

Insects of the Chilkat Valley

American Bald Eagle Foundation

Prepared by: Scott Clem
Summer 2011 Intern

Reviewed by: Dr. Dan Hart
American Bald Eagle Foundation
P.O. Box 049
Haines, AK 99827
July 1, 2011

Introduction

First off, I would just like to say that it is virtually impossible to cover all of the insects in the Chilkat Valley. Their numbers are far too great and far too diverse to be summarized into just a few pages of information. Not to mention that there are several who have not even been discovered yet! That being said, this is a brief synopsis on several of the different kinds of insects that one may encounter here in the Chilkat Valley.

Contents

Pg 3-5: What is an Insect?

Pg 5-7: Butterflies and Moths

Pg 8-11: True Flies

Pg 12-14: Bees

Pg 15: Ants

Pg 16-17: Beetles

Pg 18: Dragonflies and Damselflies

Pg 19: Plant Bugs

Pg 20: Caddisflies

Pg 21: Mayflies

Pg 22: References

What is an Insect?

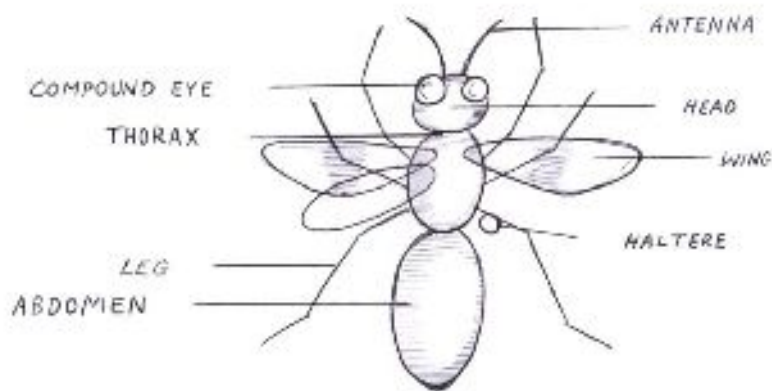
Let's start with the basics. What is an insect? Many people believe that insects are anything and everything that creeps and crawls on the ground. This is not true because there are many things that creep and crawl that are not insects. To start with, insects are in a very broad group of creatures called arthropods. Arthropods are invertebrate animals with jointed appendages, segmented bodies, and outer exoskeletons. Examples of arthropods include crabs, spiders, scorpions, centipedes, millipedes, and of course insects!



None of the creatures pictured in these photos are insects but they are arthropods. The one on the top left is a spider which can be identified by its two body segments and four pairs of legs. The one on the right is a millipede which can be identified by the fact that there are two pairs of legs on each segment. The one on the bottom left is a daddy long leg which contrary to popular belief is not a spider or an insect and is not poisonous. It is called an Opilione and it has one body segment unlike spiders. The one pictured in the bottom right is a king crab and it is a crustacean. (photos by Scott Clem)

There are specific characteristics that separate insects from other arthropods. For instance, all insects have six legs at some point in their life time. They have three jointed legs on each side on their body. All insects also have three body segments. A spider, by contrast, only has two

body segments. These three segments are called the head, thorax, and abdomen. Another defining characteristic of insects is that they all have ectognathous mouthparts; this means the mouthparts are not retracted into the head. Almost all insects will also have wings at some point in their life; many times the wings will be retracted and not visible but they are present. Compound eyes and antennae are also present on all insects. Compound eyes are different than those of humans in that they have thousands of lenses for each eye while humans only have one lens in each eye.



This is a diagram of a typical insect. (drawing by Don Scheffler)

Insects are known as the smaller majority. The reason for this is that insects, while being very small in size, far outnumber all other creatures. There are about 900,000 described species of insects which is approximately 85% of all known animals. That means there are more species of insects than there are all other animals combined! Experts believe we have not even described half of the insects on this planet! So the next time you see an insect, give it some credit!

Butterflies and Moths

There are not many butterflies found in the Chilkat Valley; in fact, there are not many found in southeast Alaska. There are actually more butterflies in the northern interior of Alaska than there are in southeastern Alaska. This is also true with many other insects. The reason for this is that even though it is much colder during the winter, summer in the northern interior is very hot. This allows butterflies and other insects to thrive. In southeast Alaska, the summers are often muggy and damp. The butterflies and other insects that do exist in southeast Alaska are adapted to survive colder climates with fewer days of warmth. They use a method in which they replace their blood with a natural “antifreeze” chemical called glycerol. This keeps their body cells from rupturing when the freezing point is reached. They will lower their body temperature below freezing without freezing their body fluids. Their temperature will continue to decrease until it reaches a supercooling point at which the insect will die. In addition to having glycerol, many insects will also use water or snow as insulation so they will not reach this supercooling point. Depending on the insect, various life stages will be the ones that survive the winter. Butterflies can overwinter in any of the stages depending on the species and the location; they will survive using snow as an insulator.

There are only about five known species of butterflies found in southeastern Alaska. These five species are the painted lady, the red admiral, the tiger swallowtail, the mourning cloak, and the mustard white. The mustard white is very common while the rest are either migrants or only appear during perfect weather. There could quite easily be more.



Mustard White Butterfly (photos by Scott Clem)



Painted Lady Butterfly (photo by Scott Clem)

Life Cycle

Butterflies have a complex, four-stage life-cycle. They start out as eggs hidden under a leaf or in another secretive location. The eggs will hatch to form butterfly larvae commonly referred to as caterpillars. The time of year in which the eggs are laid will determine when the eggs will hatch. For example, if eggs are laid in July, the eggs will hatch within a few weeks. If the eggs are laid in September or October the eggs will hatch in the next season when there are green plants to eat. Caterpillars will begin eating plant matter as soon as they are born and will continue until they have grown large enough to go into a third stage. This third stage is called the pupal stage or resting stage. The caterpillar will dangle itself from a branch of a bush or a tree and form into a chrysalis. At this stage, the insect is completely dormant and immobile and neither eats nor drinks. After staying in this stage for several weeks or months, the full grown adult butterfly will emerge from the chrysalis. Depending on the species, the adults will feed on nectar and pollinate several different flowers. Their main objective, however, is to mate and produce eggs that will start the cycle all over again.

Moths

Moths are also fairly uncommon in the Chilkat Valley; however, there are a few. Moths are much like butterflies except for a few physical differences. The best way to tell the difference is by looking at the antennae. Most moths will have plumose antennae that look almost like feather dusters while butterflies will generally have a hooked formation at the end of their antennae. It is also common for moths to rest with their wings open while butterflies usually rest with their wings folded. Butterflies are also usually much more brilliantly colored than moths. Moths will form a silk coating called a cocoon around their chrysalis during their pupal stage of development while butterflies will not. In general, most moths are more active during the night and most butterflies are more active during the day. These are the general rules that

separate moths and butterflies; however, just like all rules, there are rule breakers. There are many moths and butterflies that will overlap in characteristics. Some moths look and act like butterflies and some butterflies look and act like moths.

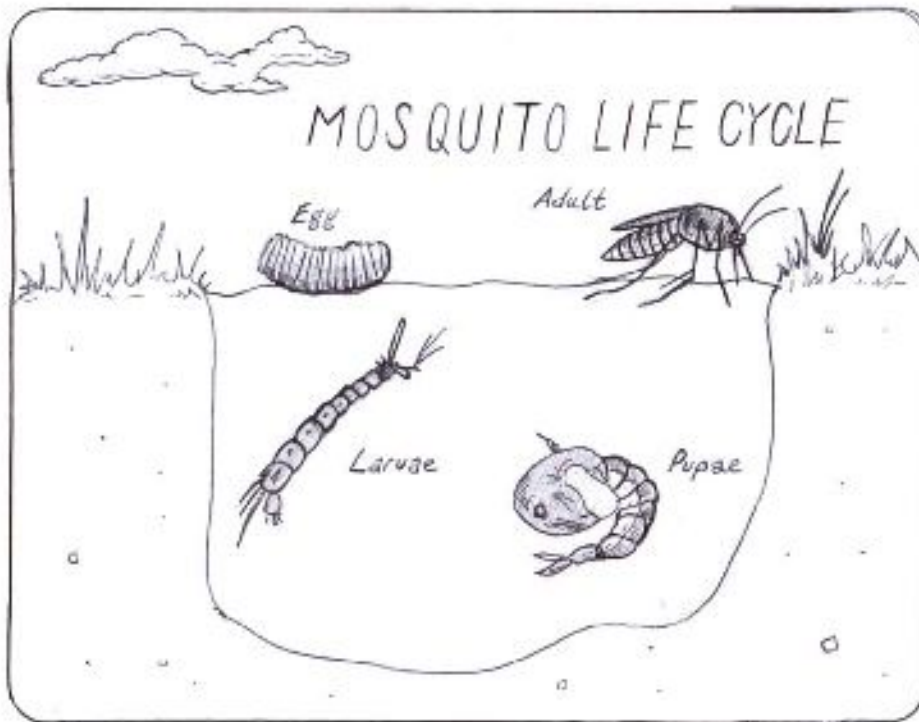


This is a sphinx moth. (photo by Scott Clem)

This is a type of moth that was found in the Chilkat Valley. It is called a Cerisy's sphinx moth. There are many different types of sphinx moths and some are unique in that they hover like a humming bird when they are sucking nectar from a flower. This moth is an example of a rule breaker because it can be active during the daytime.

True Flies

One thing the Chilkat Valley and southeast Alaska is notorious for is flies, especially ones that bite. Flies found here include deer flies, horse flies, black flies, crane flies, hover flies, no-see-ums, blow flies, house flies, and who could forget the mosquitoes. While all of these flies are different, they are all similar enough to be included under the single insect order Diptera. Flies are able to thrive in southeast Alaska because many of them depend on moist habitat. The Chilkat Valley is a temperate rainforest which means there is a lot of moisture. Many fly larvae are completely aquatic and are alive, awake, and thriving even during the harsh winters of southeast Alaska. They are able to take advantage of the insulating properties of water and, like the butterflies, use the glycerol chemical that acts as antifreeze. Their lifecycle begins as an egg. The eggs are laid in or near water where they hatch into little swimming larvae. These larvae feed on tiny pieces of organic matter in the water. The larvae then form into pupae called tumblers which attach to the water surface in order to have an air source. After a short period of time, the pupae will break open and the adult fly will emerge. This entire process can take as little as two days to complete! Other flies such as house flies and blow flies have a more terrestrial life cycle in which they lay eggs on some form of decaying matter. The eggs will quickly hatch into maggots which will then feed on the matter in which they were laid. After a series of molts, the larvae will burrow into the ground, form into pupae, and then emerge as adults about a week later.



This is a drawing of the mosquito life cycle which is very similar to most other flies that develop in water. (drawing by Don Scheffler)



This is a crane fly or “mosquito killer.” Contrary to popular belief, it does not hunt mosquitoes and it does not bite humans. (photo by Scott Clem)



This is a blow fly, also known as a bottle fly. Most blow flies are known for their metallic blue, green, or black coloration. (photo by Scott Clem)



This is a hover fly. Hover flies share many characteristics with bees in that they hover next to flowers and extract nectar. One easy way to tell the difference is that they have what is called a spurious vein in their wings. (photo by Scott Clem)



This is a house fly. House flies are among the most numerous and annoying flies around. They are pests to many people because they find human food very delectable! (photo by Scott Clem)

The Mosquito

In order to emphasize the seriousness of Alaska's mosquitoes, some people have described them as being the true state bird of Alaska! While not quite bird size and obviously not birds, some of the mosquitoes of Alaska are fairly large. There are many different species, and different ones will appear at different times during the summer. The reason for this is that different species overwinter at different stages in their life; some overwinter as adults while others overwinter as larvae, pupae, or eggs. The large, slow-moving mosquitoes called snow mosquitoes that appear first will have overwintered as adults. Most other mosquitoes will emerge depending on when the temperature of the water gets warm enough. These are smaller, more agile, and much harder to swat.



This is a species of mosquito found in the Chilkat Valley. (photo by Scott Clem)

As most know, the mosquito is notorious for sucking blood. They are able to do this by inserting a long, straw-like mouthpart called a labium into the skin. This is used to siphon blood up into the mosquito until it has had its fill. Did you know that the only mosquitoes that suck blood are the females? The females need blood to develop their eggs. The mosquito can often become a vector for diseases because it is constantly moving from animal to animal sucking on blood. It could suck up infected blood from an infected animal and transfer it to the non-infected blood of a non-infected animal. Fortunately, many serious mosquito diseases such as West Nile, dengue, encephalitis, and yellow fever are either not found or are uncommon in Alaska. This is because the two species of mosquito that often carry these diseases cannot survive Alaska's cold climate. So rest easy if you are in Alaska and you see that one of these annoying yet caring and brave mothers has decided to taste you!

Bees

Bees are among the most important insects in the world. They are responsible for the variety and quantity of fruits and vegetables available for the use of mankind and all other creatures. They are the reason you were able to eat that cheeseburger and fries that you picked up at the drive through window the other day! Bees have a very special role in our environment; they are pollinators. Pollination is the ability to take pollen from one flower and transport it to another flower. Pollen grains are the male sperm cells of a plant. Flowering plants have both female and male reproductive organs which allow them to self-pollinate. However, if plants self pollinated themselves over and over again, they would form genetically identical plants that would be very susceptible to disease and deadly genetic defects. Bees and other insects prevent this problem by picking up pollen during their constant quest for nectar; nectar is located inside flowers. Pollen becomes attached to the fine hairs covering the bee's body and is transferred to another flower. If it is lucky, the pollen will get dropped in the ovule which is the female reproductive organ on plants. This keeps the gene pool of plants healthy and strong so that we as humans and other life forms can take advantage of the fruits and vegetables that plants provide. Bees are not the only pollinators, however. Many other insects such as butterflies, moths, beetles, flies, male mosquitoes, and wasps are also pollinators. Even vertebrate animals such as birds and bats can be pollinators! Bees and wasps are significant because of their ability to perform what is called buzz pollination. This occurs when bees actually attach themselves to the pollen containing organ of the flower called the anther and vibrate their wings until the anther releases pollen. This is a very efficient method of pollinating that many other pollinators cannot accomplish. A large portion of plants including eggplants, tomatoes, potatoes, and blueberries depend solely on buzz pollination. Almost all other plants depend at least partly on buzz pollination. So in this way, our entire society, and in fact our entire world as we know it rests on the delicate survival of a tiny insect: bees!

The image of a world without bees may actually be more real than one might think. There is a problem world-wide because honey bees are disappearing. It is called the colony collapse disorder. The worker bees are suddenly dying off and leaving empty colonies. No one is quite sure why it is happening but many are very concerned. Ideas as to why this is occurring range from climate change to cell phone radiation to introduced species. Many beekeepers are going out of business and the disappearance of bees could become a problem of epic proportions!



Both of the pictures above are pictures of bumble bees. (photos by Scott Clem)

There are several different species of bees in the Chilkat Valley. These include bumblebees, sweat bees, and honey bees. They are all quite common if you look for them. Bumblebees, like the ones pictured in the two pictures above are among the most common. The honey bees in this area are actually European honey bees that are not native. Beekeepers brought them in because Alaska has no native honey bees. Beekeepers want these bees because they can produce delicious fireweed honey as shown in the picture on the next page. Fireweed is a beautiful pink plant that is native to the Chilkat Valley and a favorite among gardeners, bees, beekeepers, and privileged onlookers alike. Bees take the nectar from these flowers, bring it back to their hive, and combine it with saliva to produce honey. They then feed this honey to

their larvae. There are a couple of differences between honey bees and bumblebees. Honey bees and bumblebees are similar in that they form colonies, build nests, feed on nectar, and gather pollen and nectar for their young. The main difference is that bumblebees have small annual colonies while honey bees have large perennial colonies. In bumblebee colonies, large queen females will spend the winter in hiding and appear during the spring to form a new colony. In this valley, there are also the closely related yellow jackets and other wasps that produce small annual colonies.



Fireweed honey is a delicacy among many residents of the Chilkat Valley. (photos by Scott Clem)



In addition to bees, there are also wasps like this yellow jacket pictured here. (photo by Scott Clem)

Ants

Ants are insects that are very closely related to bees and wasps. Several species of ants are very common to the Chilkat Valley. Ants, much like honey bees, are highly complex, social insects with large perennial colonies. Worldwide, there are about 8,800 ant species. They construct colonies and most of them contain one queen. Ants communicate with one another using pheromones which are specific scents emitted by individuals. The queen lays all of the colony's eggs, which will become either worker ants or alate ants. All of the workers are sterile females and their job is to perform the day-to-day activities such as foraging for food and feeding the larvae. Alates are winged, fertile male and female ants that will fly away from the colony to mate. The males will die soon after mating while the females will survive to start a new colony as the queen. When the queen gets old and stops producing a specific pheromone, the workers will raise a new queen. Ant social structure is very similar to human social structure and that is why many people find them fascinating.



This is a worker ant out foraging for food. (photo by Scott Clem)

Beetles

With over 350,000 described species, beetles are the largest and most wide-spread order of insects. Beetles are so numerous that they comprise 40% of all known species of insects and 25% of all living organisms! Beetles are found in all habitats except for the sea and extreme polar regions. Because beetles are included in such a broad category, and there are so many different beetles, there are very few characteristics that can be used to describe them all. Basically, most beetles have solid exoskeletons with two modified forewings called elytra.

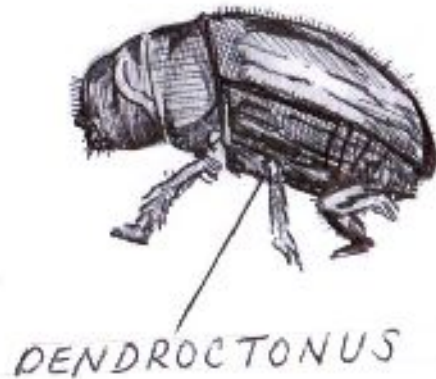


The beetle pictured on the left is a lace-winged beetle and the picture on the right is a species of click beetle. (photos by Scott Clem)

There are definitely quite a few species of beetles in the Chilkat Valley. The two beetles pictured above are only a select few of the many that exist in this area. The one on the left is a lace-winged beetle. This bright red beetle is a scavenger of decaying vegetation. The beetle pictured on the right is known as a click beetle. Click beetles are unique in that if they are knocked or placed on their back, they will snap or click themselves back onto their feet. They will also use this clicking technique as a defense against predators.

Probably the most famous beetle in the Chilkat Valley is the spruce bark beetle. Since 1989, these beetles have destroyed over 3 million acres of spruce trees in Alaska. They are native beetles that in the past have been controlled by the freezing cold temperatures of winter. Recently however, the winters have been warmer due to climate change so the beetles have been able to break out in mass quantities. These beetles are brownish-black and are typically about $\frac{1}{4}$ of an inch long and $\frac{1}{8}$ of an inch wide. They only attack spruce trees, preferring to munch on white spruce, Lutz spruce, and Sitka spruce. The winged adults emerge from their host tree in early summer and disperse out to new hosts where they will burrow into a tree, mate, and lay eggs. One female can lay up to 150 eggs in a very short period of time! The adults and larvae will feed on the interior phloem of the tree until the tree has died. The needles will turn rust-red and eventually fall off. In addition to simply being an eye sore, these dead trees pose a grave danger of being blown over and causing further destruction to

someone's home or yard. There is also the danger of fire because of the abundance of dead trees.



This is the little guy who is responsible for all the spruce tree deprivation. Dendroctonus is the genus of beetles they are listed under. (drawing by Don Scheffler)



Almost all of the trees in this picture are dead because of the spruce bark beetle. It would not take much for this hill to catch fire! (photo by Scott Clem)

Dragonflies and Damselflies

There are several species of dragonflies in the Chilkat Valley. One of these species called the four spotted skimmer is the official state insect of Alaska. There is a good reason that dragonflies have earned the title “dragonfly.” They are the dragons of the insect world. They have four hind wings and each wing has a separate muscle; this means they can move each muscle independently when flying. This gives them extreme speed and maneuverability. In addition to this amazing ability to fly, they have a basket full of barbs they use to capture their prey. Their eyes are also built for efficient prey capture. With 30,000 facets in eyes that cover the entire side of their head, dragonflies have an extremely large visual field. Because of their large immobile eyes, they have an extremely maneuverable head that can turn almost a full 360 degrees; this enables them to keep a lock on prey. While they pose no threat to us, they are pretty much the scariest thing imaginable to small flying insects like mosquitoes.

Dragonflies have an aquatic life cycle. The female dragonfly lays her eggs in fresh water. The eggs will hatch into dragonfly nymphs called naiads that are completely aquatic. The word nymph is associated with insects that have no pupae stage of development. Naiads are predacious which means they will kill and eat other small animals. They have a lower lip called a labium that will spring forward and capture prey. After growing a substantial amount, the dragonfly will crawl out of the water and onto a branch or a rock. It will then begin to shed its skin and emerge as an adult, fully flighted dragonfly.

There is something called a damselfly that also lives in the Chilkat Valley. They are very similar to dragonflies except they are generally smaller and have four front wings while dragonflies have four hind wings. Damselflies also tend to rest with their wings up while dragonflies tend to rest with their wings stretched out.



The insect pictured on the left is a damselfly while the insect pictured on the right is a dragonfly. Notice that the damselfly has wings that are not stretched out like the dragonfly pictured on the right. (photos by Scott Clem)

Plant Bugs

A plant bug sounds like it could be anything. Many people incorrectly use the words “bug” and “insect” interchangeably. In truth, a bug is actually a specific type of insect. There are several defining characteristics of true bugs but the main one is that they have piercing-sucking mouthparts used to drain liquids from plants. Cicadas, stink bugs, water striders, aphids, bed bugs, and plant bugs are all true bugs. Plant bugs, like the one pictured below, are very common in the Chilkat Valley. If you look closely at flowers and plants, you will probably see them. Being about four millimeters long, they are about the size of a pinhead. They come in a variety of colors from bright yellow to dark brown. Because of their tendency to drain plants of their juices, some species are considered agricultural pests.



This is a species of plant bug found in the Chilkat Valley. (photo by Scott Clem)

Caddisflies

Caddisflies are small, slender, moth-like insects with tiny, very fine hair on their wings. They have four wings that fold over their body in a tent-like fashion. They have an aquatic life cycle with the larvae being a very important source of food for many fish in the ecosystem. Caddisflies are a praised insect in the Chilkat Valley because of their mating flights which tend to attract fish such as dolly varden char. Fishermen will often use lures that represent the larvae of a caddisfly. Many caddisfly larvae are unique in that they will actually construct a house by spinning a sticky silk tube and attach particles of sand and other materials to it. This provides them shelter and a means of camouflage. The house also acts as a filter so the larva can get a steady flow of fresh water for oxygen. The larva will stick its tiny forelegs out and move around with this house much like a hermit crab does with its shell. Not all caddisfly larvae, however, construct these homes. The larvae that do not build houses tend to be predaceous. Once fully grown, the caddisfly larva will construct an underwater cocoon. The adult will later emerge from the cocoon, swim to the water surface, and crawl out onto a rock or tree. It will then shed its skin and become a fully flighted adult caddisfly. The adult lives for a very short period of time because it does not eat and has only one purpose: to mate.



The photograph on the left is a caddisfly larva. The drawing on the right is what the caddisfly looks like as an adult. (photo by Scott Clem, drawing by Don Scheffler)

Mayflies

Mayflies are common in the Chilkat Valley. Most mayflies enjoy fast flowing streams or rivers but a few will occupy lakes. The name mayfly, like the caddisfly, is given to the very short-lived adult stage. Like caddisflies, the adults do not have mouthparts equipped for eating. As a result, the adult mayfly can live anywhere from a few minutes to a few days depending on the species. During this time they will mate and lay eggs. Aquatic, immature mayflies are known as naiads and can be identified by the three long cerci or tails extending from the abdomen. These are also present in the adults. Naiads can molt up to twenty times during their development which can last up to a year. An interesting fact about mayflies is that they are the only living insect that molts after it has developed wings. The immature naiad will swim to the surface and molt its exoskeleton. This stage of development is known as the subimago. At this stage, the mayfly can fly but it is not a full adult. The subimago will fly to a tree branch or other object and molt a second time. This is when the insect has become a full-fledged adult; this is known as an imago. Sometimes, mayflies will emerge in mass quantities. Fish will gorge themselves on the millions of emerging mayflies. Around Lake Erie, there have actually been mayfly emergences that have appeared on weather radar! When this happens, be sure to pack your fishing gear!



This is the mayfly adult.



This is the mayfly naiad.

Notice that both the adult and the naiad have three cerci or tails extending from their abdomen. (photos by Scott Clem)

Sources

1. Clark, Wayne E. "Entomology: The Scientific Study of Insects." Web.
2. O'Clair, Rita M., Robert H. Armstrong, and Richard Carstensen. The Nature of Southeast Alaska: a Guide to Plants, Animals, and Habitats. Anchorage [u.a.: Alaska Northwest, 2007. Print.
3. "Introduction to Alaska Insect Pollinators." NRCS Alaska. Web. <ftp://ftp-fc.sc.egov.usda.gov/AK/Publications/pollinatorguide.pdf>.
4. Drawings by Don Scheffler
5. Photographs by Scott Clem