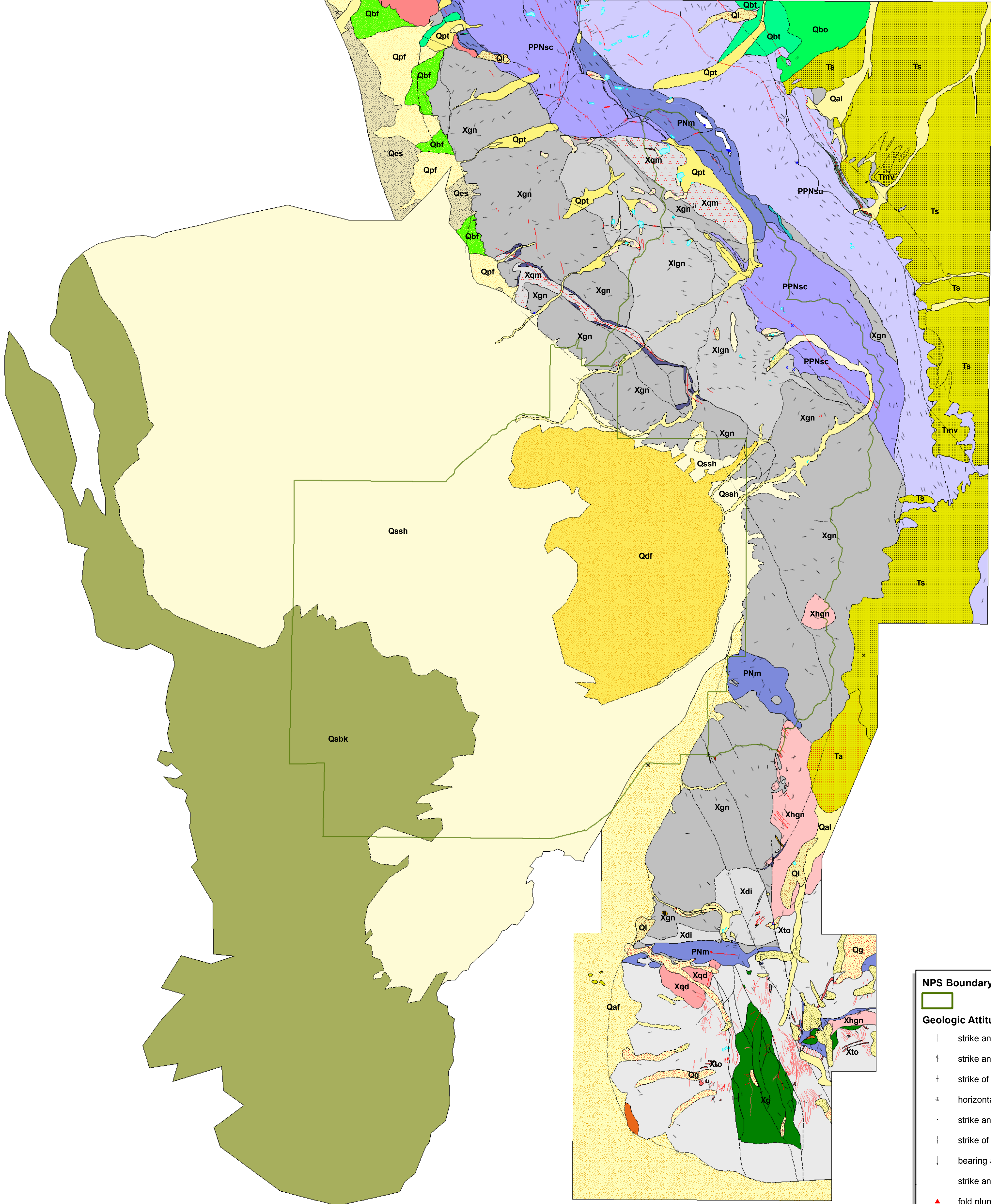
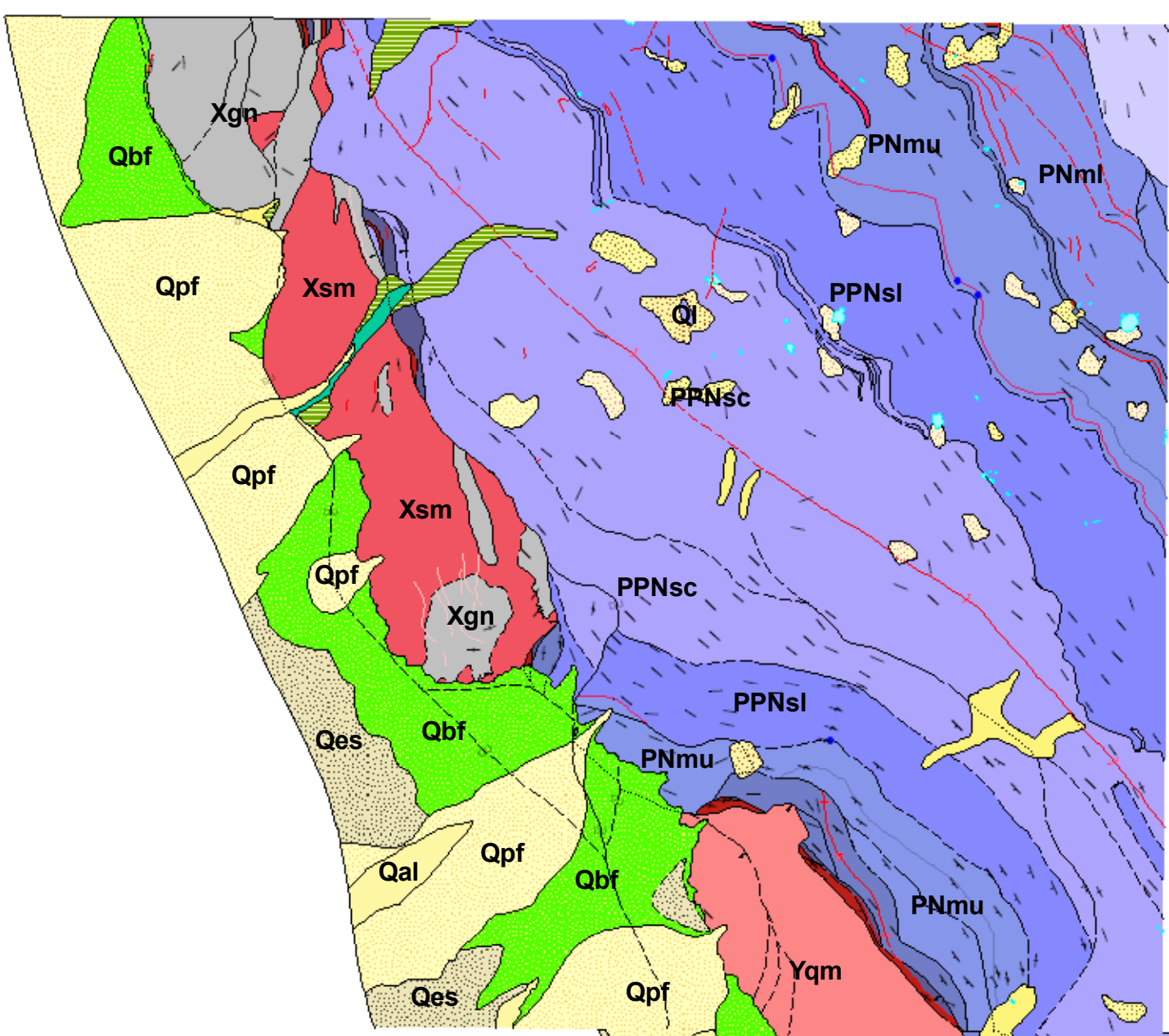




Geologic Map of Great Sand Dunes NP and PRES



Geologic Units	
Qal	alluvium
Qaf	alluvial-fan deposits
Qes	eolian sand
Qdf	dunefield
Qssh	sand sheet
Qsbk	sabkha
Ql	landslide deposits
Qrf	rockfall deposits
Qrg	rock-glacier deposits
Qpu	Pinedale glacial deposits, undifferentiated
Qpf	Pinedale fan alluvium
Qpl	Pinedale lacustrine clay
Qpo	Pinedale outwash
Qpt	Pinedale till
Qpbu	Pinedale and Bull Lake glacial deposits, undifferentiated
Qbf	Bull Lake fan alluvium
Qbo	Bull Lake outwash
Qbo2	Bull Lake young outwash
Qbt	Bull Lake till
Qbt2	Bull Lake young till
Ts	Sante Fe Formation
Tgr	granite and granodiorite
Ta	andesite
Tmv	mafic volcanic rocks
Tf	felsic dikes
Tm	mafic dikes
Jm	Morrison Formation
Je	Entrada Sandstone
PPNsu	Sangre de Cristo Formation (undivided)
PPNsc	Sangre de Cristo Formation, Crestrone Member
PPNscd	Sangre de Cristo Formation, Crestrone Member
PPNsl	Sangre de Cristo Formation, Lower Member
PNm	Minturn Formation
PNmu	Minturn Formation, upper part
PNmumls	Minturn Formation, marker limestone
PNmcls	Minturn Formation, crinoidal silty limestone
PNmush	Minturn Formation, shale and siltstone member
PNmols	Minturn Formation, oolite limestone
PNmt	Minturn Formation, Main turbidite member
PNmbis	Minturn Formation, biohermal limestone unit
PNml	Minturn Formation, lower part
PNmq	Minturn Formation, quartzose red-beds
MDOr	Mississippian, Devonian and Ordovician Sed Rocks
Oh	Harding Sandstone
Om	Manitou Limestone
Yqm	Quartz Monzonite
Yqmqz	Quartz Monzonite, vein quartz
Xp	pegmatite
Xto	tonalite gneiss
Xg	metagabbro
Xqd	quartz diorite
Xdi	diorite
Xm	mafic intrusive rocks
Xqm	quartz monzonite
Xq	quartzite
Xsm	syenite and monzonite
Xlgn	leucocratic gneiss
Xhgn	hornblende gneiss
Xgn	mixed gneiss
WATER	

NPS Boundary	Age Date Points	Linear Geologic Units
strike and dip of beds	paleontological	PNmumls - Minturn Formation, marker limestone
strike and dip of overturned beds	Prospect	PNmcls - Minturn Formation, crinoidal silty limestone
strike of vertical beds	Adit	PNmubls - Minturn Formation, brown weathering limestone
horizontal beds	Gravel Pit	PNmupals - Minturn Formation, phylloidal algal limestone
strike and dip of foliation		PNmols - Minturn Formation, oolite limestone
strike of vertical foliation		
bearing and plunge of lineation		
strike and dip of cleavage		
fold plunge arrow head		
dip of fault plane		
upthrown side of fault		
downtthrown side of fault		
monocline		
anticline		
syncline		
overturned anticline		
overturned syncline		
monocline, anticalinal bend		

Folds	Faults	Linear Dike Units
known location	known location	Tf - felsite dike
approximate location	approximate location	Tm - mafic rock dike
concealed	concealed location	Yqmqz - vein quartz
		Xp - pegmatite dike
		Xm - mafic intrusives

Geologic Contacts
known
approximate
approximate, queried
map boundary
shoreline

The original maps digitized by NPS staff to create this product were:

Lindsey, David A., Soulliere, Sandra J., Hafner, Katrin., and Flores, R.J., 1985, Geologic Map of Rito Alto Peak and Northeastern part of Mirage Quadrangles, Custer and Saguache Counties, Colorado: U.S. Geological Survey, Miscellaneous Field Studies Map MF-1767, scale 1:24,000.

Lindsey, David A., Johnson, Bruce R., Soulliere, Sandra J., Bruce, Robert M., and Hafner, Katrin., 1986, Geologic Map of the Beck Mountain, Crestone Peak, and Crestone Quadrangles, Custer, Huerfano, and Saguache Counties, Colorado: U.S. Geological Survey, Miscellaneous Field Studies Map MF-1878, 1:24,000 scale.

Johnson, Bruce R., Bruce, Robert M., and Lindsey, David A., 1989, Reconnaissance Geologic Map of the Medano Pass Quadrangle and part of the Liberty Quadrangle, Alamosa, Huerfano, and Saguache Counties, Colorado: U.S. Geological Survey, Miscellaneous Field Studies Map MF-2089, scale 1:24,000.

Bruce, Robert M., and Johnson, Bruce R., 1991, Reconnaissance Geologic Map of parts of the Zapata Ranch and Mosca Pass Quadrangles, Alamosa and Huerfano Counties, Colorado: U.S. Geological Survey, Miscellaneous Field Studies Map MF-2168, scale 1:24,000.

Johnson, Bruce R., and Bruce, Robert M., 1991, Reconnaissance Geologic Map of parts of the Twin Peaks and Blanca Peak Quadrangles, Alamosa, Costilla, and Huerfano Counties, Colorado: U.S. Geological Survey, Miscellaneous Field Studies Map MF-2169, scale 1:24,000.

Valdez, Andrew, 2000, unpublished geologic mapping of Great Sand Dunes National Park, Colorado.

Digital geologic data and cross sections for Great Sand Dunes National Park and Preserve, and all other digital geologic data prepared as part of the Geologic Resources Divisions Geologic Resource Evaluation program, are available online: http://www2.nature.nps.gov/geology/inventory/gre_publications.cfm

