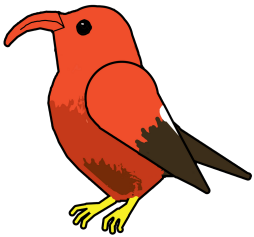
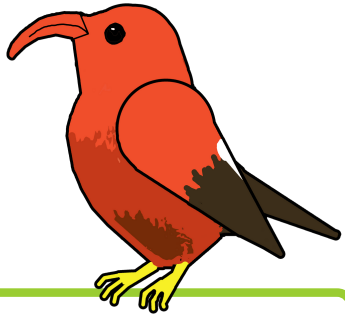
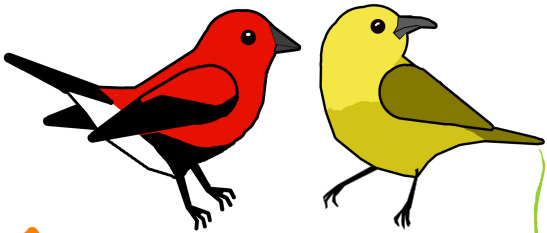
Honeycreeper ʻIʻiwi
(pronounced "ee-EE-vee")



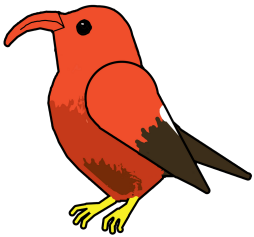
SCIENTIFIC NAME: *Drepanis coccinea*
POPULATION: 350,000
TREND: Declining
HABITAT: Wet forests found on the slopes of mountains

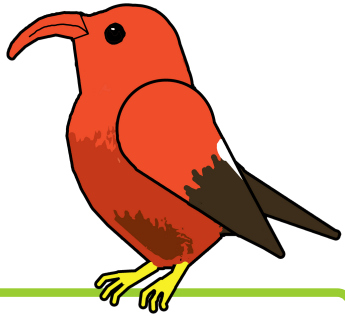


Honey Creeping

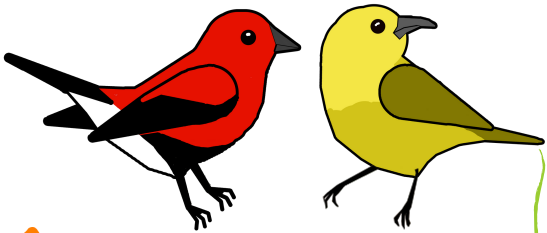


Honeycreeper ʻIʻiwi
(pronounced "ee-EE-vee")
Song

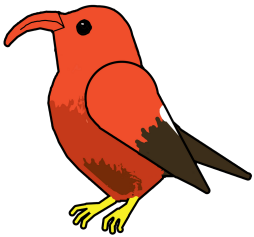


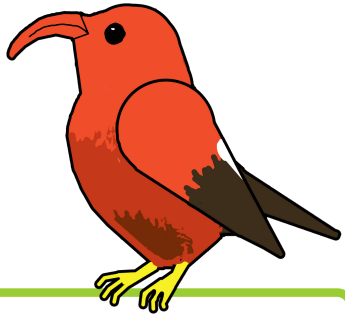


Honey Creeping

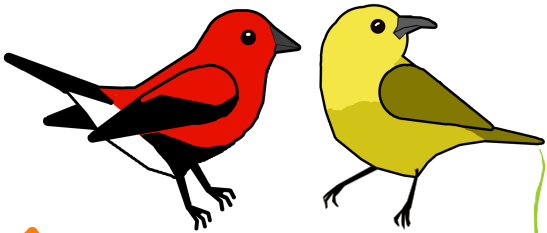


Honeycreeper ʻIʻiwi
(pronounced "ee-EE-vee")
Behavior





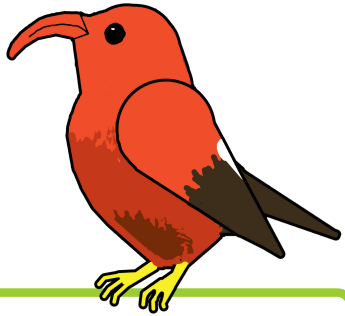
Honey Creeping



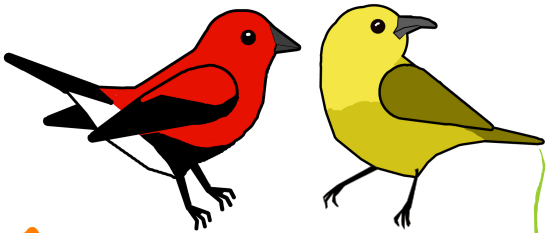
Honeycreeper ʻApapane

pronounced
ah-pah-PAH-ney

SCIENTIFIC NAME: *Himatione sanguinea*
POPULATION: 1,300,000 individuals
TREND: Stable
HABITAT: Wet, high-elevation native forests



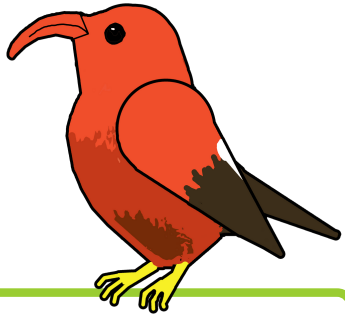
Honey Creeping



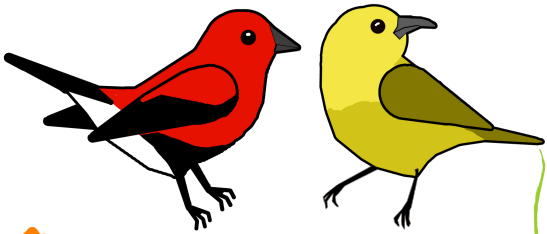
Honeycreeper ʻApapane

pronounced ah-pah-PAH-ney

Song



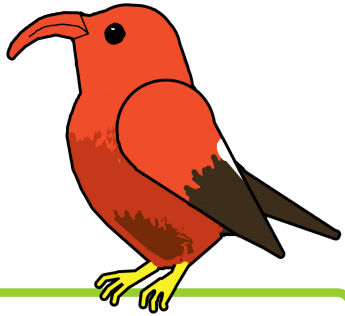
Honey Creeping



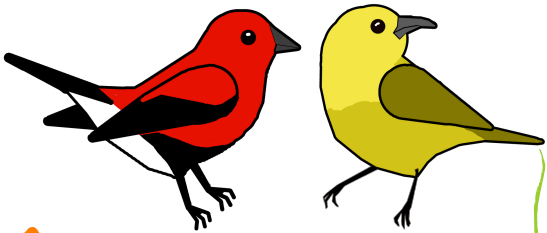
Honeycreeper ʻApapane

pronounced ah-pah-PAH-ney

Behavior



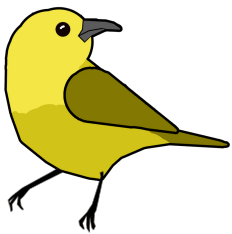
Honey Creeping



Honeycreeper ʻAmakihi

pronounced

ah-mah-KEY-he

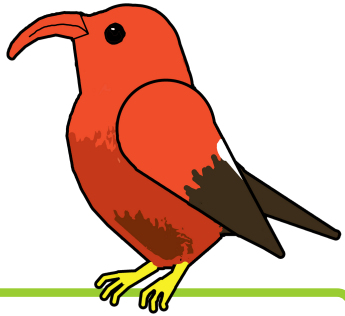


SCIENTIFIC NAME: *Chlorodrepanis virens*

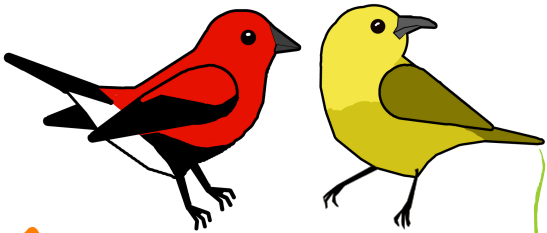
POPULATION: Approximately 800,000–900,000

TREND: Stable

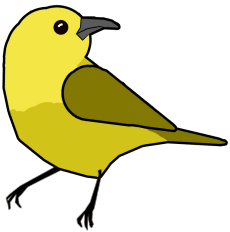
HABITAT: Forests and shrubland at a wide range of elevations

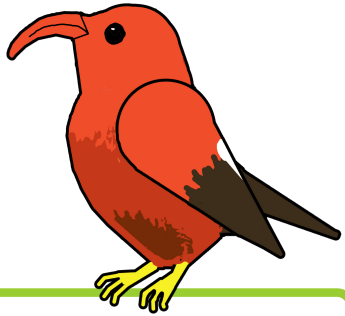


Honey Creeping

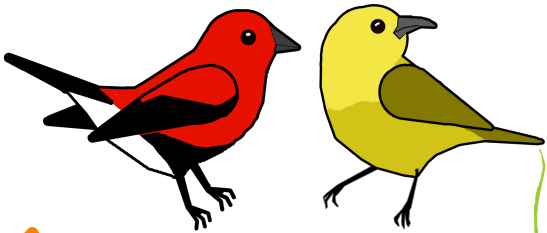


Honeycreeper ʻAmakihi
pronounced ah-mah-KEY-he
Song

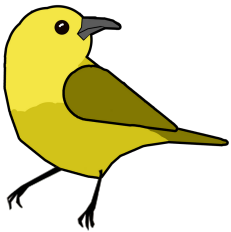


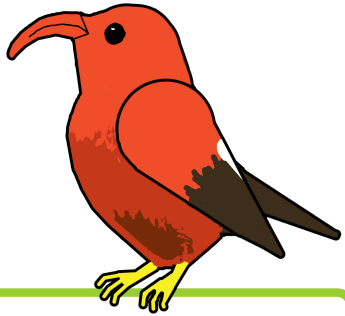


Honey Creeping

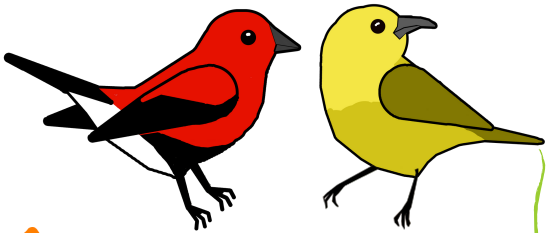


Honeycreeper ʻAmakihi
pronounced ah-mah-KEY-he
Behavior

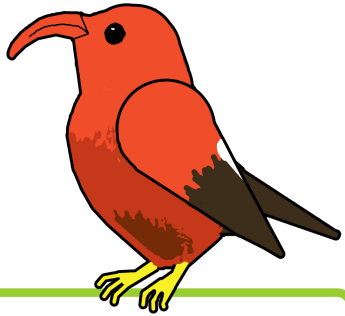




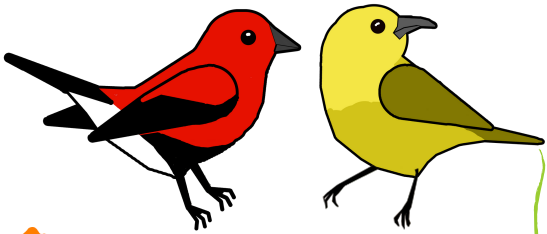
Honey Creeping



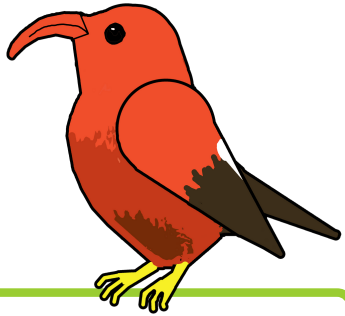
Hawaiian honeycreepers are a group of birds that evolved in the forests of the Hawaiian Islands and are found only there. Most of them eat nectar.



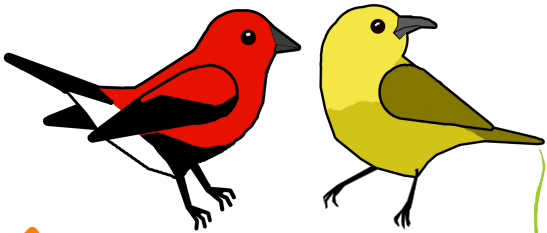
Honey Creeping



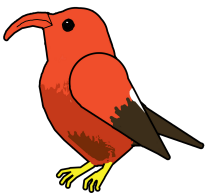
Habitat destruction and the introduction of foreign birds and mammals have led to the extinction of at least 8 of the original 23 species of honeycreepers. Most of the surviving species are endangered.

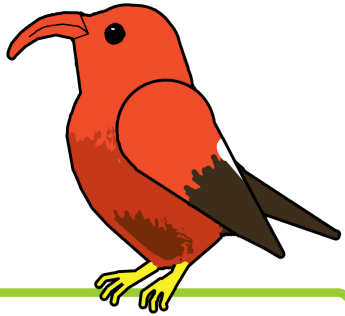


Honey Creeping

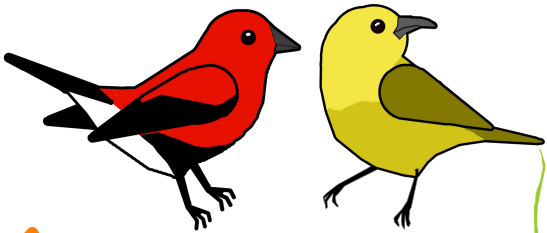


Research has shown that 90 percent of ʻIʻiwi honeycreepers bitten by a single malaria-infected mosquito die from the disease. Climate change is compounding this threat, as warming temperatures allow mosquitoes to move into higher elevators, including into forest birds' remaining mountain strongholds.

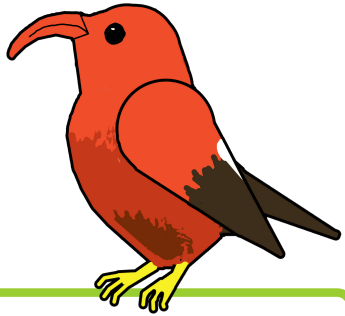




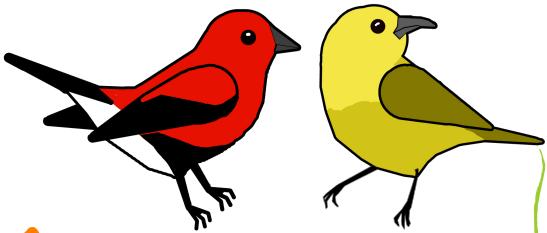
Honey Creeping



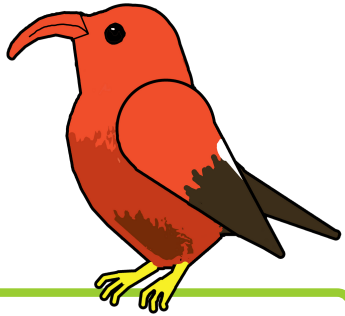
The ʻApapane honeycreeper has about a 60 percent mortality from the mosquito-borne disease. The species is also threatened by introduced predators and loss of native forest to introduced livestock, agriculture, and development.



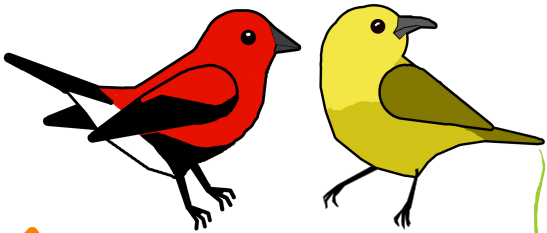
Honey Creeping



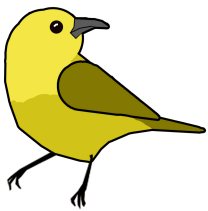
Increased detections of ʻApapane honeycreepers in low-elevation forest are a hopeful sign that this species might be developing a resistance to mosquito-borne diseases.

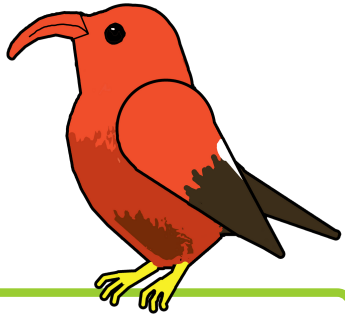


Honey Creeping



Although ʻAmakihi honeycreeper populations appear stable, the birds are susceptible to the same threats facing other Hawaiian birds, including habitat loss and predation by introduced mammals such as rats and free-roaming cats.





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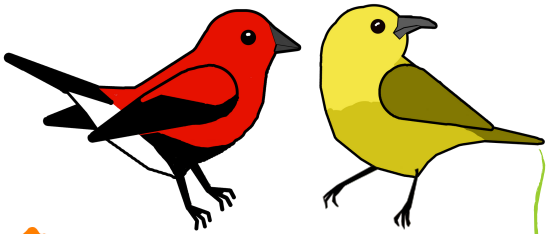
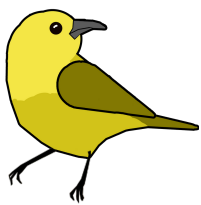
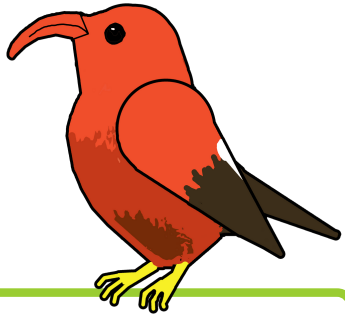


ʻAmakihi honeycreepers glean tree bark and foliage for spiders and insects with their decurved bills, drink tree sap, and sip nectar from native flowers, including ʻohiʻa and mamane, with tubular tongues. These flexible feeders also eat fruit pulp and juice, and readily drink the nectar of non-native flowers and trees.





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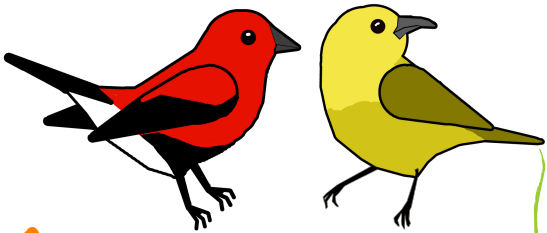
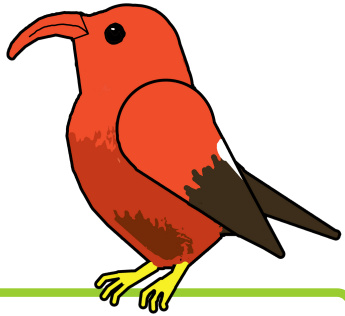


One strategy that Hawaiian honeycreepers use to deal with malaria is to avoid it by moving to **higher elevations** where the mosquitos cannot survive due to cooler and drier conditions.



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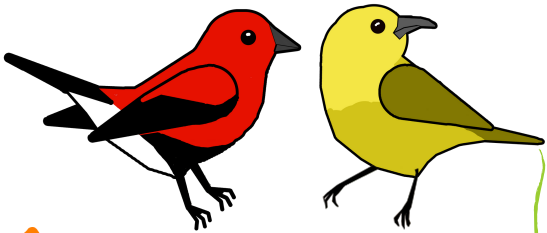
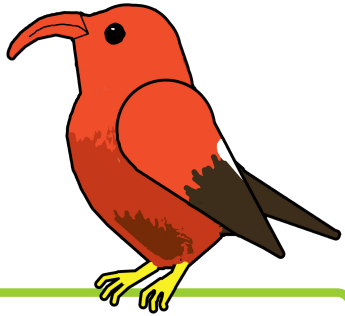


Some Hawaiian honeycreepers have remained in the lowlands and have become immune to the disease.



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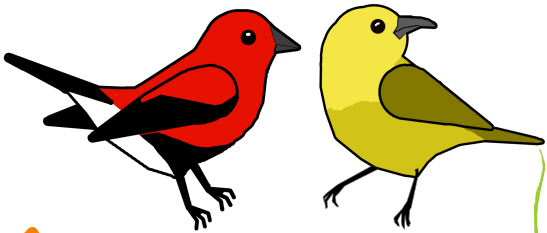
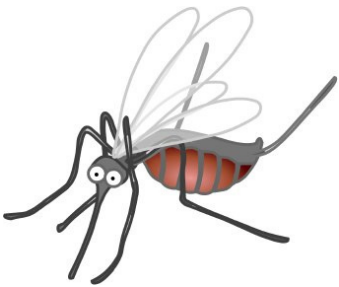
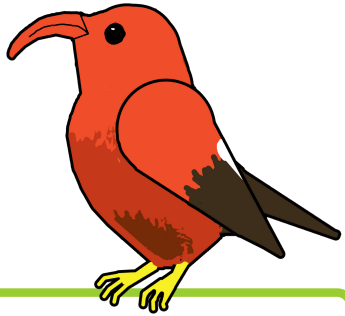


There were no mosquitoes in Hawaii before the 1800s. Mosquitoes are an invasive species in Hawaii.





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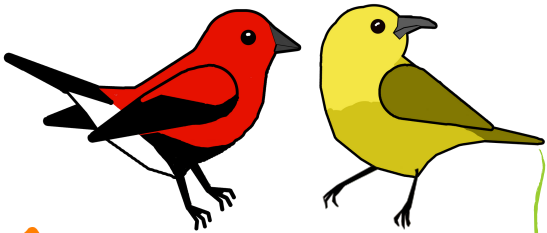
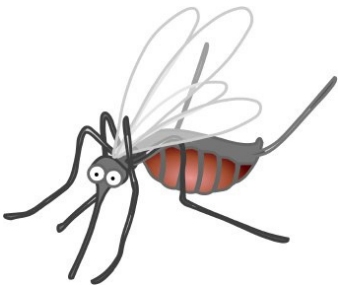
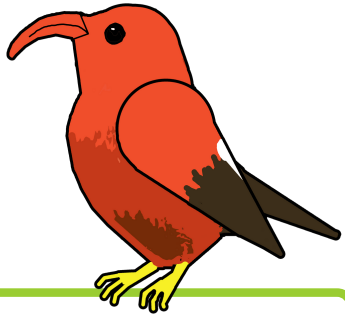


Plasmodium relictum is the microscopic 1 celled organism that causes malaria and is carried by mosquitoes. Malaria is devastating the native birds on the island of Hawaii.





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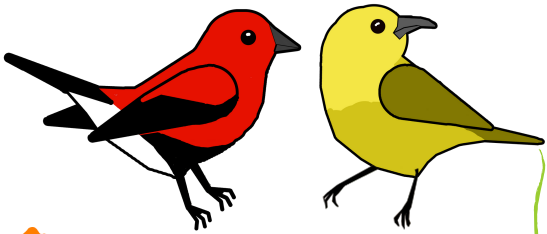
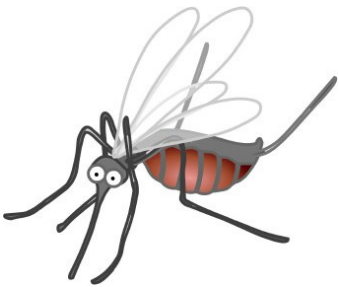
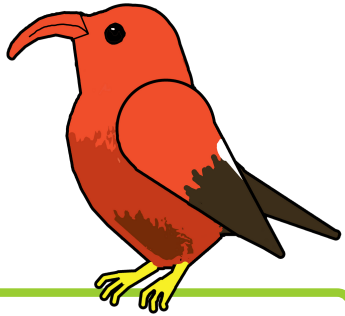


Culex quinquefasciatus, the southern house mosquito, is the current vector of bird malaria in Hawaii.





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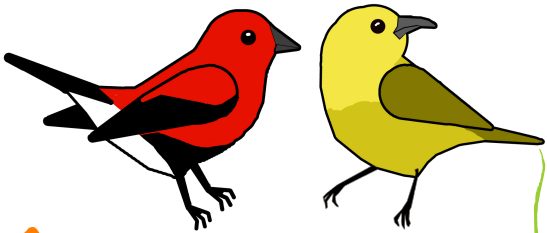
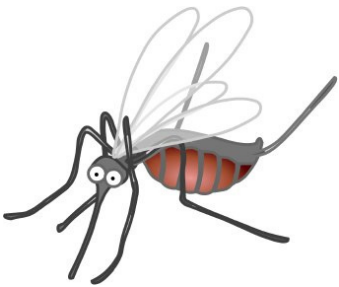
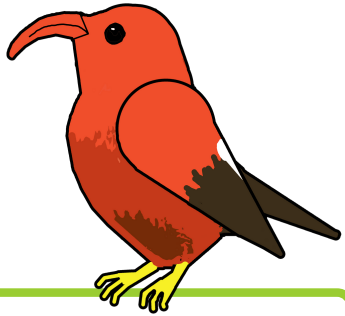
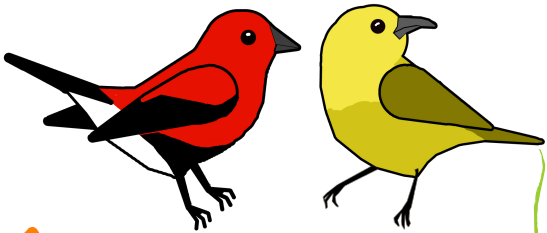


The mosquito and the parasite that cause bird malaria both depend heavily on rainfall and warmer temperatures to reproduce.





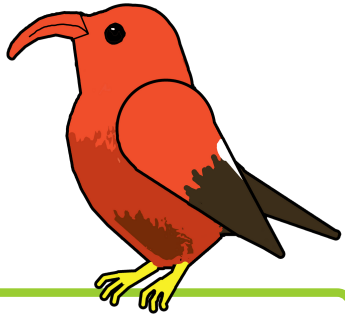
Honey Creeping



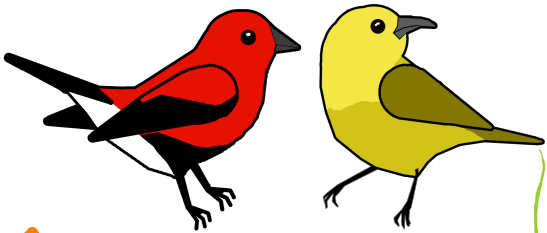
At least

50%

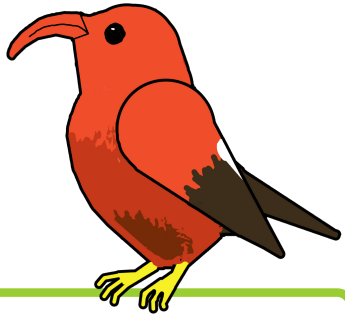
of native Hawaiian birds
have gone extinct.



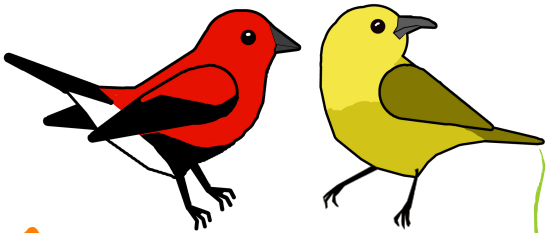
Honey Creeping



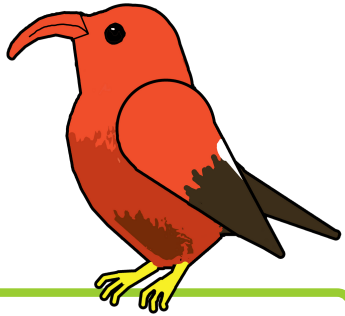
One method of saving the Hawaiian honeycreepers may be to vaccinate the remaining population of honeycreepers against malaria.



Honey Creeping



Threats to the Hawaiian honeycreepers include loss and degradation of habitat, predation by introduced mammals, and diseases like bird malaria.



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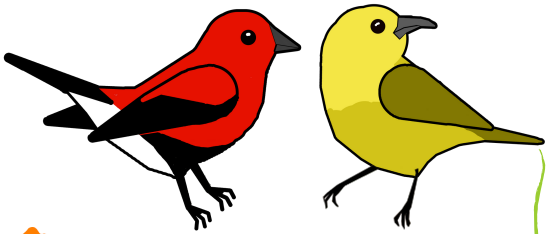
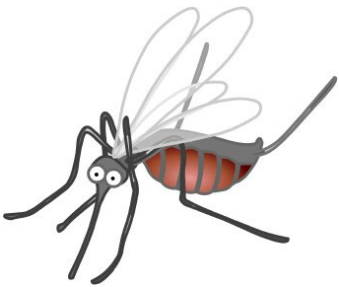
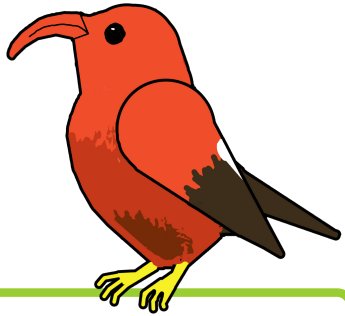
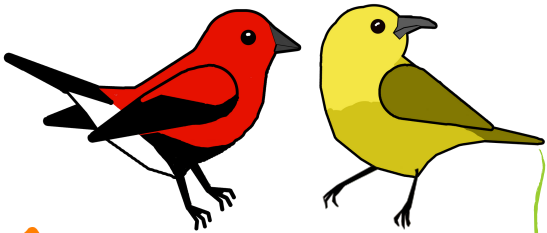


A **SINGLE** mosquito bite can transfer malaria parasites to a bird.

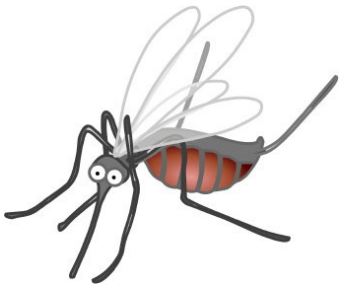


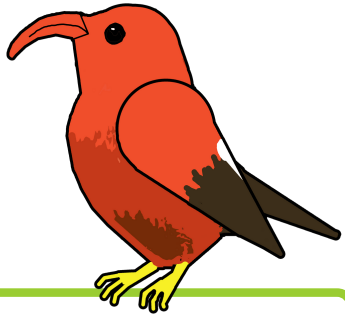


Honey Creeping

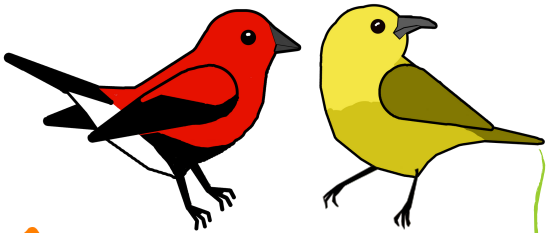


Rainfall is important in the life of a mosquito. Heavy rainfall and short-term droughts help adult mosquitoes and their babies (larvae) survive.

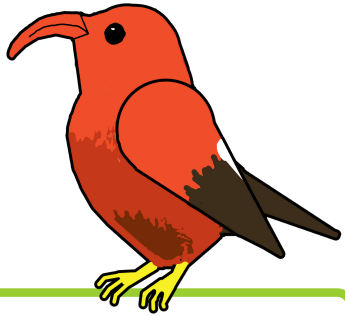




Honey Creeping



There is high year-round malaria transmission in warm, **low-elevation** forests due to the warm, wet environment. Transmission is seasonal in cooler **mid-elevation** sites. There is little, if any, malaria transmission in **high-elevation** forests that are cool and dry because the mosquitos can't survive in those conditions.



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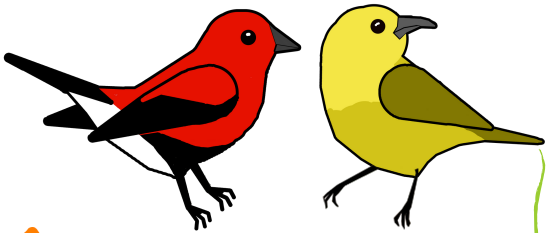
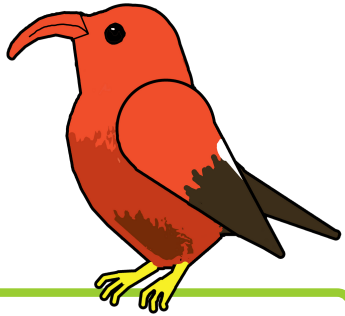
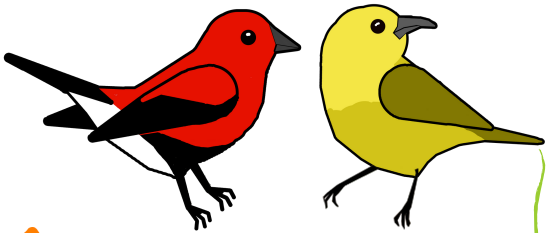


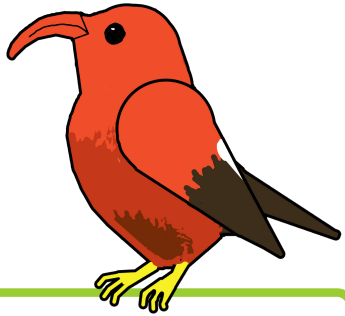
The mosquito has four distinct stages in its life cycle: egg, larva, pupa, and adult. The adult is an active flying insect, while the larvae and pupae are aquatic and occur only in water. Depending on the species, eggs are laid either on the surface of water or are deposited on moist soil or other objects that will often be flooded.



Honey Creeping



Most of the nonnative birds on Hawaii are resistant to bird malaria, but the native bird species are very susceptible to bird malaria.



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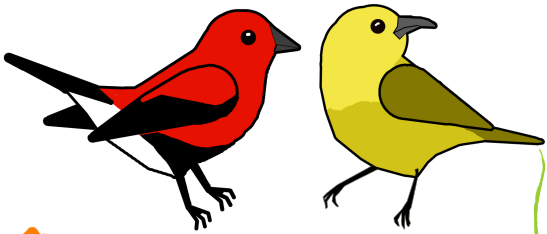
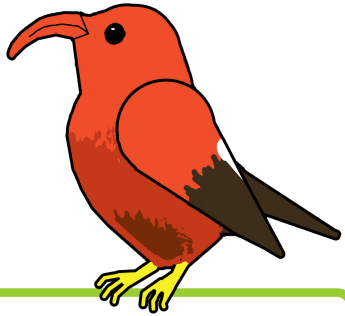


Currently, **10 native species** of birds in Hawaii have gone **extinct** because of bird malaria.



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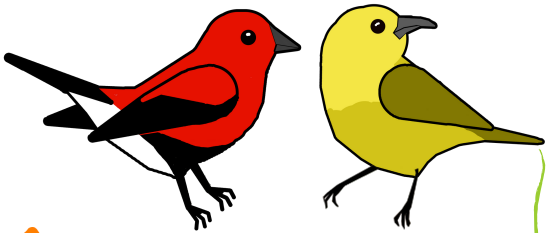
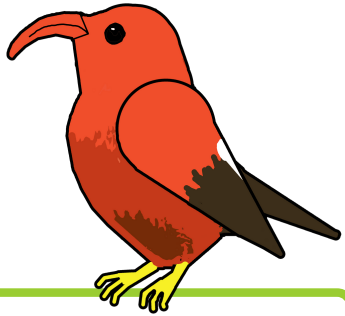


Due to warmer temperatures, the range of bird malaria-carrying mosquitoes is constantly expanding.



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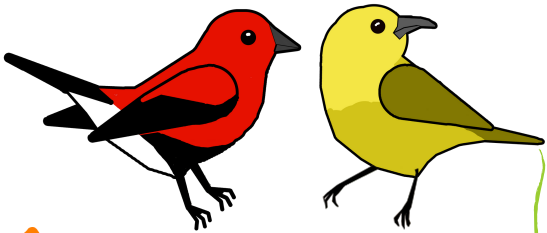
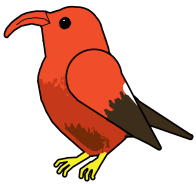
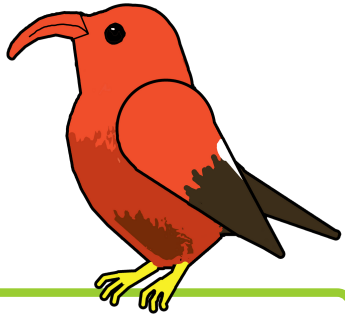


Each species of honeycreeper has evolved special feeding habits and a correspondingly special beak shape to fill a different niche found on the specific island within the Hawaiian islands. Some Hawaiian honeycreepers eat seeds, some eat fruit, some eat snails, some eat nectar.





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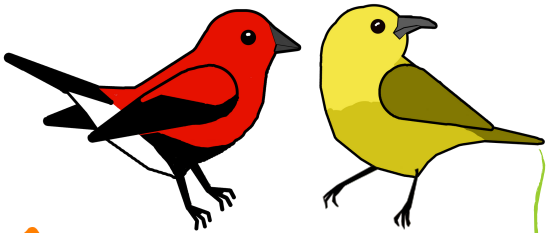
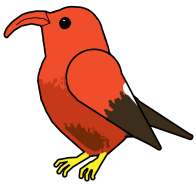
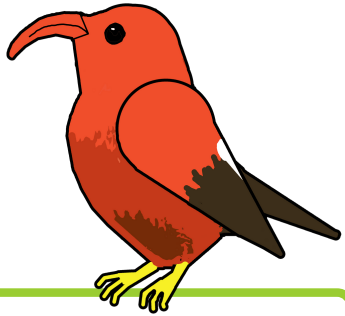


Honeycreepers can produce more offspring at low elevation because it has the greatest food resources.





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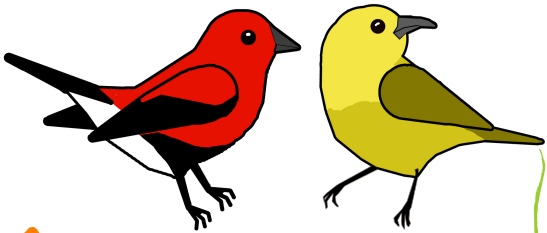
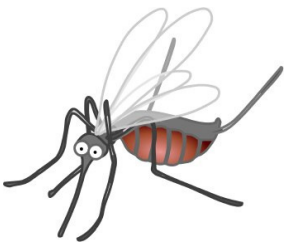
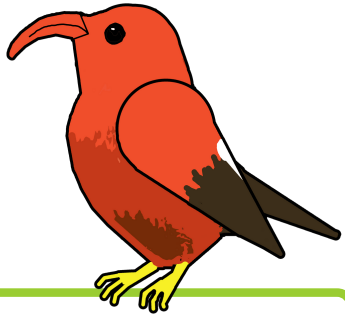


The southern house mosquito (*Culex quinquefasciatus*), is a medium-sized brown mosquito that exists throughout the tropics and the lower latitudes of temperate regions. This species is found in the southern United States and is now found in Hawaii where it is an invasive species.





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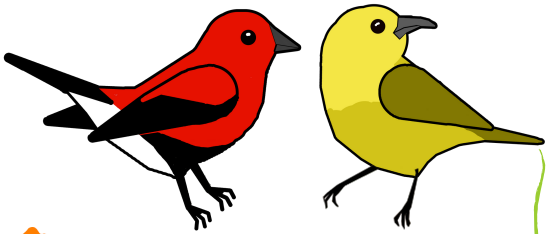
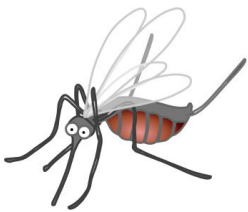
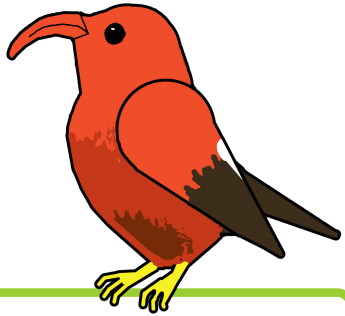


Culex quinquefasciatus female mosquitos fly during the night to standing water where they will lay their eggs. They will leave eggs in standing waters ranging from wastewater areas to bird baths, old tires, or any container that holds water. If the water evaporates before the eggs hatch or the larvae complete their life cycle, they die.





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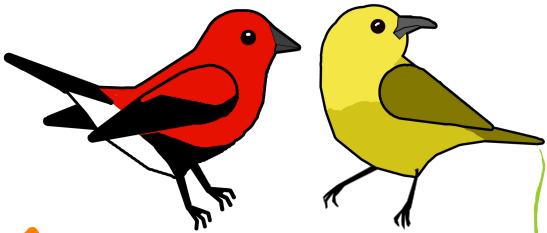
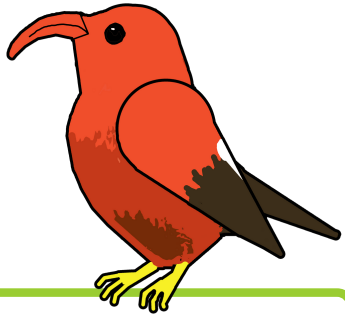


Both male and female mosquitoes take sugar meals from plants. Following mating, the female seeks a blood meal. *Culex quinquefasciatus* female mosquitos will feed on mammals and/or birds throughout the night. Males survive only on sugar meals from plants.



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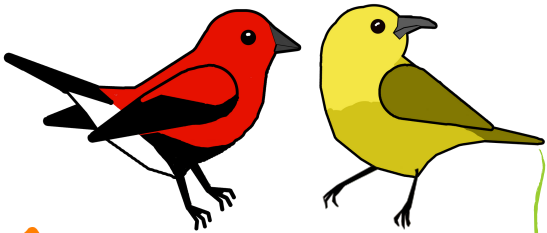
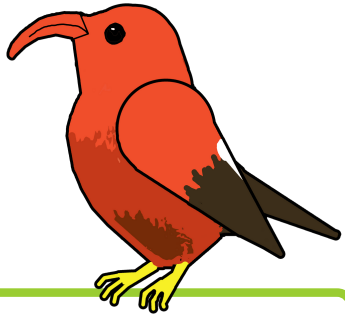


Today, most of the original vegetation on the Hawaiian islands has disappeared through clearing for agriculture and urban use. The extensive alteration of native ecosystems, along with the introduction of non-native species, has greatly accelerated the rate of extinction of native plants and animals. Today, Hawaii contains a full 30% of all federally listed endangered species in the United States.



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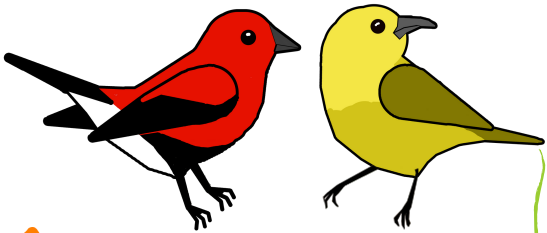
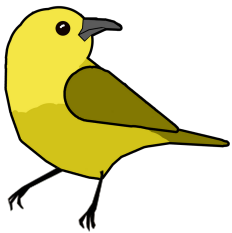
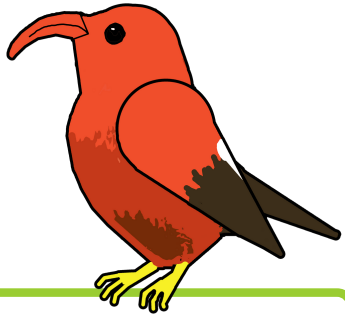


'Amakihi honeycreeper populations in **low elevation** habitats are developing resistance to bird malaria. These populations have rebounded and 'amakihi have become common in regions in which they were previously rare or absent.





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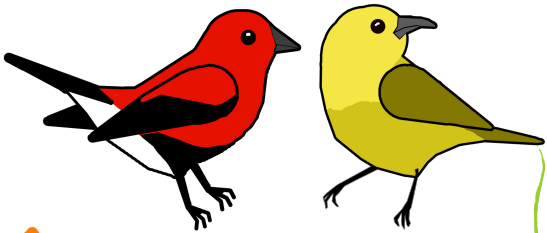
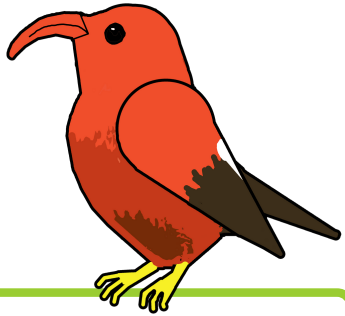


Scientists can create and release sterile male mosquitoes. This is effective in decreasing malaria in **wet and warm habitats** where there are lots of mosquitos and they produce quickly. It has no effect in **dry, cool habitats** because the mosquitos don't live there.



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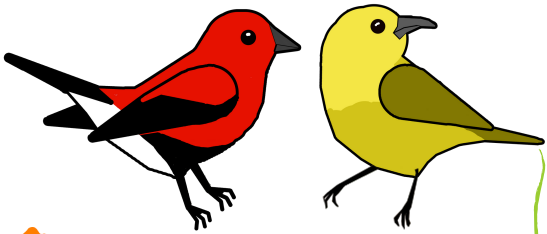
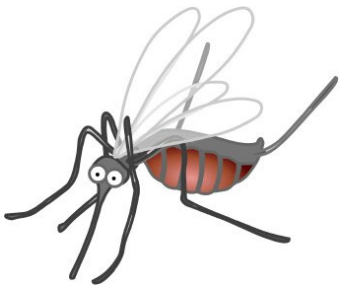
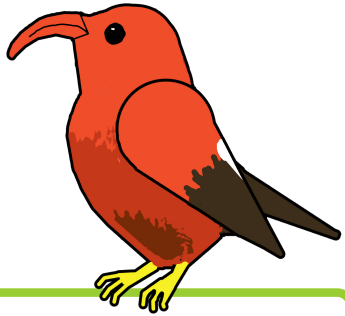


Scientists can genetically engineer mosquito males that won't reproduce. The mosquito population decreases as a result especially in warm, wet environments where there are lots of mosquitoes.





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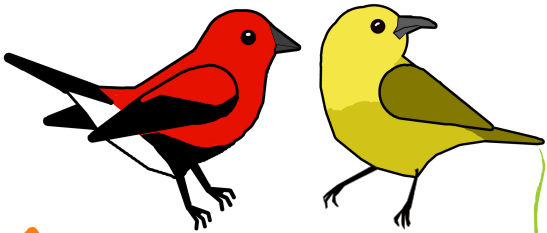
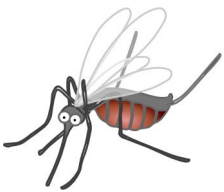
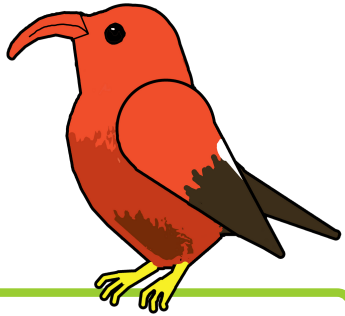


Since mosquitoes are cold blooded their activity is greatly affected by temperature. They flourish in moist, relatively warm environments, functioning best at 80°F. Once the temperature lowers to about 60°F they become lethargic and anything below 50°F they find it hard to function at all.





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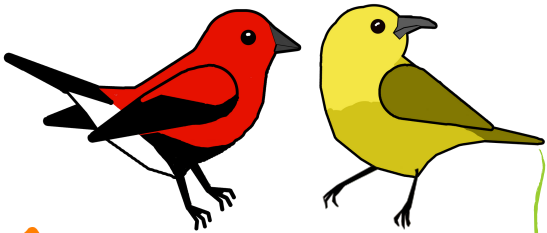
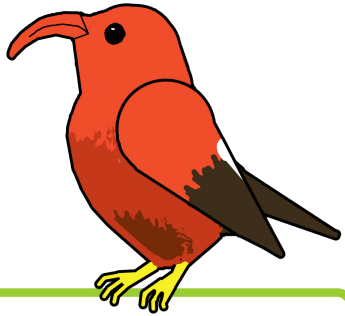


Honeycreepers build their nests in the terminal branches of ʻōhiʻa trees and get food from their nectar producing flowers. Loss of these trees due to habitat destruction or disease will greatly affect the honeycreeper population.



Honey Creeping