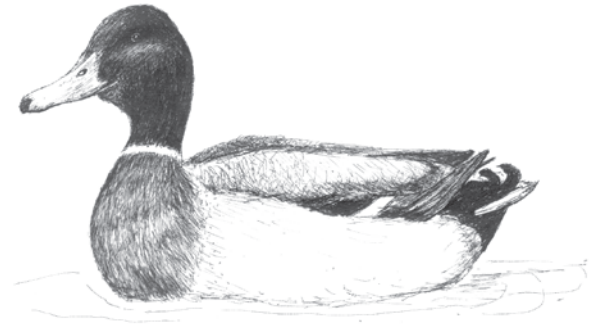


# Winter Birds

## Cool trees



## Teacher's Manual

### Grade 5



## SWAN LAKE-CHRISTMAS HILL NATURE SANCTUARY

### GRADE 5 PROGRAM

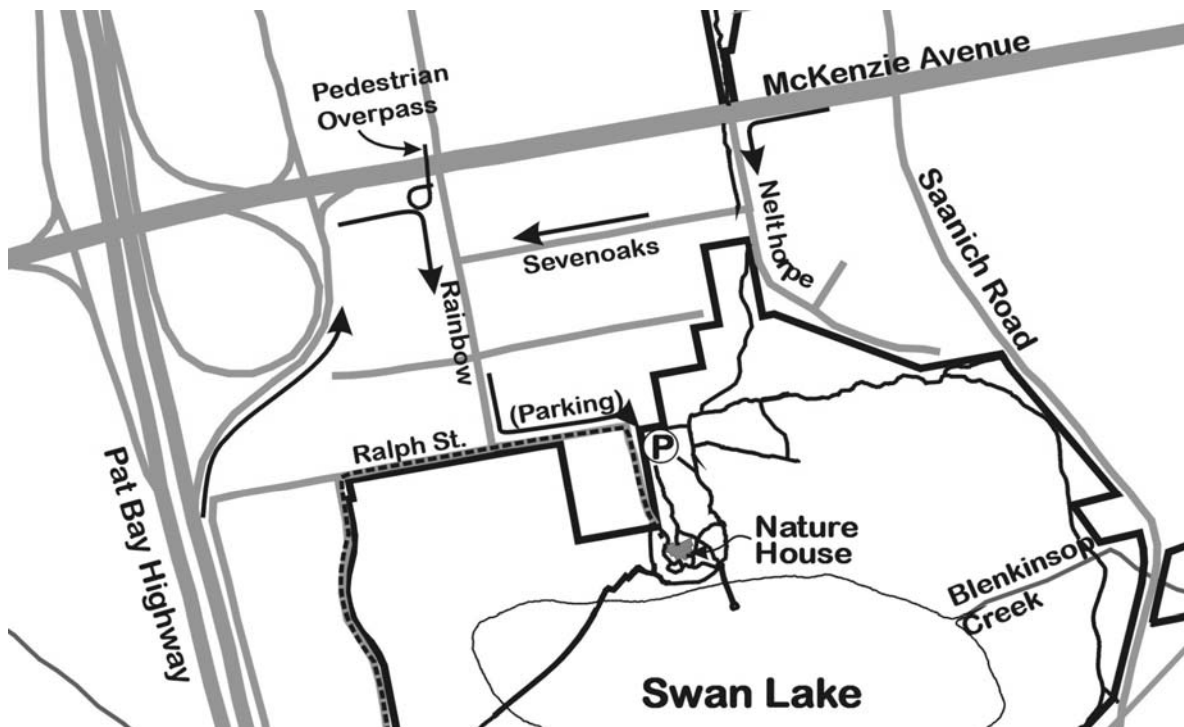
**Welcome to Swan Lake!** We hope this booklet will give you some background information to help you prepare your class for their visit.

#### **BEFORE YOU ARRIVE:**

1. Provide each student with an easily read, waterproof **name tag**.
2. Have each student bring a **pencil**.
3. Students may bring their own **binoculars**. Please check that these are appropriate adult quality. **We do provide binoculars for each student.**
4. Please encourage appropriate **clothing** for the weather. Remember that at least half of your program is outside.
5. Divide your class into **TWO groups** before the program. It is very helpful and necessary to have another adult to go along with one group, so that they can manage any problems that may arise, i.e. taking a student to the washroom.

**Thank you for your cooperation.**

**WE'LL MEET YOU IN FRONT OF THE NATURE HOUSE.**



## INTRODUCTION

**Swan Lake Christmas Hill Nature Sanctuary** is dedicated to preserving part of the Saanich peninsula's natural heritage. Our Society's Mission is to foster an understanding and appreciation of nature through direct experiences that will develop personal responsibility for the care and protection of the natural environment. Management of natural areas like urban parks is becoming increasingly important to the preservation of our local living resources.

The lake and the surrounding lowland area provide a rich habitat for a variety of wildlife.

Swan Lake was formed 12,000 years ago when the last glacier receded. The underlying bedrock, exaggerated by the scouring action of the glacier, provided the basin which defined the lake boundary.

Today, the lake is shallow, warm and flourishing with life. The lake is fed by a large watershed to the north and east which includes Blenkinsop Lake. The water drains westward from the lake into the Colquitz River and meets the ocean at Portage Inlet.

As the seasons change, so do the plants and animals that are here. During the winter months, the lake and flooded fields provide resting and feeding areas for a variety of grebes, ducks and other waterfowl. In spring and summer, the forests and blooming hedgerows are filled with nesting birds such as warblers, sparrows, wrens and finches. The fields of cattails and marsh grass are alive with calling red-winged blackbirds and marsh wrens.

## OVERVIEW of the PROGRAM

The Grade 5 program identifies 2 living **natural resources** in our local environment: **trees** and **birds**.

Some identification criteria will be used. The effect of winter on trees and birds will be discussed with a focus on some of their adaptations. Data collected will be recorded as "Field-notes".

### 1. COOL TREES - see "Field-notes" to be completed by students

\*an exploration of how trees grow and are adapted to winter survival using:

- a) a young **evergreen** coniferous tree,  
Douglas Fir or Grand Fir
- b) a **deciduous** twig, Horse Chestnut (a non-native species)

### 2. WINTERING BIRDS -see map on which students will record the kind and number of birds



- \*use of naked eye, **binoculars** and possibly a spotting scope
- \*distinguishing types of birds through **field identification**:  
habitat, size, shape, markings and patterns, colour, actions, song, seasonal occurrence.
- \***mapping** of birds on a map of Swan Lake



**Birds in the lake area** may include:

\*trumpeter swan, gull, coot, pied-billed grebe, double-crested cormorant, great blue heron, kingfisher, dabbling ducks (mallard, widgeon, green-winged teal, pintail, shoveller), diving ducks (ring-necked duck, bufflehead, lesser scaup), mergansers (common, hooded).

**Birds around the Nature House** and feeders may include:

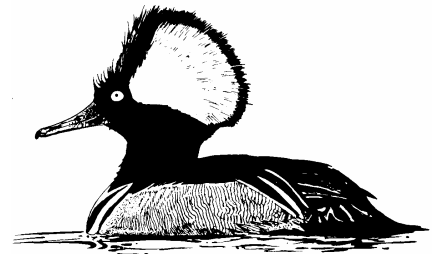
\*robin, towhee, house sparrow, golden-crowned sparrow, song sparrow, fox sparrow, house finch, red-winged blackbird, Anna's hummingbird, crow, raven. Occasionally a raptor may be seen: red-tailed hawk, Cooper's hawk, sharp-shinned hawk, Northern harrier, bald eagle, barred owl, Great horned owl.....

\*\*\*\*\*

### **OUR GOALS**

**Basic goals of the program** are for students to be able to:

1. use binoculars and record data
2. identify some birds that over-winter here
3. recognize some adaptations of trees to winter
4. be aware of patterns of growth in trees



### **IRP LEARNING OUTCOMES**

This program will contribute towards the following learning outcomes:

**Grade 5 Earth and Space Science: Renewable and Non-Renewable Resources:**

- \*analyze how BC's living and non-living resources are used
- \*describe potential environmental impacts of using BC's living and non-living resources

**Grade 5 Social Studies:**

- \*apply critical thinking skills including hypothesizing, comparing, imagining, inferring, identifying pattern, and summarizing to a range of problems and issues
- \*use maps and timelines to locate, interpret, and represent major physical, political and economic features of BC and Canada
- \*describe the location of natural resources within BC and Canada...
- \*explain why sustainability is important

## COOL TREES

In the northern and southern temperate parts of the world, life can be hard for plants in winter. **Dormancy and other adaptations** allow them to survive the conditions of winter.

Leaves are continually losing water to the atmosphere by evaporation. This loss is called **transpiration**. As the temperature decreases, the rate of activity in the root cells also decreases and the leaves can no longer be supplied with sufficient water. In very cold areas, the soil water freezes and no water uptake is possible. By losing their leaves and becoming dormant, deciduous plants can over-winter. Leaf scars containing bundle scars (where veins entered and left the leaf) are formed on the twig when the leaves fall.

Evergreen trees have various "secrets of survival" or adaptations. As in deciduous trees, the cell sap is a solution of various compounds and has a **freezing point less than 0 degrees C**. The leaves are thicker than those of deciduous plants and have thick surface **cuticles** to reduce water loss. Most stomata, the openings through which water escapes, are on the under-surface of the leaves or needles. Evergreen leaves have a layer of **waterproof material** (resin or oil), just under the cuticle. The small, **needle-like** leaves of conifers have a reduced rate of transpiration due to the reduced surface area. Broad-leaved evergreens such as arbutus shed cold rain and snow from shiny leaf surfaces.

Evergreen trees do shed old leaves but not all at one time. The Arbutus, a native broad-leaved evergreen, sheds a large number of leaves in July. What happens to the fallen leaves, the tree's garbage? Nature's Garbage Squad, the decomposers, munch them...earthworms, slugs, millipedes, fungi and bacteria. Imagine what Swan Lake would look like after 10,000 "falls" of leaves, if it were not for the activity of these decomposers.

During the previous growing season, all plants, deciduous and evergreen, develop **buds**, protected from inclement weather by **scales**. Scales are specialized leaves covered more heavily with wax, resin, or other **waterproof material**, than other leaves. The miniature leaves and flowers for the next season are contained within these buds.

The **age** and the rate of growth of a tree or twig can be measured. In deciduous trees, **terminal bud scale scars** from previous years can be seen, and hence the amount of growth for each growing season measured. In coniferous evergreens, the central bud becomes the trunk and the lateral buds, the side branches. The age of some young conifers can thus be determined by counting the number of **whorls of branches**. "Good" years and "bad" years can be determined by measuring the distance between whorls of branches. If the central bud of a conifer is damaged, a lateral branch, sometimes two or three, will grow upwards becoming the main trunk(s).





## WINTER BIRDS

### 1. Introduction to Swan Lake

Victoria and most of BC was covered by around 1 Km of ice during the last ice age, 15,000 years ago. The glaciers helped to shape the bedrock surface of the land, partially gouging out the hollow which is Swan Lake. The inflow, **Blenkinsop Creek**, is at the east end of the lake and drains **Blenkinsop Lake** about 2.4 Km away. The outflow, **Swan Lake Creek**, is at the west end and travels about 2.7 Km to join the **Colquitz River** which flows into **Portage Inlet**.

The lake is fairly **shallow**, 5 m. at its deepest point in the summer, with a deep muddy bottom.

For more than 100 years, people have moved into the area around the lake, clearing the forests and building farms, houses, roads in ever increasing density. The run-off from these lands goes to the lowest point in the area which is Swan Lake. With the forests gone, the water runs off the land much faster, taking rich topsoil, fertilizers and other nutrients down to the lake. Swan Lake has a very large drainage basin (ratio of basin: lake being 100:1), so the effect of people on the amount of nutrients in the lake, the filling in of the lake and ultimately the aging of the lake, has been very great.

The lake is warm in the summer, and being so nutrient rich, it has an abundance of plant life, and small aquatic insects. Each fall, the plants die back and become part of the rotting "compost pile" at the bottom of the lake. This in turn provides nutrients for new plants in the spring, and so the cycle continues.

In the winter, rainfall increases, and so does the level of the lake. Water flows into the lake from the drainage basin faster than it runs out. The water flows over the lake edge and into the flood plain, the fields of grasses around the lake. Water-birds can then swim through this area which provides a supply of winter food. In the spring, the receding waters leave nutrients behind in the soil to fertilize a new crop of grasses, and eventually next winter's food for the water-birds.

### 2. BIRDING

Several kinds of birds are able to over-winter in Victoria because our **climate is mild and food is available**. Water-birds particularly enjoy Swan Lake because they find it a rich source of food. Puddle ducks, or **dabblers**, can swim along the edges of the lake and across the flood plain, readily finding seeds, grasses, aquatic plants and small aquatic animals. Because the lake rarely freezes, **diving ducks** have year round access to submerged plants, fish and small aquatic animals. Ducks have a characteristic "duck bill",

which has strainer-like lamellae (bumps on the edges of the beak) to strain food from the water. With no teeth, ducks grind their food in a special stomach called a crop.

**Seed-eating birds** also over-winter in Victoria, There are many kinds of seeds and fruits available for birds, and water rarely freezes. Some insect catching birds like woodpeckers are able to find insects living inside trees or hibernating in crevices. Most **insect-eating birds** that catch insects in the air **migrate** to warmer places.

**Birds stay warm and dry** because:

- a) there are **2 kinds of protective feathers**, "downy" and "contour"
- b) a **blanket of air** is trapped in the feathers
- c) feathers are **waterproofed**.

Birds are **warm-blooded**, controlling their body temperatures which are usually higher than ours. There are 2 types of feathers involved in insulation:

**downy feathers** - next to body, soft, fluffy, no main shaft, barbs not interlocked, trap air well

**contour feathers** - outer layer, give body stream-lined shape, have a vane, barbs interlocked, and trap air.

In general, birds have more feathers in winter. These are fluffed up to form a **blanket of warm air** next to the skin for thermal regulation. The skin temperature of the feet is kept at a much lower level to avoid heat loss through conduction or convection. This occurs because of circulatory structures that control the flow of blood to and from the feet.

**Air trapped in a bird's feathers increases buoyancy.** Dabbling ducks like the mallard, with approximately 10,000 feathers, keep quite buoyant with trapped air and "ride" fairly high out of the water. This allows them to take off into the air faster.

Diving ducks can flatten their feathers, decreasing the amount of trapped air and thereby their buoyancy. With their increased density they can then dive deeper.

**Feathers are waterproofed by oil** produced in a gland at the base of the tail. The bird rubs oil on its bill, and then spreads it on the feathers. This "**preening**" also involves pulling the feathers through the bill to "zipper" the feather barbs back together.

The **cormorant**, a diving bird, has feathers that are not completely waterproof. It actually allows water into its feathers to decrease buoyancy. This way it can dive deeper and faster after the fish it eats. After feeding, the cormorant, like a dog, shakes its feathers out and then "hangs them out" to dry.



If a water-bird is soiled by an **oil slick**, the oil sticks the feathers together so the bird can't preen properly. Feathers lose their waterproofing, therefore their insulation properties, and the bird gets soaked to the skin. Treating birds affected by an oil spill involves washing their feathers many times to remove the offending oil. This also removes their own special waterproofing oil, so that the birds should not be released until they produce enough of their oil to waterproof their feathers again.

## FOLLOW-UP IDEAS FOR COOL TREES

1. See *Project Learning Tree*.
2. Look around the **school yard** and its neighbourhood for the different kinds of evergreen and deciduous trees. Use **keys**.
3. 1) Without leaves, trees may be difficult to identify, but many can be identified by their bark. Note differences in the colour and texture. Make a collection of **bark rubbings of trees** in your area. Rubbings are made by rubbing a blunt crayon or charcoal over a sheet of paper held against a tree trunk.  
  
ii) **Twigs** are also useful for telling one kind of tree from another. Look for differences in colour and texture of the stem, and the shape, size, colour, number of scales, and arrangement of the buds; also the size and shape of the leaf scars.
4. **Force branches** of some plants; e.g. forsythia, horse chestnut, ornamental plum, apple, cherry.
5. Keep a **record of when the buds** of different shrubs and trees, around the school, start to open.  
  
For both 4) and 5), observe whether leaves and flowers are in the same or different buds, and whether leaves or flowers appear first.
6. Observations of opening leaves and flowers, can lead into discussions about **water and food transport** in plants. This can be demonstrated by putting plant cuttings, like a celery stalk, into food-coloured water.
7. Review how a tree **grows in height**, and then discuss how a tree **increases in girth**. A useful visual aid is the poster, "How a Tree Grows", put out by the B.C. Forest Service.

8. **Choose a tree** in the neighbourhood, preferably a deciduous one. Do an in-depth study of the tree and keep a record of all the things you discover. Some possibilities are: Map location; height and diameter measurements; monthly drawings (or photographs) to record seasonal changes; detailed drawings of buds, flowers, leaves; records of all animals seen in, on, or about the tree; records of any plants growing on or about the tree; bark rubbings; records of when buds open, flowers bloom, seeds ripen, leaves change colour, leaves fall; and finally a creative story or poem about your tree.

### FOLLOW-UP ACTIVITIES FOR BIRDING



1. See *Project Wild* and other resources from **Wild BC**.
2. Daily **bird count**: students could do these at a regular time each day at school or at home. Specific birds could be noted and counted and new ones identified. A simple bird check list could be made; e.g. gulls, robins, crows, starlings, juncos. Study seasonal variations; discuss migration.
3. Visit Beacon Hill Park, Elk or Beaver Lakes, Kings Pond, or any ocean beach to have a closer look at ducks and other birds. **Record behaviours**. Discuss reasons for certain behaviours like courtship.
4. Build winter **bird feeders** and place them in sheltered spots that can be observed. Be consistent in your feeding throughout the winter. **Study beaks**, their form and function depending on the kinds of food. Anna's hummingbirds stay in Victoria and surrounding areas all year and depend on bird feeders.
5. Develop a unit study on **Food Webs** using animals and plants seen in various habitats at Swan Lake, your school yard and your backyard.
6. Observe the social behaviour of a common species like crows or robins. Have students draw conclusions, check out theories.
7. Study **feathers** using magnifying lenses. Discuss structure and function.
8. Study the effect of **oil spills** on the feathers of a water-bird. See "No Water Off a Duck's Back", an experiment in *Science Is*.
9. **Art** - a **collage** of birds cut from magazines; **clay** modelling; **plaster** casting of footprints....
10. Birds in favourite **songs**, cartoons, poems, stories.  
e.g. The Ugly Duckling, Woody Woodpecker, the Road Runner etc.
11. Do some **creative writing**.
12. Discuss the **environmental importance of birds**, studying birds and recording data from Bird Counts.
13. Discuss reasons for or do **Library research** on the decline of bird populations and how this impacts the environment. Devise strategies for protecting birds.
14. Discuss the pros and cons of birding on **Tourism and on the environment**.

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SWAN LAKE-CHRISTMAS HILL NATURE SANCTUARY

NAMES: \_\_\_\_\_

COOL TREES

Trees breathe and **lose water** through their leaves. In the winter, roots can't get enough water to the leaves. Leaves can also be destroyed by **freezing**.  
So...trees have **adaptations**:

In Fall, **Deciduous trees** \_\_\_\_\_ their leaves.

**Evergreen trees** can keep their leaves because they are **adapted** to winter by having:

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_

**I. YOUNG CONIFEROUS EVERGREEN TREE**

Species of the tree studied \_\_\_\_\_

Number of **side buds** for branches next spring \_\_\_\_\_

Age of tree \_\_\_\_\_

How much it grew up last year \_\_\_\_\_ cm

The year it grew up the most was \_\_\_\_\_

The year it grew up the least was \_\_\_\_\_

If a ribbon is tied on the tree, just below the tip, where will the ribbon be positioned in 5 year's time?

\_\_\_\_\_

If the centre bud is broken off, what does the tree do to replace the damage?

\_\_\_\_\_

**2. DECIDUOUS TREE**

Species of the tree studied: \_\_\_\_\_

**Sketch and label** 1 year's growth of a twig

**terminal bud with scales**

**lateral bud**

**leaf scar**

**bundle scar**

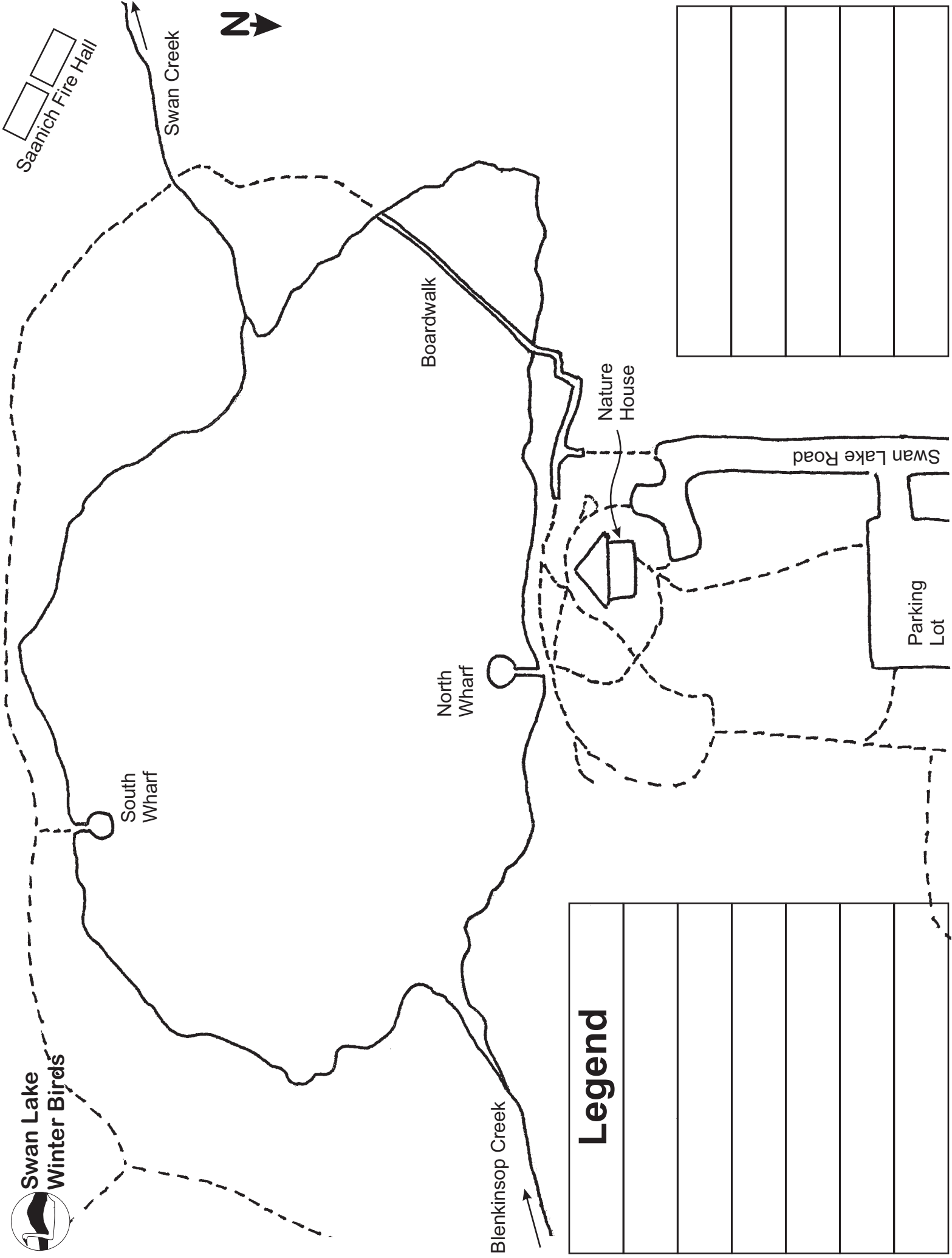
**terminal bud scar**  
(from last year)

How much did your twig grow last year? \_\_\_\_\_ cm

Look at a cut **bud** with a magnifying lens. Find **leaves and flowers**.



Swan Lake  
Winter Birds



<b>Legend</b>
