The flow will also dictate how the sediment is deposited, which in turn contributes to the type of **habitat** available to different types of organisms. Three types of bedforms provide excellent "living" space, including mud, **riffles,** and **pools**. The accumulation of finegrained sediments (mud) in quiet rivers can influence growth for small invertebrates and fish eggs. The mud represents a "cushion", and if disturbed because of increased movement of water, can cause damage to the organisms that live there.





Riffles are relatively shallow portions of a river with a change in elevation where water cascades over cobbles or boulders along its path. The fast-moving water allows gas in the atmosphere to mix with the water, therefore increasing the dissolved oxygen that enters the water system. Behind the rocks are areas that debris can build up and act as a habitat for fly **larvae** and other small invertebrates.

Pools of water are areas that are deeper. When water reaches

a pool the velocity of the water slows down, making it an excellent resting place for fish.

Riffles in a stream

Ground water as it moves through soil and rock is actually being naturally filtered. Some substances like sand can help filter pollutants and particles easily. Clays in soil and rock also act as a way to "capture" and exchange some



elements and compounds when they are dissolved in water. This helps to eliminate other pollutants that filtration cannot handle.

Water is stored in **aquifers**, which have similar characteristics of reservoir rocks that store soil and gas. Well-sorted sediments with high **porosity** (A) and highly **fractured** (C) rocks are excellent candidates for aquifers. If poorly sorted rocks are partially cemented (B), they are not good reservoir rocks. The fluid must have room to move around. An aquifer is not an underground river, it just retains the water until it is pumped out through a well or naturally emerges as a **spring**.



#### WATERSHEDS

A **watershed** or **drainage basin** refers to a system controlled by topography, which defines how water will flow. You refer to a watershed by the largest body of water that the creeks, rivers or streams feed into. For example, all creeks that flow in the San

Francisco Bay are part of the San Francisco Watershed. However, there are many smaller watersheds within this area depending on flow patterns. Alameda Creek Watershed would be an area that drains into Alameda Creek.

When it rains, water will flow into its appropriate



**Continental Divide** 

watershed. A ridge or topographical higher areas that connects two waters are called a **divide**. In the United States there is an area in the Rocky Mountain called the "continental divide." This refers to water

on the east of the divide flows into the Atlantic. The water on the west side flows into the Pacific.



A watershed has an orderly flow pattern. The pattern is dendritic or branching, as it

flows from the headwaters to a larger body of water. When one stream flows into a larger stream or river they are called **tributaries**. The smallest channels in a watershed with no tributaries are called first order streams. A second order stream is when two first order streams join. If you look at the stream order diagram, you can see the creation of a fifth order stream channel. Fifth to sixth order streams are usually larger rivers, while first and second order are often small, steep, or intermittent.



Stream order formation

Watersheds are affected by different physical and climatic differences. Climates refer to the weather in a region over a long period of time. Your location will determine the type

of the seasonal input of water. Temperature of the atmosphere caused by **solar radiation** will also control the rate and nature of the precipitation.

Physical make-up of the area where water flows will also make a difference. If the rocks



Steep Banks formed by rapid erosion As they fall and decompose, they add the organic components to the soil. Trees are the protectors of the watershed. The tree litter protects the soil's surface as the roots of the tree protect the soil from erosion. Trees also provide a canopy that keeps the water cool so organisms



The vegetation in watersheds effects the quality of the water. Grasses, shrubs, and trees make up the majority of plant cover.



Area of influence riparian aquatic don't die of thermal pollution. The **canopy** can also reduce the force of the rain and the velocity of

and the velocity of wind in a watershed.

Plant cover is important to a watershed to prevent the erosion of valuable soil as water rushes downstream. Plant cover also provides food and protection for many small organisms.

The green zone along a stream ecosystem is called a **riparian** area and has several unique properties. Riparian zones have the capacity to buffer rivers and other waters from runoff from agricultural, urban, or other areas. Healthy riparian zones can absorb sediments, chemical nutrients, and other substances contained in runoff.

Riparian areas provide all the components needed for a wildlife habitat including food, water, and cover. Diversity of organisms living in these wetland areas is very high. A riparian habitat includes three areas depending on the influence of water. The aquatic area refers to the area that is the stream channel or pond. The organisms that live in this area must be adapted to a wet lifestyle. Not far from the banks of the water is an

area referred to as the riparian area, which are organisms that require a moist habitat. Many plants require their roots to be moist. A transition area between a riparian area and upland cover is called an area of influence. Moisture decreases as you move away from the water.

Riparian vegetation adds to the shade of an area which helps to control temperature and photosynthesis of plants living in the stream. It also is a source of larger and fine plant detritus, which is used by many insects and invertebrates for their food source. If you have a vigorous riparian zone, you will have a diverse flora and fauna living in this area.



Watersheds naturally clean themselves as water can be filtered as it flows in the system. However, we sometimes pollute these watersheds through industrial or municipal waste discharging into the watershed (point source pollution). This overloads the systems and pollution increases. Even non point source pollution (many contributors to pollution) can accumulate and cause as much damage. Our watersheds reflect the health of our environment. Water that migrates through the different levels of the watershed nourishes biological life. In this activity you are to search the internet and find out more about the watershed that you live in. Use the worksheet to help find this information.

NOTES

# SKILLS NEEDED FOR RESTORATION



Mapping

**Plants and Maintenance** 

Monitoring

**Biological Assessment** 

# Mapping



# MAPPING

. Restoring an area requires an understanding of mapping. Historical maps help you understand how you should proceed on restoration.

As you take a hike you can notice different land features. But how did these landforms get that way? A landform is any feature of the Earth's surface that is produced by nature. This includes **plains**, **plateaus**, mountain ranges, or **valleys**. Roads and streets produced by humans are not landforms.

The forces of nature that create landforms include **water**, **ice**, **wind**, **volcanoes**, and **earthquakes**. They are divided into landforms created by erosion and landforms created by **tectonic** activity.

As nature works its magic on the surface of the Earth, we get many spectacular views. It is our job to determine how they were created.

Running water along **rivers**, **streams**, or **creeks** can cause valleys with a "V" shape. Water cuts along a centerline as it **erodes** the rocks and soil as the water flows over. As soon as the water in a river erodes the Earth's surface, the river it also wants to deposit the **sediment** it created. If the energy in the water is high enough, the sediment will continue to stay in the water. However, if the water slows down, the sediment will drop out or be deposited because there is not enough energy to hold the sediment in the water. This process of eroding and **depositing** is called **weathering**.

**Tectonic** activity including earthquakes and volcanoes can change different landforms. Movement along an earthquake **fault** can cause mountains and valleys to form over a long period of time.

Volcanoes can cause a visible difference after an eruption. Hawaii is an example of a **landscape** shaped by volcanoes. The lava acts like a very slow moving river of water as it drapes itself over existing land.

Topographic maps show a 3 dimensional world in 2 dimensions by using **contour lines**. Many people have trouble reading these maps, because they have mountains and





valleys are represented with **concentric** circles and lines. A topographic map can help identify landforms if you can interpret the contours. Many hikers use topographic maps, especially in areas where there are no roads with signs. Geologists depend on topographic maps to record the types of rocks. Engineers use topographic maps when they are planning roads, buildings, or other human–made structures. Imagine designing a city without considering where hills and valleys are located!

A geologic map is a map of the different types of rocks that are on the surface of the Earth. By mapping different rock types, geologists can determine the relationships between different rock formations, which can then be used to find mineral resources, oil, and gravel deposits.

#### 1. Mapping Exercise



Look at the picture on the top and its representative topographic map at the bottom. Can you locate on both maps the following:

- 1. A church (circle)
- 2. A bridge over the river (star)
- 3. An oceanside steep cliff (rectangle)
- 4. The mouth of the river (X)
- 5. Describe the hill on the left:
- 6. Describe the hill on the right.

7. How can you tell that there is a stream coming from the hill on the right? (Hint: contours)

# 2. Topographic Map of Tyson Lagoon area



Follow instructions from your guide.

## Basic Geologic Map



Use different colors and make your own geologic map.

Legend	Name and Description of Rock Formation in Fremont Area
	<b>UNNAMED</b> (Holocene-Pleistocene) (Qu) Clays to silt.
	<b>BRIONES FORMATION</b> (late Miocene) (Tbr) Sandstone to conglomerate with shells
	<b>CLAREMONT FORMATION</b> (middle to late Miocene) (Tcc, Tcs) Chert and siliceous shale
	OURSAN SANDSTONE (To) mudstone-sandstone
	<b>ORINDA FORMATION</b> (Tor) sandstone-conglomerate
	<b>SOBRANTE FORMATION</b> (Ts) White, fine to medium grained quartz sandstone.
	<b>TICE SHALE</b> (middle Miocene) (Tt) Distinctly bedded, dark brown, gray and tan, siltstone, mudstone and siliceous shale
	<b>UNNAMED</b> (Cretaceous) (Ku) Distinctly bedded gray to white, well lithified, massive to cross bedded, micaceous, coarse to fine grained sandstone, siltstone and shale.

# PLANTING AND MAINTENANCE



# PLANTING AND MAINTENANCE

Since plants are the base of the food chain they need to be established first in a restoration area. Native plants will attract organisms that have evolved with the plants. Native plants have also adapted to the soil in an area.

## **Plant propagation**

Growing plants can be done in many different ways. For native plants it is best that you have the correct species for the area that you are restoring. The native species of plants have the genetic material necessary to combat local plant diseases and insects and they are already accustomed to the climate. The following are practical guides for general propagation. For specific information on each species Tools needed: peat pots seedling containers trowel clippers

consult a native plant manual or local expert. This is sometimes difficult.

#### Seed

To plant plants by seed you need to first find a mature tree in the location you are planning to plant. The correct location would include areas with similar conditions to where you are trying to restore. You do not want to collect plants from the Sierra Nevada Mountains to plant in the East Bay Hills; they are completely different areas with different climates.



This mature tree will have the correct genetic adaptations to the environment you are planting along with natural defenses against local bugs and pathogens. Collect seeds at the proper time of year (generally early summer to fall depending on the species) and plant at the right time. Having a greenhouse or cold frames helps to produce the ideal conditions necessary for your plants to germinate quickly. Once germinated the plants are seedlings. For each species you need to learn how long they can remain in a pot. Some plants like oaks grow very large taproots to help find water. If they are n a pot, they cannot adapt to the local conditions.

Small grasses and or flowers can be planted once they are in the one gallon containers but trees, unless they have a well developed tap root like an oak, should be planted after 2-3 years. You want a healthy top portion of the plant and very healthy root in order for your plant to survive.

Place seed in soil and cover lightly with soil. Water and continue to water once germinated. After a few weeks, transplant plant into a larger container. You may want to add nutrients depending on the species.

#### Cutting

Not all plants grow successfully through seeds. Some plants, especially those in wetlands can propagate by cutting a slice of a branch and emerge it in moist soil or water. If you use this method the cutting needs to be moist until it starts rooting.

Willow trees are a common example of plants that start by this method. Even large branches that are cut germinate. root by this methods but require younger branches.

If you do not have a manual or any experts, experiment!

#### Rhizomes

Many aquatic plants like tules and other sedges can be spread easily by planting their rhizomes, Planting rhizome fragments is labor intensive and has variable success. Usually dig rhizomes in late winter or early spring before the shoots emerge. Cut the rhizomes so there is at least one internode or

thickened bands on the rhizome. Plant it in wet soil and keep moist until the plants emerge.

Another successful way is to submerge the rhizomes in water and let them grow for a few weeks. You can then transplant them in an area. This should be done only prior to when rains will insure the soil will be moist for a few months, until the tules become established.



Some other trees can



# **Tree Planting**

Planting a tree or any other plant requires patience, diligence, and some hard work. Know what you are doing and you can have yourself a wonderful plant for many years to come.

#### Preparing the soil for a new plant

Dig a hole using a hole digger or shovel. Start by making small depressions into the earth and use the handle as a lever to push out the soil. Place the soil near the hole (you will need it later) then to widen the hole take some off the sides, so that you are not hefting more than you can carry, and place it in your pile.

Once your hole has reached about 1.5 times the size of your plant's pot, in depth and width, you can start the process of planting. Take the pot off the plant carefully. Check the roots, are they free or are there many very close together growing around the pot? If they are free you can proceed to the next step if they are growing together loosen the roots or take them by the bottom and gently pull them apart to loosen.

Fill in some of the soil back into the hole until you have a mound. Place the plant in the hole on top of the mound and then proceed to fill back in the soil. Stop once you have reached the crown of the roots. Pack the soil and water. If after the water has drained the soil has settled then add some more soil and water again.

Apply some mulch around the edge of the hole, not directly against the trunk, to prevent moisture loss. Water well to prevent shock and your plant will be able to survive.

**For Planting on a slope:** make sure that you create a catch basin or shelf for the plants to collect water. If you don't do this plants will wash away during the next heavy rain. This also serves as a shelf for the plant to sit on and provide stability for the plant. Notice on the picture to the right there is an area of flat ground that helps the water collect and for the roots to spread out.



## **Non-Native Plant Removal**

Non-native plants compete with native plant species for space and resources. Many non-native plants tend to be aggressive growers and reproduce quickly. Plants become established through different seed dispersal mechanisms including wind, bird, and attachment on other animals including humans. Seeds plant themselves in the ground and will grow if soil and weather conditions are good. Control of these plants can be difficult but with diligence can be completed and successful Tools needed: Shovel Hoe gloves weeder

A good example of seed propagation is the growth of *Erodium cicutarium*, which came to California from Spain. Historians suspect the horses that the Spaniards brought over ate grain and the feces would contain seeds. Seeds could have gotten in the hoofs or shoes and easily brought to California. It acts as a time line of when the Europeans arrived in California. They can even trace the movement of the plant species from southern to northern California.

#### **Removing various grasses**

Grass roots tend to be shallow and by removing the major growing portion of the plant you have killed the plant. Make sure that the grasses have not gone to seed because next season you will have to repeat the process. Using a shovel or a hoe you can gently remove the growing portions of the grass and by removing the stalks you can prevent the regrowth. As a preventative measure add a layer of mulch to prevent the buildup of seeds from sprouting and causing problems.

#### Removing non-natives with taproots

The taproot is a single root that goes deep into the ground and provides an anchor for the plant and example of such a non-native is the dandelion. The photo at the right shows the dandelion plant with its root system the above portion with green and white is what lies above the ground while the root is below. By cutting off the top of the plant the root is able to continue to grow and produce another green top. You need to remove the root in order to remove this type of non-native. Another type similar to this in more marsh areas includes the curly dock with its taproot.



To remove the root you need to get down to its level and either pull the root out or take a weeder to remove the root without disturbing the surface too much.

#### Thistles and thorny plants

These plants should be removed using a shovel with the head held at ground level chop off the growing portion. Carefully rake into a bag to be picked up or place into a compost pile. Many species of thistles have small itchy thorns that can imbed themselves into your skin and provide you with the wonderful experience of having to pull them out so be careful.

Large shrubs and trees are already established and removing them can cause a large ecologic impact therefore it is not recommended to remove all of them.

#### General things to remember when removing non-natives:

- Try to remove before they have gone to seed.
- For plants with large taproots wait until after it has rained or you watered, the soil will be looser and easier to move.
- Remove as much of the taproot as possible
- Remove all parts of the plant, some can regenerate from just a small cutting
- Try not to disturb the soil too much
- Place a mulch over the disturbed area to prevent any future growth of the nonnative you have removed
- For already seeding plants such as pampas grass or fountain grasses bag the seed head and then proceed removing the remaining plant.
- Thistles or other thorny plants need to be completely removed or they will regenerate

# Mulching

Mulch is a ground cover that helps to prevent weeds (lack of photosynthesis), retains moisture, prevents erosion, can provide organic matter for plants, and protects the underlying soil from the harsh effects of the sun. Mulch can consist of various elements alone or mixed together, including compost, wood chips, rocks, plastic, moss, hay, grass clippings and more. The only difference between them is the time it takes to decompose, their weed retardant ability, and how much water they hold.

Organic mulches also improve the condition of the soil. As these mulches slowly decompose, they provide organic matter which helps keep the soil loose. This improves root growth, increases the infiltration of water, and also improves the water-holding capacity of the soil. Organic matter is a source of plant nutrients and provides an ideal environment for earthworms and other beneficial soil organisms.

Mulched soil will be cooler in the summer than an adjacent unmulched soil. In the winter, the mulched soil will lose heat slower. However, since mulch acts as an insulating layer, mulched soils tend to warm up more slowly in the spring and cool down more slowly in the fall than unmulched soils.

The recommended mulching depth, depending on the material selected, is 2 to 2.5 inches. At this depth, most mulches will accommodate the primary objectives of weed control, soil moisture conservation and temperature modification. A mulch that is too thick may severely reduce or eliminate drying and lead to waterlogged soil, particularly during wet seasons or in heavy clay loam soils.

#### Spreading chips

Wood chips are usually delivered by the truckload and are dumped on the ground in piles. Eventually these piles have to be spread out to an effective thickness to prevent weeds from emerging. To do this properly you need to take the following steps.

- Move the chips from the pile down with a shovel or rake
- Work with gravity, not against it.
- Spread evenly using the flat side of the metal rake (not a garden rake)

# Compost

If you are going to maintain a restored area, learning to use compost from native plants will help provide nutrients that these plants thrive in. However composting is not time consuming if you following the following parameters.

#### Aeration

Oxygen is required for microbes to decompose organic wastes efficiently. Mixing the pile once or twice a month provides the necessary oxygen and significantly hastens the composting process. A pile that is not mixed may take three to four times longer to decompose. Raising the pile off the ground allows air to be drawn through the mass as the material decomposes. Coarse materials should be placed on the bottom as the pile is built or placed in the pile and removed after the decomposition starts.

#### Moisture

Adequate moisture is essential for microbial activity. A dry compost will not decompose efficiently. Proper moisture encourages the growth of microorganisms that break down the organic matter into humus Add enough water so the pile is damp but not soggy. Avoid over watering. Excess water can lead to anaerobic conditions that slow down the degradation process and cause foul odors. If the pile should become too wet, turn it to dry it out and restart the process.

#### **Particle Size**

Grinding the organic material before composting greatly reduces decomposition time. The smaller the size of an organic refuse particle, the more quickly the microbes can consume it. A shredder is useful for chipping or shredding.

#### Temperature

Temperature of the compost pile is very important to the biological activity taking place. Low outside temperatures slows the activity down, while warmer temperatures speed up decomposition. A well mixed, adequately working compost pile will heat to temperatures between 110° and 160°F as the microbes actively feed on the organic materials. These high temperatures will help destroy weed seeds and disease organisms within the pile.

#### **Carbon-Nitrogen Ratio**

Microbial activity is greatest when the carbon-to-nitrogen ratio (C/N) is 30:1. For proper decomposition the nutrients in the compost heap should be in the right proportions. The carbon:nitrogen (C/N) ratio will determine how long decomposition will take. When the decomposing organisms do not have the proper diet of carbon, the organisms may lose nitrogen to the atmosphere as ammonia. Food waste has a ratio of 15:1; leaves have 60:1, grass clippings have a 19:1, and fruit waste is 35:1.

#### Proper pruning of trees and shrubs

Pruning of plants with a bark removes dead and unwanted growth. The most

appropriate time of the year to prune is when a plant goes dormant. Each tree and shrub has their own requirements, so each plant requires some research before you cut unless it is an emergency (such as a split branch). Pruning should only be done with sharp tools prevent further injury.

Tools needed: Garden shears loppers pruning saw



Trees generally require pruning throughout its first 10 years to help the tree develop properly. Shrubs usually don't have to be pruned unless you want to keep a selective shape or size

Pruning trees

Trees need to have various limbs removed as they begin to mature to help stabilize the tree and to help the tree to grow properly. Improper pruning can reduce growth, possibly cause disease and even kill the tree or shrub, which is not what pruning is supposed to

accomplish. Pruning does not mean that you cut everything back to the stem! This is called topping and is not good for the tree.

Before pruning you should look at the way a tree is growing,





A. U-shaped strong B. V-shaped weak union and ask yourself the following questions:

1. Is it growing properly?

2. Is it in the way of anything such as a structure or other tree?

3. Is there any portion that looks unhealthy?

4. Are there crossing branches?

5. Are there any dead branches?

- 6. Are the branches attached securely in a "U" shape
- 7. Does the tree pose any danger to power lines or pedestrians?

A yes to any of these questions should trigger a need to prune the tree in any number of ways. Next you need to know what you are doing and why.



Before pruning you need to know a bit about the anatomy of a tree trunk. The tree consists of different layers that provide strength, stability, growth and protection. The areas that provide the strength and stability consist of hardwood and sapwood these are located in the interior of the trunk and expand as the tree matures. On the outside of this area lies the cambium, a thin layer of cells to promote growth of the tree and of the bark. Damage to this layer can cause the tree to stop growing and without the cambium the tree dies and will eventually fail. The bark

helps to protect the tree from disease and insects along with human activities. There

are other areas of growth of a tree and if pruned improperly they will grow back much quicker than before.

Proper pruning

When pruning a tree it is important to not damage this cambium layer since it will release the correct hormones to begin the healing process. If you cut the branch



flush with the stem, you have the potential to cut off the cambium layer and prevent the healing of the cut. By cutting too far out you have the potential of sprouts from the cut stem that you will have to cut again and again. Another common problem is that when



cutting the branch you have a heavy branch that with traditional cutting you tear the bark and this prevents proper healing. Never make pruning cuts flush with the tree trunk!

First you need to select the branches that you will prune. Branches that cross, are weak, dead, too far down etc. should be pruned. The branch bark ridge should never be cut. Smaller branches can be cut with a pair of loppers in one cut. As a rule of thumb you should not cut anything larger then your thumb with a pair of loppers, you can damage the tree and the loppers. Larger branches should be cut with a pruning saw in the illustrated manner. This consists of a

three cut process that allows for larger branches to be cut with the least damage to the tree. The first cut should be made about 6" away from the trunk of the tree at the bottom of the branch to around midbranch. The second cut should be made farther out on the top of the branch cut halfway through. A third cut should be made on the outside of the branch collar all the way through. Doing this process in one cut can greatly increase the damage done to the cambium and prevent proper healing of the tree.

Once the branch is removed do not apply any type of sealant, these do not facilitate the healing process, they can actually introduce moisture and rot out the tree. Leave the branch alone and proceed with another that needs pruning. The image at the right demonstrates where this tree needs to be pruned. Branches to be cut are in blue and the line of the cut is located in red.



#### **Pruning Guidelines**

To encourage the development of a strong, healthy tree, consider the following guidelines when pruning.

#### General

- Prune first for safety, next for health, and finally for aesthetics.
- Never prune trees that are touching or near utility lines; instead consult your local utility company.
- Avoid pruning trees when you might increase susceptibility to important pests
- Use the following decision guide for size of branches to be removed: 1 under 5 cm diameter go ahead, 2 between 5 and 10 cm diameter think twice, and 3 greater than 10 cm diameter have a good reason
- Assess how a tree will be pruned from the top down.
- Favor branches with strong, U-shaped angles of attachment. Remove branches with weak, V-shaped angles of attachment and/or included bark.
- Ideally, lateral branches should be evenly spaced on the main stem of young trees.
- Remove any branches that rub or cross another branch.
- Do not remove more than one- quarter of the living crown of a tree at one time. If it is necessary to remove more, do it over successive years.
- Remove basal sprouts and vigorous epicormic sprouts.

# **Pruning Tools**

<ul> <li>Hand pruners</li> <li>USE: Used to prune small (less than 3/4"diameter) branches. Great for jobs where the branch to cut is near your torso like for vines.</li> <li>How to USE: Hold the branch with one hand and with the other place the cutting end near the base of the branch and cut by squeezing the handles together.</li> <li>CARE: Clean after each cut to reduce dulling of the blade. Wipe with a cloth to remove plant sap. Do not try to cut larger branches.</li> </ul>
<ul> <li>Hedge shears</li> <li>Use: Used to trim and shape bushes with young branches (less than ¼" diameter). Use quick motion to trim.</li> <li>How to USE: grip the handles firmly with both hands and then close like scissors while trimming only the tips of the plants branches. Open and repeat as necessary.</li> <li>Care: Not for use on larger branches clean blades with cloth after each cut.</li> </ul>
Loppers USE: Used to prune small –medium branches off the trunk of a tree or shrub. Branches absolutely NO LARGER than 1.5". Larger branches can cause the loppers to break at the cutting area How to Use: grip the handles firmly with both hands, pull the handles apart and place around the branch to cut, close and the branch should nicely cut. If the branch is not cutting easily do not force it move on to a saw. Care: wipe clean after each cut and store closed for safety purposes
<ul> <li>Pruning Saw</li> <li>USE This usually has a curved blade and is used to prune larger branches in tight spots.</li> <li>How to use: Make a cut under the branch about 3" away from the trunk of the tree about 1/4<sup>th</sup> the way through and then make a second cut, closer to the trunk, from the top of the branch all the way through. This saw usually cuts on the pull stroke and is easier to use.</li> <li>Care: wipe clean after each use and store covered in a sheath to prevent injury.</li> </ul>

in ()	Pole Saw
	USE: Used to prune branches that are high on the
	tree. The saw is on the top and a string helps to
	cut the branch.
	How to use: Place the pole saw on the branch to
	cut. Make sure no one is in the way before cutting.
	Then use the string and pull until the branch is
	loose and remove the trimmed branch.
	Care: Use extreme caution, eye and head
<b>j</b> e	protection when using this tool.
	Bow Saw
	Use: This is usually for large branches that are too
	large for a pruning saw.
A A A A A A A A A A A A A A A A A A A	How to Use: Use where there is enough room for
WANNAMAN WANNAMAN	movement so that the tree is not damaged. Cut
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	back and forth holding on to the bow and not the
	blade.
	Care: wipe blade clean after each use, if blade is
	dull ask for a replacement.

#### Shovels

Shovels come with two different types of handles the straight handle and the shorter D-handle. The straight handle gives great leverage when moving large amounts of dirt and rocks out of the ground. The D-Handle gives more maneuverability when digging.

#### Round point shovel

Use: This shovel is used to dig holes and to penetrate into hard materials (soil).

How to use: Hold the shovel and push into the soil in a scooping motion when starting holes. Then begin to cut into the soil by holding the shovel perpendicular to the ground and forcing it into the earth. Use the handle to help lift the loosened soil and pick up. Place removed dirt into a pile close by.

Continue until the size hole desired has been reached.

Care: Remove dirt and debris from shovel head. Make sure there are not any dings on the head if there are ask for a file to fix.

