Duck, Duck, GOOSE!

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Standard Statements:

Explain pest control. 4.5.4.B
Know reasons why people control pests.
Identify different methods for controlling specific pests in the home, school and community.

Explain benefits and harmful effects of pests. 4.5.7.A
Identify several locations where pests can be found and compare the effects the pests have on each location.

Explain how pest management affects the environment. 4.5.7.B
Identify issues related to integrated pest management that affect the environment.

Research integrated pest management systems. 4.5.12.A
Design and explain an integrated pest management plan that uses a range of pest controls.

Standard Statements for Additional Categories in Environment and Ecology:

Environmental Health
Describe how human actions affect the health of the environment. 4.3.7.B
Identify land use practices and their relation to environmental health.

Ecosystems and Their Interaction
Explain how ecosystems change over time. 4.6.7.C
Explain how specific organisms may change an ecosystem.

Threatened, Endangered and Extinct Species
Explain how species of living organisms adapt to their environment. 4.7.7.B
Explain how structure, function, and behavior of plants and animals 4.7.10.B affect their ability to survive.
Describe an organism's adaptations for survival in its habitat.

Environmental Laws and Regulations
Explain the role of environmental laws and regulations. 4.9.7.A
Explain the role of local and state agencies in enforcing laws and regulations.

Content Objectives:
Student will be able to:
Explain why some migratory Canada geese, in terms of their biology, become resident geese.
Identify ways in which resident Canada geese are considered pests.
Explain how human activities may impact an environment to favor the overpopulation of one species.
Identify different IPM tactics which may be used to manage a population of geese.

Suggested Level:
Grades 6-10

Standard Category:

4.5.4 B
4.5.7 A
4.5.7 B
4.5.12 A

Materials:

Video: "Suburban Goose Management: Searching for Balance". Media and Technology Services, Cornell University, 1998. 28 minutes (Borrowed from PA IPM Program - order on web site)

4 stakes (4' tall) per group
"Eye-spot" balloons
Kites shaped as birds of prey
Mylar tape (6-foot x 30-inch)
Colored mesh vegetable bags
Plastic garbage bags
Scarecrows
Note: See "List of Suppliers"

Instructional Strategies:

Direct Instruction
Observing
Thinking Skills
Problem Based
Small Group Project
Discussion

Design an experiment to modify the habitat of resident geese.
Explain why the management of wildlife is regulated.

Assessment Strategies:
Student should be able to:
Design and conduct an experiment to modify the habitat of Canada geese.
Record observations, analyze data and communicate results in a lab report on the effect a management tactic(s) had on the behavior of the geese.
List at least four factors which have contributed to the overpopulation of Canada geese in urban environments.
List several IPM tactics used to control goose populations which are regulated by state and federal agencies.

Background:

In the early 1900's Canada goose populations nearly disappeared in many parts of North America due in part to draining of wetland habitats and unregulated hunting and gathering of eggs. With the introduction of the Migratory Bird Treaty Act of 1918 and the creation of protective refuges, the number of geese made a fair recovery. Other human activities including changes made in planting and harvesting techniques and the clearing of land for development created ideal habitats for geese: an abundant food supply and large grassy areas near permanent bodies of water.

The term "urban geese" has been used to refer to the phenomenal growth in numbers of geese which live either most, if not all, of their lives in urban and suburban environments. This includes both "resident" as well as "migrant" geese which spend time in these types of environments from fall to early spring. In eastern and midwestern U.S. and Canada, the subspecies is Branta canadensis maxima, the giant Canada goose. The western U.S. and Canadian subspecies is Branta canadensis moffitti. Migratory populations have decreased in numbers since 1985 due to poor survival rates in harsh environments and low reproduction rates. Resident geese spend most if not all of their lives, however, in areas safe from natural predators. They mate for life and are aggressively protective of their young as are the migrants, but begin breeding a few years younger. In five to seven years, one pair of geese can become 50 to 100 birds. In the central U.S. a few thousand geese estimated in 1965 grew to about 1.1 million by the mid 1990's.

How are geese considered to be a nuisance? The abundance of goose droppings littering recreational areas, such as park grounds, athletic fields, golf courses, and municipal pools has presented quite a dilemma to those responsible for cleaning up the mess. One Canada goose can produce about one pound of fecal matter per day. Health officials are concerned with droppings on school grounds. Although disease or parasite transmissions to humans are not well documented, the potential of a hazard exists. Reports of aggressive behavior of the geese toward pets, children and adults center around the need geese experience to protect their nests and goslings. Geese will beat their wings or snip at someone approaching, to threaten them off.

In natural areas geese trample grass in medium to heavy soils creating "hard pan" which prevents growth of vegetation, erosion and loss of habitat for other wildlife. The effect on the environmental health of ponds and lakes due to heavy concentrations of droppings has been studied. Generally the nitrogen level in grasses when released back into the cycle by geese does not increase levels of nitrogen in nearby ponds and lake. When geese feed on overfertilized grassy recreational areas, however, the nitrogen in their droppings may be in a form that is more available to algae and water plants. This may result in the deprivation of sunlight critical to the survival of other species.

Agricultural losses are also evident as geese trample spring crops such as sunflowers and cereal grains. Yields suffer in corn, soybeans, and alfalfa as well. Other grains grown during the fall and winter can be pulled and trampled.

One of the most significant effects even just one goose can have, however, is in its collision with aircraft. "Bird strikes" have caused 400 deaths since they were first recorded in 1912. It is estimated that only about 20% of bird strikes are reported. Annually bird strikes cause $500 million damage to commercial and military jets. A legal battle is currently being fought by U.S. Air Force officials to prevent a trash company near a base from expanding its operation. In 2001, 48 bird strikes were recorded at the Dover Air Force Base. Other birds such as gulls, hawks, herons, vultures and egrets contribute to the losses. One nonprofit organization has estimated that a 12-pound Canada goose struck by a jet going 150 m.p.h. at liftoff creates a force equal to a 1,000 pound weight dropped from 10 feet!

So what control measures are legally available to prevent geese from being such a pest and in some cases a serious menace to humans, other wildlife and the environment? Examples from several tactics of IPM are provided in the following:

Cultural
People can be educated about the harm they do in attracting geese by feeding them.
The attractiveness of grazing areas can be decreased by reducing or eliminating mowing. Geese prefer young shoots on mowed lawns and this also makes it more difficult for geese to have an unobstructed view of their surroundings to be on guard for predators.
Plants such as mature tall fescue can be substituted for the preferred Kentucky bluegrass.
Alternate feeding areas can be created or "lure" crops can be used to prevent crop damage.

Physical
Techniques to frighten geese away from problem areas can be used. Although geese may adapt to a change in their environment, using several techniques together may prove to be successful. Noisemakers include motorboats on a lake or a pick-up truck on an airfield, shooting blanks from a rifle, propane cannons and other pyrotechnics. Barriers include mylar fencing or the planting of shrubs around a pond. Visual repellants are brightly colored (preferably orange, yellow or red) scarecrows, balloons with large contrasting eyespots, kites shaped like birds of prey, and mylar strips taped to a post which also create shrieking sounds.

Biological
Border collies are perceived by geese as predators and can be used to harrass them. A state permit may be necessary for their use. During midsummer when geese have lost their flight feathers in molting, dogs should be on a leash to prevent the capture of geese. Other biological methods requiring a permit are lethal management techniques. Hunting, damaging eggs by oiling (sealing off the exchange of gases), puncturing eggs, sterilization practices or even herding the geese for a capture and transporting them to be processed for a charitable donation to a food bank.

Chemical
Repellants available for turf areas are ReJex-iT and Bird Shield. They are made from a "nontoxic", biodegradable food ingredient called methyl anthanilate (MA). MA makes grass unpalatable. These methods are expensive if applied on large areas.

Regulatory
The U.S. Fish and Wildlife Service and the Pennsylvania Game Commission issue permits in some situations for the destruction of geese. If determination has been made that artificial feeding has been terminated, hunting has already been tried in areas where possible, nonlethal techniques have been unsuccessful and there is an immediate threat to human health and safety, a permit will may be issued for the use of lethal techniques. Birds gathering at an airport is one such case.

Procedures:
1. Group students to brainstorm ways in which they perceive Canada geese to be pests and to identify locations at which they have observed them. They should analyze what these areas have in common.
2. Share group findings in a class discussion.
3. Show video "Suburban Goose Management."
4. Identify a local area in which it is feasible to modify a habitat. If geese congregate on school grounds this is ideal. If not, arrangements may be made through local officials or a grounds manager in a park to study a habitat off school property and transportation may need to be provided.
5. Inform students that they will be working in small groups to research ways in which habitats have been modified to make them less attractive to geese. Discuss the background information. Provide supplemental resources and related web sites.
6. Discuss federal and state regulations to determine if a permit is needed to conduct an experiment. Direct student attention to physical tactics which are generally permitted. See the "List of Suppliers" and be sure to have a range of materials available. Note: Federal and State Regulations prohibit the hazing of geese during nesting season.
7. Provide students with 4 stakes per group to form a quadrat within the selected area. Students should decide the

arrangements of these quadrats, the distance between each experiment, and whether they want to use one type of hazing material or more than one. Materials can be tied to the posts or staked down within the quadrat.
8. Discuss ways to determine the effectiveness of the "hazing" techniques. Students may suggest making qualitative observations of a possible change in the behavior of the geese or making quantitative observations such as in counting fecal droppings in their quadrats before and after placing the materials. (If this option is selected, teachers should handle the "sanitation" of the area over the duration of the study).
9. Once quadrats are in place, it should be determined over what time period the experiment is to be conducted. All materials must be removed prior to nesting season.
10. A formal lab report should be written by each group of students (or submitted individually).
Students should share results of their experiment with other groups. Class discussion should also include answers to the following questions:
1. What determines the "threshold level" at which geese are considered pests? Describe a situation in which one geese could be a pest and one in which it would take a population of about 60 geese to be seen as being pests.
2. Why is it necessary for wildlife that is considered a pest to be regulated by government agencies?
3. How did observations made at the beginning of the experiment compare with that at the end?
4. Why are methods selected to manage geese living in field habitats different than those which remain closer to water sources? Describe how they are managed differently.
5. Provide a list of at least four reasons why overpopulation of urban geese has occurred. Regardless of the regulations involved, select another management tactic (other than lethal methods) and explain why you think it would be effective.
Estimated Duration:
4 - 5 class periods for the preliminary instruction, class discussion, and set up of research materials in the field; observation time may vary in length

Conclusion:
In this activity students have recognized that as geese become readily adapted to urban areas for their habitat, they increasingly compete with people for space. Students have discussed problems ranging from the nuisance of walking through recreational areas littered with droppings to the direct threat of bird strikes on aircraft. They have identified ways in which geese threaten the existence of other wildlife. They have described differences between short-term solutions, including scaring techniques in addition to lethal strategies. Many materials were made available for students to investigate hazing strategies. They have shown evidence of understanding concerning the risks and benefits associated with the IPM tactics discussed. Students have completed their own group experiment using a physical means of management and have shared the results with their classmates.

Extension:
Invite local officials or other persons responsible for the maintenance of public areas to speak to the class about management tactics which have been used on geese or on other pests in the community.

Conduct a role playing activity in which each member of a group represents a special interest in managing or removing geese from an area. They must agree to a plan to manage geese in that scenario.

Research related web sites and arrange for students to share their research online with others conducting similar studies.

Arrange for state wildlife officials to speak with the class on the importance of regulating wildlife populations. (USDA-APHIS-Wildlife Services in Pennsylvania: 717-728-0700)

Resources:

Gelb, Jonathan. "Air Force faces a new foe at Dover: Birds." The Philadelphia Inquirer 15 July 2002: B1, B9.

Smith, A.E., S.R. Craven, and P.D. Curtis. 1999. Managing Canada Geese in Urban Environments: A Technical Guide. Jack Berryman Institute Publication 16, and Cornell University Cooperative Extension. Ithaca, N.Y.

Suburban Goose Management: Searching for Balance. Media Technology Services, Cornell University. Videocassette, 1998.

Williams-Whitmer, L.M., Brittingham, M.C., and Casalena, M.J. "Geese, Ducks and Swans." Wildlife Damage Control Fact Sheet #6. College of Agricultural Sciences, Cooperative Extension, Penn State University, 1996.

Related Web Sites:

U.S. Department of Agriculture:
www.usda.gov

Pennsylvania Game Commission:
www.state.pa.us/PA_Exec/PGC

Cornell Urban IPM Program:
http://www/nysaes.cornell.edu/ipmnet/ny/urban/index.html

PA IPM Program (to order video):
http://paipm.cas.psu.edu

List of Suppliers:

Arbico
P.O. Box 4247
Tuscon, AZ 85738-1247
Fax: 520-825-2038
Telephone: 800-927-2847
E-mail: arbico@aol.com
Web site: http://www.usit.net/biconet

Gurney's Seed and Nursery Co.
110 Capital St.
Yankton, SD 57079
Telephone: 605-665-193
Fax: 605-665-9718

Margo Supplies Ltd.
P.O. Box 5400
High River, Alberta, Canada
T1V 1M5
Telephone: 403-652-1932
Fax: 403-652-3511

Nasco Farm and Ranch
Telephone: 800-558-9595
Web site: http://www.nascofa.com
E-mail: info@nascofa.com

Sutton Ag Enterprises
746 Vertin Ave.
Salinas, CA 93901
Telephone: 408-422-9693