Estimating the Magnitude of Private Collection of Points and Its Effects on Professional Survey Results

A Michigan Case Study

Michael J. Shott

"Surely we cannot interpret what remains in the field without discovering what has been so recently removed" (Griffiths 1996:67).

This paper is about the size—the magnitude—of samples of dart and arrow points generated by professional survey compared to those accumulated in private surface collections. Comparisons must be controlled for complicating factors. This study exploits

ABSTRACT

Chipped-stone projectile points are used to mark the passage of time and cultures in the record. Archaeologists often recover points in surface survey, yet we do not know how many were found by private collectors before or after professional work. In a 1975–1977 Michigan probabilistic survey, professional archaeologists documented 30 private collections from 20 sample units. In those units, points found by private collectors outnumber professionally recovered ones by a factor of about 32. The survey region's point population estimated separately from the professional and private-collection samples differs by nearly an order of magnitude in favor of private collections, despite highly conservative assumptions about the latter. The number of points found in professional survey is inversely correlated with the number found in private collections, and the professional sample is more sparsely and randomly distributed. However, proportions of several common types are similar between professional and private collections. To the extent that large, reasonably complete samples of points are important for research and preservation, archaeologists must document private collections compiled in and near their survey areas.

Los cabezales líticos o puntas de proyectil se usan para marcar el paso de tiempo y las culturas en el registro arqueológico. Los arqueólogos suelen recuperar los cabezales durante la prospección de superficie, pero no se sabe cuántos son encontrados por coleccionistas privados antes o después de los reconocimientos. En un estudio probabilístico llevado a cabo en Michigan en los años 1975–1977, arqueólogos profesionales documentaron 30 colecciones privadas de cabezales desde 20 unidades de muestra. Allí, el número de cabezales encontrados por coleccionistas privados sobrepasó el número recuperado por los profesionales por un factor de casi 32. Si se estima el tamaño de la población de cabezales por separado con base en las muestras profesionales y en las colecciones privadas, los resultados difieren por casi un orden de magnitud en favor de las colecciones privadas, a pesar de suposiciones conservativas sobre esta fuente. El número de cabezales en la muestra profesional resulta inversamente proporcional al número de cabezales en colecciones privadas, y la muestra profesional tiene una distribución mas dispersa y más aleatoria. Sin embargo, las proporciones entre tipos comunes de cabezales son parecidas en las dos muestras. En la medida que las muestras grandes y razonablemente completas de cabezales son importantes para la investigación y la preservación de los recursos arqueológicos, los arqueólogos deben documentar las colecciones privadas obtenidas en o alrededor de sus regiones de prospección.

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results of one professional survey conducted 40 years ago that, uncommonly, documented private surface collections from the same tracts that it surveyed. It also explores the implications for archaeological practice of the considerable difference in magnitude between professional and private samples.

Most points are bifacial chipped-stone tools that were hafted as the leading part of composite tools. Types constructed from the great variation in points serve as markers certainly of past time and perhaps of cultural affiliation. Points are remarkably abundant in the North American record, and the time-space systematics developed to accommodate variation in that record rely heavily on point types as time markers. As much as anything, North American archaeology marks the passage of time and measures the duration of constructed phases using points.

Because points are important, the size and quality of the available sample should concern us. Points are abundant on the surface of the cultivated fields that blanket midcontinental North America and other places where the surface is not heavily vegetated. Survey is a common method used to document the distribution of artifacts and sites. Cultivated landscapes are highly sensitive to the randomizing effects of tillage on the probability that artifacts might lie exposed on the surface and to degree of surface weathering. A typical tillage event can expose about 2–7 percent of artifacts that circulate in a plowzone (Bradley 1987:39; Shott 1992:Table 2–1), and as weathering of that surface advances, more of that subsample is exposed and therefore available for collection (Shott et al. 2002). Thus, a "site" may vary by tillage event in size or limits, and in the distribution and abundance of artifacts. Among other things, tillage means that the more often a surface is surveyed, the more is apt to be found; a single pass across a site's surface is not always sufficient to sample accurately either the site's boundaries or its contents.

Professional archaeologists document many points lying on the ground surface. But so do hobby or avocational collectors. (The focus here is on points, but of course collectors also take other artifact types.) Collectors are vastly more numerous than are professionals, and many live near the surfaces they survey. In the aggregate, collectors have many more opportunities to visit and revisit the same places in search of points. In the midcontinent, optimal survey conditions often obtain in late spring or late fall fields then being cultivated and weathered but not grown up in crops. The comparatively few archaeologists in academic settings rarely have the opportunity to survey at such times, and the comparatively few in preservation practice do so only by the circumstance of project scheduling. Local and more numerous private collectors may do so by choice. The fact of large-scale private collection is no secret to most archaeologists. Obviously, such collection reduces, probably significantly, the size of point assemblages that professional archaeologists document. It also may bias professional collections if private collectors preferentially take intact points, or particular point or toolstone types. Thus,

> recurrent collecting badly biases the surface remains at a site . . . such as projectile points . . . that archaeologists use for chronological control. In severely collected sites . . . the surface remains from site to site become undesirably monotonous; a few small, undecorated sherds and lithic flakes [Schiffer 1996:116; see also Cain 2012; Griffiths 1996:67; Hasenstab 2008:11, 34; Ruig 1995:82].

Whatever views that professionals hold of private collectors, any who conduct survey or research databases drawn from survey should be concerned to confront and, for analytical purposes, account for the effects of private collection. Ignoring the effects of private collection is at best naïve. It may be dangerous, as well, to research that rests on biased databases of assemblages and sites. It may also be dangerous to sites themselves if, per Schiffer's scenario, some are consigned to oblivion merely because the single professional survey, possibly under suboptimal surface conditions or where preceded by extensive private collection, fails to recover at least one diagnostic point.

It is one thing to acknowledge that private collection may bias survey data. More pragmatic and constructive is to make reasonable efforts to gauge and thereby control for that bias. This seems the course that concern for database validity and resource preservation would counsel. Among the many questions that this process should engage are the duration, magnitude, and pattern of private collection. Magnitude refers variously to the number of collectors, and the size and composition of their collections; in this case study, it refers to number of points. Pattern refers to both spatial distribution of collecting activity and possible selectivity in types or conditions of artifacts collected. Magnitude being this paper's focus, duration and pattern of private collecting are addressed only briefly.

The duration of private collection in North America varies by region. The eastern seaboard was occupied first and longest by Europeans. By 1859, casual private collecting was so common in New England, its products abundant to the point of commonplace, that Henry David Thoreau invoked the vivid metaphor of "raining arrowheads" (Shott 2008). In Ohio, private collection surely began in the early nineteenth century (e.g., Shott 2008:31) and on the Plains by the late nineteenth century. Across the midcontinent, therefore, duration of private collection ranges from 150 to 200 years. Concerning its pattern, bias introduced by uncontrolled collection affects assemblage contents (e.g., Baxter 2013, who found previously collected parts of sites impoverished in artifact types desired by collectors compared to less accessible parts; Spears 1978; Spears 1978 cited in Ruig 1995:17), spatial distribution (e.g., Francis 1978), and perhaps other properties of the archaeological record.

Magnitude of private collecting is in part a product of its duration. Before the end of the nineteenth century, large point collections were compiled across the midcontinent (e.g., Hinsley 2000; Wilson 1876 I:56). One example, surely easy to replicate in a modest literature search, suffices here to demonstrate that collecting is of long duration and that its aggregate magnitude is enormous. MacLean (1885) inventoried 35 then-extant private artifact collections in Butler County of southwestern Ohio, near Madisonville and Cincinnati. Between them, the collections contained nearly 4,000 artifacts identified either as "Arrow Heads" or "Spear Heads," along with impressive quantities of groundstone and worked-slate tools (Figure 1). The latter artifact types probably were less fragmented and therefore more recognizable

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ARCHÆOLOGICAL CABINETS IN BUTLER COUNTY, OHIO.

TOWNSHIP.	NAME.	Axes.	Hatchets.	Hammers.	Chisels.	Fleshers.	Spades.	Pestles.	Mortars.	Knives.	Rimmers.	Arrow Heads.	Spear Heads.	Pipes.	Polishers.	Shuttles.	Wands.	Crescents.	Tubes.	Gorgets.	Pendants.	Images.	Pottery.	Miscellaneous.
Hamilton	W. P. Cooch	14	9	....	1	7	....	8	2	....	6	60	50	....	....	....	1	....	1	1	....	....	....	1
"	W. H. Hart	12	15	6	....	5	....	6	....	....	8	60	50	....	....	....	....	....	....	....	....	....	....	....
"	Wm. Huber, Jr.	25	6	....	....	7	1	12	....	2	5	236	53	....	1	....	....	....	....	1	....	....	....	4
"	Dr. J. L. Kirkpatrick	39	7	5	2	9	....	17	....	3	1	120	38	....	....	....	1	....	....	2	....	....	....	....
"	G. B. McKnight	40	35	....	....	47	2	44	1	12	12	253	213	....	8	2	6	1	1	2	1	....	....	324
"	J. P. MacLean	51	22	7	1	20	1	36	....	11	18	200	127	1	1	1	8	1	2	12	3	1	1	5
"	J. G. Shepherd	20	6	....	5	10	....	10	....	....	2	50	50	....	....	....	....	....	....	....	....	....	....	....
"	F. I. Whitehead	8	2	1	1	3	....	5	....	....	....	17	13	....	....	....	....	....	....	1	....	....	....	....
Lemon	P. W. Clark	2	3	....	....	....	....	3	....	2	....	13	5	....	1	....	....	....	....	....	....	....	....	....
"	J. P. Sharkey	5	4	....	4	4	....	1	1	7	4	110	28	....	1	....	1	1	....	8	1	....	....	3
"	R. T. Shepherd	9	11	1	4	13	3	8	....	7	9	145	27	1	1	3	9	2	1	14	5	1	....	66
"	Marion Warner	1	....	....	....	2	....	1	....	....	....	12	....	....	....	....	....	....	....	....	....	....	....	....
"	F. W. Whittaker	1	....	....	....	2	....	1	....	....	....	40	10	....	....	....	....	....	....	1	....	1	....	....
Morgan	Prof. J. A. Clark	2	2	2	....	....	....	1	1	2	....	8	2	....	....	....	....	....	....	....	....	....	....	....
"	J. L. Evans	3	2	3	....	....	....	2	....	2	....	5	2	....	....	....	....	....	....	....	....	....	....	....
"	Minter Morris	....	6	1	....	....	....	....	....	....	....	20	....	....	....	....	....	....	....	....	....	....	....	4
Oxford	John R. Bevis	8	4	....	2	....	....	6	....	1	1	24	19	....	....	....	....	2	2	....	....	....	....	....
"	Llewellyn G. Bonham	9	2	....	....	3	....	2	....	7	4	34	25	1	....	....	1	....	1	5	....	....	....	....
"	Samuel Gath, Jr.	26	20	....	1	1	6	16	....	4	13	275	294	2	....	1	5	....	1	10	1	1	....	3
"	D. A. McCord	14	4	....	1	....	....	....	....	....	2	42	38	....	....	....	3	....	1	....	3	....	....	....
"	Prof. B. F. Marsh	7	1	....	....	....	....	3	....	....	3	75	32	....	....	....	....	....	....	....	....	....	....	....
"	Wm. and Richard Martindale	24	5	1	....	5	....	19	....	1	9	230	60	....	....	....	3	....	1	4	....	....	....	....
"	John M. Stern	33	1	....	....	6	....	10	....	....	1	30	32	....	....	....	....	....	....	....	....	....	....	....
"	Harry Wetmore	....	....	....	....	....	....	....	....	2	11	107	66	1	....	....	2	1	....	4	....	....	....	....
Ross	Richard Brown	10	32	16	1	....	1	13	....	2	4	50	64	....	....	....	1	....	2	....	1	....	1	....
"	J. and J. Demoret	1	....	....	....	6	....	....	....	....	....	7	9	....	....	2	....	....	1	....	....	1	....	5
"	Col. Griffin Halstead	6	6	6	....	....	....	5	4	1	....	10	6	1	....	....	....	....	....	....	....	....	....	....
"	Harvy Ross	18	10	2	4	10	6	7	....	....	4	80	30	....	1	....	....	....	....	1	3	....	....	18
"	Mrs. John Ross	20	23	....	5	13	8	13	1	1	12	60	180	....	4	....	1	1	1	3	5	....	2	100
St. Clair	W. L. Clark	10	6	1	....	4	....	6	....	....	....	12	....	....	1	....	....	....	....	....	....	....	....	....
"	John T. Waldron	5	2	....	1	1	1	2	....	....	4	30	20	....	1	....	....	....	....	1	....	....	....	6
"	Mrs. Eliza Walker	8	1	....	....	1	....	3	....	....	1	12	17	....	....	....	....	....	....	....	....	....	....	....
Union	J. K. Aydelott	....	....	....	....	1	....	....	....	2	....	25	3	1	....	....	....	....	....	....	....	....	....	....
"	Judge Z. W. Selby	1	1	....	....	6	1	2	....	8	....	20	2	....	1	1	....	....	....	....	....	....	....	....
Wayne	Dr. J. B. Owsley	20	38	....	....	....	....	23	....	25	....	56	44	....	....	....	3	....	2	5	....	....	....	....

FIGURE 1. Inventory of Butler County, Ohio, private collections in 1885. Source: Maclean (1885).

than they would be now, and recovered either by collectors or by farmers as they traversed fields more slowly and nearer the ground than is customary today. Yet even points were found then in truly impressive numbers. And that was more than 130 years ago; it is impossible to know how many points have been collected in the generations since then, but the number must be high. In survey, it is doubtful that professional archaeologists have documented nearly as many points from Butler County. Professional results are affected even by comparatively recent collection. For instance, Macleod et al.'s (2015:110, Table 17) survey in Jasper County, Indiana, recovered only four points. A single private collection from the survey area and environs contained 431 points.

So much conceded, one obvious implication is that the vast majority of points found across the midcontinent were found by collectors. Had archaeologists systematically documented private collections in the intervening decades, at least we would have reasonable estimates of the magnitude of collecting. Unfortunately, such documentation has been limited, sporadic, and highly incomplete. As a result, not only are we missing very large portions of highly informative parts of the archaeological record, but we do not know the size or character of what we are missing. T. Wilson's study, originally published in 1899, reported 8,000 "well-formed" points along one segment of the Savannah River, a private collection that numbered 20,000 artifacts, and another collector who found "no less than" 16,000 artifacts in one 40-acre tract (2007:234), all from Georgia. He also reported caches of "about 3,500" stone tools (2007:255) and "[t]wo barrels of specimens" (2007:257), both in Schuyler County, Illinois. These accounts are merely anecdotal. Whatever the precise magnitude of private collection, it is likely to be high; Thulman (2006:105) estimated that 98 percent of known Paleoindian artifacts in Florida were found by collectors. That figure, of course, by definition excludes Paleoindian artifacts that were found but are not known to professional archaeologists. Australian studies suggest comparable magnitude there; by the mid-twentieth century, the National Museum had acquired "truckloads of stone artefacts" from private collections (Griffiths 1996:66), some of which measured "1 ton 6 hundred weight of specimens" (Griffiths 1996:74).

Archaeologists' neglect of private collectors and their resulting ignorance of the duration, pattern, and magnitude of collecting can be mitigated only by substantial effort in outreach and research. To demonstrate the need and possibly to inspire some effort, this paper estimates the magnitude of private collection in one area by comparing a partial inventory of private collections to professional survey of the same surfaces.

Materials and Methods

From 1975 to 1977, the University of Michigan (UM) conducted a probabilistic survey of the River Raisin basin of southeastern Michigan (Figure 2; Peebles 1979; Peebles and Krakker

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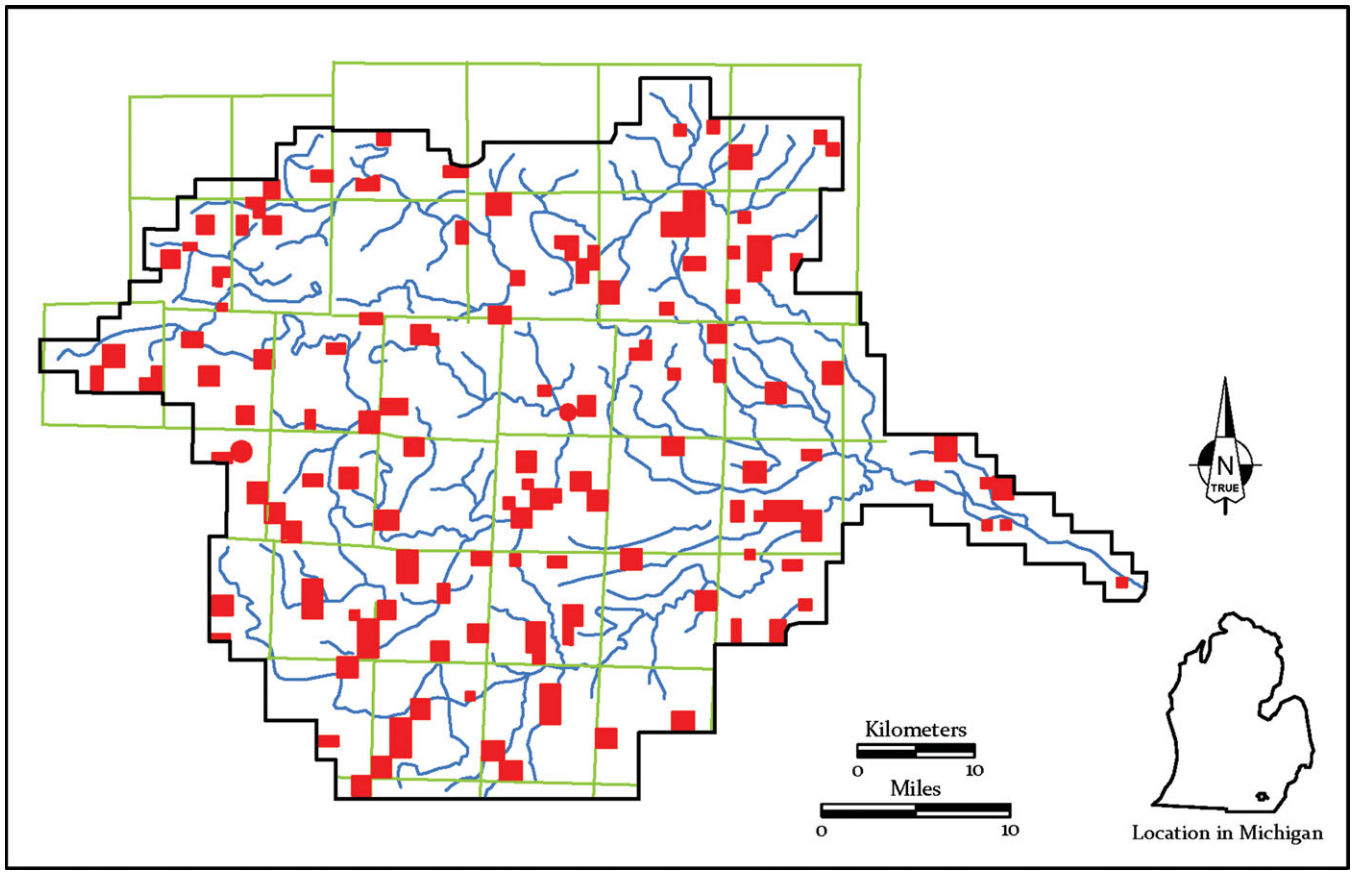

FIGURE 2. The River Raisin basin and distribution of sample survey units. Inset: River Raisin basin location in southeastern lower Michigan. Original map by Peebles and Shott (1981), digitized by Susan Hall.

1977; Peebles et al. 1976). Carried out in the first flush of archaeology's enthusiasm with rigorous sampling, the River Raisin survey was designed to produce probabilistic estimates of the distribution and abundance of archaeological sites in a region measuring 2,935 km^2 (1,129 mi^2). The basin was stratified by surface geology, chiefly moraine, lake plain, and till plain. Altogether, the project was designed to survey over 100 sample units (varying in size from 1.51 km^2 to 0.40 km^2 [1 mi^2 to 0.25 mi^2]) that covered 252.2 km^2 (93.2 mi^2), comprising 8.25 percent of the Raisin basin. Because only 70 percent of the basin was cropland at the time of survey (Peebles and Shott 1981:3), and survey was conducted only on cultivated cropland, the sampling fraction was, effectively, 0.7 × 8.25 percent = 5.78 percent. In the event, ground-cover restrictions and refusal of access by some landowners reduced the surveyed area to 93 units that measured 157.4 km^2 (60.5 mi^2, 5.36 percent of the Raisin basin), although parts of that subsample were not surveyed intensively. By chance, the reduced survey coverage was distributed randomly among the design's sample strata (Peebles and Shott 1981:6). Owing to coverage restrictions noted above, the actual areas surveyed are nearly but not strictly a probabilistic sample of the Raisin watershed. Because they approximate it, however, I treat the survey as a probabilistic sample of the basin. Estimates derived from that sample are not intended for research or management purposes, but merely to provide rough estimates of the proportion of points in the Raisin basin found in professional survey among all points found and, by extension, to estimate the magnitude of private collection of points there.

In the course of UM survey, landowners were interviewed to determine whether they had compiled collections from their property. As a result, a number of collections made by landowners or others were documented. For this study, only those documented collections that were compiled by collectors from UM survey units were examined. Over the three seasons of the project, a total of 30 private collections were documented from 20 survey units. That is, the private collections came from tracts that the professional crew also surveyed. Documentation consisted largely of complete photography of the collection (usually three exposures of each composition, bracketing the chosen f-stop) under either natural sunlight or adequate artificial light, along with count and inventory by artifact type in several cases. Original images of fair quality were available as contact, not full-size, prints (Figure 3).

Documentation of private collections was confined to those held by landowners and close relatives. Survey crews made no attempt to identify and contact other possible collectors who held material from the same survey units. Across the midcontinent, many collectors collect points only from their own property. Many others, not necessarily large property owners themselves,

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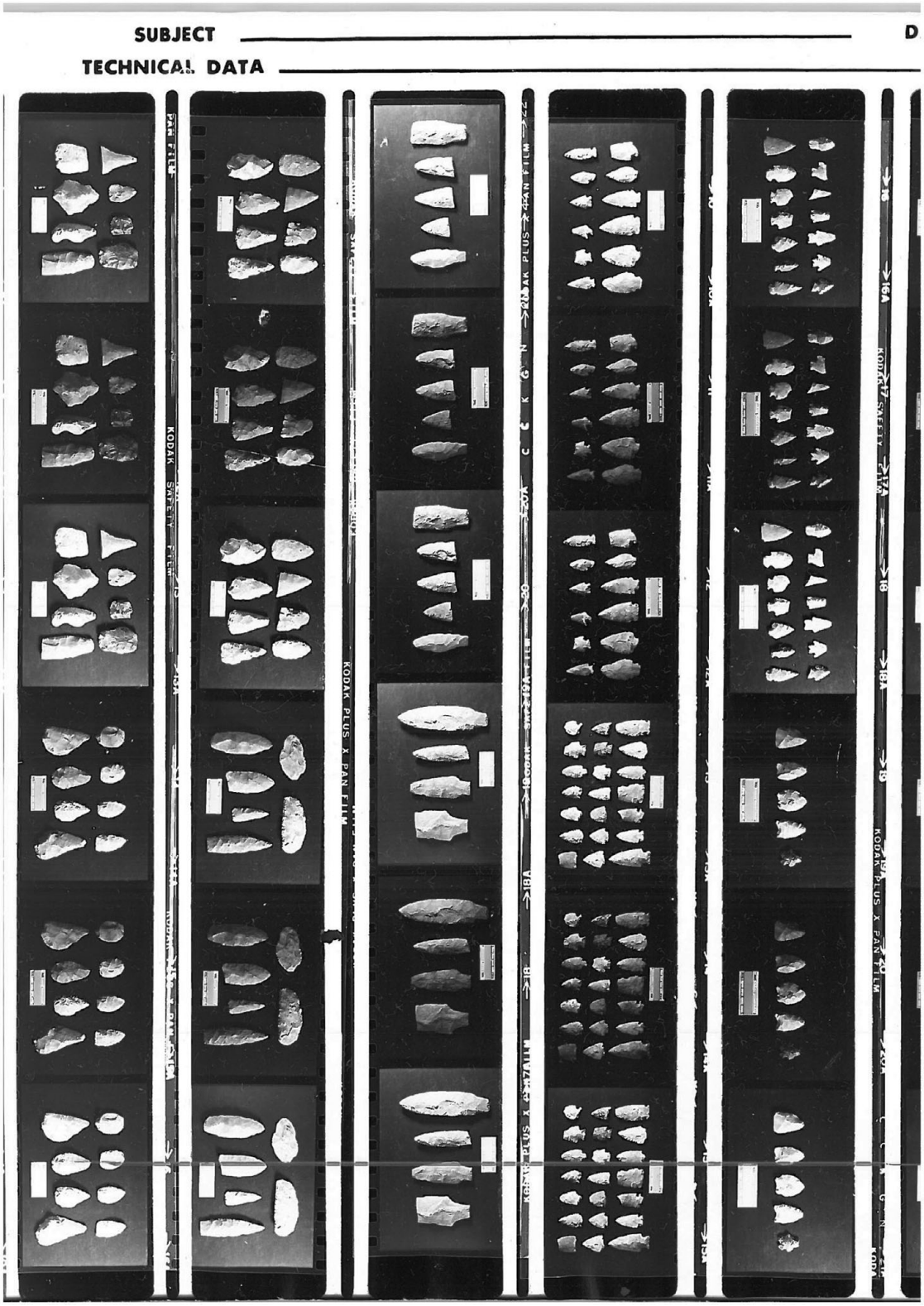

FIGURE 3. Example of contact print of private collection from the University of Michigan River Raisin Archaeological Survey. Photographer unknown.

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travel varying distances from their homes in order to collect on a regular basis from one or more fields or sites. Nor, obviously, was it possible to document private collections in the Raisin basin that were made in past generations but lost or dispersed by the time of the UM project (e.g., one consisting of "bushels" of points from one sample unit that was lost by 1976, and another large local collection sold to a "relic dealer" [Peebles and Krakker 1977:51, 55]). Neither was it feasible, without attempting a comprehensive search of existing collections, to locate and analyze River Raisin collections held by UM (e.g., a 1935 accession of 144 points from the basin [Peebles and Krakker 1977:43]) or other repositories before or since the 1975–1977 project. The Raisin survey was unusual among professional projects in integrating collections documentation into its research design, but even its efforts were limited to then-extant and accessible collections held by landowners who resided on or near their property.

Whatever its limitations, the effort to document some private collections from survey units offers a rare opportunity. UM directly reported the number of points found by its survey crews. By tabulating the number and type of points found in the documented private collections, it is possible directly to compare professional survey results to what private collections already had compiled. Because the River Raisin survey design was probabilistic, the population of points across the entire basin can be estimated from professional survey results and separately from results of private collection. Therefore, the Raisin basin's sample and collections documentation offers an unusual opportunity to estimate the magnitude of private collection and its effects on professional survey results.

Typological Assignment of Points

Points were typed against standard sources (Justice 1987; Ritchie 1961), with allowance for variation in local terminology (e.g., in Michigan, Lamoka points are known as Dustin points). Typological assignment is straightforward in concept, but sometimes challenging in practice. Some defined types are distinctive (e.g., Clovis/Gainey fluted points, Thebes, Meadowoods, Adenas, late prehistoric triangles [although the latter encompass a range of subtypes themselves the subject of dispute]). But any archaeologist who has contemplated a collection of midcontinental points appreciates the difficulty of assigning many of them to time-specific types. Type definitions originated as Platonic ideals innocent of the need for both systematic control of variation within the unit by time, function, or other factors and systematic alteration of specimens' original size and shape in use. No matter how well they are defined, variation arising from toolstone, use and damage, and post-depositional deterioration can blur the boundaries between types. Also, some types' definitions are very broad or overlapping. For instance, Wiant (2001) noted the ambiguity of typological assignment of Illinois points that resembled both Early Archaic St. Charles or Kirk points and Middle Woodland Snyders points, the difference in age between the types exceeding 7,000 years.

If typological assignment is difficult when judged from original specimens or high-quality images at 1:1 scale, those difficulties are compounded in examining sometimes grainy contact prints, even under 20× magnification. As a result, some points in River Raisin private collections were easily recognized as representatives of defined types, but many were not. Rather than attempting typological assignment in the absence of reasonable certainty, points of comparatively unambiguous affinity were assigned to specific types (fluted Paleoindian, Thebes, Kirk [cf. Wiant 2001], bifurcate-base, Middle Archaic large side-notched, Brewerton Stemmed/Notched, Satchell, Dustin/Lamoka/Durst, Meadowood, Kramer, Adena, Snyders, Jack's Reef, Late Woodland triangular), and other specimens were simply counted as points. Several private collections also included what apparently were biface preforms. In many cases, these could be distinguished from diagnostic points and not included in their counts, but it is possible that some small number of preforms were counted as points.

Survey Results and Magnitude of Private Collections

A total of 1,562 points were tabulated from private collections, 315 (20.2 percent) of which could be assigned to the above types. In total, UM crews found 136 points in River Raisin sample units, of which 48 (35.3 percent) were assigned to the same set of types. The difference in typable proportion probably owes to the uneven quality of contact prints. Figure 4 shows the distribution of points (including untyped ones) found per survey unit by professional archaeologists in the River Raisin survey. Values range from 0 to 10, averaging 1.7. (Differences in size of survey units are ignored, and apply equally to figures reported from private collections.) Arguably, a stricter comparison of results is confined to units that yielded points to both UM and private collectors. This yields a density value, which required correcting for difference in unit sizes. Figure 5 shows that comparison. The mean is 2.3 for professional survey and 74.4 for private collections, a difference exceeding a factor of 32. (Assuming that no private collections exist in survey units where none were documented, the number of private-collection points averaged over the entire River Raisin sample of 90 units is 17.3.) Again confining comparison to survey units in which private collections were documented, the frequency distribution of points per unit in professional survey (Figure 5) shows five cases in which UM crews found no points. Among all private collections in those five units, the mean number of points was 170.3 per unit.

I treat the completed UM survey as a simple random sample and use it to derive a (statistical) point estimate of the Raisin basin point population. This is not strictly valid, because the survey was designed as a stratified sample. Overall, it yields an estimate of 2,637 points in the entire basin. As above, the River Raisin survey offers the unusual opportunity both to compare professional and private point samples from the same survey tracts and, because of the professional survey's design, to compute independent estimates from the two samples of the overall point population in the basin.

Accordingly, for comparison to professional results, the mean number of privately collected points per River Raisin survey unit yields an estimate of 25,614 points across the basin, nearly ten times the estimate from professional survey. To belabor the obvious, results of professional survey produce much smaller estimates of the size of the River Raisin point population. Yet the estimate from private collections is highly conservative, because it does not include private collections accumulated and lost or dispersed before the 1975–1977 professional survey, or those

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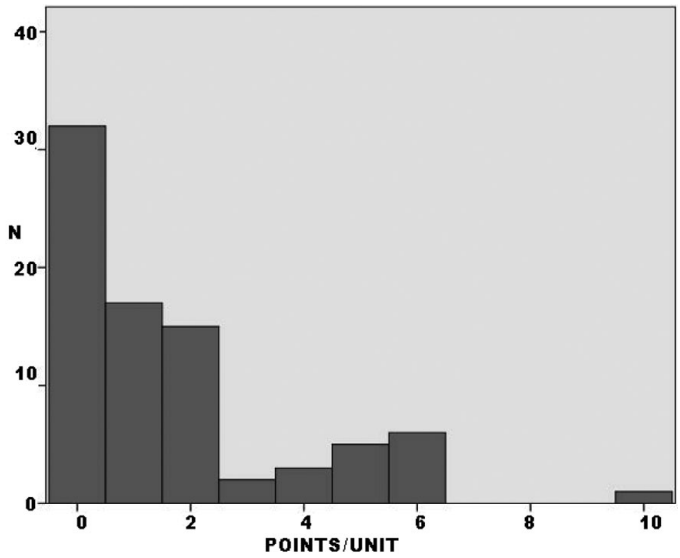

FIGURE 4. Points per unit in all professional survey units.

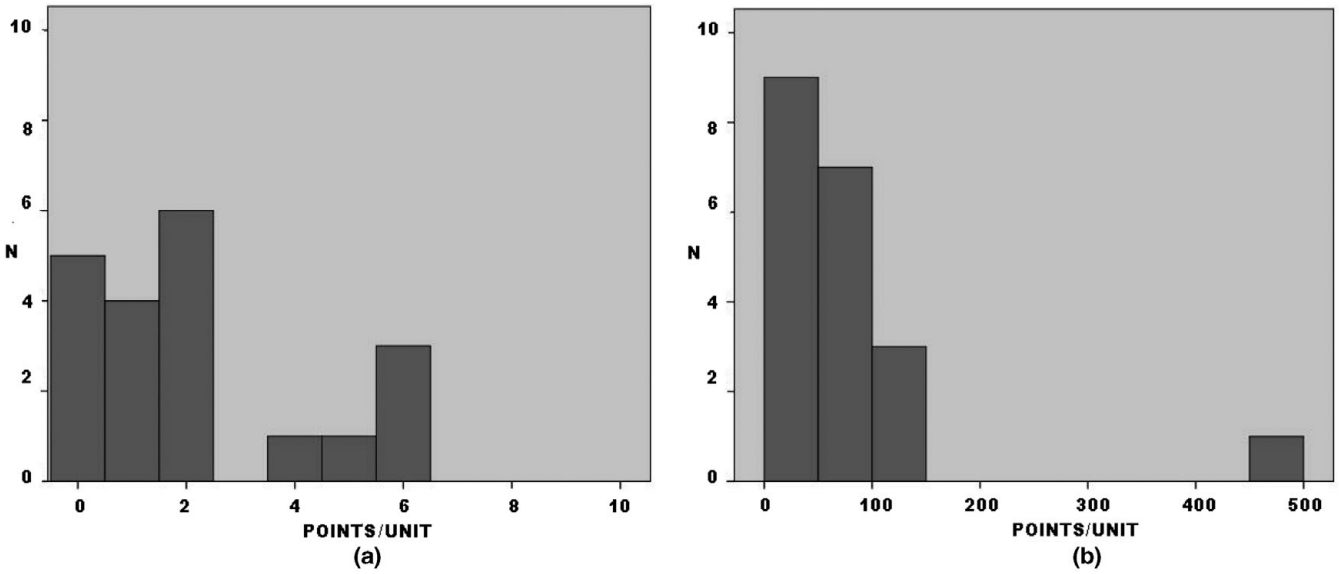

FIGURE 5. Points per unit in units containing private collections: (a) professional results, (b) private collections.

existing then that were not known to or documented by UM crews. That is, in units where professional survey did not identify private collections, estimation assumes a private-collection count of 0. As above, where private collections *were* documented the mean number of points per unit was 74.4, much higher than the value of 17.3 used for estimation. How many private collections may exist in such units numbering how many points is impossible to know, but it is not unreasonable to suggest that the estimate of 25,614 points—already nearly 10 times the estimate from professional survey—itself is conservative, the true value much higher. Even at face value, results of this exercise suggest that the magnitude of private collection of points exceeds professional collection by approximately 10 times, or one full order of magnitude.

Further Analysis

The main goal of this study is the simple comparison of point samples and estimation of point populations reported above. Yet the data, noisy as they are, can be interrogated further. Robust nonparametric correlation shows an inverse relationship between number of points found in professional survey and in private collections (Figure 6; $r_s = -.51$ $p = 0.03$). Even with removal of an outlier sample unit that contained 440 points in private collections and none in UM survey, results nearly attain significance ($r_s = -.44$ $p = 0.07$). At least crudely and unsurprisingly, then, where private collectors find many points, professional survey finds few. The explanation for this correlation is obvious, some of its implications perhaps less so. Among them, two stand out: (1) the

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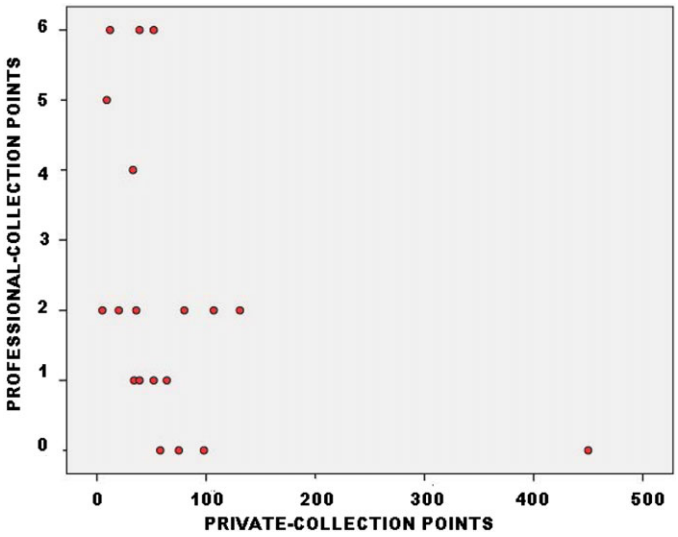

FIGURE 6. Points found in professional survey against points in private collections. Note the difference in y-axis and x-axis scales.

absence of points in single-pass professional survey emphatically does not mean that no points are or ever were present in the survey unit; on the contrary, it may mean quite the opposite (Ruig 1995:81–82); and (2) in all cases, but particularly when professional survey results are slim, it is imperative to consult and document private collections from those survey tracts.

Spatial patterning of portions of the samples' point distributions can be assessed by quadrat analysis, tested as described by Harvey (1967). If point samples are distributed randomly, no cultural or environmental pattern is revealed in their distribution. Nonrandom distribution of those samples (e.g., clustered or uniform) implicates cultural, environmental, or sample patterning. Yet the size of point samples can affect their distributions, small samples being likelier to match the random distribution (Rogers and Gomar 1969:381).

Early Archaic Thebes/St. Charles, bifurcate-base, and, advisedly, Kirk points are distinctive enough to be reliably identified in photographs, as are Late Woodland triangle types that include Madison and Levanna (Ritchie 1961:31–34; Scully 1951). Accordingly, frequency distributions of these two groups of types were compiled for comparison between professional and private collections (Table 1). UM point samples are randomly distributed (for Early Archaic points $\chi^2 = 0.25$ $p > 0.50$; for Late Woodland points $\chi^2 = 0.12$ $p > 0.90$), but private ones are clustered, not random, in distribution (for Early Archaic points $\chi^2 = 16.5$ $p < .01$; for Late Woodland points $\chi^2 = 39.4$ $p < 0.01$). Extending analysis to all units surveyed by UM, the frequency distributions of both Early Archaic and Late Woodland diagnostic types remain random (for Early Archaic points $\chi^2 = 1.41$ $p > 0.20$; for Late Woodland points $\chi^2 = 1.99$ $p > .15$).

One explanation of the difference in spatial structure is the broader, less concentrated distribution of professional survey effort. But another contributing factor may be the random effects of tillage on artifacts that circulate in plowzones. A single survey pass, as is customary in professional survey, is unlikely to recover many diagnostic points, even from sites that contain many points in the plowzone. In any one cultivation event, only a small fraction of all plowzone artifacts is likely to be exposed and therefore available for collection. Instead, larger points assemblages are likely to accumulate only over time as the product of repeated visits and collections of the same surface. Clusters manifested by the occurrence of several or many points of the same type are much likelier to result from repeated, sustained private collecting than from occasional, single-pass professional surveys. If so, professional and private collections are not valid independent samples by which to gauge the spatial distribution of diagnostic points, but must be analyzed together.

TABLE 1. Early Archaic Thebes/St. Charles and Late Woodland Triangular Points per Unit in Professional Survey and Private Collections.

Early Archaic Thebes/St. Charles			Late Woodland Triangular		
Observed	**Professional**	**Private**	**Observed**	**Professional**	**Private**
Count	*n*	*n*	Count	*n*	*n*
0	14	4	0	18	10
1	5	7	1	2	3
2	1	4	2	0	3
3	0	1	3	0	0
4	0	0	4	0	1
5+	0	4	5+	0	3

Note: Units confined to those in which private collections were documented.

Private collections usually are selective, collectors taking only points and other preferred artifacts while ignoring flake debris, body sherds, and other materials. One clear virtue of professional surveys is their collection of the full range of artifact types exposed on cultivated surfaces. In the River Raisin survey, the

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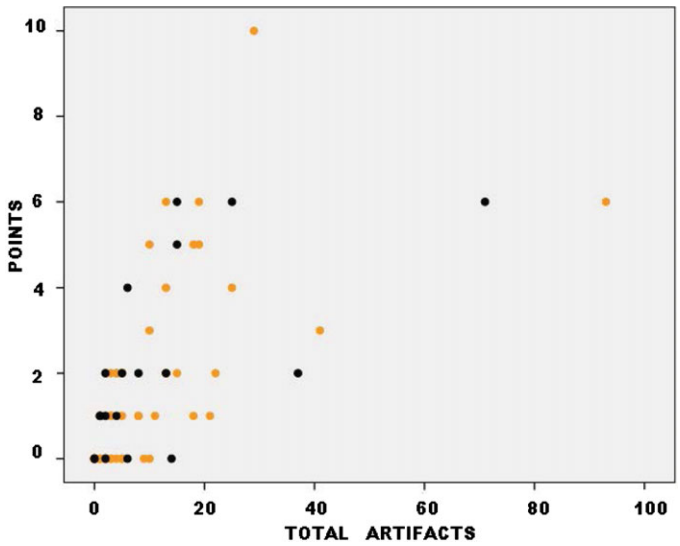

FIGURE 7. Points found against total artifacts found in professional survey. Orange circles are sample units in which no private collections were documented; black circles are sample units that contained documented private collections.

number of diagnostic points found per survey unit correlates with the total number of artifacts found (Figure 7; $r = 0.63$ $p < 0.01$; $r_s = .73$ $p < 0.01$). Thus, as more artifacts are found, the probability of encountering points among them also rises; essentially, in tracts subject to extensive prior private collection, points are found as a function of artifact density.

Finally, the distribution of points among defined types that span the prehistoric range from Paleoindian to Late Woodland can be compared between professional and private collections. Of the 136 points found in professional survey, 48 were assigned to defined types. Type assignments in the professional survey were confirmed by examination of the specimens in UM's collection. Advisedly, type assignments of points in private collections were made from contact prints. In such small samples as the professional one, correlations between sources by count or proportion of points is questionable. Instead, cumulative proportions were calculated separately for the UM and aggregate private point samples (Figure 8). The Kolmogorov-Smirnov D = 0.18, indicating no significant difference. In this respect at least, the professional and private sample are similar.

Summary of Analysis

On balance, the magnitude of private point collection is enormous in the Raisin basin of southeastern Michigan. An inverse rank-correlation between points per unit found in professional survey and documented in private collections suggests, obviously, that where collectors find many points, they leave few for discovery by professionals. This conclusion supports earlier views on the cumulative effects of sustained private collection on the composition of assemblages documented in surface survey (Griffiths 1996; Schiffer 1996). What is more, the spatial distribution of professional and private samples differ, the latter being more aggregated. Fortunately, type proportions in professional and private samples do not differ significantly. Thus, if professional survey of the Raisin basin did not recover nearly as many points, or the presumably original aggregated patterns found in the private sample, at least professional-sample type proportions may be representative.

These results imply no criticism of UM crews. Modern survey standards may be higher (Banning et al. 2016), but the UM survey followed reasonable methods for its time. However, they implicate the profound shortcomings of single-pass survey in the complex sampling universes that are cultivated fields and the magnitude of private collection that preceded professional survey of the Raisin basin.

Magnitude of Private Collection: Implications

> Not only can the amateur . . . make a valuable contribution but he [*sic*] provides as well the sole sure route to effective public and financial support. Failure of the professional archeologists to enlist this aid with maximum effectiveness has been one of archeology's most serious faults [McGimsey 1972:19].

We cannot stop private collection; trying to would make archaeologists "seem like folks on the shore yelling at the tide to stop coming in" (Thulman 2011). Nor, arguably, should we try. Forty years ago, McGimsey considered properly documented private collections to be "of inestimable value" (1972:11). Despite misgivings among some, the experience of archaeologists elsewhere in working with, rather than against, collectors generally has been positive (e.g., Bland 2005). Rather than yelling in futility at the tide, we should document the work of responsible collectors and educate the responsive so that they can meet acceptable standards.

Some archaeologists fear the specter of false foundation, the possibility that collectors might, for whatever reason, deliberately misrepresent the provenience of artifacts in their collections.

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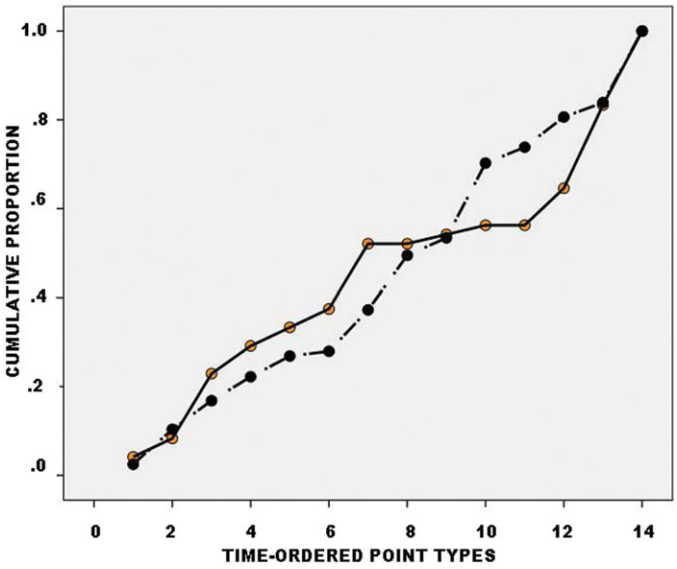

FIGURE 8. Professional (UM) and private-collection cumulative frequency distributions of time-ordered point types. Orange circles denote professional (UM) survey data, black circles denote private collections.

There is no denying this possibility, even if the experience of many archaeologists, including me, is that the great majority of collectors are honest and reliable. Yet willful indifference to the information that resides in private collections risks another, much likelier, variety of false foundation: the probability that we condemn sites to oblivion, either for research or preservation purposes, because single-pass professional survey failed to recover at least one diagnostic point where collectors may have found dozens. False foundation cuts both ways; we should be mindful of both possibilities, not just one of them.

This study suggests that in one archaeologically unremarkable corner of Michigan, professional survey recovered only a tiny fraction of all chipped-stone points ever found. Whether this fraction is comparable to other areas is a question for future research. Yet there is little doubt that, where private collection is of considerable duration and magnitude, only a small fraction, whether 10 percent or less, of points are likely to have been found in professional surveys. Whatever the size of professional samples of points, clearly it comprises only a small fraction of a much larger potential database and may not be representative of original distributions or pattern of association of points with other artifact types. Wherever considerable private collection is known or suspected, we cannot treat professional samples as representative of original point populations.

This conclusion has implications for our ability to identify patterns of prehistoric land use and their changes through time in the fullest detail possible. There is no single or simple solution to the challenge of accounting for magnitude and distribution of private collection, but at least some small steps in that direction are perceptible.

The much larger database of points scattered across thousands of private collections should be documented for its own sake, simply because it exists. Documentation should extend also to museums, which often include donated private collections. Private collections also should be documented for preservation and resource management, because they more fully document the distribution and abundance of cultural occupations across the landscape than do professional samples alone (e.g., Perazio 2008:99; Shott 2008). It is beyond this paper's scope to specify complete documentary standards that, in any case, can be developed only following extensive discussion and consultation with the profession (Shott and Pitblado 2015:12). Minimally, however, documentation must include reproduction of catalogues, maps, or other written paper records. Crucially, it also must include digital data capture of points in private collections, using methods already tested and validated (e.g.; Means et al. 2013; Porter et al. 2016; Selden et al. 2014; Shott and Trail 2012). In the process, collections documentation can, as Schiffer (1987) suggested, transform many of the "nondiagnostic flake scatters" that litter SHPO site files into cultural components. But there are good reasons to document point databases purely for research purposes as well.

To the extent that larger collections and samples are preferable to smaller ones, then private collections of diagnostic points should be documented, archived, and studied because:

(1) They provide much larger samples by which to recognize and define new types and to refine the definitions and boundaries of existing ones by encompassing the fullest range of variation known.
(2) Their greater numbers and wider distribution might help reveal the processes by which types branch and diversify or change by degree over time. North American time-space systematics are based on chipped-stone tool types more than any other artifact category. It is remarkable that, even now, archaeology lacks theory of the characteristics that efficiently describe types and distinguish among them, theory to explain the design and scale of defined types, and theory to explain how and why types either disappear or change to

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other types (Shott 2015). Professionally documented point collections are invaluable in such research, but the research can be strengthened by access to the enormous aggregate collections in private hands.

The relative abundance of point diagnostics in private collections can illuminate:

(1) population trends (e.g., Bettinger 1999): mindful of complicating sources of variation like differences in systemic number and use life, the vast number of diagnostics residing in private collections are the best collective source of data on such trends.
(2) patterns of toolstone use: larger private collections are the best sources of data on the proportions of points by source and may document a wider range of sources, including local ones, than do smaller and less widespread professional collections.
(3) differences in pattern and scale of reduction: private collections provide much more information on curation rates than do professional ones.
(4) patterns of assemblage variation across space and through time: the full range of that variation is documented only when large private collections are considered.

Ethical Considerations

Private collections exist, in large numbers that encompass nearly countless artifacts. All are informative to a varying degree, depending on the quality and detail of their documentation. Many are available for study. Yet the profession, in both its research and preservation branches, large ignores them, with some honorable exceptions (e.g., Charles 1983; Judge 1973; LaBelle 2003, 2005). We do so from some combination of attitudes that range from ignorance of to indifference to their information potential, and from the arguable position that engagement with collectors and collections is unethical. Failing to do so compromises the magnitude and probably the distribution of the point samples that we document. By extension, it also weakens our ability to use points to measure past time.

In an ideal world, no private collections would exist. We cannot stop future collecting nor undo the century and more of collecting that already has occurred. Instead, we should engage constructively with responsible collectors, reach out to the responsive who might improve their collecting practice when the benefits are explained to them, and continue to shun and sanction the irresponsible among private collectors (Daniel 2016; McGimsey 1972:6–10; Shott and Pitblado 2015). These efforts will increase our database for research and improve the preservation of archaeological resources for future research, and may provide opportunities to engage and educate. They are not merely consistent with the Society for American Archaeology's (SAA) Statement of Ethics (1996), but directly responsive to them (Pitblado 2014; Shott and Pitblado 2015:12).

Principle 1 urges us to pursue "the long-term conservation and protection of the archaeological record by practicing and promoting stewardship of the archaeological record" and to "promote public understanding and support for its long-term preservation." If this case study is remotely typical, private collectors hold much, and a disproportionately informative portion, of that record. Therefore, Principle 1 demands that we deal with the reality of private collections and make serious efforts to preserve the artifacts and contextual information they possess. It also demands public outreach to responsible and responsive collectors at large (Pitblado 2016). Principle 4 advocates public education, both for its own sake and to promote preservation. Educating responsive collectors is an effective way to promote preservation. Principle 7 concerns the preservation of records. It does not require that the records be professional or be made or maintained by SAA members; nor does it otherwise delimit the scope of records to preserve. All private collectors have artifacts and the responsible ones have records of their collections; both must be preserved. Finally, Principle 3 rightly condemns commercialization of artifacts. This does not mean spurning collectors, but instead educating responsive ones about the harmful effects of artifact commerce and about collections' intrinsic documentary value. These arguments, in turn, may promote good practice (e.g., LaBelle 2003:124).

If we engage more constructively with private collectors, we nevertheless should respect serious reservations expressed by some of our colleagues. For instance, increased collaboration may stimulate collecting, either through greater efforts by existing collectors or by attracting others to the pursuit. Also, some collectors may interpret collaboration as an endorsement of any collecting, no matter its low standards or commercial impulses. Reservations like these counsel caution, but should not pose obstacles to collaboration. Effective education on minimum documentary practices would maintain acceptable standards among collectors and simultaneously underscore the boundaries of responsible practice for all to see. Only those of bad faith could claim endorsement of their unacceptable practices, and there is no defense against bad faith. Far better for the professional community is to collaborate constructively with private collectors of good faith.

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Data Availability Statement

All professional collections referenced herein are curated in perpetuity at the University of Michigan Museum of Anthropological Archaeology. All inquiries regarding access to these collections can be addressed to the Curator of the Great Lakes or the Head

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of the Collections Division. Contact information is available at https://lsa.umich.edu/ummaa/people/curators.html.

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AUTHOR INFORMATION

Michael J. Shott ■ Department of Anthropology and Classical Studies, University of Akron, Akron, OH, 44325 USA (shott@uakron.edu)

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