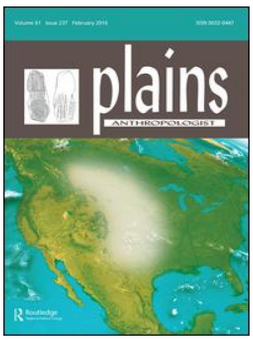

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ARTICLE

The frequency and typology of ceramic sites in western Wyoming

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Native ceramics are rare in the northwestern High Plains and Central Rocky Mountains where prehistory is dominated by mobile foraging societies and pottery appears late in the archaeological record. Our survey of the Wyoming Cultural Resource Information System for 11 western Wyoming counties and the Yellowstone National Park found 209 sites with sherd frequencies ranging from less than 10 to more than 1,000 yielding an estimate of 6175 total sherds. Ceramic sites are most common in southwest Wyoming, due in part to intense energy development and associated archaeological inventories but also to the overlap of multi-regional ceramic traditions. Ceramic typologies for western Wyoming are poorly standardized with variable grey wares attributed to Fremont, Shoshone, and Crow ceramic traditions. In this study, we summarize the frequency and typology of Wyoming ceramic traditions and outline a protocol for further research of an understudied but potentially informative component of the regional archaeological record.

KEYWORDS ceramics, typology, gray ware, Wyoming

Archaeologists working in the Northwestern Plains and Central Rocky Mountains often take for granted that stone tools and debitage are the most common artifacts in the archaeological record, contrary to those working in other parts of North America where ceramics are generally the most ubiquitous artifact class. This discrepancy reflects the relative paucity of ceramics in regional artifact assemblages. However, anthropological assumptions concerning the utility of pottery

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production among small-scale, mobile hunter-gatherers (Arnold 1985), as well as a host of methodological issues, underscore the lack of rigorous ceramic studies. Ceramics appear late in the regional archaeological record (about 1500 B.P.) and are considered either intrusive or as an inconsequential aspect of nomadic peoples' material culture (Kornfeld et al. 2010:432). When found in archaeological contexts, ceramic vessels are typically fragmented, poorly constructed, and rarely decorated. However, as Kornfeld et al. (2010:436) note, we stand to learn a great deal about the recent past using geochemical and petrographic techniques applied to highly fragmented ceramic assemblages recovered in Wyoming and adjacent regions (see also Eerkens et al. 2002). This work is currently in the developmental stages and focuses explicitly on Intermountain Ware, a ceramic tradition affiliated with historic and ancestral Shoshonean groups (Mulloy 1958), in an effort to understand the effects of colonial encounters on Shoshone mobility, territoriality, and ethnogenesis in western Wyoming (Finley et al. 2012; Scheiber and Finley 2010, 2011).

As a prelude to a proposed ceramic provenance study, this paper provides an overview of the current knowledge of prehistoric ceramics in western Wyoming (Figure 1), an area that covers the Central Rocky Mountains (Fenneman 1931),

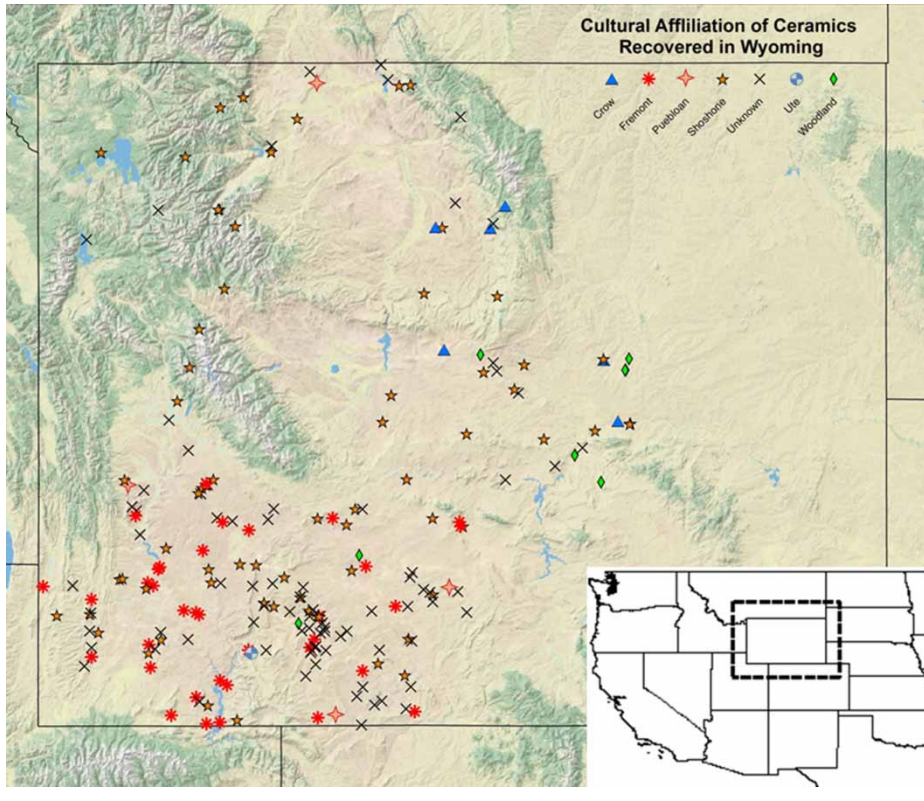

FIGURE 1 Project study area and spatial distribution of western Wyoming ceramic types grouped by probable ethnic affiliation.

but is culturally transitional between the Great Basin, Northwestern Plains, and northern Colorado Plateau (Shimkin 1986; Voget 2001). Central to this study are questions concerning the frequency of ceramics and the nature of typological variation in the western Wyoming archaeological record. We also ask, what is the total universe and nature of typological variation in western Wyoming ceramics? These questions are crucial to archaeological understandings of variability in ceramic use and mobility among Late Prehistoric hunter-gatherers with complex histories leading to the ethnohistoric and ethnographic period. Our primary data source is the Wyoming Cultural Records Information System (WYCRIS) database, an online digital archive of archaeological site information maintained by the Wyoming State Historic Preservation Office (SHPO). With over 200 ceramic sites in 11 western Wyoming counties and the Yellowstone National Park representing less than 1 percent of the total number of archaeological sites in these counties, we can conclude that ceramic sites are uncommon. Our work highlights problems in applied typologies, which is partly a byproduct of the reality that archaeologists encounter ceramics infrequently in their work. While efforts have been made to create ceramic typologies for adjacent parts of Colorado (Brunswig et al. 1995) and Utah (Madsen 1977), a systematic typological framework has not been developed for western Wyoming. A key problem is the use of surface color as a primary typological criterion, as at least eight different varieties of gray ware have been identified. In this study, we demonstrate the eight varieties represent more variability than we should expect within a single category. One solution to the typological inconsistences is the systematic description of assemblages from which objective and meaningful information about ceramic technologies can be extracted. We conclude with suggestions for systematic ceramic artifact descriptions that may guide future archaeological research.

Ceramics in the Wyoming Basin and Central Rocky Mountains

Archaeologists generally recognize three main western Wyoming ceramic traditions: Uinta Gray Ware, Intermountain Ware, and Uncompahgre Brown Ware. A smaller number of Woodland (i.e., Besant), Crow Gray Ware, and occasional Ancestral Puebloan ceramics also occur in the archaeological record (Frison 1971, 1976; Haspel 1984; Metcalf 1995). The primary criteria defining regional ceramic typologies are vessel shape, paste color, temper composition, and, to a lesser extent, surface treatment (Dean 1992; Madsen 1977, 1986; Mulloy 1958; Pippin 1986). Building techniques include slab, coil, and paddle-and-anvil (Madsen 1977; Metcalf 1995; Pippin 1986). In rare circumstances where ceramics occur in a dated context, age is also a key defining attribute for ceramic types. In our assessment of the published literature from the northeastern Great Basin, Wyoming Basin, and Central Rocky Mountains, we find Middleton et al.'s (2007) study of the Firehole Basin ceramics most comprehensive in describing regional ceramic traditions.

Uinta Gray Ware is most common in the far northern Colorado Plateau and is typically associated with Uinta Fremont occupations, a regional variant of the Fremont complex in northeastern Utah and northwestern Colorado (Madsen and

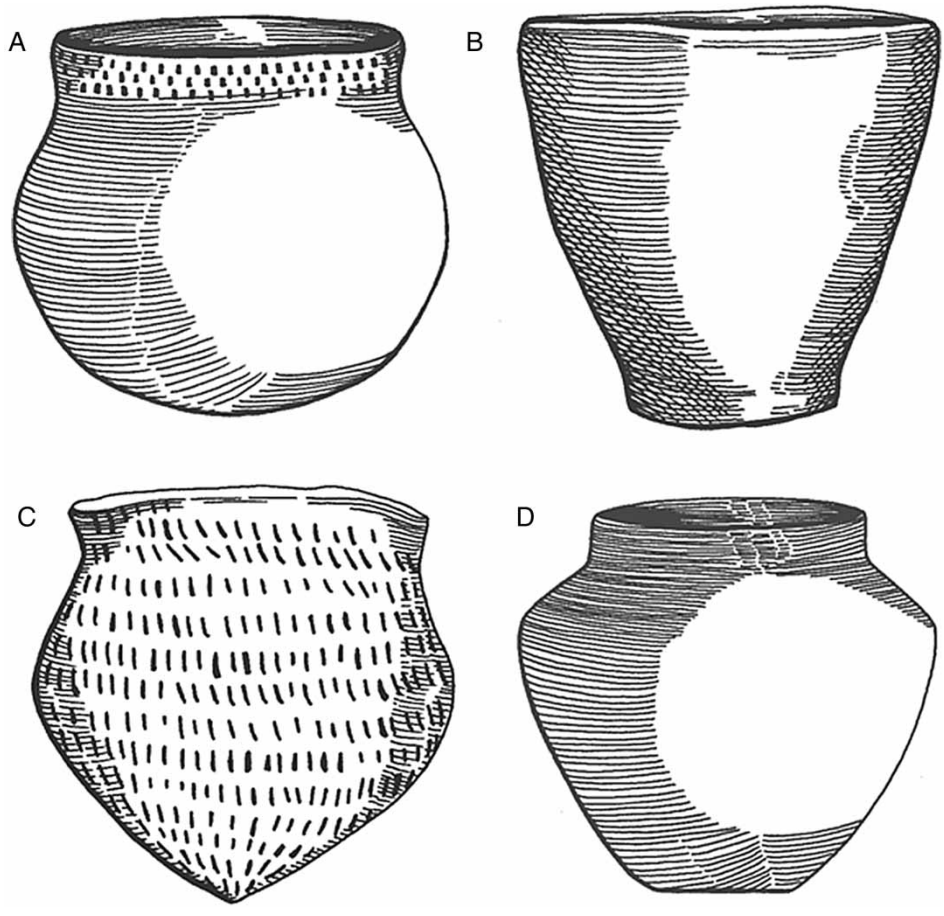

FIGURE 2 Illustrations of representative regional vessel forms: (A) Fremont jar, (B) Intermountain Ware 'flower pot', (C) Uncompahgre Brown Ware, and (D) Crow Gray Ware (A and B redrawn from Sutton and Arkush (2013:135); (C) redrawn from Janetski (1991:59); (D) redrawn from Frison (1976:34).

Simms 1998; Smith 1992). The most common vessel forms include globular jars with loop handles, although shallow bowls sometimes occur (Figure 2A) (Madsen 1977). Uinta Gray Ware is rarely painted and occasionally decorated with incisions, punctates, or 'coffee bean' applique usually restricted to the vessel rim. An apparent defining criterion of Uinta Gray Ware is the use of calcite temper (Dean 1992; Madsen 1977; Simms et al. 1997; Truesdale and Hill 1999), although doubt has been cast on this criterion (Johnson and Loosle 2002). Uinta Gray Ware appears in the regional archaeological record from about 1650 to 610 ^{14}C yr B.P. (Middleton et al. 2007; Smith 1992). While Middleton et al. (2007) limit their discussion of Fremont ceramics to Uinta Gray Ware, Great Salt Lake and Promontory Gray Wares are important Fremont variants linked to the Great Salt Lake region of northern Utah that may also occur in western Wyoming (Smith 1992). While Great Salt

Lake and Uinta Gray Wares share many attributes, Great Salt Lake Gray Ware has more variety in jar form and temper mineralogy reflecting the Wasatch Front parent geology rather than the Uinta Basin calcite (Madsen 1977). Promontory Gray Ware is thought to reflect an easterly Plains influence marked largely by a paddle-and-anvil construction rather than the coil construction common to Uinta and Great Salt Lake Gray Wares (Madsen 1977; Metcalf 1995). Promontory Gray Ware jars lack applied lugs, although jars are otherwise elongated like those of the Great Salt Lake Gray Ware. Creasman et al. (1990) proposed Fremont-like ceramics in the Wyoming Basin as Black Buttes Gray Ware. Although Creasman et al. (1990) recognized many of the typological criteria shared with Uinta Gray Ware, they limit the age of the Black Buttes type to 1300 to 650 ^{14}C yr BP.

Intermountain Ware is found throughout the Central Rocky Mountain region, as well as into the far western Great Basin and Northern Rocky Mountains (Davis et al. 2010; Eerkens et al. 2002; Finley et al. 2012; Frison 1971; Haspel 1984; Kehoe 1959; Kornfeld et al. 2010; Pippin 1986). Intermountain Ware (Fig. 2B) is typically described as brown with a distinctive vessel form commonly referred to as 'flowerpot' or 'truncated cone' with thick rims and thick, flat bases (Kornfeld et al. 2010:436). In general, Intermountain Ware vessels are regarded as crudely designed with thick walls, coarse and poorly sorted temper consisting of sand, crushed rock, and/or grog, and surface treatment that is limited to rough scraping and brushing on exteriors (Coale 1963; Mulloy 1958). Although temper size has been characterized as quite large (less than or equal to 2.5 mm) (Middleton et al. 2007:35), recent petrographic analysis of the Eden-Farson, Bugas-Holding, Platt, and Boulder Ridge ceramic assemblages (Finley and Scheiber 2011) reveals temper grain size as variable, but often less than or equal to 0.125 mm (fine sand). Occasional fingernail impressions and incised line patterns occur on rims and shoulders (Coale 1963; Kehoe 1959), and incised chevron designs on body sherds are reported in collections from the central Montana plains (Kehoe 1959). Intermountain Ware occurs in the regional archaeological record from 750 to 200 ^{14}C yr B.P. as bracketed by the earlier Myers-Hindman site in Montana (Lahren 1976) and the later Nidiwh Site in Wyoming (Chomko 1986). Since Mulloy (1958) first suggested an affiliation between 'Intermountain Tradition' ceramics and historic Shoshone groups, Intermountain Ware recovered in archaeological contexts has been linked with a suite of Shoshone diagnostic artifacts (Davis 1975; Eakin 2007; Frison 1971; Holmer 1994; Husted and Edgar 2002; Larson and Kornfeld 1994; Scheiber and Finley 2010; Swanson 1972) to an ancestral Shoshone or Numic entrada into the Central Rocky Mountains (Davis et al. 2010; Kornfeld et al. 2010; Loendorf and Stone 2006). Field identification of Intermountain Ware and inferences about ethnic affiliation are often troubled by reliance on single, readily observable categories such as vessel type, wall thickness, or surface color, which are, themselves, debatable. Historic eastern Plateau groups, including the Flathead and Kutenai, who were allied with the Northern Shoshone during the eighteenth and nineteenth centuries also made flat-bottomed ceramics (Ewers 1955; Malouf 1956), along with the Sarcee and Blackfoot (Mulloy 1958), a fact of particular relevance when inferring ethnic affiliation based on ceramics recovered at historic sites on the central Montana plains (Kehoe 1959). Vessel wall thickness is another trait that may fail

to bear scrutiny according to scholarly arguments over Shoshone- and Fremont-affiliated wares in southern Idaho (Butler 1981; Plew 1979, 1981). Plew (1979) argues that the regionally accepted range of wall thickness (i.e., 4 to 8.5 mm) attributed to the 'Shoshoni' ware by Jack Rudy (1953:94) falls within the range of Fremont varieties distributed throughout western Utah and eastern Nevada (e.g., Great Salt Lake Gray Ware and Snake Valley Gray Ware), precluding wall thickness as a reliable means of distinguishing regional variation. Although Intermountain Ware is often interchangeably referred to as brown ware (Pippin 1986) these ceramics range in surface color from brown to grey (Kehoe 1959; Rudy 1953). Additionally, Intermountain Ware is not the only brown ware that occurs in the study region. As a result, the authors advocate the strict use of the term Intermountain Ware rather than one linked to color. Regional variants include Creasman et al.'s (1990) unpublished description of Intermountain-like ceramics in the Wyoming Basin as Boar's Tusk Gray Ware.

Although not widely recognized in the western Wyoming archaeological record, Uncompahgre Brown Ware is associated with post-Fremont occupations of ancestral and historic Ute groups in northern Colorado and eastern Utah following about 850 ^{14}C yr B.P. (Buckles 1971; Middleton et al. 2007:35; Reed 1995). Uncompahgre Brown Ware is distinguished by pointed or rounded bottom vessel forms with systematically applied fingernail or punctate impressions along characteristic flaring rims (Figure 2C). Instances of Uncompahgre Brown Ware may be similar to Intermountain Ware in terms of surface color, temper size and minerology, and surface treatment, although in western Colorado and eastern Utah fingertip impressions sometimes cover the vessel exterior and sherds exhibit punctate, stick-impressions, and corrugation (Reed 1995). Notably, mica is a common aplastic used in Uncompahgre Brown Ware along with quartz sand (Buckles 1971; Murcray et al. 1993). When combined with a paddle-and-anvil thinning, micaceous sherds may represent an intrusive regional ware (Sangre de Cristo Micaceous) in western Colorado contexts (Reed 1995). Martin (2000) designated ceramics from the Carter Site (48NA1425) as Waltman Brown Ware, a type that Middleton et al. (2007) interpreted as similar to the Uncompahgre Brown Ware from their study.

The remaining indigenous ceramic traditions known in the Wyoming Basin and Central Rocky Mountains have their origin in Plains Woodland and Middle Missouri traditions northeast of the study area. Woodland ceramics are alternatively associated with the terminal Late Archaic to early Late Prehistoric Avonlea and Besant cultures dating to approximately 1500 to 1000 ^{14}C yr B.P. (Kornfeld et al. 2010:62–63; Miller et al. 1987). Defining typological criteria of Woodland ceramic traditions are coil construction, cord-marked surfaces, and wide rims with pointed bases (Kornfeld et al. 2010:Figure 2.15; Miller et al. 1987). In keeping with the well-documented Crow-Hidatsa schism and subsequent westward migration of Crow people from the Middle Missouri villages onto the Northwestern Plains by at least about A.D. 1675 (Wood and Downer 1977:98), Crow Gray Ware recovered from historic sites in Wyoming has been characterized as most similar to Mandan Tradition ceramics (Frison 1976; Mulloy 1958). While representing yet another regional gray ware that may be problematic to identify when highly fragmented, Crow Gray Ware follows the Middle Missouri tradition of coil

manufacture, open rims with collared necks and pronounced shoulders, and are often decorated with extensive linear geometric designs (Frison 1976). Crow Gray Ware and Shoshone Intermountain Ware co-occur on sites in the Bighorn Basin and the eastern slopes of the Bighorn Mountains. Frison (1976:41) interpreted this phenomenon as resulting from either intertribal marriage or bride capture, a common form of exogamous marriage associated with Plains Indian warfare, during the turbulent centuries of the early contact period about A.D. 1500 to 1700 (Lowie 1909:195, 2004 [1935]:229; Trigger 1968:63).

Western Wyoming ceramic sites

The Wyoming SHPO Cultural Records Office in Laramie, Wyoming maintains an online database that registered users can query for project and site specific information, including digitized site forms (i.e., Wyoming Cultural Properties Forms or CPFs), data recovery reports, and peer reviewed publications. The site information can be searched by county or the Smithsonian trinomial using various criteria including age, feature type, and site type. In developing the CPF and implementing a searchable online database, Wyoming SHPO personnel have sought consistency in the usage of terms applied to variables such as feature type and site type. We searched the dataset by county using the criterion "Feature Type CONTAINS Pottery" and "Site Type CONTAINS Ceramics". These searches return generally similar results, although in some cases sites may appear on one list but not on another given variations in how field archaeologists apply the categories during site documentation. For sites documented prior to the implementation of the Wyoming CPF (about 1997), SHPO personnel coded sites as either pottery or ceramic in the process of developing the comprehensive WYCRIS database. The database is not organized to search ceramic sites by type such as Uinta Gray Ware, Boars Tusk Gray Ware, and Intermountain Ware. While we acknowledge that the results of the search presented here may not be an absolute representation of western Wyoming ceramic sites (i.e., key ceramic sites such as the South Baxter Brush Shelter (48SW5176; Hoefer et al. 1992) do not appear under either search criteria), the search is systematic in approach to the data available to all regional archaeologists. Furthermore, the University of Wyoming Archaeological Repository (UWAR) maintains a complete inventory of the stored ceramic assemblages, but since not all Wyoming collections are at UWAR (a second curation facility is at Western Wyoming College in Rock Springs, Wyoming) it too is an incomplete record. Our comparison with the UWAR record indicates that our dataset is in fact the most comprehensive for the western part of the state.

We recorded a series of attributes for each site, including site name, location (legal and UTM), elevation (feet and meters ASL), ceramic type, potential ethnic affiliation, number of sherds, and a minimum number of vessels. In cases where specific numbers of documented sherds was not listed, we assigned the site a minimum sherd count of one and a minimum vessel count of one. We converted sherd count approximations to absolute counts; that is a sherd count greater than 500 became 500. Estimating a minimum number of vessels in this context is more problematic,

since a single vessel can be broken into several hundred small fragments.[1] In such cases (a total of three sites in the dataset), we used an arbitrary estimate of 200 sherds from a single vessel such that a sherd count greater than 500 yields a minimum vessel count of three. While the results of our site search are comprehensive within the restrictions of the WYCRO database, we recognize that our estimates of sherd and vessel counts may be inaccurate given the limitations of the reported data on site forms.

Our search of 11 western Wyoming counties and the Yellowstone National Park resulted in a total number of 209 ceramic sites. The number of sites by county (Table 1) ranges from a low of one or two (Hot Springs and Teton Counties and Yellowstone National Park) to a high of 101 (Sweetwater County). The number of ceramic sites by county is clearly proportional to the total number of recorded sites, which is a reflection of archaeological research effort in that particular county. Sweetwater County, for example, has experienced considerable energy development over the last three decades with a resurgence of work since the late 1990s. The number of ceramic sites is conspicuously low for Hot Springs and Teton Counties and Yellowstone National Park, an area with comparatively fewer cultural resource management projects. Regardless, less than 1 percent of the total number of documented prehistoric archaeological sites in western Wyoming contains ceramics. Based on our search of the WYCRO database, we can conclude that ceramic sites in the Wyoming Basin and Central Rocky Mountains are rare.

The total number of ceramic sherds in this sample is 6,175, which we estimate represents 266 vessels. The number of ceramic sherds at individual sites ranges from a minimum of one to a maximum of 1,000. The mean number of sherds per site is

TABLE 1

FREQUENCY OF CERAMIC SITES BY COUNTY (AS OF OCTOBER 2010)

County	Prehistoric sites		
	Total	With ceramic	Per cent with ceramics
Bighorn	3343	6	0.18
Fremont	5309	12	0.23
Hot Springs	703	2	0.28
Lincoln	3780	13	0.34
Natrona	3493	23	0.66
Park	2066	11	0.53
Sublette	6599	24	0.36
Sweetwater	15 720	101	0.64
Teton	778	2	0.26
Uinta	2179	8	0.37
Washakie	1905	6	0.31
Yellowstone	1190	1	0.08
Total	47 065	209	0.44

29.5, although the standard deviation is quite high ($\sigma = 96.8$) due largely to uncertainties in absolute sherd frequencies at some sites and the subsequent large range of values. The modal sherds per site is one with 35 percent ($n = 73$) of sites represented by a single sherd. A cumulative 65 percent of the site sample contains 10 or fewer sherds, and only 13 sites contain more than 100 sherds. The implications of these summary data of sherd frequency are that while the probability of discovering ceramics on archaeological sites is low, the probability of discovering sherds representative of an entire vessel is even lower. Since the majority of sherds are arguably from vessel bodies rather than rims and/or bases, and since rim and base sherds are the most typologically sensitive elements, it is understandable why reliable typological classifications are difficult to achieve.

The challenge of this dataset emerges when we consider the details of how archaeologists working in western Wyoming have assigned typologies to ceramic artifacts (Table 2). The dataset can be distilled down to a minimum of 16 different typological varieties. While the majority of sites ($n = 69$, or 33 percent) are classified as Intermountain Ware, archaeologists have described six different Fremont ceramic varieties. Fremont typologies are either specific (i.e., Salt Lake Gray Ware or Uinta Gray Ware) or quite general (i.e., Fremont Black-on-White, Fremont Gray Ware, or Unspecified Fremont). Regardless, 16 percent ($n = 34$) of ceramic sites are typed as Fremont. Unspecified Gray Ware constitutes 7 percent ($n = 15$) of the dataset, while the typology of 32 percent ($n = 68$) of the sample is unknown.

TABLE 2

SUMMARY OF WESTERN WYOMING CERAMIC TYPOLOGY

Type	Frequency	%
Crow Gray Ware	6	2.9
Intermountain Ware	69	33
Fremont Black-on-White	1	0.5
Fremont Gray Ware	14	6.7
Promontory Gray Ware	1	0.5
Salt Lake Gray Ware	1	0.5
Uinta Gray Ware	12	5.7
Fremont (Unspecified)	5	2.4
Unspecified Gray Ware	15	7.2
Jeddito Black-on-Orange	1	0.5
Largo-Gallina Painted	1	0.5
Pueblo II	1	0.5
Uncompahgre Brown Ware	1	0.5
Corrugated Ware	3	1.8
Woodland	7	3.3
Unknown	68	33.5
Total	206	100.00

Other regional ceramic varieties occur in relatively low numbers. These varieties include Crow Gray Ware ($n = 6$, 2.9 percent), Uncompahgre Brown Ware ($n = 1$, 0.5 percent), and Woodland ($n = 7$, 3.3 percent). Although not a significant part of the dataset, Ancestral Puebloan ceramics from the American Southwest have long been reported in southwestern Wyoming (Metcalf 1987). Three occurrences of Ancestral Puebloan ceramics are reported in western Wyoming, including one case of Jeddito Black-on-Orange (i.e., Ancestral Hopi; Museum of Northern Arizona 2005), one case of Largo-Gallina Phase (i.e., Northern Rio Grande Valley, probably Jemez Pueblo; Anschuetz 1998) pottery, and an unspecified Pueblo II Black-on-White ceramic site northeast of Cody, Wyoming. While photographs in the site records confirm the first two cases, we were not able to confirm the Pueblo II sample from the Bighorn Basin.

Discussion

Typological problems

Based on the preceding results, we question whether or not the collective western Wyoming ceramic typology exhibits too many distinct types and whether archaeologists have tended to split rather than lump types. We also question the use of this typology as a form of a priori justification wherein the universe of identified types is limited to those that we expect to find in the regional record, rather than those that are empirically observable. In order to test these questions, we divided the dataset into two regions where southwest Wyoming includes Uinta, Lincoln, Sweetwater, and Sublette counties and northwest Wyoming includes Big Horn, Fremont, Natrona, Hot Springs, Park, Teton, and Washakie counties, as well as the Yellowstone National Park.[2] With the few Ancestral Puebloan examples aside, there are a minimum of 13 typological categories including those classified as unknown. We used a Pearson χ^2 test to determine whether or not a relationship exists between the number of sites with specific ceramic types and the region where they were found. The test demonstrates that a relationship exists between the two variables ($\chi^2 = 47.096$, $df = 17$, $p = 0.001$). Most importantly, both Crow Gray Ware and Intermountain Ware ceramic sites occur more frequently than expected in northwestern Wyoming than in southwestern Wyoming counties (Table 3). Sites with Fremont ceramics occur almost exclusively in southwest Wyoming, and those ceramics are most commonly typed as Fremont Gray Ware or Uinta Gray Ware. That the expected values nearly match the observed values for both categories (Table 3), indicates that these are reliable types, although the generic Fremont Gray Ware may be more aptly called Uinta Gray Ware. Likewise, unspecified Fremont Ware ($n = 4$ in the dataset) is probably Uinta Gray Ware.

Another fact made clear in the summary data (Table 2) is that there are too many gray wares based on our survey of the probable regional types. The single occurrences of Fremont types such as Sevier Gray Ware and Promontory Gray Ware, along with other related types like Fremont Black-on-White, drive this element of variability in the dataset. Further complicating the issue of a reliable gray ware classification is that not all Intermountain Wares are brown, some are gray wares,

TABLE 3

OBSERVED AND EXPECTED VALUES FOR THE NUMBER OF CERAMIC SITES BY TYPE IN NORTHWEST AND SOUTHWEST WYOMING (SIGNIFICANT VALUES IN BOLD)

Type	Northwest Wyoming		Southwest Wyoming	
	Observed (expected)	Adjusted residual	Observed (expected)	Adjusted residual
Crow Gray Ware	4 (1.1)	3.1	2 (4.9)	–3.1
Intermountain Ware	23 (13)	3.8	47 (57)	–3.8
Fremont Black-on-White	0 (0.2)	–0.5	1 (0.8)	0.5
Fremont Gray Ware	0 (2.6)	–1.8	14 (11.4)	1.8
Promontory Gray Ware	0 (0.2)	–0.5	1 (0.8)	0.5
Salt Lake Gray Ware	0 (0.2)	–0.5	1 (0.8)	0.5
Uinta Gray Ware	0 (2.2)	–1.7	12 (9.8)	1.7
Fremont (Unspecified)	1 (0.9)	0.1	5 (4.9)	–0.1
Unspecified Gray Ware	0 (2.8)	–1.9	15 (12.2)	1.9
Jeddito Black-on-Orange	0 (0.2)	–0.5	1 (0.8)	0.5
Largo-Gallina Painted	0 (0.2)	–0.5	1 (0.8)	0.5
Pueblo II	1 (0.2)	2.1	0 (0.8)	–2.1
Uncompahgre Brown Ware	0 (0.2)	–0.5	1 (0.8)	0.5
Corrugated Ware	0 (0.6)	–0.8	3 (2.4)	0.8
Woodland	0 (1.3)	–1.3	7 (5.7)	1.3
Unknown	10 (13.0)	–1.8	60 (55.4)	1.8

hence the reason for Creasman et al.'s (1990) classification of Boars Tusk Gray Ware as a valid regional type in spite of the fact that it does not appear in the dataset. Note also that Creasman and colleagues' Fremont variant, Black Buttes Gray Ware, does not occur in the dataset. While virtually every Wyoming Basin ceramic study cites the unpublished 1990 Plains Anthropological Conference paper, we advocate total abandonment of this particular typology due to the lack of access to the original study, its informal descriptions, and the fact that it only adds to the typological confusion. The single occurrence of Promontory Gray Ware and Great Salt Lake Gray Ware indicates to us the uncertainty of local archaeologists with eastern Great Basin typological schemes (Madsen 1977, 1986). While we do not discount the presence of either ware in the regional archaeological record due to proximity with the Salt Lake Valley and known interregional connections (Harvey 2012; Shimkin 1947), it may be reasonable to expect more than a single occurrence of each type. The single Fremont Black-on-White example may be a painted Fremont variant less common in the study area or a misclassified Ancestral Puebloan vessel (Madsen 1977; Watkins 2006). The various Fremont and post-Fremont (i.e., Promontory) grey wares have proven difficult enough for regional specialists to classify (Bright et al. 2005; Dean 1992; Madsen 1986), let alone local archaeologists who encounter these artifacts infrequently. Based on morphometric and mineralogical analysis, Dean (1992:126–130) concludes that the Great Salt Lake Gray and

TABLE 4

KEY ELEMENTS FOR BASIC CERAMIC ANALYSIS (SUTTON AND ARKUSH 2013)

Form and Function	Technological Analysis	Stylistic Analysis
Vessel Shape	Core (Paste vs. Temper)	Decorative Elements
· Rim and Shoulder · Refit/Conjoin · Vessel Mouth Diameter (Template) · Rim and Shoulder Profiles · Base Form · Wall Thickness (Thinnest and Thickest to nearest mm)	· Paste Color (Munsell Soil Color Chart) · Paste Texture (Wentworth size-grade scale) · Temper Type (rock/mineral, grog, shell, fiber) · Temper Mineralogy · Chemical and Mineral Characterization (NAA, LA-ICP-MS, thin-section petrography)	· Type (Fingernail, Punctate, Geometric) · Location (Rim, Body, Both)

Promontory Gray Wares represent a continuum in design and local geological resources rather than ethnically distinct groups making unique ceramic vessels.

There are likely only three valid regional gray wares: Uinta Gray Ware, Intermountain Ware, and Crow Gray Ware. These three types can be discriminated almost on design element alone, as well as spatial and temporal distributions. When rim, base, or shoulder sherds are present, the Fremont jars, pitchers, and bowls may be easily discerned from the Intermountain Ware 'flowerpot' and the shouldered-and-collared Crow vessels. While Fremont and Shoshone affiliated wares overlap spatially in the Wyoming Basin, Fremont ceramics are significantly older than Shoshone-affiliated ceramics (note that Rhode's (1994) direct luminescence dating of Intermountain Ware places initial manufacture of those vessels in the southern Great Basin as early as A.D. 1080 overlapping with both Fremont and Ancestral Puebloan ceramics). Crow Gray Ware is limited to northwestern Wyoming, which is consistent with the spatial distribution of an ancestral Crow migration to the Northwestern Plains and Central Rocky Mountains and the southwestern extent of their historic territory in the Wind River Basin (Voget 2001; Wood and Downer 1977). Unfortunately, as most archaeologists working in the area know, rim, shoulder, and base sherds are few and associated radiocarbon ages infrequent leaving us, in the end, grasping at straws to make confident designations.

Methodological solutions

How do we reliably document and report meaningful descriptive information when the ceramics encountered in the field are often highly fragmented and small with a large proportion of nondescript body sherds? Orton et al. (1993), Rice (2005), Shephard (1980), and Sutton and Arkush (2013:111–139) provide working protocols for consistent descriptive analysis. Basic ceramic analysis covers three separate analytical categories: form and function, technological analysis, and stylistic analysis (Table 4). Form analysis relies on the presence of rim and/or shoulder sherds. An attempted reconstruction of the vessel allows estimation of the vessel mouth diameter using a rim diameter measurement template (Sutton and Arkush 2013: Figure 6.8). Rim form and base profiles are an important complement to vessel diameter that provides useful information with which to more confidently type ceramic vessels. Lastly, wall thickness should be measured for each sherd with the

thinnest and thickest measurement reported to the nearest millimeter. With highly fragmented assemblages lacking rim or base sherds, wall thickness may prove to be the most valuable information with which to discriminate types (Dean 1992; but see Plew 1979 for a counter argument about the validity of wall thickness).

Technological analysis examines the sherd core and its surface with most emphasis placed on the core. Ceramic cores are divided into two constituents: paste (i.e., clay body) and temper (i.e., visible coarse-grained component). While analysts working in the American Southwest or other areas with abundant ceramics often begin their description with a fresh break on a sherd using pliers, we cannot advocate this technique due to the overall shortage of samples available for analysis. Core paste color reflects primary mineral content and firing conditions where reds occur in combination with high iron content under oxidizing conditions and dark grays or blacks indicate the presence of carbon and a reducing or smudged atmosphere (Orton et al. 1993:68–69). As with all sediments, core color should be described using a Munsell soil color chart. Paste texture should be examined under low-power magnification using a 10× hand lens and described using the Wentworth (1922) grain-size scale. Common temper types in North American ceramics include rock/mineral, sherd (i.e., grog), shell, and fiber. Rock/mineral and grog tempers are most common throughout the region. As with the paste, grain-size description should include the use of the Wentworth scale along with grain sorting (i.e., poorly sorted samples have a wide range of grain sizes such as coarse to fine sand and well-sorted samples have a similar grain-size distribution such as fine sand). Temper identifications can be conducted under low-power magnification (15 ×–45×) focusing on the relative proportions of easily identified minerals such as quartz, feldspar, mica, and calcite. Advanced technological analyses rely on chemical characterization of pastes using neutron activation analysis (NAA) or laser ablation inductively coupled plasma mass spectrometry (LA-ICP-MS) and temper using thin-section petrography with a polarising light microscope (Glascock and Neff 2003; Miksa and Heidke 2001; Quinn 2009; Speakman and Neff 2005). While these techniques are semi-destructive (LA-ICP-MS) and/or destructive (NAA and thin-sectional petrography), they are highly informative and should be considered as central techniques in any informed ceramic analysis (Eerkens et al. 2002; Finley et al. 2012).

While most descriptive efforts are devoted to technological analysis, stylistic analysis is perhaps the most critical as stylistic attributes are among the most typologically sensitive variables we can document in ceramic assemblages. Stylistic analysis examines surface treatment, which is simple although relatively uncommon in Central Rockies archaeological assemblages. Except for the occasional geometrically incised Crow or painted Ancestral Puebloan vessel, surface treatment is either plain, fingernail impressed, or punctate. Surface treatment type and location should be included as the final element of a systematic descriptive analysis that should be included for all regional ceramic assemblages. Detailed regional analyses currently exist for a handful of sites at best (Haspel 1984; Webb 1992). We argue that because the western Wyoming sample is relatively small (compared with assemblages from single sites in either the American Southwest or Southeast), a systematic and basic analysis of the entire sample combining both descriptive attributes and chemical/mineralogical characterization would go a long way toward resolving the problematic regional typology.

Conclusion

> "Just as classificatory confusion can arise from the different typologies within one ceramic ware, it also can result from different wares within the same region exhibiting similar attributes. A case in point comes from the northeastern Great Basin, where plain wares produced by Fremont groups (Great Salt Lake Gray Ware) from between about A.D. 400 and 1400 and Shoshone groups (Shoshone Ware) from between about A.D. 1400 and 1850 both contain similar raw materials, were formed by coiling, thinned by scraping, and fired in a poorly controlled atmosphere. Dean and Heath (1990) pointed out that the current typological attributes applied to these wares preclude one from easily classifying potsherds from northern Utah and southern Idaho as either Great Salt Lake or Shoshonean. This problem will not be solved until rigorous sets of objective typological criteria (**if they exist**) are developed for each ware and applied systematically by local archaeologists" (Sutton and Arkush 2013:125; emphasis added).

This quote captures the essential problem with regional ceramic typologies. The few definitive regional wares have raw material and manufacturing attributes that are too similar and over two decades after Dean and Heath's (1990) observations, there are still no 'rigorous sets of typological criteria' to guide regional archaeologists in confident classification. These sentiments have also been echoed recently in the consulting community where many archaeologists are struggling with systematic classification (Bill Current, personal communication 2012). The results of our study indicate a high degree of uncertainty and disorder in western Wyoming ceramic typology where types do not necessarily map onto cultural categories (e.g., Fremont, Shohone, and Crow). Central to this typological conundrum is the variety of gray wares. Even a best-guess effort at assigning a meaningful type to these highly fragmented and seemingly nondescript samples becomes nothing more than an arbitrary choice. Further compounding the confusion is the fact that in the more than 200 examined site forms there are few systemic descriptions of ceramic assemblages. Since standardized descriptions are absent, we argue that our collective goal should not be to type ceramic assemblages, but to provide systematic descriptions. We need to start over by characterizing the variability of regional wares and, from that variability, develop a codified ceramic typology for the Central Rocky Mountains. In this study, we suggest that systematically applied protocols could lead to the clarification of ceramic variability.

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End Notes

1 Voss and Allen (2010) provide a means for assessing the minimum number of vessels (MNV) in historic ceramic assemblages. Rim sherds are most important to these estimates, which are based largely on ware type, form, and decoration. Body sherds are problematic since any single vessel may break into increasingly smaller pieces via both depositional and post-depositional processes. MNV estimates for plain ware prehistoric ceramics are especially difficult and are even more so with incomplete reporting information typical of many archaeological site forms. In this case, rim decoration, shape, thickness, and temper mineralogy may be the most relevant variables. Since these data are not available in this study, we arbitrarily chose 200 sherds as representing a single fragmented plain ware vessel.

2 We note that our division of the dataset into regions by county is potentially problematic given the spatial incongruities of western Wyoming counties. For example, parts of Fremont county occur in both the southwestern and northwestern portions of the state. Likewise, many researchers consider Natrona county to be part of central Wyoming.

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