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Digital technologies and quantitative approaches to recording rock art in the Great Basin, USA

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ABSTRACT

A recent cultural resources inventory project recorded rock art sites in the Great Basin using a number of digital techniques. This streamlined data collection enabled comprehensive documentation of the rock art and improved analytical approaches to understanding the art's nature and extent. The Lincoln County Archaeological Initiative focused on three Nevada rock art assemblages (in Mount Irish, Shooting Gallery and Pahroc). These three areas are managed by the Bureau of Land Management, and the overall project involved a comprehensive heritage inventory of >700 recorded sites.

Building on legacy data from previous rock art recorders, one of this project's goals was to provide a comprehensive digital record of the areas' heritage resources. Digital innovation was achieved using hand held recording devices linked to a rock art database, digital enhancement, photogrammetric software, and a GIS-based database, leading to improved recording, analysis and management of prehistoric rock art. Research goals included the archaeological contextualization of legacy data and newly recorded rock art. Previous models for understanding Great Basin rock art have included hunting magic, costly signaling behavior and shamanism. This paper deploys Information Exchange Theory as a way of understanding the stylistic relationships between these three rock art sub-provinces. A Multiple Correspondence Analysis of Big Horn Sheep is used to demonstrate synchronic and diachronic stylistic variability in the Pahranagat Valley.

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1. Introduction

The Lincoln County Rock Art Project involved a Class III cultural resources inventory of 72,800 ha in Lincoln County, southern Nevada (see Fig. 1). The Pahroc, Mount Irish, and Shooting Gallery Areas of Critical Environmental Concern (ACEC) are managed by the Bureau of Land Management (BLM). Funding for the project was provided by the Lincoln County Archaeological Initiative (Giambastiani et al., 2015). This Rock Art Project provided the impetus for technological innovation in methods used to collect, organize, and process field data for an integrative approach to the study and analysis of rock art.

The three ACECs are located in Lincoln County within a 40 km × 40 km area. Located in the physiographic Great Basin, each of the ACECs has similar geologies and support similar plant and animal communities. Mount Irish ACEC covers 33,165 ha of upland and foothill terrain, with elevation ranging from 1600 to 2900 m. Volcanic tuff canyons and boulder fields provide ideal locations for rock art production. Pahroc ACEC covers c. 5300 ha at the south end of North Pahroc Range. This project area covered mostly the plains below the foothills

(from 1700 to 2000 m) and did not include all known rock art sites in the greater Pahroc area. Shooting Gallery covers 34,300 ha and has steep, east-sloping field blocks and boulders of tuff (between 1400 and 2430 m). High densities of rock art were found across Shooting Gallery.

Previous rock art recording and research has generated a large amount of legacy data and grey literature (e.g. Fowler and Sharrock, 1973; Gilreath et al., 2011; Heizer and Hester, 1978; Lee, 2004; McLane, 2006; Swartz, 1992; Swartz and Hurlbutt, 1994; White, 2013; White and Orndorff, 1999). Early work at Black Canyon identified the Pahranagat Anthropomorph style (Heizer and Hester, 1978) and the extent of the Pahranagat Representational style has been identified within the Pahranagat Valley and surrounds (White, 2013).

The rock art sites occur within a broader prehistoric landscape of many different types of archaeological sites and features, and these are often a significant component of large habitation complexes. While the overriding goal was to complete the Class III inventory, this Project also provided opportunities to address many important research objectives. Primary research aims were to document spatial, temporal, and contextual associations between rock art and other archaeological evidence; to interpret the rock art from a landscape perspective; to undertake stylistic analyses; and, to provide some measure of chronology. A number of innovative digital methods were used for recording,

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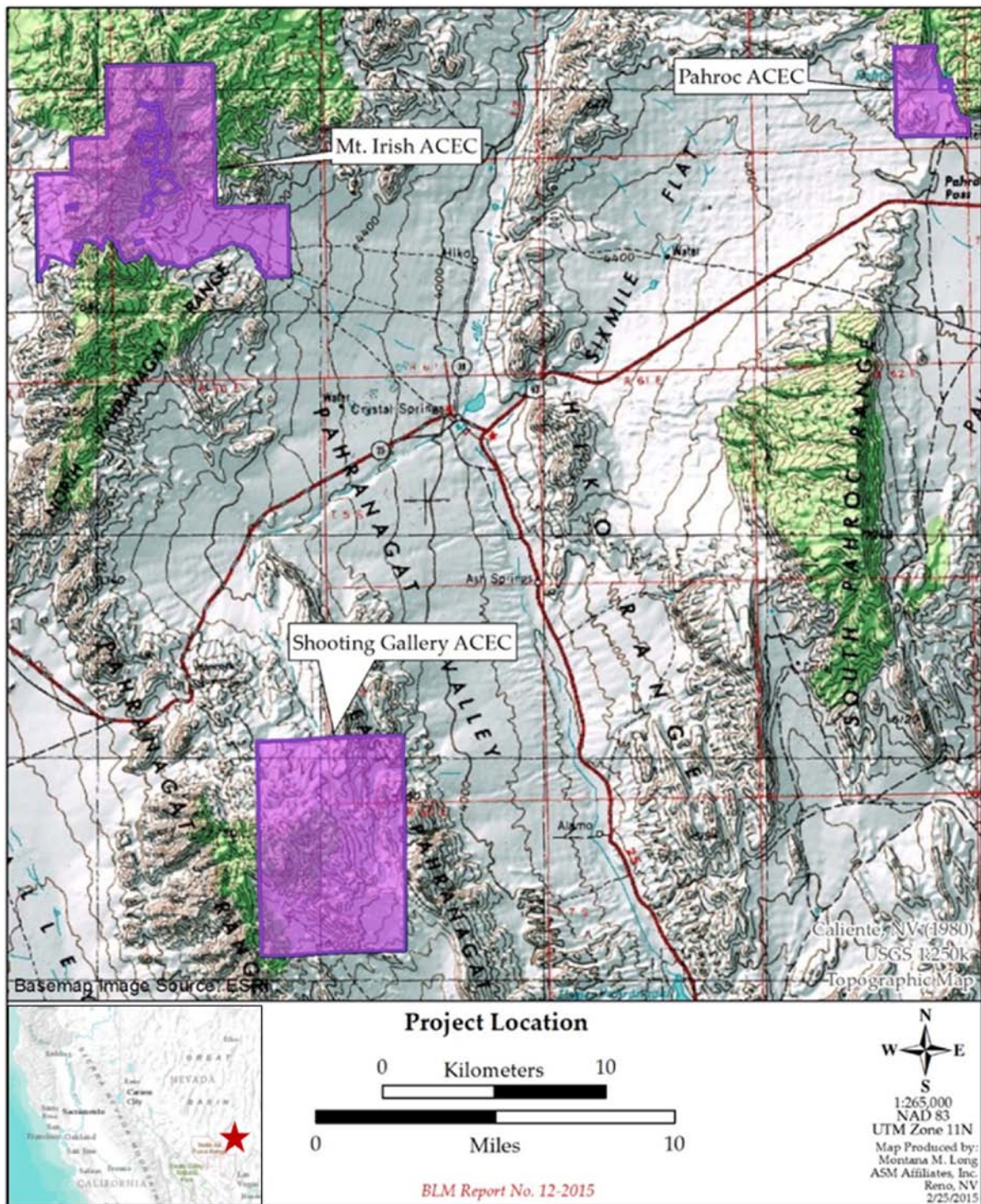


Fig. 1. The three Areas of Critical Environmental Concern in Lincoln County, Nevada, USA.

processing and analyzing data. A stylistic analysis of rock art aimed to understand the interrelationships of rock art in these three areas and to contribute to our understanding of the nature and extent of rock art production as part of broader occupation indices in this part of the North American Great Basin.

The Pahranagat cultural chronology spans the entire occupation sequence for the Great Basin from Palaeoindian (thought here to have started c. 13–10,000 years Cal B.P.) to a post-Puebloan historic period (Roberts and Allstrophm, 2012). A total of 705 archaeological sites and c. 600 isolated finds were documented within the three ACECs

(Giambastiani et al., 2015: 2). The Pahranagat occupation sequence has been synthesized from the extensive surface archaeological evidence from these sites, with some obsidian hydration dating of a sample of artefacts and diagnostic lithics and ceramics (Giambastiani et al., 2015: 177–250). Several small excavations were done in the 1970s and 1990s (Fawcett et al., 1993). This Pahranagat occupation sequence begins 13,000 years ago and six culture periods are seen within the late Pleistocene, through the early, middle and late Holocene. As part of her role in this project, McDonald (2015) undertook an analysis of the stylistic diversity in the rock art in an effort to understand how rock art was

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