The Gems

Welcome to The Gems' Essay! We combined groups 10 and 12 to form our group. For, our essay, we researched how technology can help to save endangered species.

Introduction

According to a mathematical model developed for extinction, 99.9% of all species that have ever existed are now extinct (Newman, 1994), and many more are endangered. With the help of organizations that fund sciences such as tagging and tracking, organizations, reproduction techniques, cloning, and motion cameras, we can prevent these endangered species from becoming extinct and build their population so that they are no longer threatened.

Organizations Helping to Save Endangered Species

Tagging animals can help scientists to save endangered species. This technology can help track animals and study their migration and territory patterns. Scientists capture a small sampling of a certain species and tag them. Tags are put under skin like many household pets, through the skin like a piercing, or on birds, around the ankle as shown. Some tags act more like a marker. With these tags, scientists will go to the same place and recapture the same amount of animals to tag as before and count how many have already been tagged. This method is called mark-and-recapture.

The simplest tracking tag consists of a unit that stores the information in its memory. To access the data, the tag must be retrieved so that the data can be downloaded. Some of these tags have radio transmitters that will transmit the data once it is within the range of its corresponding receiver.

Other, more complicated tags use a cellular network like your cell phone uses to have two-way communication. The researcher can then get the data from the tag in real-time as long as it is in range of the cellular network. The programming of the tag can also be changed so that the researcher can change for often the tag transmits data or turn the tag off, even from a distance. (van Hooijdonk, 2008)

The most complicated and most expensive tag uses a satellite network. You have probably used a satellite positioning system like this if you have a Global Positioning System (GPS) in your car. These tags provide global coverage and can be programmed to transmit information at regular times each day, week, month, or year. These tags do not however, provide real-time coverage like the cellular tags would because the information call only be received when a satellite is overhead. (Snively, 2009)

GPS tracking has been used on the endangered snow leopards. One thing the researchers hope to learn is how much space a snow leopard needs. They are a solitary, territorial animal. The researchers also hope to learn more about the elusive animal so that they can work to bring them out of endangerment. Similar things have also been done for other endangered species such as blue cranes and sea turtles. (Anitei, 2006)

With the help of the animal tagging and tracking technologies, more endangered species will be saved. By watching the migration and movement patterns of endangered species, researchers can determine the reason for their endangerment and can work to prevent the extinction of the species. In the future, we may not have any endangered animals.

Websites

GPS-practice-and-fun.com. 16 Feb. 2009 http://www.gps-practice-and-fun.com/gps-wildlife-tracking.html.

maps-gps-info.com. 16 Feb. 2009 http://www.maps-gps-info.com/gp-trkg.html.

"Tracking Solutions." Sirtrack. 16 Feb. 2009 http://www.sirtrack.com/tracking_solutions.asp.

Anitei, Stefen. "Snow Leopards and GPS." 28 Nov. 2006. Softpedia. 16 Feb. 2009 http://news.softpedia.com/news/Snow-Leopards-and-GPS-41228.shtml

. Pictures

"Tracking Band." 16 Feb. 2009 http://www.naturalsciences.org/prairieridge/What_Time_shrike.html.

"Cellphone." Photograph. 16 Feb. 2009 http://www.info4u-services.com/cellphone/.

"Satellite." 16 Feb. 2009 http://www.aero.iitb.ac.in/home/zephyr/index.php?option=com_content&task=view&id=57&Itemid=9.

"Snow Leopard." 16 Feb. 2009 http://news.softpedia.com/news/Snow-Leopards-and-GPS-41228.shtml.

Organizations Helping to Save Endangered Species

One of the most common organizations currently saving the endangered species all around the world is World Wildlife Federation (W.W.F.) They have been around and established for more than 45 years and are continuing to save and prevent extinction. Found in more than 100 countries with more than 1.2 *million* workers in the U.S. alone (more than 5 *million* globally), the WWF uses many science technology techniques to save and protect the animals. They try to make the animal population abundant and make it continue to grow. Some of the missions/goals are to protect animals while still in their natural environments/habitats. Another part is to use natural resources to prevent waste/pollution by finding and using more efficient ways of energy to help reduce pollution as efficiently as possible. One of the WWF major goals and priorities is to conserve 19 of the world's natural places to change the global market all by 2020. 82% of WWF's spending goes to worldwide conservation activities. WWF uses technology such as websites, blogs, and other scientific explorations to keep in contact with all of the supporters and colleagues helping with the survival of the animal race. (1)

A second organization striving to save animals is WildlifeDirect based in Africa. Their main focus is to save animals in the wild solely in developing countries such as a few in Africa because their habitats are being destroyed at an alarming rate. WildlifeDirect believes that unless drastic measures are taken, future generations won't have the privilege of biological wealth and diversity. They want to make sure everyone is up to date with efforts so therefore they post on online diaries and blogs. This ensures that donors and workers can communicate and talk about donations and new activities. WildlifeDirect's goal is to make a global awareness about the endangered lives of animals not only in Africa but all over the world. They want people all around the world to know about worldwide efforts to save the species. Donations and fundings towards WildlifeDirect go directly to the organization to buy supplies and necessities so the animals can be taken good care of. WildlifeDirect started out in Africa as an organization to save the endangered gorillas in the Virunga National Park and is growing to make a huge impact on the wildlife-saving-organizations. The mission is to prevent forests from being cut down, poachers, and of course prevent diseases from wiping out whole species. WildlifeDirect uses technology like websites, blogs, and new scientific developments to save the animals and keep in touch with all of the concerned people that are trying to help with the attempted survival of the animals. (2)

A third organization founded to save the extinction of animals is the Ecology Project International. Founded in 2001 by Scott Pankratz and Julie Osborn, Ecology Project International has grown to thousands of people in 4 countries whose goal is to share with others the importance of saving turtles and other endangered species. When they first went to Costa Rica, they had 61 local students and teachers to share with and show the importance of monitoring the leatherback sea turtles to prevent their extinction. While they are still growing, Ecology Project International is teaching students how to make a difference to make conservation efforts and to gain educational first hand experiences that will prepare them for more opportunities later on in life. Ecology Project International uses a lot of technology so that they can not only remain in touch with all of the workers, but can find out the best ways to save and protect the dwindling population of animals.(3)

I and many other people hope that more people in the world will be more prone to save the endangered animals that need your help so volunteer and make a difference both locally and globally.

(1) WWF: taken from http://www.worldwildlife.org/home

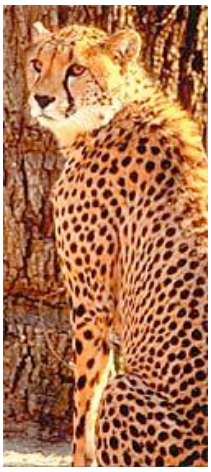
(2) WildlifeDirect: taken from http://wildlifedirect.org

(3) Ecology Project International: taken from http://ecologyproject.org

Reproduction Techniques

Often, natural reproduction does not work, so scientists must use assisted reproduction, Scientists work with zoos around the world to create assisted reproduction techniques. These methods are used to increase genetic diversity in small populations, (like endangered species), to prevent inbreeding. The techniques include artificial insemination, 'in vitro fertilization', and cryopreservation [1] (which is the process where cells or tissues are preserved by cooling them to temperatures below zero (-196^{o}C).

To carry out these methods, and Genome Resource Bank (GRB) (or 'Frozen Zoo') is needed. A GRB is a frozen 'collection' of biological materials such as sperm, embryos, tissue, blood products and DNA. Shipping such materials is less stressful than transporting the animals themselves.



Cheetah produced by artificial insemination[1]

Frozen leopard sperm[2]

Frozen leopard embryo[2]

In the Arabian Peninsula, scientists at the Breeding Centre for Endangered Arabian Wildlife in Sharjah, UAE have set up banks for the Arabian leopard, Sand gazelle, Asian Cheetah, and Gordon's Wildcat. Even with this, there is still a large amount of material to be cryopreserved before it is too late. [2]

In the United States, two black-footed ferrets at the Smithsonian National zoo have each given birth to a kit. These endangered ferrets were artificially inseminated with the frozen sperm from two deceased males. Only 3 black-footed ferrets have been born using this method. The black-footed ferret breeding also depends on computerized match- making so that the best ferrets can be mated together.[3]

[1]http://nationalzoo.si.edu/ConservationAndScience/ReproductiveScience/ConsEndangeredCats/
[2] http://www.arabianwildlife.com/current/fr_zoo.html
[3]http://esciencenews.com/articles/2008/09/02/black.footed.ferrets.sired.males.died.8.years.ago

Animal Cloning/DNA

Animal Cloning is the process when an organism is recreated from a cell taken from the "parent animal". Scientists have been successful in producing animals like rats, cats, horses, pigs, deer, etc. They can even clone human beings now.

Reproductive cloning is used in a process called "somatic cell nuclear transfer", when scientists take material from the nucleus of an adult cell to an egg whose nucleus has been removed. Once the embryo reaches a certain stage, it's moved to the uterus of a female host where it develops until birth.

An extinct species of mountain goat called the Pyrenean ibex, has been "resurrected" by scientists who created a clone of it with domestic goats. Sadly, it was short-lived because the new-born kid died in minutes of being born as it had breathing problems caused by deformed lungs. But, it was a first because no one had been able to create a clone of an extinct species before.

The cloning process is still very inefficient; it once took 277 tries to get one live, healthy sheep. An earlier attempt to clone sheep ended in failure in 2003, with two pregnancies from dozens of attempted embryo transfers. Both pregnancies did not get beyond the two-month stage. There's also some evidence that offspring created by the cloning aren't normal. Cloned mice for example, do not seem to live as long as ordinary mice.

So why do scientists want to clone endangered animals? Because some endangered animals are so rare and so difficult to breed in captivity that cloning offers a way to continue the line; without it, animals could die out, in captivity or not. And yet, cloning is probably not the answer to endangered animals simply because the biggest threats to wild animals today are habitat loss, human encroachment, poaching, pollution and climate change.

Cites:

www.buzzle.com/articles/animal-cloning/
www.ornl.gov/sci/techresources/Human_Genome/elsi/cloning.shtml#whatis

Motion Cameras

Motion sensor cameras are one of the many ways to help an endangered animal with technology. Motion cameras can be disguised to look like its surroundings so they do not disturbed the animal in any way. Even the flash isn't blinding.

[3] *This is the camouflaged version of the sensor camera.*

These cameras can withstand all kinds of weather. Snow, sleet, rain, and blazing heat are only a few examples. Because of this, these cameras can go places where humans cannot. But weather isn't the only factor, some animals are too dangerous to get close to, such as the cougar and wolves below.

 [4]
 [5]

Motion cameras catch many non-threatened animals on film, such as deer and foxes. Since endangered animals are, well, endangered, they are much harder to get on camera. The good thing about this is, the cameras have almost unlimited patience, unlike a human were they would have to give up one time or another.[1]

These cameras also recorded threats of endangered animals. The endangered Amami rabbit is a small rabbit that are continuously under threat by cats and dogs. With these animals under threat, a motion camera was set up to find threats like this[2]:

 [2]

With this, researchers know that there are threats out there, and they can take further precautions to keep this lovely creature safe.

Citations:

Trail cameras 10-31-05 Author unknown
http://www.kk.org/cooltools/archives/001004.php [1]

Pink Tentacle 11-19-08 Asahi http://www.pinktentacle.com/2008/11/scientists-clone-endangered-amami-rabbit/#comments [2]

Blogspot 9-18-08 Bushnell Trail Cameras http://bushnell-trail-cameras.blogspot.com/ [3]

Andes to Amazon © 2006 Botanical Research Institue of Texas
http://www.andesamazon.org/components/fauna/camera_traps.aspx [4]

Howl Box 3-20-08 Matt Ransford http://www.popsci.com.au/category/tags/howlbox [5]

Conclusion

So, as we hope you can now understand the importance of saving endangered species, we would like to take the time to review what we have already laid before you.

1)TAGGING AND TRACKING: It's a great way to follow the movements of animals. It will help scientists in further research by aiding in the study of habitual living space and the movements of animals.

2)ORGANIZATIONS: A lot of people don't realize how many (or few) organizations there are that are focused in saving the needy species. You should take a look at the websites and learn even more.

3)REPRODUCTION TECHNIQUES: This method allows scientists and researchers the ability to avoid inbreeding and allows them to mix the frozen sperm cells with female bodies so as to, in a way, create new animals.

4)CLONING: Cloning can reproduce even extinct animals as long as scientists have a cell of that animal. Cloning is still almost certainly not the conclusion to the problem of endangered animals.

5)MOTION CAMERAS: This science is a harmless way to view the life/actions of not only endangered species but also it is a way for people to take a closer look at wildlife. The creators made sure that the flash of the camera won't harm the animals.

We all hope that after reading our essay, you will be not only better informed, but also more willing to save/protect species. All it takes is a few minutes to learn more about different ways people all over the world are contributing to helping others. More research might lead to the aid of no extinction. So...be a kind person and learn. Trust us when we say that it isn't hard so learn and spread your knowledge.

We hope that you enjoyed learning about some of the struggles and the ways they are changing. Hopefully those struggles will be able to change for the better and the number/percent of extinction will slowly(yet surely) go down. No matter how hard you think your life is, please stop and think about all the animals that are slowly disappearing. Thank you for your time, we hope we have informed you well and can continue to do so.