

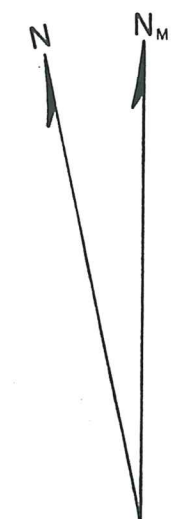
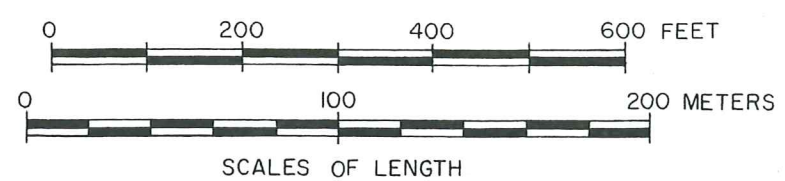
- DEFINITE FAULT (ARROWS SHOW RELATIVE MOTION)
- DEFINITE FAULT
- CONJECTURAL FAULT
- CONTACT OF FORMATIONS
- CONJECTURAL CONTACT
- STREAMCOURSE
- LEDGE OR CLIFF
- CAVE OR MINE
- FOOT TRAIL
- PIT OR SINK
- STRIKE/DIP (NUMBER INDICATES DIP ANGLE)

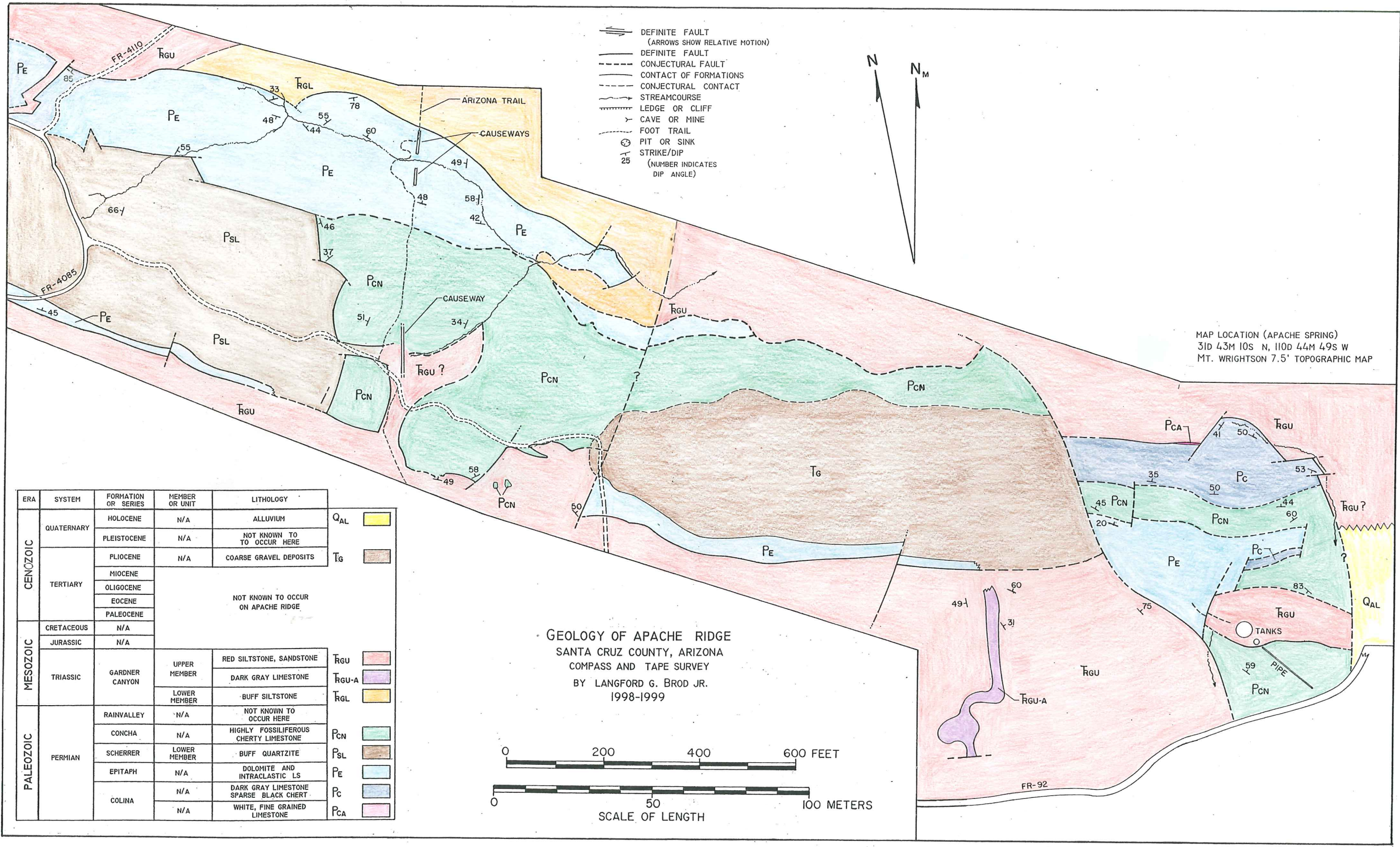
ERA	SYSTEM	FORMATION OR SERIES	MEMBER OR UNIT	LITHOLOGY, LOCATION	
CENOZOIC	QUATERNARY	HOLOCENE	TALUS, SILT	SOIL, SAND, GRAVEL	Q _{AL}
		PLEISTOCENE	TERRACES	SOIL OVER COARSE GRAVEL	Q _T
	TERTIARY	OLIGOCENE?*	DIKE	GRAY RHYOLITE	T _R
	EOCENE?*				
MESOZOIC	CRETACEOUS	FORT CRITTENDEN	BROWN CONGLOMERATE MEMBER	SW OF ONYX HILL NOT SHOWN	
	TRIASSIC	GARDNER CANYON	UPPER MEMBER	RED SILTSTONE	T _{RGU}
			THIN LS MARKER BEDS	THIN LIMESTONE	T _{RGL-A}
LOWER MEMBER			FINE, RED SS & SILTSTONE	T _{RGL}	
PALEOZOIC	PERMIAN	RAINVALLEY	N/A	THIN TO MASSIVE LS CENTRAL PART, ONYX HILL	P _R
		SCHERRER	UPPER QTZITE MEMBER	QUARTZITE & THIN BEDDED SANDSTONE	P _{SU}
			MIDDLE DOLOMITE MEMBER	MASSIVE GRAY DOLOMITE	P _{SM}
			LOWER QTZITE MEMBER	PRESENT ON ONYX HILL?	
			BASAL SILTSTONE MEMBER	NOT PRESENT ON ONYX HILL	
		EPITAPH	N/A		
		COLINA	N/A	SMALL OUTCROP AREA SE END OF ONYX HILL	P _C

*AN INDETERMINATE RADIOMETRIC AGE PER DREWES (1972)

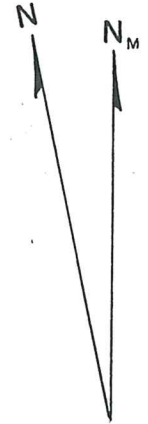
MAP LOCATION (ENT. TO ONYX CAVE)
 31D 43M 03S N, 110D 46M 12S W
 MT. WRIGHTSON 7.5' TOPOGRAPHIC MAP

GEOLOGY OF ONYX HILL
 SANTA CRUZ COUNTY, ARIZONA
 COMPASS AND TAPE SURVEY
 BY LANGFORD G. BROD JR.
 2002





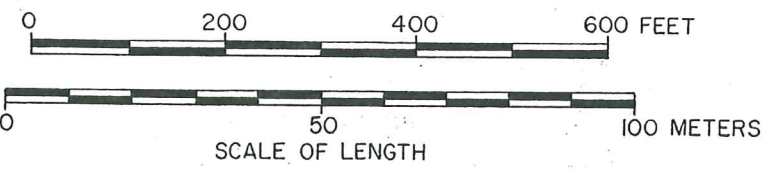
- DEFINITE FAULT (ARROWS SHOW RELATIVE MOTION)
- DEFINITE FAULT
- CONJECTURAL FAULT
- CONTACT OF FORMATIONS
- CONJECTURAL CONTACT
- STREAMCOURSE
- LEDGE OR CLIFF
- CAVE OR MINE
- FOOT TRAIL
- PIT OR SINK
- STRIKE/DIP (NUMBER INDICATES DIP ANGLE)



MAP LOCATION (APACHE SPRING)
 31D 43M 10S N, 110D 44M 49S W
 MT. WRIGHTSON 7.5' TOPOGRAPHIC MAP

ERA	SYSTEM	FORMATION OR SERIES	MEMBER OR UNIT	LITHOLOGY	
CENOZOIC	QUATERNARY	HOLOCENE	N/A	ALLUVIUM	Q _{AL}
		PLEISTOCENE	N/A	NOT KNOWN TO OCCUR HERE	
	TERTIARY	PLIOCENE	N/A	COARSE GRAVEL DEPOSITS	T _G
		MIOCENE		NOT KNOWN TO OCCUR ON APACHE RIDGE	
		OLIGOCENE			
		Eocene			
PALEOCENE					
MESOZOIC	CRETACEOUS	N/A			
	JURASSIC	N/A			
PALEOZOIC	TRIASSIC	GARDNER CANYON	UPPER MEMBER	RED SILTSTONE, SANDSTONE	T _{GU}
			LOWER MEMBER	DARK GRAY LIMESTONE	T _{GU-A}
				BUFF SILTSTONE	T _{GL}
	PERMIAN	RAINVALLEY	N/A	NOT KNOWN TO OCCUR HERE	
		CONCHA	N/A	HIGHLY FOSSILIFEROUS CHERTY LIMESTONE	P _{CN}
		SCHERRER	LOWER MEMBER	BUFF QUARTZITE	P _{SL}
EPITAPH		N/A	DOLOMITE AND INTRACLASTIC LS	P _E	
COLINA		N/A	DARK GRAY LIMESTONE SPARSE BLACK CHERT	P _C	
	N/A	WHITE, FINE GRAINED LIMESTONE	P _{CA}		

GEOLOGY OF APACHE RIDGE
 SANTA CRUZ COUNTY, ARIZONA
 COMPASS AND TAPE SURVEY
 BY LANGFORD G. BROD JR.
 1998-1999





C - COARSE CALCITE
 F - FAULT EXPOSURE
 S - SLICKENSIDES
 QT1-QT4 - LOW TERRACES
 (0-3M) ALONG SAWMILL CREEK


* AN INDETERMINATE
 RADOMETRIC AGE
 PER DREWES (1972)


ERA	SYSTEM	FORMATION OR SERIES	MEMBER OR UNIT	LITHOLOGY
CENOZOIC	QUATERNARY	HOLOCENE	N/A	SOIL, TALUS STREAM GRAVEL
		PLEISTOCENE	N/A	ALLUVIUM OVER RE- DEPOSITED GRAVEL
	TERTIARY	PLIOCENE	N/A	COARSE TERRACE GRAVEL
		EOCENE?*	DIKE	GRAY RHYOLITE
MESOZOIC	TRIASSIC	GARDNER CANYON	UPPER MEMBER	RED SILTSTONE
			LOWER MEMBER	BUFF SILTSTONE
				THIN, LIGHT COLORED LIMESTONE
				QUARTZ BRECCIA
				WHITE QUARTZITE
			PALEO-ZOIC	PERMIAN
COLINA	N/A	DARK GRAY LIMESTONE SPARSE BLACK CHERT		
PENN-PERMIAN	EAP	N/A	LIGHT RED SILTSTONE	


QAL 


QT 


QT_G 


TR 


TR_{GU} 


TR_{GL} 












TR_{GL-A} 

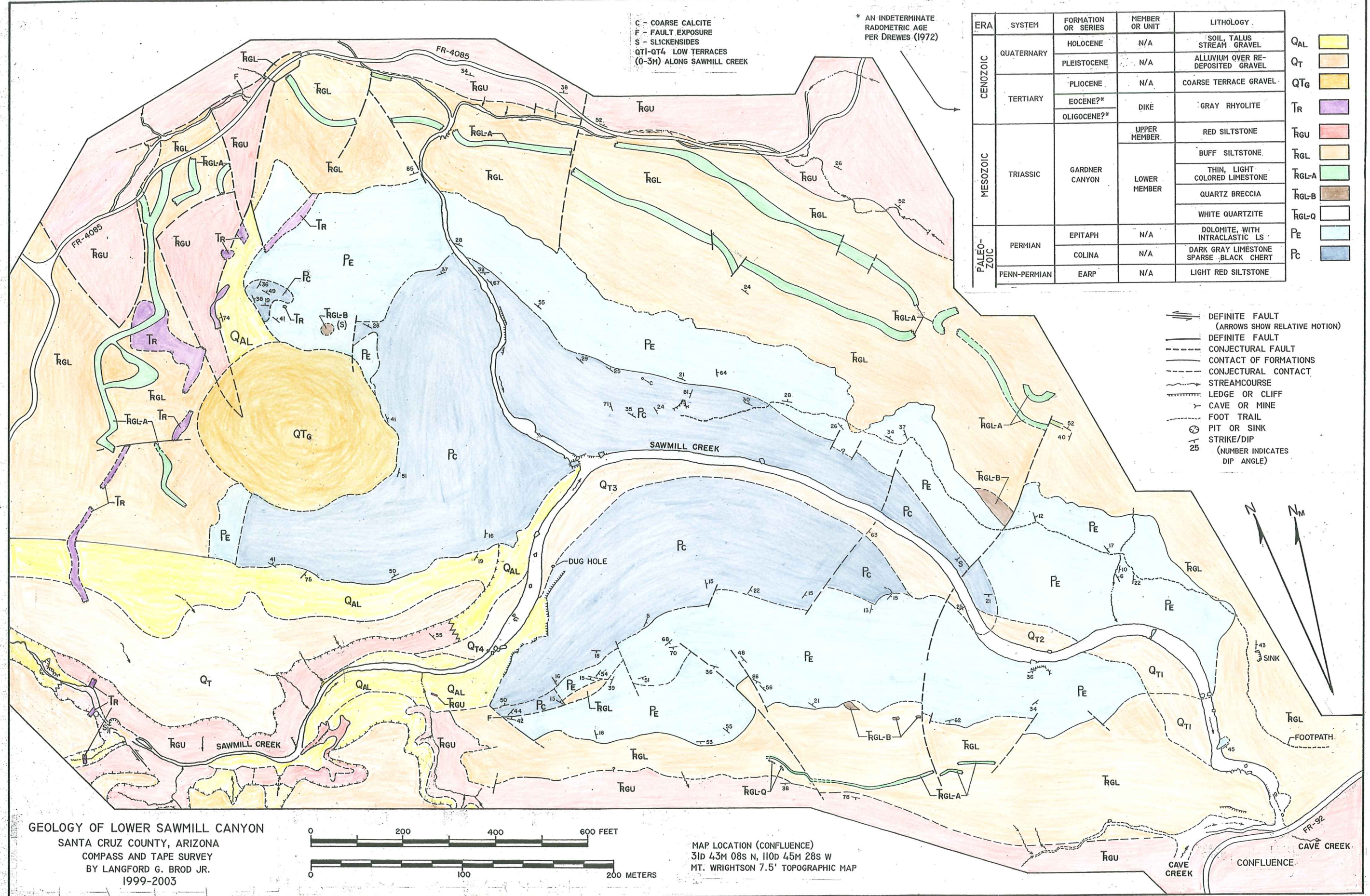
TR_{GL-B} 

TR_{GL-Q} 

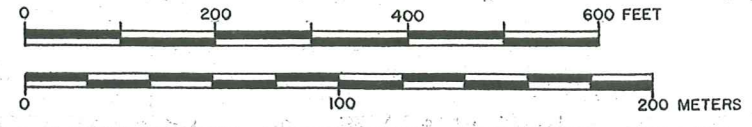
PE 

PC 

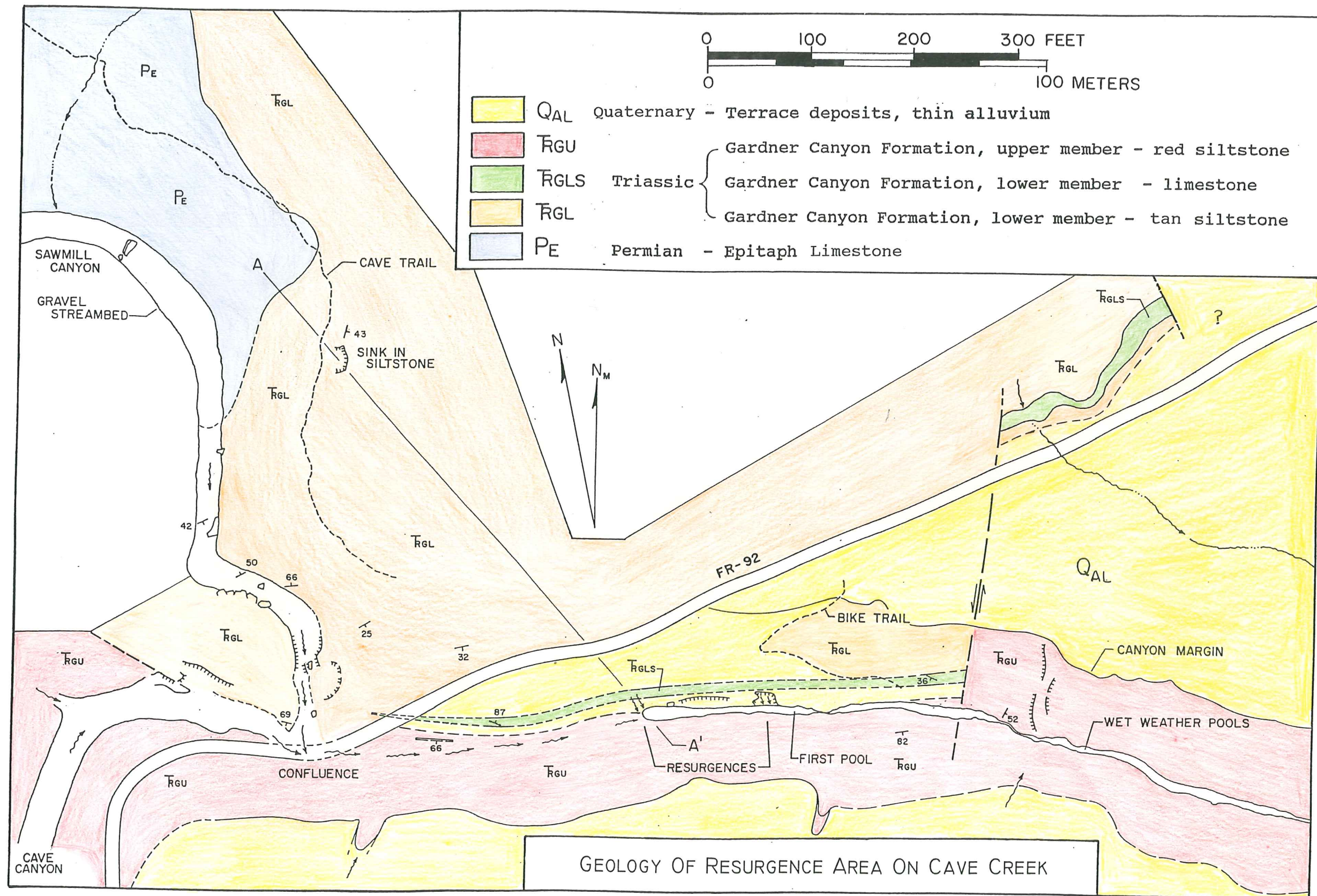
-  DEFINITE FAULT
(ARROWS SHOW RELATIVE MOTION)
-  DEFINITE FAULT
-  CONJECTURAL FAULT
-  CONTACT OF FORMATIONS
-  CONJECTURAL CONTACT
-  STREAMCOURSE
-  LEDGE OR CLIFF
-  CAVE OR MINE
-  FOOT TRAIL
-  PIT OR SINK
-  STRIKE/DIP
(NUMBER INDICATES
DIP ANGLE)

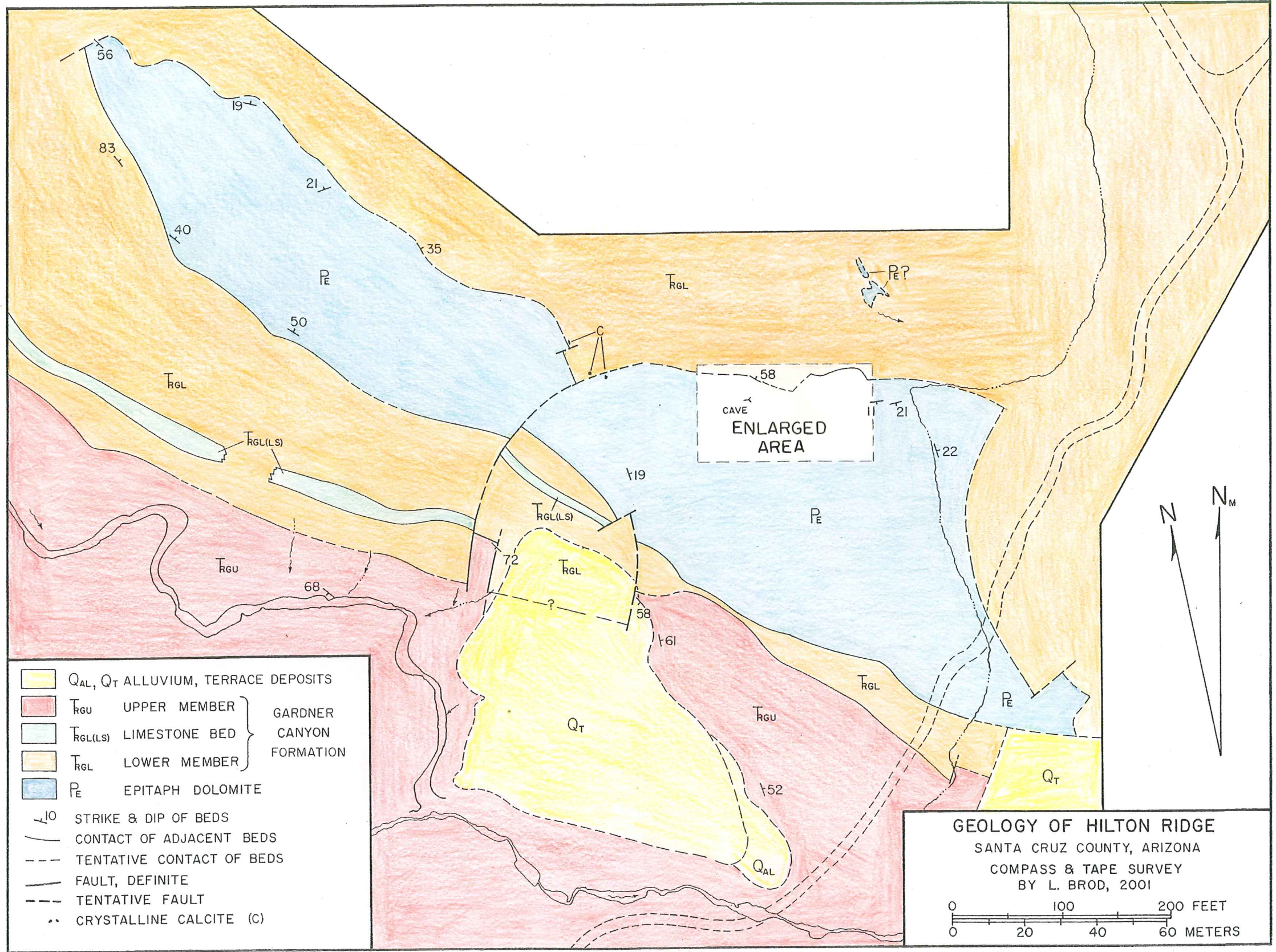


GEOLOGY OF LOWER SAWMILL CANYON
 SANTA CRUZ COUNTY, ARIZONA
 COMPASS AND TAPE SURVEY
 BY LANGFORD G. BROD JR.
 1999-2003



MAP LOCATION (CONFLUENCE)
 31D 43M 08S N, 110D 45M 28S W
 MT. WRIGHTSON 7.5' TOPOGRAPHIC MAP

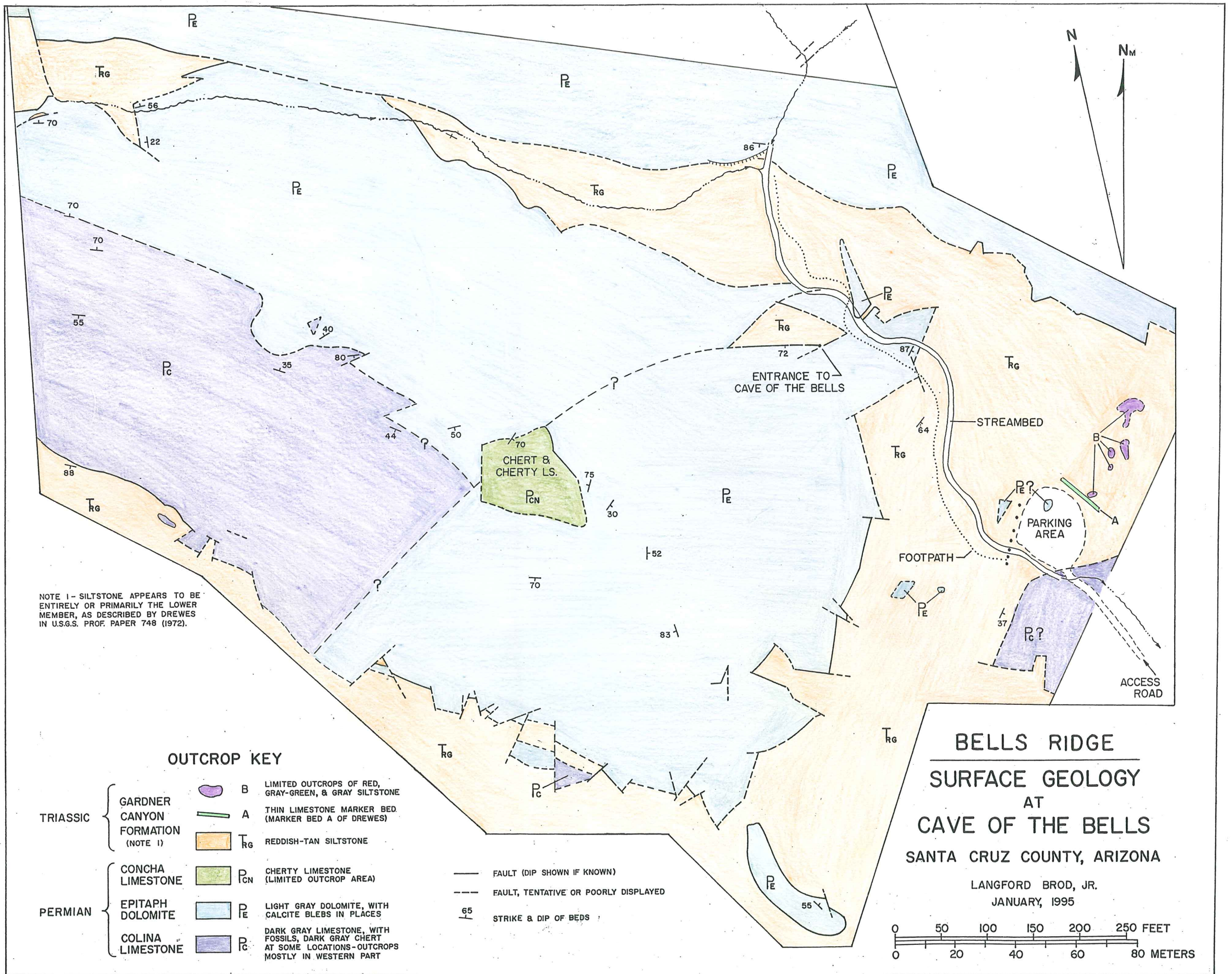




- Q_{AL}, Q_T ALLUVIUM, TERRACE DEPOSITS
 - T_{RGU} UPPER MEMBER
 - T_{RGL(LS)} LIMESTONE BED
 - T_{RGL} LOWER MEMBER
 - P_E EPITAPH DOLOMITE
- } GARDNER CANYON FORMATION
- STRIKE & DIP OF BEDS
 - CONTACT OF ADJACENT BEDS
 - TENTATIVE CONTACT OF BEDS
 - FAULT, DEFINITE
 - TENTATIVE FAULT
 - CRYSTALLINE CALCITE (C)







GEOLOGY OF HILTON RIDGE
 SANTA CRUZ COUNTY, ARIZONA
 COMPASS & TAPE SURVEY
 BY L. BROD, 2001




0 100 200 FEET
 0 20 40 60 METERS



NOTE 1 - SILTSTONE APPEARS TO BE ENTIRELY OR PRIMARILY THE LOWER MEMBER, AS DESCRIBED BY DREWES IN U.S.G.S. PROF. PAPER 748 (1972).

OUTCROP KEY

- | | | | |
|----------|-----------------------------------|--|--|
| TRIASSIC | GARDNER CANYON FORMATION (NOTE 1) |  B | LIMITED OUTCROPS OF RED, GRAY-GREEN, & GRAY SILTSTONE |
| | |  A | THIN LIMESTONE MARKER BED (MARKER BED A OF DREWES) |
| | |  Trg | REDDISH-TAN SILTSTONE |
| PERMIAN | CONCHA LIMESTONE |  Pcn | CHERTY LIMESTONE (LIMITED OUTCROP AREA) |
| | |  Pe | LIGHT GRAY DOLOMITE, WITH CALCITE BLEBS IN PLACES |
| | |  Pc | DARK GRAY LIMESTONE, WITH FOSSILS, DARK GRAY CHERT AT SOME LOCATIONS - OUTCROPS MOSTLY IN WESTERN PART |

-  FAULT (DIP SHOWN IF KNOWN)
-  FAULT, TENTATIVE OR POORLY DISPLAYED
-  STRIKE & DIP OF BEDS

**BELLS RIDGE
SURFACE GEOLOGY
AT
CAVE OF THE BELLS
SANTA CRUZ COUNTY, ARIZONA**

LANGFORD BROD, JR.
JANUARY, 1995

