U.S. DEPARTMENT OF THE INTERIOR

U.S. GEOLOGICAL SURVEY

Geologic map of the southern Galiuro Mountains in Pinal, Graham, and Cochise Counties, Arizona, as compiled for the U.S. Bureau of Land Management Muleshoe Ecosystem Planning Document

by

Leslie J. Cox[1]

Open-File Report 95-202

1995

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[1] Tucson, Arizona

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CONTENTS

INTRODUCTION

This report presents a simplified map of the geology of the southern Galiuro Mountains (fig. 1). This map was compiled from existing geologic maps (fig. 2). The map is provided here as a page-sized map, without a cartographic base, because a digital version of this map has been prepared for incorporation into the geographic information system being assembled by the Bureau of Land Management (BLM) for the Muleshoe Ecosystem planning area (fig. 3). A cartographic base is one of several layers of data in the BLM's geographic information system for the Muleshoe area.

The geologic map in this report was produced with the GSMAP program of Selner and Taylor (1988). The GSMAP data base was subsequently converted into an ARC/INFO[2] coverage with the GSMARC program of Green and Selner (1988) so that it can be electronically transferred to the geographic information system (GIS) being assembled by BLM. Once incorporated as a data layer in BLM's GIS, the geologic map may be reproduced with other data layers, including the cartographic base, at any scale. However, because complex geology was simplified to be shown at scales of approximately 1:100,000 from maps whose scales range from as large as 1:24,000 to as small as 1:250,000, the accuracy of this map is not guaranteed at scales larger than 1:100,000. For greater detail the reader should refer to the original maps.

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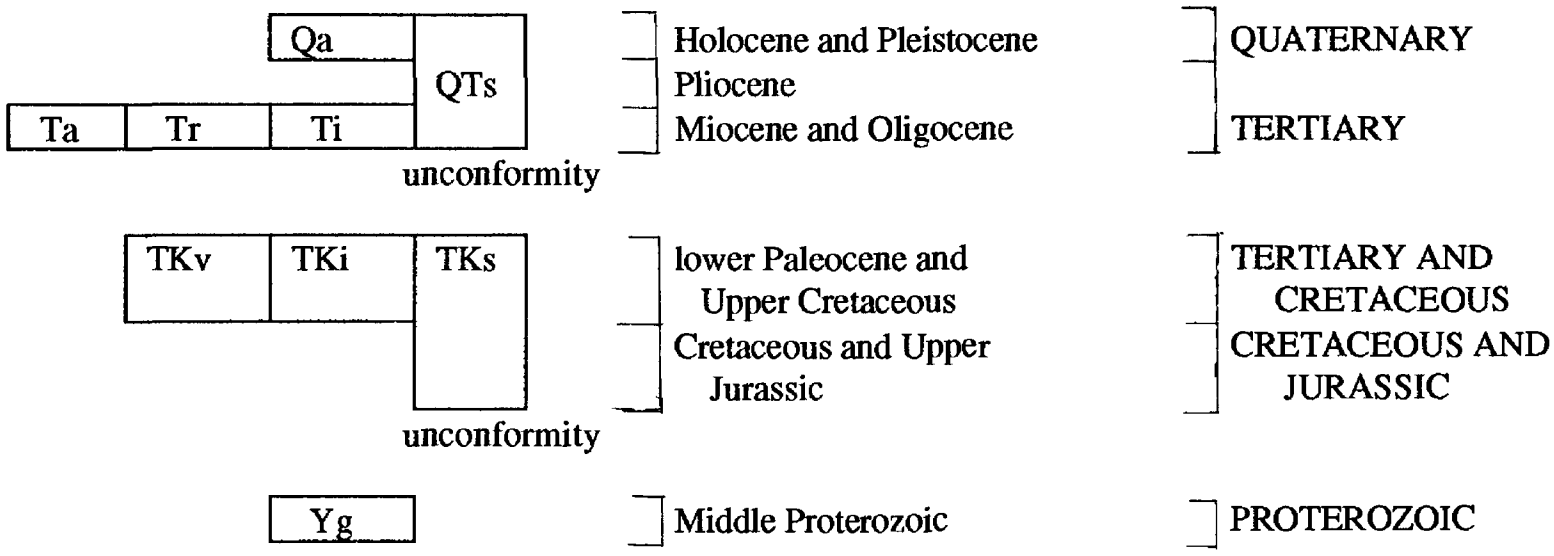
[2] ARC/INFO is the trade name for geographic information systems software produced by Environmental Systems Research Institute, Inc.

CORRELATION OF MAP UNITS



DESCRIPTION OF MAP UNITS

Qa **Alluvium (Holocene and Pleistocene)**--Surficial material

QTs **Stratified rocks (Oligocene and younger)**--Sedimentary materials deposited in basins and overlying unconsolidated strata; includes Mineta Formation at south end of map

Ti **Igneous intrusions (Miocene and Oligocene)**--Dikes and small- to medium-sized bodies of intrusive dacite, latite, quartz latite, monzonite, rhyodacite, and rhyolite

Tr **Rhyolitic lava and eruptive-center rocks (Miocene and Oligocene)**--Chiefly flow-foliated rhyolitic lava with interbeds of tuff and pyroclastics; local occurrences of obsidian and of ash-rich clastic breccias

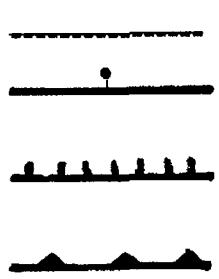
Ta **Andesitic volcanic rocks (Miocene and Oligocene)**--Chiefly andesite flows and some pyroclastic deposits. Basaltic andesite occurs in the southeastern area

TKi **Igneous intrusions (early Paleocene and Late Cretaceous)**--Diorite porphyry

TKv **Volcanic rocks (lower Paleocene and Upper Cretaceous)**--Andesitic volcanic breccias of the Muleshoe Volcanics

TKs **Sedimentary rocks (lower Paleocene to Upper Jurassic)**--Conglomerate of the Cascabel Formation of early Paleocene to Late Cretaceous age and sandstone, mudstone, and conglomerate of the Bisbee Group of Late Jurassic to Early Cretaceous age

Yg **Granitic rocks (Middle Proterozoic)**--Ruin Granite pluton



Contact--Dashed where approximately located

Normal Fault--Dashed where approximate and dotted where concealed; bar and ball on downthrown block

Low angle normal fault--Dashed where approximate and dotted where concealed; hachures on downthrown block

Reverse Fault--Dashed where approximate, dotted where concealed; teeth on upper plate

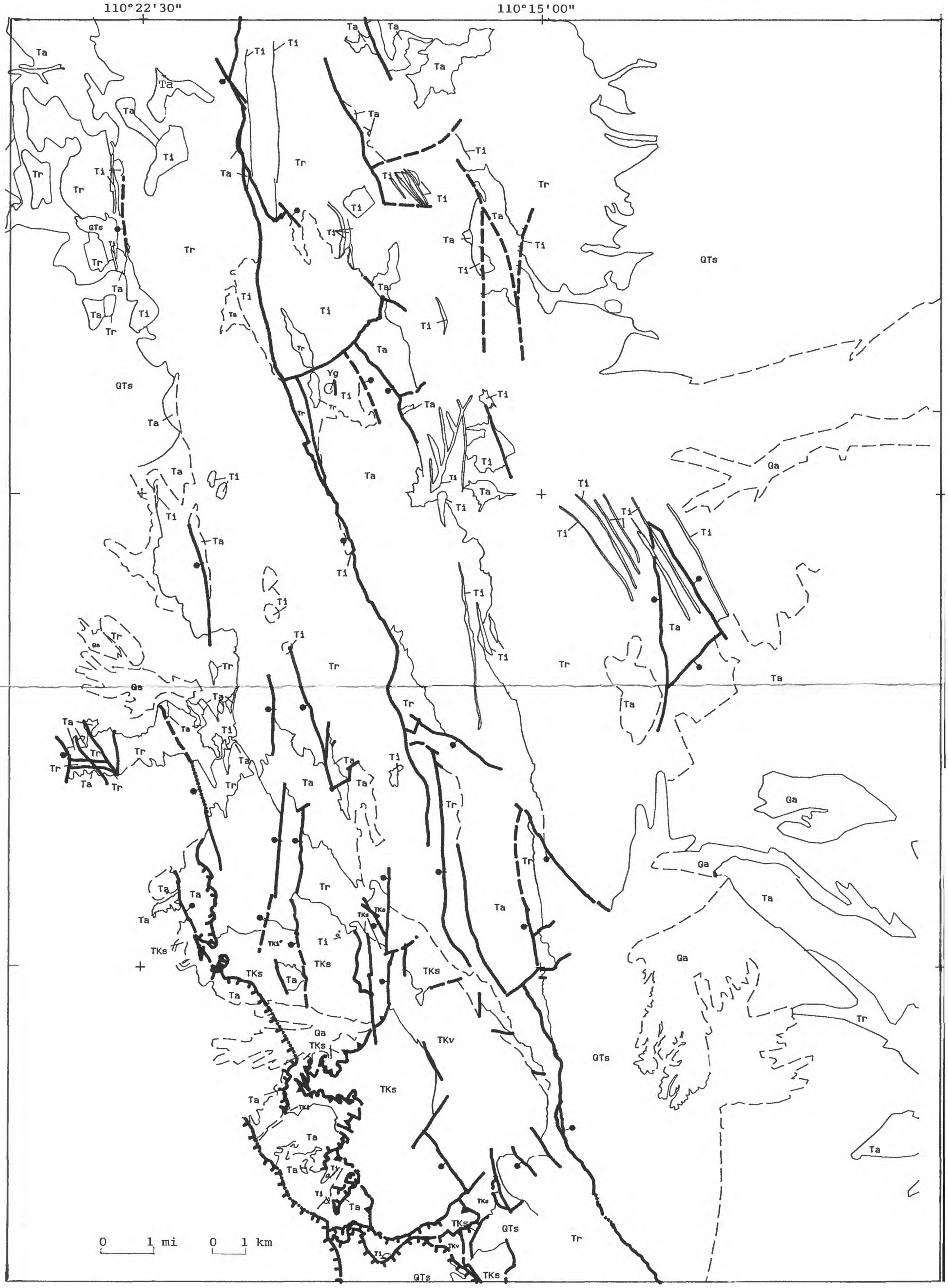
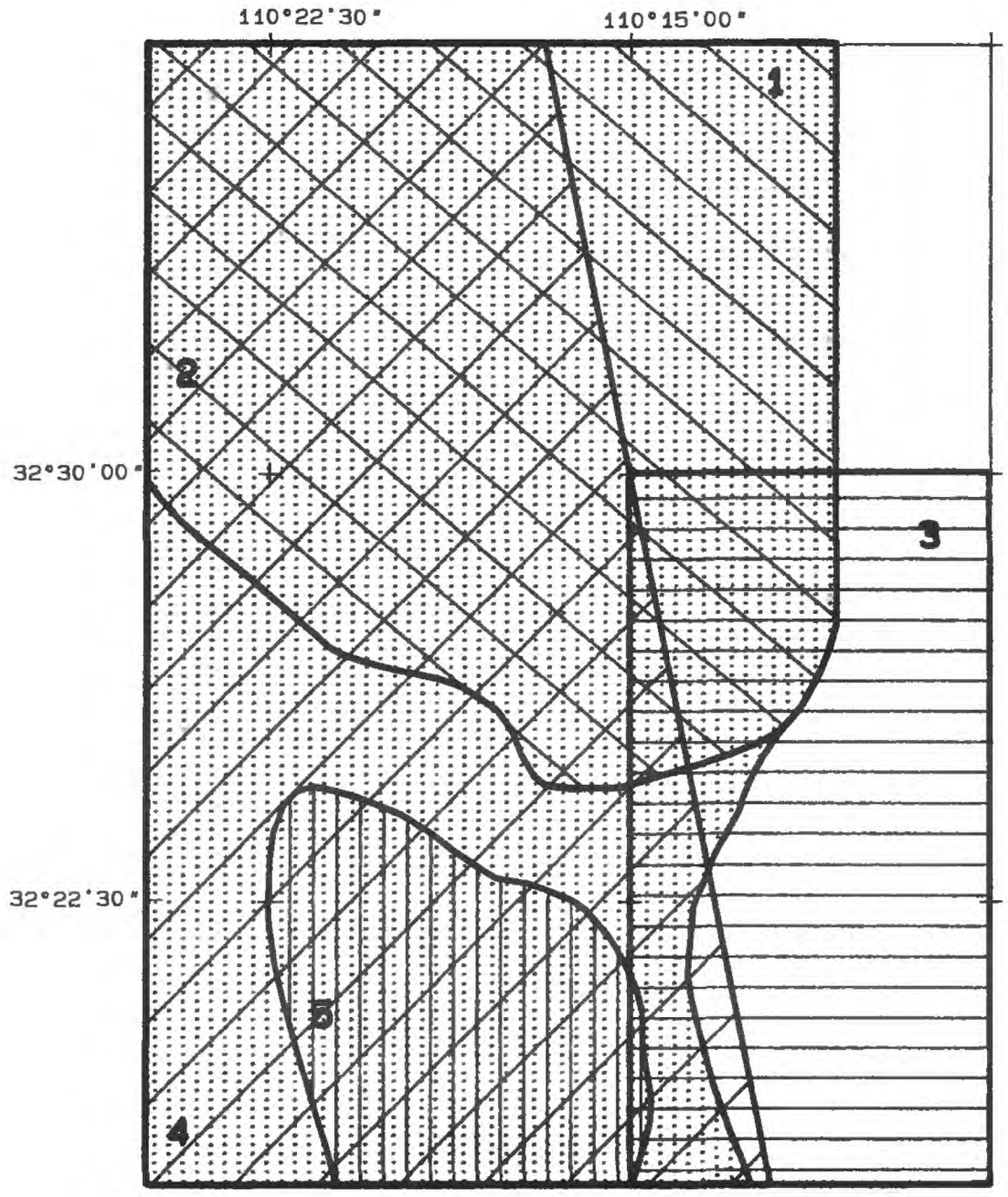


Figure 1. Geologic map of the southern Galiuro Mountains in Pinal, Graham, and Cochise Counties, Arizona. Geology simplified from Burchell (1992), Creasey and others (1981), S.C. Creasey and E.D. Wilson (unpub. data, pre-1969), Dickinson (1991), Goodlin (1985), B.B. Houser (written commun. 1991 and 1995), and Mark (1985).

Figure 2 Index to geologic mapping.



SOURCES OF DATA

1. Burchell, 1992, Univ. Arizona MS thesis, scale 1:62,500
2. Creasey and others, 1981, USGS Bulletin 1490, scale 1:62,500
3. Creasey, S.C., and Wilson, E.D., pre-1969 unpublished data, scale 1:62,500
4. Dickinson, 1991, GSA Special Paper 264, scale 1:125,000
5. Goodlin, 1985, and Mark, 1985, Univ. Arizona MS theses, scale 1:24,000

Houser, B.B., reconnaissance mapping of post-Miocene units within area's boundaries

LEGEND

Boundary of geologic map

Muleshoe Ecosystem planning boundary

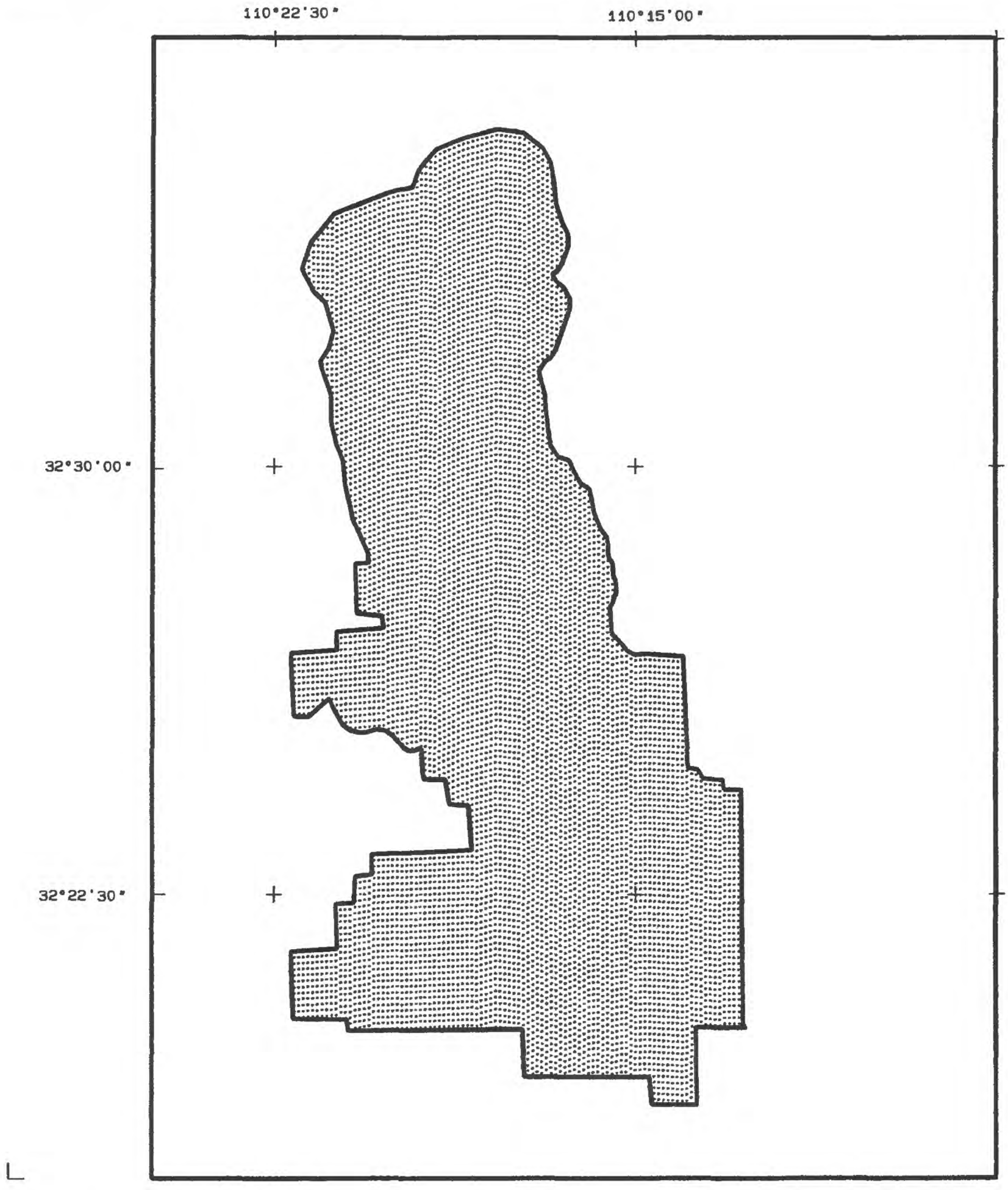


Figure 3 Map showing the approximate location of the Muleshoe Ecosystem planning boundary within the boundary of the geologic map compiled of the southern Galiuro Mountains in Pinal, Graham, and Cochise Counties, Arizona.

REFERENCES CITED

Burchell, Alison, 1992, Mid-Tertiary volcanic stratigraphy and petrogenesis; Galiuro Mountains, southeastern Arizona -- A field-based geochemical reconnaissance:: Tucson, University of Arizona, MS thesis, 192 p., 1 pl. in pocket, scale 1:62,500.

Creasey, S.C., Jinks, J.E., Williams, F.E., and Meeves, H.C., 1981, Mineral resources of the Galiuro Wilderness and contiguous further planning areas, Arizona: U.S. Geological Survey Bulletin 1490, 94 p., 2 pls., scale 1:62,500.

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Mark, R.A., 1985, Structural and sedimentary geology of the area north of Hot Springs Canyon, southern Galiuro Mountains, Cochise County, Arizona: Tucson, University of Arizona, MS thesis, 96 p., 3 pls. in pocket, scale 1:24,000.

Selner, G.I., and Taylor, R.B., 1988, GSDRAW and GSMAP version 5.0: Prototype programs, level 5, for the IBM PC compatible microcomputers, to assist compilation and publication of geologic maps and illustrations: U.S. Geological Survey Open-File Report 88-295A and B, 130 p. and 2 disks.

GEOLOGIC TIME CHART
Terms and boundary ages used in this report

EON	ERA	PERIOD		EPOCH	BOUNDARY AGE IN MILLION YEARS
Phanerozoic	Cenozoic	Quaternary		Holocene	0.010
				Pleistocene	1.7
		Tertiary	Neogene Subperiod	Pliocene	5
				Miocene	24
			Paleogene Subperiod	Oligocene	38
				Eocene	55
				Paleocene	66
	Mesozoic	Cretaceous		Late Early	96 138
		Jurassic		Late Middle Early	205
		Triassic		Late Middle Early	~ 240
	Paleozoic	Permian		Late Early	290
		Carboniferous Periods	Pennsylvanian	Late Middle Early	~ 330
			Mississippian	Late Early	360
		Devonian		Late Middle Early	410
		Silurian		Late Middle Early	435
		Ordovician		Late Middle Early	500
		Cambrian		Late Middle Early	~ 570[1]
Proterozoic	Late Proterozoic				900
	Middle Proterozoic				1600
	Early Proterozoic				2500
Archean	Late Archean				3000
	Middle Archean				3400
	Early Archean				
pre-Archean[2]			3800?		4550

[1] Rocks older than 570 m.y. also called Precambrian, a time term without specific rank.

[2] Informal time term without specific rank.

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