Investigating Tlingit Ecological Knowledge

Student Packet

Standards Addressed in this Unit

Themes (*parallels AP Environmental Science Content as found at http://apcentral.collegeboard.com/apc/public/repository/ap-environmental-science-course-description.pdf and Juneau School Districts science content standards*)

Science

1. Science as Inquiry and Process

- Science is a method of learning and constantly changes the way we understand the world

SA1.1 Students ask questions, predict, observe, describe, measure, classify, make generalizations, analyze data, develop models, infer, and communicate
SA1.2 Students recognize and analyze multiple explanations and models, use information to revise student's own explanation or model if necessary
SA2.1 Evaluate credibility of cited sources when conducting the student's own scientific investigation
SA3.1 Conducts research and communicates results to solve a problem

2. Energy conversions underlie all ecological processes

- Energy cannot be created; it must come from somewhere

SC3.1 Relate carbon cycle to global climate change

c. The Earth itself is one interconnected system

- Biogeochemical and natural systems vary in ability to recover from disturbances

SC3.2 Analyze potential impacts of changes

d. Humans alter natural systems

- Technology and population growth have enabled humans to increase both the rate and scale of their impact on the environment

SD3.1 Describe causes, effects, preventions, and mitigations of human impact

e. Environmental problems have a cultural and social context

- Understanding the role of cultural, social, and economic factors is vital for solutions

SE1.1 Research how social, economic, and political forces strongly influence which technology will be developed

f. Human survival depends on developing practices that will achieve sustainable systems

- A suitable combination of conservation and development is required

SF1.1-SF3.1 Investigate the influences of societal and or cultural beliefs on science

Language Arts

a. The student restates/summarizes and connects information.
R4.2 Summarize information or ideas from a text and make connections between summarized information or sets of ideas and related topics or information

b. Student analyzes content of text to differentiate fact and opinion
R2.9 a. Differentiate between fact and opinion. b. Express opinions about text with support

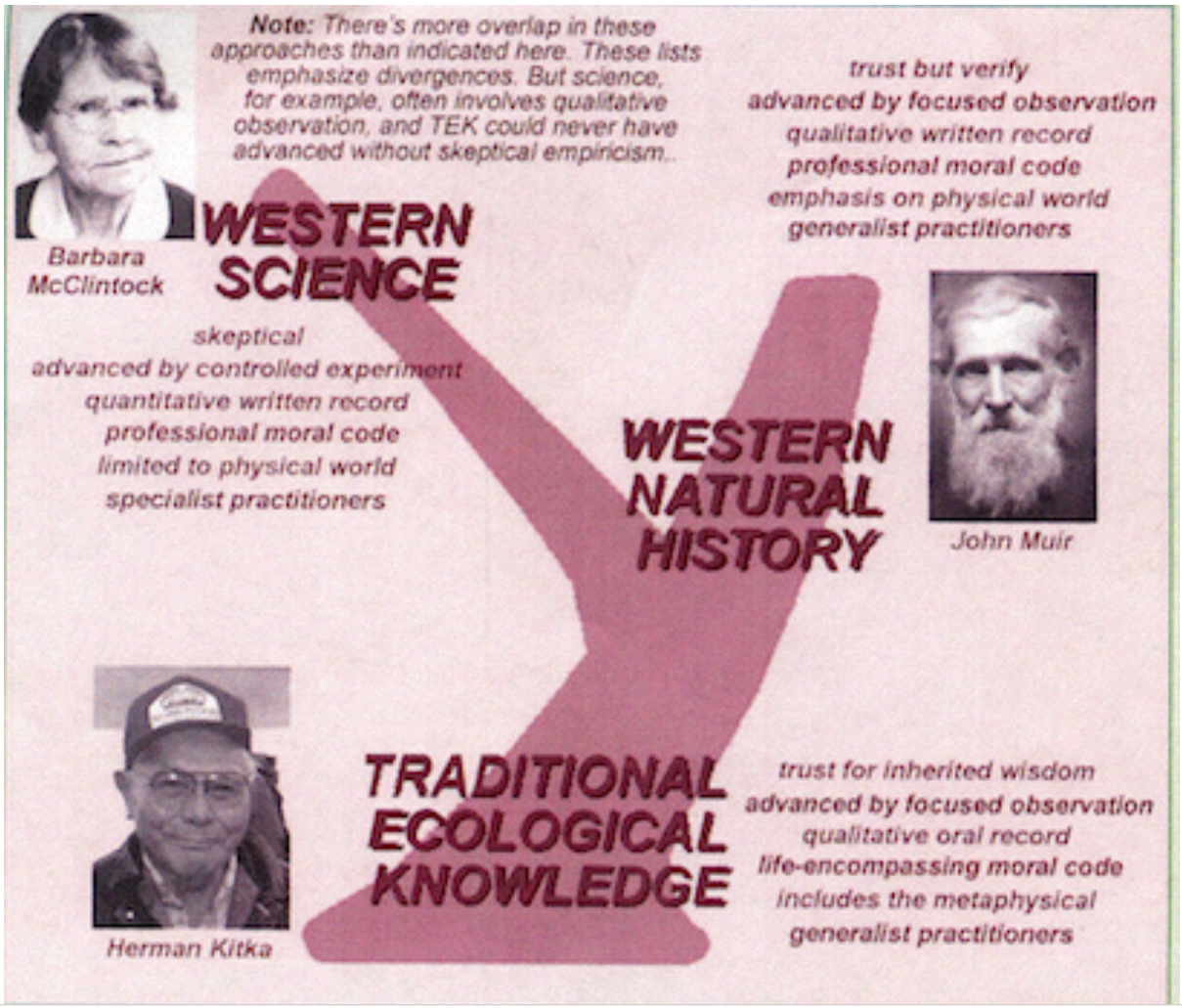
c. Student connects and evaluates cultural influences/events.
R3.10 Compare and contrast how texts reflect historical and cultural influences.
R4.9 Analyze the effects of cultural and historical influences on texts.

Cultural Standards

A.2 Students will recount their own genealogy and family history
B.4 Identify appropriate forms of technology and their use for improving community
D.3 Interact with Elders in a loving and respectful way that demonstrates and appreciation of their role as culture-bearers and educators in the community
E.2 Understand the ecology and geography of the bioregion they inhabit

Connections to Advanced Placement Environmental Science Course Content

Overview of Lessons	Literacy Strategies	Academic Vocabulary	Assessments
Lesson 1: Nature of Science *Science is a Process (1-2 sessions)* Students explore the convergence of western and traditional science through guided reading, discussion, and reflection writing. • Student Page: "Ways of Knowing" article • Student Page: "Western science /traditional article	• Guided writing • Quick-write • Think-Pair-Share • Mark the text • Paraphrasing	• traditional ecological knowledge • western science • empiricism	• Journal Prompt • Peer Reflections
Lesson 2: Cultural Ways of Knowing *Science is a Process (1-2 sessions)* Students practice problem-solving strategies as they create graphic representations of abstract concepts regarding the future of science. • Student Page: What is an oral narrative? • Student Page: Venn diagram template	• Graphic representation • Generating questions • Annotations • Quick-write • Paraphrasing	• oral narrative • cultural context	• Article summaries & annotations (peer review) • Diagram
Lesson 3: Natural & Cultural History *Energy conversions underlie all ecological processes (2 sessions)* Students are introduced to the unit's culminating activity expectations to use the problem-solving strategy of working backwards to find the answer. • Student Page: Learner's journey concept map • Student Page: Final project scoring guide • Student Page: Aak'w Kwaan/Taak'u Kwaan Map • Student Page: Siting factors diagram • Student Page: *Basket Bay History* story • Student Page: *Basket Bay* Responses	• Note-taking • Generating questions • Discussion group • Debriefing • Work backward • Oral Reading • Rereading	• abiotic • biotic • ecosystem dynamics • archipelago	• Quick-write • Siting factor group work • Abiotic and Biotic Factor responses
Lesson 4: Glaciation & Tlingit Migration *The Earth is one interconnected system* Students explore the power of glaciers and the energy transfer of the surrounding ecosystems. Direct connections are made between local glacier activity and Tlingit migration. • Student Page: SE Alaska Map • Student Page: Siting Factor Outline • Student Page: Oral Tradition Journal Excerpts • Student Page: Migration History Worksheets	• Quick-write • Think-Pair-Share • Mark the Text • Oral Reading • Note-taking • Paraphrasing	• Little Ice Age • Isostatic rebound • Carbon cycle • Calving rates • Basal slip & surge • Terminus	• Basket Bay responses • Short-term lineage project
Lesson 5: Tlingit Ingenuity & Technology *Environmental problems have cultural & social context* • Student Page: Free Response Assessment • Student Page: Excerpts from "Tleikwaani, the "berried" landscape" • Tlingit Ingenuity PowerPoint	• Quick-write • Mark the Text • Oral Reading • Note-taking	• displacement • fermentation • pH • anaerobic respiration	• Free Response • Article summary
Lesson 6: Relationships with the Land *Human survival depends on sustainable practices* • Student Page: Student site selection (3 exported images)	• Think-Pair-Share • Note-taking • Work	• geographical information systems (GIS) • layers	• Final project preparation
Lesson 7: Sharing Our Idea *Science is a Process* • Student Page: Final presentation slideshow	• Graphic representation • Paraphrasing	• respect	• Final project slideshow



WAYS OF KNOWING

In recent years, there have been many attempts to explore the similarities and differences between Traditional Ecological Knowledge (TEK) and Western Science (WS), mostly in an attempt to reconcile these sometimes diverging world vies, and to arrive at ways for each to respectfully inform the other.

Here, we introduce a third element to the dichotomy between WE and TEK-the discipline of Natural History (NH), as exemplified by naturalists such as John Muir. over time, as WS has taken over the role of original research, naturalists have tended to move into the role of interpreters, synthesizing and community the findings of scientists to the public.

In the graphic above we present the relationships between TEK, NH, and WS as a tree. Position on this tree-crown vs roots, etc-is not intended to signify superiority of one over the other. But a progression over time is suggested. Our challenges is to be sure the roots of the three don't wither as the branches proliferate.

Examining the attributes of these 3 approaches to knowledge, we suggest that old-style Natural History and TEK may be more closely related to each other than either is to WS. Today's naturalist may use GPS and digital photography, but philosophically, s/he may be closer to the root than the crown of the tree. The naturalist and the Tlingit hunger or spruce-root gatherer are generalists, whereas the scientist is increasingly specialized. Although the discipline of natural history is not bound to a life-encompassing morel code or spirituality, many individual naturalists are deeply spiritual. John Muir saw in nature the expression of God.

With science, the advancement of knowledge becomes more formalized. In its strictest definition, science involves hypothesis generation, followed by rigorous, quantitative experimentation. Because skepticism is at the core of this testing, science distance itself from the metaphysical (i.e. the untestable). Of course, individual scientists may be religious, but most would claim that their untestable beliefs are not permeated to bias their scientific objectivity.

In science, except for professional ethics, there is no right or wrong-only the incremental pursuit of truth, mostly through hypothesis generation. Scientists don't hope to *arrive* at the ultimate Truth; they're more interested in chipping away at truth with a small "t."

By: Richard Carstensen of Discovery Southeast

EMBO reports

Western science and traditional knowledge

Despite their variations, different forms of knowledge can learn from each other

Fulvio Mazzocchi

Cultures from all over the world have developed different views of nature throughout human history. Many of them are rooted in traditional systems of beliefs, which indigenous people use to understand and interpret their biophysical environment (Iaccarino, 2003). These systems of managing the environment constitute an integral part of the cultural identity and social integrity of many indigenous populations. At the same time, their knowledge embodies a wealth of wisdom and experience of nature gained over millennia from direct observations, and transmitted—most often orally—over generations.

The importance of this traditional knowledge for the protection of biodiversity and the achievement of sustainable development is slowly being recognized internationally (Gadgil *et al*, 1993). For example, Article 8 of the Convention on Biological Diversity urges us to "...respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity...." (United Nations, 1992). In addition, traditional or indigenous knowledge has been rediscovered as a model for a healthy inter- action with, and use of, the environment, and as a rich source to be tapped into in order to gain new perspectives about the relationship between humans and nature.

However, our difficulty in approaching the knowledge from indigenous cultures is already reflected in the way in which we describe and name it. No universal definition is available, and many terms are used to establish what indigenous people know (Berkes, 1993), including traditional knowledge or traditional ecological knowledge, local knowledge, indigenous knowledge or science, folk knowledge, farmers' knowledge, fishers' knowledge and tacit knowledge. Each of these terms carries different implications, and there is an ensuing discussion about which one is the most appropriate. The word 'traditional', for example, places the emphasis on the transmission of knowledge along a cultural continuity, but might ignore the ability of traditional societies to adapt to changing circumstances. Another widely used word, 'indigenous', is meant to highlight the autochthonous nature of this knowledge, but it might overlook knowledge from populations who are not officially recognized as indigenous. The word 'local' can be applied to different geographic contexts, but it lacks specificity. At present, traditional ecological knowledge is interpreted as a cumulative body of knowledge, practices and representations that describes the relationships of living beings with one another and with their physical environment, which evolved by adaptive processes and has been handed down through generations by cultural transmission (Berkes *et al*, 2000).

Many indigenous populations have relied for centuries or even millennia on their direct environment for subsistence and autonomy. Over time, they have developed a way in which to manage and use their resources that ensures their conservation into the future. Such traditional societies are interested more in preserving their own social, cultural and environmental stability and integrity than in maximizing production. Consequently, there is no 'exploitation' of nature —which they do not consider as a collection of commodities—in the interaction between humans and natural milieu. On the contrary, their way of life is based on a strong sense of

interconnection and interdependence. This also applies to their social life. Ethics is explicitly part of the traditional approach. Relationships are based on reciprocity and obligations towards community members. Natural resource management is based on shared meanings and knowledge (Berkes, 1993). Activities in traditional societies often include a strong symbolic dimension in which every action is highly ritualized, and allow humans to participate in the preservation of the natural order. Of course, these rituals differ between cultures, as each society has its own belief systems, which determine its cultural identity and type of technology.

Traditional knowledge has developed a concept of the environment that emphasizes the symbiotic character of humans and nature. It offers an approach to local development that is based on co-evolution with the environment, and on respecting the carrying capacity of ecosystems. This knowledge—based on long-term empirical observations adapted to local conditions—ensures a sound use and control of the environment, and enables indigenous people to adapt to environmental changes. Moreover, it supplies much of the world's population with the principal means to fulfill their basic needs, and forms the basis for decisions and strategies in many practical aspects, including interpretation of meteorological phenomena, medical treatment, water management, production of clothing, navigation, agriculture and husbandry, hunting and fishing, and bio- logical classification systems (Nakashima & Roué, 2002). Beyond its obvious benefit for the people who rely on this knowledge, it might provide humanity as a whole with new biological and ecological insights; it has potential value for the management of natural resources, and might be useful in conservation education as well as in development planning and environmental assessment (The World Conservation Union, 1986).

Of course, I am not trying to assert the ideal of the 'noble savage'. Not all indigenous people have lived or are living in peace and harmony with nature; history has seen many cultures disappear after they had exhausted the environment's ability to sustain their population, such as the Maya or the Anasazi in the Americas. However, many existing traditional practices are ecologically healthy, and we can- not simply dismiss them as primitive and unscientific belief systems.

In all cultures, humans have gained knowledge by conceptualizing empirical observations to better understand nature, and thus interpret and predict it (Iaccarino, 2003). The problem is how to study and analyze indigenous knowledge and belief systems. Of course, we cannot depend only on their empirical aspects, but must embrace their specific world views. It is not possible to simply reduce them to practical knowledge that is exclusively based on experience as opposed to theoretical knowledge, which is developed through deductive or inductive reasoning. In any case, discovering the fundamental principles of dealing with nature in many far-off cultures is not an easy task. Western science—which is deeply rooted both in the philosophy of Ancient Greece and the Renaissance—and traditional knowledge systems have developed radically different strategies to create and transmit knowledge, and it is exceedingly difficult to analyze one form of knowledge using the criteria of another tradition.

Still, there is a vast body of literature on such comparisons between Western science and traditional knowledge systems, which has identified various characteristics and opposing views. Western science favours analytical and reductionist methods as opposed to the more intuitive and holistic view often found in traditional knowledge. Western science is positivist and materialist in contrast to traditional knowledge, which is spiritual and does not make distinctions between empirical and sacred (Nakashima & Roué, 2002). Western science is objective and quantitative as opposed to traditional knowledge, which is mainly subjective and qualitative. Western science is based on an academic and literate transmission, while traditional

knowledge is often passed on orally from one generation to the next by the elders. Western science isolates its objects of study from their vital context by putting them in simplified and controllable experimental environments—which also means that scientists separate themselves from nature, the object of their studies; by contrast, traditional knowledge always depends on its context and particular local conditions (Nakashima & Roué, 2002).

In general, traditional knowledge systems adopt a more holistic approach, and do not separate observations into different disciplines as does Western science (Iaccarino, 2003). Moreover, traditional knowledge systems do not interpret reality on the basis of a linear conception of cause and effect, but rather as a world made up of constantly forming multidimensional cycles in which all elements are part of an entangled and complex web of interactions (Freeman, 1992). Of course, there is always the risk of oversimplifying by reducing the things of interest to essentials and/or dichotomies. However, from this brief overview of the dissimilarities, we can gain an understanding of how hard it is
to compare two systems of knowledge that are so profoundly different. Trying to analyze and validate traditional knowledge systems by using external (scientific) criteria carries the risk of distorting such systems in the process. At the same time, we cannot extract just those parts of traditional knowledge that seem to measure up to scientific criteria and ignore the rest. This process of cognitive mining would atomize the overall system and threaten traditional knowledge with dispossession (Nakashima & Roué, 2002).

However, Western contemporary culture and philosophy does offer some interesting ideas as to how to deal with these problems. The Austrian- born philosopher Paul Feyerabend, for example, questioned the widespread assumption that only Western science holds the criteria to determine the truth. As Feyerabend pointed out, any form of knowledge makes sense only within its own cultural context (Feyerabend, 1987). Similarly, the British anthropologist Gregory Bateson has compared knowledge about the material world to a map and the terrain it describes: the map itself is not the terrain, but only one representation of it (Bateson, 1979). Just as different maps can give accounts of the same terri- tory, so too can different forms of knowledge about the material world. Its actual representation ultimately depends on the observer's view.

Contemporary hermeneutics—a branch of philosophy concerned with the theory of existential understanding and interpretation of texts—and, to a certain extent, complex thinking can offer useful approaches to compare different forms of knowledge and rationality. Complex thinking has provided new insights, and has contributed to a renewed interpretation of the concept of nature, and a new paradigm of science and epistemology. This new approach has brought a greater awareness of the short- comings of simple explanations in comprehending reality. It aims to overcome the limits of both reductionism and holism by integrating them into a wider perspective, which investigates the complex structure of interconnections and retroactive relationships in the real world.

According to the classic epistemological approach, the creation of knowledge is a process of qualitative refinement and quantitative accumulation. Its goal is to disclose the ultimate foundation—the 'meta' point of view from where we can see the ontological order and the objective truth—and to provide a neutral and universal language to explain natural phenomena (Ceruti, 1986).

Complex thinking has strongly questioned this notion of a meta point of view along with its heuristic value as a principle for the creation of knowledge. Instead, it seeks and analyses the web of relation- ships among different perspectives. This is continually redefined in a dynamic

process involving multiple points of observation and explanation. These places are fundamentally incommensurable, yet they can complement each other and be part of a constructive network. What matters, in fact, is the possibility of including multiple viewpoints that are vicarious in building a cognitive universe and can disclose a more complete picture of reality.

In this context, the hermeneutical notion of a 'horizon' as expressed by the German philosopher Hans-Georg Gadamer seems to be highly relevant: "Horizon is the range of vision that includes everything that can be seen from a particular vantage point" (Gadamer, 1960). Rationality intrinsically works from this point, which starts the process of comprehension through which we can interact with other and different horizons, and ultimately expand our own knowledge horizon.

The encounter between different cultures and knowledge systems can then be regarded as an encounter between different macrohorizons; such systems come from different traditions, and each has its own way of understanding phenomena and its own 'logic' that allows the observed phenomena to be placed within an overall vision. Nevertheless, all representations of reality are expressions of the same cognitive features that are inherent in human nature.

Traditional environmental knowledge is an important part of humankind's cultural heritage—the result of countless civilizations and traditions that have emerged over human history. This cultural diversity is as important for our future as is biodiversity. It is a potential source of creativity and enrichment embodied in several social and cultural identities, each of which expresses its uniqueness (United Nations Educational, Scientific and Cultural Organization, 2002). However, European colonization has eroded and destroyed much of this traditional knowledge by replacing it with Western educational and cultural systems. The trend towards a global culture might even worsen this situation and enhance a process of cultural homogenization.

Scientific knowledge has long held a central role and attained a dominant position in our developed societies, but we cannot ignore the fact that other valid knowledge systems exist. The imposition of Western scientific ideas and methods not only causes disruption to existing social and economic relationships, but also might spoil the local knowledge. Allowing science to be the final arbiter of the validity of knowledge, and to establish the threshold beyond which knowledge is not worthy of its name, would create the conditions whereby an astonishing cultural heritage is transformed into a monolithic structure. Instead, we would be better advised to recognize the value of this heritage, and to devise strategies for its preservation for the benefit of present and future generations.

First, a renewed approach to dialogue among cultures is required. Such a dialogue can only take place if there is a common principle shared by all participants. All humans from all cultural backgrounds have the same biological nature. At the same time, however, a dialogue is only possible because there is diversity at various levels. Eliminating these differences or staying in rigid isolation eliminates the conditions needed for a potentially mutually beneficial converse.

By acknowledging the uniqueness of each knowledge system, we can go well beyond a mere pluralist approach to knowledge. Dialogue can become a tool for social cohabitation, as well as for dis- covering and enhancing knowledge. It should be based on a sense of profound hospitality because it arises from different identities and traditions, which are interested in exchanging their perspectives and experiences. This should not be anathema to Western science—in fact, it is through dialogue that new insights have emerged from the ancient Greek academies to today's laboratory meetings and scientific conferences. In this sense, a dialogue

can catalyse the development of shared meanings, which are key factors in binding people and societies together as vehicles of social cohabitation (Bohm, 1996).

The real world is too complex to be compressed into static conceptualizations. Dealing with this complexity requires approaches and strategies that maintain a continuous openness and willingness to discover and learn (Morin, 1990). This dialogue should take place with the unknown and the otherness. By shifting our perspective, and looking at other paths to knowledge that humans have developed and lived, we might create the necessary conditions for hitherto unknown knowledge to be revealed. All of these perspectives describe the human experience of reality. We need to open ourselves to participating in the experience of others, and yet we should also be aware that this opening can only start from where we already are—from our point of view or the tradition to which we belong. Our historical and culturally embedded perspective has been described by Gadamer as the "initial directedness of our whole ability to experience" (Gadamer, 1967). Nevertheless, from our delimited horizon we can still accept the invitation of other paths to knowledge and might well learn from them.

For example, some authors (Freeman, 1992; Iaccarino, 2003) have suggested that traditional knowledge systems can be helpful in dealing with complex systems: "The understanding of complex systems remains a major challenge for the future, and no scientist today can claim that we have at hand the appropriate methods with which to achieve this. Thus, we can- not discuss the future of science without taking into account the philosophical problems generated by the study of complexity. Modern, or Western, science may not be best suited to fulfill this task, as its view of the world is too constrained by its characteristic empirical and analytical approach that, in the past, made it so successful. We should therefore remember the contributions of other civilizations to the understanding of nature. [...] Such traditional or indigenous knowledge is now increasingly being used not only with the aim of finding new drugs, but also to derive new concepts that may help us to reconcile empiricism and science" (Iaccarino, 2003).

There is little doubt that modern science can gain a lot from such a dialogue. It has been extremely efficient in studying specific aspects of the natural world— those that are achievable through observation and experimentation—but operates in an environment that is either strictly con- trolled, such as a laboratory, or highly simplified. This approach is crucial in order to make generalized claims about the validity of scientific propositions, because it allows hypotheses under the same or highly controlled conditions to be tested and verified. However, an increasing number of critical voices argue that an approach based on reductionism—as helpful as it has been in the past—might no longer be sufficient to analyze and understand higher levels of complexity (Kellenberger, 2004; van Regenmortel, 2004). Moreover, scientists work only at specific levels of analysis. The theories formulated at each level are based on key observations, and, therefore, can explain only a specific set of facts (Iaccarino, 2003). Hence, the integration of methods and results from different approaches and levels of analysis can become essential.

These considerations seem to be particularly relevant for studying biological, eco- logical and social phenomena that include different levels of complexity. As already mentioned, the Western tradition of thinking is developing a different approach to gaining knowledge from complex systems, but it would be equally useful to learn how traditional approaches explain such complexity. Not only are they more holistic, but also they seem to be better suited to coping with the uncertainty and unpredictability that are viewed as intrinsic characteristics of natural systems. Western science and traditional knowledge constitute different paths to knowledge, but they are rooted in the same reality. We can only gain from paying attention to our cultural history and richness.

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What is an Oral Narrative?

Tlingit oral narratives contain many layers which enrich our knowledge and imagination. On one level, these stories are great entertainment. Some Tlingit narratives explain how aspects of our world came to be. Other oral narratives relate epic adventures of specific clan ancestors. Stories involving Raven often include humorous exploits which may lead us to reflect upon respectful treatment of others. However, oral narratives were not told solely for entertainment.

Many oral narratives have been written down. Some are written down exactly as they are told and therefore sound like the storyteller. Others have been changed over time to sound more like stories. Oral narratives are best when you can see and hear the storyteller who can make an oral narrative come to life.

In the past, oral narratives were used to convey many forms of knowledge. Oral narratives teach about place names, property, geography, and science. From these stories, younger generations would learn about food preparation, the ebb and flow of the tides, and behavioral patterns of hunted mammals. Many of these stories assisted in the teaching of life skills such as navigation an obtaining food from the land. In addition, oral narratives were used to convey traditional values and social responsibility: They explore human nature and may involve concepts of identity, alienation and isolation, coming of age, loyalty, pride, loss, and other conflicts humans experience throughout life. These stories are spiritual, intellectual gifts which have been passed down from esteem ancestors. Like all good literature, Tlingit oral narratives can be used to enhance content learning in the classroom. These stories can be used as a springboard to teach history, geography, science, mathematics, Tlingit heritage language, reading, writing, and more.

The Gift of Tlingit Stories

When you hear a Tlingit story it is a gift. You may be hearing a story that does not belong to you. This story may be over one thousand years old. The story might even tell about the history of the clan who owns it. Be sure to show respect for this gift. Listen with your heart and show appreciation for the story teller.

Types of Tlingit Stories

- Oral Narratives
- Songs
- Dances
- Totem Poles

Paraphrase in your own words the significance of oral narratives:

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_____

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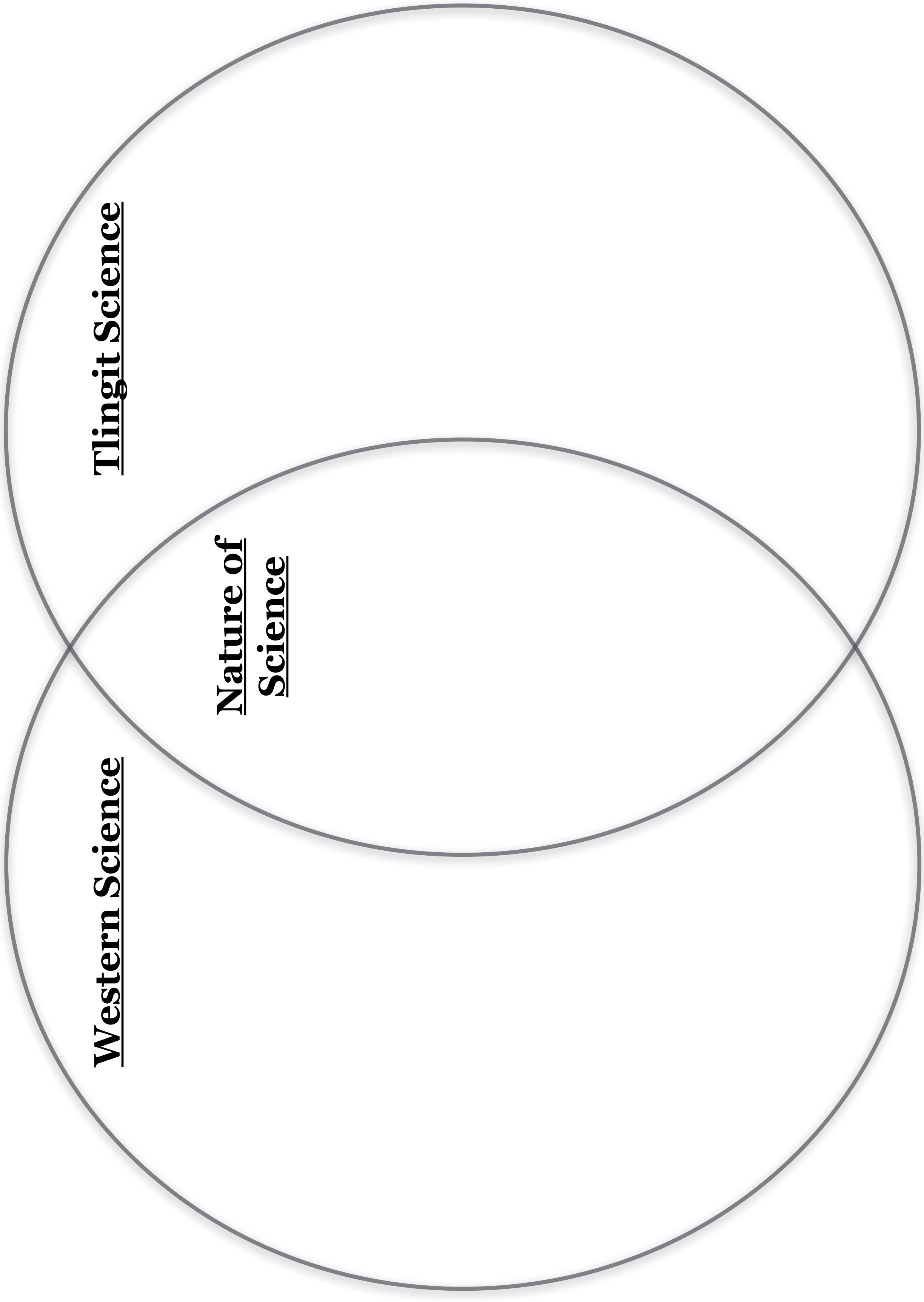
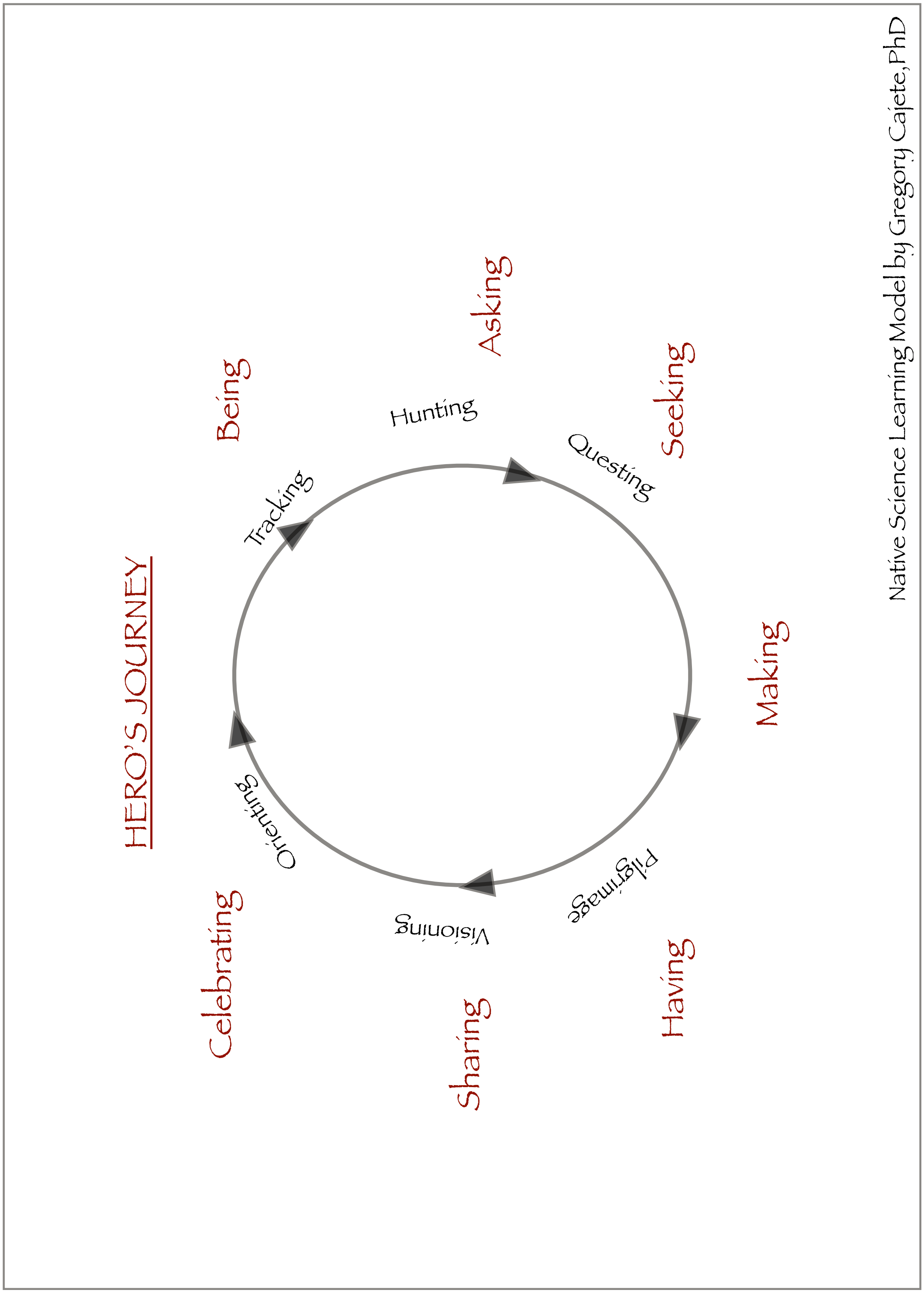
_____

Note: *Tlingit oral narratives are the property of specific clans. Many stories require permission before they are shared.*

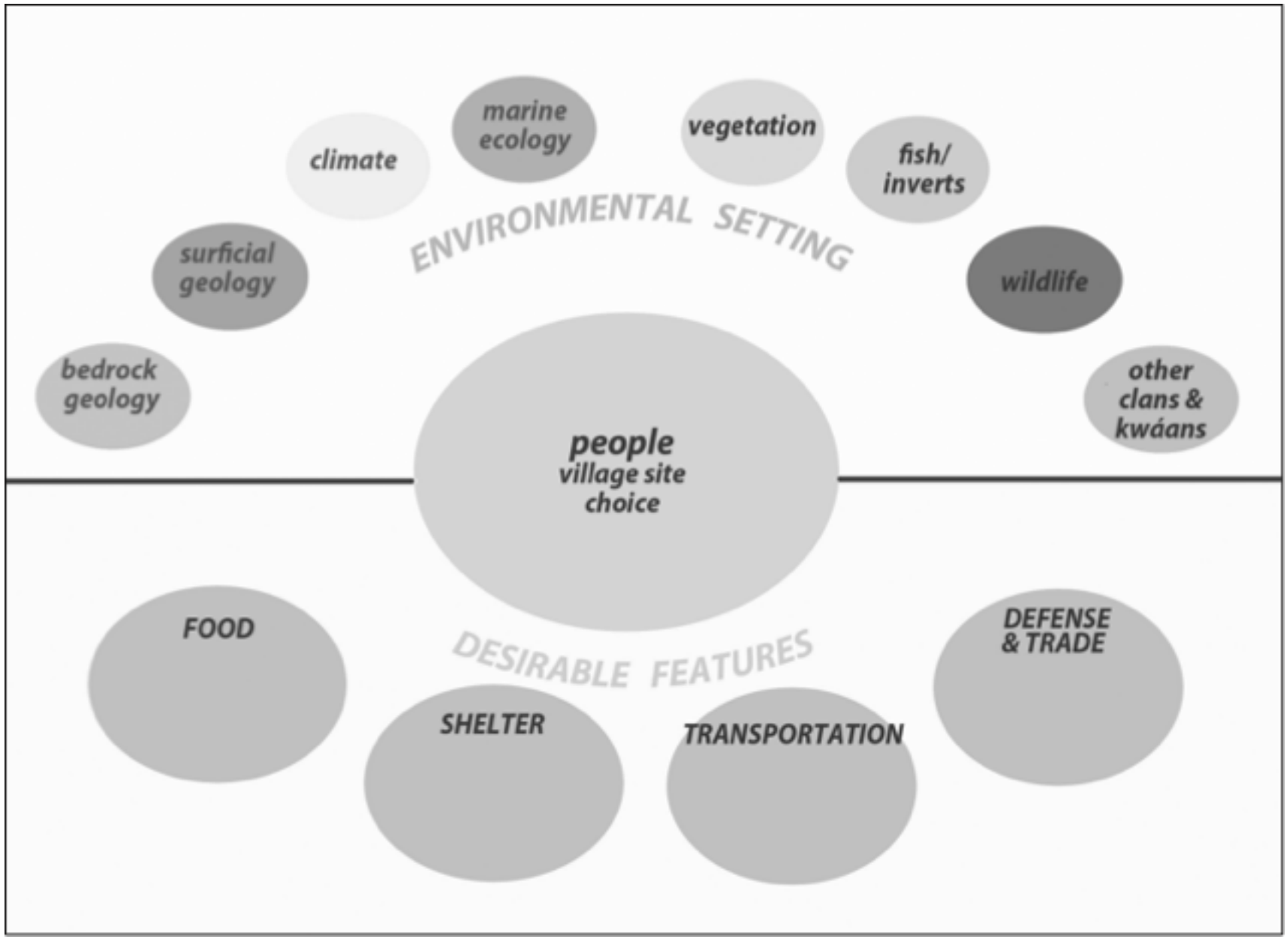

Tlingit Science
Nature of Science
Western Science


HERO'S JOURNEY
Being
Asking
Seeking
Making
Having
Sharing
Celebrating
Tracking
Hunting
Questing
Pilgrimage
Visioning
Orienting
Native Science Learning Model by Gregory Cajete, PhD

Final Project Rubric: *Community Site Selection & Presentation*	**Name:** **Group Members:**	
Grading Criterion (3 points/each)	No	Yes
Preparation: Student utilized the siting factor guidelines and project rubric to organize & plan their work.		
Focus on Task: Used time well, focused on the project, worked well with others.		
Essential Question: Created an original, interesting way to address the essential question in their presentation.		
Identity: Individuals introduce themselves by presenting their lineage (either through a Tlingit or English introduction), acknowledge Tlingit aani and the land they stand, and their migration history to this place to the best of their understanding.		
Audience Awareness: Design, vocabulary, audio, and graphics fit target audience		
Voice Consistency: Voice quality is clear and audible throughout the presentation		
Voice Pacing: The pace fits the information presented and draws the audience into the story.		
Narration: Each member narrates a section within the presentation. Tlingit and English names of sites are given.		
Imagery: Each individual selects at least three images of their site selection. • Map highlighting the location of both the winter and seasonal sites • Satellite image of the specific coastline • ShoreZone images of their specific site locations.		
Detail: Presentation has exactly the right amount of detail-not too short or too long.		
Highlights: Each community site will have a strong feature to highlight (gardens, canoe beach, summer food preparation site, fresh water, etc). Groups will need to identify the component to highlight and incorporate additional information learned throughout the unit.		
Purpose: Establishes purpose early and maintains that focus throughout.		
Duration: Group presentation is between 3 to 5 minutes in length.		
Requirements: Product includes all required elements.		
Total Points (42 points available):		

Aak'w Kwaan and Taak'u Kwaan map created by Richard Carstensen of Discovery Southeast based off of Haa Léelk'w Hás Aaní Saax'ú: Our Grandparents' Names on the Land. Edited by Thomas F. Thornton. 2012.

Siting Factor Diagram created by Richard Carstensen of Discovery Southeast



Ká<u></u>k'w
Shaadaax' <u></u>éidá<u></u> sh kalneek

Basket Bay History
As told by Robert Zuboff

This text is prepared and contributed by Naatstlaa (Constance Naish) and Shaachooka (Gillian Story) as a memorial to Shaadaax' (Robert Zuboff) who gave so much help in their early student of the Tlingit language upon which the present system of writing Tlingit is based.

Yú haa aani áyú,
yú haa aani,
Ká<u></u>k'w áyú yóo duwasáakwñ
Dleit K<u></u>áa <u></u>'éina<u></u> k<u></u>u.aa,
Basket Bay.
A áyú, tsaa áyú áa shadu<u></u>ishdeen,
yú tl'átk.
Tla<u></u> kasiyéiyi yá<u></u> áyú yatee yú tl'átk.
Yándei yaa k<u></u>aleéinin áyú,
tléiná<u></u> yateeyi aa k<u></u>áa áyú,
kandu<u></u>éich.
Yú k<u></u>ées' áyú,
k<u></u>úna<u></u> a káa yan woodáaych.
Yá aan tayeedéi,
téil kagánee káax' ana.átch,
yá aan tayeedéi.
Yá Tus'k<u></u>oowú eexayáak,
yá Kaakáakw, a shakana<u></u>.aaná<u></u> áyú,
a shakana<u></u>.aaná<u></u> yá Kaakáakw, a
shakana<u></u>.aaná<u></u> áyú yoo aya.átk,
yá aan tayeedéi.
Dzeit áyú áa wduwa<u></u>út',
aatlein;
aas áyú.
Ayú dzeit<u></u> wududliyéx.
Ana<u></u> áyá yaa ag<u></u>a.átjeen yóo aan tayeedéi,
téilx' k<u></u>aa jee yéi nateech; aadéi
akdulgánch.
A káax' áya shadu<u></u>ísht yá tsaa,
yá aan tayeex'.

That land of ours,
that land of ours
is called Ká<u></u>k'w;
but in English
Basket Bay.
You know, they used to club seals,
at that place.
That place is kind of strange.
When the tide was almost out
they would send
one man as guard.
People would keep
a watch on the tide.
They would go underneath the village
in a grotto, by the light of sapwood,
underneath the village.
Down the bay from Shark's Cave,
to the head north of Kaa<u></u>áakw,
to the head north of this they would
cross over
to go under the village.
A ladder was adzed there
a huge one;
it was a tree.
This is what was made into a ladder.
This is what they came down on to go
underneath the village.
Sapwood torches were held; they would
be lighted.

Ldakát yéidei át áá át woodaháaych yá diyée.
A áyá yá kées' latini ku.aa áyá át kugasteech;
tlénáx áyú yú hit éegi yan aa uhaanch.
Tléináx áyú yú hit káx' aa ganúkch.
Nás'gi aa áwé ku.aa, áa yax haan áwé Kaakáakw shakée;
daax'oon aa áwé,
ch'u tle wé wool x'éi yax haan.
Ch'u tle éekdáx yaa wunadéini teen áwé,
kei at'aa.ix'ch,
"Dei éekdáx yaawadáaaaaa."
Ch'u tle yóo hit kát aa,
aa x'éit was gadutéenin,
"Eekdáx yaawadááááá."
Yéi áwú has du xoox yaa gaxixch.
Ch'u tle yá hóoch'i aayich áyá, anax...
aan yá woolnáx áyá yéi yaa yaxdagichch,
"Dei éekdáx yaawadáaaaa."
A káax' áyá,
yá kan jáagadi,
yá a leikachóox'unáx áyá kindei shaduxóot,
yá tsaa yoowú.
Anax áyá du.úxs'.
Tle x'adus.aaxw;
Tle x'adus.aaxw;
Tlax kúnáx áyú yasátk yú haa yee.
Oowayáa, yaa shanats'it'i yáx áyú nateech aadéi yasatgi yé.
Ch'u tle x'éix dushadi yáx áyá yoo yaneek,
yá has yee.
Ch'u tle tlax kúnáx áyú yéi jidunéi nooch,
yá kan jáagadi daax'.
Ch'u tle yándei yaa yéi ndusneeni teen áwé,
tláakw áwé,
kindei yóo dzeit kát áwé kaa ugookch kagit tú áyá;
áwé ch'a wé téil káax' áyá át kaa lunagúkch.

"

By the light of this they clubbed seals,
underneath the village.
Many different kinds of animals would gather down there.
And you know, there would be tide watchers.
One would stand out on the beach.
One would sit on the top of a house.
The third one would stand at the arch of Kaakáakw;
the fourth one
would stand right at the mouth of the hold.
As soon as the tide started coming up
he would cry out,
"The red cedar is starting uuuuup."
As if it were put in his mouth
the one sitting on top of the house repeated
"The tiiiiiide is starting uuuuup."
This was how they passed the word.
The very last man
would red red red cedars head down the hole with the words,
"The tiiiiiide is starting uuuuup."
Accordingly,
men would pull up the seal stomachs
through the throats
of their kills.
They would blow them up through the throat.
They tied them off;
they tied them off;
they tied them off.
The tide comes in under us very quickly,
like filling a container to the brim is how quick it is.
It's like cutting off any escape
under us.

Ch'u tle áyá a nák neil oo.aatch
yá kaa jáagadi.
red cedar yaa red cedar áwé red cedar,
Yankaadéi yaa kgadéinin,
aagáa áwé yá kaa red cedar,
yá Goon X'aak'ú red cedar áwé
red cedar anasgook nooch,
yá kaa jáagadi.
Ayá, yéi áyá,
Ch'u tle red cedar yaakw a káa daak kuxji
nooch.
Yéi áyá dutláakw,
a daat át,
yá Kák'w, aadáx haa ádix siteeyi yá,
aadáx haa ádix siteeyi yé.
Naaléi,
dei ch'áakw áyá,
dei ch'áakw,
aadáx haa dutlaagú;
ách haa dudlisáakw,
Kak'weidi.
Shóogoonáx,
aadéi yóo at kawdiyayi yé,
yá Lingit,
shayadiheni aa yéi sh kalneek
yá ixkéenax áyá,
haat haa wsidák,
yá ixkée.
A áyá shayadiheni aa,
Shtax'héen yiknáx yaa wsidaak,
Shtax'héen yiknáx.
Yá ax éesh hás has dutlakw nooch,
yá Sthtax'héen yiknax, yaa has wusdaagi.
Tléix' yateeyi yé áyú áx',
yá héen,
sit' tayeedéi naadaa.
Ax' áyá wududlis'it yá xaanás'.
A káx' áyá yéi has wuduwa.oo
yá shaanáx'w sáani.
Awasti yóo aa wduwasáakw

They would work very hard,
on this kill of theirs.
No sooner would they finish the last
one than they would run
quickly;
they would run up the ladder in the dark;
only by the light of the sapwood
would they run up.
They would even go home from their kill.
When the tide was finally nearly up,
when the tide was nearly up,
was when out from the village, in the
bay,
in front of Spring Water Point
their kills would pop up out of the water.
You know, this is the way it was.
Then they would just get them by boat.
This is how the history is told,
about
Basket Bay, from the time it's been ours,
from the time it's been ours,
ages.
It was long ago,
it's been long,
since the histories have been told of us;
we are named for it,
red cedar.
For the things that happened
to the Tlingits
in the beginning,
many say
we migrated here
through the south,
the south.
And, you know, there are many
who migrated down the Stikine
River,
down the Stikine River.
The story of my fathers is always told,
of when they migrated down the Stikine.

yá shaanáx'w sáani.
Hás áyá shóogoonáx yá sit' tayeedéi daak has wuduwagúk.
A tayeenáx has galháash áwé héinax.aadei
kei has at kaawashée.
Yá sit' tayeenáx has wulhaashi áyá
át has shukawdlixúx.
A káax' áyá,
xaanás' yéi wdudzinee.
A kaadéi aa woo.aat.
A tayeenáx áyá yá si' tayeenáx áyá
kuwlihaash,
yá ixdei.
Tsu shayadiheni aa ku.aa áyá
áa akawdlixéetl'.
yé sit' tayeedéi wulhaash.
Ach áyá a kát aa uwa.át,
yá sit' kát aa uwa.át,
Sit'ká á,
Sit'ká, yóo kuduwasáakw,
A áyá Jilkáatnáx yeik uwa. át
yá ax éesh hás xoonx'i,
yá Dakl'aweidi.
Jilkáatnáx yeik uwa.adi aa.
Yá uháan,
yá Deisheetaanx haa sateeyi,
ch'a yaadachóon áyá,
yéi has akanéek,
yá ixkéenáx áyá,
yá ixkéenáx.
Goot' aanáx sé kwshé yeik wutuwa.át uháan.
Goot'á sá kwshé anax yeik wutuwa.át.
yá nándei,
gunayéi kuwtuwashée,
Shayadiheni yé kawduwa.aakw.
Shayadiheni yé aanx wududliyéx.
Wé gaaw áwé,
yé Xutsnoowú yax'áak,

At one place, there,
in the river,
the river flowed under a glacier.
This is where they tied a raft together.
They put the elderly women on it.
One's name was Awastí and the other Koowasíkx,
these elderly women.
They are the first ones who were pushed under the glacier.
Having drifted under it and through to the other side,
they started singing.
Floating under the glacier
gave them their song.
Based on this
a raft was made.
Some went on it.
Under it, under the glacier, they floated,
down the river.
But many of them
were afraid
to float under the glacier.
This is why they started over it,
some started over the glacier.
These are the ones who came down the Chilkat, the relatives of my fathers,
the Dakl'aweidí.
They became the Chilkats.
The name that came from those who went over the glacier
is Sit'ká indeed,
those who came down through Chilkat, are named Sit'ká.
Those of us
who are Deisheetaan,
still
tell it like this,
as coming from the South,
from the south.

yá Xutsnoowú yax̲’áak,
yax̲ ilt’éex’,
t’éex’ kát aa uwa.át,
wé gaaw áwé,
aag̲áa daak k̲uwligas’i yé.
Ha! shayadiheni aa yá haa x̲oonx’i,
yá Deisheetaan,
yá dáak̲ káx’ yéi aa dax̲yatee.
Ch’u ch’áagudáx̲,
áa yéi has yatee.
Shayadihéin,
yá Nahóowu, áa yéi yatee,
k̲a yá ax̲ ssayi,
Shaadaax’ tsú áa yéi yatee,
yá dáak̲ ká.
A áyá a daa yoo tux̲atángi áyá, hás,
ch’u ch’áagudáx̲ áa yéi s teeyi,
has du een gé yá woochdáx̲ haa wusdaag̲éen.
Yéi áyá a daa yoo tux̲atangi nooch.
Ach yá éil’ kát haa kawdiyáa,
uháan k̲u.aa.
Ch’a yéi áyá x̲’akk̲wanáak̲,
yá sh kalneek.

I wonder where we came out, those of us.
I wonder where we came out.
From there we finally went northward,
northward,
we began searching.
They tried many places.
Villages were founded in many places.
At that time
across from Brown Bear Fort,
when it froze,
they walked over ice
at that time,
at the point when they moved across.
Well! There are many who are our relatives,
these Deisheetaan,
some are living in the Interior.
Since long ago,
they have been living there.
They are many,
Nahóowu lives there
and this namesake of mine.
Shaadaax’ is also there,
in the Interior.
You know, thinking about them,
if they’ve been living there a long time,
maybe we separated and migrated from them.
This is what I”m thinking about them.
This is why we
gathered here on the coast.
This is where I will end
this story.

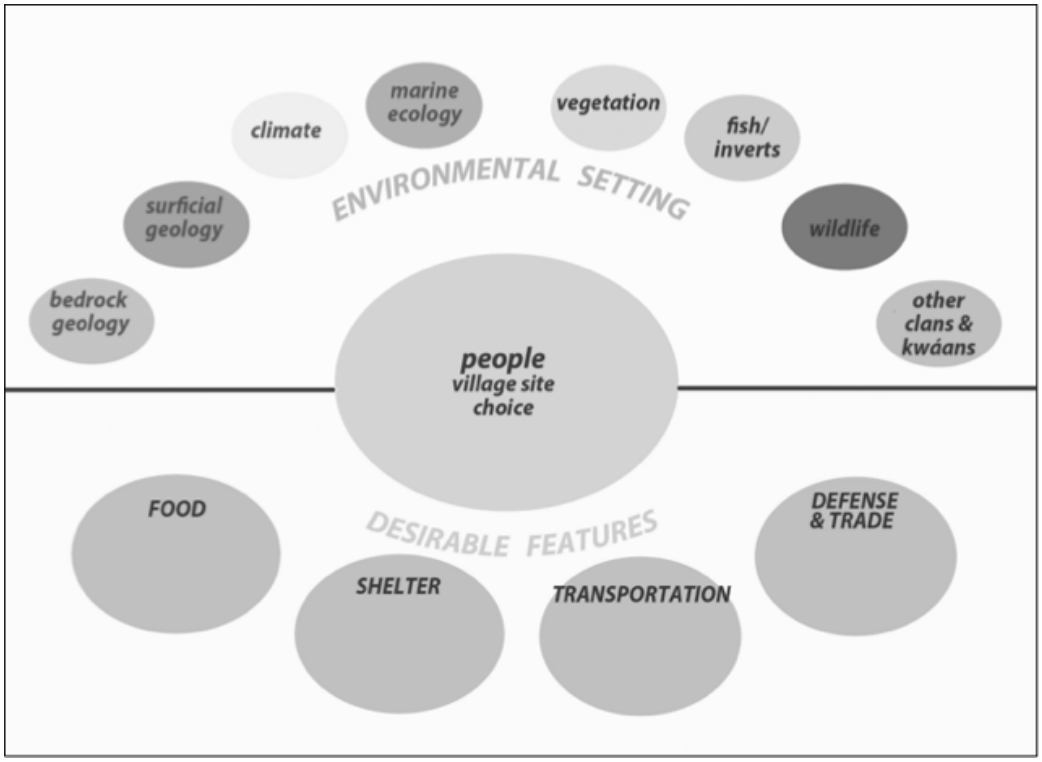
Basket Bay History

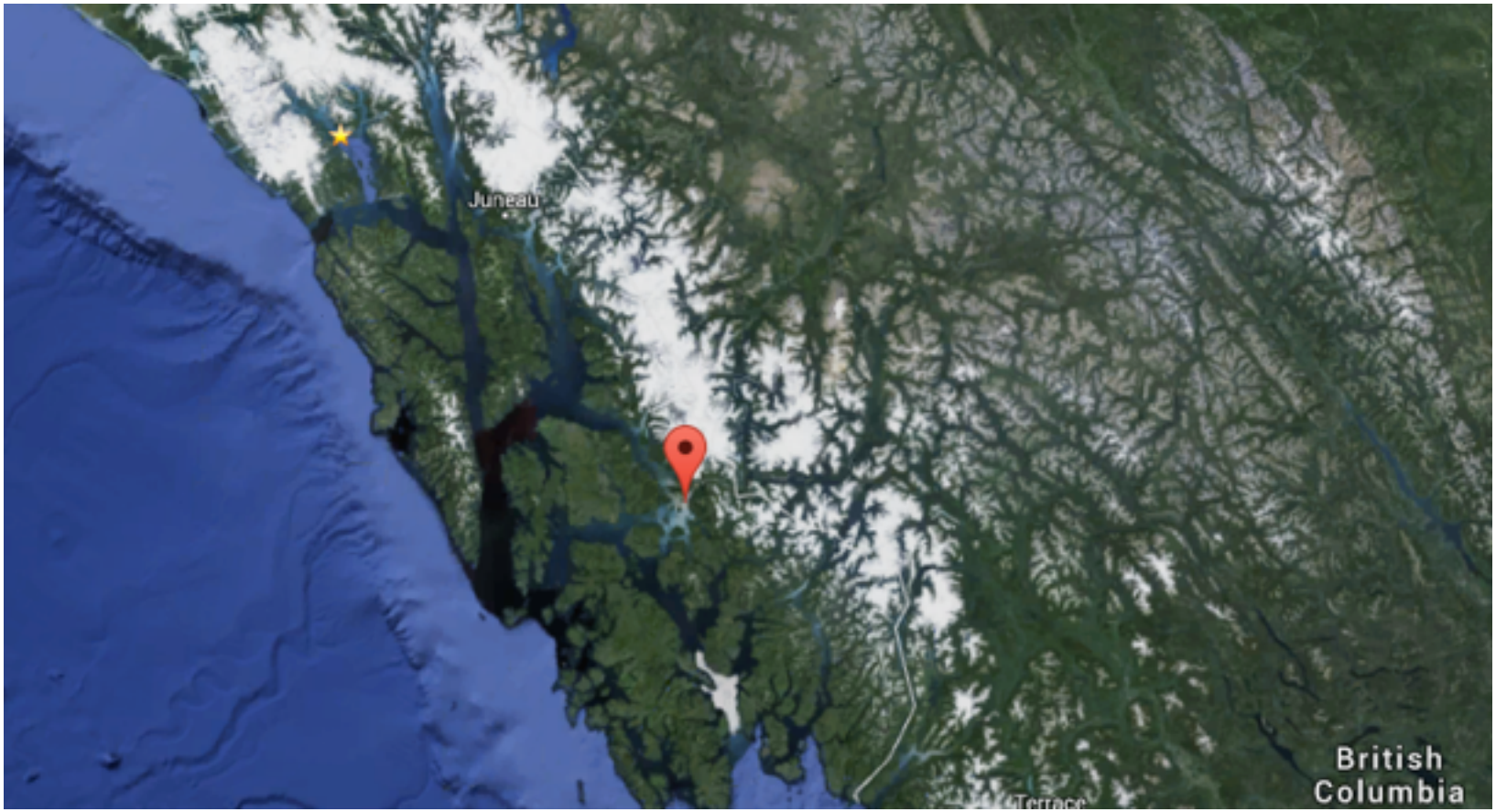
As told by Robert Zuboff in Nora Marks Dauenhauer & Richard Dauenhauer's Haa Shuká, Our Ancestors: Tlingit Oral Narratives.

As you reread Robert Zuboff's narration of *Basket Bay History*, mark the text and annotate thoughts, comments or questions on the side of your copy. Use your notes to answer the following questions:

1. **Write in the Tlingit name for Basket Bay on the map below.**

1. **2. Fill in the diagram with the ecological conditions mentioned in the oral narrative (only lines 1-81).**





The red balloon indicates the Stikine River near Wrangell mentioned in the *Basket Bay History* story and the gold star represents Glacier Bay, Chookaneidi and Deishetaan ancestral lands in the science journal you will read. Mark with your pen the approximate location of Kák'w just south of what is now called Tenakee Springs.

SITING FACTORS FOR SEASONAL & WINTER VILLAGES
CONSIDERED AT KWÁAN & TONGASS SCALES

Outline designed by Richard Carstensen: Discovery Southeast

This outline approaches the question of village-&-campsite choice from 2 perspectives. The first part, called *desirable features* is what, ideally, we would LIKE to have. The second part, *environmental setting*, presents categories an ecologist or geologist would use to describe what we ACTUALLY have.

DESIRABLE FEATURES

food

access to resources, and means of storage

- freshwater
- proximity to pink & chum streams; more the better for multiple clan house ownerships
- clam gardens, seaweed/gumboot beaches
- intertidal richer in S & outer coast; estuaries & uplift meadows better in N, near glaciation
- some plants considered "wild" were actually stewarded: kóox (*rice root*), tséit (*silverweed*), yaana. eit (*wild celery*), t'óok'(*nettle*).
- only acknowledged pre-contact domestic crop was tobacco, but this probably underestimates Tlingit horticultural practices (pre-Russian potatoes)
- post-contact, introduced root crops grew popular: turnips, carrots, etc. As with previous "wild" harvest, best sites were uplift meadows.
- food storage attributes: breezy & low precip for drying; easy digging for storage pits

shelter

suitable substrate & microclimate, access to materials

- harbor protected from wind/waves (more abundance S of Frederick Sound)
- uplift beaches best for drainage, level housesits, ease of digging (more abundant in N, near glaciers)
- red cedar for lodge planks, fiber (spruce was workable but distinctly second-choice)
- firewood; especially challenging prior to iron tools, may have enforced frequent village-shifting
- dilemma of cozy coves vs. defensive visibility; see below

transportation

easy launching, friendly waterways, access to canoe wood or trade thereof

- moderate gradient sand or gravel beach for haulouts, protected from wind, surf & currents
- redcedar for canoes (spruce was second choice)
- cottonwood on transboundary rivers
- intricate, fine-scale waterways (more abundanct in S; channels in N wider & more exposed)

defense & trade

location relative to social threats & opportunities

- defensive visibility; fort proliferation ~1500yrs BP; villages move from coves to points
- proximity to trading partners; family among neighboring kwáans, control of transboundary rivers
- distance from brown bears-RC hypothesis; central villages larger and fewer on ABC islands

*location relative to **physical** threats (ie. the opposite of foregoing, which is location relative to desirable features*

*location relative to **physical** threats (ie. the opposite of foregoing, which is location relative to desirable features)*

- avalanche (destroyed several villages, esp in N)
- tsunami (Lituya)
- river outburst floods (Alsek, Taku)

ENVIRONMENTAL SETTING

bedrock geology

parent material has strong influence on:

- soil productivity > veg > fish & wildlife diversity
- mountain steepness (is flat or steep "better?")
- defensible bluffs, view shed
- lake abundance & character
- beach accessibility

surficial geology & soils

consider these basic unconsolidated landforms:

- marine
- glacial
- alluvial (stream & river)

siting considerations for:

- canoe access
- longhouse foundations
- food-storage pits & lagoons
- gardens

climate

quite variable throughout Southeast and even at kwáan scales:

- wind (prevailing direction, storm exposure)
- precipitation (in SE, less is better)
- sun exposure (southerly, no mts to S)

marine ecology/oceanography

gradient from outer-coast (full salinity, exposed) to mainland rivers (dilute, protected)

- currents/upwellings (e.g. Aangóon)
- wave exposure
- harbors/travel routes (best in S)
- kelp beds, edible algae (best outside & S)
- plankton blooms (fish prey base, PSP issues)

vegetation

wild and cultivated foods, meds, timber, fiber, etc

- salt marshes & uplift meadows
- berry patches, role of disturbance
- the great "red cedar divide," consequent

fish & marine inverts

tied to oceanographic gradient, glacial proximity, stream-channel characteristics

- ubiquitous (all kwáans)
  - salmon runs (especially sockeye lakes)
  - halibut holes
  - beach food
- unique resources (important inter-kwáan trade)
  - herring, especially roe
  - hooligan, for oil

wildlife

pre-firearms, marine mammals more accessible than terrestrial, overall

- seals, especially near glaciers & glacial rivers
- sea otter (fur trade, pre & post contact)
- deer; inverse relation to glaciers & wolves, often hunted in water
- goats; wool-gathering (especially by Jilkáat)

inter-kwáan trade & clan relations

kwáan territory can only be understood in relationship to that of competing and cooperating neighbors

- *trading rivers*
- *canoe-range (kwáan centers-1 day apart in norther Southeast)*
- *fort sites (proliferation throughout neoglacial)*

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Glaciers and Climate Change: Perspectives from Oral Tradition

JULIE CRUIKSHANK

(Received 18 September 2000; accepted in revised form 15 January 2001)

(pg 377) ABSTRACT. *In northwestern North America, glaciers figure prominently in both indigenous oral traditions and narratives of geophysical sciences. These perspectives intersect in discussions about global warming, predicted to be extreme at Arctic and Subarctic latitudes and an area of concern for both local people and scientists. Indigenous people in northwestern North America have experienced climate variability associated with the latter phases of the Little Ice Age (approximately 1550–1850). This paper draws on oral traditions passed down from that period, some recorded between 1900 and the early 1950s in coastal Alaska Tlingit communities and others recorded more recently with elders from Yukon First Nations. The narratives concern human travel to the Gulf of Alaska foreshore at the end of the Little Ice Age from the Copper River, from the Alaska panhandle, and from the upper Alsek-Tatshenshini drainage, as well as observations about glacier advances, retreats, and surges. The paper addresses two large policy debates. One concerns the incorporation of local knowledge into scientific research. The second addresses the way in which oral tradition contributes another variety of historical understanding in areas of the world where written documents are relatively recent. Academic debates, whether in science or in history, too often evaluate local expertise as data or evidence, rather than as knowledge or theory that might contribute different perspectives to academic questions.*

Key words: *environmental change, exploration narratives, Gulf of Alaska, Little Ice Age, oral tradition, science studies, traditional knowledge, Yukon*

The glaciers creep like snakes that watch their prey, from their far fountains,
Slow rolling on.... Percy Bysshe Shelley, "Mont Blanc" (1816)

In one place Alsek River runs under a glacier. People can pass beneath in their canoes, but, if anyone speaks while they are under it, the glacier comes down on them. They say that in those times this glacier was like an animal, and could hear what was said to it... Deikinaak'w, speaking at Sitka in 1904 (cited in Swanton, 1909:67)

The climate system is an angry beast and we are poking at it with sticks! Wallace S. Broecker (cited in Stevens,1998:F1, F6)

(pg 378) *Athapaskan and Tlingit oral traditions attribute to glaciers characteristics rather different from this discovered through science. Glaciers have long provided travel routes that enabled human connections between coast and interior, and they are characterized by sentience: they listen, pay attention, and respond to human behavior-especially to*

indiscretion. One serious prohibition in the Yukon, for example, concerns "cooking with grease" (Smith in Cruikshank et al., 1990:209), and elders have frequently expressed dismay at the ida of overnight campers and hikers' frying bacon near glaciers in the national parks now inscribed on this region. The historical and cultural crevasses separating these narratives seem so deep that they rarely intersect. Yet, glaciers figure prominently in both indigenous oral traditions and the narratives of geophysical science and the two different approaches collide in unexpected ways in contemporary discussions about climate change.

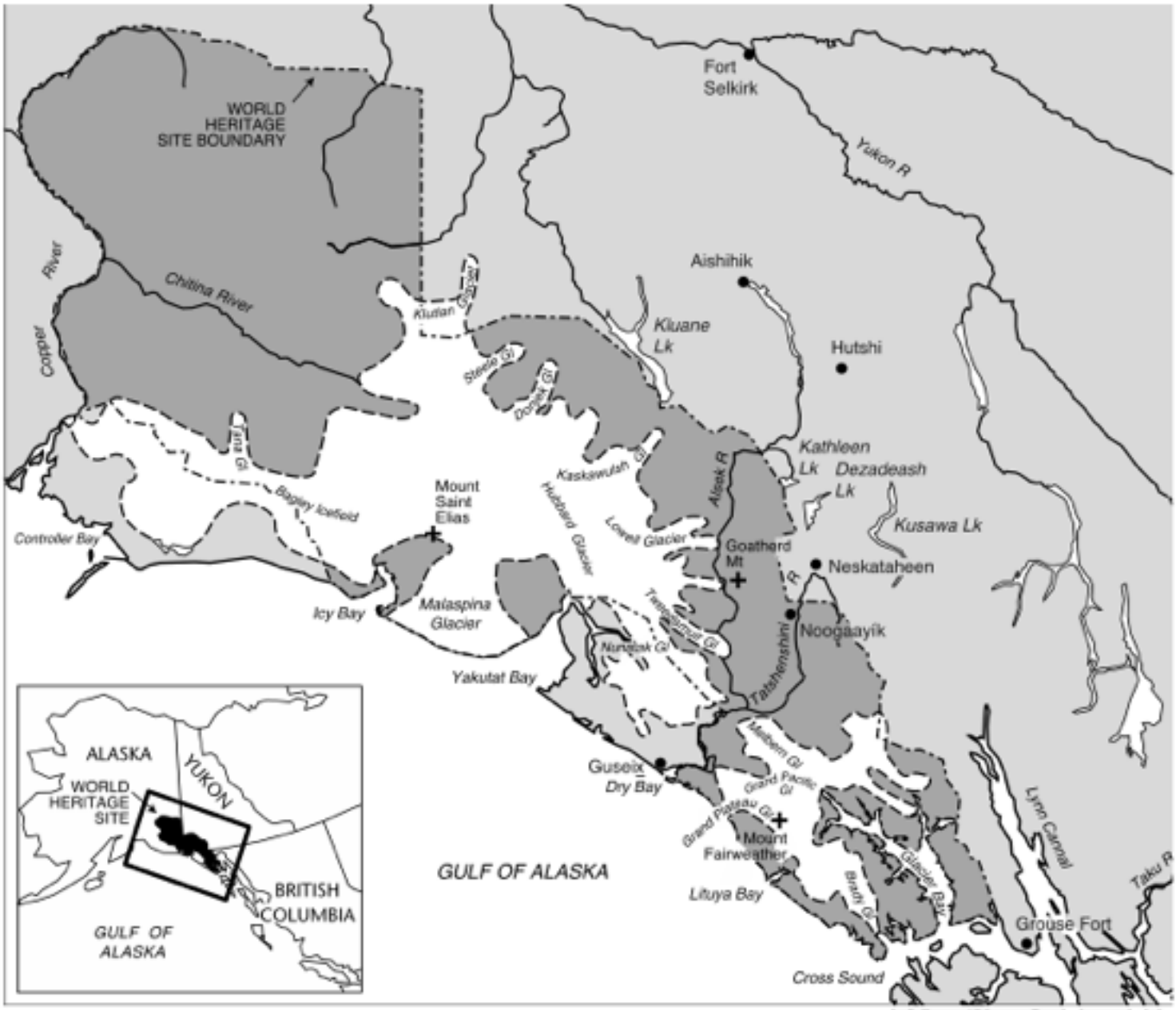


FIG.1. Map of the Gulf of Alaska and southwest Yukon, indicating the approximate extent of present glaciers and the World Heritage Site Boundary. Prepared by Eric Leinberger.

(pg 387) Clan narratives tell of river travel under ice bridges to the coast on every major river in this region. Deikinaak'w reported this for the Alsek (Swanton, 1909:67), and de Laguna also heard how Tlingit traders from Dry Bay traveled upriver over a portage on the west side of the Alsek and paddled downstream under glaciers (de Laguna et al., 1964:81). Stories are told along the Taku River (McClellan, 1975:447) and along the Stikine, the next major river 200 km to the south (McClellan, 1975:446; Sidney, in Cruikshank et al., 1990:39 – 40), about elderly men who made subglacial journeys, prepared to sacrifice their lives to benefit their descendants. Like the Copper River migrants who crossed glaciers on foot, the two men who navigated under the Taku glacier dressed in their finest clothing, painted their faces, and decorated their hair before undertaking the dangerous journey. Paddling toward the glacier, they composed songs for each stage of their journey. "This little child is going to take my place after I die," one sang. Remarkably, they arrived at the other side of the glacier unscathed. Next, "two young fellows," made the trip by boat, then ran back *over* the glacier to report the news. Then everyone walked across the glacier, collected fish, and returned on foot. The following year, people say, the glacier dam broke and salmon returned upriver (McClellan, 1975:447 – 448). Tlingit elder Eliza- beth Nyman explained the T aku glacier' s retreat as the result of blood on the glacier drained from a slave's body, an explanation similar to those given for recessions at both Icy Bay and Yakutat Bay (Nyman and Leer, 1993:43).

A more common inland glacier story concerns travel to the coast by two trading partners, one Athapaskan and one Tlingit (Sidney, 1982:88 – 89; Smith, 1982:95 – 97; Ned, in Cruikshank et al., 1990:308 – 310). The Tlingit man slipped into a crevasse and his Athapaskan trading partner, terrified of being blamed, nevertheless traveled to the coast to report the tragedy. The grief-stricken relatives held a potlatch and then journeyed back to recover the body, but they discovered their kinsman alive, sustained both by the provisions he had carried and by food his relatives had offered to the fire at his potlatch. The story underscores the perils of glacier travel but also the responsibility of Athapaskan men to their Tlingit trading partners and the uncertain ethnic boundaries differentiating them.

(pg 385) Narratives told by Susie James and Amy Marvin bring us closer to the heart of questions regarding the social consequences of climate change, because both take as their central theme issues of social responsibility. In each ver- sion, just as Swanton heard, a secluded young menstruant foolishly calls out to the glacier as though her words had no consequences, triggering the advance that destroys the village. The story's impact lies in the choices people are forced to make instantaneously as the glacier advances with alarming speed. In one version, the girl's grand- mother insists that she will remain at the site so that her grandchild can go on to bear children, so crucial for the survival of the clan. In effect, she takes responsibility for the younger woman's flippant words. In the other version, the young woman insists on remaining herself, accepting full responsibility for her actions and unwilling to face the shame of living with the consequences that her actions have unleashed on others. Whatever the outcome, the image of the "woman in the glacier" remains the embodiment of the Chookaneidí title to Glacier Bay, a claim clan members say is verified by the fact that they "paid for" this place with the blood of their ancestor, the woman in the glacier. Amy Martin concludes with the dispersal of house groups that were to become separate clans. "The Kaagwaantaan went to Ground Hog Bay. I guess it's called Grouse Fort.... As for us [Chookaneidí], we continued away from them..." (Dauenhauer and Dauenhauer, 1987:289).

Glaciation here has erased most remains of ancient settlements, and isostatic rebound and tectonic uplift make other sites hard to locate (Schroeder, 1995:279).

(pg 390) Here, too, glaciers provide rich ways to think about these issues. A dominant theme in Subarctic oral traditions from the Little Ice Age concerns living with unprecedented risks associated with rapid climate change, and specifically with the behavior of glaciers—unexpected advances, violent surges, catastrophic floods, and accompanying weather variations. Athapaskan and Tlingit travelers clearly accumulated enormous knowledge about glacier travel, the kind acquired only by long experience of living on the land rather than observing from a distance. Topham (1889:432), for instance, expressed surprise that his Yakutat guide casually described a three-day hunting trip he had recently made over glaciers to the north peak of Mount Saint Elias only *after* he returned Topham safely from the same expedition. Overlapping with accounts from passing historical observers and contemporary field scientists, Tlingit and Athapaskan observations about the behavior of glaciers attest to the porosity of approaches to knowledge. Like science, these oral traditions are grounded in a material world: subsistence patterns and trade arrangements that were changing rapidly during the 18th and early 19th centuries. Residents had to be observant and attentive to unexpected changes and pre- pared to make innovative and flexible responses. In other words, local knowledge of the world now deemed "natural" has more similarities with contemporary science than differences from it (Kuzyk et al., 1999).

Local knowledge embedded in oral tradition remains committed to controlling outcomes (though less interested in predicting them), more like experiential than experimental science. The key distinction is commitment to an active, thoroughly positioned human subject whose behavior is understood to have consequences (such as causing glacial surges). In oral narratives from this region, we hear stories about the importance of human agency, human choice, human responsibility, and the consequences of human behavior, and it is here that one of their contributions to climate change research may lie. Narratives underscore the social content of the world and the importance of taking personal and collective responsibility for changes in that world. The performative "working" capacity of oral tradition is crucial here. Stories about glaciers have two important attributes. On the one hand, they are *referential*. Like science, they do indeed refer to an external reality that may encompass historical events such as glacial surges. On the other hand, narratives centering on glaciers are also *constitutive*. Glacier narratives have the power to create or to establish what they signify—in this case, a land that responds to humans in a reciprocal rather than a hostile manner. This constitutive part asserts the ongoing importance of human agency and human responsibility, a perspective that is frequently missing from detached scientific expertise.

In the past, then, things and people were always entangled. In the future, they will be more entangled than ever before. Local knowledge in northern narratives is *about* unique entanglements of the physical and the social, and increasingly we see this view in science as well as in northern oral traditions. Ultimately, we need knowledge bridges that work from local concepts as well as from science if we are to bring broadly based human values to bear on problems such as climate change. Following Latour's advice about the need for sciences to address uncertainty, we would do well to take Broecker's bridging metaphor that opened this essay as seriously as we take his science: "The climate system is an angry beast and we are poking at it with sticks!"

Aadóo Sáyá Xát?

Who Am I?

Family Questionnaire for Alaska Native students

We will be learning about our family lineage from the Sealaska Heritage "Who Am I?" Unit. Please complete the following survey.

It is okay if you cannot answer all of the question; answer to the best of your knowledge

• **Name / Saa:**

Waa sá i duwasaakw?

What is your English name? _____

What is your Tlingit/traditional name? _____

• **Moiety:**

Yéil kach'u ch'áak' ákyá wa.é? _ ***Ch'áak'*** **(Eagle) _** ***Yéil*** **(Raven)**

Are you Eagle or Raven?

•Clan:

Daakw naa sá wa.é?

What clan are you? (refer to list below)_____

• **Clan House / Naakahídi:**

_____ hítdáx áyá xat.

•Village / Kwaan, the traditional land of your clan house

_____ kwáan áyá xát.

• **Father's Clan –**

Daakw naa sá i éesh?

Who are your father's people? (refer to list below)_____

Father's Clan house:

I eesh du hidee?

What is your father's clan house? _____

• **Grandfather's Clan:**

Daakw naa sá i leelkw?

What is your grandfather's clan?_____

Grandfather's Clan house:

I leelk'woo hidee?

What is your grandfather's clan house? _____

Clan Names (circle your clan)

Ch'áak' (Eagle) Side:

Chookaneidí / Dakl'aweidí / Kaagwaantaan / Naanyaa.aayí / Naasteidí / Shangukeidí / Teikweidí / Tsaagweidí / Wooshkeetaan / Yanyeidí

Yéil (Raven) Side:

Deisheetaan / Gaanax.ádi / Gaanaxteidí / Kiks.ádi / Kaach.ádi / L'eeneidí / Lukaax.ádi / L'uknax.ádi / Taakw.aaneidí / T'akdeintaan

Aadóo Sáyá Xát?

Who Am I?

Family Questionnaire for non-Native students

We will be learning about our family lineage from the Sealaska Heritage "Who Am I?" Unit. Please complete the following survey.

It is okay if you cannot answer all of the question; answer to the best of your knowledge

• **Name / Saa:**

Waa sá i duwasaakw?

What is your English name? _____

Do you have any traditional names? _____

• **Heritage:**

What heritage do you identify your family history with? (IE. Irish, Norwegian, Hispanic, Pacific Islander, etc)

_____

•**Do you have a family crest** *(Scottish, Native American, etc?)*

_____

• **Can you trace where and when your family have lived within Alaska? Where did they come from before?**

_____

Mother's Clan:

Who are your mother's people?(Mother's Maiden Name)_____

Mother's Origins:

*Where did your mother come from?*_____

• **Father's Clan:**

Daakw naa sá i éesh?

Who are your father's people?(Father's Name)_____

Father's Origins:

*Where did your father come from?*_____

• **Grandparents on Mother's Side:**

Who was your grandmother? (Maiden Name) _____

Who was your grandfather? (Name) _____

Grandparent's Origins:

*Where did your grandparents live?*_____

• **Grandparents on Father's Side:**

Who was your grandmother? (Maiden Name) _____

Who was your grandfather? (Name) _____

Grandparent's Origins:

*Where did your grandparents live?*_____

• **Any other relatives from previous generations?**

List names and relation:

Tlingit Introduction (Abbreviated)

The intention of this format is to encourage students unfamiliar with the Tlingit language to try giving their introductions for the final presentations to pay tribute to Tlingit aani and people.

_____ **yóo <u>x</u>at duwasaakw.**

I am called (name)

_____ **áya <u>x</u>at**

My mother's people are Irish, Norwegian, Samoan…

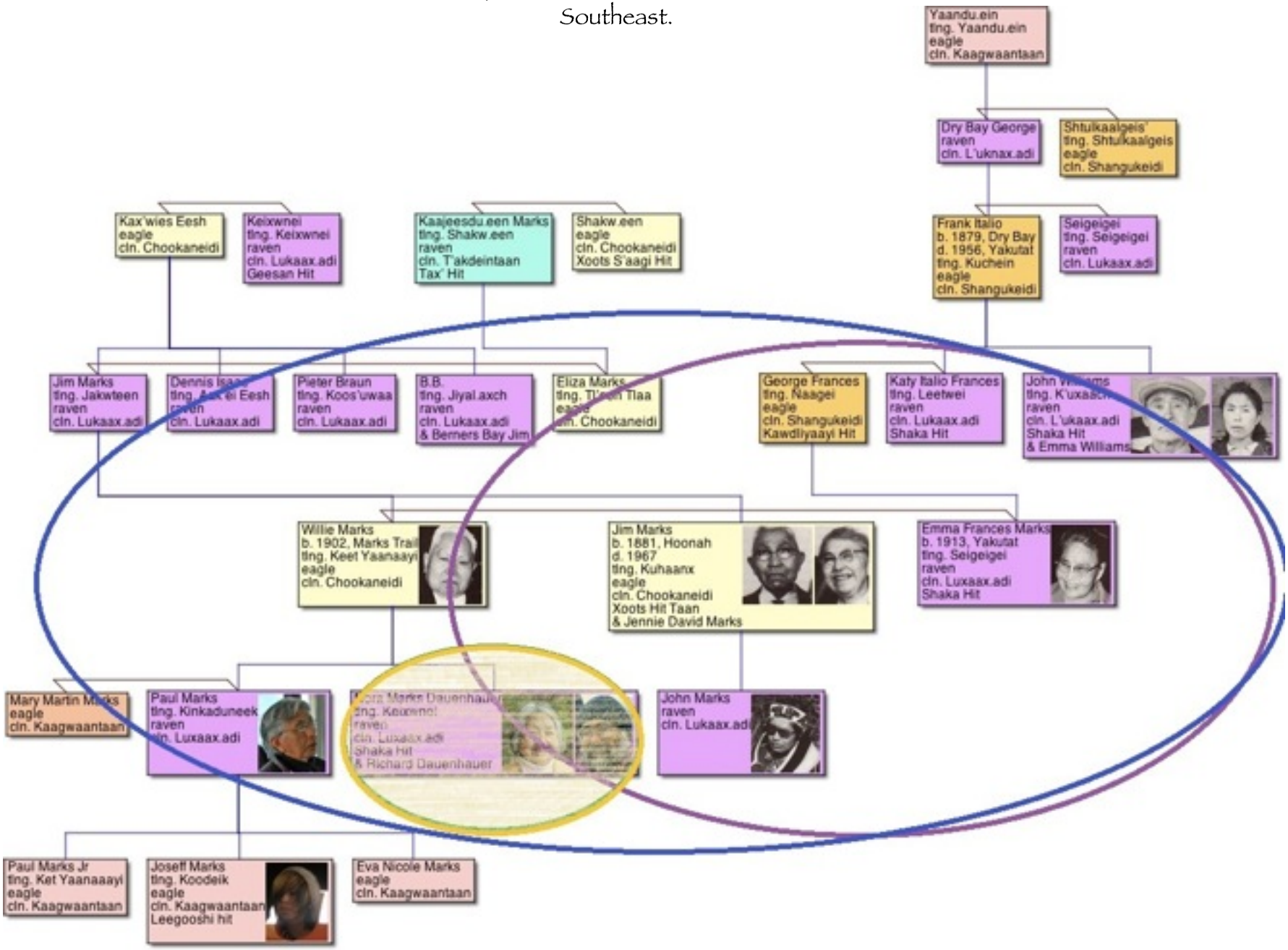
_____ **yadi ayá <u>x</u>at**

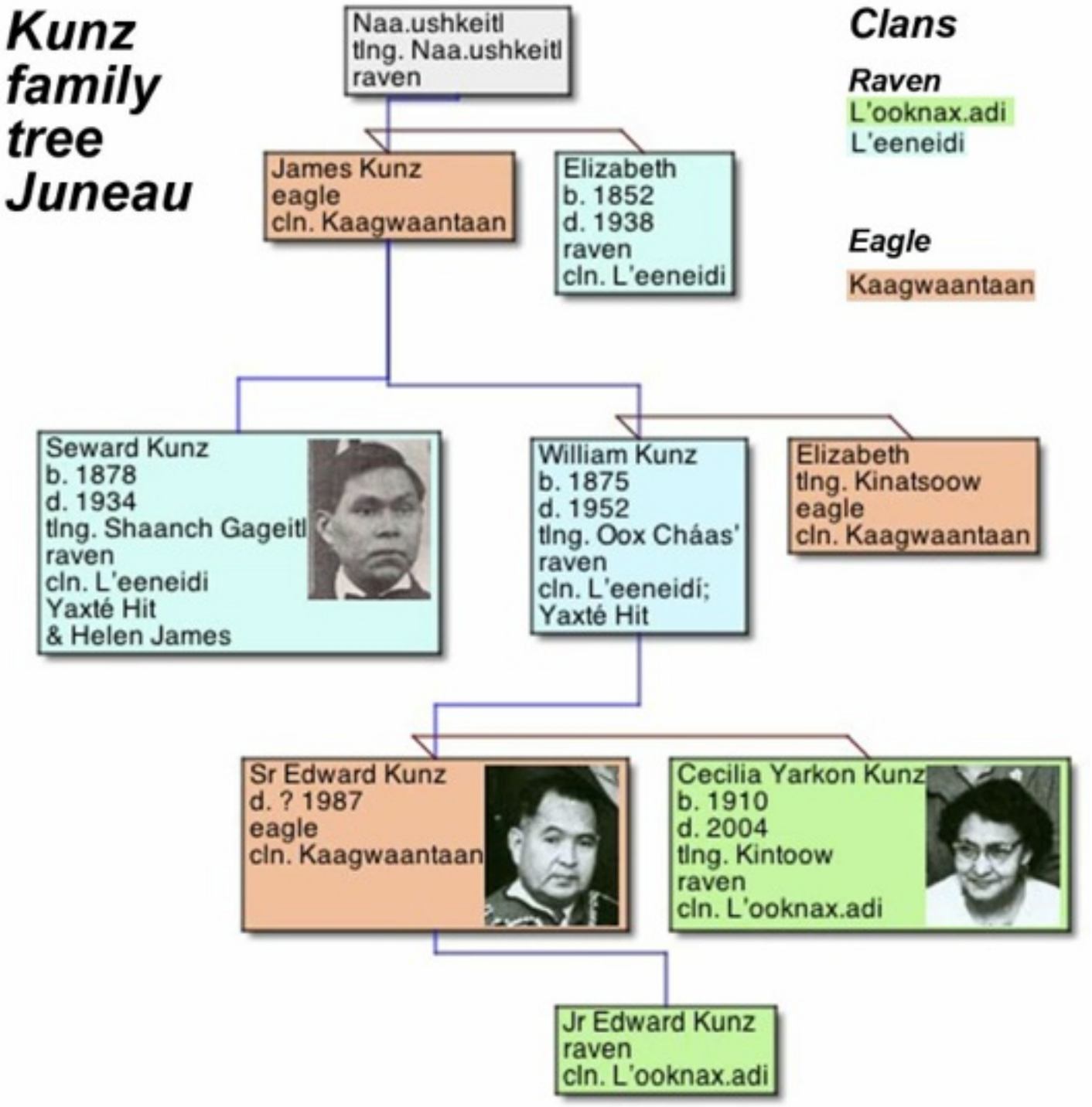
My father's people are Scottish, Tlingit, Yupik…

Gunalchéesh to Aak'w and Taak'u Kwaans.

Thank you to the people of Aak'w Kwaan and Taak'u Kwaan.

*The Marks and Kunz Family Trees were researched on http://wc.rootsweb.ancestry.com/cgi-bin/igm.cgi?db=klea, compiled, and created by Richard Carstensen of Discovery Southeast.





*The Marks and Kunz Family Trees were researched on http://wc.rootsweb.ancestry.com/cgi-bin/igm.cgi?db=klea, compiled, and created by Richard Carstensen of Discovery Southeast.

FREE RESPONSE

There is a coastal year-round nestled in a protected cove surrounded by steep, high mountains in Southeast Alaska. There are many other beings this community interacts with in the surrounding area including herring, salmon, ptarmigan, clams, mountain goat, and seal. Community members respect the brown bear by traveling to a nearby seasonal site each summer to prepare food. Cedar and spruce trees offer shelter, weaving, and building materials. When picking the site, villagers paid close attention to risks such as avalanche zones and ensured visibility of the channel. The community is thriving and doubles their population 50 to 100 families as clans from neighboring areas intermarry.

Other people nearby in a new city noticed the great herring and salmon runs near this community site and start to bring their boats out to the cove to fish and bring home food to their families. These people fish differently with nets capable of catching fish by the tons. The families in the city have plenty of food and their population starts to grow fast. The villagers notice that there are less fish each year, and start to think about what might be causing the change by observing what they see and remembering stories from the past. The community members discuss the necessary permissions of taking fish from clan protected waters with the folks from the city, but the over harvesting continues. Some people are moving to the community cove to be closer to the fishing and using the nearby trees to make their homes. Both groups of people have the same needs: food, water, shelter, and space. What will happen to all of the people, animals, and vegetation?

(2013 AP Environmental Science Free-Response Question-modified)

1. *Biological diversity, or biodiversity, has become a topic of great concern among conservationists. Biodiversity is often used by scientists and policy makers to help determine the health of ecosystems. Write a free-response (short essay) to answer the following questions).*
   - ***A.*** *What abiotic and biotic factors influence the community site.*
   - ***B.*** *Describe TWO characteristics shared by ecosystems that have high biodiversity.*
   - ***C.*** *identify TWO specific human activities that result in a loss of biodiversity, and* ***explain*** *how each activity lowers biodiversity.*
   - ***D.*** *For each human activity you discussed in C,* ***propose*** *a practical strategy (other than simply banning the activity) to reduce the loss of biodiversity.*
   - ***E.*** ***Describe*** *ONE naturally occurring factor that could lead to a change (loss or gain) in biodiversity.*
   - ***F.*** ***Describe*** *TWO ecological benefits that greater biodiversity provides.*

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http://ethnobiology.org/sites/default/files/pdfs/JoE/19-1/Thornton.pdf

TLEIKWAANi, THE "BERRIED" LANDSCAPE: THE STRUCTURE OF TLINGIT EDIBLE FRUIT RESOURCES AT GLACIER BAY, ALASKA

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ABSTRACT.- This paper analyzes the structure of a relatively neglected resource in Tlingit and NorthwestCoast etlmology: berries. Historically, like salmon streams and other key resource areas among the Tlingit of Southeast Alaska, prime berry patches were named, owned, managed, and celebrated as places. Certain berries, including those found in the vicinity ofGlacierBay National Park, were recognized as being of exceptionally high quality and abundance. Glacier Bay berries were internationally renowned, widely traded, and comprised an important nutritional component of the diet and symbolic element in ceremonial feasts. Maintaining the productivity of prized berry patches involved a variety of techniques and strategies to control supply and demand and thus avoid shortages. Despite National Park Service restrictions on hunting and fishing in Glacier Bay, berry picking remains an important communal subsistence activity in the park--one relatively free from controversy and competition-that continues to bind modern Tlingit groups to their ancient homelands.

Key words: Tlingit, berries, traditional knowledge, ethnogeography,subsistence

> *"Today as I talk I see my grandfather on that each, I seamy uncle. I see them all because that's where they were in love with. And I can't help but place my love there because it provided for them, like an icebox"*-Richard Dalton, Huna Tlingit T'akdeintaan leader, at his homeland, Dundas Bay, in Glacier Bay National Park, 1996 (Thornton 1998).

The Tlingit of southeastern Alaska use a number of related metaphors to depict the role of Glacier Bay National Park in their economy. The Park Comprises a significant portion of northern Tlingit territory (see Figure 1), while most of the rest of Tlingit country lies int he Tongass National Forest, the largest temperate rain forest in the U.S. In English Glacier Bay has been described by Huna Tlingits (whose present day village, Hoonah, contains many of the descendants of the original inhabitants of the bay) as their "storehouse," their "icebox," their "refrigerator," even their "breadbasket" (cf. Goldschmidt and Haas 1998:52,131). These seemingly anachronistic container metaphors are consciously employed by these traditional hunter-gatherers to convey to modern Euro-American audiences the importune of Glacier Bay as vital source of food. In this sense, they stand in stark contrast to the dominant Euro-American metaphor of Glacier Bay as a wilderness landscape, a pristine park that is uninhabited and unspoiled by human intrusions.

THE “BERRIED” LANDSCAPE

"Glacier Bay is flU! best placefor berries."-Richard Sheakley, late leader of the Tlingit,T'akdeintaan clan, which claims parts ofGlacier Bay National Park (Thornton 1998)

Tlingits harvested wild fruit from a wide range of plants, many of which thrive in Glacier Bay. These fruits are popularly known as berries. IN addition to being a major source of sugar and carbohydrates for the pre-contact indigenous peoples, berries contained other important vitamins and minerals, including vitamins A and C, calcium, iron, niacine, riboflavin, and thiamine, many of which were lacking in other foods (see Norton 1981; Newton and Moss 1984:23, 41; Kuhnlein and Turner 1991). Like other prestigious Native foods, Tlingit report "craving" these berries, especially during the spring and summer. Even berries considered to have a bland, bitter, or sour taste were coveted and often were rendered palatable by combining them with other foods (sec Thornton 1998). Aside from the edible fruit, Tlingits valued other parts of the plants.The leaves of berries, kayaani, were also consumed and considered to be a vital sign offspring and a potent "spiritual"medicine. At one time, bearberry leaves were smoked as tobacco, and other berry leaves were used to make teas. The roots and stems of berry plants generally were not used, although the shoots of young salmonberries (and, less commonly, thimbleberries) were an esteemed early spring supplement to the diet (Emmons 1991:151). The term kayaani is a synonym for medicine in Tlingit. Shamans, in particular, were trained in the arts of kayaani (and could harness the power of plants to promote healing, awareness, strength, affection, and other ends, including changes in weather. It could be dangerous for one without knowledge of these parts to pick or handle plants casually or to introduce them into new settings. Although much of this traditional knowledge is lost today, many elders, especially elderly women, are still familiar with the medicinal qualities of plants(Thornton 1998).

Table 1 shows the berries that are found in abundance in Glacier Bay National Park and Preserve and the seasons of harvest by Tlingits from Hoonah and neighboring communities. In most areas of Southeast Alaska, salmonberries were the most abundant species and the first to be harvested, usually in July. Not surprisingly, the general term for berry is associated with this fruit. Blueberries, cranberries, gray currents, huckleberries, and thimbleberries were also common and could be found on both the islands and the mainland. In contrast, other fruits, including bearberries, nagoonberries, soapberries, and strawberries were largely confined to the mainland (with a few well-known exceptions), making them a desirable commodity for trade to the islands. Glacier Bay was known to be the best source of these mainland berries in Northern Southeast Alaska, and some species,such as soapberries and nagoonberries, were traded internationally as far south as Haida country (cf. Norton 1981).

Historical Ecology-While Alaska as a while is renowned as a land of berries, Glacier Bay is a uniquely productive environment for these plants. Both natural and human circumstances have contributed to Glacier Bay's emergence as a coveted berry picking site.

Because of its unique geologic history, Glacier Bay has emerged as particularly productive habitat for berries. Like the bay itself, the plant life in Glacier Bay has been shaped largely by the forces of glacial advance and recession. Just two hundred years ago, in 1794,whenGeorgeVancouver's pioneering expedition ventured into Ley Strait, they found nothing but a massive wall of ice and a small bight at the mouth of Glacier Bay. Yet, within the two centuries, a geological instant, this bight has grown to be one of the largest, richest and most dynamic ecosystems within Southeast Alaska.

By the time JohnMuir arrived in 1879,seeking to understand the dynamics of glaciation, the ice had retreated nearly 50 miles and plants and other species had begun to re-inhabit the land.As he made his way up the bay,Muir (1895) observed the succession of plants in reverse, beginning with the maturing forests of alder and spruce at the mouth and regressing back to the newly uncovered rock and rubble at the foot of the retreating glacier. In between was a rich array of edible plants, including a variety of berries. While newly exposed areas revealed only sand and rubble, berry plants were among the first to return to the sandy soils, making use of the bed laid down by algae and mosses. Tlingit oral history and recent scientific studies of the interstadial forests in the upper reaches of Glacier Bay suggest that the process of plant succession has been repeated at least several times in Glacier Bay. Each time the mature forest was leveled and cleared by glacial advance, ply to be exposed again in the subsequent retreat as flattened forelands primed for succession. Two major warming periods-one between 10,000 and 4,500 years ago and the other from 1750 to the present have each produced habitat conditions stable enough for berry lands, forests, animals, fish and therefore, people (cf. Ackerman 1968; Powerl 1995, Thornton 1995).

Combined with other features of the a landscape, such as well-drained soils, and comparatively favorable exposure to sunlight, these conditions made Glacier Bay an ideal habitat for bearberries, gray currants, nagoonberries, soapberries, and strawberries. Whit few

TABLE 1.– Berries Commonly Harvested at Glacier Bay National Park with Seasonality

Common Name	Tlingit Name	Scientific Name	Spring	Summer	Fall
BERRIES	tléikw		x	x	
Bearberry (kinnikinnick)	tínx	Arctostaphylos uva-ursi	x	x	
Blueberry, (generic and oval-leaved)	kanat'á	Vaccinium ovalifolium	x		
Blueberry, Alaskan (ripens later)	naanyaa kanat'aayí	Vaccinium alaskaense	x	x	
Blueberry, bog	ts'éekáxk'w	Vaccinium uliginosum	x	x	
Blueberry, dwarf	kakatlaax	Vaccinium caespitosum	x		
Cloudberry, yellow	néx'w	Rubus chamaemorus	x		
Cranberry, bog	k'eishkaháagu	Oxycoccus microcarpus	x	x	
Cranberry, highbush	kaxwéix	Viburnum edule	x	x	
Cranberry, lowbush (ligonberry)	dáxw	Vaccinium vitis-idaea	x	x	
Current, gray	shaax	Ribes bracteosum		x	x
Current, swamp	kaneilts'ákw	Ribes lacustre	x	x	
Elderberry, red	yéil'	Sambucus racemosa	x		
Huckleberry, red	Tleikatánk	Vaccinium parvifolium	x		
Nagoonberry	neigóon	Rubus Arcticus	x		
Raspberry	tlekw yádi	Rubus idaeus (R. pedatus)	x		
Salmonberry	was'x'aan tléigu	Rubus spectabilis	shoots	x	
Soapberry	xákwl'i	Sheperdia canadensis		x	
Strawberry, seaside	shákw	Fragaria chiloensis		x	
Thimbleberry	ch'eix'	Rubus parviflorus	shoots	x	

exceptions, these resources are not found in comparable abundance elsewhere in Tlingit territory, and in some cases were rare. In contrast, the major varieties for blueberries and salmonberries, otherwise the most common and evenly-distributed of the Tlingit fruits, were not exceptionally productive in Glacier Bay due to their habitat preference for damp woods and moist clearings. These habitat distinctions are reflected in the Tlingit ethnogeography of the Glacier Bay region, and the relative patchiness of key very resources had important implications for the structure of the foods in the Tlingit economy.

Tlingit history relates that Glacier Bay was settled originally by what are today four distinct matrilineal clans of two reciprocating moieties: the Chookaneidi ("People of Chookaneidi" or

"Beach Grass Creek," a reference to Berg River / Bay), the Kaagwaantaan ("People of the Burned House"), and the Wooshkeetaan ("People with Houses onTop ofOneAnother") of the Eagle/Wolf moiety; and the T'akdeintaan ("People of the House Toward the Side" [of a particular island on the OuterCoast ofGlacier Bay National Park]) of the Raven moiety. A fifth group, the ~uyeikeidi ("People of Kuyeik'" {Excursion InletD, also of the Raven moiety but now extinct (or perhaps transformed into the Lukaax̲.adi of Haines as suggested by Emmond (n.d.) reportedly dwelled at Excursion Inlet. All of these groups take their names from landmarks or settlements in the vicinity of Glacier Bay. The Eagle group swede said to have migrated to Glacier Bay from the Interior-Via the mainland rivers, braving treacherous ice dams on their descent-while the Raven groups trace their origins to the coast (cf. Swanton 1908; de Laguna 1972). Oral histories from these clans suggest that there has been at least one major advance and retreat of the ice during their occupation of Glacier Bay, perhaps corresponding to the so-called “Little Ice Age” which began some 900 years ago and ended around 1750.

These clan histories and stories reflect the deep ties and organic relationships between these Tlingit clans and their homeland. They recall how events happened in the lives of the groups' ancestors, how they came into being and how they evolved at certain places. The narratives themselves are sacred property, or at.60w (literally, "owned things”) and typically reference other sacred property of the clan,such as crests,spirits, songs, names, and various elements of the geography, which are also considered at.60w (d. Dauenhauer and Dauenhauer 1987:14-17). The most vivid account of dramatic glacial shifting in Glacier Bay is contained in the Chookaneidi story of Kaasteen,several versions of which have been published (Dauenhauer and Dauenhauer1987:245ff;Culp, et all995). In this story the young Chookanshaa (ChookaneidiTlingit girl), Kaasteen, violates her prescribed seclusion at menarche by communicating to a glacier, which responds by advancing rapidly, thus destroying the settlement in the bay, claiming the life of a Chookaneidi woman who remains behind, and forcing the exodus of the Tlingit from Glacier Bay.

Place names provide another important index of the natural and cultural history of Glacier Bay (Thornton 1995, 1997a" 1997b). Both the Tlingit and English toponymies shed light on Glacier Bay National Park and Preserve as berry habitat. While most berrying locales are not identified as such by their names, semantic references to berries do occur in both sets of place names. In all cases these references are based on metonymic associations, wherein a part of the environment the berry comes to stand for the place as a whole. Thus, in English we have Strawberry Island and Strawberry Point (a.k.a. Point Gustavus), examples of metonymy based on the salient prevalence of this resource at the site. Similarly, the Tlingit also reference Point Gustavus as “Strawberry Point” (Shaakw X’aayi), though the feature is more commonly known as S’e X’aayyi Lutu (“Clay Point”). Interestingly, while it is sometimes referred to as *Shaakw X’aat’i* (Strawberry Island), the original Tlingit name for Strawberry Island is L’eiw X’aat’i or “Glacial Sand Island,” indicative of the island’s habitat at an earlier stage of succession, prior to proliferation of strawberries. Another exampled from the Tlingit is ***Tinx Kayaani***, “Bearberry Leaves” from the bearberries that dominate this Alsek River landscape, which were used in traditional Tlingit tobacco and medicine and gathered in conjunction wight he berries themselves. In

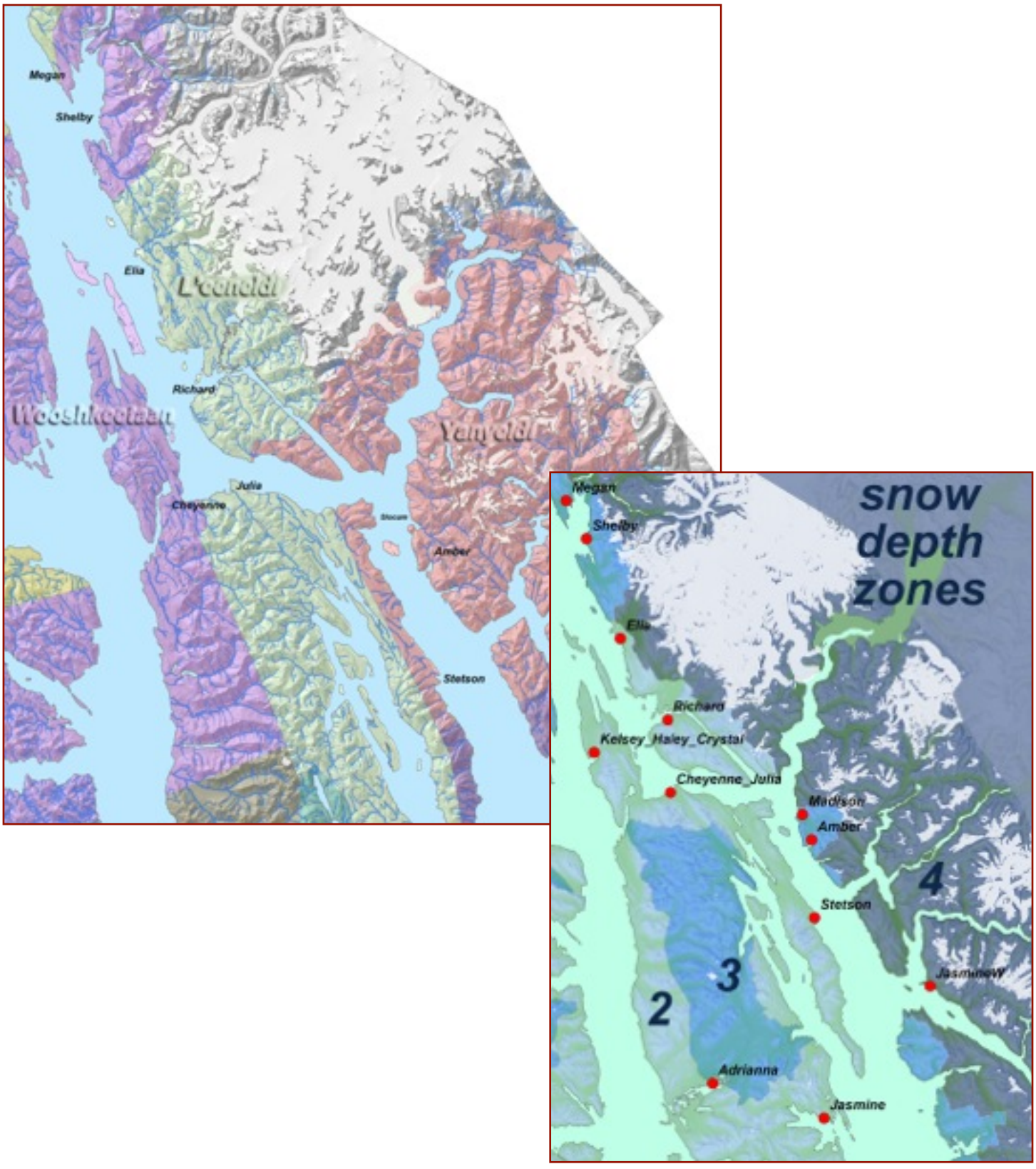
addition to these well-known place names there are also regional nicknames, such as the aforementioned ***Tleikw Aani*** *("*Berry Land"), applied to Dundas Bay and sometimes to the lower portions of Glacier Bay, or **Shakw Aani** ("Strawberry Island"), given to the area between Gustavus and Point Gustavus.

All of this suggests that, from a Tlingit perspective, the shores of Glacier Bay National Park were "berried" landscapes. The ethnogeography and ethnohistory of the region emphasize the significance of berries as a salient presence on the land and corroborate the ethnographic reports detailing Tlingits' strong cultural interest in these plants.

CONCLUSION

Glacier Bay National Park is a special place for berries, and the berries of Glacier Bay are special to the Tlingit descendants of Glacier Bay. Berries not only formed a significant portion of the overall diet, they were a key source of nutrition, medicine, symbolic capital, and trade goods. Glacier Bay berries were considered of exceptionally high quality and abundance and thus were a celebrated feature of the Tlingit landscape, cultivated to a higher degree than any other plant. A fine-grained analysis of both the ethono-metaphysics and social economy of berries shows why these potent but patchy resources were so valued and carefully managed. Huna Tlingit employed a variety of resource management strategies to maintain or enhance supplies and to control demand in ways that ensured the survival of the resource and, whenever possible, boost the prestige of owners…These fruits came to stand for Glacier Bay itself, especially in the context of memorial potlatches and other ceremonial gatherings. Despite displacement from Glacier Bay, first by an advancing glacier and later by an advancing federal government and National Park system (the so-called "Second Ice Age," by Hoonah Tlingit; see HIA 1994), Tlingit ties to Glacier Bay remain strong.

Examples of GIS Final Project Images:



Examples of Three Exported Images for Final Project:

Figure 1: Map indicating where in Aak'w Kwaan or Taak'u Kwaan your sites are located

Figure 2: Aerial (or topographic map) of selected shorelines

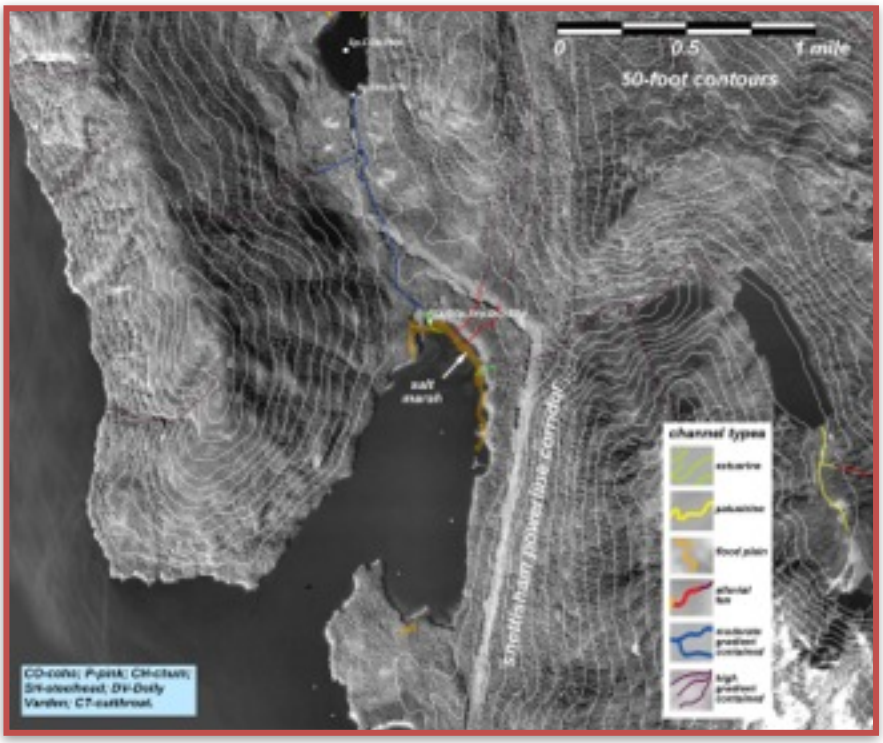


Figure 3: ShoreZone image of community site location (preferably of clan house site):

Investigating Tlingit Ecological Knowledge

A Science and Literacy Unit for High School

Investigating Tlingit Ecological Knowledge

A Science and Literacy Unit for High School

Unit Overview

Over the course of this ecological literacy unit, students will practice reading, writing, listening, and oral language strategies while developing understanding for Tlingit oral narratives and technological tools and systems. This multi-week, seven-lesson unit focuses on an interdisciplinary study of the oral narrative *"Basket Bay History"* to establish equity in science, math, and literacy. Students will be challenged by the combination of Tlingit and Western science as they engage in projects focused on field investigations of Southeast Alaska's natural history and local ecosystems, Tlingit migration in relation to glaciation, and exploring today's technology to bring clarity to the question that unites us all, *why do we live here*?

Why Use Oral Narratives?

Tlingit oral narratives contain many layers which enrich our knowledge and imagination. On one level, these stories are great entertainment. Some Tlingit narratives explain how aspects of our world came to be. Other oral narratives relate epic adventures of specific clan ancestors. Stories involving Raven often include humorous exploits which may lead us to reflect upon respectful treatment of others. However, oral narratives were not told solely for entertainment.

In the past, oral narratives were used to convey many forms of knowledge. They taught about place names, property, geography, and science. From these stories, younger generations would learn about food preparation, the ebb and flow of the tides, and behavioral patterns of hunted mammals. Many of these stories assisted in the teaching of life skills such as navigation an obtaining food from the land. In addition, oral narratives were used to convey traditional values and social responsibility: They explore human nature and may involve concepts of identity, alienation and isolation, coming of age, loyalty, pride, loss, and other conflicts humans experience throughout life. These stories are spiritual, intellectual gifts which have been passed down from esteem ancestors. Like all good literature, Tlingit oral narratives can be used to enhance content learning in the classroom. These stories can be used as a springboard to teach history, geography, science, mathematics, Tlingit heritage language, reading, writing, and more.

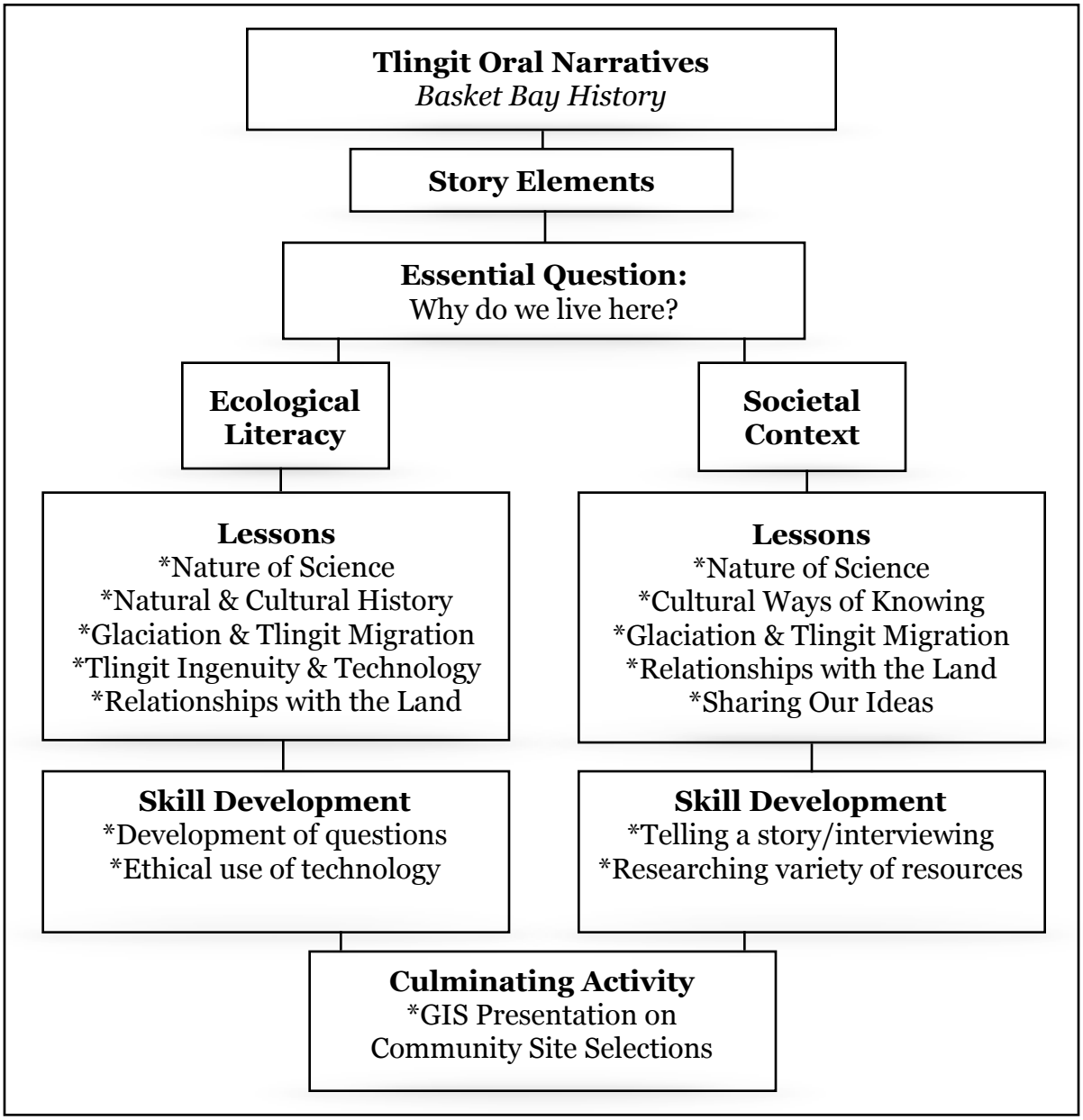
Note: *Tlingit oral narratives are the property of specific clans. For many stories, permission is needed before they are used in the classroom. The Basket Bay History story this unit refers to is from the Haa Shuka, Our Ancestors compiled by Nora Marks Dauenhauer and Richard Dauenhauer as told by Robert Zuboff.*

Tlingit Story Elements

This unit will focus on two Tlingit story elements: *ecological literacy* and *societal context*. Students will build background knowledge as they meet and listen to elders and community members, read informational and narrative text, engage in local harvest, practice traditional processing and preservation techniques, conduct scientific experiments, and prepare a GIS (Geographical Information Systems) presentation as the culminating activity to address the essential question:

- Why do we live here?

The following chart illustrates how lessons were derived from the Tlingit oral narratives.



Embedded Literacy Strategies

The lessons in this unit utilize specific literacy strategies to scaffold student learning. Guided reading strategies ensure comprehension of informative and narrative text. Guided writing strategies allow students to communicate what they learned and to engage in the writing process effectively. The following chart defines the strategies which are incorporated into this unit.

Reading Strategies	Writing Strategies
Guided Reading: Teacher models specific strategies to guide students through challenging text. **Predicting:** Students make guesses about the text by using text features; title, pictures, and/ or thinking ahead about events which could occur, based on evidence in the text. **Marking the text:** Students select text by highlighting or underlining specific components such as the main idea. **Summarizing/Paraphrasing:** Students restate in own words the essential information or main idea of a text. **Story Maps:** Students use a clearly defined graphic organizer to identify story elements. **Word Maps:** Students use a clearly defined graphic organizer to identify and reinforce word meanings.	**Guided Writing:** Teacher models the writing students are expected to do by guiding them through the writing process before students are expected to perform the same process. **Brainstorming:** Students list multiple ideas in a short amount of time without excluding any ideas. **Drafting:** Students incorporate brainstorming ideas into a written format or story. **Marking the Draft:** Students highlight or underline or code areas for revision. **Generating Questions:** Students clarify and develop ideas by asking questions of the draft. This may be a part of self-editing or peer editing. **Adding Details:** Students enhance text by adding additional words, phrases, sentences, or ideas. **Self-Editing/Peer Editing:** Students work alone or with a partner to examine and identify areas that might need correction for grammar, punctuation, and spelling.
Speaking Strategies	**Math Strategies**
Oral Reading: Students read aloud one's own text or the texts of others to share work, build fluency and increase confidence in presenting to a group. **Rehearsal:** Students engage in multiple practices of a piece of text prior to performance to refine use of story telling techniques.	**Think-Pair-Share:** Students work individually to analyze the problem and partner up to share reflections. **Graphic Representation:** Students interpret mathematical concepts to create visual organization of data. **Group Presentation:** Students work together to share graphic representations, analysis, and conclusions.

Standards Addressed in this Unit

Themes (*parallels AP Environmental Science Content as found at http://apcentral.collegeboard.com/apc/public/repository/ap-environmental-science-course-description.pdf and Juneau School Districts science content standards*)

Science

1. Science as Inquiry and Process

- Science is a method of learning and constantly changes the way we understand the world

SA1.1 Students ask questions, predict, observe, describe, measure, classify, make generalizations, analyze data, develop models, infer, and communicate
SA1.2 Students recognize and analyze multiple explanations and models, use information to revise student's own explanation or model if necessary
SA2.1 Evaluate credibility of cited sources when conducting the student's own scientific investigation
SA3.1 Conducts research and communicates results to solve a problem

2. Energy conversions underlie all ecological processes

- Energy cannot be created; it must come from somewhere

SC3.1 Relate carbon cycle to global climate change

c. The Earth itself is one interconnected system

- Biogeochemical and natural systems vary in ability to recover from disturbances

SC3.2 Analyze potential impacts of changes

d. Humans alter natural systems

- Technology and population growth have enabled humans to increase both the rate and scale of their impact on the environment

SD3.1 Describe causes, effects, preventions, and mitigations of human impact

e. Environmental problems have a cultural and social context

- Understanding the role of cultural, social, and economic factors is vital for solutions

SE1.1 Research how social, economic, and political forces strongly influence which technology will be developed

f. Human survival depends on developing practices that will achieve sustainable systems

- A suitable combination of conservation and development is required

SF1.1-SF3.1 Investigate the influences of societal and or cultural beliefs on science

Language Arts

a. The student restates/summarizes and connects information.
R4.2 Summarize information or ideas from a text and make connections between summarized information or sets of ideas and related topics or information

b. Student analyzes content of text to differentiate fact and opinion
R2.9 a. Differentiate between fact and opinion. b. Express opinions about text with support

c. Student connects and evaluates cultural influences/events.
R3.10 Compare and contrast how texts reflect historical and cultural influences.
R4.9 Analyze the effects of cultural and historical influences on texts.

Cultural Standards

A.2 Students will recount their own genealogy and family history
B.4 Identify appropriate forms of technology and their use for improving community
D.3 Interact with Elders in a loving and respectful way that demonstrates and appreciation of their role as culture-bearers and educators in the community
E.2 Understand the ecology and geography of the bioregion they inhabit

Curriculum Review

The unit, in its entirety, can take up to six weeks or through an entire semester. Individual lessons or a combination of lessons from this unit can be used to address ecological literacy and the development of scientific reasoning skills. The curriculum derived from the course, Investigating Traditional Ecological Knowledge, which was initially piloted in Spring of 2013 in the Juneau School District (JSD). The class was sponsored by Goldbelt Heritage Foundation (GHF) and the University of Alaska Southeast (UAS) School of Education. Henry Hopkins, Juneau High School's biology teacher was the district teacher-of-record and Frank Coenraad of UAS was the university teacher-of-record. The class was part of the Department of Education's Demonstration Grant for Indian Children. Thirteen students from all three JSD high schools completed the class for 1/2 elective credit and 3 university credits. The class was made possible with great contributions of time, knowledge, and kindness from Tlingit elders and knowledge bearers, UAS professors, JSD teachers and staff, and United States Forest Service scientists.

Assessments

Throughout this unit students are assessed on the standards and how well they respond to the essential questions. The standards are the objectives for each lesson. This unit includes both formative and summative assessments:

- Pre-assessment and post assessment tests
- Paraphrasing to demonstrate comprehension
- Journal writing prompts
- Final presentation scoring guide/rubric

Elders & Cultural Specialists in the Classroom

Students benefit from listening to elders and cultural specialists. An elder or cultural specialist should be invited to tell the story of *Basket Bay History* in their own words as an introduction to the unit. If the elder/culture bearer is a heritage language speaker, they might also teach heritage vocabulary and phrases related to ecology and harvest.

Supplemental Materials & Suggested Texts

This unit consists of project rubrics, concept maps, student worksheets, PowerPoints, and articles. In addition, there are four narrated slideshows that accompany and enhance specified lessons provided by Goldbelt Heritage Foundation on the USB drive associated with this unit. These slideshows were created by Richard Carstensen, lead expert of Natural History for Discovery Southeast. Each slideshow is approximately twenty minutes long and provide incredible detail and insight on community siting factors and the dynamic landscape of Southeast Alaska.

- Haa Shuká, Our Ancestors: Tlingit Oral Narratives. Nora Marks Dauenhauer and Richard Dauenhauer. 1987. Volume 1.
- Haa Atxaayí Haa Kusteeyíx Sitee, Our Food is Our Tlingit Way of Life. Excerpts from Oral Interviews. Richard G. Newton and Madonna L. Moss. USDA 3rd Edition.
- Haa Léelk'w Hás Aaní Saax'ú: Our Grandparents' Names on the Land. Edited by Thomas F. Thornton. 2012.
- SpringBoard Mathematics with Meaning: Middle School 3. Collegeboard 2010

Final Project Rubric: *Community Site Selection & Presentation*	**Name:** **Group Members:**	
Grading Criterion (3 points/each)	No	Yes
Preparation: Student utilized the siting factor guidelines and project rubric to organize & plan their work.		
Focus on Task: Used time well, focused on the project, worked well with others.		
Essential Question: Created an original, interesting way to address the essential question in their presentation.		
Identity: Individuals introduce themselves by presenting their lineage (either through a Tlingit or English introduction), acknowledge Tlingit aani and the land they stand, and their migration history to this place to the best of their understanding.		
Audience Awareness: Design, vocabulary, audio, and graphics fit target audience		
Voice Consistency: Voice quality is clear and audible throughout the presentation		
Voice Pacing: The pace fits the information presented and draws the audience into the story.		
Narration: Each member narrates a section within the presentation. Tlingit and English names of sites are given.		
Imagery: Each individual selects at least three images of their site selection. • Map highlighting the location of both the winter and seasonal sites • Satellite image of the specific coastline • ShoreZone images of their specific site locations.		
Detail: Presentation has exactly the right amount of detail-not too short or too long.		
Highlights: Each community site will have a strong feature to highlight (gardens, canoe beach, summer food preparation site, fresh water, etc). Groups will need to identify the component to highlight and incorporate additional information learned throughout the unit.		
Purpose: Establishes purpose early and maintains that focus throughout.		
Duration: Group presentation is between 3 to 5 minutes in length.		
Requirements: Product includes all required elements.		
Total Points (42 points available):		

Overview of Lessons	Literacy Strategies	Academic Vocabulary	Assessments
Lesson 1: Nature of Science *Science is a Process* Students explore the convergence of western and traditional science through guided reading, discussion, and reflection writing. • Student Page: "Ways of Knowing" article • Student Page: "Western science & traditional knowledge" article	• Guided writing • Quick-write • Think-Pair-Share • Mark the text • Paraphrasing	• traditional ecological knowledge • western science • empiricism	• Journal Prompt • Peer Reflections
Lesson 2: Cultural Ways of Knowing *Science is a Process* Students practice problem-solving strategies as they create graphic representations of abstract concepts regarding the future of science. • Student Page: What is an oral narrative? • Student Page: Venn diagram template	• Graphic representation • Generating questions • Annotations • Quick-write • Paraphrasing	• oral narrative • cultural context	• Article summaries & annotations (peer review) • Diagram
Lesson 3: Natural & Cultural History *Energy conversions underlie all ecological processes* Students are introduced to the unit's culminating activity expectations to use the problem-solving strategy of working backwards to find the answer. • Student Page: Learner's journey concept map • Student Page: Final project scoring guide • Student Page: Aak'w Kwaan/Taak'u Kwaan Map • Student Page: Siting factors diagram • Student Page: *Basket Bay History* story • Student Page: *Basket Bay* Responses	• Note-taking • Generating questions • Discussion group • Debriefing • Work backward • Oral Reading • Rereading	• abiotic • biotic • ecosystem dynamics • archipelago	• Quick-write • Siting factor group work • Abiotic and Biotic Factor responses
Lesson 4: Glaciation & Tlingit Migration *The Earth is one interconnected system* Students explore the power of glaciers and the energy transfer of the surrounding ecosystems. Direct connections are made between local glacier activity and Tlingit migration. • Student Page: SE Alaska Map • Student Page: Siting Factor Outline • Student Page: Oral Tradition Journal Excerpts • Student Page: Migration History Worksheets	• Quick-write • Think-Pair-Share • Mark the Text • Oral Reading • Note-taking • Paraphrasing	• Little Ice Age • Isostatic rebound • Carbon cycle • Calving rates • Basal slip & surge • Terminus	• Basket Bay responses • Short-term lineage project
Lesson 5: Tlingit Ingenuity & Technology *Environmental problems have cultural & social context* • Student Page: Free Response Assessment • Student Page: Excerpts from "Tleikwaani, the "berried" landscape" • Tlingit Ingenuity PowerPoint	• Quick-write • Mark the Text • Oral Reading • Note-taking	• displacement • fermentation • pH • anaerobic respiration	• Free Response • Article summary
Lesson 6: Relationships with the Land *Human survival depends on sustainable practices* • Student Page: Student site selection (3 exported images)	• Think-Pair-Share • Note-taking • Work	• geographical information systems (GIS) • layers	• Final project preparation
Lesson 7: Sharing Our Ideas *Science is a Process* • Student Page: Final presentation slideshow	• Graphic representation • Paraphrasing	• respect	• Final project slideshow

Lesson 1
Nature of Science

Purpose
To introduce students to primary resource analysis and interpretation regarding the nature of science; to develop the skill of gathering information from multiple resources; to assess and build background knowledge of traditional ecological knowledge; to increase listening, reading, and writing fluency.

Essential Questions
- What is the nature of science?

Duration
75 minutes (1-2 sessions)

Lesson Objectives: Connecting to the Standards

SA2.1 Evaluate credibility of cited sources when conducting the student's own scientific investigation
SA3.1 Conducts research and communicates results to solve a problem
SF1.1-SF3.1 Investigate the influences of societal and or cultural beliefs on science
R3.10 Compare and contrast how texts reflect historical and cultural influences.
R4.2 Summarize information or ideas from a text and make connections between summarized information or sets of ideas and related topics or information

Academic Vocabulary
- Traditional ecological knowledge
- Western science
- Methodologies
- Empiricism

Materials
- Student composition notebooks
- "Ways of knowing" article: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1479546/
- "Western Science and traditional knowledge" article

Suggested Guests
- Elder to introduce Tlingit science (David Katzeek, Paul Marks-Goldbelt Heritage Foundation)
- Paul Berg (Juneau School District) to speak to high and low context cultural differences

Literacy Strategies

- Guided writing
- Quick-write
- Think-Pair-Share
- Marking the text
- Adding details
- Annotations
- Paraphrasing

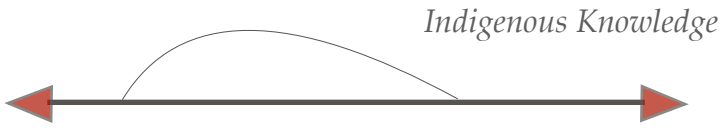
Assessments

- Pre-assessment journal response: *Essential Question*
- Check for student understanding: *Think-Pair-Share; Class list of science methodology factors*

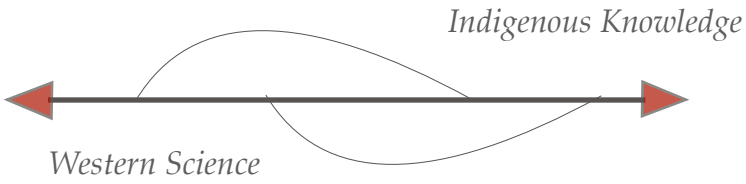
Procedure

Step 1) Introducing Content: 15 minutes

- Welcome students to a class that will challenge the way they approach science and the way they interpret the world around them. Students can expect to utilize familiar concepts such as the scientific method, but will also learn from Tlingit pedagogy in the search to find previously undiscovered commonalities and differences in the two methodologies.
- Draw a timeline on the board (this timeline was originally presented to Paul Berg of Goldbelt Heritage Foundation by a Oglala-Sioux Elder in South Dakota):



- The timeline represents time immemorial to the left (all that humans remember in our history) and the future. The curve represents knowledge held by many cultures worldwide about how the world works. It extends far into the past and includes the future.



- The second arc underneath the timeline represents what collectively is called western science, what students are familiar from learning in school. It is not as ancient as indigenous knowledge, but with tools and technology, western science is able to examine microcosms and extend theories into the future.

- Finally, the green shaded in area is what the class will be focusing on. This knowledge is held by indigenous cultures worldwide and is called Traditional Ecological Knowledge. It is a wealth of knowledge and explanations of other macro- and micro-dimensions western science has yet to consider.

Step 2) Assessing Background Knowledge: 30 minutes

Explain:

- In order to move forward together, there needs to be a common definition of science. Hand out student binders and answer essential questions in composition notebook as a pre-assessment and present the essential questions of the lesson:
  Question 1) *What is the nature of science?*
- Teacher can use guided writing strategy to model their journal response to the question. Responses should take in consideration factors such as:
  - how do researchers conduct science, what are they looking for, how do scientists communicate their findings, and the role of ethics, culture, tools and technology *(answers will be shared during a think-pair-share session).*

Assess:

- Pair the students and have them read their answers for just Question 1.
  -Student pairs should compare and contrast their answers to create a list of unifying factors both of their reflections share
  -Student pairs should take the overlapping factors and create a working definition of science (2-3 sentences)
- Create a class list of student-driven scientific factors on the board for students to take down as notes
- Have each pair read aloud their definition of science to the class

Step 3) Building Background Knowledge: 30 minutes

- Discuss the similarities and differences in their individual responses. Read aloud (or hand out quote to staple into science notebook) the definition of science as given by the Dalai Lama of Tibet when asked to compare contemplative and scientific explanations of the world:

  "For me, science is first and foremost an empirical discipline that provides humanity with a powerful access to understanding the nature of the physical and living world. It is essentially a mode of inquiry that gives us fantastically detailed knowledge of the empirical world and the underlying laws of nature, which we infer from the empirical data. Science processes by means of a very specific method that involves measurement, quantification, and intersubjective verification through repeatable experiments. This, at least, is the nature of the scientific method as it exists within the current paradigm."
- Add any factors to the class list such as measurement, quantification, and verification through repeatable experiments if they are missing and check for student understanding
- Finish presenting the Dalai Lama's definition:

"Within this model, many aspects of human existence, including values, creativity, and spirituality, as well as deeper metaphysical questions, lie outside the scope of scientific inquiry."

- Reemphasize the intention of the class is to find the overlap between western and traditional science methodology, the overlap will naturally be found in the humanizing elements of how and why science is conducted.
- Pass out the "Ways of Knowing" article and allow time for students to read in class. Encourage marking the text.
  - Marking the text: If your students are unfamiliar with this strategy, demonstrate how to mark the text for main ideas using the first few sentences. Underline or circle key words or phrases which help to answer the question: What is an oral narrative? Have students use the strategy for the remaining paragraphs for homework.
- Add additional factors to the what is science class list that may have been generated from the article and have students save article in notebook for the next class.

Homework: *Reading for Information & Summarizing*

- *Homework:* Pass out "Western Science and Traditional Knowledge"
- Students will read to answer the question: What is the nature of science?
- **Marking the text:** If your students are unfamiliar with this strategy, demonstrate how to mark the text for main ideas using the first few sentences. Underline or circle key words or phrases which help to answer the question: What is the nature of science? Have students use the strategy for the remaining paragraphs for homework.
- **Make annotations:** Students should write down thoughts or questions in the margins as they read.
- **Reread:** Students should be encouraged to reread the text to check for details they may have missed the first time.
- **Paraphrase:** Students will need to paraphrase their new understanding of *what is the nature science* in their journals for homework (1-2 paragraph response).

Lesson 2
The Ways We Learn

Purpose
To introduce students to Tlingit oral narratives and cultural ways of knowing; to create graphic representations of abstract concepts; to build primary resource analysis and interpretation skills; to identify individual learning styles; to develop the skill of gathering information from multiple resources; to assess and build background knowledge of Tlingit and western science; to increase listening, reading, and writing fluency.

Essential Questions
- What are the different ways we learn?

Duration
75 minutes (2-3 sessions)

Lesson Objectives: Connecting to the Standards

SA1.2 Students recognize and analyze multiple explanations and models, use information to revise student's own explanation or model if necessary
SA3.1 Conducts research and communicates results to solve a problem
SF1.1-SF3.1 Investigate the influences of societal and or cultural beliefs on science
R4.2 Summarize information or ideas from a text and make connections between summarized information or sets of ideas and related topics or information
R2.9 a. Differentiate between fact and opinion. b. Express opinions about text with support
D.3 Interact with Elders in a loving and respectful way that demonstrates and appreciation of their role as culture-bearers and educators in the community
E.2 Understand the ecology and geography of the bioregion they inhabit

Academic Vocabulary
- oral narrative
- cultural context

Materials
- Student composition notebooks
- Blank Venn Diagram template
- "What is an oral narrative" worksheet
- Brain dominance assessment package

Suggested Guests
- Elder to introduce Tlingit oral narrative (contact Goldbelt Heritage Foundation)

- Paul Berg (Juneau School District) to speak to high and low context cultural differences and the role of culture in science today

Literacy Strategies

- Graphic representation
- Generating questions
- Marking the Text
- Quick-write
- Rereading
- Annotations
- Paraphrasing

Assessments & Student Pages

- Pre-assessment: Peer review and share out of article summaries (homework from lesson #1)
- Assessment: *Creating a venn diagram (Western science and Tlingit science)*
- Assessment: *What is an oral narrative?*

Procedure

Step 1) Introducing Content: 30 minutes

- Begin with summarizing the article students read for homework, "Western science and traditional knowledge."
- Model peer review and discuss how self and peer revision will be a regular part of the class. When reading, reviewing, and editing each other's work, suggestions and reflections should be given in a respectful manner.
- Students should exchange their article summaries for peer revision and group discussion about the new topic of western science and traditional knowledge

Step 2) Assessing Background Knowledge: 20 minutes

Explain:

- As the author of "Western science and traditional knowledge," Fulvio Mazzocchi stated:

  > *"despite their variations, different forms of knowledge can learn from each other…the British anthropologist Gregory Bateson has compared knowledge about the material world to a map and the terrain it describes: the map itself is not the terrain, but only one representation of it (Bateson, 1979). Just as different maps can give accounts of the same territory, so too can different forms of knowledge about the material world. Its actual representation ultimately depends on the observer's view."*

- With great societal change and challenges, tremendous solutions wait on the horizon. Scientific reductionism has explained in great detail many components of the natural world. Western science, however, becomes a cultural myth when stated as the only way to approach truth. Traditional scientific approaches of controlled, repeatable experiments cannot be applied to phenomena that fall outside of specific conditions.

  > *"…Hence, the integration of methods and results from different approaches*

and levels of analysis can become essential. These considerations seem to be particularly relevant for studying biological, ecological and social phenomena that include different levels of complexity. As already mentioned, the Western tradition of thinking is developing a different approach to gaining knowledge from complex systems, but it would be equally useful to learn how traditional approaches explain such complexity. Not only are they more holistic, but also they seem to be better suited to coping with the uncertainty and unpredictability that are viewed as intrinsic characteristics of natural systems. Western science and traditional knowledge constitute different paths to knowledge, but they are rooted in the same reality. We can only gain from paying attention to our cultural history and richness."

Assess:

- Using their resources (notes, summaries, and the two annotated articles from lesson #1 "Ways of knowing" and "Western science and traditional knowledge") students should work individually to create a graphic representation of their understanding of the similarities, differences, and commonalities of western and Tlingit science methodologies in a Venn Diagram *(to be collected for a grade).* *Venn diagram worksheet included at the end of the lesson plan.

Step 3) Building Background Knowledge: 25 minutes

Cultural Ways of Knowing:

- Cultural ways of knowing have been categorized into high and low context cultures. There is no good or bad within these schemas, it just refers to how people in varying societies learn and conduct their daily lives.
  - Low context refers to cultures that depend heavily on directional language for communication, understanding, and reference. Families tend to be nuclear and societal systems are divided and reduced for simplification. Examples of low context culture are many Western societies and institutions. American education system is extremely low context as demonstrated by 70% of the school day being devoted to instructions "take out your book, turn the page, change classes, etc…"
  - High context cultures consist of many Indigenous cultures. Words are more of a releaser between community members, with many things being communicated through body language and context. It is not unusual for individuals to be multi-talented in dancing, singing, musical instruments, acting, producing art work and crafts. Families are community-oriented and there are usually multi-generations living in one household. French society is another example of high context culture.
- Oftentimes, placing high context individuals in low context settings does not work well. Americans can go both ways. Low context within our institutions and dominant language, but high context on special days like graduation and weddings.
- Explain that just as there are cultural ways of knowing, individual ways of knowing also differ greatly across humanity. Pass out "Brain dominance assessment" for students to fill out for homework. Explain that they are to answer the questions based on their true tendencies and to not overthink each question to vary the answers.

- Due to a great difference in ways of knowing, there are a variety of ways of sharing knowledge. Within today's Western paradigm, science theories and facts are only

accepted out of peer-reviewed scientific journals where multiple experts have checked experiments and conclusions. In Tlingit culture, information is shared through oral narratives and At.oow', sacred belongings of families and clans. Just as the Smithsonian Institute contains libraries of knowledge, elders hold ancient knowledge that was tested as true through the act of living in Alaska's dynamic landscapes. The oral narratives, Chilkat and button blankets, hats, armor, wooden sculptures, and other At.oow' act as the peer-reviewed journals that communicate and verify certain theories, facts, and conclusions about natural systems.

Tlingit Oral Narratives in this Unit:

- Introduce Tlingit oral narratives by creating a discussion around what students think an oral narrative might be.
- Explain that oral narratives have different purposes and pass out the "what is an oral narrative?" worksheet. Students should read through the description remembering to mark the text, annotate, and paraphrasing their understanding of the significance of oral narratives. As a class, two Tlingit oral narratives will accompany science lessons to better understand the ecology and natural history of Alaska to help answer the unit's essential question, "why do we live here?"
    - If possible, have a Tlingit knowledge bearer such as David Katzeek, Paul Marks, or Fred White visit the class to lead the discussion of what is an oral narrative and if they feel up to it, to share one with the class. Depending on clan rights and who is able to present to the class, it would be ideal to have either the *Basket Bay History* be told, but students will benefit from any oral narrative shared with them.
- Deeper exploration of the oral narrative and interactions with Tlingit elders and knowledge bearers will be presented throughout the unit. One type of oral narrative will accompany this unit, it is a historical records not a fictional story. The oral narrative speaks of migration through Southeast Alaska and the hero's journey that historical Tlingits embarked on. Every student is also on a learner's journey.

Homework: *Reading for Information & Graphic Representations*

- *Homework:* Students to complete "Brain dominance assessment" packet to identify individual learning styles and strengths.
- **Paraphrase:** Students should summarize their learning preferences and how they believe this influences them throughout the school day and learning outside of school as well. *Are there certain hobbies or interests they prefer because of their learning styles, do certain teachers use strategies that help them learn, do they recognize when information is presented to them in a challenging way?*

Lesson 3
Alaska's Natural History

Purpose
To introduce students to unit and final presentation; to distinguish the abiotic and biotic factors that support life in Southeast Alaska; to introduce Aak'w Kwaan and Taak'u Kwaan ancestral lands; to build primary resource analysis and interpretation skills; to develop the skill of gathering information from multiple resources; to assess and build background knowledge of Tlingit and western science; to increase listening, reading, and writing fluency.

Essential Questions
- What are the ecological conditions that support human life?

Duration
150 minutes (2 75-minute sessions)

Lesson Objectives: Connecting to the Standards

SA1.1 Students ask questions, predict, observe, describe, measure, classify, make generalizations, analyze data, develop models, infer, and communicate
SF1.1-SF3.1 Investigate the influences of societal and or cultural beliefs on science
R4.2 Summarize information or ideas from a text and make connections between summarized information or sets of ideas and related topics or information
R2.9 a. Differentiate between fact and opinion. b. Express opinions about text with support
E.2 Understand the ecology and geography of the bioregion they inhabit

Academic Vocabulary
- abiotic
- biotic
- ecosystem dynamics
- archipelago

Materials
- Student composition notebooks
- Learner's Journey Concept Map
- Final Project Student Rubric
- Aak'w Kwaan and Taak'u Kwaan map
- Siting factor diagram
- Copies of *Basket Bay History*
- *Basket Bay History* worksheet (homework)

Suggested Guests

- Richard Carstensen of Discovery Southeast; Lead Scientist of Natural History
- David Katzeek of GHF; Knowledge Bearer of Tlingit Community Sites

Literacy Strategies
- Note-taking
- Generating questions
- Debriefing
- Quick-write
- Work backward
- Paraphrasing

Assessments
- Pre-assessment: *What you think you need to know (journal prompt)*
- Assessment: *Siting factor sheet (student page)*

Lesson Extension (Field Study Experience)
- Create a cultural-heritage ecological survey for students to search for biotic factors around the school or in a field trip to the coastline. For plants and animals found, have students research the significance to Tlingit culture (can use the book Haa Atxaayí Haa Kusteeyíx Sitee, Our Food is Our Tlingit Way of Life. Excerpts from Oral Interviews. Richard G. Newton and Madonna L. Moss. USDA 3rd Edition). Can create rows, columns, or symbols to represent categories such as: medicine, food, spirituality, cultural identity (clan crests), basketry, dyes, soap, or fuel.

Procedure
Step 1) Making Connections: 30 minutes
- Remind students that the two oral narratives we will be learning about both contain stories of real people who complete the "hero's journey." This is a literary device or term that refers to characters who are profoundly changed by life's experiences. Through the brain dominance assessment, students discovered their individual strengths and natural inclinations for learning. Present the learner's journey concept map created by Gregory Cajete, Ph.D. (student page at the end of lesson #3).
- Explain that although students enter each class day with a certain state of being (ie. cranky, happy, tired, bored, energetic…) there is the choice of going through the circle and leaving in a new state of being. The same can be said about the class, as well as their path as scientists. Scientists use the scientific model which follows a similar pattern of hypothesizing, seeking answers, creating experiments, and sharing knowledge.
- Pair students up to discuss the results of their brain dominance assessment homework and to reflect on the learner's model.
- Explain that they will be working in small groups on their own learner's journey to study the coastlines surrounding Juneau. This area is Tlingit territory known as Aak'w Kwaan and Taak'u Kwaan (map provided at end of lesson #3). Explain the history of the formation of Southeast Alaska's archipelago, and how islands created natural boundaries for distinct clans to protect and identify with natural resources. Aak'w

Kwaan consists of L'eeneidi (Raven moiety) and the Wooshkeetaan people (Eagle moiety). Taak'u Kwaan was the Yanyeidi clan (Eagle).

- The culminating activity consists of group presentations of community site selection throughout ancestral Aak'w Kwaan and Taak'u Kwaan (areas surrounding Juneau) that combine Tlingit oratory, personal lineage, GIS technology, critical thinking, understanding of natural history, systemic and dynamic changes, and global concepts.
- Hand out final scoring rubric and discuss expectations (student page).

Step 2) Assessing Background Knowledge: 10 minutes

Explain:

- Students need to know where they are going by understanding the final project rubric. One problem-solving strategy is to work backwards. On the learner's model students first need to ask questions in order to move forward seeking answers. What do students need to understand to be able to select a community site for winter and seasonal use?

Assess:

- Using their resources (the Aak'w and Taak'u map, the learner's journey, and the final scoring rubric), students need to do a quick write to answer "what do I need to know to be able to select appropriate community sites in Southeast Alaska?"
- Partner students up to compare and contrast essential factors and things to know. Have students continue to add details to their own responses.

Step 3) Building Background Knowledge: 45-75 minutes

Natural History

- Hand out the "People village site choice" diagram (student page) to each student for their binder. Explain that there are many abiotic and biotic factors that influence environments and where people choose to live. Abiotic factors are often referred to as "non-living." Tlingit culture states that everything in an ecosystem has a spirit, that even rocks are connected to one another and to us, that their nature shapes people just as people shape them. Biotic factors include what most people refer to as living, the dynamic vegetation and animals that inhabit an area.
- Use ecological field survey here if applicable.
- Combine students into small groups and hand out several blank index cards to each group. Students should work together to complete details under each bubble in the diagram
    - For example: What should go in the food category? Students should identify any known food resources they are familiar with found in Southeast Alaska: berries, different fish, nettles, mushrooms, animals, etc)
- As a class, create a large visual of the diagram that will help students identify all the factors they will need to take into consideration for community site selection. Groups can read aloud their details and someone can record each component on the class visual.
- Model the act of examining a coastline on the map and visualizing the thought process that would go into selecting a suitable site. Student groups should discuss and defend how people may need to prioritize desirable features and environmental settings.

Cultural History & Literacy

- If possible, invite a knowledge bearer in to tell *Basket Bay History*.
- Hand out *Basket Bay History* copies to each student (in Tlingit and English). Have students read aloud as a class lines 1-81. Stop before migration history begins.

Homework: *Reading for Information*

- *Homework:* Students should reread *Basket Bay History* for homework to answer the question "why did Tlingits choose to live there?" They should mark the text and annotate as they read. As students complete the accompanying worksheet for homework, they should be thinking about both the abiotic and biotic factors of Kak'w that made it a thriving community site *(worksheet to be collected)*.

Lesson 4
Glaciation & Migration History

Purpose
To investigate the relationship between glaciers and people; to explore local glaciation and glacier science; to introduce students to primary resource analysis and interpretation regarding the interconnectedness of the world demonstrated by the carbon cycle; to develop the skill of gathering information from multiple resources; to assess and build background knowledge of traditional ecological knowledge; to increase listening, reading, and writing fluency.

Essential Questions
- Why do we live here?
- How do the dynamic landscapes of Alaska influence culture?

Duration
300 minutes (4 to 5-75 minute sessions)

Suggested Field Trip
5 hours

Coordinate with UAS Professor of Glacier Science, Dr. Eran Hood or Dr. Rick Edwards of the US Forest Service Pacific Northwest Research Laboratory to explore the Mendenhall Glacier and associated stream types. Dr. Hood and Dr. Edwards can present on glacier science in detail and history in the Mendenhall Visitor Center and help lead students in field exploration of two stream types converging (Mendenhall and Montana Creek). Students can test for water quality and consider factors such as rock size for salmon migration. Richard Carstensen from Discovery Southeast can also help lead a community site investigation along the Mendenhall where there used to be a L'eeneidi traditional food preparation site less than 100 years ago.

Lesson Objectives: Connecting to the Standards

SC3.1 Relate carbon cycle to global climate change
SA1.2 Students recognize and analyze multiple explanations and models, use information to revise student's own explanation or model if necessary
SF1.1-SF3.1 Investigate the influences of societal and or cultural beliefs on science
R4.9 Analyze the effects of cultural and historical influences on texts.
A.2 Students will recount their own genealogy and family history
E.2 Understand the ecology and geography of the bioregion they inhabit

Academic Vocabulary
- Glacier science

- Little Ice Age
- Isostatic rebound
- Carbon cycle
- Calving rates
- Slip glaciers
- Surge glaciers
- Terminus

Materials
- Student composition notebooks
- Copy of *Basket Bay History*
- Google image of SE Alaska
- Excerpts from the scientific journal, "Glaciers and Climate Change: Perspectives from Oral Tradition." Full version available at: http://arctic.journalhosting.ucalgary.ca/arctic/index.php/arctic/article/viewFile/795/821
- Migration History worksheets (Aadóo Sáyá Xá" worksheets, Kunz & Marks family tree example, and abbreviated Tlingit introduction (optional))
- Alaska Native Genealogy http://wc.rootsweb.ancestry.com/cgi-bin/igm.cgi?db=klea
- PowerPoint on Glaciation & Carbon Cycle (not included in this unit)
- Optional: Chasing Ice Educational Documentary (filmed on-site at Mendenhall Glacier through the Extreme Ice Survey which is currently still occurring)

Suggested Guests & Experience
- Paul Marks of GHF; Knowledge Bearer of Tlingit Glacier History (Father is Chookaneidi)
- Dr. Eran Hood of UAS; Professor of Glacier Science
- Dr. Rick Edwards of US Forest Service PNW Lab; Lead Stream Ecology Scientist
- Marsha Hotch of GHF; Knowledge Bearer of Tlingit genealogy
- The end of the lesson could be a separate class session held within a computer lab to allow students time to research their family history

Literacy Strategies
- Quick-write
- Think-Pair-Share
- Mark the Text
- Oral Reading
- Note-taking
- Debriefing

Assessments
- Pre-assessment: *Collect Basket Bay History worksheet (homework)*
- Assessment: Short-term project

Lesson Extensions

- GHF's "Glacier Math" is an academically-rigorous lesson written by Juneau School District teacher, Paul Berg covers calculating the rate of ice loss (flow rate = distance/ time)

Procedure

Step 1) Introducing Content: 30 minutes

- Begin class with a quick-write in student journals regarding what were the unique ecological conditions that made Ká k'w an ideal village site *(why did Tlingits select the site for their community?)*. Students can use their homework worksheet and copy of *Basket Bay History*. When they are finished, collect the homework.
- Hand out the outline "Siting factors for seasonal & winter villages" and give students time to compare their list of factors with the article. Students can add details to their lists and keep the worksheet for future reference.
- Explain that they are doing to continue to learn more from the *Basket Bay History* about where people were before they found Ká k'w. Just like their families have personal lineages, Tlingit, Haida, and Tsimshian clans migrated throughout Southeast Alaska and the Interior of Canada to meet their societal and fundamental needs throughout time.
- Have class take turns reading out loud *Basket Bay History* lines 82-158 (end of oral narrative).

Step 2) Assessing Background Knowledge: 45-60 minutes

- Have students think-pair-share about the main concepts presented in the second part of the oral narrative and record responses in journals as a graphic organizer or paragraph. Pass out the google map image of the Southeast Alaska for students to orientate themselves to the oral narrative references.

Explain:

- Remind students that many oral narratives are historical accounts of observed events. Glaciation has played a large role in how people live and interact with the surrounding landscapes for the last few thousand years. Glaciers might have even impacted the way individual students' families moved throughout Alaska, they will be researching into this possibility later.
- Present to students about local glaciation processes and the carbon cycle. The carbon cycle is a way to clearly observe how everything is connected. Just as the gases are exchanged throughout our environment and atmosphere, Tlingits see that everything has a spirit and moves in circles. Any disturbance or dramatic change in one condition will cause effects elsewhere. Southeast Alaska plays a huge role in the carbon cycle. Between the coastal interactions of land, sea, and storms, the carbon sinks of local muskegs and peat bogs, and the glaciers found around the mainland and islands who's retreat is causing dramatic isostatic rebound and land growth. Glaciers are controversially being referred to as the canary in the coal mine, and the local Mendenhall Glacier has seen continuous and noticeable recession of the glacier's terminus (the position of the end of the glacier). Glaciers move through internal deformation and basal slip. However, occasionally glaciers move in what is known as a surging glacier. Tlingit oral narratives, such as the story of Interestingly, the Taku

Glacier is one of the few in the world that is currently advancing in size. Discuss the differences in calving rates between tidal glaciers and inland glaciers and introduce the discussion of natural system changes and the controversy of global climate change.

Step 3) Building Background Knowledge: 30 minutes

- Hand out the excerpts from the scientific journal, "Glaciers and Climate Change: Perspectives from Oral Traditions" from the student packet. Give students time to read the highlighted sections, reminding them to mark the text, annotate, and to reread throughout. Students should also write down in their journals any questions that are generated from the article or earlier presentation.
- In small groups, students should debrief about the article (*insert Glacier Math lesson here if desired). As a class discuss opinions and thoughts generated by the text.
- Explain that why we live here extends beyond just the ecological conditions. Many people had to work hard together for us to be standing here today. Just like the *Basket Bay History,* our lives are intertwined with the landscape and our surroundings and it's just as important to understand our cultural history as it is to study Alaska's natural history. Even if students just moved to Alaska, it is possible for them to trace their migration history on their family's journey to Alaska through time to better answer the question, why do we live here?
- Some students will discover that their ancestor's migration history is directly tied to local glaciation events, just as in the oral narratives. Model completing the Aadóo Sáyá Xá" and creating your own family tree. A sample tree of the Kunz family has been included for reference. The family trees they create should be matrilineal since Tlingit culture is matrilineal and it is beneficial for all students to understand their family history within a different social context. Since students will be presenting on Tlingit ancestral lands, they can take on the challenge of learning their Tlingit introduction. This is a great opportunity for Tlingit students to help their peers if applicable.
- If possible, Marsha Hotch can teach about Tlingit clan and Kwaan formation to better understand genealogy. Marsha can also share with students a short Tlingit introduction

Short-Term Project: *Generating Questions*

- *Homework:* Pass out "Aadóo Sáyá Xá" and the abbreviated introduction sheets. There are two versions, one for Alaska Natives and one for others.
- Students will complete the worksheet to answer the question: *"Why do I live here?"*
- Students will need to communicate with their families about their ancestors. If a student does not know their family, they can pick a favorite elder or community member and research their background.
- If any students are Tlingit, Haida, or Tsmishian there is an excellent free, genealogy website: http://wc.rootsweb.ancestry.com/cgi-bin/igm.cgi?db=klea where previous students have been able to trace back seven generations.
- Give students a time-frame to finish their research and to choose a creative way to share their personal migration history and how their family's history is interconnected with the environment (i.e. glaciation, fishing harvest, potato famines overseas, etc).

Lesson 5
Science of Tlingit Foods & Technology

Purpose
To investigate the relationship between the environment and people; to explore local foods and the Tlingit ingenuity of ancient technology that influences today's tools; to understand basic food preparation; to introduce students to primary resource analysis and interpretation regarding the interconnectedness of the world demonstrated by the carbon cycle; to develop the skill of gathering information from multiple resources; to assess and build background knowledge of traditional ecological knowledge; to increase listening, reading, and writing fluency.

Essential Questions
- Why do we live here?
- How do the dynamic landscapes of Alaska influence culture?

Duration
120 minutes (2-75 minute sessions)

Lesson Objectives: Connecting to the Standards

SE1.1 Research how social, economic, and political forces strongly influence which technology will be developed
SA1.2 Students recognize and analyze multiple explanations and models, use information to revise student's own explanation or model if necessary
SF1.1-SF3.1 Investigate the influences of societal and or cultural beliefs on science
R4.2 Summarize information or ideas from a text and make connections between summarized information or sets of ideas and related topics or information
B.4 Identify appropriate forms of technology and their use for improving community
E.2 Understand the ecology and geography of the bioregion they inhabit

Academic Vocabulary
- displacement
- fermentation
- microorganisms
- pH
- biopreservation
- anaerobic

Materials
- Free response prompt

- Tlingit Ingenuity PowerPoint
- Excerpts from "Tleikwaani, the "berried" landscape: The structure of Tlingit edible fruit resources at Glacier Bay, Alaska" (full version at http://ethnobiology.org/sites/default/files/pdfs/JoE/19-1/Thornton.pdf)

Suggested Guests & Experience
- Henry Hopkins of Juneau School District; Biology teacher-boat technology and fermentation presenter for pilot class
- Helen Watkins of GHF (contractor); Knowledge bearer of Tlingit foods
- Edward Hotch of GHF; Knowledge bearer of smoking, drying, and hooligan oil production
- Fred White of GHF; Knowledge bearer of Tlingit canoes

Literacy Strategies
- Quick-write
- Mark the Text
- Oral Reading
- Note-taking
- Debriefing

Assessments
- Free Response Prompt
- Article summary

Lesson Extension
- Visit a traditional community site to research evidence of historical sites. Teach students about compass navigation and allow them to explore a pre-arranged compass course. At each compass bearing set up a small action such as guessing the diameter and height of a tree, leave a field guide for students to identify a nearby plant, have students identify manmade versus natural features.

Procedure

Step 1) Introducing Content: 30 minutes
- Begin class with a group discussion reflecting on the main themes presented and studied in *Basket Bay History:*
  - *historical community site locations*
  - *Tlingit language*
  - *Abiotic and biotic factors of community sites (influence on site selection)*
  - *Animals and vegetation used by community members*
  - *Tlingit harvest methods*
  - *Oral responses and communication*
  - *Effects of glaciation on Tlingit migration and clan history*
- Topics that the class has not explored yet in detail, but that are essential for the final project of community site selections are:
  - *navigation*
  - *trade*

- *technology and transportation*
- *food preparation and storage*

Step 2) Assessing Background Knowledge: 45-60 minutes

Explain:

- Explain that ecology is a concept that has always been understood by cultures over time. Navigation, transportation, trade, and food preparation all require a deep exploration of ecosystems and the activities that potentially cause changes to surroundings.

Assess:

- Present students the Free Response Prompt that is a modified version of questions used on the AP Environmental Science exam each year. Students should complete the free response *(to be collected)*.

Step 3) Building Background Knowledge: 30 minutes

- Introduce the standard "SE1.1 Research how social, economic, and political forces strongly influence which technology will be developed"
- Technology, in turn, can have potential for great impacts intellectually, socially, for health and wellness, and on the environment. Explain that students will be examining some of the forms of technology designed by Tlingit ingenuity that affects the technology seen in the world today.
- Show "Tlingit Ingenuity & Technology" PowerPoint and have students take notes. Have guest speakers present on the topics of Tlingit canoes, adzes, fermentation, food preparation, and navigation if possible.

Homework:

- Pass out excerpts from "Tleikwaani, the "berried" landscape: The structure of Tlingit edible fruit resources at Glacier Bay, Alaska" (full version at http://ethnobiology.org/sites/default/files/pdfs/JoE/19-1/Thornton.pdf)
- Students should read, mark the text, annotate, reread if necessary, and paraphrase in their science journals to answer the question, "what is the relationship between the glaciers, the vegetation, and the animals/people who inhabit Glacier Bay over time?"

Lesson 6
Relationships with the Land

Purpose
To combine previous knowledge into preparation for culminating activity; to introduce students to primary resource analysis and interpretation regarding the interconnectedness of the world demonstrated by the carbon cycle; to develop the skill of gathering information from multiple resources; to assess and build background knowledge of traditional ecological knowledge; to increase listening, reading, and writing fluency.

Essential Questions
- Why do we live here?

Duration
120 minutes (2-75 minute sessions)

Lesson Objectives: Connecting to the Standards

SA1.1 Students ask questions, predict, observe, describe, measure, classify, make generalizations, analyze data, develop models, infer, and communicate
SA3.1 Conducts research and communicates results to solve a problem
SF1.1-SF3.1 Investigate the influences of societal and or cultural beliefs on science
R4.2 Summarize information or ideas from a text and make connections between summarized information or sets of ideas and related topics or information
B.4 Identify appropriate forms of technology and their use for improving community
D.3 Interact with Elders in a loving and respectful way that demonstrates and appreciation of their role as culture-bearers and educators in the community
E.2 Understand the ecology and geography of the bioregion they inhabit

Academic Vocabulary
- geographical information systems (GIS)
- layers
- aerials
- topography

Materials
- Computer Lab with GIS programming
- Access to internet for data programs:
  - https://alaskafisheries.noaa.gov/shorezone/
  - GIS interactive map of Southeast Alaska (prepared by Richard Carstensen)
- Flash drives for saving student images for projects

Suggested Guests

- Richard Carstensen of Discovery Southeast; to present Intro to GIS and multi-layered Southeast Alaska map

Literacy Strategies

- Think-Pair-Share
- Note-taking
- Work backwards
- Quick-write

Assessments

- Final Project

Procedure

Step 1) Introducing Content: 30 minutes

- Students should think-pair-share about the article excerpts from the night before. They should review the list of key factors.
- Introduce Richard Carstensen's narrated slideshow on siting factors.

Step 2) Assessing Background Knowledge: 45-60 minutes

Explain:

- Explain that Tlingit, Haida, and Tsmishian lived throughout Southeast Alaska due to their comprehensive understanding of coastal ecology, geology, and oceanography.
- Introduce the concept of Geographical Information Systems (GIS). GIS is defined to:

  > "integrate hardware, software, and data for capturing, managing, analyzing, and displaying all forms of geographically reference information. GIS allows us to view, understand, question, interpret, and visualize data in many ways that reveal relationships, patterns, and trends in the form of maps, globes, reports, and charts. A GIS helps you answer questions and solve problems by looking at your data in a way that is quickly understood and easily shared."

Assess:

- Students should work individually to explore the GIS map of Southeast Alaska. Layers to turn on and off include:
  - Tlingit place names (symbols for forts, villages)
  - Clip (to reset)
  - Glaciers
  - Estuaries
  - Snow depth
  - Forest Type
  - Anadromous streams
  - Sedge
  - Clans and Kwaans
  - 2009 aerials
  - Topographic lines

    - Location of year-round site and nearby summer seasonal site for food preparation (sensitivity to bear habitat).
- Allow students to explore the coastlines of Aak'w Kwaan and Taak'u Kwaan for their preferred community site. Students can create a graphic organizer to act as a ecological factor checklist.
- When students have selected a potential community site, they should export images of the site on three different scales onto memory drives (examples of expectations available in the TEK student packet):
    - map image indicating where on Aak'w Kwaan and Taak'u Kwaan their selected site is located
    - aerial view of the community site's shoreline
    - Shorezone image from the website https://alaskafisheries.noaa.gov/shorezone/
- Consolidate site selections into small groups of students who chose sites near one another and have them defend their site until the best site is selected

Step 3) Building Background Knowledge: 30 minutes

- Use the book Haa Léelk'w Hás Aaní Saax'ú: Our Grandparents' Names on the Land. Edited by Thomas F. Thornton. 2012. to have students research if their selected site was traditionally a village site.
- Students should prepare their final presentation slides for a class slideshow on their selected village site. They should pick the most distinct feature of their site (canoe beach, garden, forest types, resources…) to present on.
- Teacher can prepare for final presentation event:
    - Have students sign thank you cards for guest speakers
    - Make sure all groups complete their visual slides and narration
    - Secure a venue for culminating activity
    - Invite elders, cultural specialists, and extended family members to come to the event
    - Assign students to prepare and bring traditional food and drinks for the events
    - Run a dress rehearsal with the students so they have a chance to practice presenting their work to a larger audience

Short-Term Project: *Generating Questions*

- *Homework:* Students should refer back to their learning concept map and reflect in their journals about what they knew, what they have learned, and how they view their surrounding landscapes.

Lesson 7
Sharing our Ideas

Purpose
To combine previous knowledge into preparation for culminating activity; to assess student understanding and ability to communicate knowledge; to assess and build background knowledge of traditional ecological knowledge; to increase listening, reading, and writing fluency.

Essential Questions
- Why do we live here?

Duration
60-90 minutes

Lesson Objectives: Connecting to the Standards

SA1.1 Students ask questions, predict, observe, describe, measure, classify, make generalizations, analyze data, develop models, infer, and communicate
SA3.1 Conducts research and communicates results to solve a problem
SF1.1-SF3.1 Investigate the influences of societal and or cultural beliefs on science
R2.9 a. Differentiate between fact and opinion. b. Express opinions about text with support
B.4 Identify appropriate forms of technology and their use for improving community
A.2 Students will recount their own genealogy and family history
D.3 Interact with Elders in a loving and respectful way that demonstrates and appreciation of their role as culture-bearers and educators in the community
E.2 Understand the ecology and geography of the bioregion they inhabit

Materials
- Completed Final Presentation Slides (can be presented as one class presentation with each group aging 3-4 slides focused on their site selections)
- Traditional food and drinks for guests to share
- Electronic equipment to present students' work
- Microphone and sound system
- Elders, cultural specialists, and extended family members

Literacy Strategies
- Generating Questions
- Rehearsal

- Oral Reading
- Group Presentations

Assessments

- Final Project Presentations (willingness to share and demonstrate respectful listening skills)

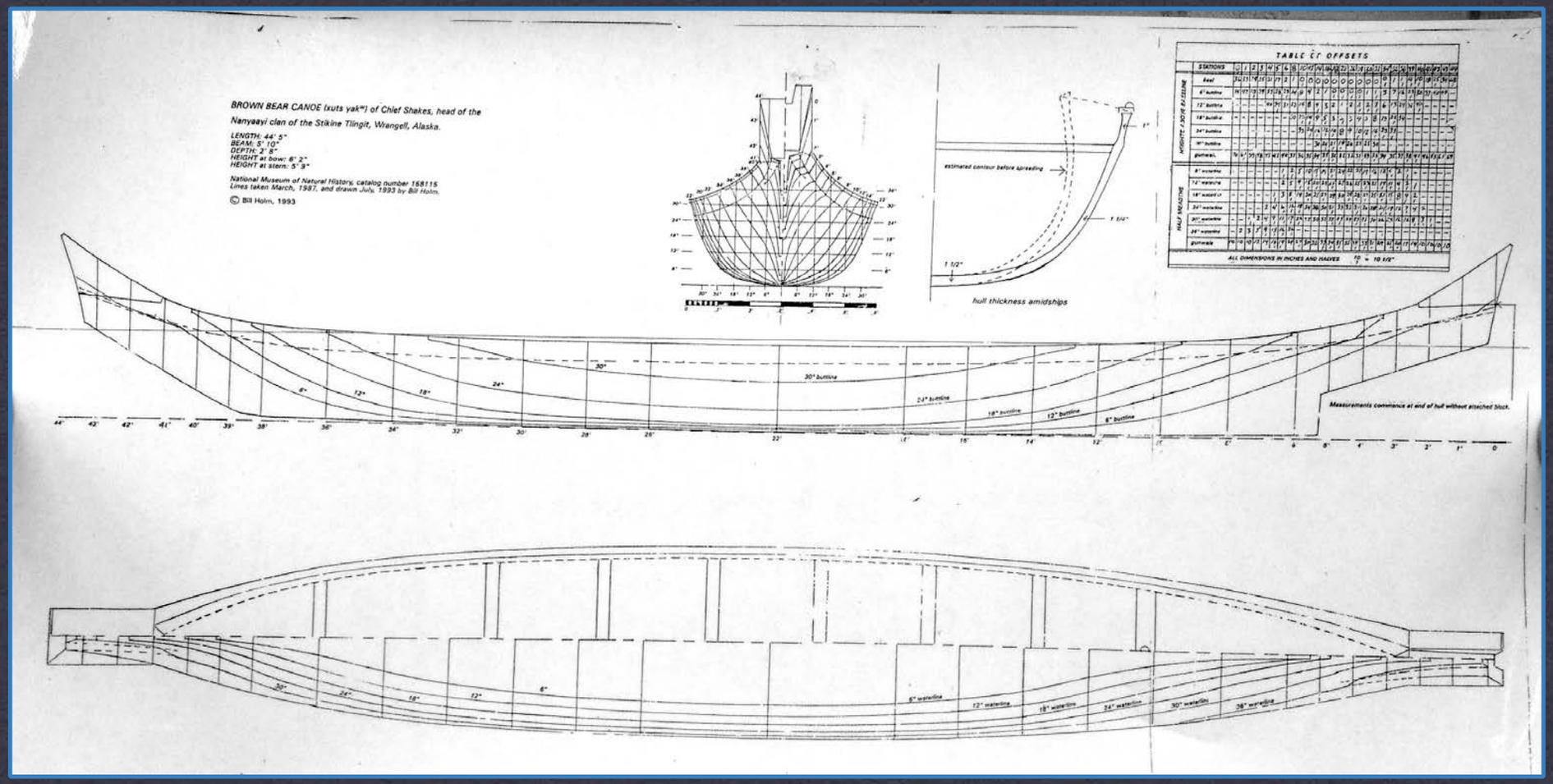
Procedure

Step 1) Preparation for Event

- Gather presentation materials
- Arrange traditional snacks and drinks for guests
- Assign students to usher guess in and help seat and serve elders

Step 2) Culminating Event

- Two students (preferably an Eagle and a Raven) introduce themselves to the group, thank the elders, cultural specialists, and panel members for helping them during the unit, thank people for coming, and invite people to have something to eat while they share their work. Show respect for Aak'w Kwaan and Taak'u Kwaan before the presentations begin.
- Students share the final presentation and show reverence to *Basket Bay History* oral narratives and their respective clans.
- Students present thank you cards to guest speakers. Guests can respond to the student presentations.
- Teacher thanks the students for all their hard work and thanks the audience for their support. Teacher encourages students to help clean up and usher elders to their transportation.



TLINGIT INGENUITY & TECHNOLOGY

GOLDBELT HERITAGE FOUNDATION INVESTIGATING TLINGIT ECOLOGICAL KNOWLEDGE

What does it take to thrive in Southeast Alaska?

- Focused observation over generations
- Trust for inherited wisdom from ancestors
- Qualitative oral record
- Life-encompassing moral code
- Respect for the interconnectedness of everything (awareness of the metaphysical)

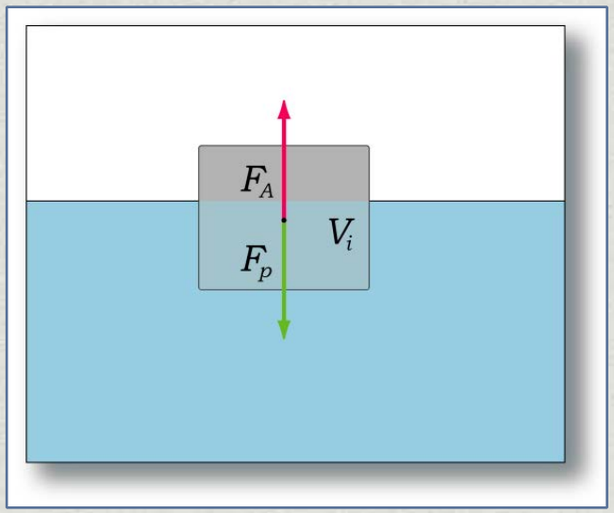
What else?

- Deep understanding of ecological conditions
  - bedrock geology
  - surficial geology & soils
  - climate
  - marine ecology & oceanography
  - vegetation
  - fish & marine invertebrates
  - wildlife
  - human relations
- Ability to move great distances for trade, safety, and defense (navigation, transportation)
- Fishing technology & gear
- Food preservation

Transportation

- Southeast Alaska requires inter-coastal waterway travel in difficult conditions (low visibility, wave and wind variability)
- Knowledge of the Interior navigation
- Good relationships for trade, design of canoes came from Haida

Understanding Boat Technology



PLANING BOATS

- Bottom is a flat line to stern
- At rest, uses hydrostatic lift (buoyancy)
- At speed, uses hydrodynamic lift
- Hull comes almost entirely out of water at high speeds

DRAFT ↓ AS SPEED ↑

- Powerboats need high power engine to overcome gravity to plane

DISPLACING BOATS

- Hull below water, at high speed “appears trapped” behind a bow wave
- Speed limited by waterline and displacement weight
- Relies more on hydrostatic lift
- Speed determined by distance between bow and stern waves

DRAFT ↑ AS SPEED ↑

- Higher resistance because bow is trying to climb waves while stern is being sucked back down by dynamic forces

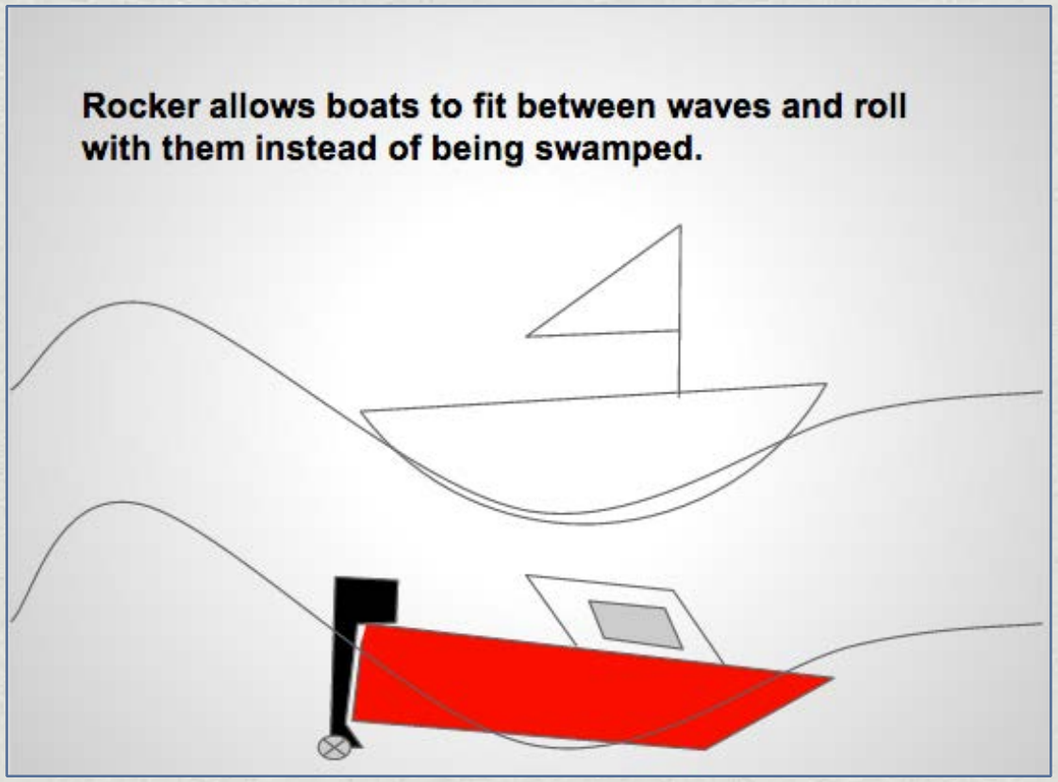
- Are Tlingit canoes planing or displacing boats?
- In this picture, huge amount of the hull is below the waterline (not able to be seen)
- Displacing hull speed video: https://www.youtube.com/watch?v=3lffCqqluYI
- Planing boat demonstration: https://www.youtube.com/watch?v=hyME1EDreNg

Specialized Features of Boat Hulls

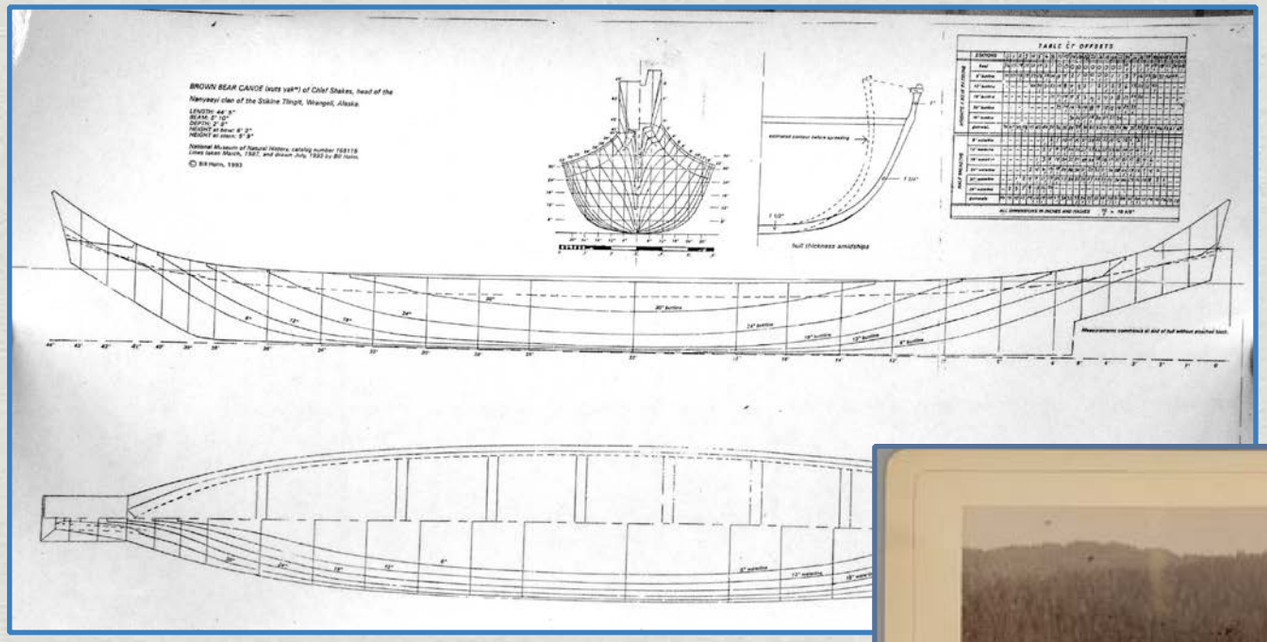
- Rocker
- Forward flotation/extended forward floatation
- Wave blocking devices
- Bulbous bows and bow wave dispersion devices
- C-shaped double ender

Rockers

- Flat bottom boats do not have rockers
- In Southeast Alaska, the design is necessary to withstand the waves and wind

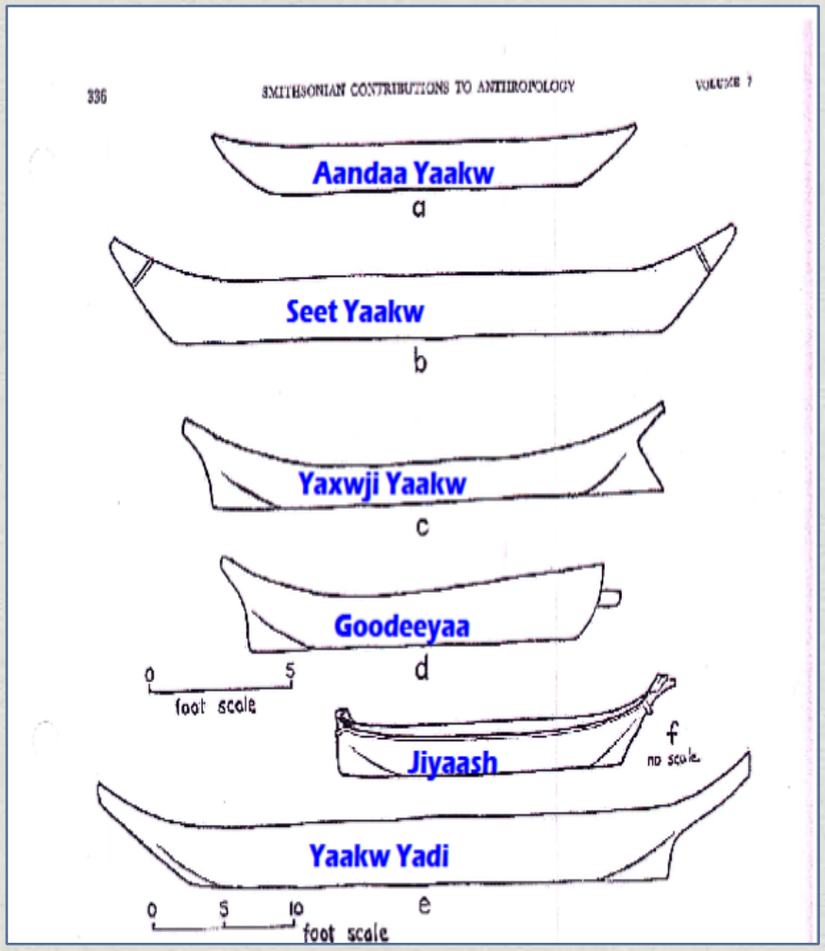


Does the Chief Shake canoe have a rocker?



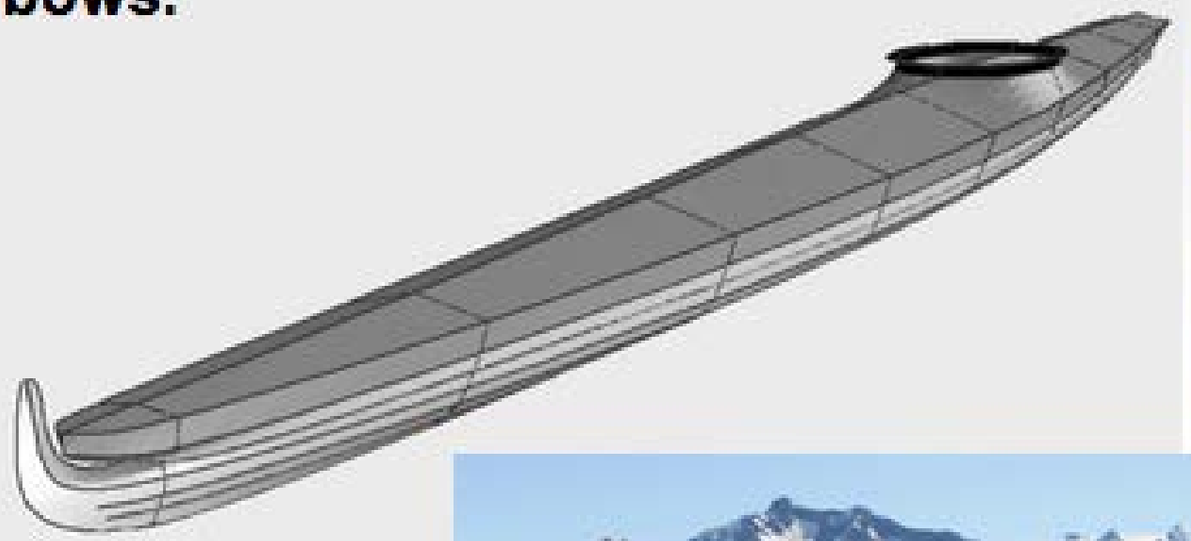
In addition to rockers, many of these early engineering devices are seen in most boats today

- Extended forward flotation devices
- Wave dispersion devices
- Large bulbous bows to draw boat up onto the wave



Elsewhere in Alaska….

Aleut Kayak's (iqyax) have very sophisticated bulbous bows.



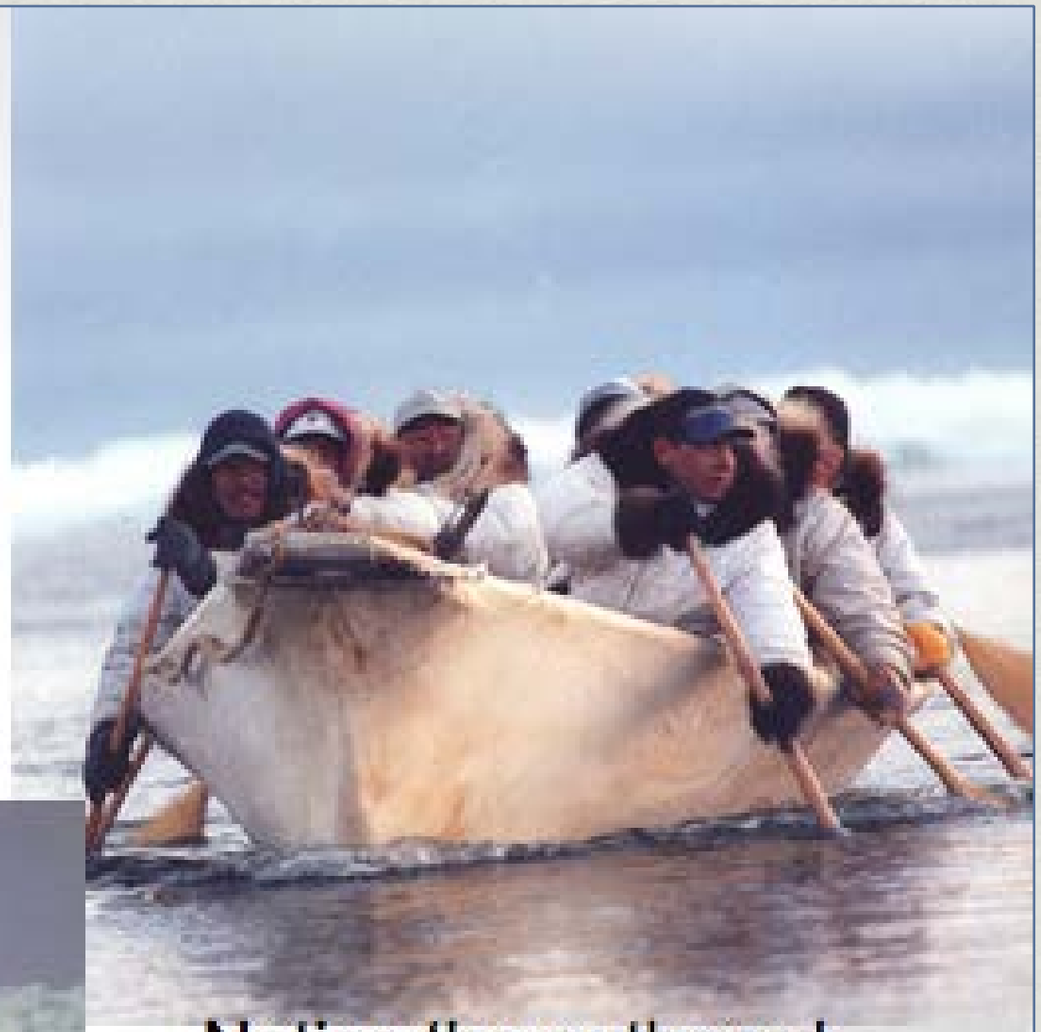
Aleut paddlers routinely beat the steamships on the Unalaska-Akutan route.

The race was usually a wager, which the Aleuts always won.

The Umiak

These are in some ways the equivalent of a large Tlingit/Haida canoe in Eskimo/Aleut cultures.

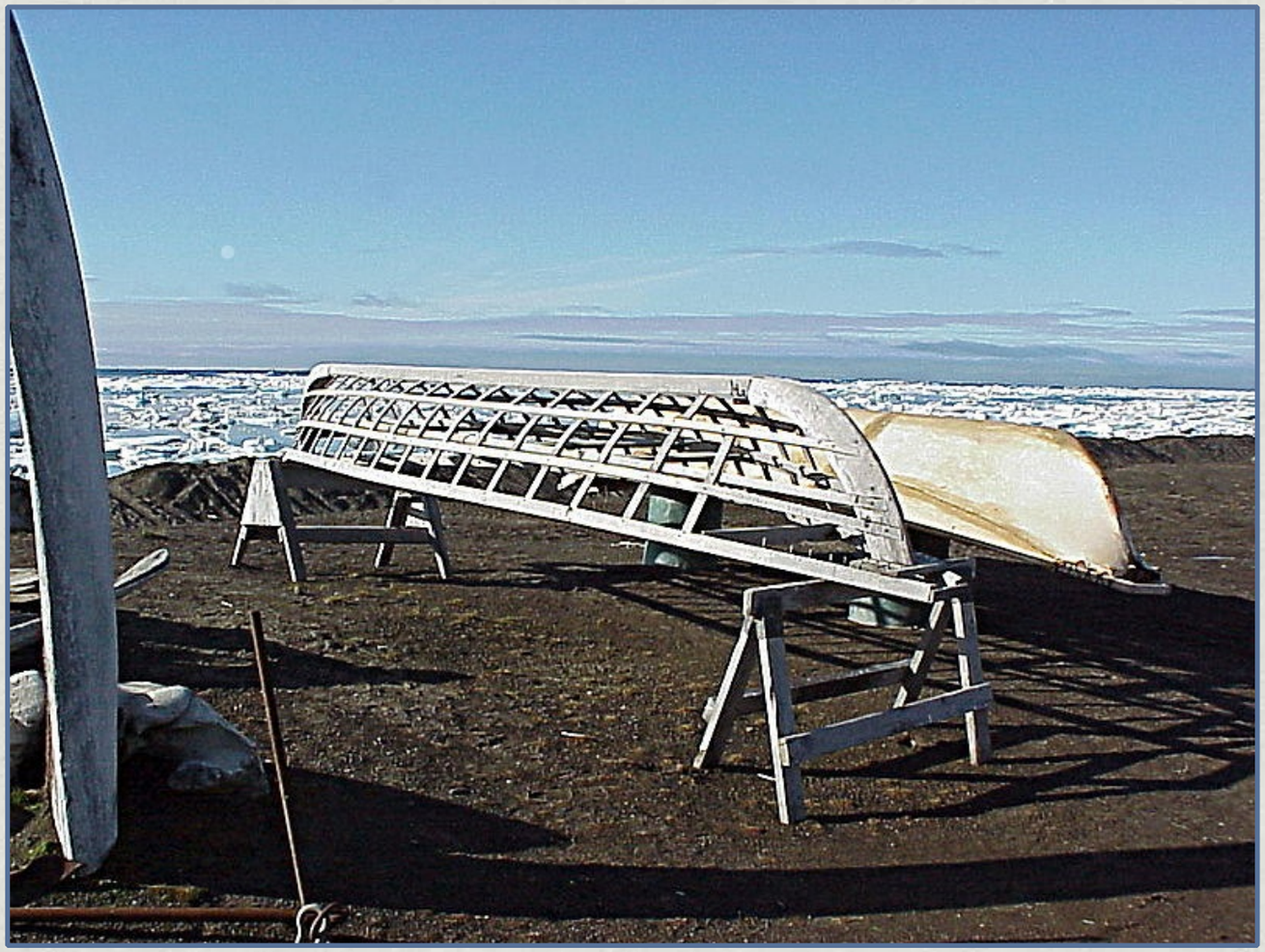
Does an Umiak also have equivalent ocean going capabilities?



Notice the outboard bracket

Based on the shape, what are these boats used for?

- Water-line length?
- Rocker?
- Forward bow flotation?
- Bulbous bow structure?



More influences on today's technology

- Tools
  - Adze
  - Halibut hooks
- Food Preservation techniques:
  - Drying
  - Smoking
  - Oils
  - Fermentation

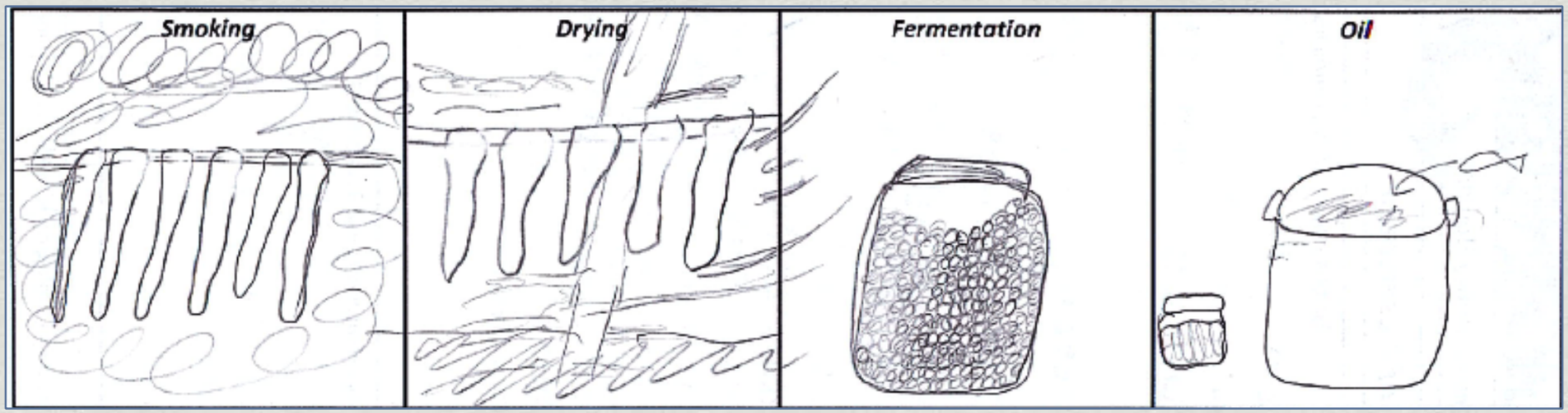
Food Preservation

- **SMOKING:**
  - Region-dependent wood use
  - Cottonwood in Chilkat region (Klukwan)
  - Alder throughout Southeast
  - Alder contains toxins that help eliminate bad bacteria during smoking process
  - Smoking also evaporates water (preventing growth of bacteria)
  - Aas Kwaani-the Tree People communicate with one another (evidence in oral narratives)
    - chemical communication between root systems
    - one alder will alert the grove to raise levels of toxins when deer are grazing nearby

Food Preservation

- **DRYING:**
  - Water removal inhibits growth of microorganisms (evaporation through sun or wind drying)

- **OIL AS A PRESERVATIVE:**
  - Hooligan and seal oils were used to preserve fats and meat
  - Prevents oxygen from reaching the meat, depriving bacteria of basic needs



Food Preservation

- **FERMENTATION:**
  - Occurs in oxygen-deprived environments
  - Metabolic process that converts sugars into acids, alcohols, or gases
  - Wine and beer fermentation is relatively safe and controllable because adding yeast means that the yeast outcompetes other microorganisms
  - Fermentation of meat is more high-risk and can be fatal if done wrong

Fermentation Continued

- Bio-preservation adds lactic acid
- When the fish muscle drops below a pH of 4.5 it greatly inhibits microbial growth
- Traditionally, fish pits were dug and plant material and sticks were added into the pit
- Today, plastic gallon jugs and bags are used
- Increased risk of Botulism caused by the Botulinum bacteria which thrives in anaerobic environments

Images & References

- Slideshow modified from Henry Hopkins, Helen Watkins, and Fred White's presentation during pilot class
  - Wikimedia Commons Images:
    - Albacore Dinghy-Dabbler 2005
    - Imperial War Museums A-724-Royal Navy Officer Tomlin 1940
    - Archimedes; Principle-Finot 2006
    - Carving adze-Waldo Brown 1910
    - Walrus meat-Ansgar Walk 1999
  - Tlingit canoe-SMU Central University Library 1887
  - Chief Shake's canoe-University of Washington Libraries 1916
  - Halibut Hook-FishEx Alaska Seafood

WHAT WOULD RAVEN SEE?

DRAFT

New and old ways of knowing: land and history of the Auk and Taku people

Richard Carstensen, Clay Good, Sanjay Pyare and Kathy Hocker

For Goldbelt Heritage Foundation

Spring, 2010

Adaa analg̲éin

Raven's way of studying the world

"The word we've always used in teaching and instructing our young people is attributed to Raven (Yéil). What the ancient teachers would say to their students was *adaa analg̲éin, adaa analg̲éin!* This means, to look at, to evaluate, to savor, to think it over, whether it's in the attainment of something or the fixing of something. You had to be able to make small little tests, to see if what you were thinking might work. Studying has always been an important part of our educational sytem.

Adaa analg̲éin: to pay attention, to be still, to be quiet, almost to the extent of developing a relationship with the subject of our thought."

David Katzeek
Shangukeidí Clan

Authors of this manual:

Richard Carstensen

A Tongass naturalist since 1977, Richard is co-author of 5 books on the nature of Southeast Alaska. In 1989 he co-founded Discovery Southeast, providing nature education to students throughout Juneau's public schools. With fellow naturalist Bob Christensen, Richard developed the ground-truthing and journaling protocol described in this document. Field tested from southern Prince of Wales Island to Yakutat, this process employs high-tech instruments, but at its core is *Adaa analg̲éin*: Raven's way of studying the world.

Clay Good

Clay Good grew up in Juneau, Alaska where he taught physical science, biology and ocean sciences until he retired from the Juneau school district in 2007. The ocean science academic teams he coached won the state title at the National Ocean Sciences Bowl 7 of his 9 years coaching. He was awarded the 2000 Teacher of the Year by the Northwest Aquatic and Marine Sciences association, as well as the 2007 National Association of Geoscience Teachers Outstanding Earth Sciences Teacher of the Year award for the Pacific Northwest. Besides working as a classroom and field instructor for various summer science academies in Southeast Alaska, Clay is also a curriculum consultant. He developed, and is teaching, an online course regarding culturally relevant geosciences for teachers in Alaska through the Alaska Staff Development Network and Alaska Pacific University.

Sanjay Pyare

Sanjay Pyare is a professor in the Environmental Science and Geography at the University of Alaska Southeast, Juneau, AK. He teaches and conducts training in biogeography, geographic information systems (GIS), and GPS. He has spent about the last 13 years throughout southeast Alaska, amongst bouts in Montana, Wyoming, and Nevada, conducting ecological field research on such subjects as fungal communities and old-growth forest condition; supporting conservation efforts like amphibian declines and wolf recovery (Yellowstone); and studying the migration and dispersal of many animal species. Recently at UAS, he helped develop the Southeast Alaska GIS Library, a public GIS resource, and co-founded the Alaska Coastal RainForest Center, which conducts research and outreach about temperate rainforest ecosystems. He has conducted numerous K-12 teacher training courses at UAS and as a former co-director and co-founder of the Great Basin Institute (based in Reno Nevada).

Katherine Hocker

Katherine Hocker grew up in Juneau. She studied biology at Harvard University and science illustration at the University of California. Now she works as a naturalist, teacher, and illustrator in Juneau. Katherine's work can be seen in books, on Alaska Folk Festival posters, and interpretive signs. She teaches courses on drawing as a way of observing and learning from nature, and sharing what we learn.

CONTENTS

Introduction

We feel honored to participate in this ground-breaking course on Traditional Ecological Knowledge (TEK) for high school students, sponsored by Goldbelt Heritage. So that the 2010 pilot session might lay a foundation upon which to build in subsequent years, we've created this "how-to" manual, blending cutting-edge technologies with time-tested field naturalists' skills, and sprinkled with wisdom from the elders. These are the tools and techniques that, in our respective careers, have proven most fruitful in deepening our sense of place. These skill sets have honed our understanding of natural processes, from the movement of crustal faults to the migrations of prehistoric peoples.

None of us–Pyare, Good, Hocker or Carstensen–is Alaska Native. But we respect the traditions and insights of cultures that co-evolved with the northern rain forest for centuries and millennia. We're inspired by the chance to intermingle our skills with those of elders and culture bearers, helping students to develop a relationship to place that has never before been possible in Southeast Alaska. It will tap the depths of traditional ecological knowledge, also grafting to these ancient roots the newer perspectives from satellites, repeat photography, and internet communications (e.g. blogging).

This educational philosophy–a 3-pronged curriculum integrating Nature, Culture and Communications, is most eloquently expressed by the Axe Handle Academy, first conceptualized in the 1980s by Ron and Suzanne Scollon, with Nora and Richard Dauenhauer (*www.ankn.uaf.edu/curriculum/axehandle/*). The Axe Handle philosophy was well ahead of its time–Alaska's home-grown manifesto on "place-based education," written long before anyone began to use that recently fashionable phrase. We think the coming Goldbelt Heritage class on TEK–and the associated ASDN teacher's workshop entitled *Connection: rooted in place, school and community*– will demonstrate that, by whatever name we might choose, Axe Handle's day has come.

Our manual begins with the basic technological tools commonly used by geologists, foresters, wildlife biologists, archeologists and naturalists. We describe the applications of GPS, cameras, and other measuring and recording devices. Next, we discuss the many ways in which data acquired through these tools can be compiled and synthesized. It's often during this more reflective stage that the real learning takes place–ideas emerge that would never have occurred to us in the distracting exertions of cross-country travel.

Last comes the sharing part. Explaining the "Communications" facet of the Axe Handle Curriculum, Richard Dauenhauer notes that it encompasses everything from traditional story-telling skills to blogging, and the ever-morphing Web.

Here's something to bear in mind as we wade into the nuts and bolts of 21st-Century nature observation, synthesis and reporting: Anything we write about GPS or photography or blogging today will seem almost childishly antiquated in the year 2020. The thing about the "cutting edge" is that it keeps slicing deeper–here today, somewhere else tomorrow. That's not a problem; we or our successors can update those parts of the manual as time goes by.

But there are more tenured components of this manual that will never fade with age. Stories of the

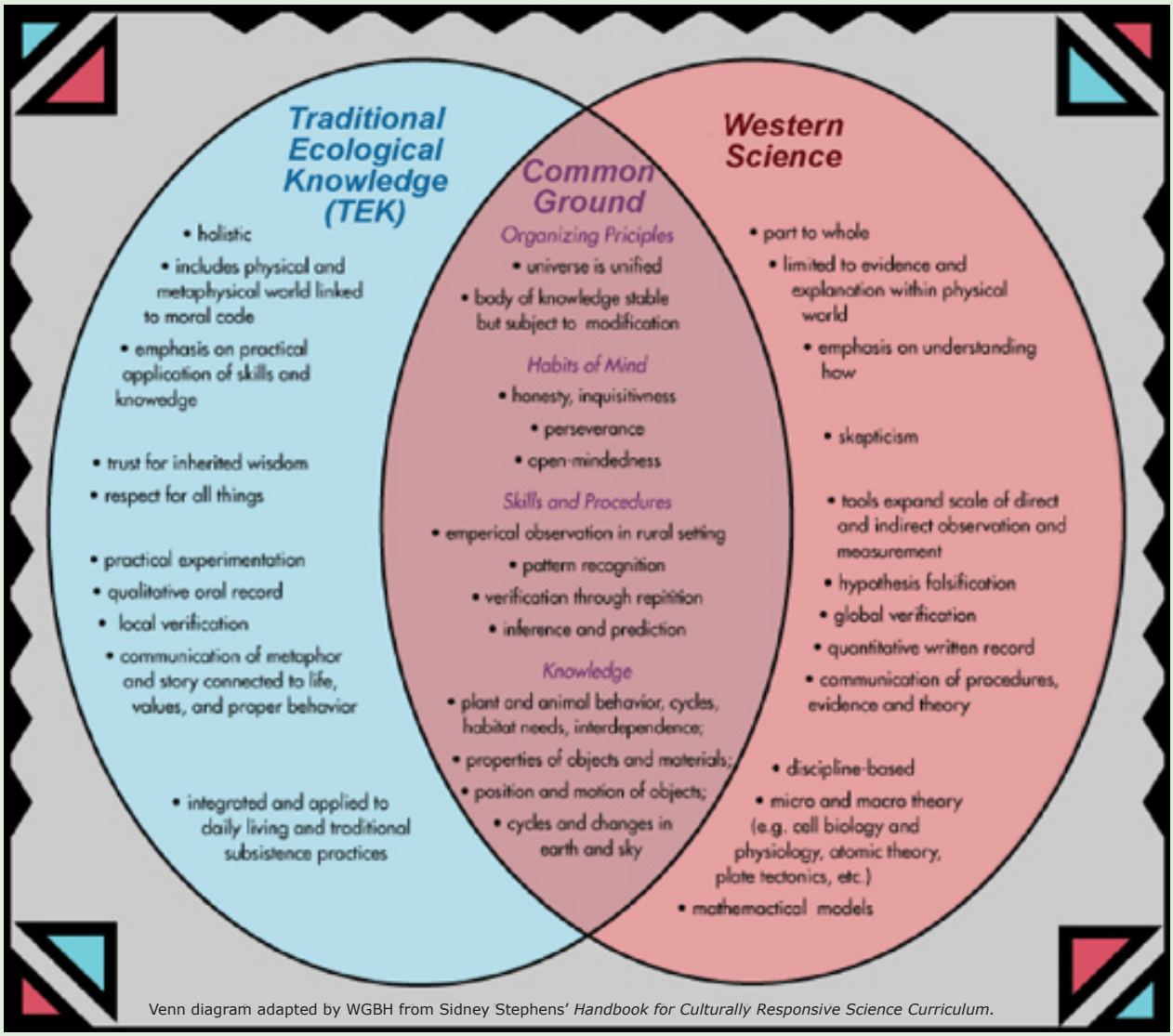
TRADITIONAL ECOLOGICAL KNOWLEDGE

TEK is defined as follows by the Convention on Biological Diversity, Article 8 (j):

"Traditional knowledge refers to the knowledge, innovations and practices of indigenous and local communities around the world. Developed from experience gained over the centuries and adapted to the local culture and environment, traditional knowledge is transmitted orally from generation to generation. It tends to be collectively owned and takes the form of stories, songs, folklore, proverbs, cultural values, beliefs, rituals, community laws, local language, and agricultural practices, including the development of plant species and animal breeds. Traditional knowledge is mainly of a practical nature, particularly in such fields as agriculture, fisheries, health, horticulture, and forestry."
www.ser.org/iprn/tek.asp

On the Alaska Native Knowledge Network website, anthropologist Tom Thornton adapts the definition of TEK to Tlingit country, as exemplified by the life and wisdom of Kaagwaantaan elder Herman Kitka:

"Tlingit traditional ecological knowledge (TEK) is the product of generations of learning and experience with the lands, waters, fish, plants, wildlife, and other natural resources of Southeast Alaska. As Sitka elder Herman Kitka Sr. shows, Tlingits were trained from an early age to be aware of and respect the community of living beings that surrounds them. This meant learning not only how to hunt, fish, gather and process key subsistence foods and other necessities, but also how to understand the behavior and roles of other species in the ecosystem, and how to successfully interact with them in sustainable ways. This knowledge was not gained in a classroom but largely passed down by elders through oral histories, songs, crafts, and practical training. With maturity, one's TEK continues to grow in unique ways through reflection and experience on the land."
ankn.uaf.edu/Resources/course/view.php?id=11



Venn diagram adapted by WGBH from Sidney Stephens' *Handbook for Culturally Responsive Science Curriculum.*

TEK AND SCIENCE

In 2009-2010, Clay Good piloted an on-line course for teachers called Explore Alaska! - Alaska Native and Western Perspectives on Earth's Systems. The essential question was:

How can digital resources and effective teaching methods be used to integrate Alaska Native ways of knowing and Western scientific methods in order to create greater understanding of, and interest in, geosciences for students?

Traditional Alaska Native knowledge has provided the information and technologies necessary for humans to survive and thrive in some of the harshest, most unforgiving environments on Earth. This collective wealth of knowledge has existed for centuries and has been transmitted traditionally by oration and stories, passed down from generation to generation.

Just as modern Alaska Native peoples have wisely included modern scientific knowledge and technologies into their cultures, modern scientists are wisely taking into account the wealth of knowledge and on-the-ground experience that Alaska Native peoples have regarding the natural history and phenomena of places under study.

elders are not so much "timeless" as *purified by time*– object lessons slowly winnowed to their essences, an oral survival of the fittest. Far from obsolescing, the elders' stories grow stronger and wiser in application to the changing world. They are the hearth, compared to the flying sparks of technological wizardry. Likewise, the core principles of good speaking, writing and illustrating cut across space and time. Shared by cultures throughout the world, these fundamentals of observation and communication will be the same in 2050 as they were in the time of Katlian or Shakespeare.

WAYS OF KNOWING

In recent years, there have been many attempts to explore the similarities and differences between Traditional Ecological Knowledge (TEK) and Western Science (WS), mostly in an attempt to reconcile these sometimes diverging world views, and to arrive at ways for each to respectfully inform the other.

Here, we introduce a third element to the dichotomy between WS and TEK–the discipline of Natural History (NH), as exemplified by naturalists such as John Muir. Over time, as western science has taken over the role of original research, naturalists have tended to move into the role of interpreters, synthesizing and communicating the findings of scientists to the public.

In the graphic above, we present the relationships between TEK, NH and WS as a tree. Position on this tree–crown vs roots, etc–is not intended to signify superiority of one over the other. But a progression over time is suggested. Our challenge is to be sure the roots of the tree don't wither as the branches proliferate.

Examining the attributes of these 3 approaches to knowledge, we suggest that old-style Natural History and TEK may be more closely related to each other than either is to Western Science. Today's naturalist may use GPS and digital photography, but philosophically, s/he may be closer to the root than the crown of the tree. The naturalist and the Tlingit hunter or spruce-root gatherer are generalists, whereas the scientist is increasingly specialized. Although the discipline of natural history is not bound to a life-encompassing moral code or spirituality, many individual naturalists are deeply spiritual. John Muir saw in nature the expression of God.

With science, the advancement of knowledge becomes more formalized. In its strictest definition, science involves hypothesis generation, followed by rigorous, quantitative experimentation. Because skepticism is at the core of this testing, science distances itself from the metaphysical (i.e. the untestable). Of course, individual scientists may be religious, but most would claim that their untestable beliefs are not permitted to bias their scientific objectivity.

In science, except for professional ethics, there is no right or wrong–only the incremental pursuit of truth, mostly through hypothesis falsification. Scientists don't hope to *arrive* at the ultimate Truth; they're more interested in chipping away at truth with a small "t."

GPS (Global Positioning System)

GPS has changed the way we place ourselves on the landscape, and how we share that information with others. Originally a military technology, GPS rapidly found applications in off-trail routefinding, surveying, anti-theft devices, restaurant searches, and bird migration tracking. Accuracy and affordability are constantly improving. For example, only in the past few years have GPS units been able to connect with satellites from beneath a dense forest canopy.

GPS units are not only becoming faster and more forest-ready, they keep adding new bells and whistles. For example, the Garmin Rino doubles as a radio for vocal communications with your field partner. More important, through those same radio signals it shows your partner's track and position on the map page, alongside your own. Anyone who's ever become separated from their partner in the dense Southeast rain forest can easily appreciate the utility of this feature.

But the availability of increasingly sophisticated navigational tools should never lull the backcountry traveler into a false sense of security. Just as students learn to multiply on paper before using calculators, it's best to understand basic map and compass work before progressing to GPS. For one thing, although basic GPS units are able to identify direction, they do this only when the user is in motion; they are much inferior to a simple, relatively glitch-proof compass in this regard.

For another thing, batteries go dead, and electronic devices malfunction. Murphy's Law says that the more expensive your gadget, the more remote the location in which it will chose to blink out. A GPS-enabled bushwacker without a back-up compass is like a stunt flier without a parachute. Appendix 1 has some basic tips on the use of map and compass.

THE DOWNSIDE OF GADGETS

Sitka anthropologist Richard Nelson remembers that when the younger Inuit first began to use compasses, the elders were worried. The compass, they claimed, was weakening the peoples' intimacy with their treeless northern landscape. No longer could hunters orient themselves by the concordance of subtle natural signs, such as the way snow is deposited in the prevailing winds. The compass was, in a sense, weakening the peoples' relationship with their environment.

Today the compass–once "cutting edge"–is now increasingly left behind by outdoorspeople armed with more advanced navigational tools. But does ever-advancing technology place even more buffers between the navigator and the terrain?

We might bear this cautionary note in mind as we explore the use of technology in this course. Few would suggest we abandon useful tools such as compasses, or their technological descendants–GPS units. But we should remember Raven's perspective. Do our tools sharpen or dull our perceptions?

GPS: nuts & bolts

This tutorial is written for the Garmin Etrex Venture HC. Slight differences may be noted in screen shots and menus between Etrex models. GPS units in the Goldbelt Heritage Foundation set have excellent satellite reception under canopy, but lack magnetic compass and barometric altimeter. We recommend using basic compass with declination adjustment (Appendix 1).

<u>Collecting GPS data:</u>

Power on

• Press and hold the power button to turn on the Etrex.

The 3 pages on the Etrex HC: main menu; map, and compass. On your map page, note that roads are not included for the Juneau area–only coastlines.

The page button

• First, cycle through the above 3 pages on the Etrex by pressing the page button. In the following instructions, you will sometimes get deep into nested menus. To quit after making a menu selection, or simply to escape if you get into the wrong menu, just hit the page button.

Clearing previous data

• With these shared GPS units, it's a good practise to always clear off existing waypoints and tracks from past users. Same goes at the end of a session; don't leave a cluttered unit for the next person.

• To clear waypoints: select *main menu>find> waypoints.* Now, press the menu button and scroll down to *delete*. Select *all symbols,* and confirm *yes*.

• To clear tracks: select *main menu>tracks> clear.* Confirm *yes.*

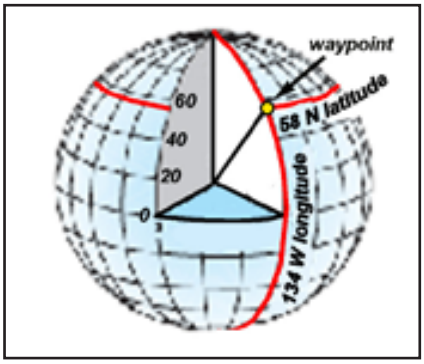
Waypoint Formats

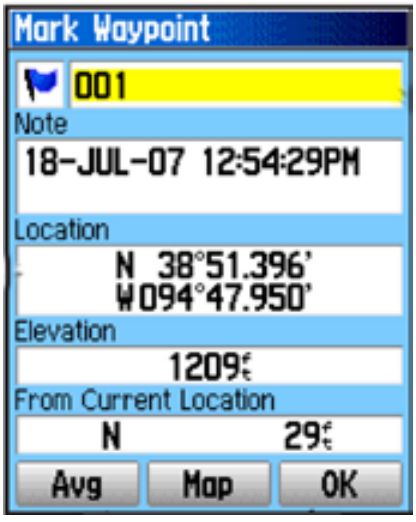
• Waypoints are point locations, plotted in longitude ("X") and latitude ("Y") coordinates. Juneau is at roughly 58°N latitude and -134°W longitude.

• Coordinate format can be changed as follows: *main menu>setup>units>position format*. We recommend decimal degrees hddd.dddddd.

Recording and labeling waypoints

• Press in on the enter/rocker button and hold for 2 seconds to capture current location.





• Stay with the default number–001 in this illustration. If your waypoint is associated with a photograph, remember to write down the waypoint and a note about the photo in your field notebook. (This label –yellow space–can be changed to a descriptive word using on-screen keyboard.)

• Select OK to store waypoint information.

Accessing stored waypoint information

• Select *find>waypoints.*

• Select desired waypoint on list.

Track formats

• Tracks function like "cookie crumb" trails.

• Track crumbs can be dropped at specific time OR distance intervals.

• To specify track formats and intervals, select *main menu>tracks>setup*. Then specify record method & interval.

To Turn Tracking on/off

• Select *main menu>tracks>on or off.*

To Save or Clear Tracks in Memory

• Select *main menu>tracks>clear.*

<u>Navigating with GPS</u>

Find & Goto

• Select *main menu>find> waypoints.* Select a waypoint on list, and check *Goto*.

• On the map page, a purple line will appear connecting your position to the selected waypoint. Press the page button to bring up the compass page.

• Walk in the direction of the red arrow on the compass. This is a geographic digital compass and not a magnetic digital compass; thus you must be actively moving for the compass be useful.

• To get out of navigation mode (red arrow), hit the menu button while on the compass page, and select *stop navigation*. The arrow will disappear

Map pointer & compass

• Flip to the map page. Move the rocker key sideways in any direction. A white arrow will appear. Moving the rocker again will steer this arrow

• Note that as you move, the bearing and distance to the waypoint from your location (black triangle) changes

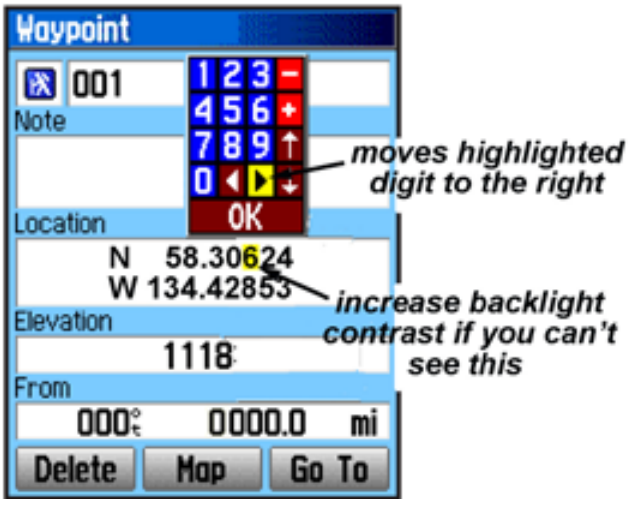
• Use a magnetic compass to orient to the bearing towards the waypoint; recheck the bearing periodically on the GPS and adjust accordingly.

Tracks

• You can also navigate on the map page using previous track logs as approximate guides and comparing these to your location (black triangle) and your current track log.

<u>Adding Coordinates into a GPS</u>

• Before doing these steps, "clean" up any saved waypoints, tracks, and clear the track log. Following



APPROPRIATE TECHNOLOGY

There are many approaches to the question of appropriate technology. Discovery Southeast naturalists have long debated appropriate technology in regards to place-based education. We have limited time to spend with students. In our Nature Studies program (grades 3 through 5), if we have a field hour with kids, we want to spend it grubbing in the soil or listening to birds, not fiddling with some distracting gadget.

In the older grades, technology has obvious benefits. In the realm of education, one could define appropriate technology as that which deepens our appreciation and understanding of the natural world. In contrast, inappropriate technology insulates and distracts us from the world, promoting disinterest or fear or exploitive relationships with nature.

In these terms, a GPS is pretty nifty technology. Not only does it precisely situate us on the earth, it can't be used inside! The GPS *draws us outdoors*. Unlike an Ipod, say, you're unlikely to be distracted by its alluring indoor apps.

Not to put-down Ipods; naturalists and ornithologists use them to identify bird song in the field. Nor is there anything wrong with Ipod games or music; they just don't tend to advance our connection to the earth. In the context of place-based education, appropriate technology obviously depends upon the user as much as the tool.

are 2 ways to transfer locations to a GPS:

1) Manual entry: enter coordinates directly into a GPS. Record a waypoint (see above) and manually change the coordinates. In the waypoint window, select waypoint 001, scroll down to the lat/long field and select it. A numeric keypad will appear.

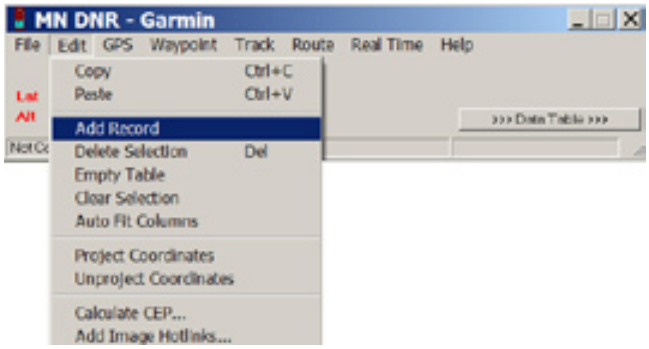
• It takes awhile to get the hang of this keypad. Moving the left & right arrows moves the yellow highlight marker through the digits. (You may have to increase the backlight contrast to see which digit is selected,) Enter the following coordinates for waypoints 1-5.

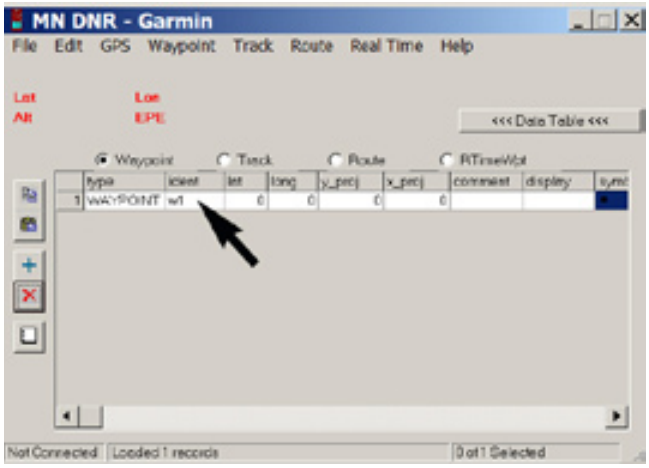
Label	Latitude	Longitude
1	58.3856	-134.6415
2	58.3824	-134.6394
3	58.3891	-134.641
4	58.3861	-134.6416
5	58.3838	-134.6406

2) GPS Software: use a GPS software program (DNR Garmin)[1] to enter coordinates and upload these to a GPS

• Start DNR Garmin: *start > programs > GIS, GPS, and related > DNRGarmin*

1 This is a free program from the Minnesota DNR: *www.dnr.state.mn.us/mis/gis/tools/arcview/extensions/DNRGarmin/DNRGarmin.html*





• Add a record.
• Click the "waypoint" box.
• Double click the empty *ident* cell and add the first label below; then add latitude and longitude.

Label	Latitude	Longitude
6	58.3866	-134.6420
7	58.3873	-134.6465
8	58.3848	-134.646
9	58.3828	-134.6384
10	58.3907	-134.6468

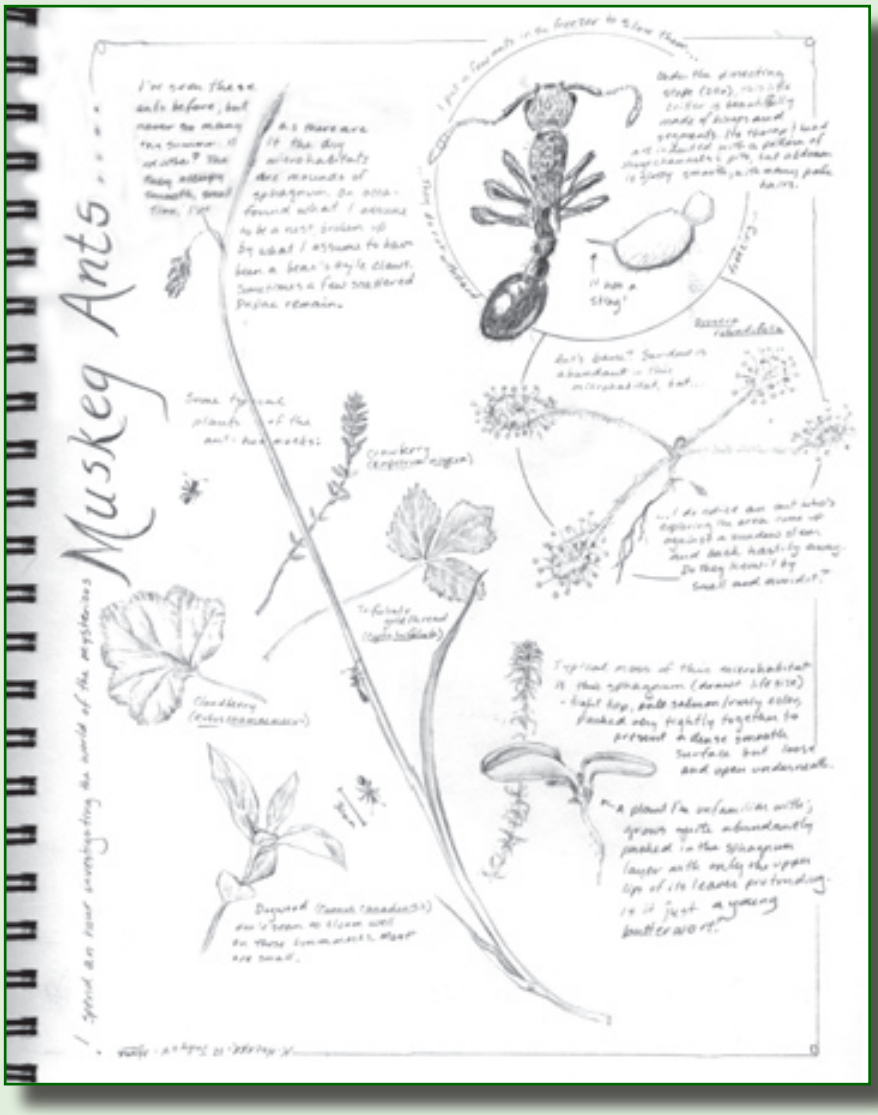
• Repeat for remaining 4 waypoints.
• Obtain a GPS unit, hook up the cable to the GPS and the serial port in the back of the machine. Turn it on.
• Make sure DNR Garmin can "see" the GPS unit – the GPS model type (Garmin Etrex) should appear in bold near the top of the DNR Garmin window.
• Upload waypoints 6-10 to the GPS by selecting "Upload" under the Waypoint dropdown bar.

3) Other methods: There are other, more technical, ways to upload coordinates to a GPS. DNR Garmin allows you to upload a pre-existing table created in Microsoft Excel. And there are several programs in addition to DNR Garmin that interface with ArcMap.

In this section we've covered the field use of GPS units, and introduced one way to interface between GPS and the computer. Below, in ***From GPS to map****, we'll explain several options for transfering GPS coordinates onto maps or aerial photos.*

DRAWING AS A WAY OF SEEING

Juneau's premier nature illustrator is Kathy Hocker, a naturalist who draws to observe, to understand, and to share what she learns. Here are some tips, distilled from Kathy's career in scientific illustration, and from teaching classes in nature drawing and journaling:



"Drawings can record information that words cannot—for example, it's much easier to show the shape of a fish's fin or the interior structure of a flower than it is to describe these things in words. The process of drawing from observation can help you observe your subject more thoroughly; you may notice things about it that you would not otherwise have seen. The process of drawing and taking notes as you draw engages your whole mind, allowing you to use all of the potential of your intelligence to perceive, process, and absorb.

Why not use photos? Photographs are very useful tools, but they have definite limitations. If you take a photograph of a plant, you will have an image that records everything visible about that plant from that angle. In a way, that can be both more information and less information than you might need for your study. More, because the photo will show so much detail that it can be overwhelming; less because the photo may not show everything you want to remember, such as the undersides of leaves, the appearance of different stages of blooming, or the pattern of roots. In a drawing, you can emphasize certain features, and take notes about others, building a more complete picture than would be possible with a photograph. . .

'Look at your subject of study from the bottom up, and from the inside out; examine it in great detail, meditate on it.' -Tlingit Elder David Katzeek

As you look, try to let go of the idea of a name or classification. Allow yourself to be still, and focus all of your attention on your subject. What do your senses tell you about this thing, be it a plant, stone, animal, or landform? What shapes do you see? What colors? Textures? How does it feel to the touch?

Don't rush into trying to capture your subject on paper. The more you look at (and touch) something, the more that thing will enter your consciousness. The more firmly seated it is in your consciousness, the truer your drawing will be. Look at it from different angles. Meditate on it. Let it tell you about itself.

What should a drawing in a science notebook look like? That depends on the purpose of the drawing. If you are studying a habitat and want to make a record of the types of plants that grow there, your drawings may be quick sketches of leaves for identification later. If you're curious about different seed types, you might sketch a series of different seeds from different plants to compare side-by-side. A study of a particular plant species might warrant a more technical drawing, showing the plant's typical growth form, leaf shape, root style, buds, flowers, fruit, etc.

Remember that drawing in science is not the same as creating art. While a scientific drawing may certainly have beauty in and of itself, its primary purpose is not to hang on a wall but to help you observe, learn, and remember. It's far more important that the drawings truly reflect what you observe than that they look "pretty." So don't worry about trying to make your drawings look like art—that's not their purpose!

As you draw, take notes. What do you notice about your subject as you are observing and drawing? Some of these notes might even stand in for things you can't draw or don't want to clutter your drawing with (for example, you could note that a plant's stem is densely hairy, or write down the measurements of a bird's wing, note the

color and texture of the soil a plant is growing in, or list the species of trees that are growing on a glacial landform that you're sketching).

Questions are the soul of science. The process always begins with a question, whether it's as specific as "I wonder which insects pollinate fireweed flowers?" or as general as "I wonder what this plant can tell me about itself?"

In Tlingit tradition, it is extremely important to respect ourselves and to respect the world around us. This applies to science as it does to other aspects of life. As you draw and write in your science notebook, respect yourself by taking the time and making the effort to allow the intelligence that is inside you to flourish: observe carefully, think with your whole mind, write down your thoughts faithfully.

In Tlingit tradition, when a plant or animal is taken for carving, food, or other purpose, the person who collects it speaks to it, acknowledging its life. S/he explains why this thing is being taken, and the good that will come of it. This kind of acknowledgement is a good practice. It frames your relationship with what you're studying, begins the process of observation, and cements respect."

Katherine Hocker, June 2008

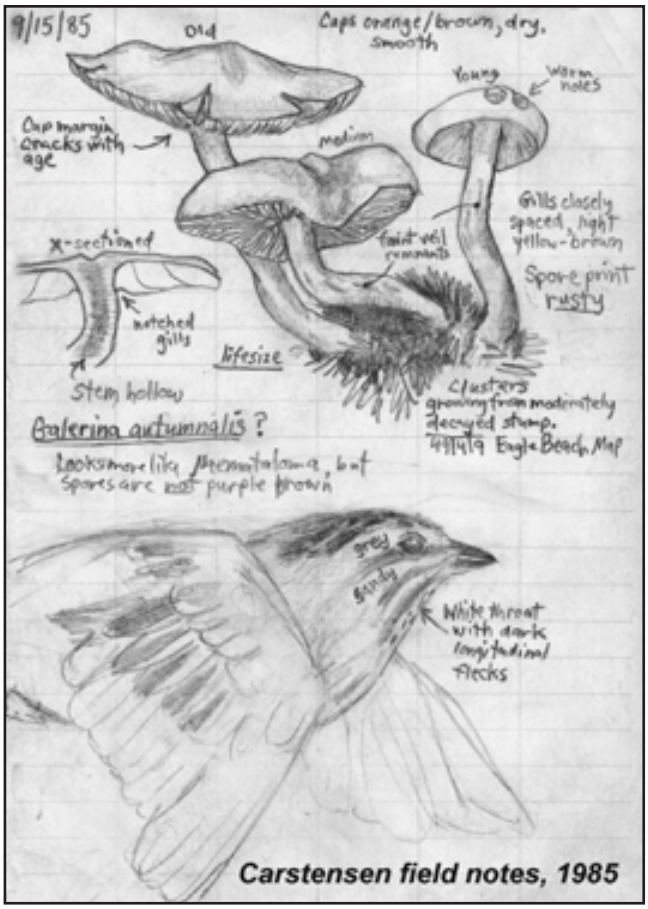
The field notebook

Even if electronic technology weren't so fallible, we'd still be fans of good, old-fashioned paper and pencil. For some naturalists, the simple field notebook is far more than a fall-back tool for when the gadgets misfunction; it's a primary way of relating to nature, in the tradition of naturalists reaching back as far as writing itself.

Formats for written or sketched field observations are as variable as the needs and personalities of each naturalist. One of us (Carstensen) habitually tucks a folded 4x6 notecard and pencil into a shirt pocket whenever heading outdoors. Shorthand notes and simple sketch maps on this card later serve as memory-joggers during the evening's digital journaling. The card is usually thrown away after such transferal.

But Juneau's acknowledged master of the field journal is naturalist Kathy Hocker. The accompanying sidebar contains a page from one of her many journals, as well as tips to get you started. For Kathy, the journal is not a disposable "placeholder," subsidiary to the typed and photo-illustrated final product. Instead, it's a stand-alone reference, carefully labelled and filed.

We each evolve our own way of recording the field experience. In this course, you'll have an opportunity to dabble in broad range of field and lab methods. One advantage of the Hocker method described in the sidebar is that you do more of the contemplative, synthetic part right out in the field. Questions that arise can sometimes be answered on site, simply by looking closer, digging a hole, turning a leaf over. In electronic journaling, described below, you're back indoors before the ruminating phase, and may have to wait until your next field trip to address those types of questions.



Page from Carstensen field notes. The lower sketch was from a dead Lincoln's sparrow. Such finds are wonderful opportunities to make detailed close-ups, and to examine features such as feather tracts, not even visible through a telephoto lens.

Your field notebook–or a simple notecard if that works better for you–can also serve as the place to record your waypoint and photo numbers, as explained in the preceding and following sections on *GPS, Digital camera*, etc.

The digital camera

Like GPS, and over about the same time span, digital photography has exploded in popularity. It's hard to believe that only a decade ago, photography meant film. Few suspected in 1999 that Kodachrome would soon seem as antiquated as Civil War tintypes. When Discovery Southeast naturalist Steve Merli brought in

View of Auke Rec, the old village site (brushy foreground) and Point Louisa from the top of a spruce tree behind the Raven totem. To capture a very wide field of view, a series of vertical-format pictures were taken, working from left to right. To create a panorama, "stitching" programs must have at least 20 percent overlap in coverage. The result is less distorted than if a fisheye lense were used.

a 35-mm slide projector to Glacier Valley Elementary recently, his students were fascinated; many had never before seen light passed through film transparencies.

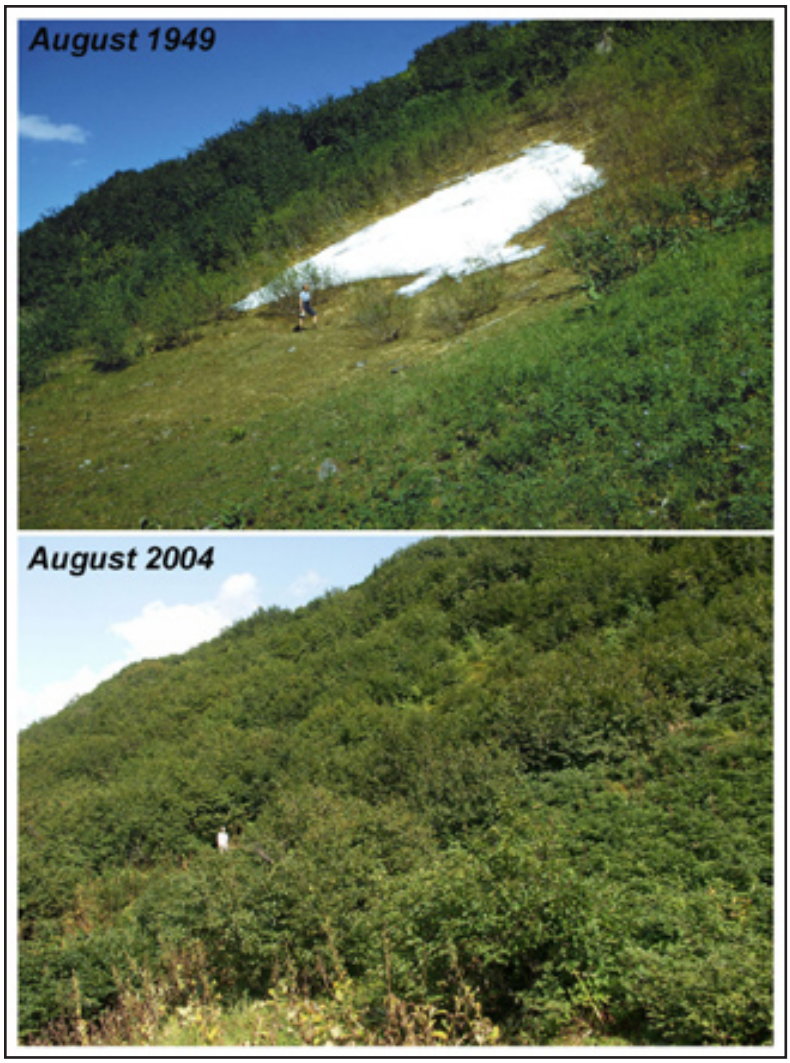
Any camera–even the cheap ones in cell phones with their tiny lenses–can be used to document your field outing. As Kathy Hocker noted earlier in reference to science drawing, the goal is understanding and communication, not to create a work of art.

That said, there's no reason an illustrative photo or drawing *shouldn't* be beautiful, and you'll be more successful in communicating if it is. Common mistakes in field photography include poor focus, and careless framing.

Even with the more expensive, image-stabilized digital cameras, taking a tack-sharp hand-held photo in the dim light of the forest understory can be challenging. Serious photographers continue to pack tripods to get vibration-free photos (and also to have more time to contemplate their framing). A load-lightening and less time-consuming option is to brace the camera against a tree whenever your meter indicates you're not getting enough light. The rule of thumb is that your photo speed should be at least the inverse of your lens setting. For example, with a 50 millimeter lens, you should shoot at 1/50 second or faster. If you can't, brace your shot.

Zoom lenses aid in framing just the portion of a scene you need to document your intended subject or phenomenon. Professional photographers sometimes spend as much time framing their image as Kathy Hocker does observing and sketching. Some telephoto zooms now magnify as much as 20 times over their wide-angle setting. These digital cameras make wildlife photography much easier than in the old days of gigantic lenses for film cameras that could only be used with massive tripods for stabilization.

At the other extreme from telephoto settings, consider using one of the automated panorama stitching programs to capture scenes too broad or tall for your widest-angle lens setting. Examples are above, and in the sidebar on journaling. All you have to do is swing the camera from left to right, making sure



Above: Snowpatch on the Mount Roberts Trail, below the cross. Taken by Professor Donald Lawrence, a pioneer in Alaskan succession research. Don's wife Lib stood at the base of a snow patch in 1949. Even in this end-of-summer shot, the Sitka alders surrounding the snow are barely leafed out. Only a few weeks earlier they were buried. The low turf downslope from Lib was likewise covered by snow until mid summer.

Plant growth is much slower at 2000 feet than down at sea level. Still, this replacement of subalpine meadow by brush constitutes an important change for wildlife.

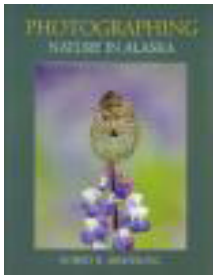
Below: Repeat photo by Richard Carstensen. I'd have been unable to see Bob Armstrong, had he stood in Lib's 1949 position. So he moved about 20 feet to the left.

I first retook this scene back in 1989 at Don's request. Alder advanced as much in the 15 years between 1989 and 2004 as in the previous 40-year interval between 1949 and 89. That suggests an acceleration of brush invasion, possibly in response to accelerating climate change.

that each photo overlaps at least 20% with the adjacent ones. The program will automatically search for that area of overlap, and stitch the series seamlessly together.

Almost everything an Alaskan nature photographer needs to know is covered in Robert Armstrong's new book, *Photographing nature in Alaska*, 2010. It makes great reading too, because it's not just a technical book; you learn a lot about local natural history along the way.

But with any tool, it pays to step back from our love-affair with technology and ask "What would Raven think about this toy?" Or: "Would an elder think I'm missing something important here, *because* of my tools?" Imagine yourself a raven, looking down from high in the canopy, chuckling at the photographer peering myopically through the lens, surrounded by unseen nature.



Repeat photography

The world is ceaselessly changing. One of the most valuable questions you can ask yourself on a field outing is: "What did this place look like 100 years ago; 10,000 years ago?"

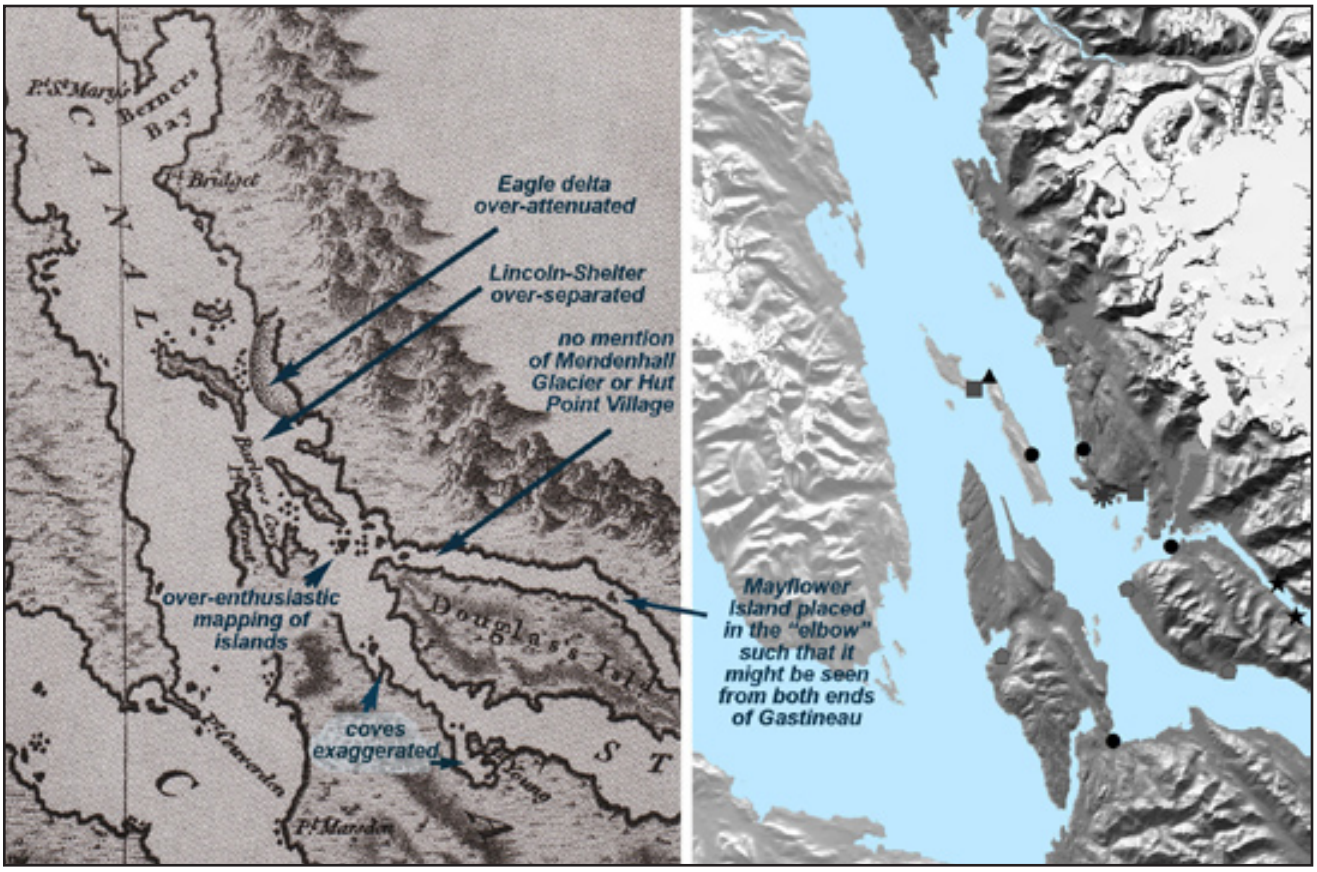
And one of the best answers, at least to the first question, comes from the attempt to relocate the sites of historical photos, and retake them. In this course we'll practice repeat photography, to see what it reveals about change at cultural sites.

Voice notes

Not only cameras but many other digital devices–Iphones, PDAs, etc–now double as audio recorders. Narrating your field observations into a voice recorder has its pros and cons.

On the plus side, narration vastly speeds up the notetaking process in the field. This can be especially helpful if you're travelling with others, and don't want to make everyone wait while you stop to scribble; instead, you narrate "on the fly," without breaking stride in your bushwack.

On the minus side, field time saved by narrating can mean hours of follow-up back in camp, or at your computer, listening to, transcribing and cataloguing the recordings. Often, the choice of whether or not to narrate field notes comes down to how much we value that field time. When we're in remote regions of the Tongass–places we're unlikely ever to revisit–every minute is precious. In those



Left: First detailed map of SE AK in 1794, by the Vancouver expedition. • **Right**: Comparison with modern hillshade map. Symbols mark Auk Kwáan cultural sites. Close examination reveals many inaccuracies in the 1794 map–several indicated in the blue annotations. But to appreciate the achievement of this map, consider that previous charts showed SE AK as a straight shoreline. Until Vancouver, Europeans didn't even know that Baranof and Chichagof were islands!

But obviously, the Tlingit people did. How would an Auk elder have mapped the archipelago? For insight, see the following map by Chilkat chief Kohklux.

conditions, a voice recording helps to maximize our field efficiency, making room for more tree coring, stream-flow measurements, and botanizing.

Virtually any voice recorder is adequate for making field notes that will be erased after recording. But in this course, we may have occasion to record interviews that will become priceless treasures. The voice of an elder deserves archival quality. For that purpose, there are lightweight, field-worthy professional-level digital recorders such as the Zoom H2.

Map making: the Raven's-eye view

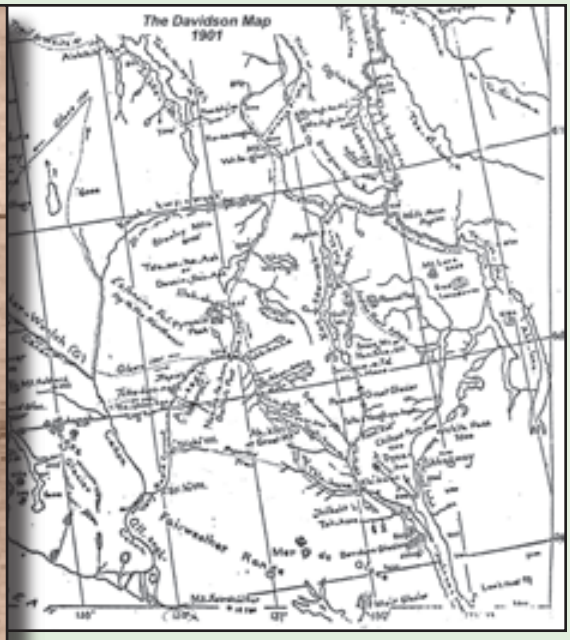
Most good naturalists and field scientists are proficient map makers. Once, this entailed years of training, learning to locate lakes, rivers, summits and submarine bottom contours on paper using plane tables, compasses, theodolites, sextants and lead lines. Today, map-making more often means *assembling* diverse elements developed and placed into the public domain by countless individuals and agencies: a hillshade for example (right-side map, above), plus maybe a streams layer, and perhaps a "dot file" representing eagle nests.

Typically, the maker of modern map might add to such pre-existing layers only a small amount of original data–for example, a color-coded GPS track distinguishing perennial from ephemeral bear trails. Few modern naturalists or scientists make maps completely from scratch, as did the cartographers in the command of Captain George Vancouver (left-side map above).

One of the first things to consider in the making of a map is the matter of scale. Do you want to show a large area, as in the examples above, or a smaller area, such as the immediate surroundings of a school?[1]

In map-making, as in Kathy Hocker-style field sketching, more information is not always better; it

1 Even experienced map users often confuse the terms "large scale" and "small scale." Think of it this way; on a large-scale map, *things appear larger.* Therefore, a large-scale map tends to show a smaller area. Pretty counterintuitive, eh? In writing and conversation, it's simplest to avoid these terms altogether, replacing them with more intuitively obvious terms like "coarse scale," "fine scale," etc.



KOHKLUX AND DAVIDSON

The earliest known map made by a Southeast Native was drawn by Chilkat chief Kohklux for George Davidson, a visiting scientist, in 1852. Kohklux had repeatedly travelled deep into the Yukon on trading ventures from the head of Lynn Canal. Although Kohklux and his two wives had never used paper or pencil, they created an exquisitely detailed sketch map, completely from memory. It took several days, detailing the routes to and from Fort Selkirk. Annotations were by Davidson, from the names given by Kohklux.

Nearly half a century later, Davidson completed the map above, including latitude and longitude lines, but employing many of the names and geography provided by Kohklux. Meanwhile, by the time the more geographically inclusive Davidson map was published, Kohklux's original had vanished.

In 1984, the Kohklux Map was relocated by Yukon archivist in California's Bancroft Library. It offers our best insight into the intimacy of geographical knowledge in the days before aerial photography and GPS-based surveys. Like the Inuit described by Richard Nelson, the Chilkat people navigated hundreds of miles without compass, tuned to the movements of sun and stars.

can clutter your message. Let's say you want to make a map of Gold Creek watershed that shows modern versus historical trails and mining roads. If you were to superimpose those features on a USGS topographic map, with its hundreds of place names, contour lines, etc, your map would be distracting for a viewer who is simply trying to compare the old and new trails. Better to use an unadorned hillshade base (example, upper right), and limit your place name labels to those most appropriate for orientation.

In this course, our source for aerial photographs, hillshades, and other mapping base layers will be the related programs Google Earth, and Google Maps.[2]

Google Earth operates through a free program that you must download to your computer before viewing. Every year, it adds new features, including many of the capabilities once available only to users of advanced GIS programs, described below. From our perspective in this class, the biggest breakthrough is the ability to directly download your GPS coordinates onto the Google Earth map or air photo. (This was formerly possible only in more expensive versions.) The following section, *From GPS to map*, explains this process.

2 See Appendix 5 for other on-line sources such as *alaskamapped.org*

In Google Earth version 5, you can attach a USB cable to your GPS unit and directly download waypoints. You can also "tilt" your view, from the default vertical perspective, to achieve an oblique perspective from any angle or bearing.

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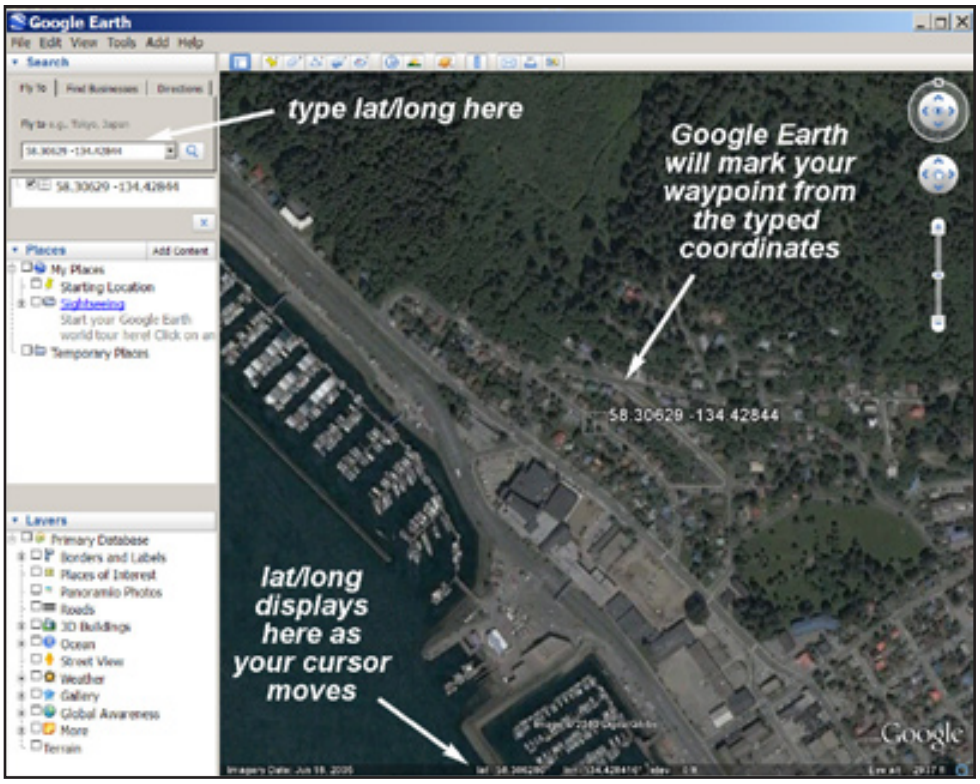


image from Google Earth

From GPS to map

In the introductory lessons on GPS, we explained the field operations of the Garmen Etrex. Here, we move on to several ways in which GPS waypoints and tracks can be used with on-line maps. This process is vastly easier than the arcane methods of plotting a known latitude & longitude against the coordinate ticks on the margins of a paper topographic map.

First it's important to recognise the different formats, or "units" for displaying latitude and longitude. They're refered to as:

decimal degrees (hddd.ddddd°)
degrees, decimal minutes (hddd°.mm.mmm')
degrees, minutes, seconds (hddd°.mm'ss.s")

The simplest of these lat/long units are decimal degrees. Let's start by standardizing that format on both your GPS unit, and in Google Earth.

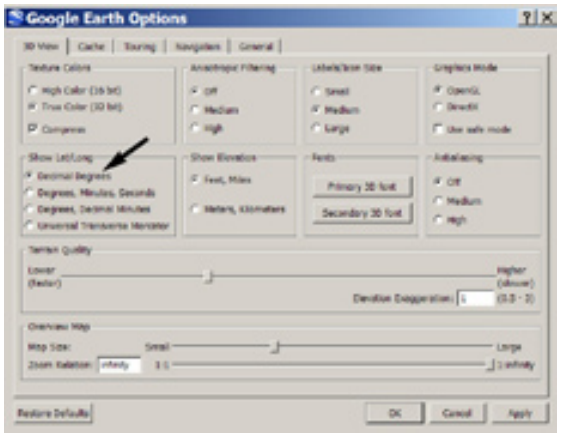
From the Google Earth header, pull down *tools>options*. You'll open this screen. In the *3D view* tab, check the radio button for decimal degrees.

Closing that window and returning to the map view, check out the lat/long display at the bottom of the screen, to see if the coordinates are now in decimal degree units. Move your cursor around over the map and watch the numbers change accordingly. If you wanted to, you could move your cursor in this manner to exactly the position indicated on your GPS, but that's pretty tedious. We'll use a simpler method.

First, be sure your Garmin coordinates are also displayed in decimal degrees. Go to the setup menu, under units, and check hddd.ddddd°.

Now, on your GPS, open the page for the waypoint of your choice. The above example was taken in downtown Juneau. Type the waypoint coordinates shown on your Etrex into the *fly to* box, upper left corner of the Google Earth window. (Here's where the decimal degrees format makes things simpler than messing with minutes and seconds.) Leave a space between the latitude and longitude, and place a minus sign in front of the longitude (if you forget, you'll fly to the opposite side of the world!)

Hit *begin search* (magnifier icon). A crosshair will appear over your specified coordinates, and Google Earth zooms in on that location.



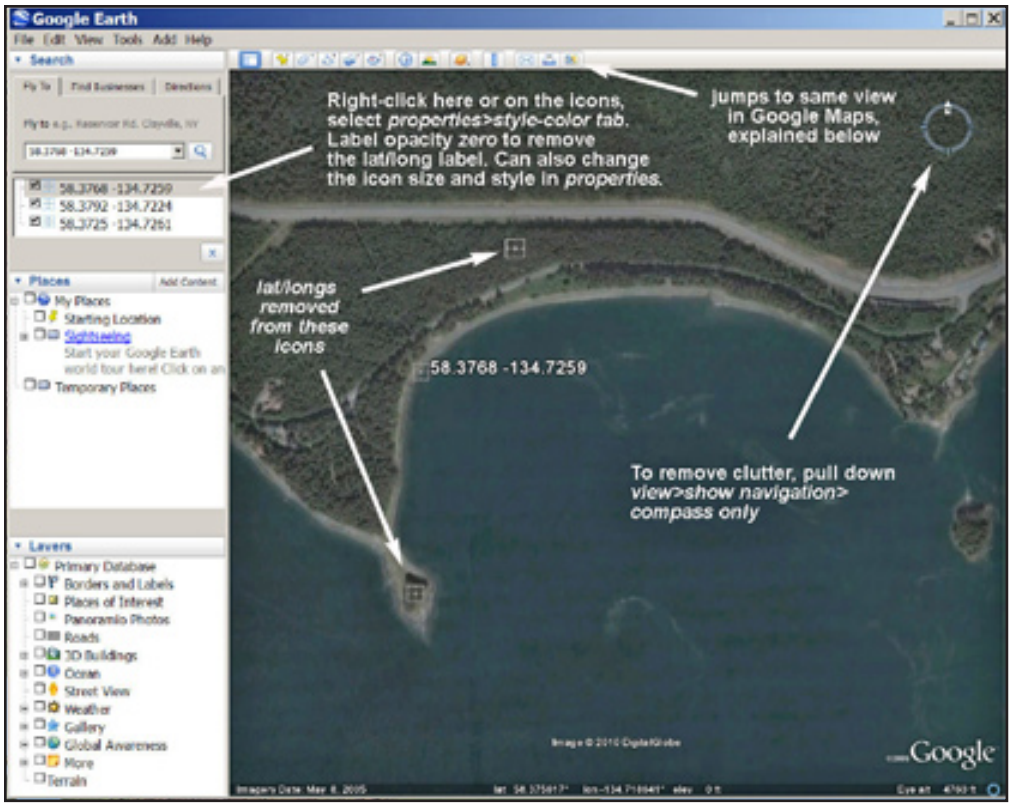
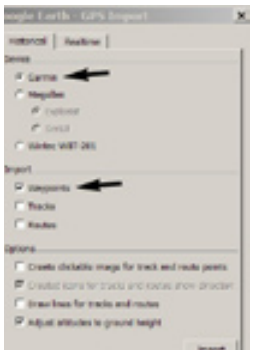


image from Google Earth

The default waypoint icon in Google Earth is a crosshair box with lat/long label. The *edit placemark* windows on next page allow you to customize this icon, before export to Photoshop.

That's the manual way to enter your GPS locations onto Google Earth. It's the simplest procedure if you only have a handful of waypoints. But imagine coming back from a serious field trip with 50 waypoints–pretty daunting! Also, when typing waypoints it's easy to enter a mistaken number, and the point can end up miles from the actual location.



But Google Earth version 5 offers a better solution. Attach a download cable to your Garmin Etrex[1] and connect the other end to your computer. On the Google Earth header, pull down *tools>GPS*. You'll get this import window. Check the radio buttons for Garmin and waypoints. (Uncheck tracks and routes.)

When you next click import, Google Earth pulls the waypoints off your Etrex and displays them in the same manner as when you typed them. The only difference is that they're marked with your Garmin-assigned numbers, rather than the lat/long.

Here's where a GPS housekeeping tip is in order. The preceding command will pull off ALL of the waypoints from your unit, whether you need them or not. Some folks who never have occasion to download waypoints accumulate huge collections on their GPS–trail destinations, favorite fishing holes, etc. This gets to be quite a clutter on the Google Earth map page, forcing you to selectively delete the unneeded waypoints from the GE page every time you download.

So, for our purposes, with these shared Etrexes, let's get into the habit of always deleting waypoints and tracks after they've been downloaded, to keep them clean for the next user.[2]

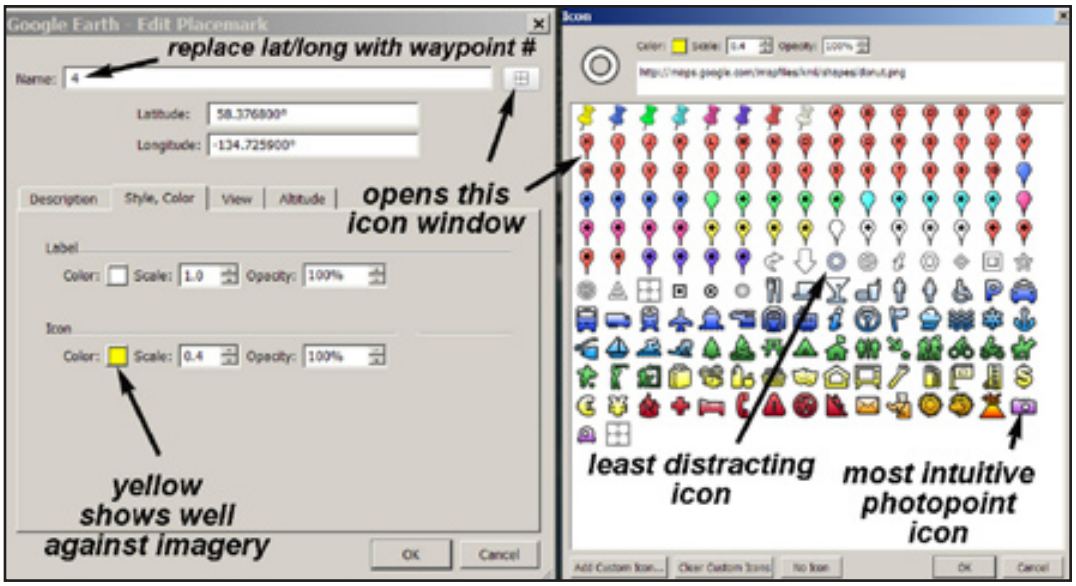
Linking photos to waypoints

On each of our field trips, we'll be asking you to take several documentary photos at GPSed locations, which will ultimately end up in your journal. Before or after taking the photo, collect a waypoint on that site. In your field notebook, or notecard, or noted orally onto your camera (if you're confident enough of that technology!) record something like "totem pole shot, waypoint 7."

Back in the computer lab, you'll create a map of the field outing in Google Earth, with several numbered waypoints corresponding to your documentary photos. The challenge is in setting up the Google Earth map window so that it shows only the photo-points and aerial imagery you want to convey, with a minimum of distracting information.

1 Earlier Garmin cables had a serial port connection at the computer end. More recent models use a USB connection.

2 On your personal GPS, you can keep your track and waypoint collection tidy in the same way. Rather than storing everything on the GPS unit, download it into Google Earth, and save the tracks and waypoints as kml files, explained below..



Options for cleaning up the Google Earth window prior to export.

From Google Earth to Photoshop

Google Earth's default waypoint icon is a crosshair box, accompanied by that point's latitude and longitude in large font (if you typed it) or Garmin waypoint number (if you cable-downloaded it). The lat/long label is needless clutter for our purposes.

But it's easy to change that. Right-click on the icon and select *properties>edit style*. In the topmost *name* box of the *edit placemark* window, replace the unwieldy lat/long number to a simple one-digit waypoint number from your GPS, that you can later reference in your journal.

Note also that you can change the icon itself, to something more discrete. Air photos provide a bounty of information about terrain, forest type, etc, and we don't want to obscure this detail with an obnoxiously large icon.

When you've cleaned up the Google Earth window, and all your waypoints are marked and numbered, frame the view and export it to jpg format by pulling down *file>save>save image*. Navigate to your journal folder, and put the map in the same subfolder as your photos from that day.

The simplified scene after export to Photoshop.

image from Google Earth

The UAS computers run Photoshop, an image-processing program. This tutorial is written for Photoshop, but its features are available in many analogous programs.[3] Photoshop features that we'll be using include shadows & highlights, layers, and opacity levels for tracing purposes.

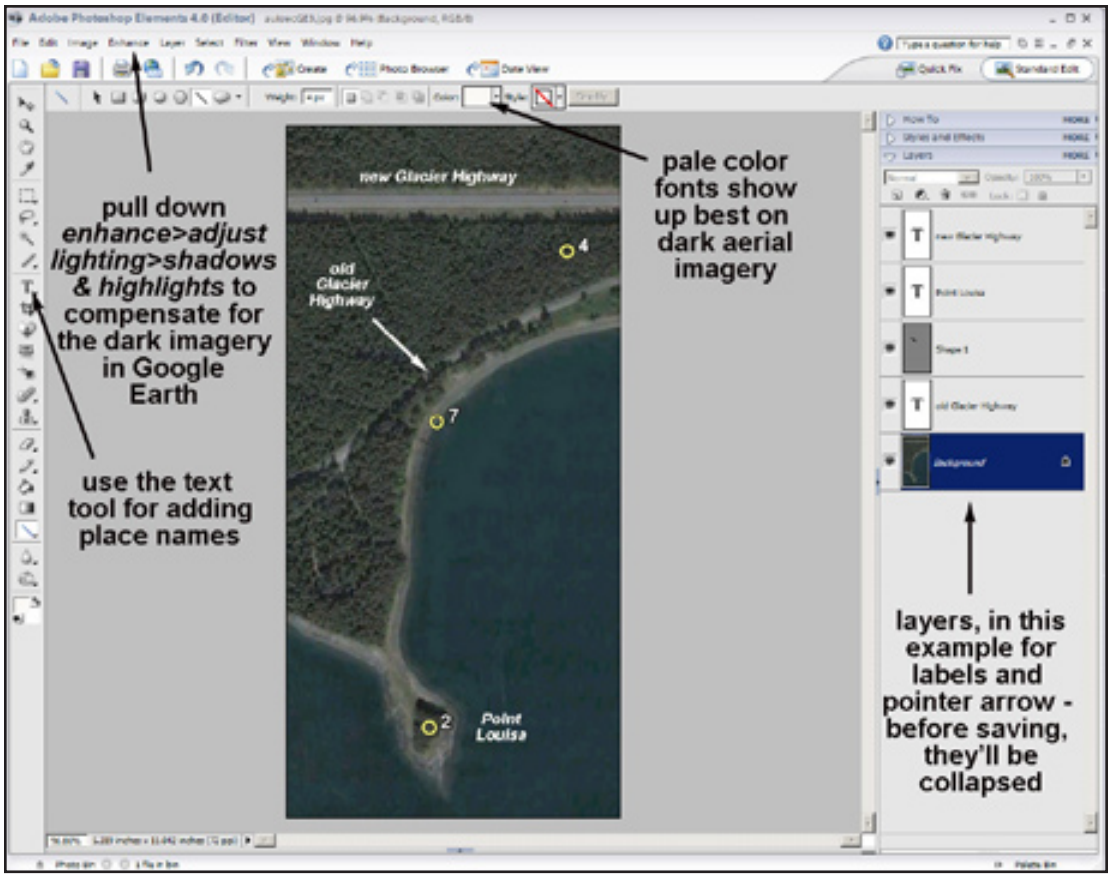
Start by fine-tuning the jpg you just exported from Google Earth. We're fortunate that most of the Juneau area is covered by recent, high-resolution aerial imagery (note in the lower left of the GE window that Auke Rec was shot in May, 2005). But this imagery is very dark while being viewed in Google Earth.

We can correct that, however, after exporting the

JOURNALING FILE ORGANIZATION

One way to structure your journal files is with dated subfolders. Using the *yyyymmdd* format for dated folders is a good habit to get into, because the folders then sort chronologically. (For example, 20100612 means June 12th, 2010.) In addition to these daily collections of field photos, you may want subfolders for web downloads, reference documents, correspondence, etc. If you're also keeping a handwritten journal, perhaps with field sketches, you might consider scanning some of the pages for inclusion in your electronic journal, as in the preceding examples from Hocker & Carstensen.

3 The full Photoshop program is very expensive, but Photoshop Elements, more reasonably priced, has everything the average person needs. All functions described in this tutorial are available in Photoshop Elements.



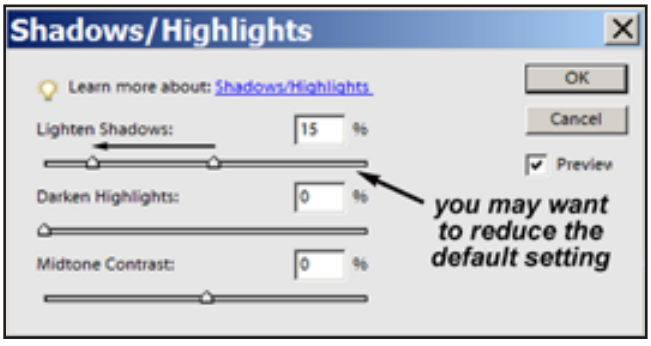
The Photoshop window, and some of the tools we'll be using.

(These screen shots are actually from Photoshop Elements. UAS machines running full Photoshop will have slightly different window layouts.)

view. In Photoshop Elements, open the jpg you just exported from Google Earth.

Almost all image processing programs have brightness and contrast sliders. One solution to an over-dark image is to drag the brightness slider to the pale side. But this changes tones throughout the entire brightness range of the image; areas at the pale extreme may turn completely white, losing detail.

The *shadows & highlights* feature of Photoshop is a better solution. It lightens and gives much greater detail in the overly dark areas, without bleaching the highlights. Try this on the Google Earth jpg: *enhance>adjust lighting>shadows/highlights*. On dark GE imagery, the default adjustments often are so bright as to bring up an unattractive mottling effect on smooth areas such as water. You'll probably have to move the *lighten shadows* slider to the left a bit.

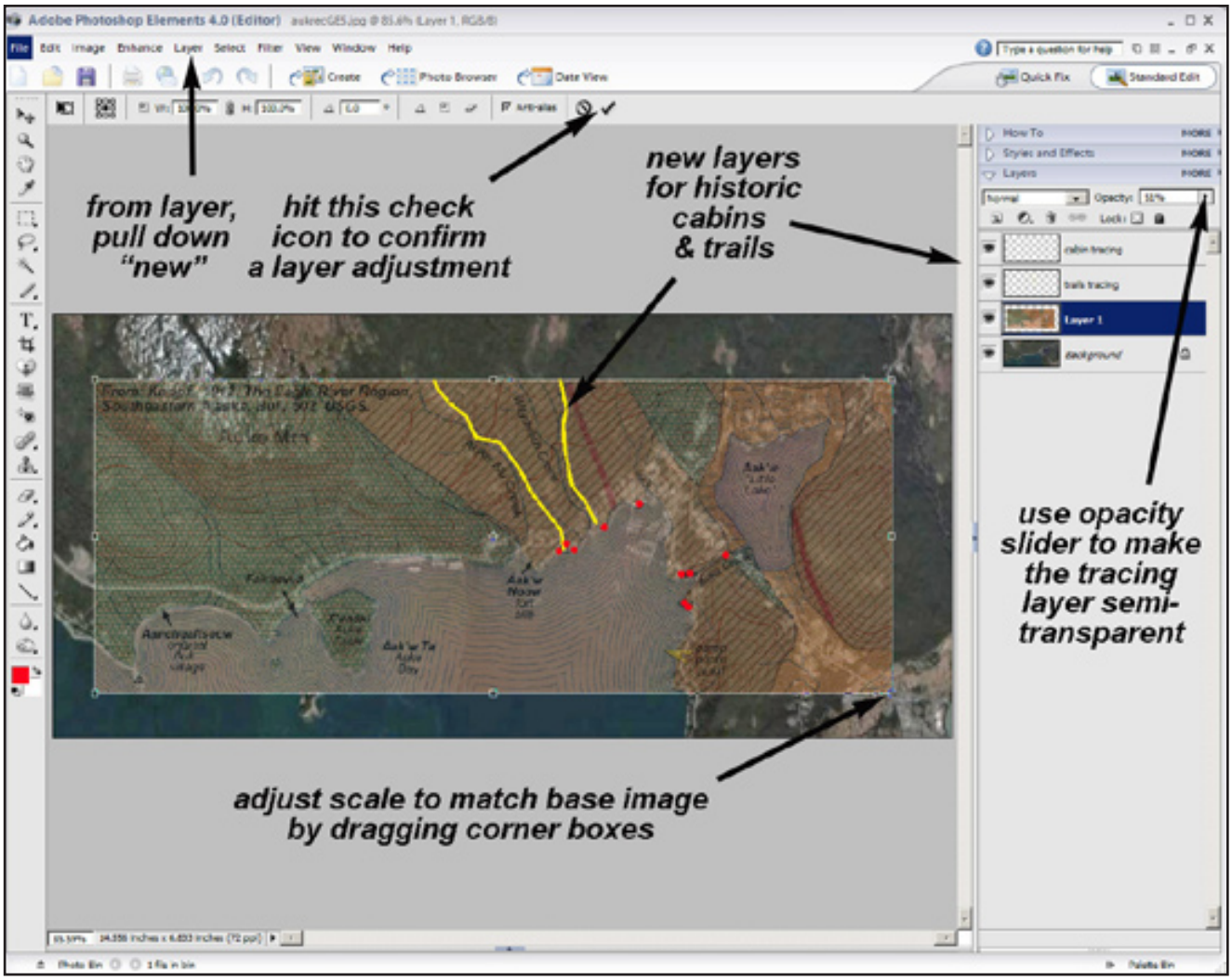


Layers are an indispensable feature of Photoshop. The layers sidebar appears on the right when you begin to add text labels, for example. These labels can be repositioned with the selection tool, or even contoured, with the *warp text* tool, to hug the curve of a road or river, for example. Before saving your image, you normally collapse all these layers into the background: pull down *layer>flatten image*.[4]

Layers also come into play when you add transparencies, either as a means of highlighting features or for tracing. Let's say you want to use an old historical map to trace the positions of mining trails and coastal cabins onto a current air photo of Auke Bay. In the following illustration, a 1910 USGS geology map has been copied and pasted onto the Google Earth export, automatically creating a new layer.

At the top of the layers sidebar is an opacity slider. Use this to make the historical map semi-transparent, so that you can adjust the scale to exactly match the underlying Google Earth aerial view. In this example,

4 Some graphic artists save photoshop files with the layers intact, as .psd files. This leaves open the option of revising the labels later, if mistakes are noted. But the file size of a .psd is 10 times greater than a .jpg, so if you're pretty sure you won't be revising the image later, it's best to flatten it.



The Photoshop window, showing use of the opacity slider (on upper right) to create a transparency for tracing.

the goal is to show historical features compared to modern landmarks. In 1910 there was no coastal road. The yellow lines trace old mining trails into the hills around Spaulding Meadows. The red dots trace cabins, including the fish camp buildings of Mary James (Sheep Creek Mary, 1835-1922, Auk Kwáan, L'eeneidí Clan, Yaxte hít, Big Dipper House) on Auke Creek, and the homestead of Wes Waydelich and his wife Jenny, also Auk Kwáan, at today's Waydelich Creek.

After tracing desired historical features, the historical map layer is removed. Right click on its name in the layers sidebar and choosed *delete*.[5]

You can use the transparency feature of Photoshop to create attractive tints on top of an aerial photo or hillshade base. Create a new layer, draw an outline with the pencil tool, fill it in with the paint bucket, then drag the opacity slider left until the detail of the underlying base image shows through.

Finally, the tracing layer can be used to transfer your GPS track and waypoints to a different base map. This is somewhat of a "back-door" approach, but is useful in cases where direct download to the base image isn't possible. For example, say you return from the Taku River trip, and cable your GPS data onto Google Earth. But the GE view, over so large an area, is disappointingly blotchy, as shown in the following comparison with Google Maps.

So how do you transfer your trip information to Google Maps, short of "eyeballing" it from GE to GM?

Unfortunately, you can't currently cable-download GPS data into Google Maps. But in mapping, there

5 Again, as explained in the previous footnote, you may wish to retain the tracing layer, for further adjustments. In this case, simply turn it off without removing, by clicking the eye button on the left of the name. Save the file as a .psd file for future use, and for importing into your Word or Publisher journal, save the view with transparency turned off as a jpg.

images from Google Maps

Comparison of Google Earth (top) with Google Maps (lower 3 images). Google Earth is not a very attractive base when you zoom out to larger areas, such as the entire CBJ. That's because the different imagery sources–high-res aerials, versus low-res satellite views–create a blotchy, uneven patchwork.

When you need to map a larger area like this, Google Maps gives you more attractive options. Note in the preceding view of a Google Earth window that the icon on the right side of the header gives you the option of jumping straight to the equivalent view in Google Maps.

A good example of the need for this broader picture will be our boat trips to Berner's Bay and Taku Inlet. The GM satellite view would make a very informative base image for a map showing your waypoints. Of the Google Maps options, it has by far the most information, showing glaciers, forest types, and even the plumes of silt emanating from glacial rivers.

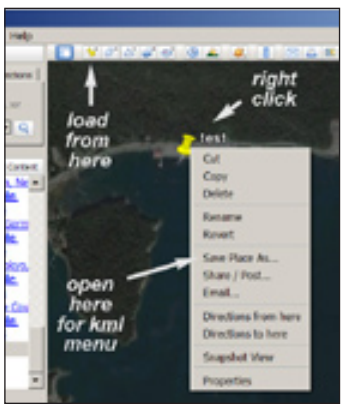
But for some mapping purposes, too much information can be distracting. The GM map view is the simplest of the 3 options for use as a base layer. (You can even turn off the place names shown here.) This might be the best choice for an overview locator map, with a rectangle indicating the position of your detail map. It's also the easiest base for superimposing your own place names.

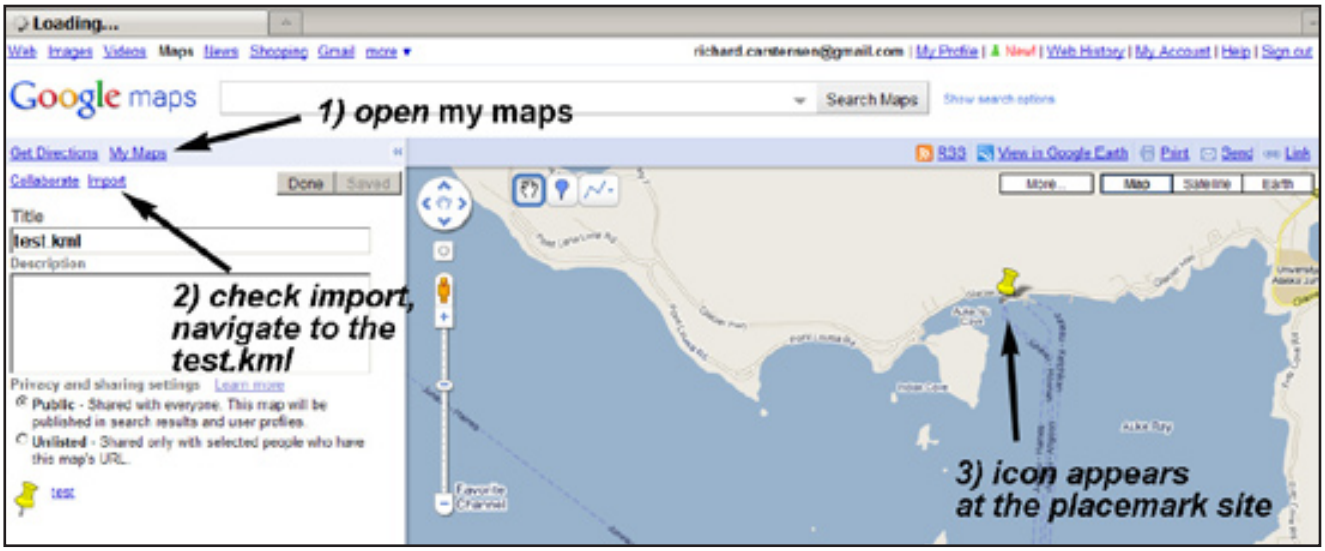
The GM "terrain view" is a tinted hillshade map. Hillshades use shadows to give an enhanced view of mountains and valleys. When it's important to understand topography, hillshades make the best base maps.

Google Maps does not allow you the option of directly downloading your GPS waypoints, as Google Earth now does. But you can display them first in Google Earth, and from there export them as a kml file. In kml format, you can display them in Google Maps.

are always several ways to skin the cat. As just explained, you could add your Google Earth view with tracks and waypoints as a semi-transparent layer over one of the 3 possible Google Maps base layers (satellite, map, or terrain), then manually trace the tracks and waypoints. This is not too difficult with simple lines and points.

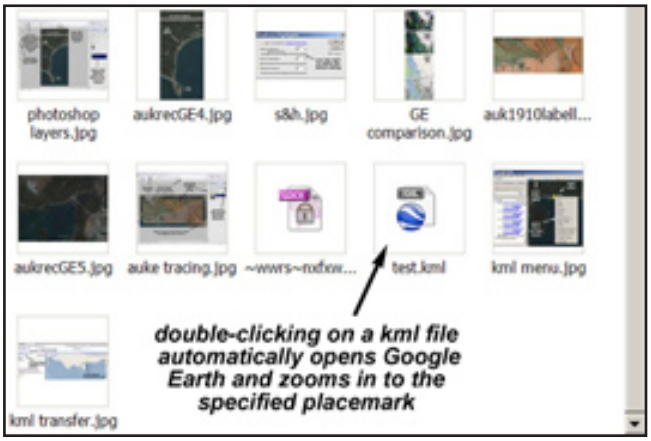
Alternatively, you can create a .kml file from your tracks and waypoints within Google Earth. Kml files are used to share spatial information, between users and between programs. To see how this works, add a placemark in Google Earth, using the thumbtack icon on the header. When you click on this icon, a placemark drops randomly into the window, and you can move it with the hand as long as it's still





images from Google Maps

Google Maps allows import of kml files created in Google Earth.



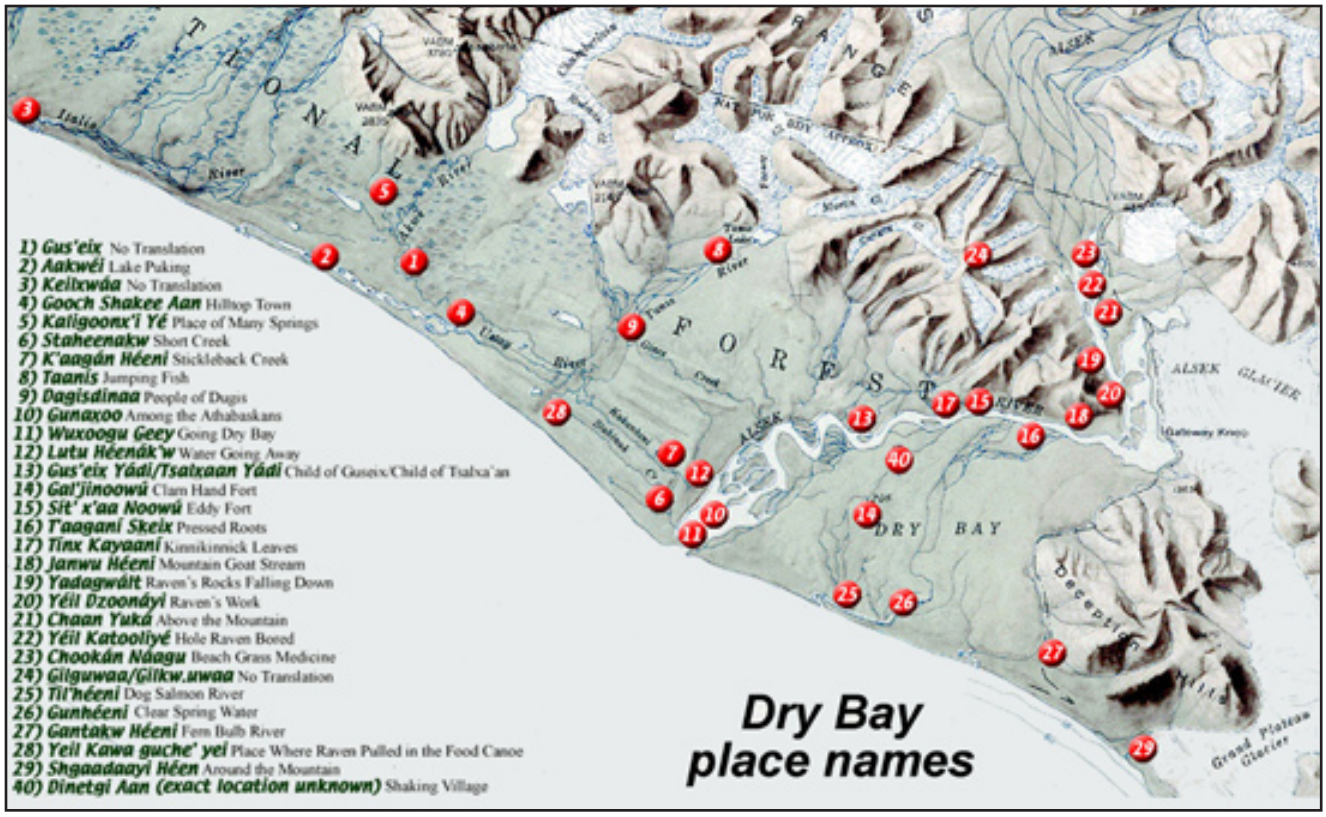
active (i.e. the *new placemark* window is still open). Name it "test," and click *okay*.

Now, to save this location (or any of your waypoints or tracks) as a kml file, right-click on the thumbtack and select *save place as*. The *save file* window opens. At the bottom, change *save as type* to kml, and send it to your journal folder.

You could email this test.kml to a friend. When s/he double clicks on it, Google Earth automatically opens and zooms in on the placemark. It's an easy way to share spatial information, say, in the middle of a telephone conversation, when you're trying to direct someone to your house.

Displaying a kml in Google Maps is slightly less automated, but not difficult. Open the GM website, zoom in to the area of concern, and click *my maps*. This will give you an *import* option. A navigation window then opens, allowing you to select the *test.kml* file. You may find that when the icon appears in the map or satellite window, no background layer is available because of the zoom setting. You only need to adjust the zoom slider, or change the background type, as shown in the previous GE-GM comparisons.

As with Google Earth windows, you can "clean up" the Google Maps window before exporting to .jpg–turning off placenames and extraneous detail.



DRY BAY PROJECT JUKEBOX

When you click on any of the numbered place names in the on-line version of the above map, Fred White, who grew up in Dry Bay, pronounces the names.

from: *http://jukebox.uaf.edu/ Scroll down to Dry Bay Project Jukebox*

"The Dry Bay Jukebox Project is the result of a collaborative effort between the traditional clans of Dry Bay (Gunaxoo), the National Park Service (NPS), the National Forest Service (NFS) and the University of Alaska Oral History Office. . .

Much of this program relates to the two field trips to Gunaxoo; in 1997 to search for the former village on Cannery Creek and for Dine'lgi.aan (Shaking Village), and in 1998 to search for the lost village of Gus'eix. The project also inspired people to gather from throughout northern Southeast Alaska to share information during the Sealaska Celebration in 1998 and in Yakutat later that same year. Much of that information has been condensed into the place name map and is presented here. . .Ultimately, this program is a record of the Gunaxoo Kwaan as it exists at the end of the 20th century, its memories of past events and peoples, and their powerful connection to this very special place. Enjoy and learn."

Cultural mapping

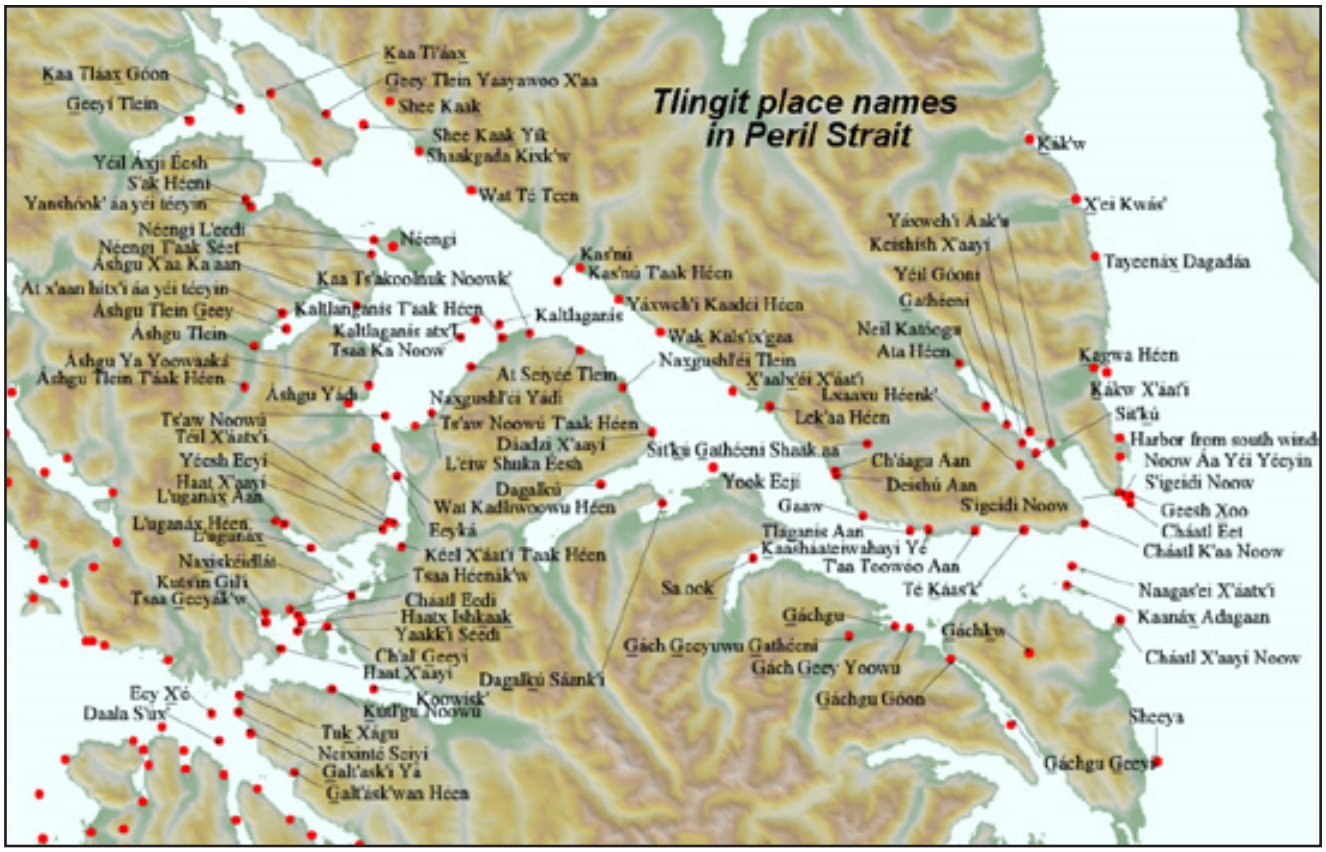
One of the most exciting developments in Southeast Alaskan cartography is the resurrection of Tlingit place-names. Among many great examples is Dry Bay Project Jukebox. In addition to audio-maps (sample above), this project recorded and posted hours of interviews relating to the history and use of this cultural crossroads for Tlingit and Athabascan people. Bert Adam's tale of the rediscovery of the lost village of Gus'eix–and the associated slide show–is just one serving in a multimedia feast.

In the Sitka area (example, next page), place-names mapping began as early as 1975, TIingit Elder Charlie Joseph Sr. began working with the newly formed Alaska Native Brotherhood Education Program, today known as the Sitka Native Education Program.

> *"We would pack up and travel around in the Program's van as Charlie pointed out various locations and told us their names in Tlingit,"*[1]

From Yakutat to Saxman, today's place-name archivists are building on a solid foundation established in 1946 by the work of Walter Goldschmidt, Theodore Hass, and interpreter Joe Kahklen of Klukwan. This intrepid team interviewed Tlingit elders in each Southeast village, recording and mapping place names, along with statements on traditional land use (Goldschmidt & Haas, 1998). Some of the elders recorded in *Haa Aaní. Our Land: Tlingit and Haida land rights and use*, were nearly 100 years old in 1946, and

1 Ethel Makinen, clan mother of Sitka L'uknax.ádi. *www.sitkatribe.org/placenames/*



Example of one of the many nested place-name maps on the Sitka Tribe website: Many are linked to audio clips with name pronunciations.

www.sitkatribe.org/placenames/

Used by permission. Please do not post or redistribute this map.

Original Lingit Place Names Shared by Charlie Joseph, Sr., 1979
Lingit Place Names Recorded and Mapped by Sitka Native Education Program:
Isabella Brady, Ethel Makinen, Roberta David, Vida Davis, Anne Johnson and Nellie Lord, 1979

Materials Translated, Transcribed and Recorded by Ethel Makinen and Vida Davis, 1993, 1998-2001
Project Review and Collaboration: Herman Kitka, Sr. and Mark Jacobs, Jr. 1998-2001
Project Coordination for the Sitka Tribe: Terry Pegues 1993 and Robi Craig 1998-2001
Project Support, Sitka Tribal Education and Training Program: Roxanne Houston 2000.2001

SENSC Local Research Coordinators: Ethel Makinen and Vida Davis
GIS Map Production: Robi Craig (STA) and Matt Ganley (Map-Alaska)
SENSC Project Coordination: Thomas F. Thornton and Harold P. Martin

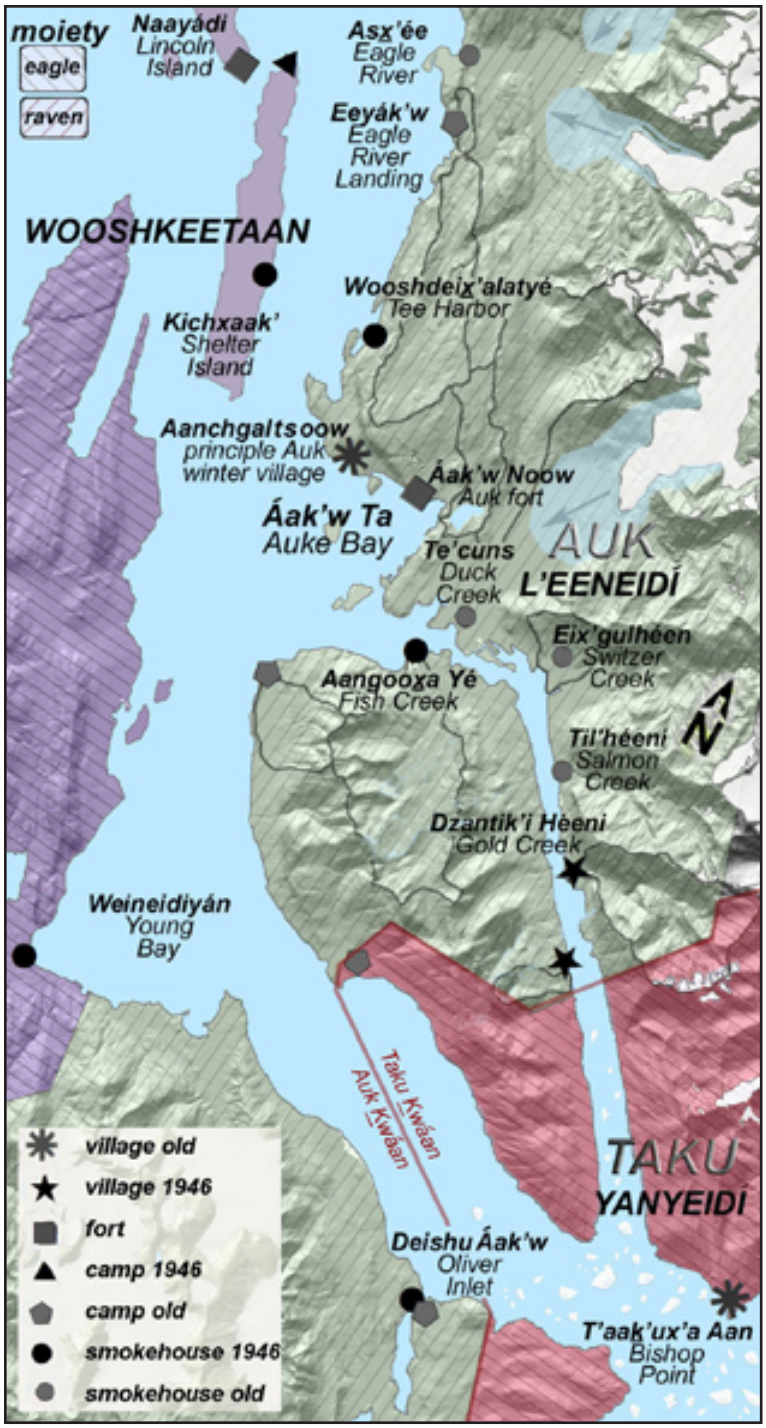
their memories extended back to a time before European settlement. In Juneau, for example, the oldest person they talked to was Mary D. Johnson, L'eeneidí clan, 98 years old. She had fished in Dzantik'i Héeni (Gold Creek) as a mature woman before Joe Juneau ever saw it.

In the 1990s, Thomas Thornton–first with the Alaska Department of Fish and Game and later with the University of Alaska Southeast–began to work with elders in several Southeast villages to record and map place names. For example, at Angoon and Kake, he and elders created web-based cultural atlases, now stored on the Alaska Native Knowledge Network.[2] These maps are password protected for Cultural and Intellectual Property Rights. Thornton is presently at Oxford, where he is working on *Haa Léelk'w Has Aaní Saax'u: Our Grandparents' Names on the Land*, a guide to Southeast Alaska native place names.

Another leader in place names mapping is the community of Hoonah, where a long collaboration with staff at Glacier Bay National Park has resulted in an extraordinary cultural map of northern Chichagof Island and Sít'eeti Geeyi (Bay taking the place of the Glacier).With the help of geomorphologists and Gustavus naturalist Greg Streveler, the elders have even reconstructed a vanished landscape, restoring ancient place names for sites since erased by advancing ice and aggrading outwash deposits (Connor *et al*, 2009).

As one result, visitors to the lodge at Bartlett Cove will soon have access to a place names atlas on an interactive touch screen. Pressing on any of the dozens

2 *www.ankn.uaf.edu/NPE/oral.html*



Áak'w Kwáan place names and cultural sites, based upon Goldschmidt & Haas (1998) and Hope (2003). Villages, camps and smokehouses still active in 1946 are distinguished from older sites. To give a sense of conditions just prior to first European contact, expanded glaciers (blue tint) are shown in the Eagle, Herbert and Mendenhall Valleys. Note bergs in lower right; even as late as the mid 1800s, ships were trapped in Gastineau Channel by ice from Taku Glacier (DeArmond, 1980).

Note the much lower density of place names on this map compared to the preceding examples from Sitka Tribe and the Dry Bay Gunaxoo clan. These are merely the existing published names. A long-term goal for Auk and Taku country might be the creation of an atlas equal in detail to those of other Southeast communities. The opportunity for Juneau students to connect with elders and GIS technicians in such work makes this objective all the more desirable.

of place names launches a sound file of an elder pronouncing the name. A sidebar connects to stories about some of the many names. (Wayne Howell, NPS, *pers comm*)

None of these inspirational examples happened quickly. They represent decades of patience, trust, and willingness to share,[3] so that place names and their stories–the tangible record of our connections to the land–are preserved for future generations. Where are the "lost villages" of Auk and Taku country? What are the first steps on the road to their rediscovery?

Place names around Juneau

To learn more about the meaning of Tlingit place names on this map of Auk Kwaan territory, we talked to Marie Olson (Auk Kwáan, Wooshkeetaan clan) and David Katzeek, Shangukeidí clan. David's ancestors come from the Klukwan and Angoon but he lives in Juneau. He showed us where the Shangukeidí's Thunderbird House used to be located at the old Auk village.

Marie acknowledges that Tlingit names can at first be a little intimidating, but she encourages us to persevere:

> *"For non-speakers, it [Tlingit] can be difficult to pronounce. But when I heard the radio announcer say 'Dzantik'i Héeni,' I said they did a good job. So it's really not that difficult. Well neither is the name of Auke Lake. Aa means lake, but when we add 'k to the end of it, it means little lake. So that's the way Auke Lake was named. When they say Auke Lake, they're just repeating 'lake.' [i.e. it's redundant.]"*

Aanchgaltsoow. It's appropriate to begin here: first, because the old village site at today's "Auke Rec" was so important to the Auk people; and second because Aanchgaltsoow illustrates the impressive depth of meanings in this complex language. We

3 There are of course constraints on use and distribution of cultural atlas work. An excellent summary is *Guidelines for respecting cultural knowledge*, on the Alaska Native Knowledge website: *ankn.uaf.edu/publications/knowledge.html*

Aanchgaltsoow

Alaska State Library, Case & Draper collection, 1888, ASL-P39-1172

should probably not assume that any one source gives us the "last word" in place name definitions.

There are currently 2 publications that offer meanings for the name Aanchgaltsoow**.** The *Dictionary of Alaska place names* (Orth, 1967) claims:

> *"The name 'Anchguhsu' (or Antcgaltsu) is reported by Swanton to mean 'town they abandoned,' a name obviously applied after abandonment about 1902."*

The meaning is in fact *not* "obvious." Thornton (2009) interprets Aanchgaltsoow somewhat differently, meaning "the town that moved," called that because the Leeneidí clan's first settlement after arrival from Young Bay was in the Fairhaven area to the east.

In other words, in the Swanton/Orth interpretation, Aanchgaltsoow is a "retrospective" name, not used during the town's actual occupancy, whereas in the Thornton interpretation, the name would have been used durign occupation. In this scenario, the name had more antiquity; the "moving" refering to the earlier immigration from Fairhaven rather than the evacuation for downtown Juneau in the 1880s and 1890s.

But talking to Marie and David, and linguist Richard Dauenhauer, we began to understand that the word may have more nuanced meanings. Marie told us:

> *"It's a difficult name [to understand]. It means when the people pack up and move. That's the way Cecilia [Kunz] explained it to me. I never knew the name of that village [before Cecilia explained it]. But that's where my mother's mother came from. She was Eagle, Wooshkeetaan."*

Marie made clear that "moving" in this case did not imply permanent abandonment of this or an earlier settlement, but a back-and-forth process:

> "*It was their winter village, and in the summer they would go to Gold Creek . . .down to Thane [and to] the outlet stream from Auke Lake, a sockeye stream."*

Perhaps the village's name even held a reference to the excellent visibility from Auk Rec beach. Marie told us of its strategic importance in defense–you could always tell when friends or foes were approaching. From the longhouses, and from the bluff to the east at Auk Nu, permanent lookouts kept watch over the comings and goings in Auke Bay.

Richard Dauenhauer (pers comm) took the word apart into its components:

> *"Aanchgaltsoow as Tlingit name for Auke Rec site. . . . Aan can mean "with it" (a + n) and can also be town or land (aan). . . The verb stem and theme are to move a population, usually for a short time, as in going to or from a seasonal village site."*

David Katzeek offered what may be the closest single-word interpretation for Aanchgaltsoow: "nexus." This town was the hub in a constellation of seasonal settlements. Like so many Tlingit place names, it tells of dynamism and process, so much richer than Euro-American names honoring distant people who never visited or cared about our home.

Dzantik'i Héeni (Gold Creek) This is probably the most often-spoken Tlingit place name in Juneau, but what few realize is that our middle school by that name is 5 miles from the stream that the Auk people called Dzantik'i Héeni. The original name, means Creek of the little flounders, refering to baby starry flounders (*Platichthys stellatus*) that rear in estuarine sloughs. Before hydraulic gold mining, water removal

This retouched photograph is a visualization for 1879, the year before the big discovery at Little Flounder Creek. To locate the 1879 shoreline, it helps to know that essentially all construction outboard of Willoughby & Glacier Avenues was on placed fill. Also, the land has risen, around 6 to 8 feet.

Pre-contact Dzantik'i Héeni was the finest salmon stream in Gastineau Channel, but the firehose climate precluded winter villages. According to Jake Cropley, there were 2 small smokehouses at the mouth of the creek (Goldschmidt & Haas, 1998). If you look close, you'll see them in the seasonally trampled meadow next to the shifting stream outlet.

and subsequent channelization excluded salmon from this stream, Dzantik'i Héeni was considered the finest fish stream in Gastineau Channel. According to Jake Cropley, (Goldschmidt & Haas, 1998) there was even a steelhead run:

> *"Gold Creek was called Dzantik'i Héeni. This was the biggest salmon creek of all, with dog salmon, humpies and cohos; and steelhead after the freeze. This place belonged to my mother and my uncles. Two smokehouses which belonged to my aunts and their husbands were still there at the time gold was discovered in Juneau.*

Eix̲' gulhéen (Switzer Creek) This–not Dzantik'i Héeni–is the name of the stream flowing by DZ middle school. We learned the meaning of the stream's name from Marie Olson:

> *"It's describing the creek up at the top where all the coho go, winter coho, they go through that little crooked creek. .. . It just remained warm – I've often wondered about that."*

There's of course no thermal springs on Eix̲' gulhéen. What the name probably referred to was groundwater influx. Retired fisheries biologist Bob Armstrong says in winter, the unusual pond at the confluence of East and West Marriott creeks (tributaries to Switzer) stays warmer than the stream, because of water upwelling from deep sediments below the frost line. Eix̲'gulhéen flows all winter, while non-spring-fed streams freeze or go dry. That makes it one of the best wintering streams in the CBJ for coho, dollies and cutthroat. For the same reason, it's also key wintering habitat for American dippers (Mary Willson, pers comm).

If our interpretation of Eix̲'gulhéen is correct, it suggests a rich understanding of hydrology and fish habitat, which one would expect of people truly native to this place, who knew the stream in all of its moods and seasons.

This exploration of the meanings of Aanchg̲altsoow, Dzantik'i Héeni and Eix̲'gulhéen has whetted our appetite for further integrating of natural and cultural history. It suggests that even where local TEK (traditional ecological knowledge) has been lost, there is potential to resurrect it through collaboration between naturalists, scientists, and culture bearers. Obviously, our guesses about place-name meanings involve a good deal of speculation, and we should remember to be clear about that. But the naturalist is a close spiritual cousin and those who once gleaned their livings entirely from local woods and waters (preceding sidebar on *Ways of knowing*). In many ways, we speak the same language.

Scanning the previous map, with place names recorded in Goldschmidt & Hass (1998), Marie and David provided us with a few simple translations. We don't know much about their associated stories:

Weineidiyán (Young Bay) Marie Olson told us the name meant "Place where you take it easy for awhile."

Translations from David Katzeek:

Naayádi (Lincoln Island) means "Clan child." There were both Eagle and Raven in that area.

Kichxaak' (Shelter Island) "Where the eagle paddles with its wings." There were large forts on both Shelter and Lincoln islands.

Asx'éé (Eagle River) This name has something to do with an opening in the trees.

Til'héeni or **Téel'héeni** (Salmon Creek) As with the English name, this creek was named for the dog salmon. According to Jake Cropley (Goldschmidt & Hass, 1998):

"Til'héeni was a big source of dog salmon and humpies. There were 2 smokehouses there in my time, but there are none there now [1946]. Some Natives go there to fish for their own use, and whites also use that place. A Native named Salmon Creek Jim had a smokehouse there and claimed the place until 12 or 13 years ago. He went up Salmon Creek as far as the falls to hunt."

By working with elders during this course, we hope to fill in more of the gaps in understanding of local place names and the stories behind them. Many more names are known by Auk and Taku Kwáan elders, and David Katzeek has given us some fascinating examples. But at this early stage of cultural atlas work for the Juneau area, it seems best to start slowly, restricting ourselves to the limited but widely respected collection of names published in Goldschmidt & Haas (1998).

We close with a remarkably prescient quote about cultural differences in place-naming. In 1790, even before Vancouver charted the Southeast archipelago, besmattering it with the names of his patrons and shipmates, explorer Charles Fleurieu described the land and people of Sitka Sound. He was the first to record the term Lingit Aani (Tlingit country). Unlike the large majority of his contemporary Europeans, Fleurieu felt that Native place names should be sought out and retained on the ever-growing atlases of the Pacific Northwest, rather than replaced by foreign ones:

"I restore to the bay [Sitka Sound] what belongs to it, the name which it has received from its inhabitants; if we were willing to act in this manner in regard to all the places whose proper names are known, we should preserve the nomenclature of geography, from those variations, annual as it were, which have no other object than to gratify the caprice or the vanity of a navigator."[4]

4 *http://dnr.alaska.gov/parks/oha/castlehill/chptthree.htm*

Tools, skills, synthesis

We've now reviewed most of the generic technology[1] used by researchers and naturalists to collect data in the field, and portray it on maps. GPS units, cameras, and their associated computer programs provide wonderful new ways to observe, measure, and illustrate your world.

But in and of themselves, these tools may not bring you much closer to an understanding of your environment. They simply enable you to collect some pieces of evidence, and look at the landscape from novel perspectives. The real reward comes next, as you review your photos, comparing them to their mapped locations, and ***begin to ask questions***.

The questions may lead to conversations with experts, or internet searches. They may remind you of something you read once, or wrote yourself long ago. Some of these questions have simple answers; others will tease you for years. If you go on to a career in science, some of these questions could become your life's work, the basis for creative experiments and detailed measurements.

But anyone can benefit richly from the methodical practise of recording experience in nature. In the next sections, we give examples of the why, what and how of "journaling."

1 By generic, we mean common to all fields, from geology to forestry to archeology. Each discipline, of course, has its own professional tools.

CARSTENSEN JOURNAL EXCERPT

A field trip with an expert is an excellent occasion for journaling–preferably on that very same evening. Otherwise, 80% of the cool stuff you learned is likely to be lost from memory before the year is over. Last summer, the British Columbian ethnobotanist Nancy Turner visited Juneau. Nancy probably knows more about the cultural use of plants on the Pacific Northwest coast than any person alive. One of the conclusions she and other researchers are reaching is that–to a far greater degree than realized by early explorers or contemporary anthropologists–Northwest Native groups weeded, transplanted, fertilized, and carefully tended gardens of plants we consider "wild." (The degree to which this applies in Tlingit country is not yet understood.) The following is excerpted from my journal of August 14, 2009. It was typed up from memory-joggers scribbled on a notecard in the field. (RC)

"Rice root fields were tended. Nancy knows elders in different tribes who as children were responsible for re-planting the unused base of the roots - the 'whiskers.' In general, there was far more culturing of plants than we attribute to these presumably non-agricultural northwestern peoples.

For example on Skeena River terraces in Tsimshian country there are relict, anthropogenic communities of crabapple and high-bush cranberry with an understory of rice root. The upper branches of the crabapples were partially broken to bend downward for easier picking. This sounds almost as intense a human signature as described by folks like Gary Nabhan (*Cultures of Habitat*) and Wade Davis (*One River*) for tropical and subtropical environments."

Journaling: putting it all together

Richard Carstensen

I began keeping a journal shortly before I moved to Alaska in 1977. The process of journaling[1] is central to my work and recreational life; it's the way I taught myself to be a naturalist, and one of the principle ways that I share my observations and insights with others. I created an 85-page journal last July when consulting on the proposed hydro development in the Soule River watershed, near Hyder. On my last birding trip to Mexico, my journal ran 98 pages. The latter trip was strictly "for fun." Whether payment is involved is irrelevant. Work or play, the goal is learning, and for me, the best way to learn is journaling.

Before getting into some of the technical "recipes" for successful journaling, I'd like to begin with some thoughts on *why* this practise–in some fields a virtually lost art–is important in the 21st Century.

At the 4th Glacier Bay Science Symposium, naturalist Greg Streveler gave a short talk entitled *Peripheral vision as an adjunct to rigor.* As a resident of Gustavus since the 1960s, and long-time park explorer who has worked intimately with scientists, Greg laments the gradual decline of broadly-based field observations, recorded in the journals of visitors and park staff. In the park's early days, rangers and researchers kept journals, in the tradition of Henry Thoreau and Rachel Carson. These Glacier Bay journals are now priceless historic records, but few of today's backcountry travelers are creating such records for the managers, park afficionados and general public of the future. Excerpts from Greg's talk are in the following sidebar.

Science has become increasingly specialized. In one sense, this is an inevitable tendency as each scientific discipline digs ever deeper. We could spend our entire lives reading about Pacific-rim plate tectonics, for example, and still fail to keep up with all the advances in this fast-paced field. In pursuit of geoscientific "rigor," we could lose track of birdsong, plant succession, and the pagentry of Northwest Coast art–the type of alertness that Greg refers to as our "peripheral vision," and that David Katzeek calls Adaa analgéin–Raven's way of studying the world.

Neither Greg nor I object to scientific specialization *per se*. As generalists, we reap the fruits of scien-

1 "Journaling" is not a recognised word. But just as "birders" go "birding," it seems to me that "journalers" practise "journaling." Spell checkers always highlight "journaling" as problematic, whether you choose one "l" or two.

tists' painstaking work and astonishingly deep insights. Nor do I mean to imply that you can't be both a scientist and a naturalist. Some older scientists are superb naturalists, with broad understanding in many fields outside their specialties.

The problem is the stuff that falls through the cracks between specialties. The costs appear at several levels:

1) At the management level, it's very difficult to even *understand* these extremely specialized studies–let alone to make regulatory decisions based upon them. A broader, contextual framework is needed.

2) At the personal level, it's hard for a specialist to develop a sense of place. That takes, as Greg puts it, "the investment of heart." And we can't love our place without at least attempting to understand its biota, its seasons, its ancient substrates, and its deep, slow changes.

3) At the community level, a collection of specialists is like the 3 blind men describing the elephant. We must each take off our blinders, and exercise our peripheral vision. Our model should be the community of hunters and fishers and gatherers who inhabited Southeast Alaska 250 years ago. Imagine the collective knowledge and love of place in a coastal village of 30 people! Every woman over 50 years old knew as much about plants as Nancy Turner. Every old man knew as much about fish and wildlife as Herman Kitka. And every child and young adult was apprenticed to those mentors. Imagine the fireside discussions, as master observers traded stories of their daily quests in the woods and waters!

In the sound-bite culture of the 21st Century, journaling is one patient practise through which we could approach once more that communal sense of place.

Henry Thoreau wrote–in perhaps the most famous nature-journal of North American literature–that firewood heats you twice: once while you're sawing and splitting it, and again as you sit by the stove. The same could be said about journaling: it first illuminates you in the act of writing and compiling, and again years later, when you pull down that notebook from the shelf, or hunt through your digital files, to relive a memorable experience, or enlarge upon a fruitful idea.

In the 1970s, when I first realized I was on the path to becoming a naturalist, I took usually 5 to 20 field notes per day, each about a different species or phenomenon. At that point, I wanted mainly to learn the names of things, the progression of the seasons, how habitats changed over time, and who ate whom. I focused for the first 12 years on one square mile at the mouth of Eagle River.

This tight geographic focus is probably typical of the early training of naturalists. Because we seek at least

A LOST BUT RECOVERABLE WAY OF SEEING

The following comments are excerpted from a short talk on the role of the generalist in Glacier Bay National Park.

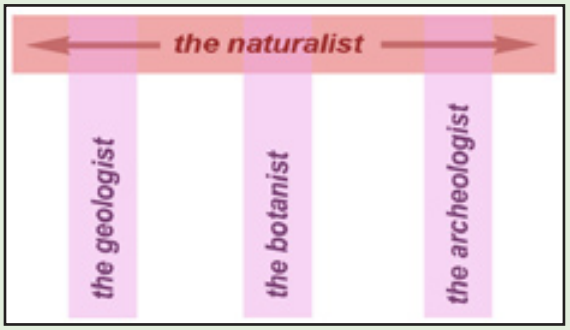
Peripheral Vision as an Adjunct to Rigor
Greg Streveler

"Over recent decades at Glacier Bay, there has been increasing emphasis on rigor in the selection and implementation of studies. . . . Taken in sum, these characteristics result in deep but narrow views of the world. If we analogize the Glacier Bay ecosystem to a broad-band spectrogram, modern research brightly illuminates a small number of spectral bands at the cost of leaving large segments of the spectrogram in darkness. . .

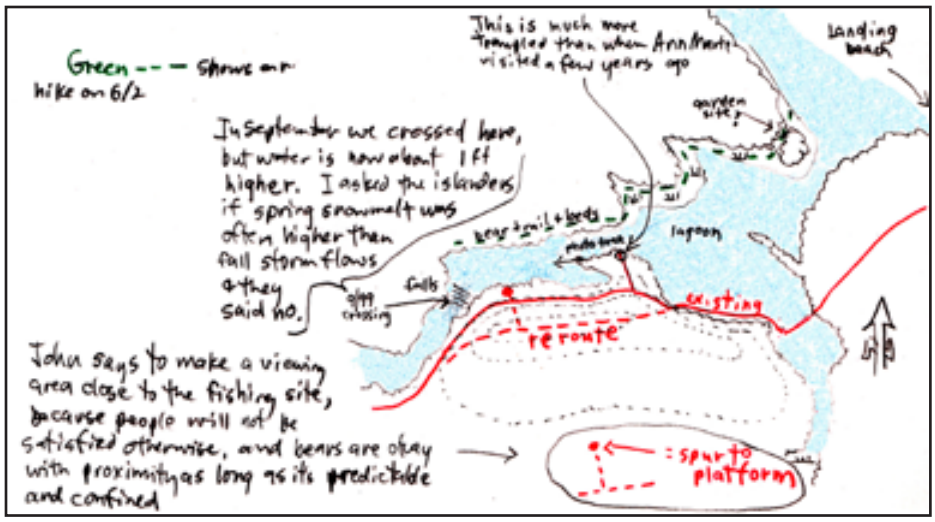
Happily, this problem can be at least partially mitigated with little or no loss to the core value of research. Here are some thoughts on a strategy for illuminating the gaps between studies . . .

- Encourage investigators to report on phenomena outside their study objectives but within their expertise. . .
- Create a conducive environment for interdisciplinary work and for linking complementary studies.
- Encourage long-term research. It generates seasoned observers capable of making many sorts of observations in a contextual fashion.
- Encourage the National Park Service and USGS field staff to keep personal journals of observations.
- ***Develop a system for guiding, accumulating and reporting ancillary observations. This need overarches all the above; without it, they will probably remain just notes buried in notebooks or files.*** *[RC italics; we'll return to this question of how to share journals with our community!]*

These ideas in sum approach what I mean by peripheral vision, but there is a final, more elusive element that one senses in the joy we all feel when listening to one another's results: the investment of heart—dare I say love of place—that always arises when any group I've ever been in talks about Glacier Bay. This feeling can unite Tlingit resident with Caucasian fisherman with researchers with park managers with tourists. This is the deep ecology of place, which allows us all to sense what we cannot measure, and which leads us to give back to Glacier Bay what it has so unstintingly given us. Anything that increases this is a good thing."



The naturalist is typically broad and shallow in terms of discipline, while the scientist is typically deep and narrow (RC).



Sketch map from a trip to Lake Eva's outlet stream on Baranof Island in May, 2000, to discuss potential trail reroutings to reduce negative interactions between people and brown bears.

entry-level familiarity with such a diversity of disciplines, we stick to an intimately-known home turf. In fact, it could be said that naturalists' only specialties *are their places*.

By the time I left Eagle River, my geographic interests had broadened to include the entire Juneau road system, as well as selected very special environments farther afield: Glacier Bay, Admiralty, outer Chichagof, Yakutat. My journals reflect these expanding interests. I kept daily logs on kayak trips and consulting jobs, noting especially the unique characteristics of remote places I'd likely never see again. These notes were sometimes accompanied by quick sketch maps, crude drawings, and references to photos taken in each location. Today, I consult these mid-career journals more frequently than my early-career notes. That's probably because most of what I learned early on–species names, diets, behaviors, etc–is still in my head, strengthened by daily reacquaintance. In contrast, the things I saw on day 16 of a paddle around Kuiu Island in 1994 now mostly survive only on paper.

I filed my 35mm slides chronologically, in annual 3-ring binders, according to a numbering system developed by my mentor Professor Donald Lawrence. (See preceding section on repeat photography.) Don steered me well; today I'm able to immediately relocate any slide I took between 1988 and 2000. But Don could probably not have anticipated an even better organizing system that had to await the advent of digital photography.

In 2001 I bought my first digital camera and my first laptop. Secure in a waterproof pelican case, the computer began to follow me into the field. Even in backcountry field camps, I could work deep into the night, to the purring of a little Honda generator, behind a distant tree at the end of a 100-foot extension cord. As with most of my technological advances, I did not pioneer the computerized field camp, but merely followed in the footsteps of the inimitable Bob Christensen, as adept in the digital world as he is on bear trails. I'd been making maps with pen and ink for 20 years. When Bob introduced me to GIS, it was like handing a caveman a scoped rifle.

Suddenly, my journaling took a quantum leap in sophistication. Beautiful maps could be prepared in minutes that used to take me all day. And no longer were the day's photo illustrations filed away in separate notebooks from the journals (after a 2-week journey through the mails to the developers). Now they could be downloaded and inserted directly into the daily report.[2]

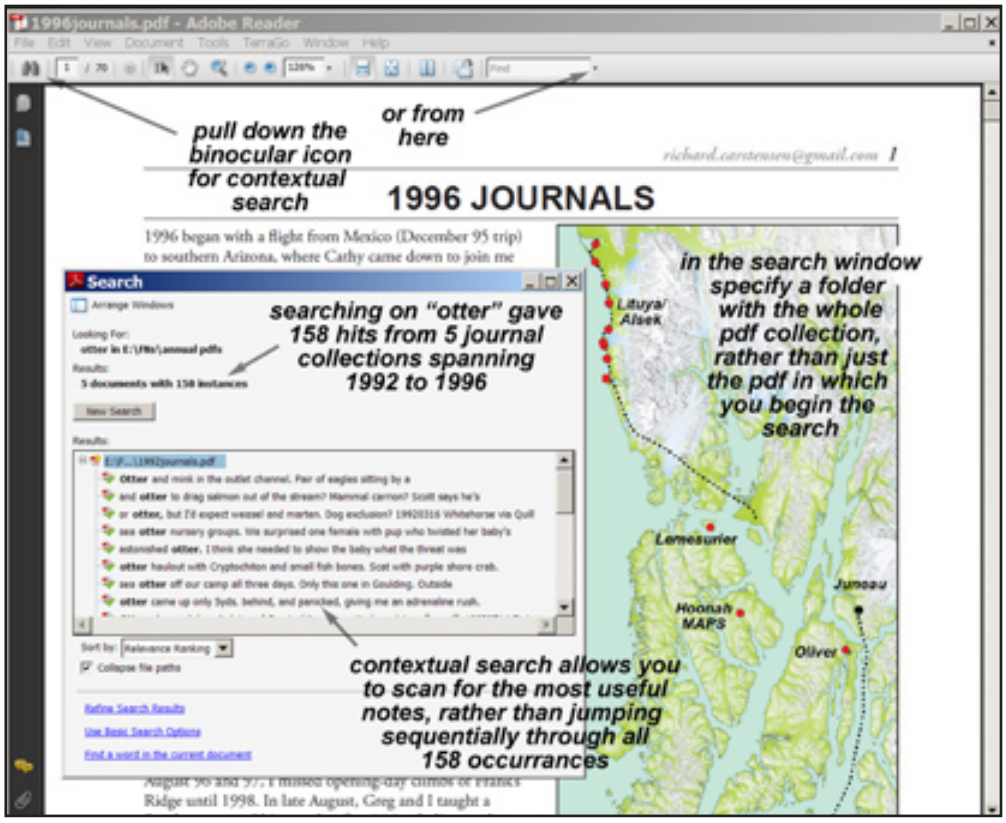
The resulting instantaneous proximity of text and illustrations is more than a matter of convenience, because each informs the other in often unforseeable-ways. For a visually oriented person, this can be especially fulfilling.

Typically, in the creation of a report or article, the writing comes first, and illustrations are thrown in almost as an afterthought, to pretty-up the page. This is especially true of large-circulation magazines and book publishers, who have separate staffs for word-smithing and photo-editing. By the time that picture gets inserted, it may have little to do with what the author was originally trying to convey. Most captions unfortunately reflect this lack of communication. Esthetics often trump information.

I usually turn the text-first layout procedure on its head. On return from the field, I deal *first with the visuals*: the pictures and tracks and maps. Opening the page layout program,[3] I begin by dropping in the

2 Every field photo–not just those that become part of the journal–is named and filed in a dated folder. Although the filing of these images is chronological–just as with Professor Lawrence's system for Kodachrome slides–naming them allows searches by subject. I can quickly locate almost every rough-skinned newt photograph I've ever taken, simply by typing "newt" into the search box, and specifying the proper drive.

3 I work in Indesign, but in this class we'll be using the more widely available Microsoft Publisher.



Example of a contextual search in Acrobat Reader. This search is more powerful than a search in Word, because it shows you each sentence in which the word or words appear. It also allows searches of entire folders or drives: not just the pdf from which the search was launched

map of the day's route, and a few photos, selected for clarity and relevance to the day's work. Only then do I start writing. With the illustrations and text together on the page right from the beginning, my left and right brains collaborate better, and my enthusiasm burns at a brighter pitch. It's almost like I'm chasing down the cool ideas that are hidden in those pictures and maps, vividly remembering the day's adventures.

These prolifically illustrated digital journals, each converted to pdf, are of course much easier to share with colleagues than the earlier handwritten ones. I soon recognised how much more interesting and accessible they were, and decided to gradually convert the handwritten journals to digital format. Using a voice recognition program, I narrated the journals from 1992 to 1996 into a microphone, transcribing them with occasional tweaks from the keyboard. I also scanned most of my old 35-mm slides, and inserted them into the daily field notes. My kayak routes and backcountry bushwacks were originally pencilled onto topographic maps and marine charts; I transfered these to hillshade bases or aerial photos in GIS–less accurate, of course, than a GPS-measured track, but still valuable.

Ultimately, instead of the 5 years of transcribed and spruced-up journals in the example above, I'll have more than 3 decades of illustrated Southeast Alaskan field notes in pdf format. At that point, I should have quite a gift to pass along to future Southeast Alaskans. In the year 2110, I hope it falls into the hands of a few eager naturalists with rugged attention spans.

Certainly, there are more ways to teach yourself, *and share what you learn* than the traditional nature-journal. My friend Bob Armstrong is one of Alaska's finest and most dedicated naturalists. Bob doesn't keep a journal, at least of the kind I've just described.

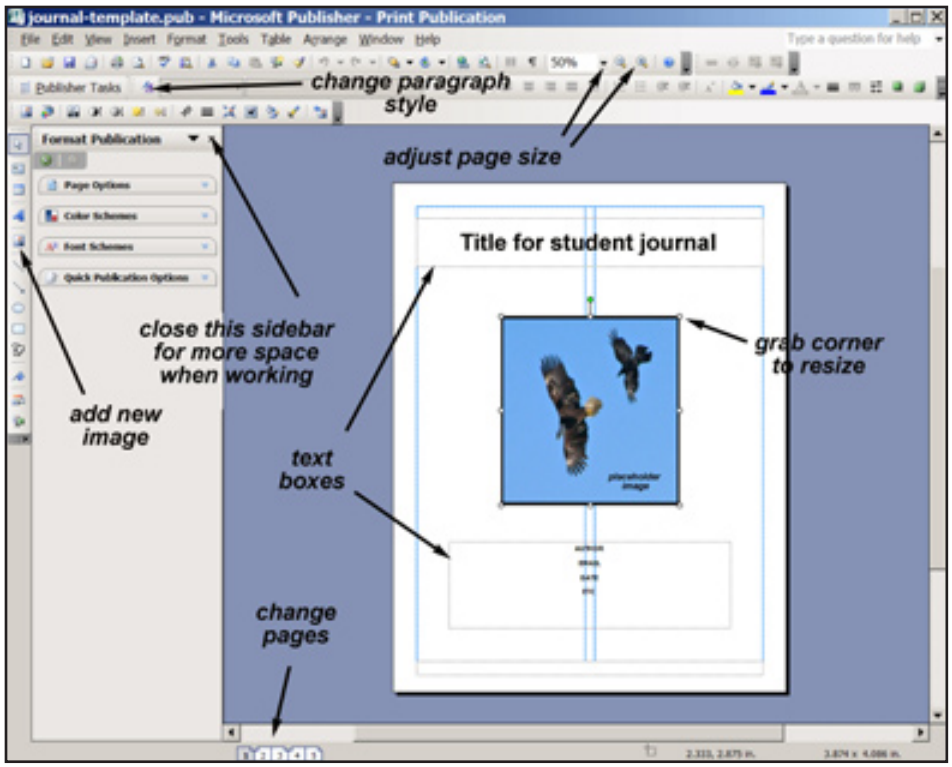
But more than anyone I know, Bob has made his life's work available to the Alaskan public, through his numerous books for adults and children. His most recent books have been self-published, a faster process than working through commercial publishing firms.

Bob–and his frequent coauthors Marge Hermans and Mary Willson–tend to work on focused book projects that span roughly one year: *Along the Mount Roberts Trail, Dragons in the Ponds, Beavers by the Mendenhall Glacier.* These are fascinating accounts, full of the sense of discovery and the excitement of learning. Bob's books are, in a sense, his journals. But unlike most journals, they're exceptionally professional-looking, and available in bookstores throughout the Archipelago.

Let's return now to the concluding recommendation in Greg Streveler's address to Glacier Bay National Park (preceding sidebar):

> *"Develop a system for guiding, accumulating and reporting ancillary observations. This need overarches all the above; without it, they will probably remain just notes buried in notebooks or files."*

Even the few remaining field workers who keep



Cover page of journal template in Publisher, highlighting a few of the most commonly used tools. You can customize the tool bars, removing items you never use.

journals do not typically make them available beyond a close network of friends and colleagues. What we need is some kind of *community journal.*

One name for a community journal is a blog. We'll get to that in a moment (*What would Raven blog?*)

Taking Greg's proposal more broadly, we could ask: "How might the people of Juneau (or any Southeast community) take advantage of new technologies to build a collective relationship with our natural home, growing it from that of deeply rooted cultures who shared such love and wisdom orally? How can we archive and protect this relationship, so that, instead of fading with time, it burns ever brighter?

The technology of communications is evolving so rapidly that even those most immersed in it cannot predict, say, what books will look like in 2050, or whether there will be books at all. In my last book project, one coauthor, growing more interested in audio than writing, submitted his contribution in the form of a CD for the inside-back-cover. Already, you have the option of creating a digital multimedia journal that links to voices of elders, or video of forest exploration. In the future, those linkages will become ever more seamless, so that we scarcely think of them as separate media.

Meantime, the wisdom of place-rooted cultures fades with each passing elder. The important thing is to start making the human connections now; technological connections are only tools. Remember Raven in the tree, watching that photographer. It's not the camera that counts; it's the places and people we see through the lens.

Journaling: the nuts & bolts

The most commonly available program for creating page layouts incorporating graphics is Publisher,[4] included in the Microsoft Office suite. We'll begin with Publisher. If you find that you enjoy layout, and want to do a lot of it, we recommend you check out more advanced programs such as InDesign.

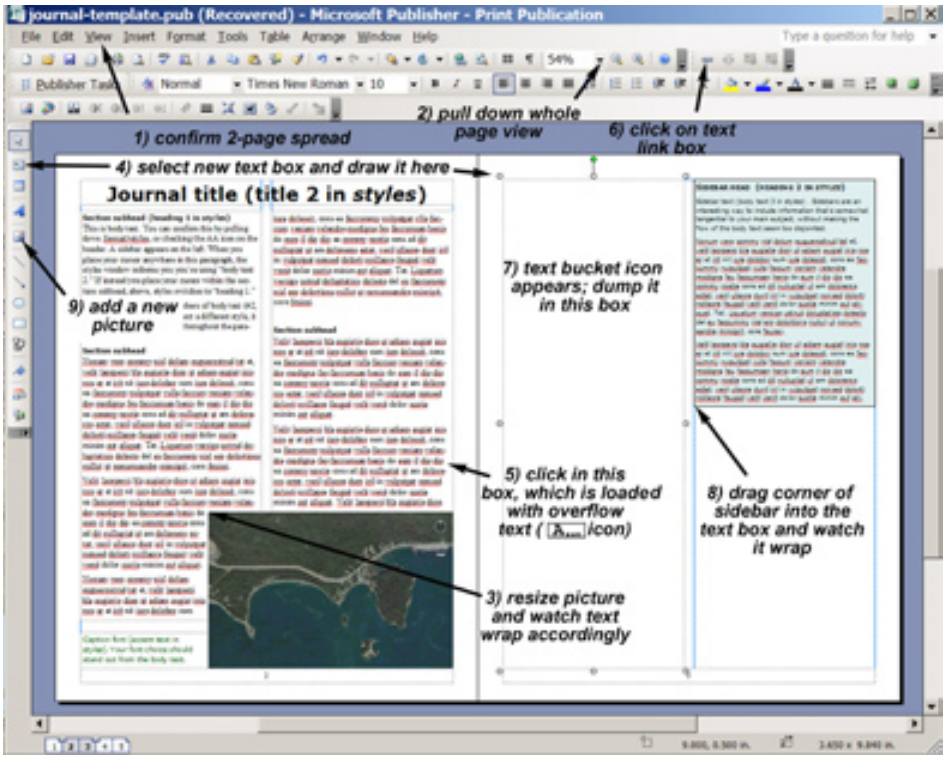
To get started, we've created a template, so that you can launch right into journaling by typing over our placeholder text and images. But first, let's look at a few of the features that distinguish Publisher (and other page layout programs) from basic text editors like Word. After you learn some of these layout skills, please feel free to change the look and style of the journal to suit your own tastes.

Open *journal-template.pub*. Rename it, preferably something including your name. The window above shows the journal's cover page. Unlike Word, the text in Publisher is confined to boxes. (Later, you'll be linking text boxes to make text flow between them.) Click in the upper box, and convert our placeholder text to a tentative title for your journal.

Before you remove your cursor from title text box, check the *AA* icon toward the left side of the header. This opens the *styles* sidebar. It's a good idea to get

4 Creating complex layouts in Word can be a hair-pulling experience. Text-wraps are clunky and pictures keep trying to jump to the next page. Although patient composers do create attractive, multi-page layouts in Word, or Powerpoint, it's like hammering nails with a wrench; these programs were never intended for such purposes.

Even Publisher has its limitations. Professional designers tend to use more powerful (and expensive) programs such as InDesign. Although the UAS computers run InDesign, it takes longer to learn, and if you do learn it, you may find it's not available at your school or on your home computer.



Pages 2 & 3 of journal template. Follow the instructions in the numbered sequence to learn more about how Publisher deals with text wrap, and flow between boxes.

in the habit of using styles when doing page layout. They give your journal a consistent, well-thought-out appearance, and save you from having to remember, for example, what font type and size you last used for a sidebar or subhead. In this case, the style is called title 2. Click on another style and watch the font change accordingly. If none of the title styles suit your taste, you can modify them (pulldown tab on right).

Change the placeholder image by right-clicking on it: *change picture>from file*. Navigate to your journal folder and pick a photo, map, or other graphic.

In the lower text box, drag through the placeholder text, and enter your name, email, date, etc

On the footer there are page icons. Click on the linked pages 2 and 3.

This template is set up in facing-pages mode. This is a handy feature, allowing the designer to envision the publication just as it will appear in printed form, with pages opened, improving layout symmetry. Once you've converted your journal to pdf, you can also view facing pages in Acrobat Reader. For example, check out the following sidebar with a sample Carstensen journal. In facing-pages mode you see the panorama across the entire spread.

Follow the numbered instructions sequentially through the above illustration:

1) Verify that you are in 2-page spread.

2) Choose whole page view (close the space-hogging sidebar on the left if it's still there)

3) Select the picture by the upper left corner and drag it larger across the text. If the text-wrap feature is working, the text should rearrange to flow around the picture box. (For this to work, the text box has to be "on top:" *arrange>text wrapping>square*.)

4) Click the text box tool. With the resulting cross-hair, draw a rectangle to fit the left column on page 3.

5) Click in column 2, page 2. An icon appears at the bottom, informing you that additional text is waiting to be linked to the box you just created. To load it . . .

6) Click on the chain icon on the header. When you hover over the waiting text box, a bucket icon appears.

7) Click, and the text will fill the box. There's still more waiting, as you can see by the overflow icon. Create a new text box beneath the blue-tinted sidebar, and link more text, in the manner you just learned.

8) The sidebar behaves the same as the picture; you can select it and drag the lower left corner into the text box you just created and filled. Text will wrap accordingly. If it doesn't, change the stacking order. With the sidebar box selected, pull down *arrange>order>bring to front*.

9) Finally, add a new picture to this page. Pull down *insert>picture>from file*, or click the picture frame icon as shown. Navigate to a folder where you have images. Select one, and it will appear randomly on the page. Resize it, and establish text flow if necessary with the *bring to front* command.

There's plenty more to learn about Publisher, but this should be enough to get you started. Check out the sample 2-page journal spread in the following sidebar. It may give you some ideas on layout.

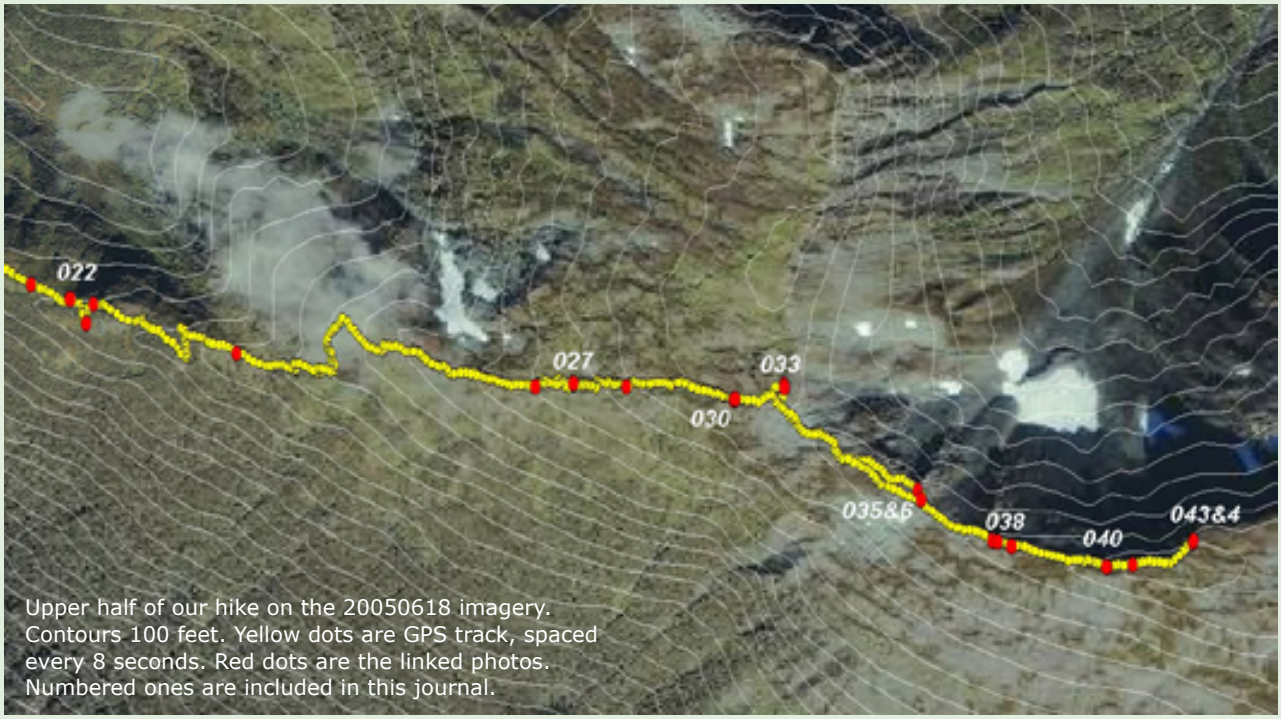
SAMPLE FROM CARSTENSEN JOURNAL, AUGUST 26, 2009

This exerpt shows a variety of map formats, panoramas, and photo annotations

033 Panorama from Gold Ridge. Coverage is shown with black arrows on the topo on facing page. This is about a 90 degree arc, from Olds Mountain at N20°E, to Gastineau Peak at E20°S. Note that you can't see Roberts Peak from this part of Gold Ridge: it's directly behind Gastineau. Bob Armstrong's book has a partial view of Roberts on page 47, that he apparently took by hiking a little farther north out Gold Ridge, until Roberts appears over Gastineau's left shoulder.

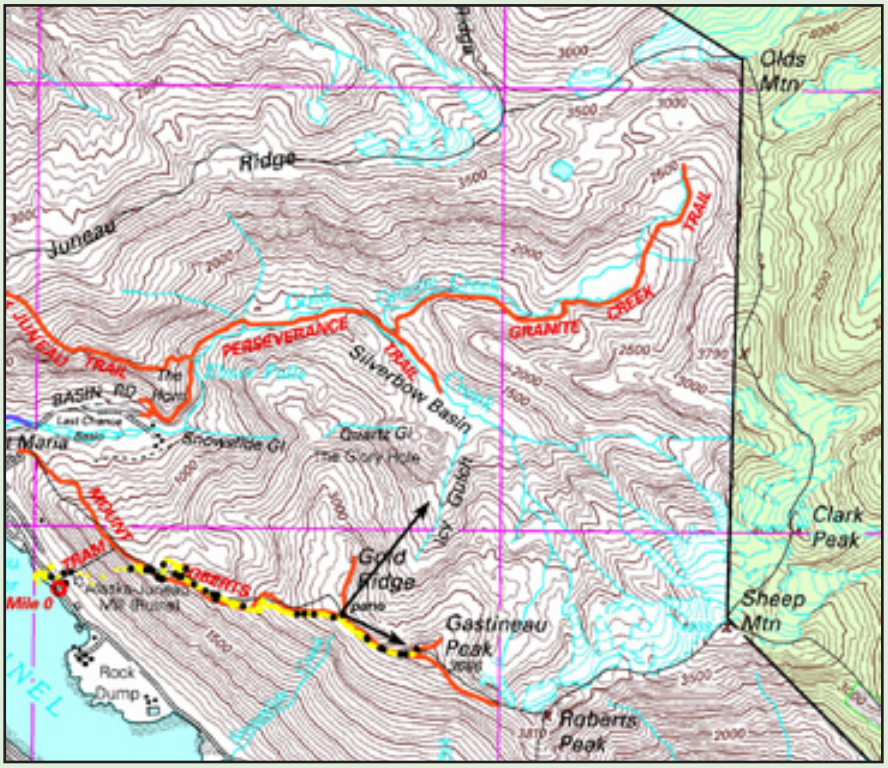
035 In the saddle between Gold Ridge and Gastineau, it gets quite a bit rockier, and there isn't enough soil for subalpine species. Here the classic, low-diversity Southeast heath tundra takes over: mostly *Cassiope* and *Phyllodoce*.

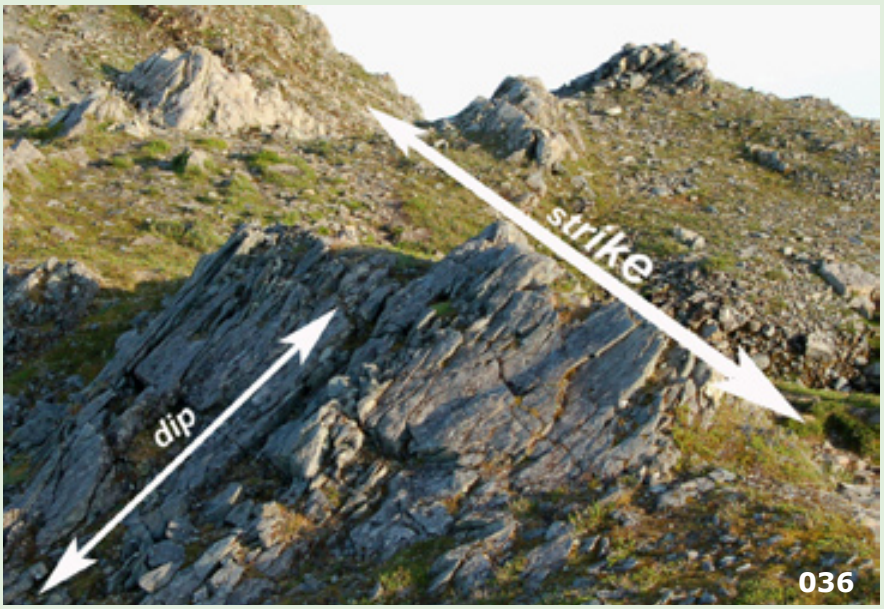
036 Triassic/Permian schist dips strongly



to the northeast, and strikes NW throughout the length of "Roberts Ridge." You can see this plainly even down around the cross area, and in occasional outcrops on the trail below the upper tram landing, but it becomes especially clear as you get to the alpine barrens, where almost no soil obscures the bedrock.

038 Approach to Gastineau summit, 3666 feet. Little vegetation left (north) of the ridge, where the winter cornice develops.





What would Raven blog?

Clay Good

Blogger introduction
If you're taking this course for credit, your assignment is to tell the story of a place and it's cultures in your own blog that you set-up specifically for this course.

You may already be a blogger and use another blog program or service. Feel free to use any other blog program or service you like. Otherwise, try blogger. It's quick! It's easy! And it's free!

Start by going to *www.blogger.com*. Follow the prompts to set up your own blog for this course. There you'll also find a helpful Quick Tour and Video Tutorial along with other useful features - just a click away.

Naming your blog
It can be a surprisingly difficult task to reduce the scope of ideas in this course to a few helpful words. Feel free to be creative and personalize, but please choose a title that somehow directly relates to this course and the purpose of your blog.

Choosing a design template
You will be prompted to select your basic template for your blog. You can change colors, add gadgets, and move elements around to suit your style. Take a little time to play with your blog design. Strive to make it unique, appealing and easy for others to use and read.

Linking your blog to the main course blog
After you save your blog, send an email to the course instructor at *explorealaskablog@gmail.com*.

Be sure to include the blog title and its URL. The URL is your blog's web address. It should look like this, but with your blog's name in it: *http://your blog-namehere.blogspot.com.*

The instructor will add your blog as a link in the Course Participants menu on the main page of the course blog.

A note on privacy
You are not required to use your real name or provide personal information on your blog. Here are some recommendations:

1. Only provide information you wish to make public.
2. You may choose to not display your personal profile when you set-up your blog.
3. You may choose to not include your email on your blog.
4. You may limit or exclude Readers' Comments under the Settings menu for your blog.

Bottom line: Treat your blog as a practical portfolio which you can use professionally.

A few words about better blogging. Among other things, blogging is writing. However, it's writing in a very public way. Unlike a personal journal or diary, blogs are open to the world and should reflect an awareness of a potentially much larger audience.

Sailing the C's to Better Blogging

Clear - Blog writing should be final draft quality. Consider doing your initial writing and editing offline, then copy and paste it into blogger when you're satisfied with its quality.

Concise - Good writing in general is spare, simple and direct. This is arguably even more true for online writing. Try to aim for 3-5 paragraphs per post.

Confidentiality - Carefully consider what kind personal information is appropriate to include in your blog. Blog profile settings offer a wide variety of features to help you best decide who and what others should know about a blog's author.

Comments - Consider how you want others to interact with your blog. From zero comments to an open forum, comments sections add richness as well as liabilities for bloggers. I recommend using moderated comments that are only displayed with your approval.

Jason Ohler's homepage is a good model for friendly, intuitive layout: *http://www.jasonohler.com*

Credible - Personal opinions can have considerable merit, especially when based on personal knowledge and experience. Otherwise, reason, research and resources should be employed to support personal views.

Creative - Blogs are an excellent medium for personal creativity. The themes you choose to feature, the kinds of other media you include, the writing style you employ and the layout and visual appeal you design are just some of the creative arenas for you to explore and master.

Contrast - Visual appeal and readability are enhanced by using contrasting fonts, colors and elements. Selecting the wrong font color may be all it takes to keep someone from reading otherwise brilliant writing.

Clean - Blogs can become cluttered with visually distracting images and features. Keep your blogs visually tidy. Besides looking better, they are more useful for others whom you'd like to visit your blog.

Credit - Good ideas and images deserve and/or require proper credit - even your own.

CRAP

These four design principles have been kicking around for several years. They are simple and easy to use for many tasks, from writing a resume to designing your own website or blog. I borrowed this version from the *DailyBlogTips.com*

The four basic principles
The following is a brief overview of the principles. Although these are discussed separately, keep in mind they are really interconnected, rarely will you apply only one principle.

1. Contrast
The idea behind contrast is to avoid elements on the page that are merely similar. If the elements (type, color, size, line thickness, shape, space, etc.) are not the same, then make them very different. Contrast is often the most important visual attraction on a page.
• *Can you see the difference between your content, ads, headings, body copy and comments?*

2. Repetition
Repeat visual elements of the design throughout the piece. You can repeat color, shape, texture, spatial relationships, line thicknesses, sizes, etc. This helps develop the organization and strengthens the unity.
• *Do you have a consistent theme or brand throughout your site? Do you reuse the same colour, shapes, blockquotes, formatting for all of your articles?*

3. Alignment
Nothing should be placed on the page arbitrarily. Every element should have some visual connection with another element on the page. This creates a clean, sophisticated, fresh took,
• *Does everything line up or have you got things centred, left aligned or out of place?*

4. Proximity
Items relating to each other should be grouped close together. When several items are in close proximity to each other, they become one visual unit rather than several separate units. This helps organize information and reduces clutter.
• *Can you find everything you need on your page easily? What is it that your visitors are looking for?*

Contrast, Repetition, Alignment, Proximity = CRAP

When you gather these four principles of design theory, the appropriate and memorable acronym is CRAP. Sorry about that.

How can you use these 4 design principles?

Look at your website's design and try to identify each singular principle. If you can't seem to identify a part, this is an area that you need to fix up. ie. If your page has no contrast, you must make contrast. If you need some inspiration check up on the many design galleries online.

Captions - Unless it is absolutely obvious, images should have some kind of caption to help make conceptual connections more clear.

Context - Images should relate obviously to the topic at hand.

Connected - Including excellent links and having others link to your blog makes it more powerful and more connected.

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APPENDICES WILL BE ADDED