Gwich’in Knowledge of Insects

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Nin Nihłinehch’ì’ – Łi’ hàh Guk’àndehtr’inahtìi
(Animals at Risk – animals we are watching closely)
2012-2017 Project

Dedication

This report is dedicated to the knowledgeable Gwich'in Elders, land-users, trappers, and hunters, both past and present, who contributed to this and other Department of Cultural Heritage (and previously, Gwich'in Social and Cultural Institute) and GRRB projects.

By sharing your knowledge about animals at risk, you are helping to keep this knowledge alive to benefit future generations.

Mahsi' Choo!

Front page photos:

Gynaephora groenlandica *Photo: Mike Beauregard CC by 2.0*
Workshop Photo: Kaytlin Cooper, GRRB
Arctic Yellowjacket wasp nest on cliff Dolichovespula albida*. Photo: Crystal Ernst*

Executive Summary

Insects are a very important part of the natural systems of the Gwich'in Settlement Region, and all across the north. With northern landscapes changing rapidly due to climate change, Gwich'in participants and scientists are worried about the health of insect populations, and the effects on the environment if insect populations do change dramatically. The Gwich'in Renewable Resources Board (GRRB) and the Department of Cultural Heritage (DCH) of the Gwich'in Tribal Council held a workshop and verification sessions to share Gwich'in and scientific knowledge about insects, and to build on the information already recorded in the DCH's digital archives. This report, funded by the GRRB and the NWT Species at Risk Stewardship Program, is based on the information shared in the workshop and gathered in previous projects, and will be used by the GRRB and their partners to make better decisions about managing Gwich'in wildlife in the future.

Workshop Photo: Kaytlin Cooper, GRRB

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Black Fly Larvae on rocks in a river. Photo: Crystal Ernst

Introduction and Methods

In November of 2016, the GRRB and DCH received funding from the GRRB and the Species at Risk Stewardship Program of the Government of the Northwest Territories in order to carry out a Gwich'in Knowledge of Insects workshop, as a part of the on-going Nin Nihłinehch'ì' – Łi' hàh Guk'àndehtr'inahtìi (Animals at Risk – animals we are watching closely) project. This project has also produced reports on Bluenose caribou, wolverine, grizzly bears, and Rat River dolly varden char.

A knowledge-sharing workshop was carried out in February of 2017. During the workshop, participants from each Gwich'in community were invited to share their experiences and knowledge of insects, and a scientist who studies insects gave a presentation and answered questions. The meeting was recorded on a Phillips Conference Recording System Model # LFH 0955 digital sound recorder and the recordings were later transcribed by eTranscription Solutions. Transcripts are stored at the GRRB and in the DCH's digital archives.

Information collected during previous Gwich'in Social and Cultural Institute (now Department of Cultural Heritage) projects was also included. The DCH's digital archives was searched using ISYS Search Software, using the search term: "insect or bug or beetle or fly or mosquito or bulldog". There were thousands of hits within the archives, although the majority were simply passing mentions or did not refer to insects (i.e. fly as in fly in an airplane).

The workshop participants were Jade English (Inuvik), Elizabeth Semple and Hailey Edwards (Aklavik), Richard Wilson and William Koe (Fort McPherson), and Angela Koe and John Norbert (Tsiigehtchic). Participants were selected by an invitation from GRRB to each community's Renewable Resource Council. A report verification session was also held with William Koe. The research team consisted of Kaytlin Cooper (species at risk biologist from the GRRB), Kristi Benson (heritage specialist from the DCH), and entomologist (bug scientist) Crystal Ernst.

Gwich'in knowledge of insects

Although insects are not as important as the plants, trees, and animals which have sustained the Gwich'in over thousands of years, there is still a large body of knowledge about insects as they are a part of the natural systems of the subarctic.

Red morph of Marsh Beetle, Elaphrus lapponicus. *Photo: Crystal Ernst*

> *We all believe in everything. We really respect owl too, wolf, crow… actually I think we respect all the animals, we really do, we respect them, even the little mouse. If it run in your house what you do is try and grab it and throw it back out instead of killing it you know. I'll tell you a little story. Years ago, my dad [was] sitting on the shore and here I see little …beetle was walking, "Oh beetle" I said, and stepped on it. And he told me, "now who is going to feed the family?" Oh, I felt so bad. You know maybe it was out trying to get something for… [Mabel laughs]… I felt so bad I cried. Anything, you know even spiders. You know if we had a little spider, [we] would never kill them or else it will rain… you take a spider [if] you see it and you take it gently and put it outside you know, don't kill it (Mabel English).*[1]

Insects are found everywhere

The following insects were reported by the workshop participants as being commonly seen in town, on the land, or at camps:

- Mosquitoes
- Beetles - wood boring
- Beetles - longhorns
- Flies – bulldogs/horseflies
- Flies - sandflies
- Flies - warbles
- Flies - black flies
- Daddy long legs - crane flies

[1] GRRB GEKP Mabel English Wolf interview 1996

- Dragonflies
- Bumblebees
- Butterflies and caterpillars
- Wood bugs
- 'Stink' bugs
- Leeches
- Spiders
- Grasshoppers, Crickets
- Ants - flying ants, crawling ants
- Fleas, especially on lynx and rabbits, and to a lesser degree fox
- Wasps, yellowjackets
- Worms
- Parasites on fish, both internal and external
- Parasites in caribou, in addition to nose bots and warbleflies
- Parasites in dogs

Arctic pseudoscorpion Wyochernes asiaticus *female with eggs*
Photo: Crystal Ernst

The workshop participants mentioned that carpet beetles are new bugs seen in the Gwich'in Settlement Region (the Gwich'in Settlement Region includes Gwich'in settlement lands in the NWT plus the Primary and Secondary Use Areas of the Yukon). They are also worried about both ticks and bed bugs, although those are not seen in the area yet. However, it is not easy to understand if insect populations are changing, because the perspective of one person is so small compared to the number of insects.[2]

Mosquitoes are prolific in the summers following a winter without much snow, which could be followed by a long summer. Of the 2016-2017 winter, the workshop participants indicated that "it would be a good [mosquito] year this year. There's not much snow. And then we might have a long summer. That's sort of what the elders are saying. So, there's no snow now, you know? We got two inches of snow maybe, maybe a little less. … so we're going to have a good, long summer."[3] Mosquitoes also do well in summers with lots of water. "Mosquitoes? It all kind of depends whether there's lots of rain, too, if it's damp. If there's lots of rain then all these little lakes and swamps are all filled up with water…ponds …that's their habitat, I guess you could say. And the willows, they like willows, too."[4] Typically, mosquitoes appear in spring around mid-May and are seen until late August, and are found pretty much everywhere. Mosquitoes come out right around the time when the muskrat season closes, "and that mosquito usually come out about the same time they quit for

[2] Jade English, Insect Workshop
[3] Participants, Insect Workshop
[4] Frank Blake, Gwich'in TK of Mackenzie Gas Project Area, 2004

rats."[5] Although mosquitoes are gone around the end of August, some insects hang around even later, and can be seen out on the water in September.[6]

Beetles can be found in the many hollow trees that are in the Mackenzie Delta.[7] Beetles are more often seen out on the land around forested areas, although they are not as commonly spotted as mosquitoes. They used to be seen more often in town when wood boardwalks were in use.[8] Beetles used to be seen on the untreated hydro poles in Aklavik, as well. The young boys would put them in jars and frighten young girls with them for fun.[9]

> *Bulldogs, in July, there's a lot of bulldogs when it's hot, but in June it's not so bad, and in August it's not so bad. But I don't really think there was a change in the amount of bulldogs. Like I haven't noticed any change in their population (Dan Andre).*[10]

Rush Darner Dragonfly Aeshna juncea. *Photo: Tony Hisgett, used with permission*

[5] GRRB GEKP Review session Muskrat Black Bear, Robert Alexie
[6] Participants, Insect Workshop
[7] William Koe, Insect Workshop
[8] Hailey Edwards, Insect Workshop
[9] William Koe, Insect Report Verification Session
[10] Dan Andre, Gwich'in TK of Mackenzie Gas Project Area, 2004

Dragonflies first appear in June, after the mosquitoes are out, "right when it gets hot… I notice when dragonflies come out too and it's kind of warm. They're always on the side of the houses [where it is] warm."[11] There may be some differences between when the large and small dragonflies appear, "I find that we see the bigger ones beginning of summer. And then the smaller ones come out like later, like maybe July and into the middle of August."[12] Dragonflies are found everywhere that mosquitoes and flies are found, as that is their food. "Wherever you go, they're going to be there."[13]

Insects are used as an indicator – when a certain bug first appears in the early summer, it was time to stop hunting for weasels, according to the elders. To keep the population of furbearers healthy for the future, "just leave it alone like we did. My great grandfather never bother. Once a little leaf come out in springtime, in June, a bug come out on [it]. [Then, it is time to] put all your guns away, because as soon as that little bug come out all the females are pregnant and you don't kill anymore."[14]

The populations of some insects are changing

"You guys, you know--years ago, we used to see a lot of beetles. You never see them anymore."[15]

Several workshop participants noted that there were many grasshoppers around in 2009, although since then, there are very few.[16] "Holy smokes. There was a lot of grasshoppers up here. It's unreal, just one summer, too."[17] The change in grasshopper populations some years may be affected by forest fires as well. "Remember, one year [2004?], they had a forest fire in the Yukon and all that smoke stayed in the settlements, and grasshoppers were all [over]? There's one time I went there and they were all over - on the roads, on the willows… it's because maybe that… smoke was too strong, so they moved closer."[18]

Grasshopper on the tundra. Photo: Crystal Ernst

[11] Elizabeth Semple, Insect Workshop
[12] Participants, Insect Workshop
[13] Participants, Insect Workshop
[14] GRRB GEKP Mabel English Weasel interview 1997
[15] William Koe, Insect Workshop
[16] William Koe, Elizabeth Semple, and Jade English, Insect Workshop
[17] Jade English, Insect Workshop
[18] Elizabeth Semple, Insect Workshop

Insect populations seem to be more variable year to year. Elders and land-users were reporting changes to insects very clearly in a 2004 TK study.

Removing specimens from a yellow pan trap on the tundra. Photo: Crystal Ernst

Mosquito? It wasn't very much the last few years too. Last, last year I know it, 2003, I know there's quite a bit of mosquitoes. But this year it was different and the years before that too. That's for mosquito. And this summer I find that hardly got any blue flies. That's the one [that produces?] maggots, huh? Us, sometimes our dryfish hanging outside, nothing bother it. So that's that. And we had, migration of , grasshopper. That's the first time I see that. Grasshopper all over. Up in the air, up in the willows, up in the house, on the side of the house, behind your back, behind your head. Grasshopper all over (Noel Andre).[19]

Mosquitoes are pretty well the same, although, we usually used to just get a black mosquito, and now we get one that's slightly yellow, or tan. It looks almost like a different kind of mosquito, because we hadn't seen those until about four years ago; three or four years ago we started seeing this new color of mosquito. And uh…I guess it just depends on the weather and when they hatch, about their population. Because I know that some years, at our camp, the…it doesn't seem to be as much mosquitoes, whereas other years there's a lot. But then again, every year, we cut willows and we cut the grass, so that could also count for them not being so much around…. Dragonflies, for me, it seems like they've dwindled; they've decreased a little bit, because we don't see as many as we used to. And because we'd always see lots around the camp, like going crazy eating mosquitoes and now it doesn't seem like there's as many. And it's the same thing for the birds, like I know the birds eat a lot of mosquitoes, so the mosquitoes seem to be, not multiplying, but it just seems like we're

[19] Noel Andre, Gwich'in TK of Mackenzie Gas Project Area, 2004

more aware that they're there…maybe there's not the birds; there's not enough birds to eat them (Dan Andre).[20]

The thing I noticed is you hardly see caterpillars. Remember they used to turn into these butterflies, but there was lots. Everywhere you went you'd see a caterpillar. Any kind of color. …everywhere you went, even here in town. Sometimes you go visit somebody and there's a squished one right in front of their door or something; somebody walked on it. Yes, so that's a thing that I noticed, you know, less of caterpillars. And hardly any butterflies. We used to go chasing butterflies, you know. They're all different colors, too, and you know, we didn't know that the caterpillar turned into a butterfly! (Agnes Andre) [21]

The summer of 2016 seemed to have several differences where insects are concerned: there were fewer mosquitoes than normal and some flies were smaller than normal, while others such as blackflies were larger. This may relate to changing seasons – there seems to be less ground moisture in recent years in particular.[22] The lack of ground moisture has led to a swamp in Aklavik drying up, which may have reduced mosquito numbers in the immediate area, "it used to be just full of grass and that. I noticed there's nothing. That's where all the mosquitoes go and just lay there and whatever. But, now, it's nothing."[23] Sandflies, however, seem to be getting bigger. "It may not seem like there's much, but they're getting large."[24]

Some insects do seem to cycle naturally as well. "Years ago when I was young, there was millions of black caterpillars, could see four or five on a willow. [The caterpillars] can just clean that bark off. [It was that way for] just one year. They killed young willows, [and ate] leaves, bark."[25]

As insects are affected by many things, including the seasons, the workshop participants noted that in the Gwich'in Settlement Region, seasons can vary dramatically year to year.

Like it could be cold all summer. It could be warm all summer…maybe most of our plants and stuff don't go too good …Because I noticed that our berries didn't grow for the past few two years that I've known. And, when we used to go to my mom's patch, in the back, we have to go like so far out to go to that berry patch. It used to be just covered with cranberries. Now, when you go back like for the past two years, it's nothing. But, what I see there is a lot of that [muskeg tea]. …It's just growing in with the berries. And I was telling somebody maybe those plants are killing the berry ground because I've never seen so many of that stuff. And then one area there is just

[20] Dan Andre, Gwich'in TK of Mackenzie Gas Project Area, 2004. Other participants also mentioned the low levels of dragonflies at that time.
[21] Agnes Andre, Gwich'in TK of Mackenzie Gas Project Area, 2004.
[22] Elizabeth Semple, Crystal Ernst, and William Koe, Insect Workshop
[23] Elizabeth Semple, Insect Workshop
[24] John Norbert, Insect Workshop
[25] Richard Ross, Gwich'in TK of Mackenzie Gas Project Area, 2004

full of blackberries. I've never seen so much blackberries in one area like this, just bundles just like… not like how cranberries used to grow like bundles. But, I couldn't believe it. And maybe because our ground is so dry, like it's no rain sometimes. Like certain times. So, nothing is still making the ground moist (Elizabeth Semple).[26]

There is a fear that the wood-boring beetles which eat, and kill, spruce trees might move into the Gwich'in Settlement Region as the climate warms.[27]

If insect populations are changing, that may have effects on many other animals, which was worrisome for the workshop participants. "Sometimes, birds and species are eating those bugs too, you know."[28]

> *So, we shouldn't be scared of our insects, you know. We need them around.*
>
> Elizabeth Semple, Insect Workshop

Insects are a benefit to people, animals, and the land

Many insects are beneficial. "Dragonflies, they eat the mosquitos, so they're good, you know?"[29] There are other insects that eat insects, and these are a benefit to people as well.

Insects such as bees and flies are important pollinators, which allow berries to form every year. Good berry years are important nutritionally and culturally for Gwich'in communities. There are ecological conditions known to be a factor in berry productivity, and poor berry years may be the result of a lack of moisture, too much moisture, or not enough sun.[30] Trees are larger in diameter than they used to be as well, which also prevents the sun from reaching the ground.[31] "This one year, we hardly had any sun and rain, and then everything was just dry and everything didn't go the way it supposed to go. And, sometimes, it'd rain so much, it's so cold, like one year, it was so cold. It just rained, rained, rained, no sun. So, right there, it was nothing."[32] Different seasonal conditions have varying effects on different types of berries. Berries are exceptionally important to other animals as well, "because I know bears eat a portion of berries before they hibernate."[33] In addition, as the flowers are feeding the insects too, changes in climate and pollution from development may be having a negative effect on flowers, insects, and other wildlife.

Insects also help to recycle dead wood and other natural waste like carcasses. "Ants are a critical animal that lives out on the land. Does lots of running around at my camp. They come out from dead

[26] Elizabeth Semple, Insect Workshop
[27] John Norbert, Insect Workshop
[28] Participants, Insect Workshop
[29] William Koe, Insect Workshop
[30] Elizabeth Semple, Insect Workshop
[31] William Koe, Insect Report Verification Session
[32] Elizabeth Semple, Insect Workshop
[33] Participants, Insect Workshop

trees, rotten logs, buildings. They will come out from anywhere. They have young ones without anyone knowing, and then they come out. Millions of them."[34]

Some people do eat warble fly larvae from caribou. "It's good just like chicken."[35] There are many animals, fish, and birds who eat insects to stay alive. For example black ducks are known to eat insects. "Yeah, on the lakes they raise their young, they eat good on the lakes, get fat. [They eat] those little bugs that swim around on the lakes. I know because every time we open …up the duck, we could see in the stomach it's all those little bugs in there."[36] Mallards, canvasback ducks, geese, brant geese, cranes, ring-necked duck, and swans eat bugs.[37] Geese have a varied diet:

> *Oh, they eat everything. They eat a lot of berries, lots of bugs, lots of flies, grass, they eat lots of gravel too... [the same as a] swan. Every geese like that, they eat gravel too, because you always find it in the gizzards, it's full of gravel in the gizzard. Just like ptarmigan…. Summertime I know they eat grass and bugs, any kind of bugs that are swimming in the water, and gravel (Gabe Andre).*[38]

Soldier Beetle (a pollinator) Dichelotarsus flavimanus *on willow. Photo: Crystal Ernst*

Flies on Mountain Avens Dryas octopetala*. Photo: Jörg Hempel, used with permission*

[34] William Koe, Insect Report Verification Session
[35] Elizabeth Semple, Insect Workshop
[36] GRRB GEKP Barney Natsie Black Duck interview 1997
[37] GRRB GEKP Gabe Andre Mallard interview 1997 and Swan interview 1996, John Kendo Mallard interview 1997, among many others
[38] GRRB GEKP Gabe Andre Geese interview 1997

Waterfowl are not the only birds to eat insects. Ptarmigan and grouse eat them, and are known to feed them to their young chicks. "They eat worms too. Bugs, that is what they feed the young ones after they hatch, they feed them something. Give them berries or bugs, worms something like that."[39]

Piping plover chick with crane fly. Photo: Chuck Holmer (www.focusonwildlife.me), used with permission.

The diet of many fish includes insects. Herring eat a variety of water bugs and the young ones (larvae) of flying insects. "You see they eat lots of flies, they must eat bugs inside the water too, worms. Just like if mosquitoes, or black flies, or sun flies they go on top the water, when they're young, and that is when there is lots of things eat them." [40] Herring and other fish will also jump out of the water to catch flying insects. "You see herring fish jump on the river? That is mosquitoes... [they] jump for that. In the mountains [there are] lots blue fish on the lake. At night time you see fish jumping up all over, they're eating mosquitoes. They eat bugs in the water." [41] Trout, crookedback, jackfish, and whitefish also eat bugs.[42]

Dolly varden char also consume a lot of insects:

> *Well, there is a lot of things [that char might eat] ...flies, bug, anything on the river. There is a lot of bugs live on the river too, they crawl around or they swim anywhere in the water too. They must live on that and beside that maybe...I see a fish they got [an*

[39] GRRB GEKP Gabe Andre Ptarmigan interview 1996
[40] GRRB GEKP Gabe Andre Herring interview 1996
[41] GRRB GEKP Thomas Mitchell Herring interview 1996
[42] GRRB GEKP Ruth Furlong Trout interview 1996, Alfred Semple Whitefish interview 1996, among many others

internal organ called] a pipe, I open it and [have seen] some little stone in them, like gravel, they eat that too. There is little sand or little rock or something like that and then they...there is a lot of things they have to eat, maybe something certain thing that grow on the river or lake or anywhere, they eat it something like...a lot of thing on the river just like...they must little certain thing they eat in there. But I know they live on not only bug, but they got something else to eat (Alfred Semple).[43]

If insect populations were to change, these animals may be affected. Many of the animals important to Gwich'in for food sources such as ducks and fish, or important economically such as furbearers, could be affected. And the animals who rely on fish for food would also be affected.[44] Even bears are known to knock down rotting trees to lick up the insects, like ants, who live in the tree. They use their tongues for this.[45]

The workshop participants knew of many animals, fish, and birds who eat insects as a part of their diet. The list is below:

- Jackfish
- Char
- Coney
- Salmon
- Loche
- Suckers (?)
- Trout
- Grayling
- Whitefish
- Walleye
- Otters
- Muskrat
- Marten?
- Weasels
- Mink
- Fox
- Bears
- Mice (i.e. shrews and voles)
- Lemmings
- Ground squirrels?
- Bats (not in GSR)
- Frogs
- Robins (and other small birds)
- Gulls
- Ducks, swans and other waterfowl
- Whiskey jacks
- Cranes
- Woodpeckers
- Eagles and owls (?)
- Snow birds (?)
- Swallows
- Snipes
- Crows/ravens

Photo: Kaytlin Cooper, GRRB

[43] GRRB GEKP Alfred Semple Char interview 1997
[44] Participant, Insect Workshop
[45] Elizabeth Semple, Insect Workshop

Insects can be a pest

Insects can be a pest to people and animals – from dogs to caribou to fish.

Warble flies, which really look like bees, are rarely seen by Gwich'in hunters due to their seasonal nature. By the time Gwich'in are hunting, the fly larvae have grown to their adult size, which they do over the winter, and left the caribou's hide in the spring.[46] In fact, caribou skins from the fall are the best for clothing as they do not have insect holes in them, "August, but it should be late August, so that there will not be any holes from bugs in the skins".[47] Sheep skins sometimes have holes from insects as well.[48] Mosquitoes can be a problem for caribou as well, "In the summer all they do is just fighting the mosquitoes. Whole shake...down the coast is danger with mosquitoes."[49]

Some furbearers have parasites like fleas in their furs, which can hop onto people if the furs are not handled properly, by leaving the fur outside or in a bag for a time, or using insect spray.[50] These insects are particularly bad on lynx and rabbits, perhaps due to the willows they live in.[51] They are also found on wolf skins. [52]

Orb-weaving spider with prey male Aculepeira carbonarioides. *Photo: Crystal Ernst*

> *You know this spring, I think it was in May, the windows are open and it was really quiet, maybe it was around 12 or 1 o'clock and there was no trucks passing and I heard…a fox and it yells too in the spring. [I asked my dad] "What does it say Dad?" and he says, "The bugs on them, the lice or whatever is bothering them." That is why they cry like that. And I went outside right away, and I listen out here and it's back here, it makes [this noise] close by (Catherine Mitchell).* [53]

> *Rabbit and lynx are bad to get lice. In spring time they really get lots on them. Lynx is worse. My dad and those they say, they just rub themselves on the tree... in the spring. They just rub themselves like this, they're so itchy they just rub themselves like that, and they just cry. They just make a noise, and cry, and that is when them bugs get really big on them. They just keep making more, move around in the bush where it's*

[46] Elizabeth Semple and Crystal Ernst, Insect Workshop
[47] Rose Cardinal, Gwichya Gwich'in Googwandak Review Session 2000, GSCI
[48] GRRB GEKP William Kunnizzi Sheep interview 1995
[49] GRRB GEKP Joan Nazon Caribou interview 1996
[50] Participant, Insect Workshop
[51] John Norbert, Insect Workshop
[52] GRRB GEKP Mary Kendi Wolf interview 1996
[53] GRRB GEKP Catherine Mitchell Bear interview 1996

brushy and scratch. Sometime it make that tree, just... take all the branches off (Mary Kendi). [54]

Waterfowl may also have external parasites, which need to be cleaned before the down is used. "Any kind of ducks you kill my mom use to take the feathers and hang it out you know, tie it to a tree so whatever kind of bugs or something in it, it will die ah. Then she check it really good the whole thing and then she make a real good blanket, nice down blanket or pillows."[55]

Horseflies or bulldogs are biting flies that are prevalent in the late summer when people are out at their camps and doing traditional activities such as making dryfish.[56] Longhorn beetles are also pests, and they can really bite. "[Beetles.] Black one, bad to bite too, you know? Oh, bad to bite. One time [refers to a bite?] I really swell up. Right where it bite? Big, long whiskers right here."[57] Bees can also deliver a painful sting. "Bees, they sting you. So, we don't want to see bees."[58] There was some joking about bees in the workshop, too. "And, as soon as they see bumble bee, they're running down the road."[59]

Mosquitoes are generally considered to be the biggest insect pest. They'll pester and bite people, especially around the water's edge.[60] Before insect repellant or "bug dope" was used, people used to make fires to smudge mosquitoes and flies away.[61] The wind is also useful at keeping mosquitoes down.[62] Biting insects are a problem for animals, too. Moose have a strategy: "they have to run to river to get away from bugs and to go drink water." [63]

Legends and Place Names

There are quite a few Gwich'in stories and legends where insects are mentioned. For example, in several versions of a particular crow legend, the crow's head is full of insects and must be carefully cleaned out. In another legend, the crow uses the cleaning of insects from his feathers as a pretext to keep someone busy as he gets up to mischief. There are also many references to mosquitoes and other bugs in various legends – in some cases, people could even turn into insects. However, most references to insects in legends are simply passing references.

This legend, which includes a bowl full of insects, was told by Gwichya Gwich'in elder Hyacinthe Andre.[64]

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[54] GRRB GEKP Mary Kendi Black Bear interview 1996
[55] GRRB GEKP Mabel English Swan interview 1996
[56] Elizabeth Semple, Insect Workshop
[57] Bob Norman, Gwich'in TK of Mackenzie Gas Project Area, 2004
[58] William Koe, Insect Workshop
[59] Hailey Edwards, Insect Workshop
[60] 1992 Gwichya Gwichin Place Names Tape 14 Gabe Andre
[61] 1994 Gwichya Gwichin Place Names Tape 9 Gabe Andre
[62] 1994 Gwichya Gwichin Place Names Tape 18 Annie and Nap Norbert
[63] GRRB GEKP Gabe Andre Moose interview 1996
[64] Tape 15: Hyacinthe Andre, March 25, 1999 – Gwich'in Social and Cultural Institute Googwandak Transcripts

Those Ts'iidęįį [stone age or legendary] people, some of them are good people and others are bad and they don't care. There is one blind man, Ndeh Ehdaii and he has a lot of children. But he is blind and he also has a wife. People didn't know what this man lived on.

In the fall, as he had a lot of children, I guess the children are always noisy and a moose is curious of the noise and walks towards the camp. But the children have already spotted the moose. The man is blind, what is he going to do? They are quiet as the moose is closer. Maybe he is talking softly to his children, "my children, I will try, give me my bow and arrows." They gave him his bow and arrows. He walks towards the moose, he must of have gotten close, he puts an arrow on the bow. He must have had it this close. The moose is coming closer, this is on a large area. It was either one of his children or his wife standing right behind him, guiding and aiming the arrow, the man is good, the aim is good now so they tell him, "alright" with this he lets go of the arrow. The arrow goes right into the ribs of the moose.

The man hears the arrow hit something and it didn't hit wood, it sounded like the arrow had gone into flesh. [However, his wife ends up saying] "Ah, your arrow didn't hit anything, what are you saying..." That woman is going to work evil that's why she is saying this. She makes a campfire in a different place with her children. The man is blind. It is fall time and the moose is in good condition, it is very fat. That is what the man killed.

So she makes another camp and this is where they took all the meat. He hears the sounds of the children and that's the directions he crawls. When he arrived, the children are saying, "our father is coming" he asks one of his children for water. "Give me water, I am thirsty for water." The child picks up a birch bark container and starts to run towards the water. "me, me, me," whispers the wife, " I will go get water for him." She is gone for a while and returns and hands him a bowl full of bugs from the bottom of the lake, there is no water in it. He flings the container aside.

After a while, he hears a loon close by on a lake, he goes towards it, crawling along like this. Finally he reaches a lake, there's water right in front of him, he stays there, just below him he hear some noises. "I am blind and there is no one with me, who is it?" he asks. It is the loon, the loon is below him, again he tells loon, "I am Blind." The loon tells him, "well, climb on my back." So the man climbs on the back of the loon and the loon dove into the lake, the loon comes up aways out on the lake, "How is your eyes now?" the loon asks the man. "I can see a little bit, but it is still foggy for me." The man says. "Again, I'll dive with you again." So again the loon comes up, he asks him "Alright?" "Now, I can see better, a little better." Again, again the loon dives and comes up. The man's eyes are clear now, his eyes are good.

Now again he went to his children, he did as before, he crawled in and again they are saying, "our father is coming." "I am very thirsty for water." He tells them, one child

picks up a birch bark container, but the mother takes it and that no good woman went to get him water. She took a long time and finally returns, hands him the container filled with bugs and small worms. [Well,] the man could see good now, but he did not let them know. He looks into the container, it is filled with worms. The woman is standing near him, facing him, he spilled the worms all over her. "What did I do to you that you are doing this to me." Right there he killed his wife and children and walked away from the meat. This is what they say. This is the only story I heard of this man.

Dąįį Dhakhąįį Chì'

There are several traditional Gwich'in place names which refer to insects, including Dąįį Dhakhąįį Chì'. This name, which translates as *Bluefly killer-his hill*, refers to a part of Big Rock.

This place name refers to a hill along Gull Creek. It was named after a man called Dąįį Dhakhąįį (Bluefly Killer). Hyacinthe Andre and Gabe Andre recounted a story that happened here even before ts'iidęįį days, perhaps thousands of years ago. In the story, Dąįį Dhakhąįį goes into a hidden passage into a hill, where he finds a buffalo or muskox cow. Past the cow he finds a person, who questions him and then lets him by. He then comes across a group of people who gave him some gifts, and he spent a lot of time with them. They had quite the set-up in this cave, with various rooms and enough to eat. There were two doors out, but only one led to the same place the man had come in from. He went back out the door he came in, and took the items he had been given as proof he had seen the people living underground.[65]

Maps on the following pages show the location of Dąįį Dhakhąįį Chì', Bug Hunter Lake, and Ts'oh Vàn.

[65] Gwich'in Place Names Atlas, http://atlas.gwichin.ca. Hyacinthe Andre & Gabe Andre, Campbell Lake Oral History, Tape #3a, 3b, 1993; Gwichya Gwich'in Place Names in the Mackenzie Delta, Gwich'in Settlement Area, N.W.T., 1994.

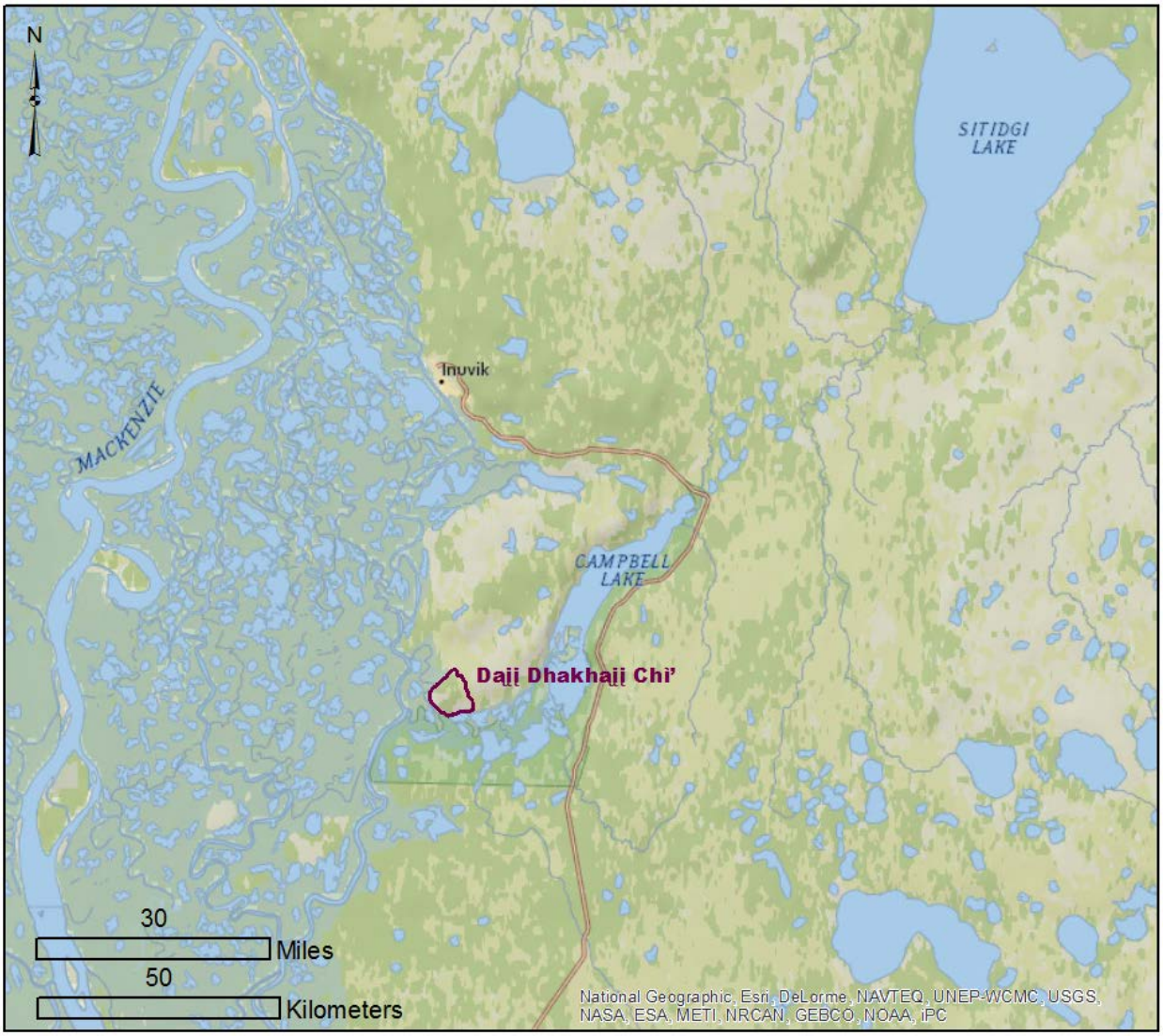

FIGURE 1. DAĮĮ DHAKHAĮĮ CHÌ.

Bug Hunter Lake or Gwatł'ak Van

Bug Hunter Lake is a place name that refers to a lake near Red Mountain. In 2012, Gwich'in Elders decided that Bug Hunter Lake should be the official name of the lake, and Gwatł'ak Van should be the alternative name.

> *The lake was named after a government insect scientist who stayed here to study bugs for a season or two. Dolly McLeod recalled, "His cabin is on the north side of the lake." Julia Edwards said, "The hill on the far side used to be good for berries. Now the lake has all dried up and you can walk across it." Mary Kendi later confirmed that the lake is all dried up now and covered with willows. Mary Kendi remembered Bug Hunter, "Maybe that boat is about that wide . . . and it's got engine in it. And it's just like*

staying in a house ... I went in the bush, I stayed there with my kids for a while, trying to look around for berries and we set rabbit snare too. It's nice ground, you could see your rabbit trails. ... All at once we run into that boat! Big boat with cows on it! ... just like [a] schooner ... And, I just look at it. [Back in town] I ask them, 'You know, you seen that boat down there in the bush, real big boat and everything inside? Just like in a house [with] table and everything there.' And they said, 'That's Bug Hunter's boat!'" (Gwich'in Place Names Atlas)[66]

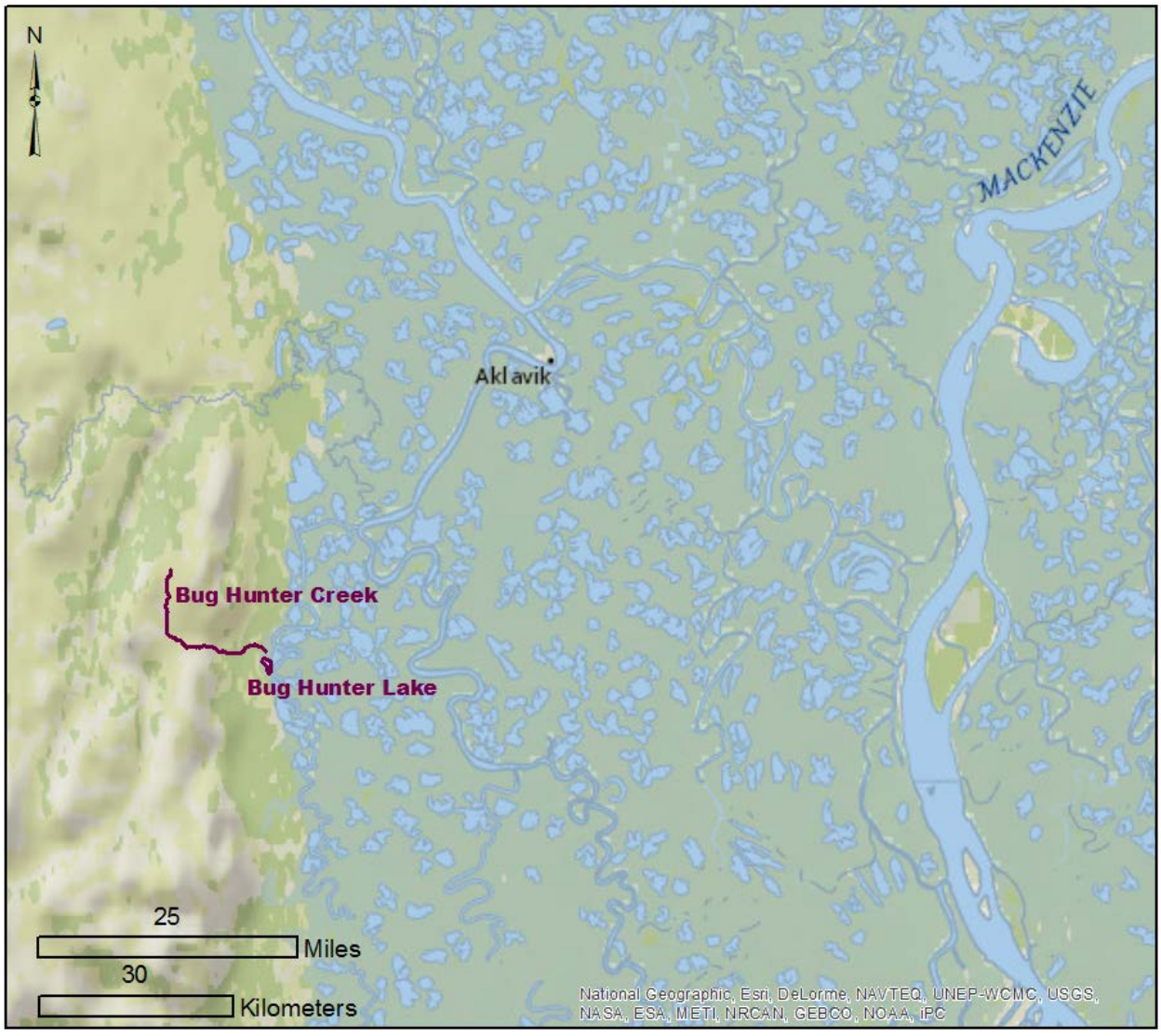

FIGURE 2. BUG HUNTER CREEK AND BUG HUNTER LAKE.

[66] Gwich'in Place Names Atlas, http://atlas.gwichin.ca. Dolly McLeod, EGPN Project 1999, January 28, 1999; Julia Edwards, EGPN Project 1999, January 27, 1999; EGPN Elders Workshop, March 29, 1999; Aklavik Heritage Conservation Zones project, April 12, 2007

Ts'oh Vàn

Ts'oh Vàn (translation: Bluefly eggs-its' lake) is a place name which refers to a lake that the community of Tsiigehtchic uses for its drinking water.

FIGURE 3. TS'OH VÀN.

Insects of Arctic Canada: a scientist's view

Ecosystems are changing in the Canadian Arctic. Researchers and communities tend to focus on how these changes might affect caribou, polar bears, and other large and impressive animals. However, there is another group of creatures – the most abundant and diverse group of living things found above the treeline – that is also being affected by change: insects. Insects are small, cold-blooded (ectothermic) animals with six legs, a hard outer shell (exoskeleton) instead of bones, and usually one or two pairs of wings. They include many familiar critters: mosquitoes, butterflies, dragonflies, wasps, bumblebees, grasshoppers, and beetles. Scientists have identified about 1,500 different species of insects from Arctic Canada so far, but the actual number is probably closer to 3,000: many species remain to be discovered and described.

Insects perform many critical ecological "jobs" in the north, such as feeding birds and fish, pollinating berry plants, recycling waste, and being pests of humans and other animals. Their presence is essential to the overall health and functioning of Arctic ecosystems. However, changing climate patterns, shifting treelines, pollution, and other human activities, might affect the life history, distribution, and diversity of these important animals.

Northern Carrion Beetle Thanatophilus lapponicus *on caribou hide.*
Photo: Crystal Ernst

Coping with cold

People who have never visited Arctic Canada are often surprised to learn that small, featherless, furless insects are abundant and thriving in the coldest regions of the country. Arctic insects have developed an impressive range of adaptations to cope with the cold, the high winds, and the short summer seasons.

Unlike mammals and birds, which can make their own body heat, insects must keep warm using other means. During the summer months, many insects bask in the warmth of the sun to increase their body temperatures, and will seek out south-facing slopes and other sun-lit areas to maximize

their exposure. Some cup-shaped flowers like poppies or dryas concentrate the sun's rays at the centre of the "cup": flies will commonly perch in this extra-warm spot after they have enjoyed a meal of nectar. Many northern insects are dark brown or black in colour. Melanism (the presence of dark-coloured pigments) improves the absorption of solar heat, much in the way a black shirt feels warmer more quickly in the sun than a white one. Insects will also limit their activities to the sunniest and warmest times of the day. Similarly, flying insects like butterflies can avoid wasting energy or being blown away by strong, unobstructed Arctic winds by being active when the wind is low, and dropping to the relative safety of low-lying vegetation when it gusts. Other insects, including many beetles and even some flies, avoid the wind entirely by being crawling animals. Over time, they evolved small, non-functional wings, or lost them altogether, and live exclusively on the surface of the ground.

The long, sunless winter months are extremely cold. Unlike birds that migrate south to avoid the cold, most Arctic insects stay put and overwinter in an inactive state called diapause, which can be thought of like hibernation. As the summer winds down, insects will move to sheltered places that offer some insulation: under dead leaves, in an empty vole burrow, or under a rock. As temperatures get colder, some insects begin to make and store chemicals like lactate and glycols in their bodies. These chemicals act as antifreezes (just like the antifreeze in your car), preventing the tissues from forming ice. Other insects tolerate freezing by chemically controlling where ice crystals can form: fluids between cells are allowed to freeze solid, but the cells themselves - and their important biological machinery - are protected from freezing. Using these strategies, insects can survive many years of freeze-thaw cycles, which allows them to gradually grow and mature over a series of short summers. Some Arctic insects actually require periods of cold in order to complete their life cycles.

How are environmental changes affecting northern insects?

Climate change can affect soil, plants, water, and other aspects of insects' habitats and food sources. For example, as annual temperatures increase further and further north, regions that once lacked appropriate habitat are becoming more suitable for some insects that have historically been restricted to southern parts of Canada. These insects can benefit from previously off-limits northern food, habitats, and hosts, allowing them to spread to new areas and grow larger populations. Many biting and parasitic flies (e.g., black flies and warble flies), for example, are responding to warmer temperatures by spreading further north, waking up from diapause earlier in the spring, finding more food, and having more offspring. This has been problematic for some caribou herds, and ground-nesting birds like snowy owls, which are not used to dealing with such high numbers of pests at certain times of the year.

Caribou Warble Fly Hypoderma tarandi*. Photo: Crystal Ernst*

On the other hand, true Arctic specialists whose life cycles depend on cold temperatures are losing suitable habitat as the southern limits of their natural ranges get too warm. Over time, these insects may lose their habitat entirely – there are several bumblebee species for which this has become a real concern. They could also be pushed out by new, more competitive species arriving from the south, causing them to disappear altogether. Similarly, many insects use temperature cues to determine the "correct" time to emerge from diapause and start looking for food and mates in the spring. As springtime and warm days begin to arrive earlier each year, some insects may emerge from diapause sooner than usual, only to find that the flowers they rely on for nectar are not yet in bloom. The insects lose the energy source they need to move around, grow, and produce eggs, and the plants miss their opportunity to be pollinated, which they need to produce fruit and seeds. Breeding birds and fish that eat insects might have similar struggles if their prey emerge too early, mature too quickly, or disappear from traditional feeding grounds. A migratory bird has no way of knowing that its previously-reliable food source might not be available when they arrive in the north. This could have potentially disastrous outcomes for the health and survival of migratory bird nestlings.

It is, of course, also true that some insects are more flexible, and can use different types of habitats, eat different foods, and tolerate a wide range of temperatures. These insects will probably find new ways to survive and thrive despite the changes, and will experience few positive or negative effects. It is difficult to predict how each insect species will be affected by climate change. In any case, it is safe to say that the Arctic insect communities of the present will not be the same as those of the future. And, as insect communities change, there will be direct impacts on the plants and animals that rely on them for food, pollination, recycling, and other ecological services.

Learning from people who live with Arctic insects

Traditionally, most research on Arctic insects has focused on identifying species, and figuring out where they live. This information is important, but without a better understanding of their life cycles, seasonal patterns of emergence and activity, behaviour, and interactions with other animals and plants (i.e., their natural history), it is difficult to predict how Arctic insects might respond to environmental change, or how those responses might affect the ecosystem. It can be very challenging to conduct formal scientific studies of insects in Arctic regions (i.e., because of logistics and costs), but there is tremendous knowledge to be gained from the people who live beside them year-round in northern communities. Peoples' observations – past and present – of insects seen out on the land (for example, while hunting, picking berries, or fishing), or of insects seen in and around town, can provide extremely valuable and timely data. This information would help improve our ability to predict, and plan for, the changes that will shape future Arctic insect communities and Arctic ecosystems.

Planning for the future

The workshop participants were clear – insects are an important part of the Gwich'in landscape. Young people should learn more about them in school or during on-the-land programs, and Elders should be interviewed to record their knowledge.

Workshop participants agreed that the GRRB and DCH should promote, through their social media accounts and during other meetings and workshops, the use of online insect identification services (NWT Species on Facebook, and BugGuide.net). These services allow for information to be stored about what types of bugs people in the Gwich'in Settlement Region are seeing. There has not been much in the way of scientific research on insects in the area.

> *I think kids are really knowledgeable in these things… because …they always wonder. And they see all these little insects. But, they don't know what it is. And I think if you guys go to the school or something and talk to them about it. Bring the bugs and like dissect them and show them the inside.*
>
> Elizabeth Semple, Insect Workshop

In addition, the GRRB and DCH should promote the use of social media like Facebook for sharing pictures and information about insects, as that is a viable way of reaching young people. The GRRB will work with insect scientists to include insects in existing wildlife programs, as well. Where possible, information gathering and sharing projects in the future should include a partnership with the Inuvialuit, as there are many shared species and concerns.

Personally, I don't think people have been keeping an eye on insects. Because they just don't like it and they don't think it's important to the environment. But, now that I came to this [workshop], it seems pretty important. And I think that what a lot of people should know when they're out on the land (Angela Koe). [67]

Crystal Ernst servicing a Malaise trap. Photo: Angulalik Pedersen, used with permission

[67] Angela Koe, Insect Workshop