

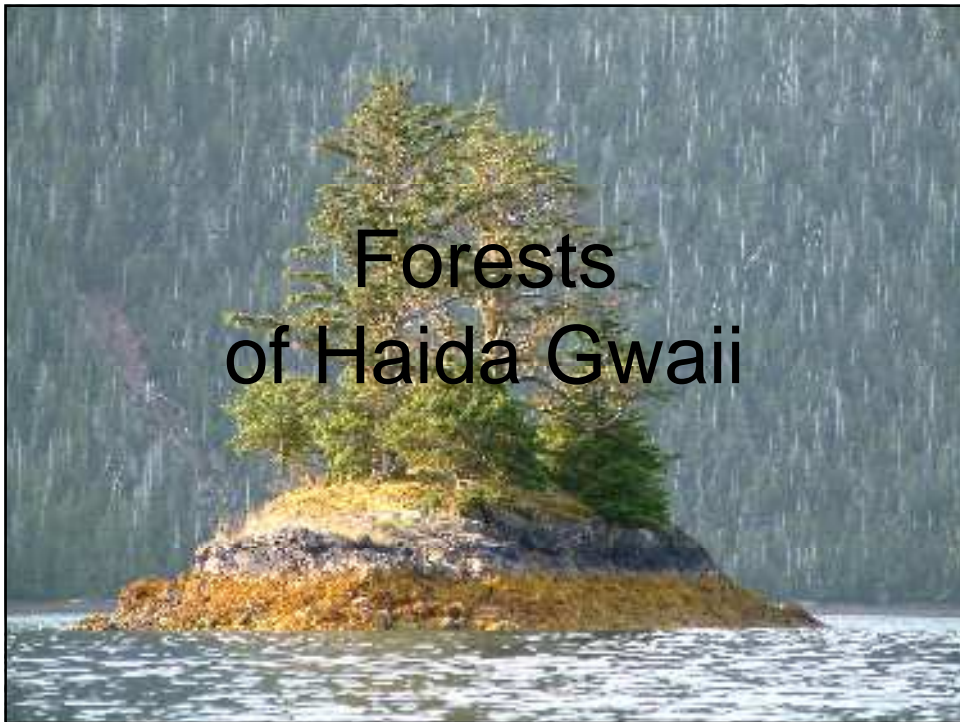
What is wrong with deer on Haida Gwaii?

A school curriculum
by the Research Group
on Introduced Species

2007



Forests of Haida Gwaii





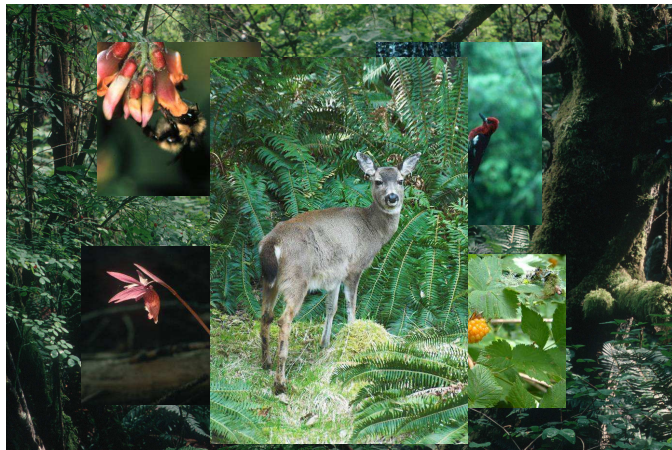
Haida Gwaii is an **archipelago**.
It consists of a great number of islands, big or small



Most of these islands are covered with **forest**

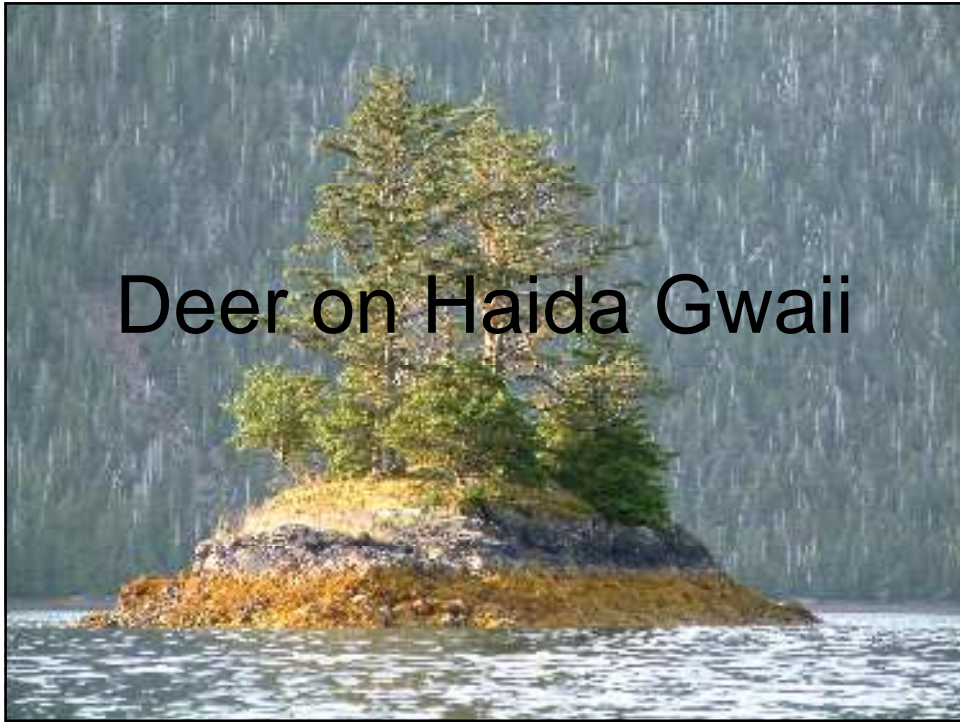


The islands are home to many **plants, insects, birds...**



... and **deer**.

While plants, insects and birds had always been present on Haida Gwaii, deer arrived only 130 years ago.



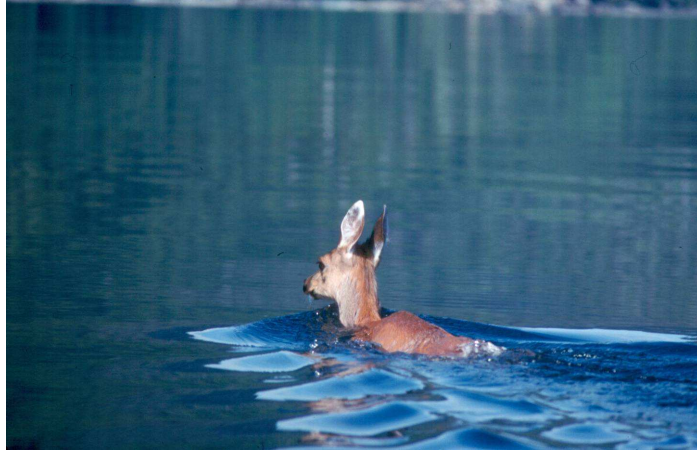
Deer were **introduced**.

People coming to settle on Haida Gwaii brought with them deer from the mainland to provide game meat.

Deer were released in the wild.

They managed very well on Haida Gwaii: the weather is never too cold, and, contrary to the mainland, there are no wolves that might hunt them.

Deer have no **predator** on Haida Gwaii.



39 deer were introduced 130 years ago.
Today, there must be **between 150,000 and 200,000** deer
on Haida Gwaii.



Deer are **herbivores**. They feed on
vegetation: grass, leaves and flowers.

They are now very numerous on Haida
Gwaii, and consequently, they eat a lot of
plants.

Deer never settled on a few islands.

On these islands, vegetation grows so **high** and **thick** that you can hardly walk in the forest.



On the other islands, deer browse the vegetation.

As a very big number of deer feed on each island, there **very little plants left** in the forest.

Deer were not the only species to be introduced on Haida Gwaii.

Like deer, some species were introduced **on purpose**:

Raccoons and beavers were introduced for fur trapping.

Squirrels were introduced to gather cones for replanting trees.



Others were introduced as **domestic animals** and **went wild**, like cats, dogs or cattle (they are called feral animals)



Some were introduced **unintentionally**, like rats, who arrived in boats as stowaways.



Many plants were introduced as ornament or fodder for cattle. Some of them have become invasive.





Insects and birds on Haida Gwaii

Insects



Many insects (like leafhoppers) are **herbivores**: they feed on plants.



Other insects, (like bumblebees) are **pollinators**: they feed on nectar, a sugary liquid produced by flowers.

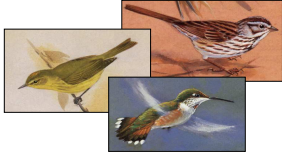


Some insects (like this beetle) are **predators**: they feed on other animals, like other insects or gastropods.

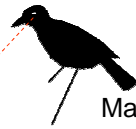


Others (like this wasp) are **parasites**: for example, they lay their eggs inside other insects.

Birds



Birds can feed on **fruits, seeds, nectar** or **insects**



Many birds need **deep vegetation** to hide their nests and **protect their eggs** from predators (for example, bigger birds).

Why is deer introduction a problem on Haida Gwaii?

Plants, insects, and birds belong to the same ecosystem: they are all linked together because they all live in the forest.

They depend on each other for their survival.

First, let's observe what the relationships between plants, insects and birds are in the forest ecosystem.

Then, we will observe what happens when too many deer are « added » to the ecosystem.

Forest without deer

All the elements of the deer-free forest ecosystem are represented next page.

✓ Show how they depend on each other by using arrows

✓ Example:



"Plants are useful to herbivorous insects and pollinators" (because they feed on them)

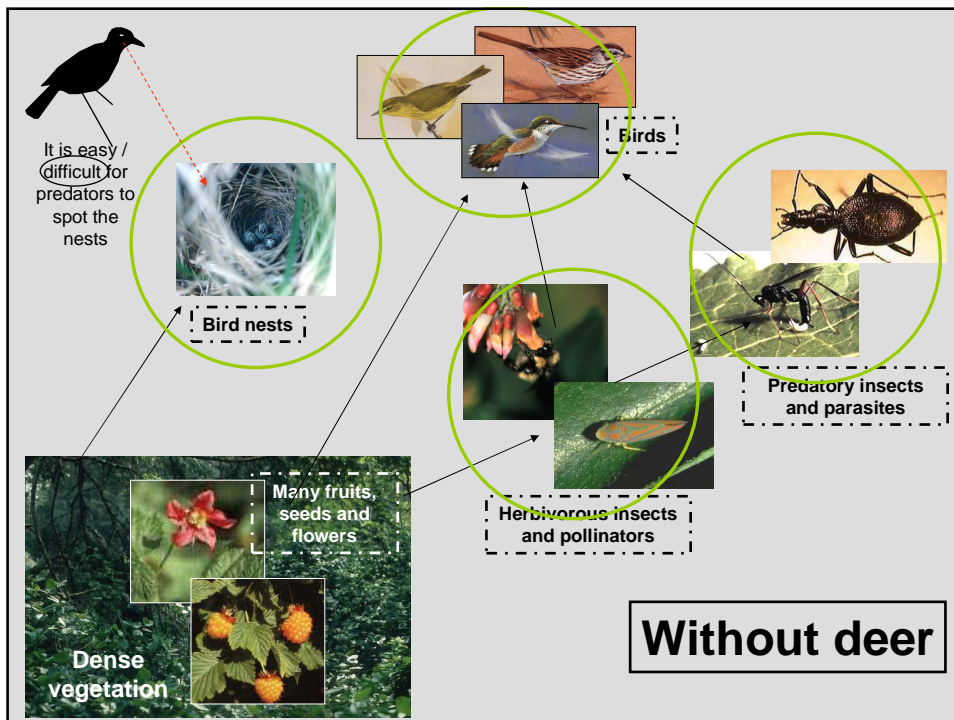
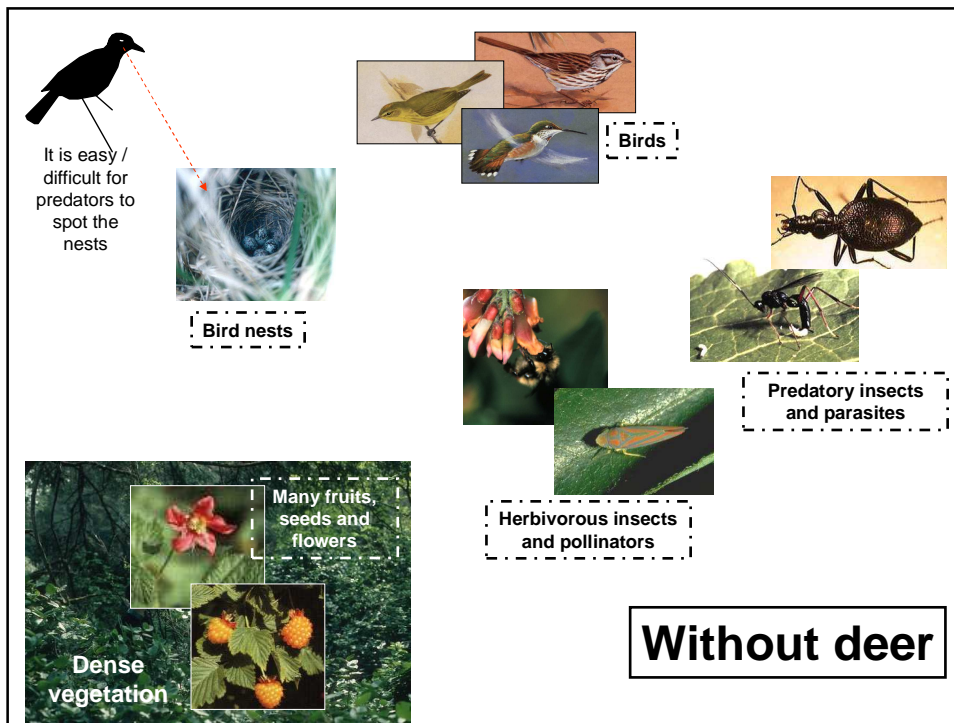
✓ Circle in green the elements that survive well in the deer-free forest

✓ Example:



"Herbivorous insects and pollinators survive well in the deer-free forest" (because they feed on plants, which are abundant)

✓ Is it easy or difficult for egg predators to spot nests ? Circle the correct answer next page.



Forest with deer

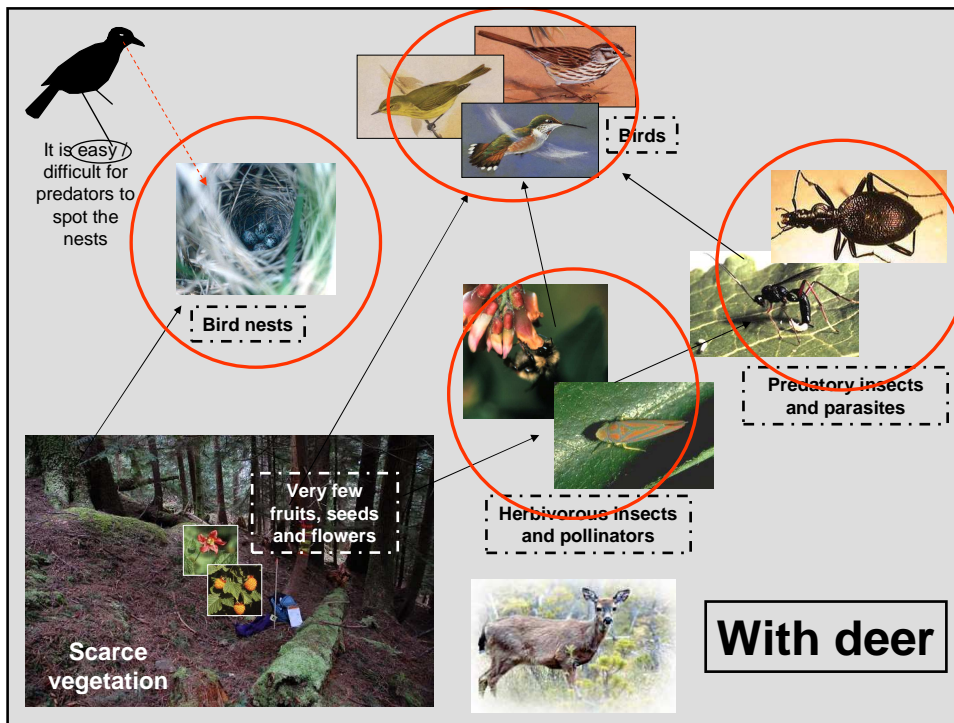
All the elements of the deer-affected forest are represented next page.

- ✓ The relationships between plants, insects and birds are still the same: reproduce the arrows that you have just drawn on the “deer-free ecosystem”
- ✓ What changes is how the elements of the ecosystem survive when the ecosystem is affected by too many deer : circle in red the elements for which survival is difficult in the deer-affected forest
- ✓ Is it easy or difficult for egg predators to spot nests ? Circle the correct answer next page.

The diagram illustrates the impact of deer on a forest ecosystem. It features several elements and their relationships:

- Birds:** A group of four birds is shown. A red dashed arrow points from a black bird to a bird's nest, indicating a relationship between the bird and its nest.
- Bird nests:** A single bird's nest is shown, with a red dashed arrow pointing to it from the black bird.
- Predatory insects and parasites:** A group of three insects (a beetle, a wasp, and a fly) is shown, with a red dashed arrow pointing from them to the bird's nest, indicating a relationship between the insects and the nest.
- Herbivorous insects and pollinators:** A group of three insects (a butterfly, a bee, and a fly) is shown, with a red dashed arrow pointing from them to a cluster of red flowers, indicating a relationship between the insects and the flowers.
- Scarce vegetation:** A photograph of a forest floor with sparse vegetation and a log is shown. A red dashed arrow points from this area to the bird's nest, indicating a relationship between the vegetation and the nest.
- Very few fruits, seeds and flowers:** A photograph of a forest floor with sparse vegetation and a log is shown, with a red dashed arrow pointing from this area to the bird's nest, indicating a relationship between the vegetation and the nest.
- With deer:** A photograph of a deer is shown in the bottom right corner, indicating the presence of deer in the ecosystem.

The text "It is easy / difficult for predators to spot the nests" is written next to the bird's nest. The text "Scarce vegetation" is written next to the photograph of the forest floor. The text "Very few fruits, seeds and flowers" is written next to the photograph of the forest floor. The text "With deer" is written in a box next to the photograph of the deer.



Direct and indirect effects of deer

Deer have a **direct effect** on vegetation

→ Deer browse the plants in the forest, that is why the vegetation becomes scarce when too many deer are present on an island.



Direct and indirect effects of deer

But deer have many **indirect effects** on the other species living in the forest

- Indirect effect on birds and insects feeding on plants
→ *Deer browse the vegetation, which becomes scarce. → Birds and insects who feed on the vegetation do not have enough food to survive.*

In the same way, describe the other indirect effects

- Indirect effect on insects feeding on or parasiting other insects

.....

- Indirect effect on birds feeding on insects

.....

- Indirect effect on bird nests

.....

Direct and indirect effects of deer

But deer have many **indirect effects** on the other species living in the forest

- Indirect effect on birds and insects feeding on plants
Deer browse the vegetation, which becomes scarce. → Birds and insects who feed on the vegetation do not have enough food to survive.

In the same way, describe the other indirect effects

- Indirect effect on insects feeding on or parasiting other insects

Deer browse the vegetation, which becomes scarce. → Insects who feed on the vegetation do not have enough food anymore and become scarce too. → Insects who feed or parasitize these insects do not have enough food to survive themselves.

- Indirect effect on birds feeding on insects

Deer browse the vegetation, which becomes scarce. → Insects who feed on the vegetation do not have enough food anymore and become scarce too. → Insects who feed or parasitize these insects do not have enough food to survive themselves and become scarce too. → Birds who feed on insects do not have enough food to survive themselves.

- Indirect effect on bird nests

Deer browse the vegetation, which becomes scarce. → Birds cannot conceal their nests to predators very well anymore. → Predators can spot the nests easily and eat the eggs.

Direct and indirect effects of deer

Although deer do not feed on birds or insects, they indirectly affect them through their direct effect on vegetation.

Because they have less to eat and fewer places where to hide from their predators:

- ✓ the number of birds and insects on deer-affected islands decreases
- ✓ the number of different species of birds and insects also decreases (only the species the less dependant on vegetation survive)

Islands like these of Haida Gwaii are especially vulnerable to introduced species

- Islands are **isolated**: native species are very often **unique** on the islands and can't be found anywhere else. They are also very **sensitive to new diseases**.
- Islands are **small**: native species encountering introduced species **cannot move away** from the threat.
- Islands have **fewer species** and **smaller populations** than the mainland: these populations are **quickly threatened** by introduced species



How can we deal with introduced species?

The consequences of species introductions on ecosystems are very difficult to forecast.

An introduced species can:

- Have a very hard time adapting to its new surrounding and not even survive
- Or find a place in the new area and become **naturalized**.

A naturalized species may:

- Cause very little disturbance on the new ecosystem.
- Or become a threat to the ecosystem and become **invasive**.

Invasive species can:

- feed** on native species
- compete** with them for food or habitat
- carry** new diseases
- damage** the habitat
- or be itself an **additional source of food**

...resulting in the **decrease** in the populations of some native species and/or in the **increase** in the populations of other native species. These changes may have impacts on the **populations of other native species** and on the **global quality of the habitat**.

Introduced species have also cultural and economic impacts

On Haida Gwaii, deer browsing prevents **Redcedars** and other trees from growing normally.

Redcedars are important to **the Haida First Nation**, who traditionally use redcedar for carving and weaving.

Tree regeneration is important to **logging industry**, who needs to make sure that forest grows again after a cut.



It is very difficult to get rid of introduced species once they are settled somewhere

✓ It has been suggested to introduce wolves on Haida Gwaii in order to reduce the population of deer. What do you think about it?

.....
.....
.....

✓ Trying to control the spread of introduced species is not always easy and often very expensive.

Therefore, we have to avoid any more species introduction. Nowadays, most of introduced species are introduced accidentally (stowaways on ships or in packages travelling all over the world, pets released in the wild or plants escaped from gardens).

We must all be careful when we travel or when we buy exotic plants or animals.