Contact: Ken A. Otter
Natural Resources & Environmental Studies, UNBC
tel: 250-960-5019 fax: 250-960-5539
email: otterk@unbc.ca
www.unbc.ca/avian-movement

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2.2 Taking Field Observations

Field Equipment:
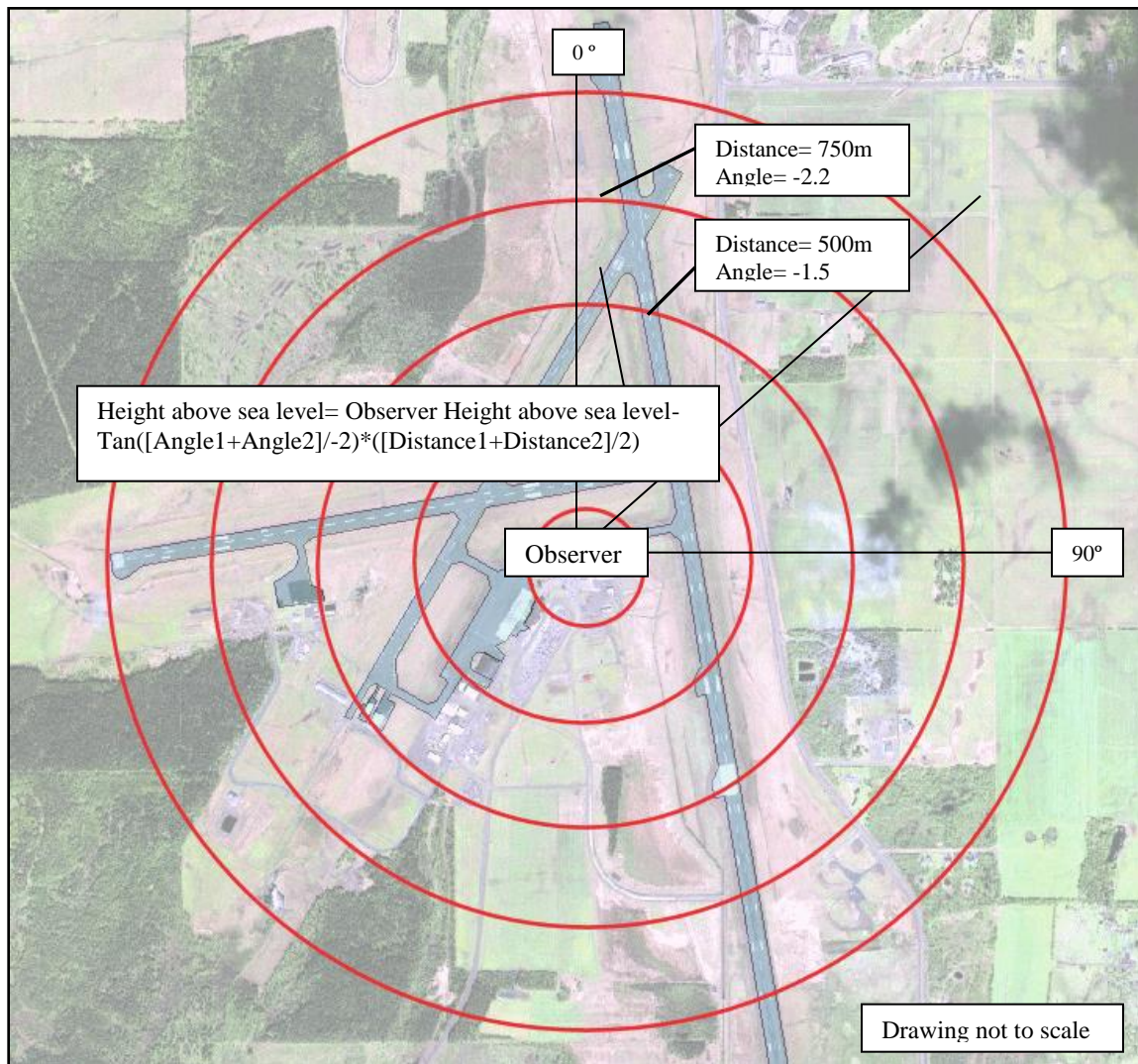
High visibility vest
Field book
Mechanical pencils with spare lead
Satellite image of observation location with 0.5km concentric circles
Compass
Clinometer
Binoculars
Voice Recorder
Rangefinder
Cellphone, depending on project
GPS
Spare charged batteries for all electronic devises
Weather appropriate gear.
Spotting scope and tripod
Bin to store equipment if left at site
Computer
Reciever
Four way box
50m extension chord

Procedure:
1. Find an observation location that allows maximum sky visibility
    a. Mark the spot as all future observations will need to be taken from the same spot
    b. Get the GPS coordinates of the observation location to use obtaining an X and Y location of the observed bird to input into GIS
        i. Turn on the GPS and leave it at the site for at least half an hour
        ii. Record coordinates and elevation above sea level in meters
        iii. Repeat this procedure for the first few field sessions to get the most accurate reading
            1. The more time the GPS is left out, the more accurate it becomes with satellite availability
2. **If using bird height above ground:**
    a. Scan the landscape and make mental note of the topography
    b. Make a map of the area with concentric distance circles from your observation location to make estimating distances easier (Fig. 1)
        i. This can be obtained using Google Map
    c. On the map of the area with the concentric circles, divide the landscape into pie slices (Fig. 1)
    d. Aim the clinometer at ground at the start of each section of each pie slice and mark the readings down on the map (Fig.1)

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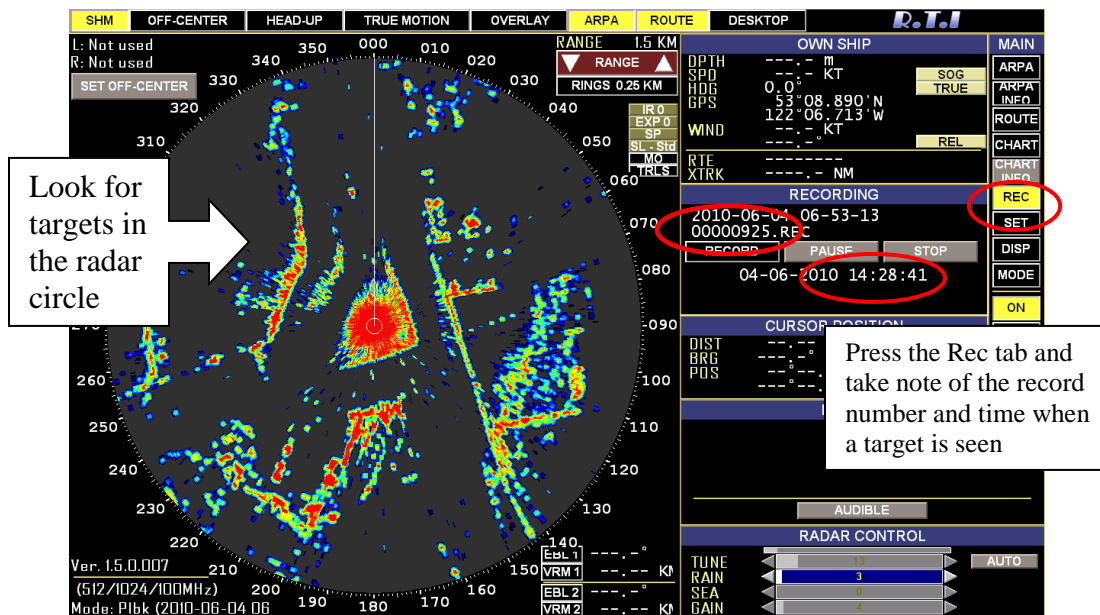
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e. An average height above sea level of each pie slice section can be calculated using average horizontal distance from the reader, clinometer reading to the pie slice centre, and elevation above sea level of the observer as shown by the GPS unit (Fig.1)

f. Repeat the calculations until all the pie slice sections have an associated average elevation above sea level

   i. NOTE: If the elevation of the ground is higher than the observer's position, the equation shown in Figure 1 needs to be changed to:
   Height above sea level= Observer Height above sea level+
   Tan([Angle1+Angle2]/-2)*([Distance1+Distance2]/2)

g. The use of this data to calculate height of bird above ground level will be explained in **Field Observations into GIS Format Protocols**

Figure 1. Example of ground height above sea level calculation

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3. Start WinHorizon software following **Remote Radar Set-up protocols**
4. Put on safety vest with compass and clinometer attached
5. Turn on voice recorder and microphone and clip the microphone to the safety vest as close as possible to your mouth
6. Navigate to an empty folder to record voice in by using the "Folder/Index" key in the bottom left corner
7. Press "Record" button and state:
    a. Date
    b. Time
    c. Name of observer(s)
    d. Start time (of session and recordings)
    e. Observed weather conditions
    f. Any additional comments
8. **Listen** to that recording to ensure equipment is functioning
9. Look for target/bird flight paths on the radar screen, with the REC tab in WinHorizon showing the time and record number (Fig. 2)

Look for targets in the radar circle

Press the Rec tab and take note of the record number and time when a target is seen

Figure 2. WinHorizon screen showing the Rec tab for taking observations

10. Upon locating a target (which will look like a dot blinking across the screen):
    a. Search for the bird in the projected location (keeping in mind that the radar uses hypotenuse distance and not distance on the ground- birds may appear a bit farther away on the radar than they really are)
    b. Turn on the voice recorder
    c. State the time and the record number
    d. Begin measurements of the bird, being careful not to look away as it is easy to lose birds in the sky

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11. **Field measurements/observations:**
    - Compass bearing
    - Clinometer reading (in degrees)   To be taken on the same bird at the
    - Horizontal distance estimation   same point
    - Repeat the measurements for as many points in the flight path you can manage
      (getting all three measurements for each point) (Fig.3)
    - The clinometer reading changes quickly as horizontal distance changes and needs to
      be taken as accurately as possible.

$\sin A = a/c$ $\sin B = b/c$
$\cos A = b/c$ $\cos B = a/c$
$\tan A = a/b$ $\tan B = b/a$

Bird Height

$a = b \tan A$

Clinometer reading in degrees

Horizontal Distance
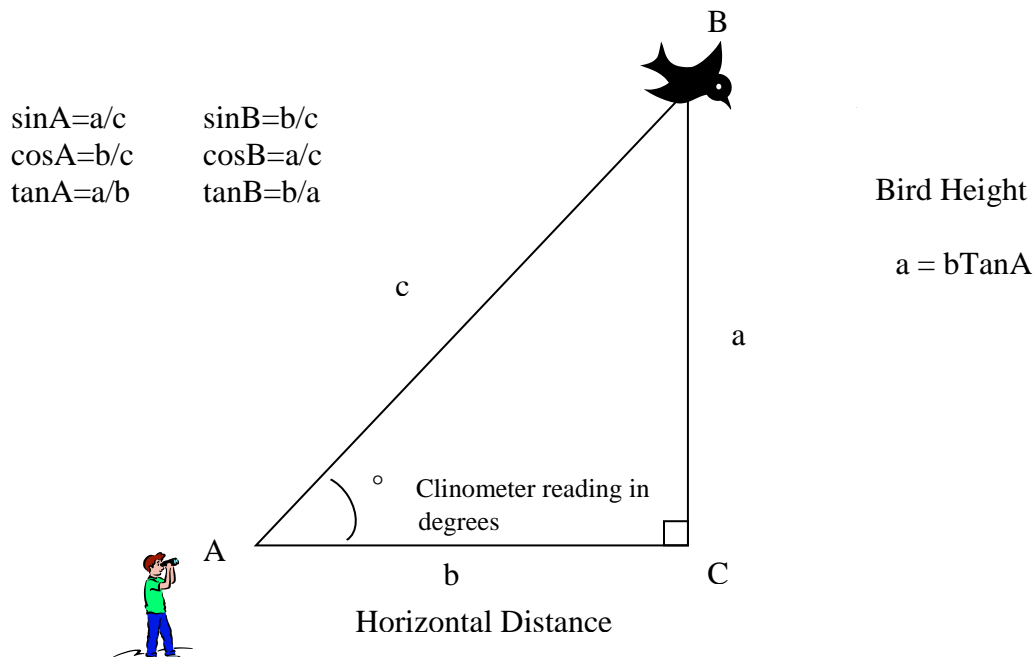
Figure 3. Field Observation Trigonometry

12. When the bird is no longer visible, confirm you have all three measurements for each
    observed point (you may have to retake a compass bearing or confirm a horizontal
    distance estimation)
13. Record the WinHorizon record number and the time at the end of the flight track
    a. This will aid in finding the tracks in WinHorizon playback at the end of the day
14. Return to the WinHorizon screen and look for the next flight path
15. At the end of the session, use the Voice Recorder to state the time the field session was
    ended and any comments on the session
16. Stop the recording function in WinHorizon, shut down the radar, and put the WinHorizon
    System to rest until the next session
    a. Click **Record** to stop recordings, then **STDBY**> **ON**> **YES**> **EXIT**> **YES**

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17. In the lab, or other dry and warm location, enter the field data into the Excel project worksheet (different for each project)
    a. Follow the format outlined in **Protocols for Field Observations to GIS Import**
    b. Save the Excel file, the WinHorizon recordings and the voice recordings onto a USB stick (replacing the old files to avoid confusion) and transfer to Birdcave hard drive