CHRISTINE HELLER'S LEGACY AND THE POTENTIAL FOR INTEGRATION OF TRADITIONAL KNOWLEDGE AND BIOCULTURAL LABELS (U.S.A.)

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ABSTRACT

Christine A. Heller (1907–1989) was a nutritionist, author, and botanist whose work in the 1960s–1970s had a lasting impact on Alaska's botanical and cultural landscapes. Her research focused on the nutritional and medicinal qualities of native plants, making important contributions to the understanding of Alaska's wild flora and its role in human health. Heller's work is particularly relevant to contemporary discussions on subsistence living because of the historical moment in which her data was collected. Although her documentation often failed to adequately acknowledge the cultural significance of Alaskan foodways, the nutritional and botanical records she compiled remain valuable as time-specific evidence of what people gathered and consumed, enabling meaningful comparison with present-day data on subsistence practices and community health. These areas of Heller's expertise emphasize the interconnectedness of human well-being, ecological sustainability, and cultural knowledge. In honoring Heller's legacy, it is important to recognize that her research, while valuable, was conducted at a time when Indigenous knowledge systems were not widely respected or acknowledged as legitimate forms of science. The historical lack of recognition for Indigenous cultural practices and knowledge has perpetuated the belief that Indigenous communities are incapable of making autonomous decisions regarding their own development, including how their scientific knowledge is recorded. This colonial mindset has contributed to the treatment of Indigenous heritage as artifacts of the past that do not require specific attribution to the communities that steward them. One emerging solution to this challenge is the implementation of Traditional Knowledge (TK) and Biocultural (BC) Labels, which are digital labels that seek to safeguard Indigenous knowledge and provide guidelines for its ethical use by attributing this information while remaining compatible with widely used scientific frameworks. This paper seeks to both honor the invaluable work Christine Heller performed in Alaska in the previous century and examine whether integrating TK and BC Labels into Alaska Native ethnobotanical knowledge would be meaningful and beneficial to Indigenous knowledge preservation efforts in the state.

Key Words: Historical botany, botanical biography, Traditional Knowledge Labels, Biocultural Labels, Alaska, nutrition, herbaria, ethnobotany

RESUMEN

Christine A. Heller (1907–1989) fue una nutricionista, autora y botánica cuyo trabajo durante las décadas de 1960 y 1970 tuvo un impacto duradero en la botánica y la cultura de Alaska. Su investigación se centró en las propiedades nutricionales y medicinales de las plantas nativas, realizando importantes contribuciones en la comprensión de la flora silvestre de Alaska y su impacto en la salud humana. El trabajo de Heller es particularmente relevante para los debates contemporáneos sobre la vida de subsistencia debido al contexto histórico en el que recopiló los datos. Si bien su documentación a menudo no reconoció adecuadamente la importancia cultural de las prácticas alimentarias de Alaska, los registros nutricionales y botánicos que compiló siguen siendo valiosos como evidencia de un momento específico sobre lo que la gente recolectaba y consumía, lo que permite comparar significativamente con los datos actuales de las prácticas de subsistencia y la salud comunitaria. Estas áreas de especialización de Heller enfatizan la interconexión entre el bienestar humano, la sostenibilidad ecológica y el conocimiento cultural. Al honrar el legado de Heller, es importante reconocer que su investigación, si bien valiosa, se llevó a cabo en una época en la que los sistemas de conocimiento indígena no eran respetados ni reconocidos como formas legítimas de ciencia. La falta histórica de reconocimiento de las prácticas y conocimientos culturales Indígenas ha perpetuado la creencia de que las comunidades indígenas son incapaces de tomar decisiones autónomas respecto a su propio desarrollo, incluida la forma en que se registra su conocimiento científico. Esta mentalidad colonial ha contribuido a que el patrimonio indígena se considere como artefactos del pasado que no requieren atribución específica a las comunidades que los custodian. Una solución emergente a este desafío es la implementación de las etiquetas de Conocimiento Tradicional (CT) y Bioculturales (BC), las cuales son etiquetas digitales que buscan salvaguardar el conocimiento indígena y proporcionar directrices para su uso ético, atribuyendo esta información y manteniendo la compatibilidad con los marcos científicos de uso generalizado. Este artículo busca honrar la labor invaluable que Christine Heller realizó en Alaska en el siglo pasado y examinar si la integración de las etiquetas de CT y BC en el conocimiento etnobotánico de los Nativos de Alaska será significativa y beneficiosa para los esfuerzos de preservación del conocimiento indígena en el estado.

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HELLER'S EDUCATION AND BACKGROUND

Christine Heller was born in Utica, New York in 1907 to a Scottish mother and American father. Early in her childhood she was relocated to the House of Good Shepherd orphanage with her older brother, Alfred, and younger sister, Margaret. She remained a boarder at the House of Good Shepherd for several years after she was no longer a minor under the establishment's care (U.S. Census Bureau 1910; Schmuland 2012). In 1933 Heller attended Cornell University, where she earned a Bachelor of Science degree, followed by a Master's degree in 1937, and later a Doctorate in Nutrition with a minor in Botany in 1952. Heller worked as a nutritionist in New Mexico and California, where she gained experience in public health and research on a variety of diets and food cultures. In 1945, Heller relocated to Juneau, Alaska, where she became involved in the study of Indigenous and non-Indigenous food systems in Alaska and botany. From 1956 until her retirement in 1965, she conducted extensive research on Native Alaskan foodways and subsistence practices, during which she traveled to numerous communities across the state. During her travels, she documented cultural food sources and ethnobotanical information, though this work reflected the research norms of the period, it did not prioritize Indigenous attribution. These details were later featured in the book she co-authored with Edward M. Scott, *The Alaska Dietary Survey* (1956–1961), a study examining the nutritional patterns of culture and cuisine in Alaska's Indigenous populations (Valentine 2023; Schmuland 2012).

HELLER'S BOTANICAL SPECIMENS AND THE JUNEAU BOTANICAL CLUB

In the late 1930s, the Juneau Botanical Club was founded and began collecting plant specimens (Swedell 1999). The club eventually built the most complete herbarium in Southeast Alaska, with over 5,000 specimens gathered from across the state and neighboring Canada (Swedell 1999; Schmuland 2012; Valentine 2023). While the club was based in Juneau and consisted of a small core group of six active members, it recruited over 65 collectors from various locations to contribute specimens. Christine Heller became involved in the Juneau Botanical Club in the mid-1940s, while working as a nutritionist for the Alaska Health Department. The collections Heller made during her travels to remote areas of the state as part of her job significantly expanded the club's plant collections. In 1949, she embarked on a major collection expedition with fellow club members, including Amy Rude, Lucille Stonehouse, and Maxcine Williams. Photographs of the trip were documented by Williams, and the entertaining and informative scrapbook is housed at the Alaska State Library. For a visual of some of the photographs taken by Williams refer to Figure 1 (Alaska Digital Archives). The group shipped a car to Haines, traveled across the Haines, Alaska, and Steese Highways to the Yukon River, and collected over 1,100 plant specimens over a span of five weeks. Heller's specimen contributions from her work helped enrich the club's herbarium by adding plant samples from distant locations that would have otherwise been difficult to access during that time. Her background contributed a nutritional and botanical analytical framework to the documentation of Indigenous foodways, reflecting her broader research on Alaska's edible and medicinal plants. The Juneau Botanical Club's herbarium and associated records, and archival materials were ultimately donated to the Alaska State Museum in Juneau in 1977, ensuring its preservation as a valuable botanical resource (Swedell 1999).

In 1991, the University of Alaska Anchorage archives received a large collection of documents and associated material from the estate of Margaret E. Heller, Christine Heller's sister (Schmuland 2012). Among these were a large collection of the Christine Heller papers, which document her life and work from the 1930s through the 1970s, comprising 15.4 cubic feet of materials. The collection primarily reflects Heller's professional career in nutrition and public health in Alaska, including extensive records from the landmark *The Alaska Dietary Survey* (1956–1961); subject files on nutrition, food, and health; teaching and academic materials; professional correspondence; publications; a large body of recipes; and Christine Heller's collected botanical specimens. It also captures her sustained interest in botany through notes, drafts, reference works, and materials related to her publications on Alaskan plants, as well as artwork and photographs documenting Alaskan communities, landscapes, flora, and a 1948 Coast Guard voyage. Together, the papers provide rich insight into mid-20th-century nutrition research, Indigenous foodways, public health, and botanical study in

Alaska. Due to preservation concerns, Christine Heller's collected botanical specimens were removed from the collection at the archives of the University of Alaska Anchorage and transferred to the Herbarium (ALA) at the University of Alaska's Museum of the North (2025) in 2010. The botanical specimens were initially fastened to cardboard stock with tape. At ALA we have carefully removed the specimens from the carboard stock and mounted them on acid-free paper, accessioned, imaged and uploaded the metadata to the open access online database ARCTOS, and moved them to a controlled archival space to be preserved for future generations. A map illustrating Heller's collection points from ALA herbarium sheets can be seen in Figure 1.

Many of the Juneau club's photographs, correspondences, record journals, and other materials remain at the Alaska State Museum in Juneau. The Herbarium of the Smithsonian Institution at the US National Museum of Natural History (US) houses 19 specimens collected by Heller, all from 1951, before she graduated with her Doctorate the following year. The appendix contains more information for each institution. For a summary of accessioned specimens, refer to Table 1 (ALA data), Table 2 (Smithsonian data), and the hyperlinked data set leading to all 528 specimens collected by Heller available at ALA. Examples of specimen sheets collected by Heller are provided in Figures 1–2. Today, her contributions continue to be recognized as an essential part of Alaska's botanical and ethnobotanical history.

HELLER'S CONTRIBUTIONS TO BOTANY AND NUTRITION

Heller published several influential works that documented the edible and medicinal qualities of Alaskan plants. Her 1953 book, *Wild, Edible, and Poisonous Plants of Alaska*, illustrated by Juneau Botanical Club members Marion R. Sheehan and Claudia Kelsey, was an influential publication from the Club and a comprehensive guide to Alaska's plant life (Table 1). The book includes critical information on plant identification, nutritional value, and potential toxicity in native flora. She revised and expanded her work in 1981, broadening its usefulness for researchers, educators, and Alaskan communities (Heller 1953, 1981; Swedell 1999). In 1966, she co-authored *Wildflowers of Alaska,* a detailed botanical guide that showcases the state's floral diversity (Heller 1966).

Her work extended beyond field guides; Heller also engaged in nutritional studies throughout her career, both within and outside Alaska. With her colleagues she published a war emergency bulletin titled *Eat Well to Work Well, the Lunch Box Should Carry a Hearty Meal*, which detailed recommendations for eating nutritionally balanced meals during wartime. It features a list of diet-related cautions titled "Are You Helping Hitler?" and an opposite list of healthy practices titled "Are You Helping Uncle Sam?" It also incorporated several lunchtime sandwich recipes appropriate and characteristic for the era (McCay, Heller, et al. 1942). Her nutritional works also include *The Alaska Dietary Survey* (1956–1961), co-authored with E.M. Scott (Heller & Scott 1967). Her research for this publication included travel to many communities in Alaska, including Allakaket, Huslia, Point Hope, Noatak, Shishmaref, Shungnak, Akiak, Napaskiak, Kasigluk, Hooper Bay, and Newtok. This study examined the Indigenous foodways of rural Alaskan populations, particularly Indigenous communities, shedding light on the role of traditional foods in nutrition, which included native plant use, and public health (Heller & Scott 1967; Valentine 2023). Heller also contributed to research on Indigenous relationships enveloping food and culture in *The Diet of Some Alaskan Eskimos and Indians*, where she continued to document traditional subsistence food practices (Heller 1964).

Her books are invaluable and record the cultural cuisine patterns of both rural and urban Alaskans at a time when that information may not have been otherwise noted. Given the historical context in which Heller worked as a nutritionist, some of her publications contain outdated and now-contested language and concepts that are no longer standard in contemporary scholarship. It is important to recognize the lasting value of her research, while also acknowledging that Indigenous stewards today can guide us toward more ethical and informed approaches to knowledge, language, and preservation in memory institutions. For an explanation of the term "memory institution" see the Appendix.

Table 1. Selection of Heller specimens housed at the University of Alaska Museum of the North ALA Herbarium (2025). These were selected because the specimens were processed for Heller's 1953 book, *Wild, Edible, and Poisonous Plants of Alaska* and contain special ethnobotanical information on the label. The entire Heller data set available via ARCTOS can be accessed at this location: https://docs.google.com/document/d/1a6Fm-JrudRlWkPkrMe8isYx4jdVciq4dtUu1zYMo2a0/edit?usp=sharing.

Barcode	GUID	Taxon	Collection Date	Locality
H1204132	UAM:Herb:90615	*Rumex arcticus* Trautv.	09 Jul 1950	Yukon-Tanana Upland, Mile 84 Steese Hwy., Circle Quad
H1204131	UAM:Herb:90676	*Oxyria digyna* Hill	09 Jul 1950	Yukon-Tanana Upland, Mile 84 Steese Hwy., Circle Quad
H1236391	UAM:Herb:41309	*Rubus pedatus* Sm.	04 June 1951	Alexander Archipelago, Revillagigedo I., Ketchikan, Ketchikan Quad, Tongass National Forest
H1184846	UAM:Herb:41320	*Vaccinium alaskanse* J.R. Anderson (Orig. ID =*Vaccinium alaskensis* Howell on label)	04 June 1951	Alexander Archipelago, Revillagigedo I., Deer Mts., vic. Ketchikan, Deer Mtn. Trail, Ketchikan Quad, Tongass National Forest
H1246348	UAM:Herb:41882	*Plantago macrocarpa* Cham. & Schltdl.	06 June 1951	Alexander Archipelago, Hydaberg, Prince of Wales I., Craig Quad, Tongass National Forest, Alexander Archipelago
H1246745	UAM:Herb:41886	*Plantago maritima* L.	06 June 1951	Alexander Archipelago, Hydaberg, Prince of Wales I., Craig Quad, Tongass National Forest, Alexander Archipelago
H1229852	UAM:Herb:127655	*Potentilla anserina* subsp. *pacifica* L.	06 June 1951	Alexander Archipelago, Hydaberg, Prince of Wales I., Craig Quad, Tongass National Forest, Alexander Archipelago
H1204137	UAM:Herb:41944	*Salicornia virginica* L. (Orig. ID = *Salicornia pacifica* Standl.)	06 June 1951	Alexander Archipelago, Hydaberg, Prince of Wales I., Craig Quad, Tongass National Forest, Alexander Archipelago
H1229342	UAM:Herb:43868	*Fragaria chiloensis* (L.) Mill. subsp. *pacifica* Staudt	14 June 1951	Hoonah, Chichagof I., Juneau Quad, Tongass National Forest, Alexander Archipelago
H1176336	UAM:Herb:43593	*Barbarea orthoceras* Ledeb.	16 June 1951	Coast Mts., Juneau, Thane Road, Juneau Quad, Tongass National Forest, Alexander Archipelago
H1204139	UAM:Herb:43600	*Bistorta vivipara* (L.) Gray (Orig. ID= *Polygonum viviparum* L.	18 June 1951	Coast Mts., mouth of Salmon Cr., near Juneau, tide flats, Juneau Quad, Alexander Archipelago
H1195339	UAM:Herb:131170	*Saxifraga spicata* D. Don	16 Jul 1951	Hogatza Highlands, Kiana, on Kobuk R., Selawik Quad
H1242975	UAM:Herb:131218	*Cicuta douglasii* (DC.) J.M. Coult. & Rose	17 Jul 1951	Kotzebue-Kobuk Lowlands, Noorvik, Selawik Quad, Selawik National Wildlife Refuge
H1204138	UAM:Herb:92578	*Claytonia tuberosa* Pall. ex Willd. subsp. *tuberosa*	08 Aug 1951	Seward Peninsula, Cape Prince of Wales, Teller Quad
H1177892	UAM:Herb:143558	*Cochlearia officinalis* L.	20 Aug 1951	Arctic Coastal Plain, Barter I., Barter Island Quad, Arctic National Wildlife Refuge
H1204130	UAM:Herb:146956	*Oxyria digyna* (L.) Hill	21 Aug 1951	Arctic Coastal Plain, Barter I., Barter Island Quad, Arctic National Wildlife Refuge
H1183461	UAM:Herb:143560	*Saxifraga hieraciifolia* Waldst. & Kit. subsp. *hieraciifolia*	21 Aug 1951	Arctic Coastal Plain, Barter I., Barter Island Quad, Arctic National Wildlife Refuge
H1029232	UAM:Herb:16888	*Taraxacum* L. sect. *Borealia* Hand.-Mazz. (Orig. ID = *Taraxacum* L. sp.)	21 Aug 1951	Arctic Coastal Plain, Barter I., Barter Island Quad
H1007224	UAM:Herb:138880	*Arctostaphylos uva-ursi* (L.) Spreng.	25 Aug 1951	Yukon Flats, Fort Yukon, Fort Yukon Quad, Yukon Flats National Wildlife Refug

Table 2. Heller specimens housed at the Smithsonian Institution at the US National Museum of Natural History Herbarium. The full metadata of this dataset can be found in their database and at this location: https://collections.nmnh.si.edu/search/botany/.

APG4#	Barcode	Taxon	Collection Date	Locality
098-071	2123604	*Carex lyngbyei* Hornem.	18 Jun 1951	Bog, Mendenhall Glacier, Loop Road near Juneau
372-056	2912745	*Mertensia maritima* (L.) Gray	13 Jul 1951	Beach at Sady Creek, Kotzebue Sound.
372-056	2912746	*Mertensia maritima* (L.) Gray	21 Aug 1951	Barter Island.
038-005	1082596	*Potamogeton alpinus* Balb.	26 Aug 1951	Fort Yukon, Sugar Bowl Lake
038-005	3834183	*Potamogeton foliosus* Raf. var. *foliosus*	09 Jul 1951	Gravel pit lake, Steese Highway, Fairbanks.
038-005	3835082	*Potamogeton natans* L.	09 Jul 1951	Gravel pit lake, Steese Highway, Fairbanks.
111-049	3680383	*Ranunculus codyanus* B. Boivin	14 Jul 1951	Edge of tundra lake, Sheshalik, on Kotzebue Sound.
111-049	3680384	*Ranunculus codyanus* B. Boivin	14 Jul 1951	Edge of tundra lake, Sheshalik, on Kotzebue Sound.
111-049	3567161	*Ranunculus hyperboreus* Rottb.	29 Jun 1951	Water's edge, tundra pool, King Salmon.
111-049	3568508	*Ranunculus pallasii* Schltdl.	23 Jul 1951	Tundra lake, Serpentine River country, near Shismaref.
111-049	3680038	*Ranunculus trichophyllus* Chaix	21 Aug 1951	Tundra pool, Barter Island.
111-049	3569713	*Ranunculus trichophyllus* Chaix	09 Sep 1951	Roadside pool, Nyac.
040-001	3933045	*Ruppia maritima* L.	30 Jul 1951	Lagoon, Cape Nome, Seward Peninsula.
098-086	2255921	*Schoenoplectus tabernaemontani* (C.C. Gmel.) Palla	25 Aug 1951	Muddy area between river and lake, Fort Yukon.
098-066	2075592	*Scirpus microcarpus* J. Presl & C. Presl	18 Jun 1951	Roadside, 6 miles along Glacier Highway near Juneau
090-001	3840588	*Sparganium hyperboreum* Beurl. ex Laest.	26 Aug 1951	Sugar Bowl Lake, Fort Yukon.
090-001	3840591	*Sparganium hyperboreum* Beurl. ex Laest.	18 Jun 1951	Roadside ditch, Mendenhall Glacier Loop Road, near Juneau.
090-001	3840694	*Sparganium simplex* Huds.	25 Aug 1951	Muddy flats between river and lake, Fort Yukon.
038-004	3833218	*Stuckenia pectinata* (L.) Börner	14 Jul 1951	Kotzebue Sound.

Impact on Alaska's botanical and cultural landscape

Heller's documentation of Alaska's plant resources influenced botanical research, environmental education for the public, and remains relevant to discussions of subsistence practices to the extent that it is a historical record of plant knowledge that intersects with subsistence lifestyles. While Heller did not consistently attribute the Indigenous sources of this knowledge, her work nevertheless preserves observations that reflect subsistence-related practices as they were documented in the mid-twentieth century, providing a reference point rather than a definitive account of subsistence knowledge. Her field notes, plant collections, and nutritional studies provided a scientific foundation for understanding Alaska's natural food sources from a nutritional perspective. Many of her materials are now housed in institutions such as the Anchorage Museum, the University of Alaska Anchorage Archives, and at the Alaska State Museum (Schmuland 2012; Valentine 2023). However, Heller's collected plant specimens have largely been forgotten to history, and, besides a newspaper article written in 1999, minimal documentation of the Juneau Botanical Club has taken place (Swedell 1999). At the Alaska State Museum, for example, the herbarium specimens and archival information from the Juneau Botanical Club have not been uploaded to an online database or prepared for public use. This is partly because of the mercuric chloride used on the botanical specimens, which raises handling concerns (see Appendix for more information). A volunteer at the Alaska State Museum, Wendy Swedell, compiled a descriptive guide for

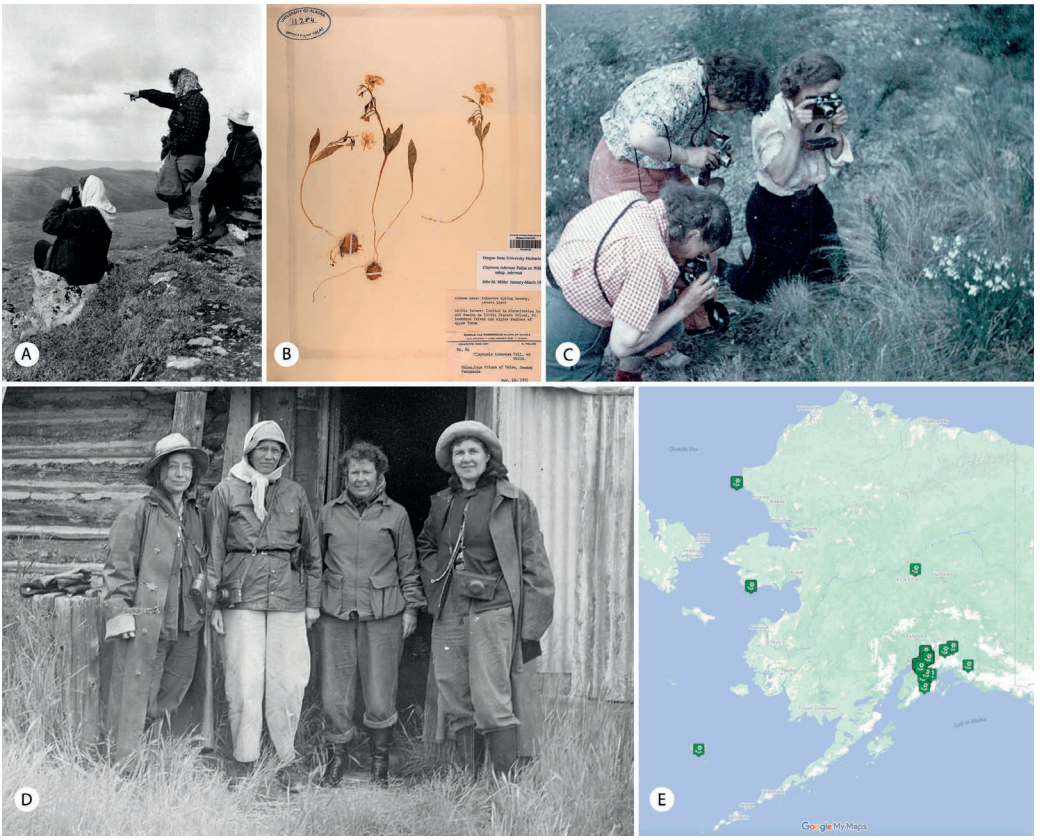

Fig. 1. Photographs (1949) showcasing Heller and members of the Juneau Botanical Club collecting throughout Alaska (Scrapbook 1, Maxcine Williams Photo Collection, Alaska State Library, identifier P121-3-1, https://library.alaska.gov/hist/hist_img/albums/asl_p121_3_1.pdf). A. Christine Heller shown pointing from Eagle Summit. B. *Claytonia tuberosa* Pallas ex Willd. specimen with notes on the edible tubers. Further information available under barcode "H1204138" in Table 1 and Figure 2. C. Photographing *Mertensia paniculata* G.Don. in the field. D. Heller together with colleagues. From left to right, Lucile Stonehouse, Amy Rude, Christine Heller, Maxcine Williams. E. Distribution map of Heller's collections as of November 2024 archived at the ALA Herbarium.

documents and ephemera related to the Juneau Botanical Club, but it relies, in part, on personal inferences and anecdotal information. Because the Alaska State Museum herbarium is small and understaffed, substantial work would be required to fully document information related to Heller and the Juneau Botanical Club. This challenge is compounded by the terms of the donation agreement, which require the materials to remain in Juneau, and by limited funding that has prevented comprehensive cataloging and online documentation.

Heller's published works have been widely used by botanists, ethnobotanists, and subsistence harvesters, but they also highlight the need for ethical engagement with Indigenous knowledge. Given that much of her research was conducted during an era when Indigenous contributions to science were often overlooked, some aspects of her documentation may lack critical cultural context and specific details of which communities she collected information from. This raises the question: how can historical botanical research, such as Heller's, be revisited and respectfully integrated into Indigenous knowledge systems and memory institutions today?

One potential solution is the implementation of Traditional Knowledge (TK) and Biocultural (BC) Labels, a framework set up by the organization Local Contexts that allows Indigenous communities to reclaim

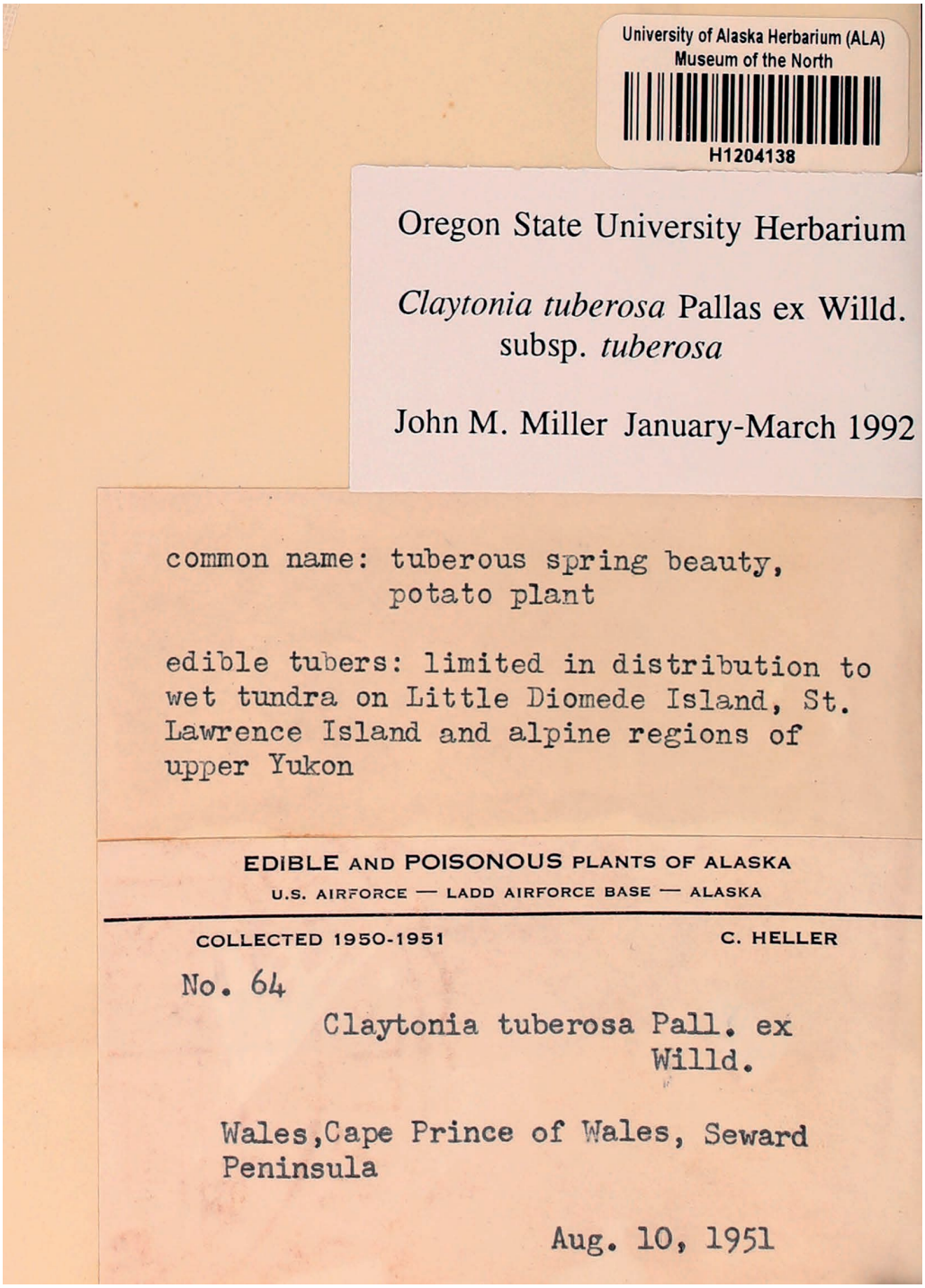

Fig. 2. Details of *Claytonia tuberosa* Pallas ex Willd. specimen label collected by Christine Heller in 1951 from Wales, Alaska with some of the ethnobotanical notes such as "Common Name: tuberous spring beauty, potato plant. Edible tubers: limited in distribution to wet tundra on Little Diomede Island, St. Lawrence Island and alpine regions of upper Yukon" via ARCTOS (Table 1).

authority over their cultural and scientific heritage. By applying TK or BC Labels to Heller's archived plant collections and publications, Alaska Native and Canadian First Nations peoples could provide additional insights, correct historical inaccuracies, and establish cultural guidelines for the ethical use of the ethnobotanical information.

BACKGROUND ON TRADITIONAL KNOWLEDGE AND BIOCULTURAL LABELS

Traditional Knowledge (TK) is described as "a culture-dependent collective rational perceiving of reality," where perceiving involves "both the action constructing reality and the construct of reality" (Gururagavendran 2023; Pflugfelder et al. 2023). TK and Indigenous Science are often framed within Western scientific knowledge systems in ways that imply they are an extension of Western Modern Science (Pflugfelder et al. 2023). Such framing obscures the fact that TK systems are distinct epistemologies with their own methods, values, and ways of validating knowledge, rooted in place, relationships, and lived practice. Furthermore, it can lead to misinterpretation, the application of colonial viewpoints, and the continued misrepresentation of Indigenous science and heritage. Even the term "traditional" can be misleading, as it implies a static framework of knowledge, often depicted as from the past, rather than a dynamic, evolving knowledge system rooted in the present. The neglect in including Indigenous cultural practices and knowledge as valid forms of science has sustained the idea that these same Indigenous communities are unable to exercise autonomy over their own development and scientific records. This historical framework has contributed to the treatment of Indigenous heritage and knowledge as artifacts of the past, rather than as current systems that remain vital within the communities that steward them (Reijerkerk 2020). Within archives, museums, and other research institutions, Indigenous contributions have been historically misattributed or entirely erased without informed consent, reinforcing the idea that this knowledge exists outside of Indigenous governance structures (Anderson & Christen 2019a). The lack of ethical attribution practices has further complicated access to and the management of Indigenous cultural heritage, particularly when housed in institutions that prioritize Western intellectual property frameworks and Western modern science. The implementation of TK and BC Labels, which seek to safeguard Indigenous knowledge and provide guidelines for its ethical use in memory institutions, including for botanical collections, would aid in mitigating these challenges. These labels provide Indigenous communities with the opportunity to reclaim authority over their intellectual and cultural property, attempting to rectify the historic erasure of Indigenous governance over knowledge-sharing (Anderson & Christen 2013).

Two kinds of labels for Indigenous communities were developed by Local Contexts, an organization founded in 2010 by Jane Anderson and Kim Christen in collaboration with Indigenous communities (Local Contexts 2025b, https://localcontexts.org/labels/about-the-labels/. Accessed September 17, 2024). The first is TK Labels, which are used for material culture, specimens, art, audio, and more (see Fig 2). The second is BC Labels, which are used for genetic information, particularly in research fields like genomics, conservation biology, and biodiversity research. BC Labels emerged in response to growing concerns about the misuse of Indigenous genetic resources in bioprospecting and biomedical research, allowing Indigenous communities to establish governance frameworks over their genetic data (Liggins et al. 2021). The unrestricted sharing of genomic data has been criticized for failing to acknowledge the cultural, spiritual, and legal rights of Indigenous communities (Hudson et al. 2020). Indigenous data is not merely biological information but is tied to identity, governance, and cultural survival. Without proper attribution, oversight, and consent, genomic data can be used in ways that are misaligned with Indigenous worldviews and values, leading to harm rather than benefit. Both BC and TK Labels serve as a tool for Indigenous communities to use alongside what Western institutions already implement. The Labels allow "communities to express local and specific conditions for sharing and engaging in future research and relationships in ways that are consistent with already existing community rules, governance and protocols for using, sharing and circulating knowledge and data" (Local Contexts 2025b, https://localcontexts.org/labels/about-the-labels/. Accessed January 1, 2026). They

can be applied to a wide range of materials, including "websites, publications, datasets, museum exhibitions, items in a collection, genetic samples, and more" (Local Contexts 2025a, https://localcontexts.org/about/. Accessed September 17, 2024). Notices, also developed by Local Contexts, are tools for not only institutions, but researchers who wish to ethically engage with Indigenous communities. The Notices "make visible Indigenous interests in collections, information, and data," which supports the transparency needed in contemporary collaboration (Local Contexts 2026e, https://localcontexts.org/notices/about-the-notices/. Accessed April 4, 2026). A comprehensive list of all available TK and BC Labels are available through the Local Contexts website. There are several examples of Labels in use provided by the Local Contexts Blog. Several digital and media collections in Aotearoa (New Zealand) have implemented the Labels alongside local Indigenous communities (Local Contexts. 2025d, https://localcontexts.org/blog/labels-in-use/. Accessed September 5, 2025). In the United States, the American Folklife Center (AFC) at the Library of Congress has applied three TK Labels: Attribution, Outreach, and Non-Commercial to their collection of Passamaquoddy wax cylinder recordings from 1890 and 1891. (Library of Congress. n.d., https://www.loc.gov/collections/ancestral-voices/about-this-collection/rights-and-access/. Accessed 5 Sept. 2025). Authors Anderson and Christen assisted with the AFC's insertion of the Labels into the collection and wrote, "This reclamation of attribution was not viewed as correcting a mistake within the record. Instead, this was seen by all as an epistemological revision that dislodged settler control and voice and placed authority and control with the Passamaquoddy" (Anderson & Christen 2019a). The three Labels used for the cylinders are pictured in Figure 3.

In botanical and ethnobotanical collections, TK and BC Labels are particularly valuable because they ensure that Indigenous knowledge related to plants, seeds, and cultural, spiritual, and medicinal practices is recognized and respected within its original cultural framework. By embedding Indigenous governance structures into metadata and digital infrastructure, Labels help prevent the extraction and commodification of Indigenous knowledge without consent (Anderson & Christen 2012).

LABELS IN AN ALASKA BOTANICAL CONTEXT

Herbaria and other botanical archives have historically been assembled within a Western scientific framework, often without the involvement of Indigenous knowledge holders or stewards. While ethnobotanical collections aim to incorporate Indigenous knowledge with appropriate attribution, significant gaps remain, and there is ongoing need for improved practices that more fully recognize and respect Indigenous contributions. These archives may include TK of plant uses, sacred species, and medicinal practices, but such information is often left without the local context. Historically, this has led to ethical dilemmas, particularly in cases where botanical knowledge has been used for commercial purposes such as in pharmaceuticals or cosmetics, without local Indigenous consent (Anderson & Christen 2013). For example, a source may document the scientific properties of a plant but omit the cultural protocols surrounding its use, such as seasonal restrictions, ceremonial significance, or gender-specific knowledge. Additionally, many botanical archives continue to attribute plant knowledge to Western scientists, ignoring the fact that Indigenous communities have cultivated and shared this knowledge for centuries prior to Western discovery (Anderson & Christen 2019).

TK and BC Labels address this issue by providing a pathway for institutions and organizations to recognize direct, local Indigenous governance over these materials, ensuring that they are not misappropriated or misunderstood. For instance, institutions applying Labels can indicate whether Indigenous protocols, such as restrictions on the use of medicinal plants for commercial research, must be upheld (Anderson & Francis 2021). Applying TK or BC Labels to Heller's work would allow Alaska native communities to contribute additional or corrected information to her records, ensuring that the plants she documented are understood not just in terms of their nutritional, medicinal, or poisonous value but also in relation to their cultural, spiritual, and ecological significance and specificity of the local knowledge in a geographical context. The value of Heller's material lies in its documentation of subsistence practices and plant relationships. An added TK or BC

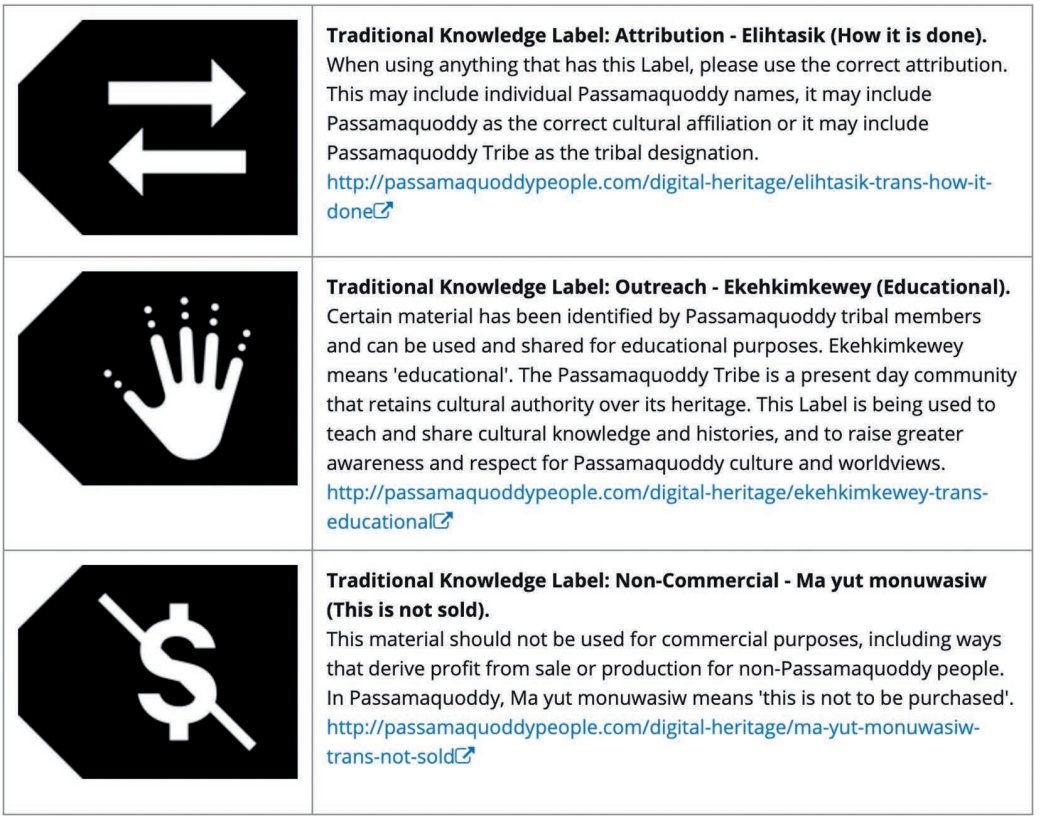

Fig. 3. The American Folklife Center at the Library of Congress worked alongside the Passamaquoddy community to apply Traditional Knowledge Labels to the digital Passamaquoddy Ancestral Voices curation. The Passamaquoddy Tribe asks that the recommendations for use of the Ancestral Voices recordings as outlined by the TK Labels are respected (Library of Congress. n.d. https://www.loc.gov/collections/ancestral-voices/about-thiscollection/rights-and-access/. Accessed 5 Sep 2025).

Label could allow this information to be shaped, corrected, and contextualized by Indigenous knowledge holders themselves. In doing so, these labels would prevent misinterpretation and allow for a more holistic representation of Alaska Native knowledge on regional flora.

However, the implementation of TK and BC Labels in Alaska presents certain logistical challenges. Local Contexts requires memory institutions to contribute an annual subscription fee to maintain access to the Label Hub, which could be a barrier for smaller museums and herbaria (Local Contexts 2025c, https://localcontexts.org/wp-content/uploads/2025/07/1-pager-Subscriptions.pdf. Accessed August 19, 2025). The subscription fee is based on the size of the Project collection using the Labels, not the size of the organization. A Project could be an entire collection or archive, a subset of materials in a collection, or even a single item of cultural heritage or dataset. The Projects have been designed by Local Contexts to be flexible to account for the many ways and places that Labels and Notices are implemented by communities, institutions, and researchers. Depending on the scale of the Project, the subscription may have no cost or may be upward of $10,000 USD. Although the project size for Heller's collection has yet to be established, a subscription Hub fee may nonetheless apply, which would require Alaskan institutions to allocate funds accordingly. But Local Context mentions, "Indigenous-led and Indigenous governed organizations that serve multiple Indigenous communities may qualify for a discount on their subscription fee," which could allow for more readily

incorporated Label use in some Alaska native collections (Local Contexts 2025c, https://localcontexts.org/wp-content/uploads/2025/07/1-pager-Subscriptions.pdf. Accessed August 19, 2025).

Additionally, further research and collaboration are needed to determine whether Alaska native communities see value in this initiative and how it could be adapted to fit their specific needs and priorities. Communities reserve the right to use or not use TK and BC Labels regardless of whether institutions in Alaska are interested in the initiative. The process requires extensive consultation with Indigenous communities to ensure that the labels accurately reflect community governance structures, a step that many institutions have historically neglected prior to the development of the Labels (Anderson & Christen 2019b). Additionally, institutions may need to redesign their existing attribution models and metadata systems, which were formed under solely Western legal frameworks rather than including Indigenous Knowledge systems (Anderson & Christen 2019a).

Finally, implementing the Labels requires a vast amount of education, ethical consideration, and effort to become part of standard documentation practices, which may pose monetary and time constraints, especially for underfunded or those institutions that lack prior experience with Indigenous-led governance models.

Despite these challenges, the potential benefits of integrating TK and BC Labels into Alaska's institutions, including in anthropology, history, ethnobotany, and other disciplines would be significant. By restoring agency to Indigenous knowledge holders and ensuring that botanical information is preserved within its proper cultural context, TK and BC Labels represent an important step toward ethical knowledge stewardship. Future research should focus on collaborating with Alaska Indigenous communities to assess the feasibility of TK and BC Label implementation and explore alternative solutions for safeguarding Indigenous plant knowledge in a way that is both culturally and financially sustainable.

APPENDIX

Definition of Memory Institution

"A memory institution is any organization body that has institutionalized the practices: Collecting or creating artefacts, providing for the long term preservation of those artefacts, facilitating access to those artefacts…examples of memory institutions include [libraries,] archives, museums, cemeteries, historical landmarks, and branches of government that create and maintain records" (University of Illinois Urbana-Champaign 2025).

Locations of Heller Herbarium Specimens

Alaska State Museum, Juneau

The data on herbarium specimens is not available at this time, as the collection has not been digitized and accession data is not complete. The collection comprises roughly 1.7 cubic feet of material in a single filing cabinet drawer, though the specimen sheets occupy a larger space.

University of Alaska Fairbanks Museum of the North Herbarium

This collection contains over 500 of Heller's specimens, which continue to be accessioned. A selection of 20 specimens which contain ethnobotanical details in ARCTOS are listed with key finding materials and specific data.

Smithsonian Institution at the US National Museum of Natural History Herbarium

19 of Heller's collected specimens are housed at the Herbarium of the US National Museum of Natural History, Smithsonian Institution, though they do not contain specific ethnobotanical information. The complete collection is available in Table 2.

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