fault on downthrown (reactivated) segment; dashed where approximately located; dashed where concealed.
- Anticline: dashed with arrow; dashed where approximately located; dashed where concealed.
- Obstructed anticline: dashed with arrow; dashed where approximately located; dashed where concealed.
- Syncline: dashed with arrow; dashed where approximately located; dashed where concealed.
- Obstructed syncline: dashed with arrow; dashed where approximately located; dashed where concealed.
- Strike and dip of bedding.
- Strike and dip of bedding where sedimentary structures show bedding to be upright.
- Strike and dip of bedding where sedimentary structures show bedding to be overturned.
- Strike and dip of bedding where stratigraphic position indicates bedding is likely overturned.
- Strike and dip of foliation.
- Unconformity: dashed with arrow.
- Strike and dip of conglomerate facies.
- Strike and dip of flow or compaction foliation in volcanic rocks.
- Beating and plunge of lineation, type unknown.
- Beating and plunge of mineral lineation.
- Beating and plunge of crystalline foliation.
- Beating and plunge of mylonitic axial fold showing clockwise rotation.
- Location of fold.
- Tectonic breccia.
- Quartz vein.
- Quartz vein with breccia.
- Location and later of sample used for age determination (see Table 2).
- Location and later of sample used for chemical analysis (see Table 2).

### DESCRIPTION OF MAP UNITS

The following unit descriptions and their distribution of structure was the result of field observations and laboratory work. Unit descriptions are also for field-scale features of 100 m or more. Unit descriptions are also for field-scale features of 100 m or more. Unit descriptions are also for field-scale features of 100 m or more.

**Recent Deposits:** Alluvial Deposits, Recent Deposits, Recent Deposits.

**Cenozoic:** Recent Deposits, Recent Deposits, Recent Deposits.

**Tertiary:** Recent Deposits, Recent Deposits, Recent Deposits.

**Mesozoic:** Recent Deposits, Recent Deposits, Recent Deposits.

**Paleozoic:** Recent Deposits, Recent Deposits, Recent Deposits.

**Precambrian:** Recent Deposits, Recent Deposits, Recent Deposits.

**Geologic Map of the Stibnite Quadrangle, Valley County, Idaho**

**Map Scale:** 1:24,000

**Map Date:** 2016

**Map Authors:** David E. Stewart, Eric D. Stewart, Reed S. Lewis, Kerrie N. Weppler, and Vincent H. Isakson

**Map Title:** Geologic Map of the Stibnite Quadrangle, Valley County, Idaho

**Map Symbols:** Contact, Normal fault, Three fault, Obstructed fault, Right-lateral strike-slip fault, Reactivated right-lateral strike-slip fault, Reactivated left-lateral strike-slip fault, Anticline, Obstructed anticline, Syncline, Obstructed syncline, Strike and dip of bedding, Strike and dip of bedding where sedimentary structures show bedding to be upright, Strike and dip of bedding where sedimentary structures show bedding to be overturned, Strike and dip of bedding where stratigraphic position indicates bedding is likely overturned, Strike and dip of foliation, Unconformity, Strike and dip of conglomerate facies, Strike and dip of flow or compaction foliation in volcanic rocks, Beating and plunge of lineation, type unknown, Beating and plunge of mineral lineation, Beating and plunge of crystalline foliation, Beating and plunge of mylonitic axial fold showing clockwise rotation, Location of fold, Tectonic breccia, Quartz vein, Quartz vein with breccia, Location and later of sample used for age determination, Location and later of sample used for chemical analysis.

**Map Units:** Recent Deposits, Cenozoic, Tertiary, Mesozoic, Paleozoic, Precambrian.

**Map Legend:** Contact, Normal fault, Three fault, Obstructed fault, Right-lateral strike-slip fault, Reactivated right-lateral strike-slip fault, Reactivated left-lateral strike-slip fault, Anticline, Obstructed anticline, Syncline, Obstructed syncline, Strike and dip of bedding, Strike and dip of bedding where sedimentary structures show bedding to be upright, Strike and dip of bedding where sedimentary structures show bedding to be overturned, Strike and dip of bedding where stratigraphic position indicates bedding is likely overturned, Strike and dip of foliation, Unconformity, Strike and dip of conglomerate facies, Strike and dip of flow or compaction foliation in volcanic rocks, Beating and plunge of lineation, type unknown, Beating and plunge of mineral lineation, Beating and plunge of crystalline foliation, Beating and plunge of mylonitic axial fold showing clockwise rotation, Location of fold, Tectonic breccia, Quartz vein, Quartz vein with breccia, Location and later of sample used for age determination, Location and later of sample used for chemical analysis.



# Private funding for mapping

- ▶ 4 maps in recent years
- ▶ Geologic networking
  - ▶ Friends from college
  - ▶ Local grads working for companies
  - ▶ GSA
- ▶ Know your state's economic geology
- ▶ Watch the market
  - ▶ last year Cobalt ~\$50/lb
  - ▶ Today ~\$15/lb
- ▶ Monitor mining claims
- ▶ Mining
  - ▶ Outside of Nevada know the Canadian majors and juniors
  - ▶ Lament the recent drought of Stanley Cup victories in Canada.



## Canadian Juniors

# Discussion

- ▶ How has your survey leveraged private industry or other resources to benefit your states geologic mapping needs.
  - ▶ well data
  - ▶ Drilling data
  - ▶ Geophysical
    - ▶ 3-D/2-D Seismic
    - ▶ Aeromag
    - ▶ gravity



**SEI** SEISMIC  
EXCHANGE



**TGS**



**PAC**  
**GEOPHYSICAL**