Princeton University Outdoor Action

OA Guide to Animal Tracking

by Rick Curtis

> "The earth is a manuscript, being written and unwritten every day. The Pine Barrens are a geological track, the Mississippi River is a track, and so are the Rocky Mountains. The track/print/geology is made and then slowly worn down or built upon by the forces of natural erosion and gravity. Gravity ultimately wants everything to be at the same level. A track is the earth's reaction to your passing over it. From each passing there are a series of concentric rings than ripple out. The track itself is one such ring, so is the call of the blue jay that scolds you as you walk beneath his tree."
>
> from John Stokes '74

> "Tracking is like learning to read. First you start with the ABC's then you work up to simple sentences, then to paragraphs and finally to books. Ultimately, with practice, you can read very difficult books with a great deal of hidden meaning."

> "A track is a window to the past of an animal. Look at the ground as if it were a manuscript of the animal's life."

> "Every pock, hill, dome, etc. is the track of something. A dent in the forest floor may be the track of a fallen branch."
>
> from Tom Brown

Learning to track is a sacred responsibility. It gives you the ability to come into the center of the lives and homes of animals. You must treasure this gift and respect the animals by being non-intrusive. Getting too close to animals can cause serious disturbances including: abandoning young, disturbing nesting grounds, damaging foraging areas, and may even cause the animal's death. For example, in winter, many animals are severely stressed to gather enough energy to stay alive. Escaping from a human prescence could rob them of enough energy that they can no longer sustain themselves. Always remember that you are only a visitor into their habitat.

Sign Tracking

The first thing to learn about tracking is knowing where to look for animals. Much of this is done by what is called "sign tracking". Signs are anything besides a track proper that is an indication of an animal (e.g. trails, scat etc.). About 1/2 of tracking is sign tracking the other 1/2 is working with actual tracks.

Large Scale Sign

I. Landscape Tracking - this is reading the landscape to locate animals. In most landscapes there are "islands" where many species will be found. One way to look is to find the best "islands" for herbivores. Wherever there are herbivores, carnivores will follow. The areas between the islands will tend to be scarce of animals except as an area for animals to pass through.

1) **Herbivore Needs** (***** = most important)
   1. ***Cover** - thick tangles of vegetation, brush, rocks, to hide in and escape to
   2. ***Wide variety of vegetation** - a single type of vegetation is cleaned out. A good supply is necessary to be able to stay in the habitat/home. Going outside of the habitat is dangerous. Therefore, having various types of vegetation that come in at different times helps to maintain an ongoing food supply.
   3. **Water** - this is not essential since many herbivores don't need it. They get water from dew and from the plants they eat.

2) **Indicator Animals** - the presence of these animals is an indicator of the "value" of the habitat. If one of these is present it is a good habitat, if all are it is an excellent habitat.
   1. Vole - most prolific rodent, and a major food source for all predators
   2. Rabbits
   3. Deer

3) **Types of Habitats**
   1. **Deep Forest** - very poor as an animal habitat. There is little undergrowth and poor cover. The vegetation is not very varied. Generally there are some raccoons, birds, rabbits, but very few others.
   2. **Fields** - also very poor. There is little or no cover except at the side of the fields. The middle of the field is open territory for hawks and owls.
   3. **Transition Areas** - these are excellent locations to find animals. A transition area is zone of intersection between two habitats. Ex. Forest and field, field and stream, forest and stream. These offer wide varieties of vegetation and cover.

II. Travel Routes - Animals will tend to take the easiest route of travel across a landscape (just like you and I - around boulders etc.) unless they are being pursued. This results in the creation of a number of "roadway systems" within the habitat. Sticking to a roadway system when being chased is poor. The prey is usually smaller than the predator and therefore tries to push through tiny openings in deep brush where the larger predator can't follow.

1) **Trails** - are species nonspecific. Any number, size, and shape of animal will use them. These are the superhighways of the woods. They are frequently used and rarely changed. Animals know them intimately. There may be troughs, no vegetation or battered vegetation.

2) **Runs** - these are less frequently used and are very subject to change. There is some definite wearing into the landscape but varies. These are very specific to a particular animal and what it is used for (e.g. runs may connect watering areas, bedding areas, feeding areas back to a trail). Survival Note: Runs are good areas to trap. You know what animal you are going for.

3) **Escape Routes**
   - **Pushdown** - Generally only used once, crashing through the brush from a trail or run to escape. Brush is broken down.
   - **Established Escape Route** - a pushdown used repetitively. It often leads to a hide.

Trail **Run** **Escape Route**

III. Animal Sleeping Areas

1) **Bed** - any consistent sleeping place. It is well chosen to be in the thickest area of brush to be able to hear a predator coming.
2) **Transit Bed** - an established bed used every so often.
3) **Lay** - usually used only once or twice. Used for rest, chewing cud, etc. Can be recognized by broken and crushed vegetation.
4) **Den** - only used to bear and raise young.

Ex. Fox is an open ground sleeper, it curls up in the brush. For birthing it excavates a hole or uses an old groundhog hole for a den. Ex. The groundhog hole is a place for the groundhog to live. While it is raising young it is a groundhog den.

IV. Feeding Areas

1) **Varied Run Feeding area** - where animals go through and eat off of the trail or run further and further. (80%)
2) **Single plant feeding area** - characterized by a run terminating at a single plant or group of plants of one kind.
3) **Eat-through** - where an animal or animals has literally eaten through a patch of vegetation and come out the other side.
4) **Patched** - marked by irregular nibblings along the edges of established trails or runs

Medium Scale Sign

This makes up the largest assortment and most definitive sign. It is found all over especially on trails and runs.

I. 8 Most Important:

1) **Rub** - polished areas on the landscape
   - **Unintentional** - animal rubbing up against an object that protrudes onto the trail (e.g. a branch).
   - **Intentional** - specific area where an animal is rubbing itself. E.g. deer scraping velvet off antlers, wallowing in dirt to rid itself of mites etc.
2) **Hair and Feathers** - especially at a rub or a projection where the hair or feather gets snagged. Clumps of hair may either be purposely pulled out by the animals or clumps of hair or feathers may indicate a kill site.
3) **Gnaws and Chews**
   - **Gnawing** - like a beaver, on nuts, trees bones (rodents get their calcium from gnawing bones). You can tell the animal by the size of the teeth marks.
   - **Chews** - where a plant has been bitten off (twigs, stalks of grass, etc.)
   - **45 degree Clean Cut** - caused by an animal with incisors - rodent
   - **Little serrated edge** - deer - pull grass up against upper palette and sickle it off by pulling neck up
   - **Masticated** - teeth marks all over possibly with saliva - a predator chew, used to get minerals
   - **Break** - *not a chew, this is caused by animal movement.*
   - **Scratchings** - these can be all over, made by claws digging in on trees, scampering over sticks, boulders etc.
     - **Intentional** - for example a skunk or raccoon scratching in the ground for grubs, cat or bear sharpening claws on a tree.
     - **Unintentional** - from the animal's passing
- **Ground Debris** - any debris on the ground that is scratched, pinched, dented, abraded unnaturally, holes, stone rolls, broken twigs etc. (stone roll = a stone out of its bed, rolled over, skidded etc.)

- **Upper Vegetation** - vegetation breaks (see above), plants abraded and broken by animal passage. The location of the break (how high up) indicates type of animal. You can age a break by clearly noting how

the vegetation has aged at the break and doing a sample break to observe and time. This is not as accurate as track aging.

- **Scat** - tells an incredible amount. Scat tells you the type of animal by its size, shape, and consistency. It tells you what the animal has been eating. Animals leave scat in areas which they feel safe. This means that it is a good area to look for animals. Scat is often found near lays.

Scat Analysis: First determine the family shape. Then lay the scat on a piece of paper, cut it down the center carefully, then quarter it. Take a pair if tweezers or a toothpick and pick away at the edge carefully. Separate the contents into piles of bone, feathers, hair, misc. in order to see what the animal's been eating (this is for carnivores). If you find a skull, check Peterson's Field Guide to Mammals for skull or teeth identification. Herbivores tend to show loose, mushy scat in the summer because they are browsing on soft succulent vegetation. As summer turns to fall you will find more evidence of nuts, seeds, and fruits. In winter the scat becomes quiet hard and compact consisting mainly of the more woody buds, twigs, and bark. *Avoid using your fingers to work with scat (wear gloves). If the scat is dry and dusty, don't inhale the dust (can lead to lung infections).*

Tubular - Dog Family, raccoon, skunks, oppossum, wolverines, bears

Tear drop or Tapered - Cat Family

Fattened Threads - Weasel Family

M&M's - Rabbits & Hares

Oblong, may have nipple at end - Deer

Pencil Lead - Rodents

Fox - Tubular & Tapered at both ends - between dog and cat

Aging Scat: can be aged but to be at all accurate you need to see it come out of the animal. Leave a popsicle stick marker and check it every so often. Scat dries from the inside out. Find some fresh, pick it apart and examine the contents. Come back later, pick another apart and see how it has changed over time.

Pellets: Raptors (hawks, eagles, and owls) regurgitate pellets of what isn't digested. These pellets consist of bones, hair and/or feathers.

Small Scale Sign

1) **Compressions** - this is both a track and a sign. On any surface there are dust particles and grit which collect. When anything walks over this surface it either presses the grit into the surface or removes it. You can see this using the sideheading technique.

Sideheading: Keep the track between you and the light source. Get you head down along the ground. Scan the ground with your bottom eye (bottom eye reads to 1 ft. top eye reads to 3 ft.). The compressions will appear as a shiny spot or a dull spot on the surface (depending on whether the grit is shiny or dull). When more dust settles it will add a layer to everything but the pock still is visible.

Ghost Scale Sign

This is an interface between tracks proper and disturbances not on the ground which disappear (or seem to).

1) **Dullings -** in the morning with dew on the ground everything is shiny from the dew. If something crosses the grass it either presses or wipes away the moisture which appears as a dull area. This disappears as the dew evaporates.
2) **Shinings -** during the day everything begins to dull down. Anything walking on the grass presses it down and the shinny side of the grass catches the sunlight giving it a shining. The shininess disappears in about 2 hours. The bent grass recovers completely in about 24 hours.
3) **Leaf Depression -** leaves are compressed as an animal walks leaving a compression outline beneath the leaves in the soil (a true track). The leaves spring back up but not all the way leaving a depression. By sideheading you can see the depression.

Tracks

Parts Of A Track

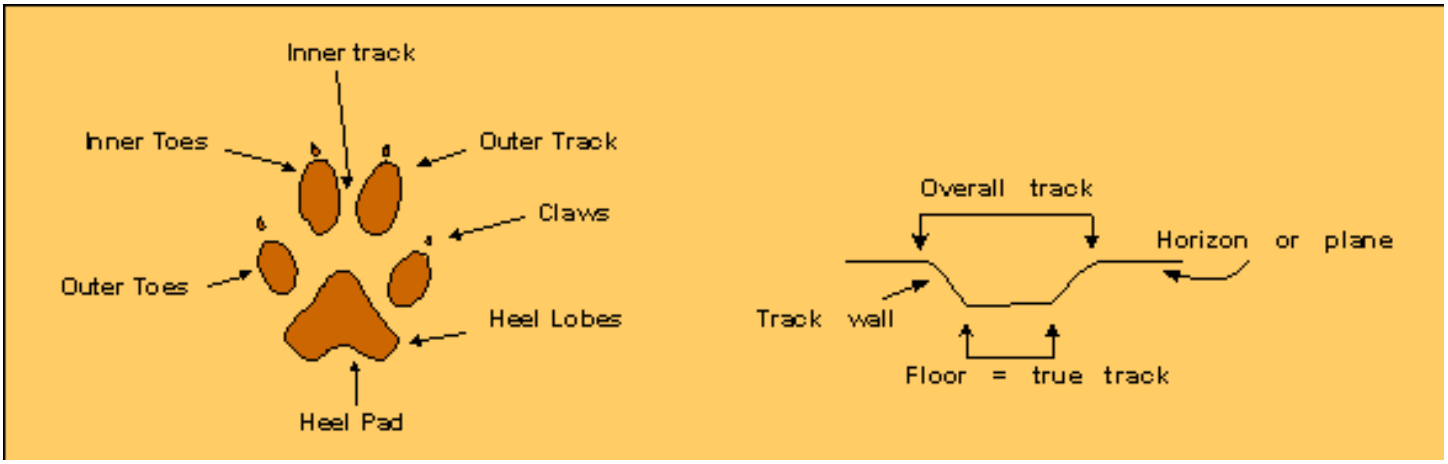
When a track is made, the heel slides into the ground, registers and pulls out. No track will register straight down. There is always some angled component (looking at the track cross-section) either from the foot entering or the foot leaving.

The softer the soil, the greater the slope of the wall creating a larger distortion between the overall track and the true track. Most people don't read the true track. They read the horizon cuts (overall track) which does not give the true track measurement. The true track is the only real measurement for tracking. If you read the overall track you could not tell the difference between a dog track and a coyote track. E.g. on a dog the inner toes are larger than the outer toes; on a coyote the outer toes are larger. But this distinction will not show on the overall track.

Measuring A Track

You need to measure the length and width of all four tracks (2 in humans). When measuring animal tracks the length readings between tracks are measured from toe to toe because animals hit first with their toes. In humans it is measured from heel to heel because we land heel first.

1) **Establish the Line of Travel** - This can be done by eye if the tracks are clear or by placing popsicle sticks at the heel of the tracks and connecting a string to the sticks.
2) **Length of Track -** measure the length of the true track.
3) **Width** - measure the widest part of the track.
4) **Stride -** is measured from the heel of one foot to the heel of the other foot (i.e. right heel line to left heel line).
5) **Straddle -** if you draw a line of travel between the left heels and a line of travel between the right heels the distance between these two lines is the straddle. There is zero straddle and positive straddle.
6) **Pitch** - is the degree to which the foot angles out from the line of travel (pitched out). At the widest point of the track, draw a line bisecting the track along its long axis. The distance from where the line exits the front of the foot to the heel line is the overall pitch.

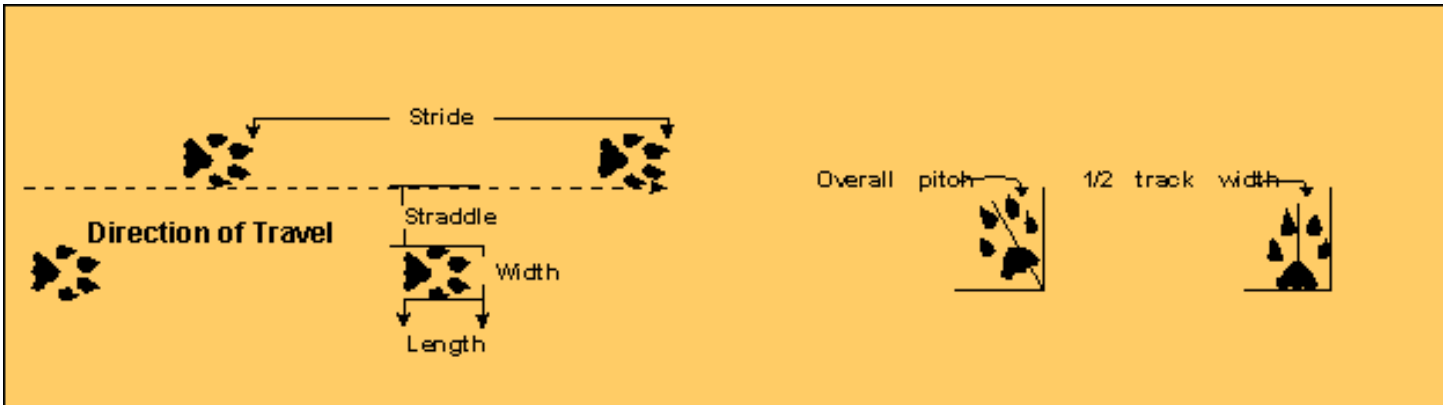


Overall Pitch - 1/2 track width = True Pitch

Ex. 4" wide track, 3" overall pitch 3 - (1/2 * 4) = 1" = true pitch

This is because if there is no pitch there would still be 2" from the line through the track to the heel line. So this measurement must be subtracted.

Ex. 2" - (1/2 * 4") = 0



7) **Overall Stride** - is measured from the heel on one side to the next heel on that side. Thus there is a left overall track and a right overall track. Comparison of these two can determine the orientation of the trackee.

8) **Determining Orientation** - The dominant side gives a short (punch) step while the nondominant side gives a long (feeler) step. Thus if a person is walking blindfolded they will circle to the dominant side. E.g. a right-sided person has a right overall stride of 20" and a left overall stride of 20 1/2". Thus the person will veer to the right. This is why a lost person often picks a path dictated by veering to their dominant side. Note: If you add 1 pound of weight for every 50 pounds of the person's body weight and carry this weight on the nondominant side it will straighten out the person's walk (no circling).

Classification Of Tracks

5% 1) **Clear Print** - when you can see the track clearly in soft soil, all toes visible.
95% 2) **Pattern Classification** - no clear print, you must tell track by general shape and size of track

Clear Print Classification

The front and rear tracks on one side will be near each other. You need to note the number of toes in the front track and the rear track. Looking at the track you will also note the type of preferred gait used by the animal (in order to differentiate between front and rear tracks).

1) **Track Shape** - the track shape is the overall shape of the track pattern.
2) **Direct Register** - as the front foot is lifted up the rear foot on that side drops directly into the front track (cats and foxes). Also called perfect walking.
3) **Indirect Register** - as the front foot is picked up the rear foot on that side drops slightly behind and to the right or left of the front track (depending on the sex of the animal).

Animals

See Track Cards.

Birds

1) **Ground Bird** - spend most of their time on the ground and show a "walking" gait
2) **Perching Bird** - spends most time in the trees - shows a "hopping" gait
3) **Mixed** - if the track shows both walking and hopping it is probably a bird that splits its time between trees and the ground e.g. Crow

Pattern Classification

There are a number of different types of locomotion patterns. 90 - 95% of the time an animal will use this method of locomotion. In each case below the gait described is the *normal walking pattern for that animal.* As the animals speed changes this pattern will change (ex. moving slowly, in pursuit, being chased).
RF = right front LR = left rear, etc.

1) **Continuum of Speed:**
   Stalk ———>Slow Walk ————>Walk ———>Trot ———>Bound ———>Lope ———>Gallop

2) **Diagonal Walkers** - the animal moves the opposite sides of the body at the same time (e.g. RF & LR move simultaneously)
   Deer Dog Cat - cat and fox direct register by being completely off the ground at one point

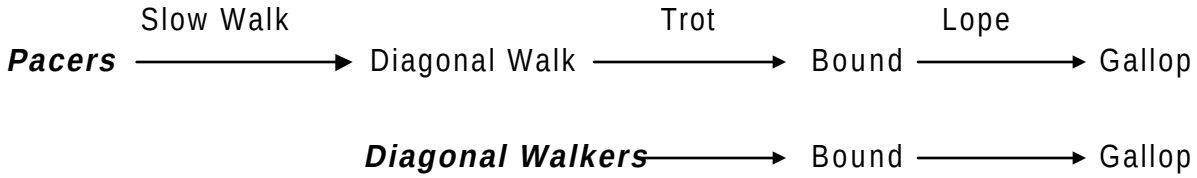
3) **Bound Walkers** - the front feet land together, then the rear feet behind 99.9% of the time these animals use this pattern even when moving slow or fast. Stride measured from rear toes to rear toes.
   Weasel Family - All Members Except Skunks & Badgers

4) **Gallop Walkers** - the front feet land first, then the rear feet come on the outside of the front feet and land ahead. 99.9% of the time these animals use this pattern even when moving slow or fast. Stride measured from rear toes to rear toes. The pattern doesn't change with speed. The distance between sets of tracks increases.
   Rabbits Hares Rodents - Except Porcupine & Ground Hog

If the front feet hit at a diagonal = ground dwelling rodent e.g. Rabbit, and the front foot that is further back is the one that hit first - sidedness (punch step). If the front feet hit side by side, it is a tree dweller e.g. Squirrel (just like tree dwelling birds - "hoppers")

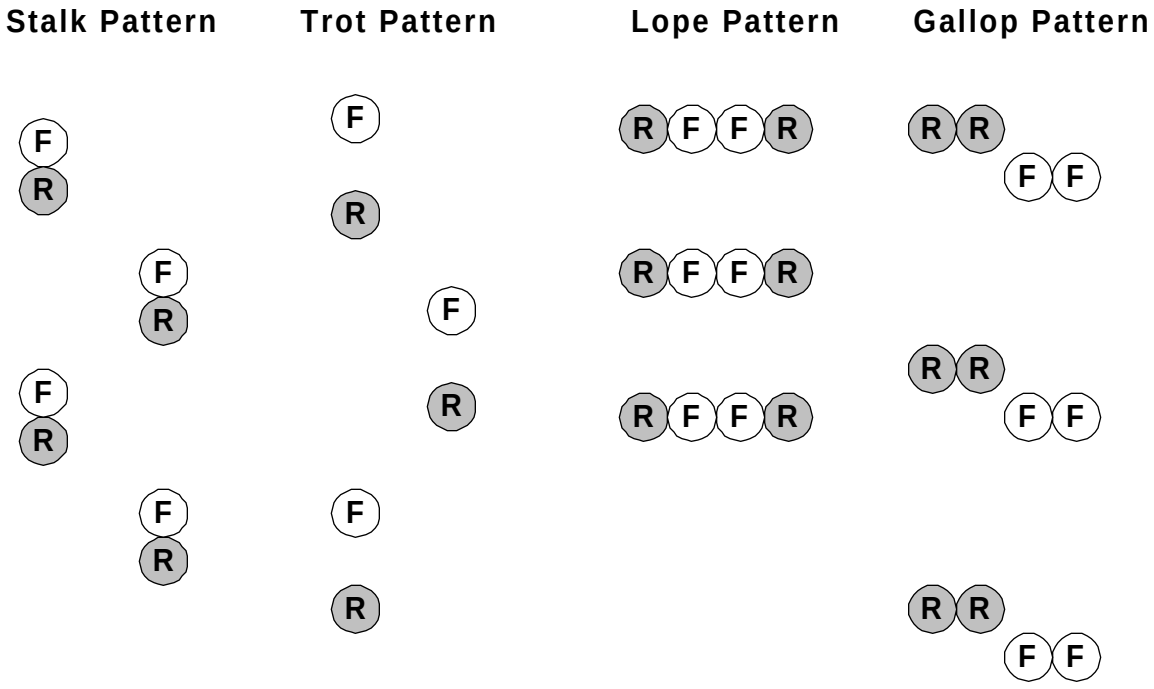
5) **Pacers** - move the same side of the body at the same time (e.g. RF & RR) - these animals have wide, rotund bodies. These are the exceptions from the other groups. 95% of the time these animals use this pattern. As speed increases, they change their pattern.
Badgers Skunk Porcupine Oppossum Raccoon Bear

6) **Variations on Pattern Classifications** - 5% of the time. All animals can change their gait. In particular, Diagonal Walkers and Pacers will change their pattern as their speed increases.



In between these major patterns there is a continuum of discernable pattern variations.

- From Pacer to Diagonal = 16 patterns
- From Diagonal to Bounder = 32 patterns
- From to Galloper = 16 patterns



Note: Relative Stride length is not displayed.

- For speed, a slow walk for a Pacer is faster than a slow walk for a Diagonal Walker.
- A stalk is generally the slowest pattern and is slower for both a Pacer and a Diagonal Walker.
- Slow Walk - animal pushes body weight forward.

RR ——> RF ——> LR ——> LF

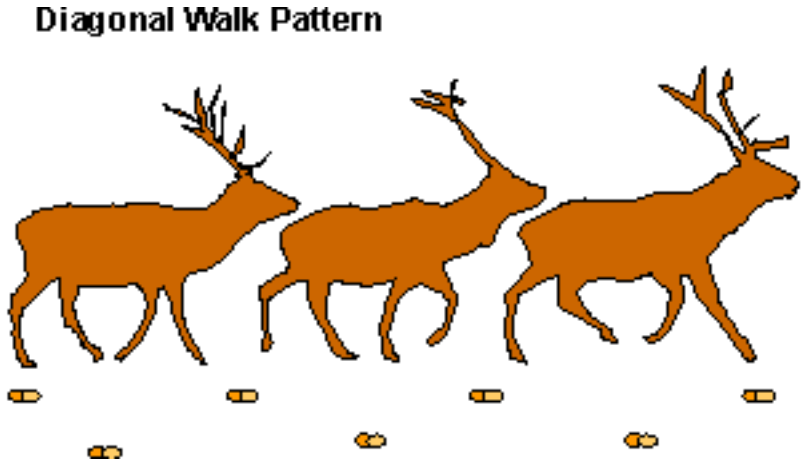
Summary Of Classifications & Variations

Tracking by patterns allows you to track over hard ground over a long distance.

1. Diagonal Walkers

- Stalk
- Slow Walk
- Pace when bored, annoyed, aggravated
- Walk
- Rarely hold a bound except in soft or rocky terrain - prefer to gallop; on clear terrain hold a bound on for a few patterns before going into a gallop - prefer to trot or lope - can go straight from a walk to a gallop (e.g. if suddenly frightened)

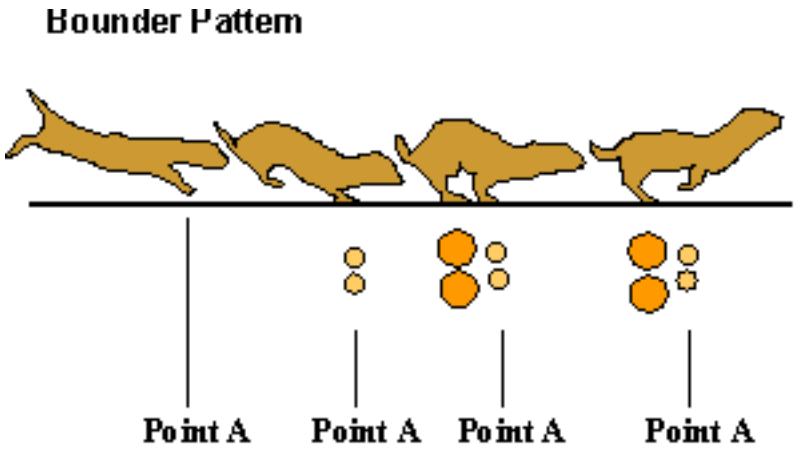
Species Note: Deer prefer to gallop for high speed except for the Black Tail Deer and the Mule Deer that prefer to bound because they live in rocky areas.



2. Bound Walkers

- For a shear burst of speed will gallop - seen just before a kill
- Will diagonal walk when approaching hunting territory e.g. slowing down to be more quiet
- Will stalk when hunting game
- Will pace when aggravated, bored or agitated, threatening, seen just before going out on hunt

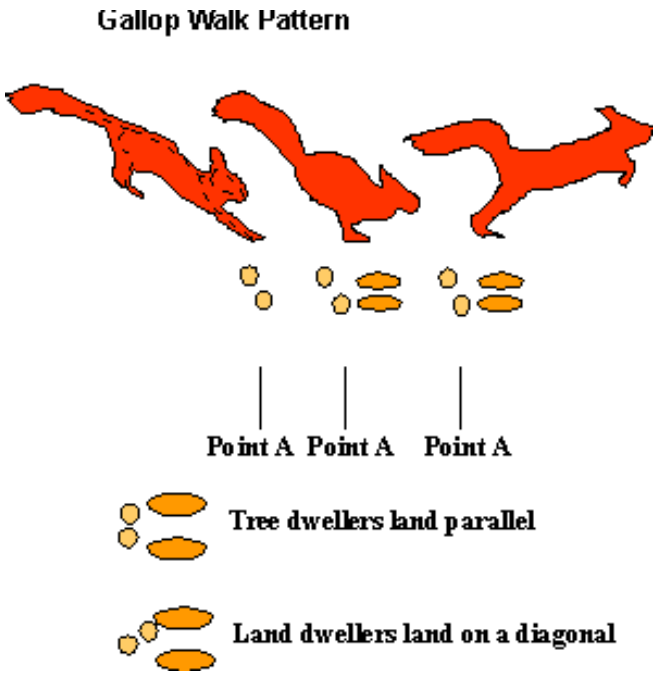
Note: This is an example of how you can tell the "emotional state" of an animal by looking at its tracks.



3. Gallop Walkers

- Prefer to gallop but will bound in soft terrain i.e. snow, mud or rocky terrain
- Will diagonal walk if it needs to cover a shorter distance than a hop would cover, e.g. rabbit moves 2" over to feed
- Will stalk when moving away from danger

- Will pace when aggravated, threatening or bored



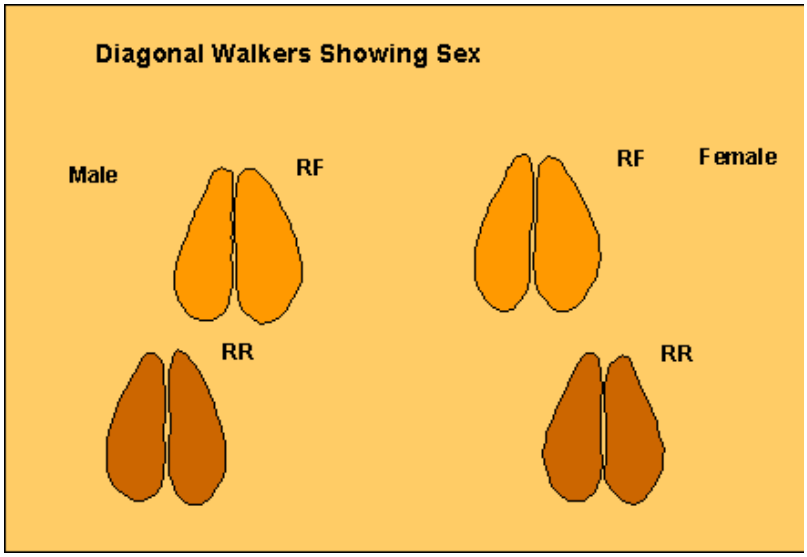
4. Pacers

- Can go from a stalk to a gallop

Reading Tracks

1) **Sidedness** - if one front foot is behind the other over 4 - 5 tracks that foot is on the dominant side. The animal will have a tendency to circle in that direction.

2) **Sex** - *(this works for diagonal walkers only).* Deer for example, just because a track is deep or splayed wide does not mean that animal is male. There are variations in the size of animals of the same species from location (different amounts of feed). Male deer (bucks) and female deer (does) have different bone structure. Doe - pelvic girdle > shoulder girdle (for birthing). Buck - shoulder girdle > pelvic girdle (to support antlers). In order to tell the sex of the animal you must compare the animal to itself. Find the front track on one side. The look for the rear track on that side. If the rear track is to the inside of the front track = male, a rear track to the outside = female. This system works only for adult animals. Immature animals have not finished bone development and may have rear track falling exactly behind front track.
Cats are another example because they direct register. Then how do you tell whether the rear foot is inside or outside the front? In cats (and foxes) the front foot is larger (by 1/3) that the rear foot. Thus the rear track will fall in the front track and be to the inside or the outside. Inside = male Outside = female.



Aging Tracks

1) The single most important factor in track degradation (and thereby aging) is weather and weather fluctuations.

2) Gravity is the second major factor in track degradation.

3) The third factor is the type of soil. The only way to learn to age tracks is to observe a track degrade over time with given soil conditions and weather conditions. Soils are classified from 1 to 10 with 1 being sand and 10 being clay (soft to hard). You must estimate the soil classification first. Then keep an accurate record of weather changes and by observing a track you will develop a sense of how a track degrades in that type of soil with those weather conditions. Weather conditions to be aware of are temperature, humidity, wind, precipitation, and hours of direct sunlight on the tracks.

4) **Wisdom of the Marks** - Do this once a month for three months and you will cover all seasons for the type of soil in your area (if possible do it with various types of soil). Clean out rectangular area of soil. Remove all rocks, transplant plants etc. Dig down 2 inches, break up soil into smooth texture, pat it down smooth and leave it to settle for 24 hours. Using a stick or object approximately 1/2 inch diameter make 5 marks in a row in the soil with varying pressure from a touch to enough to go 1/2 inch deep. Look at the marks carefully for 10 minutes to ingrain into your subconscious what they look like. Write down weather conditions. Come back 6 hours later and repeat the entire process making the new marks with the same implement and the same pressures in a row next to the first marks. You will now have fresh marks and 6 hour old marks to compare. Study both for 10 minutes. Come back in 6 hours and again 6 hours after that and again in 6 hours. This will give you a comparison of track degradation at 6 hours, 12 hours, 18 hours and 24 hours. Then go back every 24 hours for 6 days and you will see the track age and degrade over a week. After doing this summer, fall, winter, and spring you will begin to learn how to age tracks to within 2 hours of their being made. It is also advisable to do this whenever you move into a new area for tracking.

Learning Techniques

1) **File card learning Method** - Read about an animal in the Peterson's field guide an prepare a scan card on a 3 x 5 index card. By scanning these cards during "blow off time," you will quickly learn to recognize tracks.

2) **Tracking Stick** - This can be either primitive (a stick with notches cut into it) or advanced a dowel with rubber bands (“O” ring washers work great). The stick should be about 3' x 1/4" and very straight. The tip should be sharpened to give a point. The stick is used to measure a track and give you a standard for comparing and looking for the next track.

- Tip to 1st mark = length
- 1st to 2nd = width
- Tip to 3rd = stride
- 3rd to 4th = straddle
- 4th to 5th = true pitch

Since animals walk 95% of the time the tracking stick is a useful way to find the next track. If you lay the 3rd mark over the center of the last track the stick will point to the center of the area where the next track will be. To find the track add the straddle. If you don’t find the track, ask yourself what does the landscape tell you? Uphill, downhill will shorten the stride; debris - does the animal understep or overstep it? Soft earth will have an effect on stride length.

3) **Track Pack** - Carrying these items with you will help in learning to track.

- Magnifying glass - large 2-4 x, jewelers loop 10x
- Tape measurer - thin, metal 8'- to measure stride, straddle etc.
- 6" plastic ruler - to measure track
- Small notebook
- Pen
- Ziplock bags - for scat, bones etc.
- Peterson’s Field Guides
- File Cards
- Tweezers
- Popsicle sticks and string
- Price tags - for labeling.

All the information you need to find the next track is within the one you have. Never skip a track (cross-tracking); it doesn’t teach you anything. If you hit “the wall” and can’t find the next track, work at it, analyze it. This is how you learn to be a good tracker. If you spend 2 hours to find the next track, your skill will grow to a higher level.

Tracking Environmental Hazards

In any tracking situation you need to be aware of what the local environmental hazards are in order to avoid accidents. This is a general list for a typical mid-Atlantic forest region.

Sample Environmental Hazards:

1. **Scat** - avoid handling it with your hands. When picking apart scat or pellets use a stick or disposable gloves. Dry scat contains numerous microorganisms and spores which if inhaled can lead to serious lung infections.

2. **Poison Ivy, Oak, Sumac** - The basic rule of “leaves of three, let it be” serves as basic identification of poison ivy. Know how to recognize it both in the plant stage and the vine stage. Typically found in moist soil areas.

3. **Ticks** - Tick bites can lead to a number of serious diseases including Rocky Mountain Spotted Fever

(RMSF) and Lyme Disease. RMSF is primarily carried by dog ticks. Lyme Disease is carried by deer ticks which can be very difficult to locate. See the enclosed articles on Lyme Disease. Often found in the thick brush at the edge of transition areas.

4. **Bees & Wasps** - nests often found in rotting logs where you may be looking for sign.

5. **Rattlesnakes** - often sun themselves on rocks in cool weather or hide in shadowed areas in hot weather.

6. **Rabies** - Rabies is on the increase in animals. *Do not* approach animals too closely. Rabid animals may appear anxious and aggressive or very docile. In either case they can attack very suddenly.

7. **Hanta Virus** - Hanta Virus is carried by rodents.

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Graphics adapted from the following:

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