Saving the Bar BC Dude Ranch: A New Method for Setting Preservation Priorities

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On the secluded flats of the Snake River in full view of the majestic Teton Range, an upstart Philadelphian and Princeton graduate, Maxwell Struthers Burt, introduced countless Americans to the raw beauty of the Mountain West. According to his own biography, Burt had always been attracted to the American West and acted on that dream in 1906 after an abrupt departure from Princeton. In so doing he would significantly influence public advocacy for protecting and preserving the scenery, rivers, valleys, and wildlife of that country through the establishment of Grand Teton National Park and, more broadly, the creation of the National Park Service in 1916.[1] A leading proponent of dude ranching in America, Burt founded Jackson Hole's first dude ranch, the JY in 1908, followed by the Bar BC Dude Ranch four years later, in the summer of 1912. Together with his partner Horace Carncross, and later his wife, Katharine Newlin, Burt would transform the Bar BC into the most successful and influential of the first generation of Wyoming's dude ranches (Figure 1).

Dude ranching was introduced in America by the 1880s as western ranches began to accept paying guests to experience the "cowboy life" (Bourne 1983). By the beginning of the new century dude ranches began to proliferate, partly fueled by nostalgia for a disappearing frontier and its rustic lifestyle. Guest or "dude" wrangling offered working ranches additional and welcome income, especially during difficult years when cattle operations were marginal. The Jackson Hole, greater Cody, and Sheridan–Buffalo areas in Wyoming emerged as the first dude ranching centers, along with Montana (especially areas north of Yellowstone) and scattered areas in Colorado. According to Burt, "the dude wrangler is a ranch man, a cowman, a horseman, a guide, a wholesale chambermaid, a cook, and storekeeper rolled into one"(Burt 1938: 49, 58). Burt's Philadelphia and Princeton connections and his literary reputation, along with that of his wife, Katharine Newlin, brought a constant stream of important guests, including eastern socialites, writers, actors, and politicians—among them a few presidents.

The George Wright Forum, vol. 33, no. 1, pp. 47–58 (2016).

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Figure 1. Bar BC Dude Ranch, n.d., before 1945. View toward the Tetons with cabins, landscape and reflecting pool. (Photo by H.R. Crandall, Jackson Hole Historical Society and Museum.)

First and foremost a business, dude ranching promoted the economic benefits of wilderness scenery, hunting, and fishing, yet its interests also coincided with the nascent environmental movement and have much in common with today's ecotourism. At first wary of government interference, Burt himself eventually came to passionately support the National Park Service's efforts to preserve the Grand Tetons as a natural recreational area, recognizing the mutual benefits to be derived from preservation of the natural resources and the scenery as well as the control of unsightly development in and around Jackson Hole.[2] Already sensing the value of preserving both the strong frontier flavor of Jackson Hole through its vernacular log buildings and ranching as well as the natural scenery surrounding it, Burt proposed the entire area as "a museum on the hoof"(Righter 1982: 33). His belief in and understanding of the public's desire to experience the American West through dude ranch tourism was correct. In its heyday period from 1919 to 1929, dude ranching was the area's dominant industry, with guests often exceeding the resident population.[3] After the Second World War, with the rise of automobile-based tourism, shorter vacation periods, and Americans' increasing access to international travel, many dude ranches closed, and their legacy and contributions to the conservation movement were largely forgotten.

A vanishing treasure

In 1986, after years of decline, the Bar BC Dude Ranch property came under the direct management of Grand Teton National Park, part of the park's long-awaited expansion in 1950 to include the valley's bottomlands. In 1990 the property was listed as a nationally significant historic district on the National Register of Historic Places, and in 1999 an in-depth historic

structure report (HSR) was begun followed by a cultural landscape inventory (CLI) (Graham 1994; Shapins and Associates 1999). Despite these efforts and sporadic attempts to stabilize the structures to preserve the country's oldest surviving dude ranch, the Bar BC continues to languish and today remains largely unknown to the vast majority of visitors who come to the park every year.

For those who know of the place through Burt's own recounting of his experiences as a dude rancher in his popular 1924 *Diary of a Dude Wrangler*, or the intrepid visitors who travel the site's rocky road to fish the Snake River or ride the horse trails, the reward is as impressive as it must have been for Bar BC's guests in the ranch's heyday. A dry, dusty, bone-jolting ride down the access road off the Inner Park Loop Road across the first two benches eventually opens to a spectacular panoramic view of the meandering Snake River and the Gros Ventre range beyond. A series of small log guest cabins tucked in clusters within stands of trees consciously placed along the bottomlands can be clearly discerned, along with several larger purpose-built log structures, including a barn, stable, figure eight corral, and a heap of logs that was once the main cabin (Figure 2). At its period of peak operation from 1912 to1941 (which is considered the "period of significance" for cultural resource management purposes), the Bar BC had over 45 structures across 600+ acres, including a tack shed, dance hall, ranch store, and natural river-fed swimming pool. Although the park fully recognizes the significance of the place, locally and nationally, other better known and equally historic complexes, such as Mormon Row, compete for time and funding for much-needed preservation and interpretation.

Figure 2. Bar BC Dude Ranch, 2015. Current condition of overgrown landscape and ruined buildings. (Photo courtesy of the Architectural Conservation Laboratory/University of Pennsylvania.)

This situation, all too common at many western parks, and especially those whose reputation has been based historically on their natural and scenic values, has required the need for creative solutions to cultural resources suffering from a backlog of deferred maintenance and advocates for low-impact use and interpretative programs. Recognizing the importance of the long cultural imprint on park lands, Grand Teton National Park is currently completing a historic properties management plan (HPMP) to assist resource managers in establishing preservation and management priorities throughout the park. Through a unique partnership between the park and the Western Center for Historic Preservation, an education and resource center dedicated to the preservation and maintenance of cultural resources in the western national parks, and the Architectural Conservation Laboratory in the School of Design at the University of Pennsylvania, an innovative project was begun in 2011 to develop an assessment of the Bar BC site and especially its structures in terms of their significance, integrity, and condition.

The basic problem facing cultural resource managers in evaluating a large ,complex site such as Bar BC is deciding what resources get attention first and for how long. We devised a rapid assessment survey to tease out the individual and combined effects of critical variables, such as design, construction, materials, and orientation, to test various cause-and-effect scenarios. In addition, by evaluating each structure independently in terms of its principal preservation assets (historical significance, integrity, and physical condition), the entire assemblage of structures could be effectively evaluated within a given classification (e.g., guest cabins) or across an asset (e.g., condition). The goal of the survey and assessment was to help create a conservation and management plan for Bar BC Ranch and to enable resource managers to make informed decisions about immediate and long-term actions for the site (Longfield 2011). The use of a geographic information system (GIS) platform allowed the researchers to gather large data sets and analyze and visualize those data spatially as well. It also has proven beneficial in monitoring the deterioration, maintenance, and future service life of various types of repairs of all log structures in the park.

Methodology

This project develops and tests levels of recording and the critical data needed to assist resource managers to better understand and mitigate specific threats and risks associated with log structures. To do this, the survey was guided by first understanding the agents that threaten the structures. While damage, in this context, is the cumulative measurable response of cultural fabric to specific agents deleterious to it, and can be recorded as "condition," associated contextual factors such as topography, climate, vegetation, and public access can affect the type and degree of damage. As a result, both past and existing conditions of the structures as well as that of their associated context must be documented and studied to assess risk and to develop a plan to manage it.

Conservation based on risk mitigation is defined as "preventive." If risk can be reduced or controlled, deterioration will be slowed, thus the integrity of the cultural resource can be preserved and maintained to a higher degree than if no action were taken. "Remedial" conservation includes actions such as material restoration and structural stabilization. The mer-

its of indirect or preventive conservation versus direct or remedial conservation can be longer retention of original material and avoidance of expensive episodic campaigns of restoration.

The architectural condition survey and assessment, reported herein, was based on a rapid visual inspection of each structure focusing on key elements that were identified as critical to log building stability and performance. In this way, the survey attempted to quickly rank structures in order to prioritize those deemed in need of more in-depth documentation and analysis in the future as funds become available. The majority of the assessment focused on the exterior of the structures; however, interior integrity and condition were also surveyed.

At Bar BC, significance is related to the date, use, and prominence of the buildings within the context of the ranch's development; specifically, its period of significance, 1912–1941. This assessment was performed independently of that for condition and integrity because significance, as a quantifiable asset, is understood to be less easily measured. "Condition" refers to the physical state of a building and its individual elements. Since the interiors contain few structural elements not already visible on the outside, condition was largely determined from the exterior inspection. "Integrity," according to the Secretary of the Interior's Standards on Historic Preservation, is "the authenticity of a property's historic identity, evidenced by the survival of physical characteristics that existed during the property's historic or prehistoric period." In the case of Bar BC, integrity is a measure of the degree of surviving original fabric and is a function of condition alone because the structures have not been subjected to repair or significant restorations that can compromise integrity.

Individual building elements (foundations, walls, and roofs) were identified and assessed separately according to their major role in the construction and performance of the log structures. For each of these elements, several attributes were identified and their conditions recorded to allow a comparative rating within each element class. For example, in the case of foundations, the type and number of footings were considered. Each wall elevation was assessed for condition of the upper and lower halves, respectively, the sill log (which was not considered in the evaluation of the lower half of logs), extant chinking, openings within the wall, and the type of corner detail. Overall structural problems recorded were tilting, racking, displacement, and deformation. Finally, associated contextual aspects that can accelerate the decay process such as exposure, vegetation, grade, and drainage were noted and documented as well.

All roofs are of gable construction and each slope of the roof was assessed separately. Fundamental roof attributes included the skin or covering, wood sheathing, and the number of purlins in sound condition. Porch analysis identified the number of posts intact versus the number of posts intended, basal rot, and closed or open joints. Additionally, the floor slope and floorboard condition were considered. Finally, the chimney masonry was assessed for deformation, cracking, and loss.

To obtain an overall condition assessment for each building and its elements, a comparative rating system was developed for all the described features. This rating system, depending on the attributes, was a scaled description, a choice between yes and no, or a fraction. The ratings were then converted into a Likert scale, which allowed further elaboration and evaluation through summing and multiplication. This rating system provided different scales of

evaluation. Either a single element or the entire building could be comparatively assessed and analyzed within or across categories (Figure 3). A detailed description of each term and condition rating was included in an illustrated glossary to ensure recording consistency across individual surveyors.

The information generated in the survey was entered into a Microsoft Access database, which allowed the data to be analyzed quantitatively. The data were then queried to suggest relationships between the condition of the building and site characteristics such as orientation, as well as comparisons between architectural elements within a single building or across multiple examples. The creation of a "ranked" list of buildings by condition and/or integrity was created to help prioritize stabilization and preservation work on the structures as funds and assistance become available. In order to visualize the data, the Access database was linked to a GIS, producing a site plan complete with symbol-coded values for the condition of individual elements as well as an entire building (Figure 4).

Risk and threat

The condition assessment provided information that could be related to specific risks and the threats to the buildings. Three different aspects of risk were recorded: environmental (context), architectural (design and materials), and structural. Each aspect is important to understand how the buildings have and will continue to perform if left untreated. Using regression analysis, each aspect was compared against another to determine if there was a correlation between them. A correlation between two aspects could suggest a cause-and-effect relationship. Assuming processes of decay can be explained through observable conditions, measures can be taken to ultimately mitigate hazards and prolong the historic fabric of the structures through careful monitoring and maintenance.

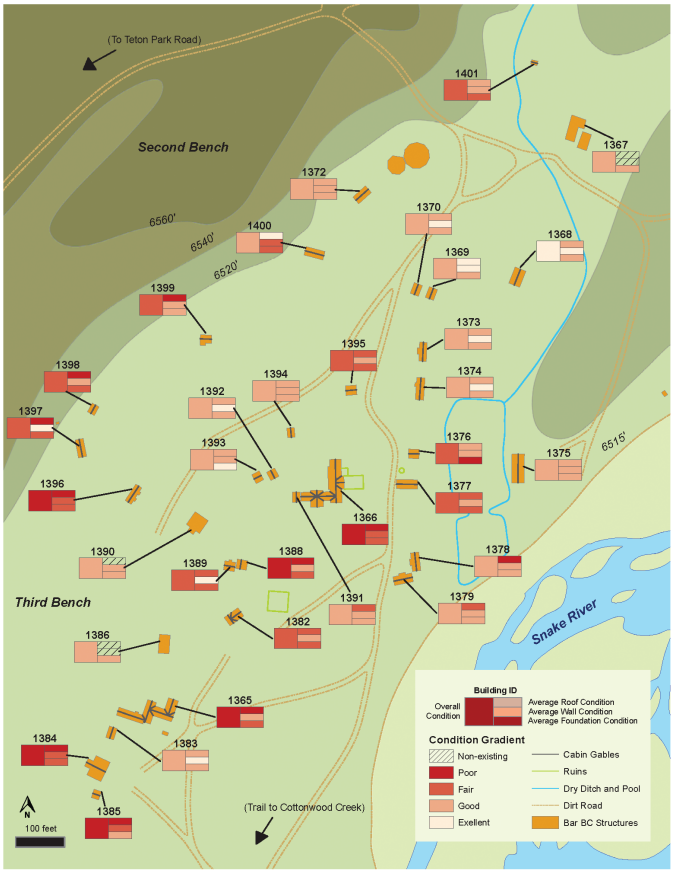
Analysis was performed on the average scores for each of the major building components: foundations, walls, and roofs. The results demonstrated several important correlations. First, that the condition of the walls is significantly related to the condition of the roofs, i.e., a building with a low score for roof condition often has walls that also score low for condition. Regression analysis did not show any significant relationships between walls and foundations or foundations and roofs. Since roof and wall conditions are closely related, these elements were further analyzed in an attempt to isolate conditions that have the greatest effect on each of the components.

Roofs protect the walls and interiors from exposure to rain, snow, and sun (solar radiation), and are equipped with sacrificial materials such as asphalt roll roofing that will decompose under the heavy onslaught of ultraviolet radiation and precipitation. Underneath the roofing material is a layer of plywood or wood planks. This layer is supported by a series of log purlins that are exposed on the interior of the buildings. Of all the construction materials within each structure, the roofing has the lowest average service life due mainly to its high ex-

Figure 3 (opposite). Bar BC Condition Assessment. Survey Data: Overall. Table of Scores, 2012. (Photo courtesy of the Architectural Conservation Laboratory, University of Pennsylvania.)

SURVEY DATA: OVERALL

NPS ID Number	Dude Cabin Number	Date Surveyed	Date Entered	Weather while Surveying	Number of Trees w/in 20 Feet	Presence of Overhanging Branches	Gable Direction	Foundation Type	Foundation Footings (# in Good Condition/ # intended)	Foundation Stabilization?	Foundation Repairs?	Foundation Notes	Average Foundation Condition Score	Average Wall Condition Score	Average Roof Condition Score	Purlin Condition (# in good condition/ # intended)	Purlin Condition Score	Roof Notes
1365		07/26/11	8/25/2011	SUNNY	20	YES	ALL	SLAB	0	FALSE	FALSE		2.89	4.22	1.21	15/20	3	COULDN'T GET INTO 1365-B, THE STORE ROOM, BECAUSE OF THE TYPE OF NAILS IN THE PLYWOOD BLOCKING THE ENTRANCE;
1366		07/26/11	8/31/2011	SUNNY	20	NO	ALL	SLAB	0	FALSE	FALSE		3.19	3.47	1.89	31/47	3	
1367		07/25/11	7/28/2011	FAIR	0	NO	NA	SLAB	0	FALSE	FALSE		4.40			NA		
1368		07/25/11	7/25/2011	SUNNY	0	NO	N-S	RAISED	6/6	FALSE	FALSE		4.40	4.63	4.33	6/7	3	
1369	1	07/25/11	7/25/2011	FAIR	10	YES	N-S	RAISED	2/4	FALSE	FALSE		3.60	4.97	4.56	5/5	5	
1370	2	07/25/11	7/25/2011	FAIR	10	YES	N-S	RAISED	7/7	FALSE	FALSE	FOOTINGS IN FRONT OF CABIN MAY INDICATE THAT IT WAS MOVED	4.40	4.83	4.11	5/5	5	NAILS POPPING OUT ALONG FLASHING
1372		07/25/11	7/25/2011	FAIR	4	NO	N-S	RAISED	11/11	FALSE	FALSE	RAISED FOOTINGS: CABIN STONE 6/6, PORCH CONCRETE 5/5	3.64	4.42	4.00	5/5	5	
1373	3	07/25/11	7/25/2011	SUNNY	5	NO	N-S	RAISED	6/6	FALSE	FALSE		4.07	4.87	3.89	5/5	5	
1374	4	07/25/11	7/25/2011	SUNNY	0	NO	N-S	RAISED	6/6	FALSE	FALSE		3.98	4.51	4.11	5/5	5	FLASHING INSTALLED ALONG ROOF EDGE
1375		07/25/11	7/26/2011	SUNNY	0	NO	N-S	RAISED	8/8	FALSE	FALSE	CONCRETE PAD - SE PAD MAY EXISIT BELOW GRADE BUT NO LONGER SUPPORT STRUCTURE	3.93	4.44	3.50	NA		DEFORMATION OCCURS WHERE PORCH WAS; BOLTS IN TRUSS POSTS AND BEAMS; LOOKS LIKE SHEATHING REPLACED
1376		07/25/11	7/26/2011	FAIR	0	NO	E-W	RAISED	3/4	FALSE	FALSE		1.90	4.28	3.67	5/5	5	
1377	5	07/25/11	7/26/2011	FAIR	0	NO	E-W	RAISED	6/6	FALSE	FALSE	CONCRETE PADS	3.00	3.85	2.88	NA		NEW SHEATHING
1378	6	07/20/11	7/26/2011	SUNNY	0	NO	N-S	RAISED	6/6	FALSE	FALSE		3.97	4.26	5.00	5/5	5	
1379	7	07/20/11	7/26/2011	SUNNY	0	NO	E-W	RAISED	6/6	FALSE	FALSE		4.17	4.13	2.67	4/5	3	
1382		07/22/11	7/26/2011	FAIR	3	NO	N-S	RAISED		FALSE	FALSE		2.83	3.90	3.35	6/6	5	
1383		07/22/11	7/26/2011	FAIR	8	NO	N-S	RAISED	4/4	FALSE	FALSE		4.10	4.92	3.56	4/5	3	
1384		07/22/11	7/26/2011	FAIR	7	NO	E-W	RAISED	8/8	FALSE	FALSE		3.15	2.90	1.13	NA		
1385		07/22/11	7/26/2011	FAIR	10	YES	E-W	RAISED	4/4	FALSE	TRUE	RAISED ON WOODEN SLED FOUNDATION	3.48	2.76	1.00	2/5	1	
1386		07/22/11	7/26/2011	FAIR	5	NO	NA	RAISED	8/8	FALSE	FALSE	BUILDING HAS BEEN DISASSEMBLED, NEW FOOTINGS HAVE BEEN POURED	4.40			NA		
1388	7	07/20/11	7/26/2011	SUNNY	0	NO	N-S	GRADE	0	FALSE	FALSE		2.80	3.72	1.78	5/7	3	
1389		07/22/11	7/28/2011	FAIR	9	YES	E-W	RAISED	4/4	FALSE	FALSE		3.15	4.58	2.67	7/7	5	UNDERNEATH WHERE ASPHALT INTACT, GOOD SHEATHING; WHERE ASPHALT DETERIORATED, SHEATHING DETERIORATED
1390		07/22/11	7/28/2011	FAIR	1	YES	NA	SLAB	0	FALSE	FALSE	CONCRETE POURED FOUNDATION WITH RANDOM RUBBLE WALL FRAGMENTS	4.40	4.45		NA		NO ROOF DUE TO CATASTROPHIC FIRE
1391	8	07/25/11	7/28/2011	SUNNY	4	NO	N-S	RAISED	4/4	FALSE	FALSE		4.35	3.78	3.44	5/5	5	
1392	10	07/25/11	7/28/2011	SUNNY	8	YES	E-W	RAISED	4/4	FALSE	FALSE	STONE FOOTINGS	3.85	4.86	3.78	5/5	5	
1393	9	07/25/11	7/28/2011	SUNNY	10	YES	E-W	RAISED	4/4	FALSE	FALSE		4.50	4.11	3.89	5/5	5	
1394		07/25/11	7/28/2011	FAIR	8	NO	N-S	RAISED	4/4	FALSE	FALSE		4.30	3.97	3.67	3/5	3	
1395	13	07/25/11	7/28/2011	SUNNY	2	YES	E-W	RAISED	4/4	FALSE	FALSE		3.25	4.00	3.11	4/5	3	
1396	14	07/25/11	7/28/2011	FAIR	20	NO	N-S	RAISED	5/6	FALSE	FALSE		3.13	3.43	1.00	1/5	1	
1397	15	07/25/11	7/28/2011	FAIR	3	NO	N-S	RAISED	6/6	FALSE	FALSE		2.97	4.69	1.56	3/5	3	
1398	16	07/25/11	7/28/2011	FAIR	12	NO	N-S	RAISED	4/4	FALSE	FALSE		3.25	4.39	1.00	1/5	1	
1399	17	07/25/11	7/28/2011	SUNNY	15	NO	E-W	RAISED	4/4	FALSE	FALSE		3.90	4.28	1.22	3/5	3	
1400	18	07/25/11	7/28/2011	FAIR	8	YES	E-W	RAISED	5/6	FALSE	FALSE	2 OF THE RAISED FOUNDATIONS ARE CONCRETE	2.63	3.44	5.00	5/5	5	
1401		07/25/11	7/28/2011	FAIR	10	YES	E-W	SLAB	0	FALSE	FALSE		2.80	3.58	3.75	NA		



NPSNum	Overall Average	Average Found	Average Wall	Average Roof
1384	2.39	3.15	2.90	1.13
1385	2.41	3.48	2.76	1.00
1396	2.52	3.13	3.43	1.00
1388	2.77	2.80	3.72	1.78
1365	2.78	2.89	4.22	1.21
1366	2.85	3.19	3.47	1.89
1398	2.88	3.25	4.39	1.00
1397	3.07	2.97	4.69	1.56
1399	3.13	3.90	4.28	1.22
1377	3.24	3.00	3.85	2.88
1376	3.28	1.90	4.28	3.67
1382	3.36	2.83	3.90	3.35
1401	3.38	2.80	3.58	3.75
1395	3.45	3.25	4.00	3.11
1389	3.47	3.15	4.58	2.67
1378	3.58	3.97	4.26	2.50
1379	3.65	4.17	4.13	2.67
1400	3.69	2.63	3.44	5.00
1391	3.86	4.35	3.78	3.44
1375	3.96	3.93	4.44	3.50
1394	3.98	4.30	3.97	3.67
1372	4.02	3.64	4.42	4.00
1392	4.16	3.85	4.86	3.78
1393	4.17	4.50	4.11	3.89
1383	4.19	4.10	4.92	3.56
1374	4.20	3.98	4.51	4.11
1373	4.28	4.07	4.87	3.89
1369	4.38	3.60	4.97	4.56
1367	4.40	4.40		
1386	4.40	4.40		
1390	4.42	4.40	4.45	
1370	4.45	4.40	4.83	4.11
1368	4.45	4.40	4.63	4.33

OVERALL CONDITIONS

BAR BC DUDE RANCH
Grand Teton National Park, WY

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University of Pennsylvania, 2012
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Sources: Graham, Roy Eugene. Bar B-C Dude Ranch Historic **Structures Report. National Park Service, U.S. Department of the** Interior. Washington, D.C. 1993; Burt, Maxwell Struthers. Diary of a Dude-Wrangler, Charles Scribner's Sons, 1925; Burt, Nathaniel. Jackson Hole Journal, University of Oklahoma Press. 1983

Figure 4 (opposite). Bar BC Condition Assessment. Overall conditions site map, 2012. (Photo courtesy of the Architectural Conservation Laboratory, University of Pennsylvania.)

posure, material, and vulnerable (albeit historical) installation method (horizontal rather than vertical). Therefore, it is not surprising to find that the roofs have the most apparent damage as compared with the walls and foundations. As the roofs are the first line of defense of the other structural components of the buildings, so the maintenance of roofing components is of the utmost importance.

The data gathered suggested that structures with roofs in good condition had walls in good condition. Therefore, it is important to identify what environmental circumstances were of greatest significance to the condition of the roofs. Two of the environmental variables that had the highest correlation were the presence of trees within twenty feet and roof orientation. Trees add twig and leaf litter to roofs which retain moisture and create adverse conditions that speed deterioration of the asphalt roofs. (Both sod and asphalt roofs were used historically; however no sod roofs were in active use at the time of the survey.[4])

Results of the analysis show that roofs with a north–south orientation were in worse condition overall than roofs with an east–west orientation. However, the rate of structural deformation of the roofs was consistently high between both gable orientation types. This relationship could be caused by environmental factors such as prevailing winds and solar radiation patterns. These hazards damage the roof both directly and indirectly. Since our results showed a relationship between the condition of the roof and the condition of the walls, a north–south orientation indirectly affects the roof by damaging the walls, therefore leading to potential roof damage. Analysis of wall orientation and condition shows that a north–south orientation correlated with the worst wall conditions, the same as for the roof orientation and condition.

Another relationship that was analyzed was purlin condition and average roof condition. The results of this analysis showed a very strong relationship. Poor purlin conditions were associated with poor roof scores, and good purlin scores were associated with good roof scores. Since this was a strong relationship, a failure in one component most likely would lead to failure in the other. Roof material had the shortest useful life. Failure in the roofing material leads to deterioration of the sheathing and then will lead to deterioration of the purlins, which has structural implications. This is an obvious and direct relationship.

Although many of the walls exhibited signs of sun and moisture damage, especially on the southern elevation, the overall condition of the individual logs was good. Despite good log condition, structural conditions observed during the field survey, such as tilting, racking, displacement and deformation, were prevalent in a great many structures. In order to understand what other factors might be significant, context (grade, orientation) and design details (wall corner treatments, purlins, and sill logs) were also studied as potential contributors.

Analysis of sill logs and overall structural conditions (an average of tilting, racking, displacement, and deformation scores) for the walls showed a unilateral relationship. Instead of a mutually damaging relationship, the presence of structural deterioration was often in-

dicated by a damaged sill log, but damaged sill logs were not good indicators of structural deterioration. Also, not all four of the structural deterioration types were associated with sill condition. The presence of deformation and tilting showed a strong relationship with sill logs in poor condition, whereas racking and displacement showed a poor relationship to the condition of the sill log. The relationship between purlin condition and the structural condition of the walls did not provide a good indicator of condition, either. Further analysis of the relationship between purlin condition and structural condition within each wall corner type may demonstrate higher correlations. For example, cabins with box and post or "hog trough" corners may have worse structural wall damage and deteriorated purlins, as opposed to cabins with more secure corner types such as square notch and saddle joined. Analysis between corner type and structural wall condition showed a strong relationship between tilting, racking, and deformation; however, displacement was not a good indicator of corner condition. Once again, further analysis of each corner type may be valuable due to the flexible strength of square notch and saddle log joints compared with hog trough corners that lack the ability to stay together during deformation. What these relationships suggest is that the conditions of the sill logs, roof, and type of corner detail have the greatest effect on the overall structural stability of a log cabin.

The sill logs of the cabins exhibited more damage than any other components within each wall. This was due to the threats that constantly surround these members: vegetation, grade level, and slope of drainage. Analysis demonstrated that soil grade had the strongest relationship with the condition of the sill log. A positive soil grade was related to a better sill log condition score, while a negative grade was related to a worse sill log condition score. A zero grade level had a less significant relationship to sill log condition; however, it was slightly negative. Each of the relationships studied showed a trend in grade hazards and sill condition, yet no single threat could be identified as the strongest indicator of condition other than a prevalence of moisture-related decay in those sill logs on the gable roof slope elevation.

Conclusions

When architectural significance and integrity are defined by the unique character-defining form and fabric of built heritage—in this case, local materials and traditional methods—preservation of the original or, if necessary, repair in kind, is critical to the continued meaning and understanding of traditional places such as Bar BC. While many of these performance relationships are well known to building pathologists and especially log construction professionals, the combined effects of multiple variables such as materials, design, and orientation are often not evident enough to suggest trends in how any given structure weathers. With over 40 buildings of similar material and age, yet variable orientation and detailing, this project afforded the team ample opportunity to test various cause-and-effect scenarios. Ultimately the goal of the survey was to devise immediate remedial and long-term preventive strategies to address the physical needs of the majority of the most important structures at Bar BC.

With the completion of the condition survey and analysis, and the preparation of the conservation and management plan, preservation of Bar BC's structures has proceeded annually since 2011 according to a prioritized list that identifies the most significant structures

in the greatest need of stabilization. Stabilization work has been accomplished through volunteer labor under park and partner supervision, but the key has been a clearly defined set of parameters to guide the process of building selection and the methods of intervention for everyone. The project demonstrates how a rapid assessment survey based on a resource's individual assets, along with a quantitative and visual database using GIS, can offer cultural resource managers a clear way out of the dilemma of deciding what resources get attention first and for how long. The conservation and management of cultural resources are not like those of natural resources, in that they are not renewable in the biological sense. However, quantitative methods can be used to describe and evaluate cultural resource assets so that informed decisions can be made to preserve as much of a site as possible without compromising its values.

Endnotes

1. On the influence of Struthers Burt and the dude ranching industry on the early environmental movement and the creation of Grand Teton National Park, see Righter 1982.
2. This moment of conversion is often identified with Burt's attendance at a meeting at Maud Noble's cabin in 1923, where a group of locals and the National Park Service devised the Jackson Hole Plan to preserve and protect the area from development.
3. In 1925 the *Jackson's Hole Courier* reported that over 600 dudes were visiting the valley in the summer, 200 over the resident population. Cited in Longfield 2011, 13.
4. In an effort to gain better service life of the roofs, a research program was initiated in 2011 to reinstall the historic sod roofs using green roof technology. See Cantu 2012.

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