Moose Habitat Evaluation Guide

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Introduction

This Wildlife Habitat Evaluation Guide (WHEG) was designed for evaluating moose habitat in interior Alaska. The intent of this WHEG is to help Natural Resource Conservation Service (NRCS) planners respond to requests from private landowners seeking assistance in managing their property for moose. The spatial frame of reference for application of this WHEG is an Evaluation Area (EA) which is a politically defined boundary surrounding private property. Within an EA, field measurements of habitat values are collected for individual stands delineated around unique habitat types. The temporal scope of the habitat being referenced in this WHEG is winter. In general, the amount, quality, and availability of habitat and forage to moose is most limiting in winter.

The procedures outlined in this WHEG provide a snapshot of habitat conditions at the time of survey. Results help form a basis to determine the need for habitat enhancement designed to benefit moose by increasing available forage. If enhancement is conducted the WHEG can be applied to compare post treatment to pretreatment habitat conditions and monitor change over time as habitats mature. If treatment is not yet necessary the WHEG can applied periodically to help determine when best to initiate treatment. Using this WHEG a planner should be able to determine the following:

- Assess the relative quality of moose winter habitat based on habitat type alone
- Objectively determine a level of forage utilization by moose
- Evaluate a stand based on estimates of a variety of habitat components
- Determine a relative index of moose habitat quality from a combination of the above metrics

The worksheets and scoring system outlined here are similar to other WHEGs that have been developed for single species elsewhere in the United States.   Briefly, an initial office assessment is done in GIS using digital imagery to outline the EA, delineate unique stands within it, and determine acreage and a habitat type for each stand. A field visit is then conducted to each stand within an EA to confirm habitat types, measure moose habitat use, and determine species composition of preferred woody forage species and estimate cover values and heights. Once entered, the sum of these three scores yields a relative index of moose habitat quality on a scale of 0 – 3. A stand scoring less than 1 would be indicative of poor quality moose habitat. A stand scoring between 1 and 2 would constitute marginal moose habitat and a stand with a score of >2 would be considered good moose habitat. The scores can be viewed as thresholds for management action. A score of <1 (poor quality habitat) could trigger discussions of enhancement options provided in the narrative. A stand with a score of 1-2 marginal quality habitat) may be better suited to enhancement based upon review of the stand components and browse utilization values or may not require enhancement. A stand scoring >2 would be indicative of high quality habitat and not require enhancement. The scores can be reviewed for each of the three metrics to determine how important each is to the overall score. For example, if the habitat type and habitat components scores are high but habitat utilization scores are low then enhancement may not benefit moose. Conversely if the habitat use index is high while habitat type and habitat components indices are low then habitat enhancement may benefit moose.

The field segment of this WHEG requires sampling evidence of moose browse within 1/100 acre belt plots placed randomly in each stand. Stand components data are then recorded from within a 25 yard radius plot centered at the same point as the belt transect. Data are entered in the accompanying MS Excel file and habitat indices are automatically calculated.

The final step requires production of a written narrative describing the habitat within each stand in an EA, the successional trajectory of each, and habitat enhancement alternatives if applicable. Assessments can be followed by management prescriptions if the landowner desires and funding is available. Throughout the application of this WHEG, NRCS planners may reach out to other state or federal agency staff who have specialties in habitat evaluation and enhancement or regional expertise pertinent to the EA.

Use of this WHEG requires the ability to identify moose forage species, specifically hardwood trees and shrubs, in summer and winter. This includes the ability to separate willow (*Salix* spp) from non-preferred shrub species such as alder (*Alnus* spp). Also important is the ability to identify and classify habitats using the Alaska Vegetation Classification (Viereck et al. 1992). This classification manual can be found online at: https://www.fwspubs.org/doi/suppl/10.3996/112015-JFWM-116/suppl_file/112015-jfwm-116.s1.pdf

Step 1 – GIS analysis

Determine the Evaluation Area boundaries. If spatial data of the EA is not available work with the landowner to delineate boundaries and create a shapefile of the EA. Overlay the EA on digital imagery. Review the imagery for the EA and determine the number of stand types within it based on the spectral signatures of the different vegetation types. Based on a review of the imagery each unique stand should be delineated separately. The minimum size of a stand for this application is five acres. Use a 1:2,000 scale resolution if the imagery is of good enough quality. Create and populate a field in the attribute table for each stand in the EA for acres and Viereck habitat type. This initial digital habitat classification of the EA is preliminary and will be ground truthed so mapping expertise is not required. Stand boundaries should be as accurate as possible but habitat typing will be field verified. Assistance with imagery interpretation can be provided by acquiring a digital habitat layer. The Landfire Existing Vegetation Type statewide data layer has 30 meter resolution and is available to download at https://www.landfire.gov/evt.php

Next, select locations for browse plots. Randomly assign sample points within each stand. Make sure the points are a minimum of 50 meters apart to insure there is no overlap. The result is a shapefile of random points in each stand. Generate one point per 10 acres but assign two points minimum per stand. Finally, download the points to a GPS. Use the GPS in the field to navigate to each point. Use the information generated here to complete the GIS – Office Data tab in the accompanying MS Excel file.

Step 2 – Field Visit

The purpose of the field visit is to ground truth the digital imagery interpretation, gather habitat use data, describe habitat components, and get a general sense of stand age, successional trend, and condition from an enhancement perspective. Each browse point should be visited and a survey of a rectangular belt plot and a circular plot be conducted at each one.

Use the GPS to navigate to the 1st sampling point. On the field data sheet record Evaluation Area, Digital Viereck Type, and Acres as determined from the office exercise. Record the date and observer. Slope/Aspect are general and overall for the stand and can be estimated. Weather includes sky conditions, temperature, wind, and precipitation but most important is snow depth if the assessment is done during winter. Snow depth can bias estimates of forage species height and hamper the ability to see understory plants, moss cover, and assess duff thickness.

The sample point is just the location for the start of a belt transect. If data are collected in an area plot (as opposed to linear or point sampling) it can be extrapolated to the entire stand. The basic protocol is to survey a 6 feet by 75 feet long plot on a random heading. Seventy five feet (25 yards) can be paced, measured with a tape, or established with a laser range finder if the vegetation isn't too thick. Six feet is roughly the distance between an adult's fingertips with arms outstretched but individuals vary so field staff should measure their "wingspan" and carry a stick to make up any difference if wingspan is significantly less than 6 feet. A 6x75 foot plot contains 450 square feet. A 1/100th acre plot contains 436 square feet and this belt plot is a rough equivalent.

Once a sample point has been located a random heading for the plot needs to be determined. Use a random number generator to do this. There are free apps online such as Pretty Random. Set it to determine a random number between 1 and 360. Set a compass to the randomly determined heading. Hang a piece of flagging tape or otherwise mark the start point. Determine 25 yards on that heading and hang another flag. Walk this belt transect with both arms outstretched as many times as necessary to collect the required data. Data collected from the belt plot include a count of the number of browsed plants and an estimate of browse availability which are explained below. Data will be entered in the accompanying MS Excel worksheet as averages from all the belt plots done in each stand.

The next variables are collected from within a 25 yard radius circle centered at the random point. The intent is to look objectively at the stand and determine the correct habitat type as well as collect data on species composition, height, and other stand characteristics like spruce abundance. Twenty five yards can be estimated based on the belt plot that was just conducted. However, in thick vegetation it may necessary to hang a few flags around the plot perimeter or have a coworker walk the perimeter. Data collected in the 25 yard radius plot include the habitat type to Viereck level IV and the dominant hardwood forage species including cover values and height estimates. These variables are explained below.

Field Data Sheet

Plot Number: The number of the plot being surveyed. There is room for plots 10 per stand. Add more if necessary.

Heading: This is the random heading used in the belt plot.

Number Browse: The number of live hardwood trees and willows with any evidence of browse by moose. Evidence can be current or past as long as it was browse (and not breakage) and if it was by moose (broken) vs. hare (cut). Leaf stripping counts as browse but bark stripping does not. This a count of browsed plants, not twigs. The focal plants have to be alive (though the browsed stem can be dead) and a minimum of three feet high which is roughly waist level – measure field staff to be sure. Any height above 3 feet counts. If a plant has been browsed by moose below that height but the plant is more than 3 feet high it counts. Moose can browse to 10 feet or more when standing on deep or drifted snow so look up. The plants have to be rooted in the plot. So for example, branches leaning in don't count.

% Used: This is a rough estimate of browse availability determined within categories. From within the plot estimate the number of preferred forage plants of all species combined greater than 3 feet tall that are available to moose. For example, if the lowest branches of a birch tree are 20 feet above the ground that plant doesn't count. The categories are ≤ 10%, 11-50%, 51-90%, >90%.

Plot Viereck Type: This is the Viereck level IV classification determined at the point. Several of these plots will help determine the overall stand type more accurately.

Dominant Hardwood Spp: Dominant Hardwood Species. This is the most common hardwood tree species in the 25 yard radius plot.

% Cov: Percent Cover. The estimated percent cover of the tree species within the 25 yard radius plot determined within categories. The categories are ≤ 10%, 10-24%, 25-60%, >60%.

X̄ Ht: The estimated average height in feet of the tree species within the 25 yard radius plot in five foot increments.

Dominant Hardwood Spp2: Repeat the above for the 2nd most common hardwood tree in the 25 yard radius plot. If there is a 3rd hardwood species present record it on the next line.

Willow % Cover: This is the estimated percent cover of willow in the 25 yard radius plot. Willows do not have to be identified to species.

Willow X̄ Height: The estimated average height of willows in the 25 yard radius plot in five foot increments.

Pics Taken?: A reminder to take 1 or 2 representative photos at each plot for future reference and reporting.

Stand Averages: These are averages of factors important in writing management prescriptions estimated from within the overall stand that should be noted.

Comments: Note the average diameter of the dominant hardwood species. Note other dominant species like alder or any common understory species. Does the stand appear to be wetland or is there evidence that it was burned? Note if there is other moose sign not documented above like tracks, beds, etc. Note if there is significant stunting or mortality of forage species due to browsing pressure by moose.

This survey is intended to be relatively rapid. These measurements are estimates. Cover values are estimates and are notoriously biased on an individual observer level. Try to be consistent and calibrate with co-workers before collecting data. Heights are estimated to the nearest five feet. Diameters can be estimated.

Field equipment necessary

- GPS
- Phone with random number generator app
- Camera
- Compass
- Flagging
- Copy of The Alaska Vegetation Classification manual
- Laser range finder or meter tape
- Clipboard
- Data sheets
- Pencils

Step 3 – Write Up

Summarize the results of field assessments in a brief document. Describe each stand in an EA. Include average estimates of dominant forage species cover, height, and diameter. Include these same estimates for any spruce within a stand. Spruce will outlive preferred hardwood forage species and will eventually dominate the stand. Discuss successional trajectories within a stand from a more or less 20 year perspective. Discuss treatment options (mechanical, hand, prescribed fire) that could be used to regenerate preferred forage species. Tree heights and diameters are important considerations in mechanical treatment options. The larger the trees, the bigger the equipment needed to clear them and the greater the cost. Organic layer thickness is important to note as well. It would have to be removed in a mechanical treatment. Include a map of the EA depicting stands within it and plot sample points. Also add a reference photo or two.