Historical Ecology of Cultural Keystone Places of the Northwest Coast

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ABSTRACT For many Indigenous peoples, their traditional lands are archives of their histories, from the deepest of time to recent memories and actions. These histories are written in the landscapes' geological features, contemporary plant and animal communities, and associated archaeological and paleoecological records. Some of these landscapes, recently termed "cultural keystone places" (CKPs), are iconic for these groups and have become symbols of the connections between the past and the future, and between people and place. Using an historical-ecological approach, we describe our novel methods and initial results for documenting the history of three cultural keystone places in coastal British Columbia, Canada: Hauyat, Laxgalts'ap (Old Town) and Dałk Gyilakyaw (Robin Town) (territories of Heiltsuk, Gitga'ata, and Gitsm'geelm, respectively). We combine data and knowledge from diverse disciplines and communities to tell the deep and recent histories of these cultural landscapes. Each of CKPs encompasses expansive landscapes of diverse habitats transformed by generations of people interacting with their surrounding environments. Documenting the "softer" footprints of past human-environmental interactions can be elusive and requires diverse approaches and novel techniques. [*historical ecology, traditional resource management, cultural keystone Places, Northwest Coast*]

RESUMEN Para muchos Indígenas, sus tierras tradicionales son archivos de sus historias, desde lo más profundo del tiempo a las más recientes memorias y acciones. Estas historias están escritas en las características geológicas de los paisajes, comunidades contemporáneas de plantas y animales, y registros arqueológicos y paleo-ecológicos asociados. Algunos de estos paisajes, recientemente denominados "lugares culturales claves" (CKPs), son icónicos para estos grupos y se han convertido en símbolos de las conexiones entre el pasado y el futuro, y entre las personas y el lugar. Usando una aproximación histórica-ecológica, describimos nuestros métodos novedosos y resultados iniciales para documentar la historia de tres lugares culturales claves en la Columbia Británica costera, Canadá: Hauyat, Laxgalts'ap (Old Town), y Dalk Gyilakyaw (Robin Town) (territorios de Heiltsuk, Gitga'ata, y Gitsm'geelm, respectivamente). Combinamos datos y conocimiento de diversas disciplinas y comunidades para contar las historias profundas y recientes de estos paisajes culturales. Cada uno de los CKPs abarca paisajes expansivos de diversos hábitats transformados por generaciones de personas interactuando con los ambientes circundantes. Documentar las huellas "más frescas" de las interacciones humano-ambientales puede ser elusivo y requiere diversas aproximaciones y técnicas novedosas. [*ecología histórica, manejo tradicional de recursos, lugares culturales claves, Costa Noroccidental*]

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For decades, anthropologists have been grappling with how to situate and study people's relationships with their biological worlds (e.g., Ingerson 1994; Ingold 2000, 2013; Steward 1955; Williams et al. 2016). In recent iterations of these discussions, researchers have come to recognize that the totality of human–environmental relationships encompass not only physical interactions but also social, spiritual, cognitive, and emotional experiences (e.g., Anderson 1996, 2014). Conceptualizing human–environmental relations in this holistic way sits more comfortably with Indigenous worldviews of nature, where interactions among humans, their nonhuman kin, and the geographic features of their homelands are inseparably interconnected (Salmón 2000; N. Turner 2005, 2014).

People's connections with their biophysical worlds are manifest in the landscapes they inhabit. In iterative relationships, both active and passive, and informed by culture-specific worldviews, people shape and are shaped by their landscapes (E. Anderson 2014; M. Anderson 2005; Basso 1996; Berkes 2012; Thornton 2008). This means the ecosystems of today have been formed by innumerable human–environmental interactions enacted over generations in particular places (Ingold 2000; Janowski and Ingold 2012; Turner 2005, 2014). The marks of these physical and metaphysical encounters are embedded in memories, languages, geological features, contemporary plant and animal communities, and associated archaeological and paleoecological records (e.g., Colwell-Chanthaphonh and Ferguson 2006; Crumley 1998; Foster 2000; Gillson 2015; Jackson et al. 2001). Some landscapes, occupied for generations, hold particular importance today because of the shared memories, lessons, and experiences embedded in them. Cuerrier et al. (2015) have suggested using the term "cultural keystone places" (CKPs) for locations imbued with such significance and that are important to a specific cultural group's identity and well-being. These places are often associated with extensive archaeological deposits, including large habitation features, reflecting their long-term use and occupancy. Today, these "persistent places" (Schlanger 1992) are symbols and archives of the myriad and complex relations that people have with their environments.

It is one thing to recognize the multidimensionality of human–environment relations. It is yet another thing to document and convey the complexities of these relations in a way that is respectful to the descendant communities, whose engagement with the landscape is ongoing and emerging. In part, documenting such complex relationships is impeded by the reification of a nature–culture divide, which is in turn sustained by entrenched disciplinary boundaries and more generally by the primacy of the natural sciences over social science inquiries (Van der Tuin and Dolphijn 2012). In addition, because many of the "subtle ecologies" (Wyndham 2009) associated with these human-environment interactions leave only light or ephemeral physical evidence, documenting these interactions can be elusive (e.g., Lepofsky and Lertzman 2008; Lightfoot et al. 2013). Furthermore, some Indigenous management practices do not conform to European perceptions of agriculture or land use, and thus even indelible and monumental management practices have sometimes gone unrecognized by researchers.

Historical ecology (e.g., Balée 1998, 2013; Crumley 1994; Szabó 2014) provides a framework for exploring long-term human–environment relations in specific cultural landscapes. Historical ecologists recognize the enduring effects of the combined cultural–natural processes that shape contemporary landscapes, including a range of management techniques to maintain or increase diversity, quality, and productivity of biological resources (e.g., M. Anderson 2005; Balée 2013; Berkes 2012; Ekblom 2015; Fowler and Lepofsky 2011). To trace these complex interactions, historical ecologists advocate employing a range of innovative techniques that cross disciplines and perspectives, and narrating histories at multiple temporal scales. In some cases, such multidimensional approaches allow us to tease out the intentional from the incidental, thus assuring that human agency is not a forgotten piece of the landscape's history (Fowler and Lepofsky 2011; Lepofsky and Kahn 2011; cf. Alvard 1994, 1998; Codding et al. 2014). Until relatively recently, most historical-ecological studies have focused on agrarian and pastoral societies, presumably in large part because agriculture is, globally, more salient and relatively easier to document. However, historical ecology has expanded recently to include landscape histories of nonagrarian peoples (e.g., Lepofsky et al. 2003; Lepofsky and Caldwell 2013; Rick and Erlandson 2008; Thompson and Waggoner 2013).

Although historical-ecological approaches have been advocated for decades (Szabó 2014), research falling under this umbrella is only now gaining momentum more broadly (e.g., Armstrong et al. 2017; Armstrong and Veteto 2015). This is due in large part to the now-shared recognition between natural and social scientists of the importance of a deep-time perspective of ecosystems that includes humans (e.g., Braje and Rick 2013; Collins et al. 2011; Rick and Lockwood 2013; Willis and Birks 2006). This recognition has had profound impacts on the way "natural" and "wild" spaces are conceived, our understanding of the range and complexity of Indigenous management, and on Indigenous assertions of their rights to continue age-old interactions with their biological worlds (e.g., Guernsey 2008; Hunn et al. 2003; N. Turner 2014).

In this article, we describe our approach for documenting the historical ecology of three cultural keystone places of central and northern coastal British Columbia, Canada: Hauyat, Laxgalts'ap (Old Town), and Dałk Gyilakyaw (Robin Town), in the territories of the Heiltsuk, Gitga'ata, and Gitsm'geelm First Nations, respectively (Figure 1). We come from diverse disciplinary backgrounds and experiences but share an understanding that documenting the full range of long-term human–landscape interactions

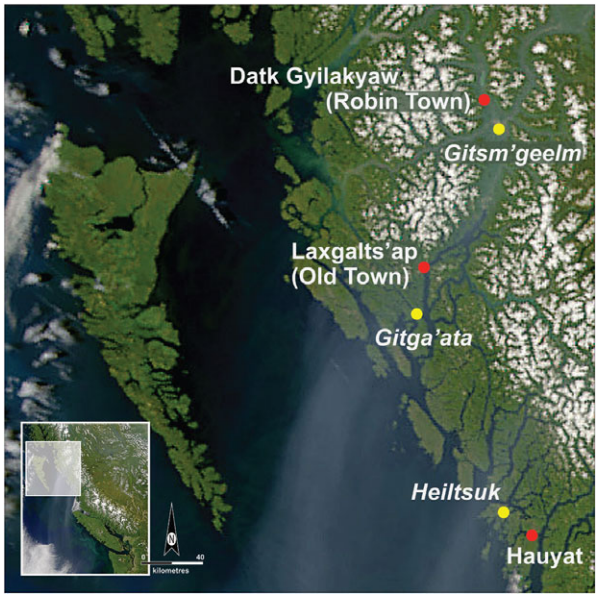

FIGURE 1. *Location of three cultural keystone places (red dots) of three communities (yellow dots) on the Northwest Coast. [This figure appears in color in the online issue]*

requires varied and innovative approaches and perspectives to capture both the subtle and less subtle evidence of these complex relationships. Working closely with descsendant communities, we continually reevaluate the project goals, methods, and the framing of our results. In the case of archaeology, specifically, our work reflects a growing trend that more fully engages community-oriented approaches (e.g., Martindale and Lyons 2014) and ultimately leads to more socially just outcomes (Armstrong and Veteto 2015).

The approach we advocate is also part of a growing body of research in the Northwest Coast region that aims to reconstruct eco-cultural histories of key landscapes (e.g., Anderson 2009; Grier 2014; Lepofsky et al. 2003; McCune, Pellatt, and Vellend 2013; Weiser and Lepofsky 2009). The success of a historical-ecological approach on the Northwest Coast is in part due to the increasing number of close research collaborations with descendent communities who are deeply connected to and hold knowledge about particular landscapes, the region's rich ethnographic record, and the possibility of working in landscapes that still bear evidence of long-term eco-cultural histories. Furthermore, ethnographic and archaeological evidence suggests the extent to which vast portions of the region's landscapes and seascapes were modified and/or created to maintain and enhance the productivity of culturally valued ecosystems and resources (Figure 2) (Derr 2014; Deur and Turner 2005; Lepofsky et al. 2015; Turner 2005, 2014; Turner, Deur, and Lepofsky 2013). We suggest that exploring the range of evidence of people's interactions with their landscapes and telling the history of these cultural keystone places can only be accomplished by collectively assembling these diverse lines of evidence and knowledge. This approach takes historical ecology beyond its conventional boundaries by engaging more fully with memory and personal connections to place.

THREE CULTURAL KEYSTONE PLACES: HAUYAT, LAXGALTS'AP (OLD TOWN), AND DAŁK GYILAKYAW (ROBIN TOWN)

The three focal places in this study fit easily within the defining characteristics of a cultural keystone place (Cuerrier et al. 2015). Each is associated with an origin story that connects the locale to the history of a particular First Nation (and/or House Group) and with more recent recollections and intergenerational memories of individual lives lived and experienced in that place. Extensive archaeological records, including remains of houses and processing features, reflect long-term engagements with the landscapes. More subtle evidence of these engagements, including management of culturally valued resources and habitats, is visible in the unique structure and composition of marine and terrestrial ecosystems (Table 1).

In each case, the First Nations communities (Heiltsuk, Gitga'ata, and Gitsm'geelm) directed us to these locations as significant cultural landscapes. Our study of these CKPs is an outgrowth of the three Nations' ongoing efforts to revitalize title, language, environmental stewardship, and well-being. The specific reasons for engaging in this research vary with each nation, but each sees these landscapes as places where their community-based initiatives and interests can be enacted, and each place serves as an example of the many locales on the landscape with which these communities are or once were deeply engaged.

The communities have chosen to partner with academic researchers for a variety of reasons. One of the community-based authors of this article offers the following:

> We partner with academic researchers to provide Western tools of knowledge, and to facilitate expressions of our rights, title, and culture into mainstream legal, political, and academic institutions. However, these are not the sole reasons and partnerships are not that superficial. These partnerships also allow for the sharing of sacred knowledge systems of all types so that we protect and learn about healthy relationships with the land that we all rely on.

While this general statement is broadly applicable, there is, of course, context-dependent diversity within communities and among communities regarding why and how to engage in these partnerships.

Each place also holds personal significance to a broad range of people within the associated community; many are connected through family history and/or their own experiences in each place. Reflecting their relatively recent occupancy and use, portions of all three are designated as Indian reserves (IRs). However, the associated cultural landscapes themselves extend well beyond reserve boundaries. Importantly, while all are too distant from the currently occupied reserve villages to be visited by most community members with any regularity, each is close enough to hold

TABLE 1. *Methods for Documenting the Historical Ecology of Cultural Keystone Places of the Northwest Coast*[1]

		Cultural keystone place		
Feature/data	Methods	*Hauyat*	*Laxgalts'ap*	*Dałk Gyilakyaw*
Community knowledge	Semistructured interviews	X	x	x[2]
Oral histories, photos, historic documents	Search local and non-local repositories	X	x	x[2]
Historic house/house remains	Survey	X	X	X
	Mapping	x	x	x
Archaeological house features	Survey	X	X	X
	Mapping	X		X
	Probing for radiocarbon dates	x	x	x
Processing features	Testing, flotation samples			x
Defensive features	Survey	X	x	x
	Mapping	x	x	x
	Probing for radiocarbon dates	x	x	x
Culturally important plants and fungi	Survey and inventory	X	X	x
Culturally important animals (fish, mammals, birds, and others)	Survey and inventory	x	x	x
Fish traps	Survey	X	X	
	Mapping	X	x	
	Dating	x	x	
Clam gardens	Survey	X		
	Dating	x		
Orchards	Survey	X	X	X
	Vegetation mapping	x	x	x
	Tree coring	x		x
	Soil pits/soil charcoal/dating			x
	Evidence of pruning			x
Berry gardens	Survey	X	x	x
	Vegetation mapping	x		
	Soil pits/soil charcoal/dating	x		
Intertidal root gardens	Survey	X	x	x
	Vegetation mapping	x		
	Soil pits/soil charcoal/dating	x		
Culturally modified trees	Survey	X	X	X
	Tree coring/dating	x		
Modified forests	Tree coring/dating			x
	Soil pits/soil charcoal			x
Trails	Mapping	X	X	x
	Interviews	X	X	x
Sea level history	Dating of raised beach (shell) deposits	X	x	x

[1] X = Investigation completed, x = Investigation partially completed.
[2] Collected by the late Dr. James McDonald with Gitsm'geelm.

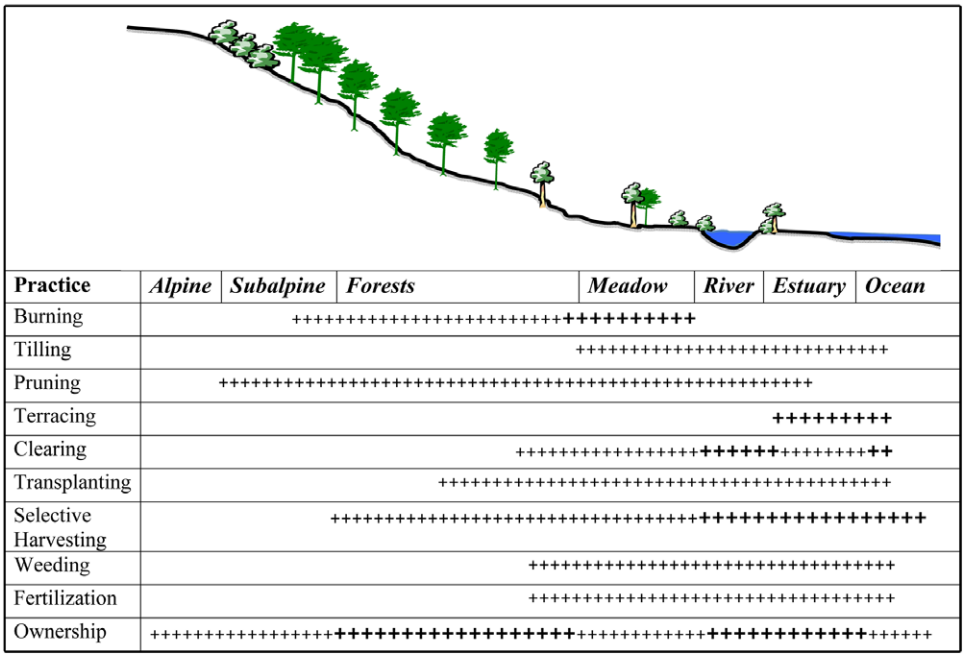

FIGURE 2. *Some of the management practices used by Northwest Coast Indigenous peoples in ecosystems from the alpine to the subtidal zone. Nonbolded symbols (+++) indicate evidence from the ethnographic record. Bolded symbols (**+++**) indicate ethnographic as well as archaeological or paleoecological evidence for these practices. [This figure appears in color in the online issue]*

on-site interviews and cultural events that bring community residents back to these iconic places.

Building on the extensive work of the various First Nations, we have conducted ethnoecological and archaeological fieldwork at each of the three CKPs (Table 1) that, when assembled, will help document their histories and uphold their importance into the future.

Hauyat

The Hauyat watershed (Figure 3a) and surrounding coastline of northern Hunter Island is situated within Heiltsuk territory, a short boat ride from the community of Bella Bella, where most Heiltsuk people live today. The Heiltsuk chose Hauyat as a place to conduct historical and ecological research because it is an example of one of many places where the Heiltsuk have left their imprint on the territory. Our investigation of Hauyat historical ecology benefits from the long-term initiatives of the Heiltsuk Cultural Education Center, coordinated by Jennifer Carpenter, who has compiled place-names and conducted interviews with cultural-knowledge holders. Our team conducted more than twenty interviews with elders who have memories of their time in Hauyat as children. Elder Steve Carpenter remarked, "This [place] is where we learned to be Heiltsuk." Even though yearly occupancy of Hauyat in the twentieth century was largely limited to the summer and early fall, it was a time and place where only Heiltsuk language was spoken, grandparents told children stories, and youth learned appropriate behavior associated with the harvesting and processing of traditional foods. These rich experiences in Hauyat reinforced Heiltsuk cultural identity, values, and connections to place and resources.

Hauyat is featured prominently in Heiltsuk origin stories (Boas [1932] 1970, 35; Olson 1955, 340), and some of these events are imprinted on the landscape in stone and other features (Figure 3b). A defining feature of Hauyat is Ḿńsğḿx̌λi, a mountain that towers over the back of the watershed. "The Mountain" is visible from many parts of Heiltsuk territory and was a bearing for navigating home for those out on the ocean (Figure 3a) (S. Carpenter, personal communication).

Our archaeological and vegetation surveys, led by Julia Jackley, have revealed an intensely occupied and managed landscape with eco-cultural features that are distributed continuously from the lowest intertidal to the upper hillsides (Table 1). The most visible evidence of use and habitation occurs at the interface of the land and intertidal and includes monumental stone and wood fish traps and clam gardens. The archaeological remains of an enormous multitiered settlement are centered in this highly transformed and historied landscape, sitting at the base of, and visually framed by, Ḿńsğḿx̌λi (Figure 3c). The association of the mountain with this settlement must have enhanced its prominence in the broader cultural landscape. Archaeological mapping and testing suggest the remains of the settlement are at least eight meters deep and about 150 meters in extent. The core of the settlement is at least six thousand years old. By two thousand years ago, the settlement expanded significantly, and we see the establishment of other smaller settlements in neighboring watersheds, but the main settlement

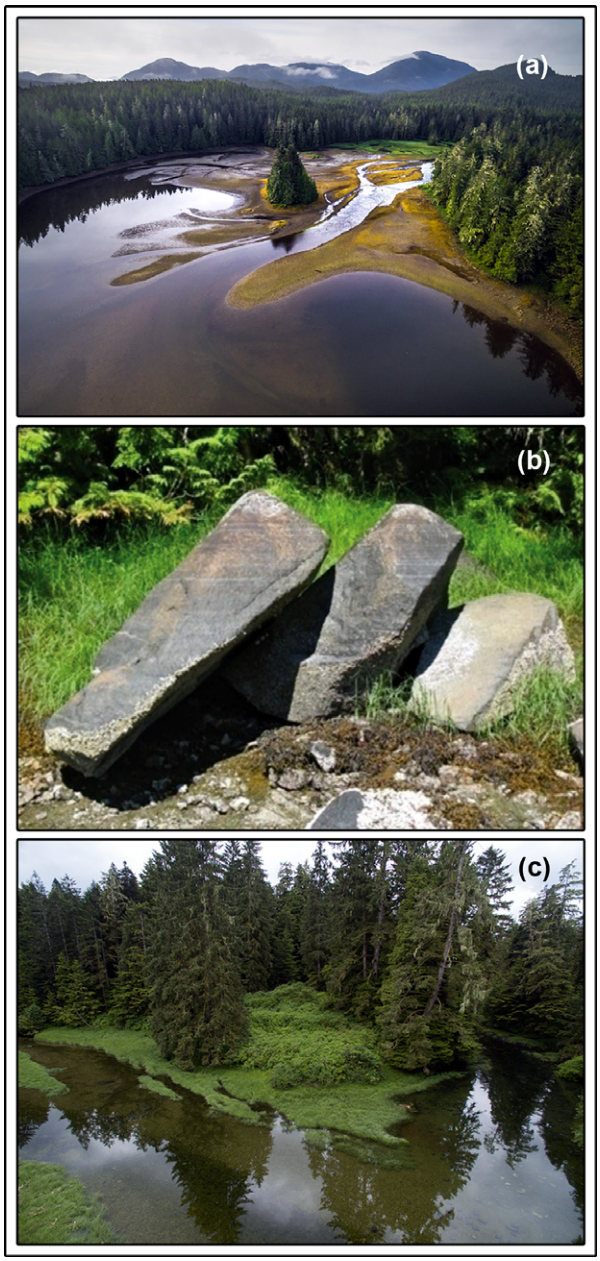

FIGURE 3. *Glimpses of Hauyat: (a) The Hauyat watershed. A defensive site is located on the island in the foreground. Nearby are clam gardens and stone and wooden fish traps. The intertidal flats encompass root food gardens and high densities of other edible plants. The main settlement is located at the back of the photograph, at the base of* Ḿńsğḿx̌λi *(Photograph by Grant Callegari, Hakai Institute); (b) A father, mother, and son who were turned to stone during the flooding of Hauyat (Olson 1955, 340; Photograph by Julia Jackley); (c) Large, multitiered settlement of Hauyat, dating to at least 6000 years ago (Photograph by Will McInnes, Hakai Institute). [This figure appears in color in the online issue]*

continues to dominate the landscape. Historic smoke houses for preserving salmon, lived in by many of today's older generations, are often situated overtop of the more ancient house platforms. This site has clearly been a "persistent place" on the Heiltsuk cultural landscape for countless generations: a definite CKP.

Laxgalts'ap

Laxgalts'ap, also known as "Old Town," is located thirty-two kilometers north of the remote village of Hartley Bay, where many Gitga'ata live today, and where Gitga'ata project co-director, Spencer Greening, lives part time. Old Town is considered the heart of the Gitga'ata, where they lived for generations before moving to Metlakatla (northern BC) in the 1860s and then to Hartley Bay. In interviews, elders tell of their deep connection to this landscape, which links mythic time to the present. Many elders born at Old Town, or who spent time there as children, have not returned for fifty years or more. Families also shared personal photographs and film footage that captured the knowledge of elders now passed (Turner et al. 2012; Turner and Thompson 2006).

The historical ecology of the Gitga'ata is written on the Laxgalts'ap landscape. The landscape is bounded at the mouths of the Quaal and Kitkiata rivers (Figure 4a) by hundreds of petroglyphs (Figure 4b) that give spiritual potency to this place, and on the upstream side by a fork in the Quaal River that is known as a cultural landmark (Satterfeld, Robertson, and Turner 2011). Prominent features include large archaeological settlements along the edge of the estuary, western redcedar (*Thuja plicata*) trees that have been stripped of their bark, stone and wood fish traps, and various ancient camp sites used to process fish and plant foods (Eldridge and Parker 2011). One ancient settlement (Galahahaaytk) is composed of ten house depressions with preserved wood and fiber artifacts, all built on "man-made island." This site, superficially investigated in the 1940s (Drucker 1943), along with many geological features, is associated with accounts recorded in the *adaawx*, or "true histories" (Ts'msyen oral records; Campbell 2011; Marsden 2012), that refer to ongoing occupancy through significant social-political events. Many of these stories embed lessons about the right way to behave in relation to human and nonhuman kin. For instance, the oral histories of petroglyphs, rock barriers, and villages tell of the Gitga'ata's connection to beings of both the physical and spiritual worlds, as well as how to live through dramatically changing social and physical landscapes.

The landscape of Laxgalts'ap encompasses more than forty named places and sites. It is home to many culturally significant plant and animal species, both aquatic and terrestrial. Our preliminary surveys identified many eco-cultural features (Table 1) and a stunning diversity and density of valued plants and animals. The expansive native crabapple (*Malus fusca*) orchards, evenly spaced and bearing named Gitga'ata varieties, are prominent features (Wyllie de Echeverria 2013). As part of our exploration of the history of Laxgalts'ap, we are documenting more fully these orchards (their age, extent, diversity) and their spatial relationship to archaeological and historic settlements. Understanding these

FIGURE 4. *Glimpses of Laxgalts'ap: (a) Looking upstream at the Qual watershed (Photograph by Mark Wunsch); (b) One of more than 200 petroglyphs at the mouth of Laxgalts'ap (Photograph by Dana Lepofsky); (c) Looking south to the mouth of the Qual River. Galahahaaytk or "Man-Made Island" is in the foreground (Photograph by Mark Wunsch). [This figure appears in color in the online issue]*

FIGURE 5. *Glimpses of Dałk Gyilakyaw: (a) Aerial photograph of southwestern portion of settlement overlooking the Kitsumkalum River. The photo, taken in the fall, shows a clearing among the conifer forests with native crabapple and hazelnut trees starting to lose their leaves. These deciduous trees are accompanied by other edible and medicinal plants, and are part of the forest gardens surrounding the ancestral village of the Gitsm'geelm (Photograph by Storm Carroll); (b) One of twelve house depressions in the upper village. Kitsumkalum community member Raven Bingham, standing in the center of the house, is coring a tree to determine timing of conifer encroachment (Photograph by Chelsey Geralda Armstrong); (c) Native crabapple and hazelnut orchard and berry garden (Photograph by Nancy J. Turner). [This figure appears in color in the online issue]*

relationships through time also involves understanding the geomorphological history of the river as well as the effects of early Holocene changes in sea level. Our research in this immense territory is guided directly by Ts'msyen place-names and the elders who used to fish and trap here.

Dałk Gyilakyaw (Robin Town)

Dałk Gyilakyaw is a CKP of the Gitsm'geelm (Kitsumkalum) Ts'msyen (Figure 5a). It is located between the Skeena and Nass Rivers in the Kitsumkalum River canyon, about a twenty-minute drive and one-hour hike from the principal Kitsumkalum Indian Reserve (IR1). At least four hectares in extent, this landscape includes three major terraces above the river (Boas 1916, 482). In the 1870s, many residents of Robin Town relocated to the fish canneries and from there moved into their present community, Kitsumkalum

IR1, adjacent to the settler town of Terrace. According to the ethnohistoric record, the town at Dałk Gyilakyaw was an important link in networks of overland trade and travel routes along the "grease trails" and abuts a large fishing pool primarily for spawning Chinook/spring (*Oncorhynchus tshawytscha*) and coho (*O. kisutch*) salmon (McDonald 2003).

Our research at Dałk Gyilakyaw builds directly on and complements the tremendous volume of archival and oral records gathered by the Kitsumkalum Social History Research Project, founded in 1979 by the late Dr. James McDonald and carried on by the Kitsumkalum Heritage Research Department (Armstrong 2016; Downs 2006; McDonald 2003, 2009–11; Table 1). Prominent features of Dałk Gyilakyaw include more than thirty large house depressions (Figure 5b), substantial rock alignments that traverse the site, and more than one hundred cultural depressions likely used for food storage (Table 1). There is also a remarkable density and diversity of culturally valued plants, which number about fifty (Armstrong 2016; Downs 2006; Turner, Deur, and Lepofsky 2013). The extent to which this landscape has been managed is reflected in the extensive remnant orchards of immense native Pacific crabapple and hazelnut (*Corylus cornuta*); numerous other food, material, and medicinal species (Figure 5c); and early settler accounts of gardening and landscape management (Downie in Mayne 1862, 451). This evidence of human–environment interaction is further substantiated by the oral knowledge that some species (e.g., *Fritillaria camschatcensis*) were transplanted from elsewhere (McDonald 2005; Turner 2014; Turner, Deur, and Lepofsky 2013). In more recent years, in the absence of intense human presence on the landscape, conifers around the periphery of the site have started to encroach on the orchards. Past management is also reflected in the extensive areas free of conifers, which in untended landscapes normally invade quickly into disturbed ecological areas. Clearly, Dałk Gyilakyaw is one of many places where the Ts'msyen used a variety of techniques to sustain and enhance plant food production, such as burning, pruning, and clearing (Downs 2006; McDonald 2003, 2005). Our archaeological and ethnoecological surveys, led by Chelsey Geralda Armstrong, have gone a long way in helping us explore the complex history of this CKP.

DOCUMENTING THE HISTORICAL ECOLOGY OF CULTURAL KEYSTONE PLACES

True to a historical-ecological approach, we use a variety of methods to piece together the long-term histories and "landscape transformations" (Balée 2013) of these three CKPs. The diversity of methods used, and knowledge and data gathered, grew out of our community–academic partnerships. In fact, ongoing and constant communication with (and participation by) community partners is the most fundamental and important of all our methods. Here we describe our historical-ecological methods, focusing especially on those that are less self-evident and thus require more detailed explanation (see Table 1 for the full list of methods used).

Community Knowledge through Interviews

A defining feature of CKPs is that communities today are deeply connected to these places; they serve as places of reconciliation and of hope. Consequently, listening to peoples' knowledge and memories is a fundamental step in documenting the landscapes' histories and, simultaneously, revitalizing intimate knowledge and connection to them. Our interviews are semistructured, and, when possible (depending on funds, logistics, and elder mobility), take place in the CKP, because it is there that the knowledge can be (re)lived. Elders share memories in English or in their own language as they see fit. Most interviews are one on one, and several elders have specifically requested that we film them doing the kinds of activities they used to do at the CKP (fishing, hunting, trapping, plant harvesting) so their knowledge and memories can be passed along to future generations. Furthermore, some have requested that youth are present to observe and learn. More generally, a fundamental motivation for most elders is that their teachings be contextualized to the places and people to which they belong. Video recordings of the interviews are essential for archiving the knowledge of these CKPs and are the foundation of various community outreach projects.[1] In the Laxgalts'ap project, because there are about thirty native speakers among the Gitga'ata, we try to record all stories first in Sm'algyax and then in English. Full transcriptions and copies of the videos are given to each participant.

In each of the three communities, we seek to interview all those having first-hand experiences with the respective CKP, as well as many people whose now-deceased parents or grandparents were closely connected to these places. In most cases, people who spent time in the CKPs are more than sixty-five years old. Our guided discussions cover seven main topics, which emerged from our initial conversations with community members: (1) knowledge about harvesting, processing, and use of resources; (2) resource and ecosystem management (see Turner and Peacock [2005] for a list of potential practices); (3) childhood recollections of being in that CKP; (4) identification of remnant features (e.g., historic houses, fish traps, hunting sites); (5) oral traditions and place-names connected to the landscape; (6) what it means to be connected to such places; and (7) value to future generations of understanding the history of these places. Collectively, these discussions result in place- and culture-specific knowledge about the three CKPs.

These topics are also used as organizing themes when analyzing interview content. Other themes have emerged from the interviews during the analysis, including: (1) how residential schools and government-run initiatives (e.g., by the Department of Fisheries and Oceans) strained and/or severed connections to place and traditional activities; (2) the importance of asserting ancient occupancy for current rights and title; (3) the importance of incorporating

language revitalization into the project; (4) what land-use strategies can be learned from these projects and then incorporated into other places in the territory; and (5) how the CKP fits into the larger traditional system of land use and land rights.

Collating Oral Histories, Photographs, Historic Documents

We are finding some archival treasures that are helping unfold the historical-ecological story of the three CKPs. Personal photographs from the early to mid-1900s are particularly valuable. These not only provide insights into the lives lived in the CKPs, but also show changes in the landscape in the intervening fifty to one hundred years. For instance, at Hauyat, photographs from an Icelandic settlement from 1917–1925 provide not only images of Heiltsuk fishing and smoke houses but also the extensive (and now hidden) ecological transformations resulting from the short-lived European settlement.[2] Given that one of our primary methods is to conduct ethnoecological surveys of the CKPs (see below), understanding recent land disturbances and transformations is critical. These images are especially valuable because they provide insights into a time when coastal First Nations' population numbers were at an all-time low due to introduced diseases and other colonial impacts.

Our understanding of the history of Laxgalts'ap and Dałk Gyilakyaw, and the Ts'msyen worldview more broadly, is particularly heightened by the unparalleled details of these places recorded by William Benyon (n.d.) in the Ts'msyen *adaawx*. The *adaawx* (true histories) and the *ayaawx* (laws) are historical recordings that provide evidence of ongoing occupation, spiritual and physical relationships, protocols, and traditional environmental knowledge about the land and people to which the Ts'msyen are socially and politically tied. The ayaawx are not laws created from humans engaging with this land; rather, they are the spirit of the land speaking and giving people the tools to live within its order and with each other. Thus, these recordings provide invaluable, multidimensional insights into these CKP. Additionally, in the case of Dałk Gyilakyaw, decades of archival and ethnographic research led by Jim McDonald provide detailed texts and photographs related to the recent and ancient history of this CKP.

Survey, Mapping, and Dating of "Archaeological Features"

Our surveys have yielded a wide variety of cultural features, only some of which would be classified as "archaeological" by many practitioners. We limit this section to a discussion of classic archaeological features, such as middens, stone walls, and the like—that is, those features with material remains. Given the immensity of the landscapes in which we are working, our archaeological surveys are judgmental—focusing on areas connected to oral traditions, place-names, and memories; areas with previously known archaeological features; and areas that are more likely to have evidence of human use (e.g., stable landforms, old shorelines, flat areas near waterways, and other productive ecosystems). Our goal is not necessarily to recreate detailed culture histories. Rather, because we are dealing with such immense landscapes, we strive to outline a general archaeological sequence for each place.

Our surveys demonstrate long-term and intimate occupation on the land. Settlement sites are extensive and are bookended temporally by ancient initial occupation, on one end, and twentieth-century historic use, on the other (Figure 6a). Such intergenerational and site-specific continuity is a hallmark of CKPs. Each of the three CKPs also bears the remains of fortified sites and lookouts and strategically situated homes used during times of conflict (Figure 3a and Figure 4c). When possible, we map the individual house features in the settlements and date the basal deposits using the now-standard regional method of retrieving radiocarbon samples from a small diameter core mechanically extracted from midden deposits (Cannon 2000; Martindale et al. 2009). This latter method is particularly important because it allows us to retrieve basal dates from deep midden sites with minimal destruction to the archaeological deposits. Our excavations are primarily limited to retrieving long-term subsistence data (i.e., zooarchaeological and paleoethnobotanical remains) that can be contextualized in discussions of community food security and sovereignty.

Our investigation of fish traps (Figure 6b) and clam gardens (Figure 6c) involve dating as well as survey and mapping to situate features relative to other cultural features and the underlying landforms. These features range from cleared beaches to monumental clam gardens and fish traps hundreds of meters in length. Dating of fish traps depends on finding wooden stakes buried in anaerobic sediments or buried naturally deposited wood to provide a maximum age. Determining the age of clam gardens through radiocarbon or optical stimulated luminescence dating requires a range of considerations, including depositional context and sea-level histories (Lepofsky et al. 2015; Neudorf et al. 2017). Identifying and dating fish traps and clam gardens is essential to understanding the larger history of CKPs—especially given the trickiness of studying more ephemeral management features and the potential importance of these management features to fisheries today.

Survey, Mapping, and Dating of Eco-Cultural Management Features

Somewhat less standard for archaeological surveys in the Northwest Coast, we conduct ecological surveys to detect the eco-cultural signatures that are also part of the physical remains of human–landscape interactions (Table 1). Eco-cultural features are plant communities whose existence is in part the result of human land disturbance or production, such as remnant forest gardens or intertidal gardens (e.g., Balée 2013). In our study areas, these features include native Pacific crabapple and hazelnut orchards (Figure 5c)

FIGURE 6. *Some of the archaeological and eco-cultural features of Hauyat, Laxgalts'ap, and Dałk Gyilakyaw: (a) Historic house at Laxgalts'ap. The beams from this house were salvaged from an older house near the same spot. This house is sitting on 1.5 meters of archaeological deposits (Photograph by Al Mackie); (b) Fish trap at Laxgalts'ap (Photograph by Spencer Greening); (c) Clam garden at Hauyat. This garden is built on bedrock (Photograph by Dana Lepofsky); (d) Intertidal root garden at Hauyat. Dana is standing below the terrace face, looking at a high-density patch of springbank clover (*Trifolium wormskjoldii*) and Pacific silverweed (*Argentina egedii*), two important root foods that were cultivated on the Northwest Coast (*Deur 2005*) (Photograph by Nancy Turner); (e) Bark-stripped tree with adze (pre-metal) cut marks in Laxgalts'ap (Photograph by Spencer Greening); (f) Young conifer forest of Dałk Gyilakyaw that likely encroached since abandonment of the main settlement. The trees in this stand are approximately seventy to eighty years old (Photograph by Chelsey Geralda Armstrong). [This figure appears in color in the online issue]*

as well as isolated European species of fruit trees, native berry gardens (areas with an unusually high density and diversity of valued berry crops), and intertidal root gardens (Figure 5d). Based on ethnographic information, it is now well established that these native gardens were widespread on the coast and were essential for ensuring an adequate supply of important fruit, nut, and root foods (Armstrong 2017; Deur 2005; Lloyd 2011; Turner 2014; Turner, Deur, and Lepofsky 2013; Wyllie de Echeverria 2013). Despite the widespread distribution of gardens, there has been limited attention paid to documenting their history or how they are situated within a larger cultural landscape.

While regional archaeologists easily accept that clam gardens are anthropogenic features because the terraces are

fronted with cobbles, there is considerably less consensus about the anthropogenic status of the other, more ephemeral eco-cultural features. In part this is because it can be challenging, without the surety of stonewalls, to identify these ecosystems as manipulated by humans. For instance, in the case of the root gardens, berry gardens, and orchards, we need to determine that the species density and diversity is the result of past human management rather than only the result of ecological succession after site abandonment. In some places there is local knowledge of individual places being created, built, and cultivated, such as Cyril Carpenter's knowledge of specific berry gardens in Heiltsuk territory and Clan Chief Kwaxistalla Adam Dick's experience with root gardens in Kwakwaka'wakw territory (e.g., Deur 2005), but without this invaluable information, we are restricted to finding physical evidence of these practices.

We have a multipronged approach for identifying and studying potential eco-cultural features. Once high-density fruit tree, berry, and root food patches are identified as potential gardens, we conduct botanical inventories in these patches and in control plots in adjacent "nongarden" ecosystems. We also note soil substrate and tidal height (i.e., meters above sea level). In general, we have found that the association with ancient settlements is the best predictor of highly dense and diverse patches of economically and culturally valued plant foods. In addition, orchards tend to be associated with soil profiles that are distinct from the adjacent conifer forests, suggesting that those orchards have longevity on the landscape (i.e., at least the hundreds of years it takes for soil horizons to develop; cf. Lepofsky et al. 2003). Finally, our more specific quantitative analyses of the diversity of species found in these patches (Mouillot et al. 2013) indicate that the plant associations that characterize these patches are ecologically unique and have specific ecosystem functions (Armstrong 2017). Collectively, these data indicate we are seeing the legacy of ancient human manipulation of their landscape.

Several methods are used to sort out the age of the eco-cultural features. At Hauyat, we have attempted to core and age the woody shrubs and trees using standard tree-ring methods but have found that the current cohort of vegetation (including stumps) is not sufficiently old to associate with a more ancient occupation. At Dałk Gyilakyaw, we cored Pacific crabapples in the orchard ($N = 12$) and conifers along the periphery of the orchard ($N = 65$); the oldest conifer is eighty years old, and the oldest crabapple is 105 years old. This indicates a relatively recent encroachment of predominately spruce (*Picea sitchensis*) and hemlock (*Tsuga heterophylla*) trees after humans ceased to actively manage the orchard. At Laxgalts'ap, we are collecting, identifying, and dating tree branches buried and preserved in the saturated soils associated with the crabapple orchards. When present, we are also aging and identifying soil charcoal recovered from orchard and garden soil profiles to understand: (1) the role of fire in maintaining these ecosystems (i.e., whether people used fire to manage the orchards as suggested by our interviews) and (2) the age and composition of past stands.

Culturally modified trees (CMTs) are the most commonly recorded archaeological site type in British Columbia and are widely recognized among the archaeological community as evidence of ancient tree management and land use (e.g., Mobley and Eldridge 1992), but few studies integrate these features into broader landscapes. Bark-stripped, planked, and traditionally logged trees are relatively common in our three CKPs (Figure 6e). We use standard techniques to map, core, and date these features (e.g., Archaeology Branch 2001). In general, the chronologies resulting from regional CMT studies are heavily skewed to the contact period, with the highest frequency of use corresponding with precipitous Indigenous population decline (Earnshaw 2016). These late dates and the sheer ubiquity and density of CMTs at CKPs, however, attest to the cultural salience of these places. That is, even after the period of most intensive inhabitation, devastating introduced diseases, and relocation to reserves, Indigenous peoples were returning to these ancestral places to continue practicing traditional forest use and management. In this sense, CMTs, by virtue of their visibility, may also serve as a proxy for other less archaeologically visible but co-occurring traditional practices, such as root gardening, that are more difficult to identify and date.

Non-Orchard Forest Histories

Because portions of Laxgalts'ap and Dałk Gyilakyaw were not industrially logged, today's forest structure and composition also have the potential to reveal details about the landscape history (cf. Lepofsky et al. 2003). At Dałk Gyilakyaw, some forests are characterized by trees whose growth patterns suggest they established in a nonforested ecosystem (Figure 6f). We hypothesize that while the settlements were occupied, people kept large areas around the forest free of trees (for defense, fuel, building materials, and to enhance berry growth), perhaps using prescribed fires. To test this hypothesis, we are: (1) coring a sample of trees in each forest patch to determine their age (counting tree rings) and (2) digging soil pits to characterize the soil-formation processes and collect macrocharcoal. If these areas were managed by people to be free of trees (perhaps to enhance berry production adjacent to the settlements), then we expect: (1) the trees to have established only recently after the settlements were abandoned; (2) charcoal will be predominately from conifers; and (3) the soil horizons will be indicative of an open ecosystem rather than a forested one. Preliminary results by Chelsey Geralda Armstrong are consistent with these being newly established forests in an area that was kept open by people when the settlement was occupied.

DISCUSSION: HISTORICAL ECOLOGY AND CULTURAL KEYSTONE PLACES

Around the world, Indigenous peoples are struggling to maintain and assert control of their traditional lands; to enable higher standards of living and better health; and retain

and reinvigorate traditional values, knowledge, practices, and beliefs, including culturally valued foods and medicines (Dallimer and Strange 2015; Turner, Plotkin, and Kuhnlein 2013 Turner et al. 2008). For many Indigenous peoples, ongoing connections to their traditional lands means not only access to valued resources but also to millennia of memories and tangible evidence of lives lived on that land. Accessing these cultural landscapes and the heritage they embody is central to cultural survival but is increasingly difficult in current local and global socio-ecological contexts (e.g., Coulthard 2014). Thus, many communities are looking for innovative means to ensure that future generations have access to the visible and visceral memories embedded within traditional lands.

Our research on the historical ecology of three cultural keystone places of the Northwest Coast is motivated by and nested within community-run initiatives to document the history of these iconic places so that future generations can know these places and their teachings. We blend Western scientific and Indigenous perspectives, methodologies, and knowledge (Kovach 2010) to tell the eco-cultural history of three cultural landscapes. We focus on the history of landscapes, rather than particular sites, and use innovative, cross-disciplinary methods to document the subtle as well as the more obvious remnants of human–environmental interactions over the long-term. Furthermore, we focus explicitly on traditional management practices and features, including root, clam, berry, and forest gardens, and orchards—the documentation of which is grossly undervalued in the extant literature and in regional archaeological surveys. A range of other techniques not specifically used in our three projects (e.g., ancient DNA, soil phytoliths [Lepofsky and Lertzman 2008]) could also be used to tease out the evidence of past human–landscape interactions. Bringing together these diverse kinds of knowledge, methods, and data will result in a more complete understanding of human–environment relationships as they are expressed in different ecosystems of the Northwest Coast (Figure 2).

By focusing on particular CKPs, we are not advocating that other areas within traditional territories are unimportant or should be ignored (see also Cuerrier et al. 2015). Rather, we recognize that some places, for a range of cultural, historical, logistical and other reasons, are the foci of distinct cultural identities, in the past and today. However, these places are situated within, and cannot be extracted from, the larger landscapes in which they are embedded. In the case of the three CKPs discussed here, the respective communities see these locales as examples of the many places that are highly culturally salient to them.

Importantly, these CKPs are places that have never stopped working. Stone fish traps catch and release fish daily, clam gardens persist as favorable bivalve habitats (Groesbeck et al. 2014), and estuarine root gardens continue to produce rhizomes. These places and features are intentional products of ecological management as well as enduring and visible constructions that speak to emergent and changing economic, social, and spiritual practices through time. The materiality of monumental village midden platforms, fish traps, clam gardens, and other features also makes these places of resistance to colonialism. These are resilient places anchoring both traditional and novel ways for a community reengaging and reorganizing with the truncated making of histories and connections to places.

In some ways, our historical-ecological approach is the antithesis of many development-driven assessments of past land use. Such assessments often rely on identifying archaeological sites—that is, discretely bounded material remains of past occupations. The evidence of the subtle ecologies, such as high-density patches of edible root foods, often has no place in such assessments. We suggest, however, that the full range of ecological evidence for harvesting and tending of trees, berry bushes, and root crops are also archaeological features and thus should be included in all archaeological surveys in the region. It is only through such a historical-ecological approach that we can begin to understand and document the multidimensional ways in which people's long-term connections to place evolve with and are embedded in the landscape.

Understanding the complexities of human–environment relations, and how they play out over time, has direct implications for a range of current environmental and social issues, including the protection of biocultural diversity, cultural reconnections, and Indigenous rights and title (Armstrong and Veteto 2015; Barthel et al. 2013; Browne and Mildon 2010; Crumley 2015; Lonzy 2006; Maffi 2005). Furthermore, documenting the many dimensions of cultural landscapes, as we do here, provides baselines for community-based conservation, restoration (e.g., Augustine and Dearden 2014; Berkes 2012; Gillson 2015; Senos et al. 2006; Szabó and Hédl 2011), and tourism (K.Turner 2010). Taken together, historical-ecological research on the Northwest Coast and elsewhere allows engagement with human–environment interactions from the individual to the group, from the ocean floor to mountaintops, and from the distant past to the present, and has relevance to a broad range of communities and contexts.

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NOTES

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1. See, for example: https://www.hakaimagazine.com/video/6000-year-old-village.
2. See, for example: http://www.hirmd.ca/hauyat-history-project.html.

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