National Bobwhite Conservation Initiative

Coordinated Implementation Program

Habitat Monitoring Training Manual

NBCI
National Bobwhite Conservation Initiative
. . . the unified strategy to restore wild quail

Cover Page Photo Credits:
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Tall Timbers Research Station and Land Conservancy (Bottom Right)
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Introduction

The National Bobwhite Conservation Initiative (NBCI) Coordinated Implementation Program (CIP) provides guidance to state wildlife agencies and other partners for successfully implementing bobwhite conservation. An important part of the CIP is a standard method to classify and measure northern bobwhite habitat across their range. Analysis of the habitat data and bird population data will provide valuable insight into the relationship of bobwhite populations and habitat at the local and range-wide scales.

The CIP habitat classification system focuses on the vegetation structure at multiple levels (canopy to the ground) and the proximity of different cover types to each other. Based on the classification system, the CIP habitat monitoring uses 14 in-field measurements to determine if a patch of cover is considered quail habitat. Good training is necessary to ensure these 14 measurements are taken consistently among years and between partners. This manual will serve as an introduction and reference guide for the habitat monitoring of the CIP. However, in-field training with an experienced observer is also necessary prior to conducting the monitoring.

This manual is broken into 6 sections to help people become more familiar with the CIP habitat monitoring. Depending on your responsibilities, it may be beneficial to read the whole documents or just certain sections.

Below are the sections and recommended audiences.

Cover Photo Credit: Dr. Matthew Springer UK Extension

Overview of the CIP

Introduction

The National Bobwhite Conservation Initiative's (NBCI) Coordinated Implementation Program (CIP) helps state wildlife agencies and other partners successfully improve northern bobwhite populations. It promotes focusing efforts on areas large enough to support sustainable bobwhite populations but small enough for a reasonable chance at success. The CIP provides recommendations on how to develop a plan, implement the plan, measure the results and learn from what happened.

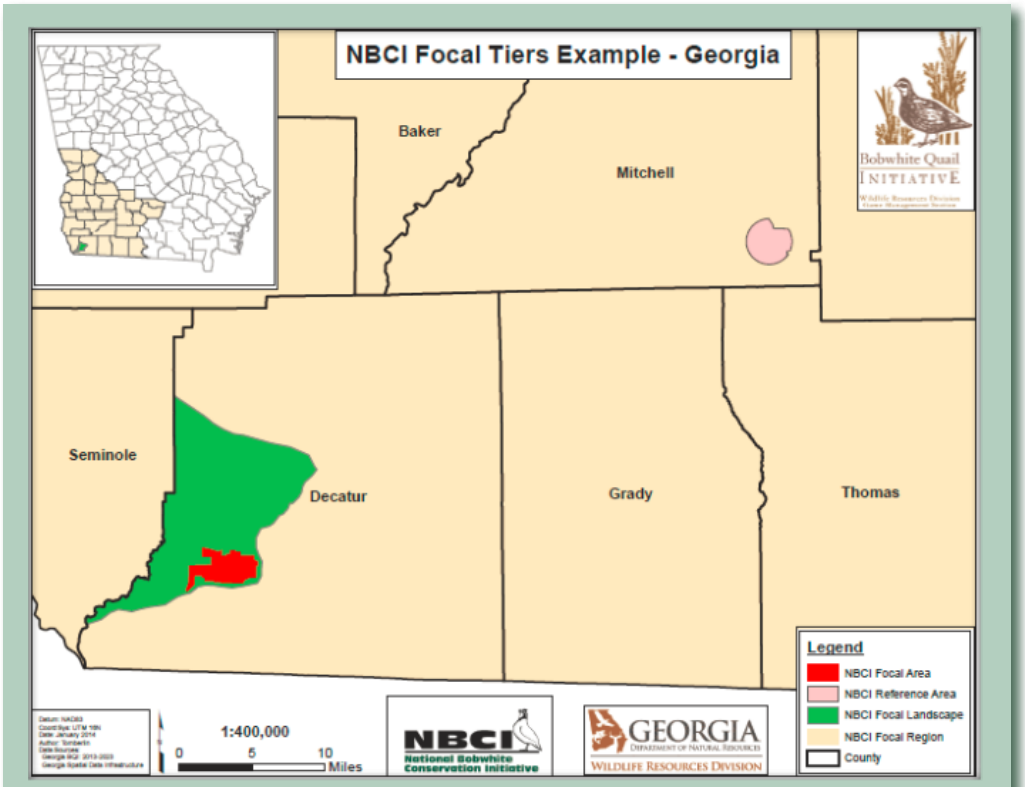
Quail Management

Traditionally, bobwhite management has focused on improving small tracts of land, often without regard to what is surrounding it. According to Williams et. al. (2004), this approach is not working. They propose management of bobwhite habitat across larger areas, (e.g., landscapes); however, landscape management can be difficult. Managing across large areas often means working with more landowners, some of whom are not interested in quail management. Therefore, landscape management requires more planning, more resources (e.g., money, equipment, personnel, etc.) and possibly greater incentives for landowners.

The CIP suggests ways to reduce the difficulties of landscape management through a) locating areas where successful quail management is likely, b) building strong partnerships that increase resources and spread the workload, and c) focusing resources using a three-tiered delivery approach, (e.g., Focal Areas, Focal Regions, and Focal Landscapes).

The connection of on-the-ground management to landscape management powers the CIP tiered delivery approach. Focal Areas provide a precise target for improving bobwhite habitat while Focal Regions and Focal Landscapes provide a framework to expand successful Focal Areas. The efficacy of any program can be improve using these three tiers to target resources and efforts for bobwhite conservation.

A Focal Area is the smallest tier of the CIP. The goal of the focal area is to concentrate habitat improvement to attain target bobwhite densities in 10 years. Within five years of establishment, Focal Areas must have at least 1,500 acres of quail habitat covering at least 25% of the area. Focal areas do not need to begin with that much habitat. Therefore, it is important to choose areas where habitat improvement will occur.



Georgia Identified a Focal Region in Southeast Georgia. The Focal Region has a Focal Landscape surrounding a Focal Area in Eastern Decatur County.

Focal Landscapes are the next largest tier of the CIP. The CIP recommends placing Focal Landscapes around one or more Focal Areas. Focal Landscapes do not have habitat or population goals. However, improving bobwhite habitat within the Focal Landscape could have a positive impact on the Focal

Area and could help bobwhite disperse out of Focal Areas.

The largest tier recommended by the CIP for bobwhite conservation is the Focal Region. This is a very large area, defined by county boundaries, watersheds or any other method desired. They should be in areas with medium and high priority for restoring bobwhite defined by NBCI 2.0 Biologist Ranking Index (The National Bobwhite Technical Committee 2011). Ideally, they would surround one or more Focal Landscapes that contain Focal Areas.

Monitoring

Understanding how habitat and bobwhite populations are related is another important aspect of the CIP. The CIP requires monitoring bobwhite habitat and populations using consistent methods for all Focal Areas. This will show the relationship of bobwhite populations to habitat within and between Focal Areas.

The CIP also requires monitoring on reference areas to show how bobwhite habitat and populations change when they are not a management priority. It is important that they represent "business as usual" for the area surrounding a Focal Area. For this purpose, the area chosen is the Bird Conservation Region (BCR). Bobwhite management should not be encouraged or discouraged in reference areas. Additionally, the dominant landcover in the reference area should match closely with the BCR. For more details about Reference Areas see the CIP document (Morgan et. al. 2014).

The four required monitoring programs of the CIP are breeding bird, fall bird, habitat and habitat management monitoring. Bird monitoring occurs annually at the peak of bobwhite calling (May, June or July for breeding, October or November for fall). The CIP recommends collecting data on other priority birds during the breeding season monitoring. Only record bobwhite covey calls during the fall surveys. For more information on bird monitoring refer to the CIP document (Morgan et. al. 2014).

Habitat monitoring must be completed during year 1, 5, and 10 of the monitoring program, at a minimum. Habitat surveys are performed at the breeding bird survey points during the growing season. Learn more about the habitat monitoring in the CIP document (Morgan et. al. 2014) or in other sections of this manual. Habitat management monitoring involves tracking what habitat management practices and acres on the focus area each year.

Conclusion

Years of habitat loss has contributed to the large population declines we have seen in bobwhite populations. Reversing these trends is not easy and will not happen instantly. However, the NBCI CIP provides a framework to start that process and to learn from the successes and failures of others.

References

Morgan, J. P., K. Duren, and T.V. Dailey. 2014. NBCI Coordinated Implementation Program. Addendum, The National Bobwhite Conservation Initiative: A range-wide plan for recovering bobwhites. National Bobwhite Technical Committee Technical Publication, ver. 2.0. Knoxville, TN.

The National Bobwhite Technical Committee. 2011. Palmer, W.E., T.M. Terhune, and D.F. McKenzie (eds). The National Bobwhite Conservation Initiative: A range-wide plan for recovering bobwhites. National Bobwhite Technical Committee Technical Publication, ver. 2.0, Knoxville, TN.

Williams, C. K., F. S. Guthery, R. D. Applegate, and M. J. Peterson. 2004. The northern bobwhite decline: scaling our management for the twenty-first century. Wildlife Society Bulletin 32:861–869.

Important Characteristics of Quail Habitat

Introduction

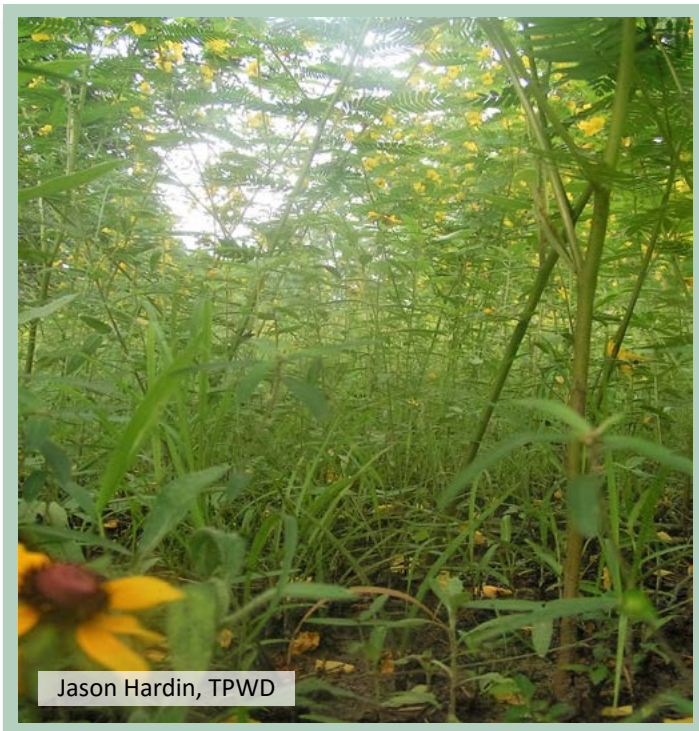
At first glance, bobwhite habitat in Texas looks different from bobwhite habitat in Florida or Kentucky. However, the structure of the vegetation and arrangement of cover types are similar. That principle is the basis of the CIP Habitat Classification System and the habitat monitoring protocol. The classification system emphasizes the importance of areas with bare ground under vegetation and near areas of protective cover. Properly managed forests, pastures, agriculture fields and other grasslands can all have these basic components of bobwhite habitat.

Bare Ground

Bobwhites primarily travel by walking or running along the ground. Standing vegetation may slightly reduce their ability to move but provides overhead cover to hide their movements. Dead vegetation lying on the ground (thatch) greatly reduces bobwhites ability to travel and does not provide cover. Excessive dead vegetation (i.e. not enough bare ground) can make a patch of cover unusable for bobwhites.

Bare ground is most important during the breeding season. Bobwhite chicks leave the nest shortly after hatching. They must be able to move around freely and find food close to the ground. A thick layer of thatch will greatly reduce their ability to move and find food.

Measuring the amount of bare ground can be difficult. The CIP considers areas of exposed soil as bare ground, even if the soil is under a canopy of vegetation. For example, a recently burned grass field with dense vegetation may have a lot of bare ground between clumps of grasses or forbs.



Jason Hardin, TPWD

Thinking about how well quail chicks can move through cover will help you understand what counts as bare ground.

However, observers may not see the bare ground unless they look under the vegetation. It is helpful to think about bare ground from the level of a quail. They are moving along the ground between the vegetation and not crashing through it as people do.

John Kaiser, ODNR

A thick layer of thatch is difficult for quail to travel through.

Protective Cover

Protective cover is vegetation that provides year round overhead protection from predators and weather. The presence or absence of protective cover plays a large role in determining the amount of quail habitat in an area. Any cover more than 164 ft. (50 m) from protective cover *is not considered* bobwhite habitat.

The important characteristics of protective cover are stem density, plant type, and size. Protective cover is dense on the sides and top making it difficult for predators to see and travel through. It also protects bobwhite from extreme temperatures and heavy snow. While dense on the outside, it should also be open underneath so bobwhite can travel through it.

This shrub patch is dense on the sides and top but open underneath. It is good protective cover.

The type of plants that provide year round cover changes based on snowfall. In the southern region of bobwhite range, herbaceous plants (e.g., river cane, goldenrod, etc.) can remain standing year round. In the northern regions of their range, snow flattens herbaceous vegetation during winter. In these areas, thickets of shrubs, young trees, or brush piles are the only things that remain standing through snow.

Not all woody plants provide year round protective cover. A patch of sumac may be dense in summer. However, most of that cover is from the long compound leafs which drop off in fall, leaving only a few standing stems.

In summer, this patch of sumac was very dense. However, in winter the stem density is low. It does not provide year round protection for bobwhite.

Predators can reach the edges of even the thickest cover and heavy winds can drive snow through small patches of brush. Therefore, the size of protective cover is as important as its structure. The CIP states that protective cover should be at least 314 ft^2 (a 10 ft. radius circle or rectangle 10 ft. by 31 ft.). Patches of cover that meet this requirement are large enough to protect bobwhite from hazards.

Conclusion

The CIP habitat classification system emphasizes bare ground and access to protective cover. These two characteristics are important factors in herbaceous, shrub and forest cover types. Learning to identify and measure these characteristics accurately should be a priority for everyone involved in the CIP program.

CIP Habitat Monitoring Protocol

Introduction

The CIP Habitat monitoring protocol balances scientific rigor with time required for completing the surveys. The survey does not require specialized field equipment and can be completed from the road. However, it is preferred that observers walk through the cover to get accurate estimates. This section describes how to identify units of cover and how to collect the required data.

Data Collection

CIP Habitat Monitoring occurs during the growing season in the first, fifth, and tenth year of a focal area program. Surveys may be conducted more frequently if desired. Data should be collected for all habitat patches within 273.4 yards (250 m) of each spring bird monitoring point. The survey can be completed from the road but walking through each patch is preferred. Walking provides a closer look of the cover especially for difficult-to-see characteristics. When walking, observers spend around three hours per point on reference areas and four or more hours for each point on focal areas.

Two types of datasheets should be used for the habitat survey. The first datasheet type is an aerial photo of the point with the 250 m boundary marked (see Datasheet 1). Datasheet 1 is used to mark and label boundaries for patches and protective cover. Protective cover is marked using a highlighter and the letter “H” or “W”, indicating if it is herbaceous or woody vegetation. Label each patch with a number that is also written on Datasheet 2.

Use Datasheet 2 to record data for each habitat patch. Do not skip any spaces on the datasheet. Below are instructions on how to answer each question on Datasheet 2.

Patch Number: For each column enter the number corresponding to each patch on Datasheet 1.

Is this developed land or non-habitat?: Developed land or non-habitat includes buildings, lawns, ponds, roads or any other cover that is not considered agriculture, herbaceous, shrub of forest. Map roads from ditch to ditch. Lawns should be mapped to where routine mowing ends.

Crop Type: Record the type of row crop planted in the field. Hayfields and pastures are considered herbaceous cover not crop.

What % of field has standing crop residue in spring?: All crop types can have standing crop residue if the field is not plowed after harvest. If you are unsure you can ask the landowner if a field was plowed.

What is the % canopy of vegetation > 12ft. tall?: Estimate tree canopy closure. A tree is defined as woody vegetation more than 12 ft. tall. Areas with at least 10% canopy closure are considered forests.

What % of the *canopy* are deciduous trees?: Estimate how much of the tree canopy is composed of deciduous trees. This estimate plus the canopy estimate for coniferous trees should equal 100%.

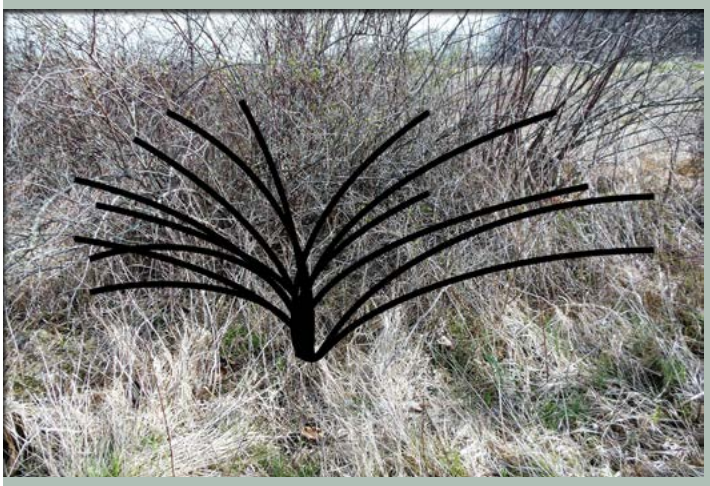
What % of the *canopy* are coniferous trees?: Estimate how much of the tree canopy is composed of coniferous trees. This estimate plus the canopy estimate for deciduous trees should equal 100%.

What is the % of shrub cover in the understory?: Estimate the percent of woody vegetation less than 12 ft tall.

What % of the shrub cover has high stems densities near the ground?: Estimate the percent, from 0-100%, of the shrub cover has a high density of stems near the ground. The growth pattern of a shrub species influences the density of stems near the ground. See next page for three common growth patterns of shrubs and how they are related to stem density near the ground.

What is the % grass cover in the understory?: Estimate the amount of grass cover in the understory. The sum of grass and forb cover can be more than 100% when there are multiple layers of herbaceous vegetation.

Growth Pattern 1: Shrubs that like sumac or mesquite have branches that grow up and then spread out. Their shape is similar to an umbrella. The stem density near the ground is low.



Growth Pattern 2: Shrubs like dogwoods, or multi-flora rose have branches that spread out but remain close to the ground. The stem density near the ground can be high. However, taller plants sometimes lose lower branches and eventually look more like growth pattern 1.

Growth Pattern 3: Shrubs like blackberry or rasberries grow in patches with a lot of individual vertical stems. The stem density near the ground is high.

What is the % forb cover in the understory?: Estimate the amount of forb cover in the understory. The sum of grass and forb cover can be more than 100% when there are multiple layers of herbaceous vegetation.

What % of the forb cover can act as protective cover?: Estimate the percentage of the total forb cover that is protective cover. Consult with state quail coordinator to determine which forbs species act as protective cover in your state.

How many forb species are present?: For each habitat patch spend ~2 minutes counting the number of different forbs species that are present. This can be done while recording other information.

What is the % bare ground, including areas underneath vegetation?: Estimate the percent of bare ground in the patch. Bare ground can be under vegetation. The sum of bare ground, forb cover and grass cover can be more than 100%. See Section 2 for more information about bare ground.

Is the herbaceous vegetation height >8" for ≥50% of the year?: Look for signs that an herbaceous field is frequently mowed. These include, presence of hay bales along the edge of the field, monocultures of common hay field plants (clover, alfalfa, etc), no woody vegetation in the field, or others. Asking landowners or neighbors if a field is hayed can also work well.

Do you think this patch has quail habitat?: Using your best professional judgment do you think this patch is considered quail habitat? This question does not affect how habitat is classified. It is there to see how the classifications system works compared to professional opinion.

Identify Units

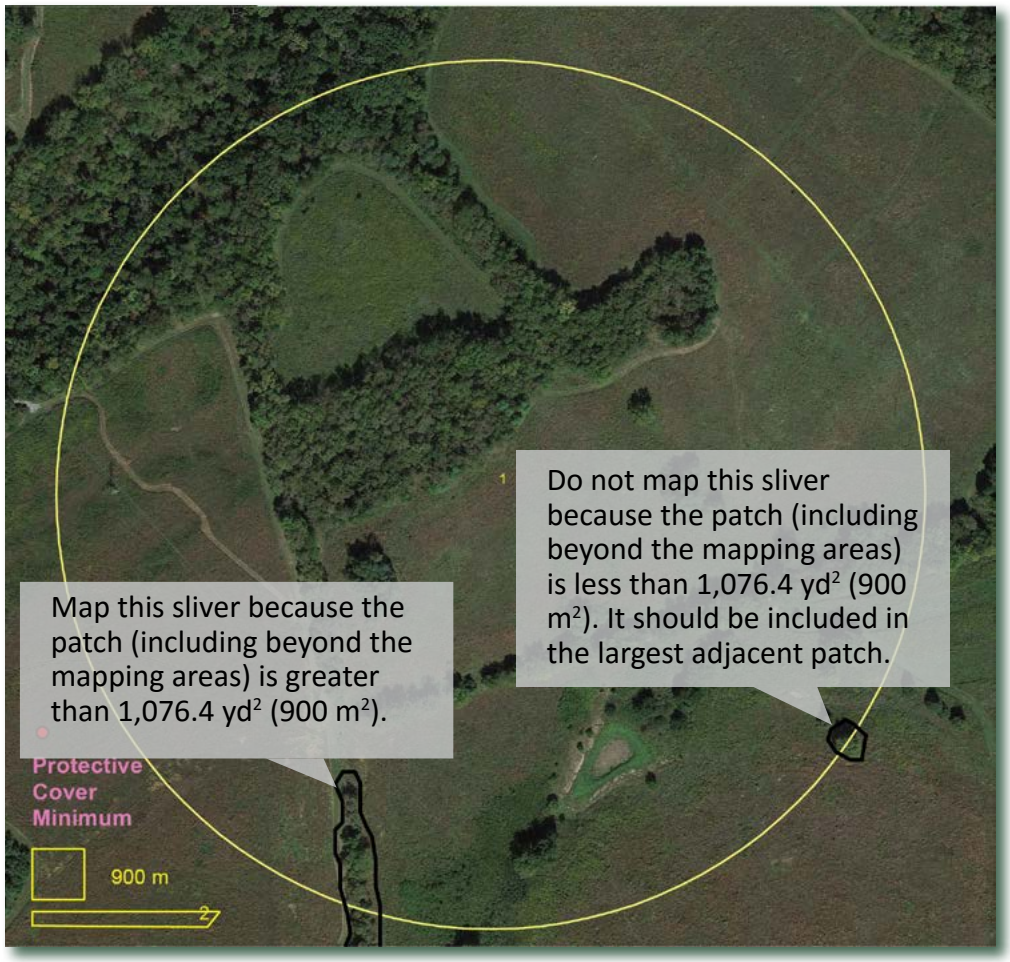
The CIP identifies two types of patches (regular cover and protective cover) recorded in the habitat monitoring protocol. The boundaries of each patch type are drawn on Datasheet 1;however, the minimum size and data collected for each patch differs.

Regular Cover: The minimum size for a regular cover patch is 1,076.4 yd^2 (900 m^2), which is a 32.8 yd by 32.8 yd (30 m by 30 m) square. Patch boundaries should be outlined using a red or other color marker that is visible against the aerial photo. Patches should be clearly labeled using numbers. Arrows or lines should be used to connect numbers to patches when necessary.

Slivers of habitat on the edge of the mapping radius boundary are mapped according to the overall size of the patch beyond the mapping area (see below). A size reference should be included on Datasheet 1 to help with outlining patches and determining if they are large enough. Observers should also practice pacing set distances to know how many steps it takes them to walk 33 yds (~30 m) However, if you are unsure if a patch is large enough, it should be mapped. Patch size can be estimated and boundaries changed using GIS.

Some patches can be delineated using only the aerial photo on Datasheet 1. However, the actual cover may not be as uniform as it appears in an aerial photo. Adjusting boundaries lines marked with a pen or marker can make datasheet messy so try to be as accurate as possible. Changes to any value in Datasheet 2 that covers at least 1,076.4 yd^2 (900 m^2) should be mapped as separate patches. For example, a recent burn on part of a field may not be seen in an aerial photo. The burned area would have more bare ground than the unburned area. However, using the aerial photo only, one patch of contiguous cover would be identified when it should be two. Below are some thresholds that will help to determine when to split patches:

1. More than 10% canopy cover of vegetation height >12 ft is considered a forest patch.
2. More than 33% shrub cover and less than 10% canopy cover is considered shrub/woody cover patch (shrubs include blackberries and woody vines).
3. Non-forest and non-shrub cover with at least



33% grass cover and at least 33% forb cover is considered a mixed herbaceous open patch.

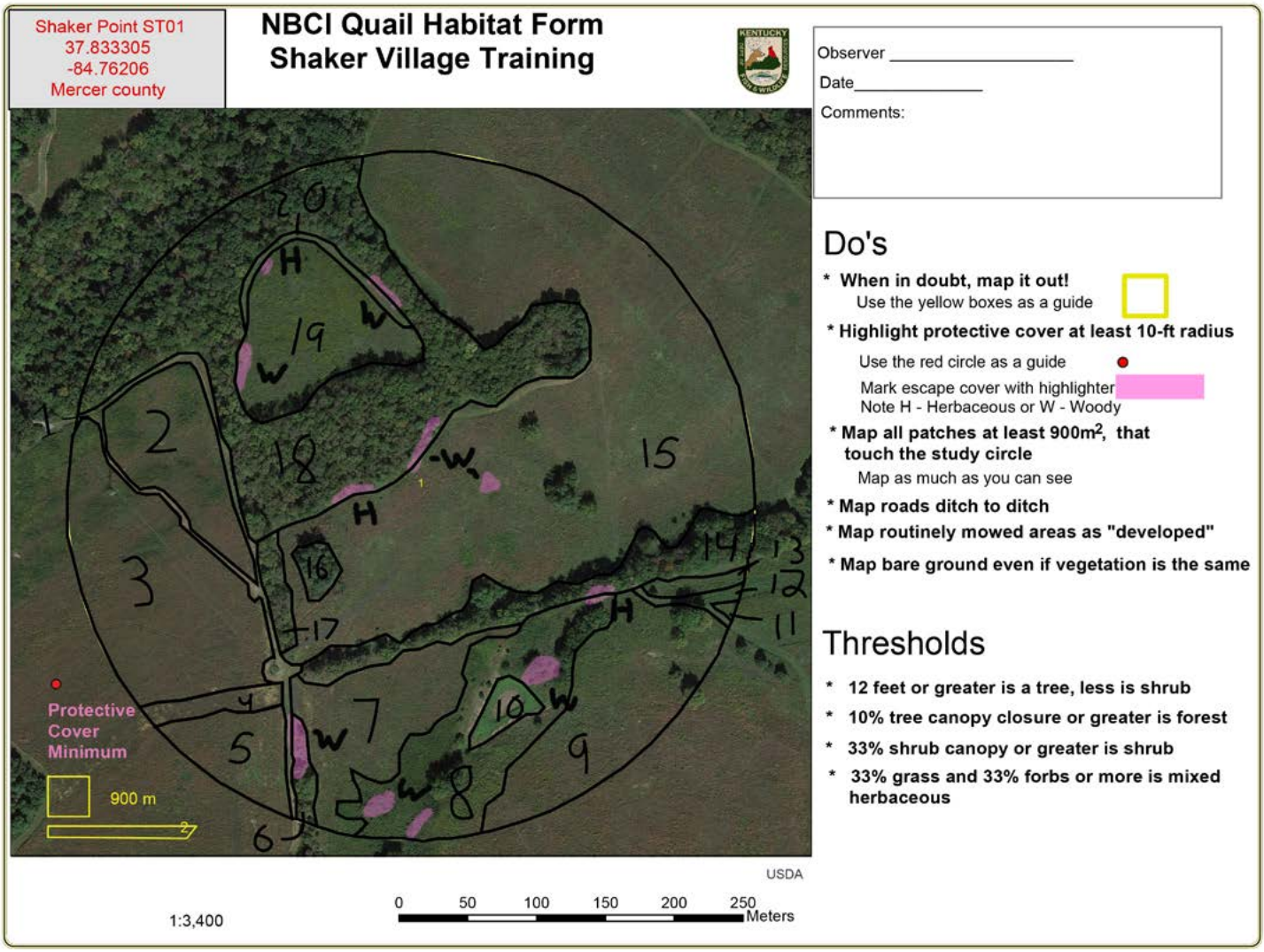
Protective Cover: Protective cover is mapped differently than regular cover. The minimum size for protective cover is 314 ft^2, which is a 10-foot radius circle or a 10 ft. X 31 ft. rectangle. A size reference for protective cover should also be included on Datasheet 1. Protective cover is mapped using a highlighter that is visible against the aerial photo. Yellow tends to not stand out well. Identify protective cover using an "H" or "W" for herbaceous or woody vegetation.

Conclusion

This section explains the habitat monitoring protocol and what data should be collected. It is highly recommended to implement this protocol in the field with an experienced observer prior to data collection. Using this and other sections of this manual in conjunction with field training is the best way to learn the CIP habitat monitoring survey.

Data Sheets

Datasheet 1: Below is an example of datasheet 1 used in Kentucky. Regular cover patches are delineated with black pen and numbered. Protective Cover is highlighted and labeled.



Example of Datasheet 2. A copy of this datasheet can be downloaded at www.quailcount.org.

Point ID:	Date:	Observer:	**NBCI CIP Habitat Monitoring Datasheet**										
		Patch Number:											
		Is this developed land or non-habitat?											
		Crop fields											
		Crop Type											
		What % of field has standing crop residue in spring?											
		Perrenial Cover											
		What is the % canopy of vegetation > 12ft. tall?											
Sum = 100% of canopy		What % of the canopy are deciduous trees?											
		What % of the canopy are coniferous trees?											
		What is the % of shrub cover in the understory?											
		What % of the shrub cover has high stems densities near the ground?											
		What is the % grass cover in the understory?											
		What is the % forb cover in the understory?											
		What % of the forb cover can act as protective cover?											
		How many forb species are present?											
		What is the % bareground including underneath vegetation?											
		Is the herbaceous vegetation height > 8 in for ≥ 50% of the year?											
		Do you think this patch is quail habitat?											

NOTES:

CIP Habitat Monitoring Image Documentation

Introduction

Taking photos while conducting the NBCI CIP habitat monitoring programs is a great way to document your data and to create training material. However, camera angle, distance from subject, and other factors can change how photos are interpreted. Additionally, the photo naming system and metadata (e.g. location, date, what is in the picture, etc.) affect how easily photos can be organized and found. Therefore, consistent photography techniques and documentation will help ensure your photos are useful in the future. This document provides the recommended guidelines for taking and submitting photos for the NBCI CIP Habitat Photo Library. Please note taking photos in the field is not required and it is not recommended to take pictures of everything within the survey point.

Taking Photos

Each image should be taken in 35 mm mode (normal zoom) using landscape orientation and the cameras auto light setting. Avoid taking photos in low light conditions such as near dawn or dusk. Avoid photos with people, shadow of people, glare, or anything else that can obscure the vegetation in the shot.

The following photo subjects and keywords are most relevant to the habitat monitoring. The keywords will be used as meta-data and for naming the photos.

Edge- Photos that show the transition of one cover type to another

Developed- Photos of developed or non-habitat cover, such as houses, yards ponds, etc.

CropResidue- Photos of crop residue in agriculture fields.

ForestCanopy- Photos to illustrate the percent of canopy for forest cover.

Shrub- Photos to illustrate the percent of shrub cover.

StemDensityHG- Photos to illustrate shrubs with high stem density near the ground.

StemDensityLG- Photos to illustrate shrubs with low stem density near the ground.

Herbaceous- Photos to illustrate the percent of grass and forb cover or the height of herbaceous vegetation.

ProtectiveForb- Photos of forbs that act as year round protective cover.

BareGround- Photos to illustrate the percent of bare ground.

PCoverUsed- Photos to show protective cover that have been used by bobwhite. Use can be confirmed through radio tracking or flushing bobwhite from the cover.

PCoverUnk- Photos of possible protective cover, but is unknown if bobwhite have used it.

Below are five shots that are approved for the NBCI habitat monitoring photo guide:

Landscape Shot- This shot should be taken in such a manner to show mostly the vegetation and to limit the horizon. Try to have less than 10% of the image with horizon in view. This is an appropriate shot for photos with the keywords **Edge, Developed, CropResidue,** and **Shrub**.

High Landscape Shot- This shot is similar to a landscape shot except that it is taken from a higher elevation like a ladder or truck bed. It is preferred over a landscape shot when used to estimate percentages. This is an appropriate shot for photos with the keywords **Edge, Developed, CropResidue,** and **Shrub**.

Medium Shot- This shot is taken at an angle parallel with the ground or slightly downward and is of a specific area or object. The height of the shot can vary depending on the purpose of the shot. It is important to be close enough to the intended target to see details that will aid in interpreting the photo. It is also beneficial to take this shot from multiple positions around the intended target. When using this shot to illustrate the height of herbaceous vegetation include a size reference (e.g. robel pole, ruler, etc). This shot is appropriate for photos with the keywords **StemDensityHG, StemDensity LG, Herbaceous, ProtectiveForb, PCoverUsed,** and **PCoverUnk**.

Upward Facing Shot-This shot is taken at breast height (4.5 ft) with the camera facing perpendicular to the ground. This shot should only be used for photos with the keyword **ForestCanopy**.

Downward Facing Shot- This shot is taken from head height facing the ground immediately in front of the photographer. Care should be taken not to

trample the vegetation prior to photo. When using this shot for photos with the keyword **BareGround,** vegetation may need to be parted so the ground can be seen. This is an appropriate shot for photos with the keywords **Herbaceous, BareGround,** and **CropResidue**.

Photo Meta-data

Background information for each photo should be recorded using the NBCI CIP photo documentation spread sheet. This information will be used to help organize and search for photos. It is also essential to maintaining long term usefulness of the photo. The following information is required for each photo:

1. Photo Name- Photo files should be named using the following format:

   PhotoKeyword_State_Month_Year_ PhotoSequence.jpg.

   - Keyword: Use the list of keywords from above. Note, there are no spaces between words and the first letter of all words is always capitalized.
   - State: Use a two letter initial for each state (e.g. PA for Pennsylvania)
   - Month: Use two numbers to indicate the month of the year. Start single digit months with a 0 (e.g. 01 for January).
   - Year: Use all four numbers of the year (e.g. 2016)
   - Photo Sequence: The photo sequence starts at 01 and increases for each photo in a category. The sequence resets if any of the previous categories (i.e. photo keyword, state, month or year) changes.
2. Shot Type- Use name of shots described above.
3. Location- Use survey point name.
4. Description- A brief description of what is in the photo. When taking photos to illustrate percent cover provided estimated percentage for each cover type visible. For photos of used protective cover, indicate how you document use (e.g., radio telemetry, visible observation, etc). Including more detail on locations (e.g., polygon number, coordinates, etc) would be helpful but are not required.
5. Photographer Name- Providing the photographer name is not required but will allow NBCI to credit photographers.

Examples

Photo Name: Edge_PA_03_2016_01.jpg
Shot Type: Landscape
Description: Transition from forest to grass field. Four cover types visible forest, shrub, mowed grass and standing grass (left to right).
Photographer: Ken Duren

Photo Name: CropResidue_PA_03_2016_01.jpg
Shot Type: High Landscape Shot
Description: Crop field has 100% crop residue remaining in spring.
Photographer: Ken Duren

Photo Name: StemDensityHG_PA_03_2016_01.jpg
Shot Type: Medium
Description: Shrubs with high stem density near the ground
Photographer: Ken Duren

Photo Name: ForestCanopy_PA_03_2016_01.jpg
Shot Type: Upward Facing
Description: 90% forest canopy 100% of canopy is coniferous.
Photographer: Ken Duren

Photo Name: Herbaceous_PA_03_2016_01.jpg
Shot Type: Downward Facing
Description: 100% grass, 0% forbs or bare ground.
Photographer: Ken Duren

Using the CIP Classification System

Introduction

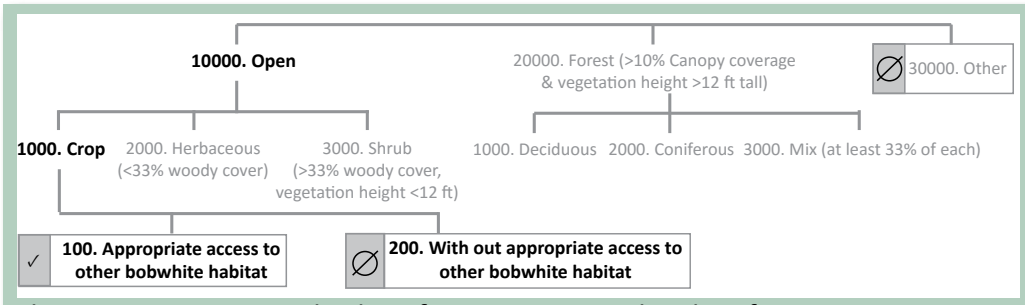
The CIP Habitat Classification System is considered the backbone of the habitat-monitoring program. The 14 in-field measurements are used with the classification system to determine how much quail habitat is at each point. The classification system uses a hierarchical structure that begins with broad cover types and ends with the ground level structure of vegetation that most affects bobwhites. This structure results in bare ground and distance to protective cover having a large impact on what is considered bobwhite habitat. However, the higher levels of the classification system are important because they influence the lower levels. For example, closed canopy forests limit the amount of light that reaches the forest floor, which can reduce protective cover and other vegetation growth. A thorough understanding of the classification system is needed to estimate the amount of bobwhite habitat in a focal area and how to increase it.

Numbering system overview

The Habitat Classification System uses a smart coding number scheme to identify the habitat characteristics for each patch. The numbers are assigned to each patch using data collected in the survey. The numbering begins with broad cover types and increases with each step down the hierarchy. The first level of the key includes Open Cover (10000), Forest Cover (20000) and Other Cover (30000). Each patch can be classified using the data of the monitoring survey and the key in Appendix A of the CIP document. To identify the number for each patch, begin at the top of the key and add the values of each split to the value of the splits above it. See below for example.

Open Cover

Open cover includes agriculture, herbaceous and shrub covers. The agriculture key is seen below. Agriculture habitat can be an important food source for bobwhite. However, it does not provide year round cover. Therefore, it is considered quail habitat only if it is within 164'. of other bobwhite habitat.



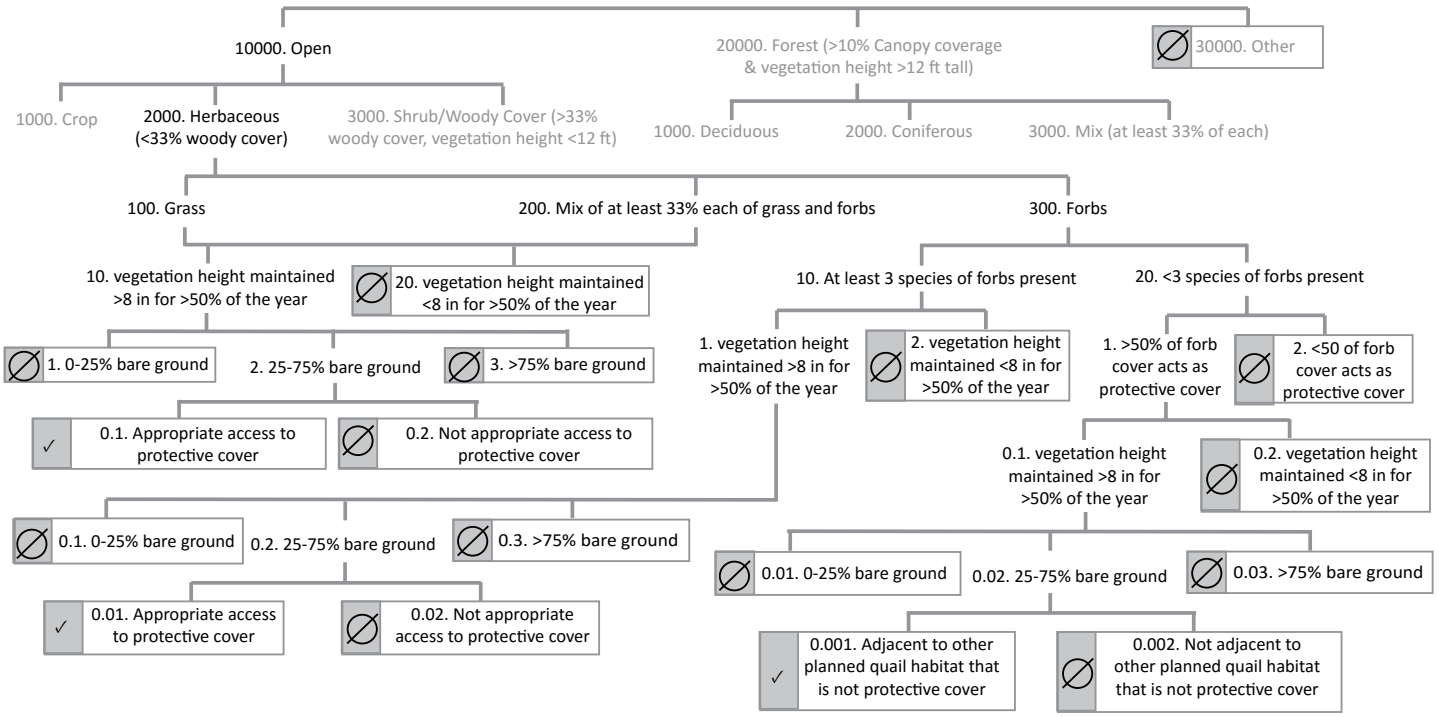
There are two potential values for row crops in the classification system. Row crops within 164'. (50 m.) of other bobwhite habitat are given value of 11100 (10000+1000+100). Row crops more than 164'. (50 m.) from other bobwhite habitat are given the value of 11200 (10000+1000+200).

Herbaceous Cover

The herbaceous cover key is the most important in the classification system. It is used when a patch has less than 10% canopy coverage of vegetation over 12'. tall and less than 33% shrub cover. It is also included in the understory of the shrub and forest cover keys.

Herbaceous cover splits into three categories, grass dominated, forb dominated and mixed (grass and forb cover are both at least 33%). Grass dominated and mixed follow the same path. They must be at least 8". tall for most of the year, have 25-75% bare ground and be within 164'. of protective cover to be considered quail habitat.

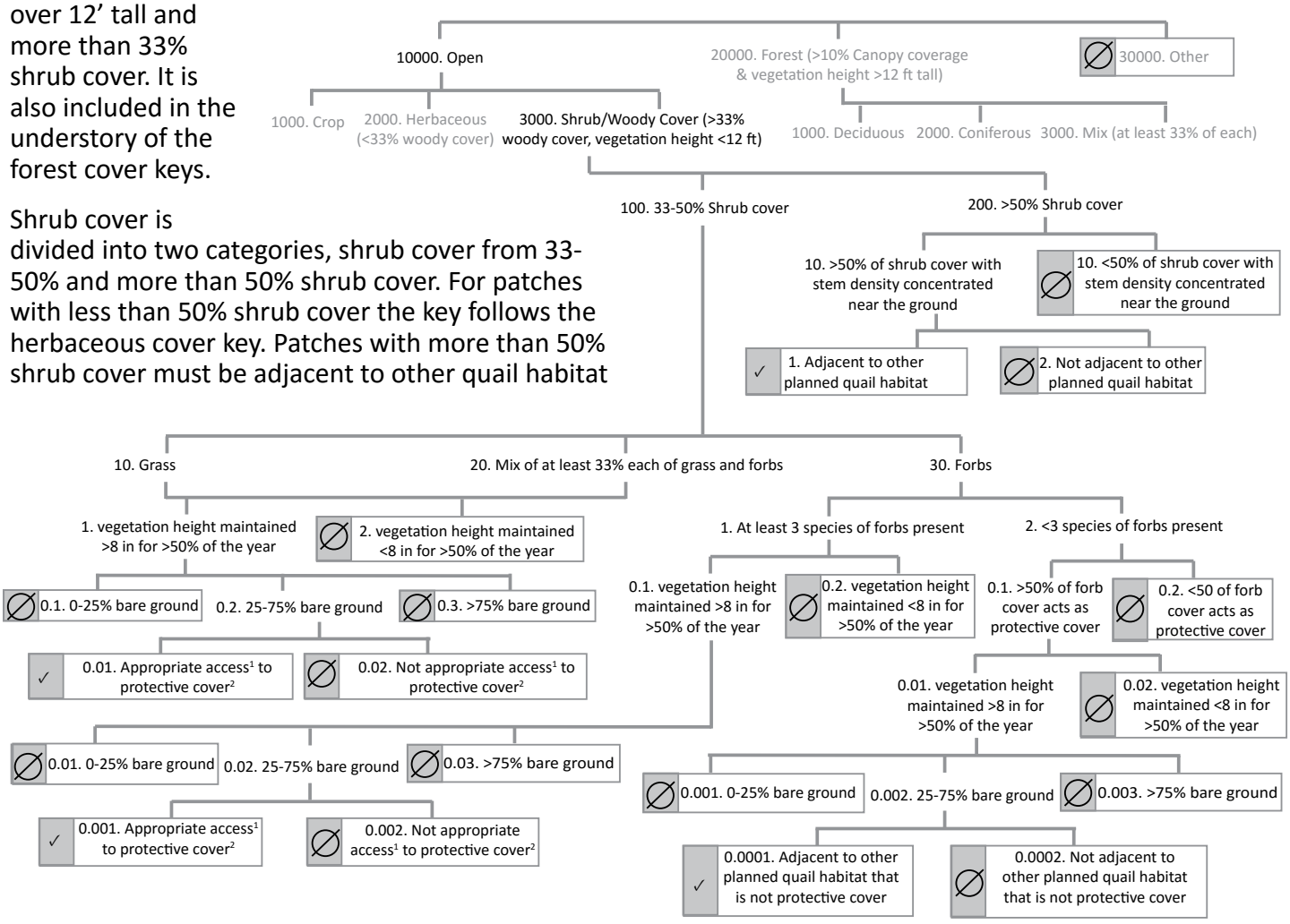
Forb dominated cover is split into two categories based on the number of forb species present. Forb dominated stands with more than three species of forbs must be at least 8" tall for most of the year, have 25-75% bare ground and be within 164'. of protective cover to be considered quail habitat. Forb dominated stands with less than three forb species have the same requirements, plus most of the forbs must be protective cover and the patch must be adjacent to other quail habitat. See below or Appendix A of the CIP, for the full herbaceous cover key.



Shrub Cover

The shrub cover key is the second most important of the classification system. It is used when a patch has less than 10% canopy coverage of vegetation over 12' tall and more than 33% shrub cover. It is also included in the understory of the forest cover keys.

Shrub cover is divided into two categories, shrub cover from 33-50% and more than 50% shrub cover. For patches with less than 50% shrub cover the key follows the herbaceous cover key. Patches with more than 50% shrub cover must be adjacent to other quail habitat and most of the shrub cover must have high stem density near the ground. See below, or Appendix A of the CIP, for full shrub cover key.



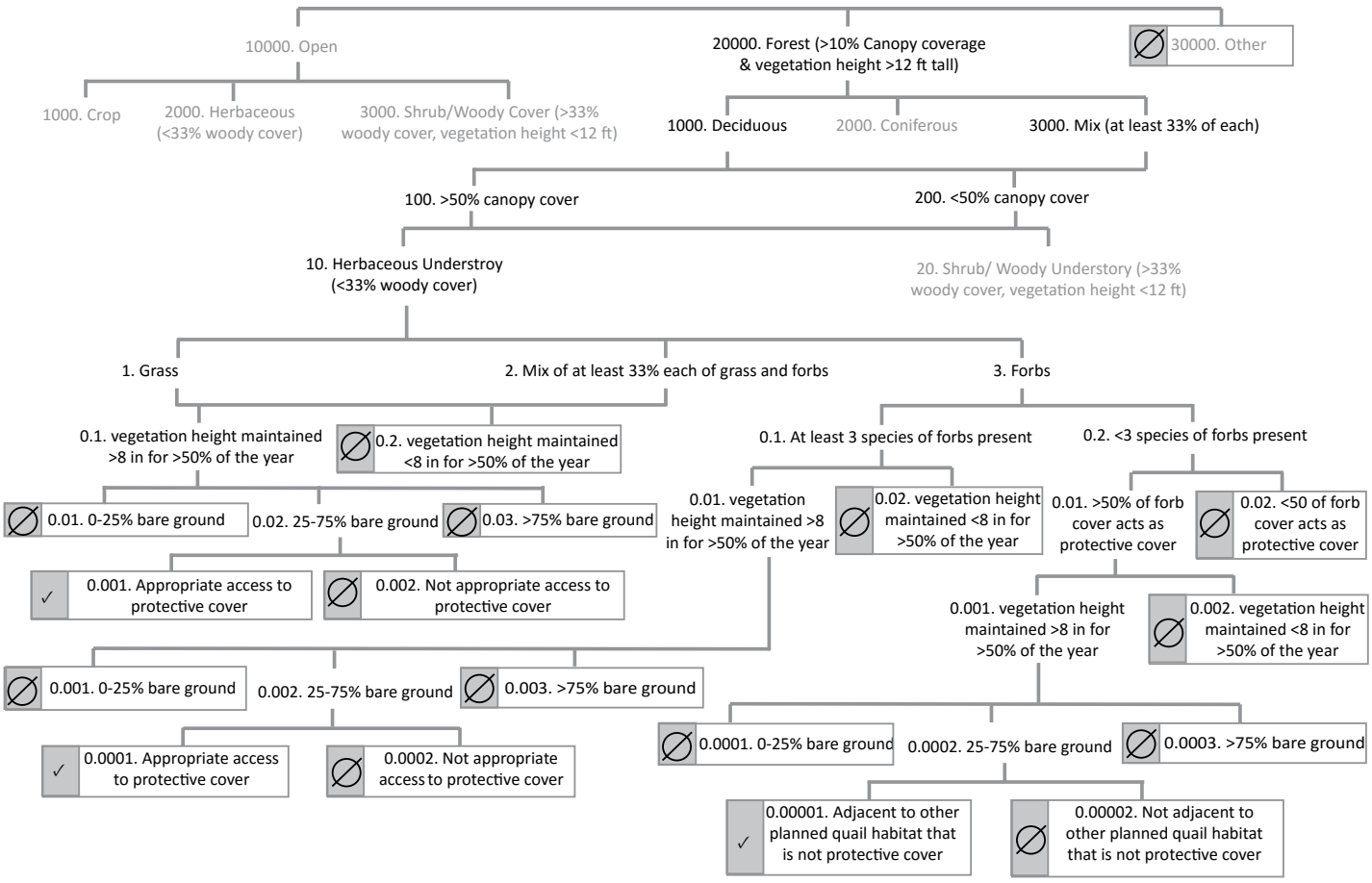
Forest Cover

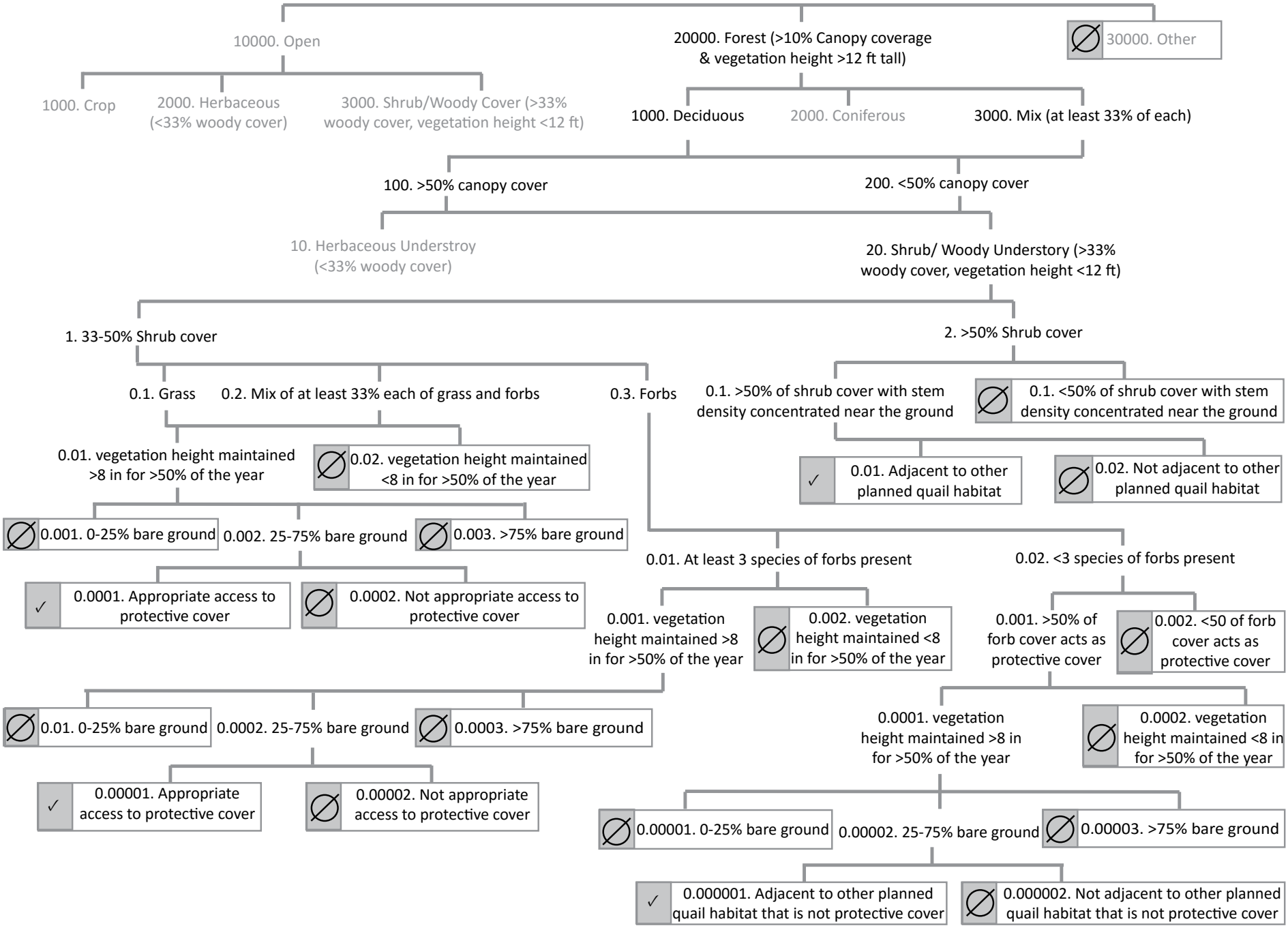
The forest cover keys are used for patches with more than 10% canopy coverage of vegetation over 12'. tall. Forest cover divides into three categories, deciduous dominated, coniferous dominated and mixed (deciduous and coniferous cover are both at least 33%). Deciduous dominated, coniferous dominated and mixed forest covers each divide twice based on canopy cover (open and closed canopy forests). The cut-off between open and closed canopy forest for deciduous dominated and mixed is 50% canopy coverage. For coniferous forests, the cut-off between open and closed canopy forests is 66% canopy coverage.

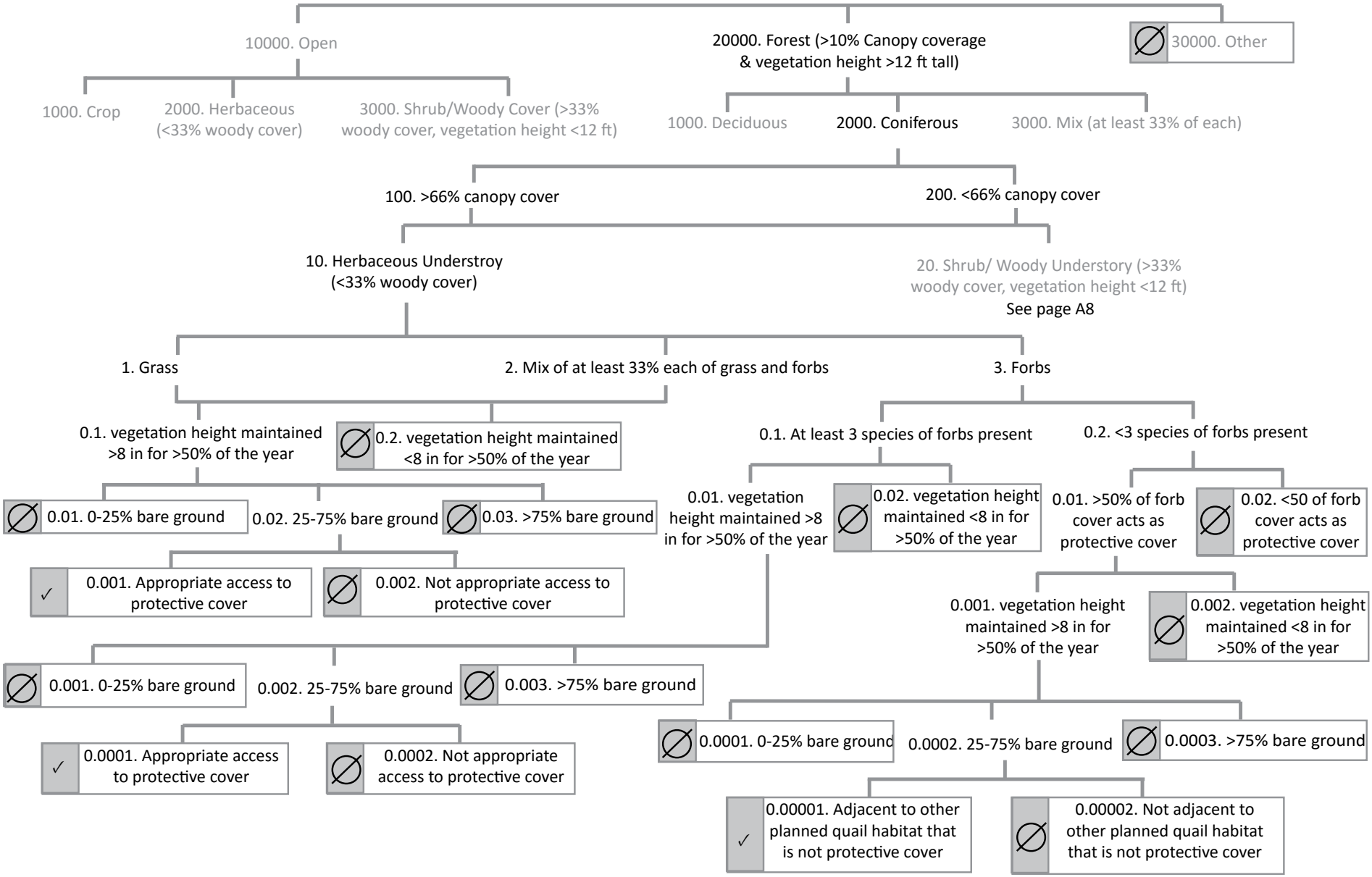
Forest canopy has a big impact on understory vegetation growth. Closed canopy forests often shade out plants that bobwhite use for cover. However, edges of closed canopy forests can receive enough light to promote a dense understory and be bobwhite habitat. Therefore, all forest types and canopy densities rely on the herbaceous and shrub keys to define what is considered quail habitat. See below, or Appendix A of the CIP, for full forest cover keys.

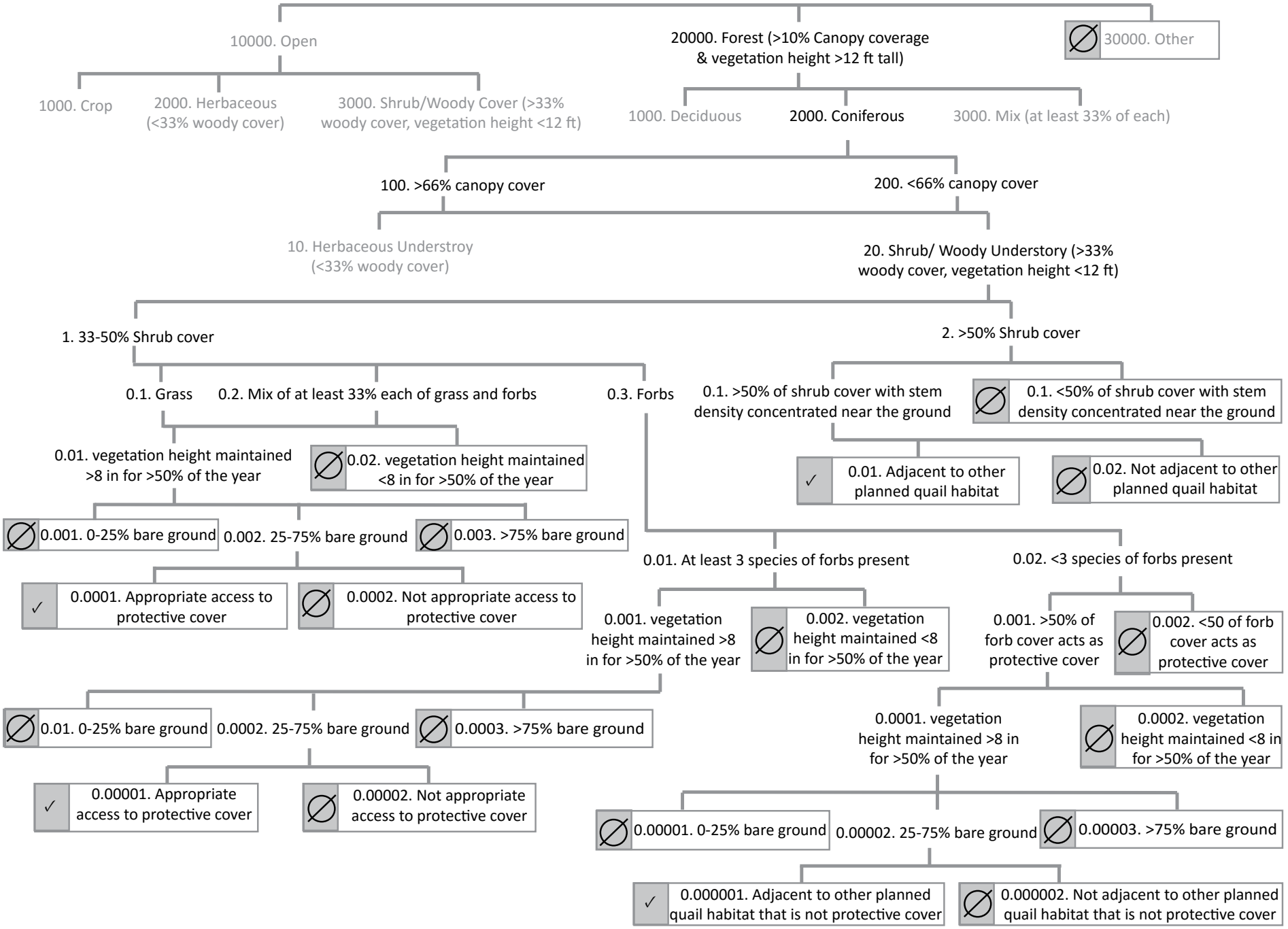
Conclusion

The size of Appendix A in the CIP document can make the habitat classification system seem intimidating. However, the system relies heavily on the structure of the herbaceous and shrub cover. Understanding how those parts of the key works will make navigating the entire classification system much easier.




10000. Open
20000. Forest (>10% Canopy coverage & vegetation height >12 ft tall)
∅ 30000. Other
1000. Crop
2000. Herbaceous (<33% woody cover)
3000. Shrub/Woody Cover (>33% woody cover, vegetation height <12 ft)
1000. Deciduous
2000. Coniferous
3000. Mix (at least 33% of each)
100. >50% canopy cover
200. <50% canopy cover
10. Herbaceous Understroy (<33% woody cover)
20. Shrub/ Woody Understory (>33% woody cover, vegetation height <12 ft)
1. 33-50% Shrub cover
2. >50% Shrub cover
0.1. Grass
0.2. Mix of at least 33% each of grass and forbs
0.3. Forbs
0.1. >50% of shrub cover with stem density concentrated near the ground
∅ 0.1. <50% of shrub cover with stem density concentrated near the ground
0.01. vegetation height maintained >8 in for >50% of the year
∅ 0.02. vegetation height maintained <8 in for >50% of the year
✓ 0.01. Adjacent to other planned quail habitat
∅ 0.02. Not adjacent to other planned quail habitat
∅ 0.001. 0-25% bare ground
0.002. 25-75% bare ground
∅ 0.003. >75% bare ground
✓ 0.0001. Appropriate access to protective cover
∅ 0.0002. Not appropriate access to protective cover
0.01. At least 3 species of forbs present
0.02. <3 species of forbs present
0.001. vegetation height maintained >8 in for >50% of the year
∅ 0.002. vegetation height maintained <8 in for >50% of the year
0.001. >50% of forb cover acts as protective cover
∅ 0.002. <50 of forb cover acts as protective cover
∅ 0.01. 0-25% bare ground
0.0002. 25-75% bare ground
∅ 0.0003. >75% bare ground
0.0001. vegetation height maintained >8 in for >50% of the year
∅ 0.0002. vegetation height maintained <8 in for >50% of the year
✓ 0.00001. Appropriate access to protective cover
∅ 0.00002. Not appropriate access to protective cover
∅ 0.00001. 0-25% bare ground
0.00002. 25-75% bare ground
∅ 0.00003. >75% bare ground
✓ 0.000001. Adjacent to other planned quail habitat that is not protective cover
∅ 0.000002. Not adjacent to other planned quail habitat that is not protective cover


10000. Open
20000. Forest (>10% Canopy coverage & vegetation height >12 ft tall)
∅ 30000. Other
1000. Crop
2000. Herbaceous (<33% woody cover)
3000. Shrub/Woody Cover (>33% woody cover, vegetation height <12 ft)
1000. Deciduous
2000. Coniferous
3000. Mix (at least 33% of each)
100. >66% canopy cover
200. <66% canopy cover
10. Herbaceous Understroy (<33% woody cover)
20. Shrub/ Woody Understory (>33% woody cover, vegetation height <12 ft)
See page A8
1. Grass
2. Mix of at least 33% each of grass and forbs
3. Forbs
0.1. vegetation height maintained >8 in for >50% of the year
∅ 0.2. vegetation height maintained <8 in for >50% of the year
∅ 0.01. 0-25% bare ground
0.02. 25-75% bare ground
∅ 0.03. >75% bare ground
✓ 0.001. Appropriate access to protective cover
∅ 0.002. Not appropriate access to protective cover
∅ 0.001. 0-25% bare ground
0.002. 25-75% bare ground
∅ 0.003. >75% bare ground
✓ 0.0001. Appropriate access to protective cover
∅ 0.0002. Not appropriate access to protective cover
0.1. At least 3 species of forbs present
0.2. <3 species of forbs present
0.01. vegetation height maintained >8 in for >50% of the year
∅ 0.02. vegetation height maintained <8 in for >50% of the year
0.01. >50% of forb cover acts as protective cover
∅ 0.02. <50 of forb cover acts as protective cover
0.001. vegetation height maintained >8 in for >50% of the year
∅ 0.002. vegetation height maintained <8 in for >50% of the year
∅ 0.0001. 0-25% bare ground
0.0002. 25-75% bare ground
∅ 0.0003. >75% bare ground
✓ 0.00001. Adjacent to other planned quail habitat that is not protective cover
∅ 0.00002. Not adjacent to other planned quail habitat that is not protective cover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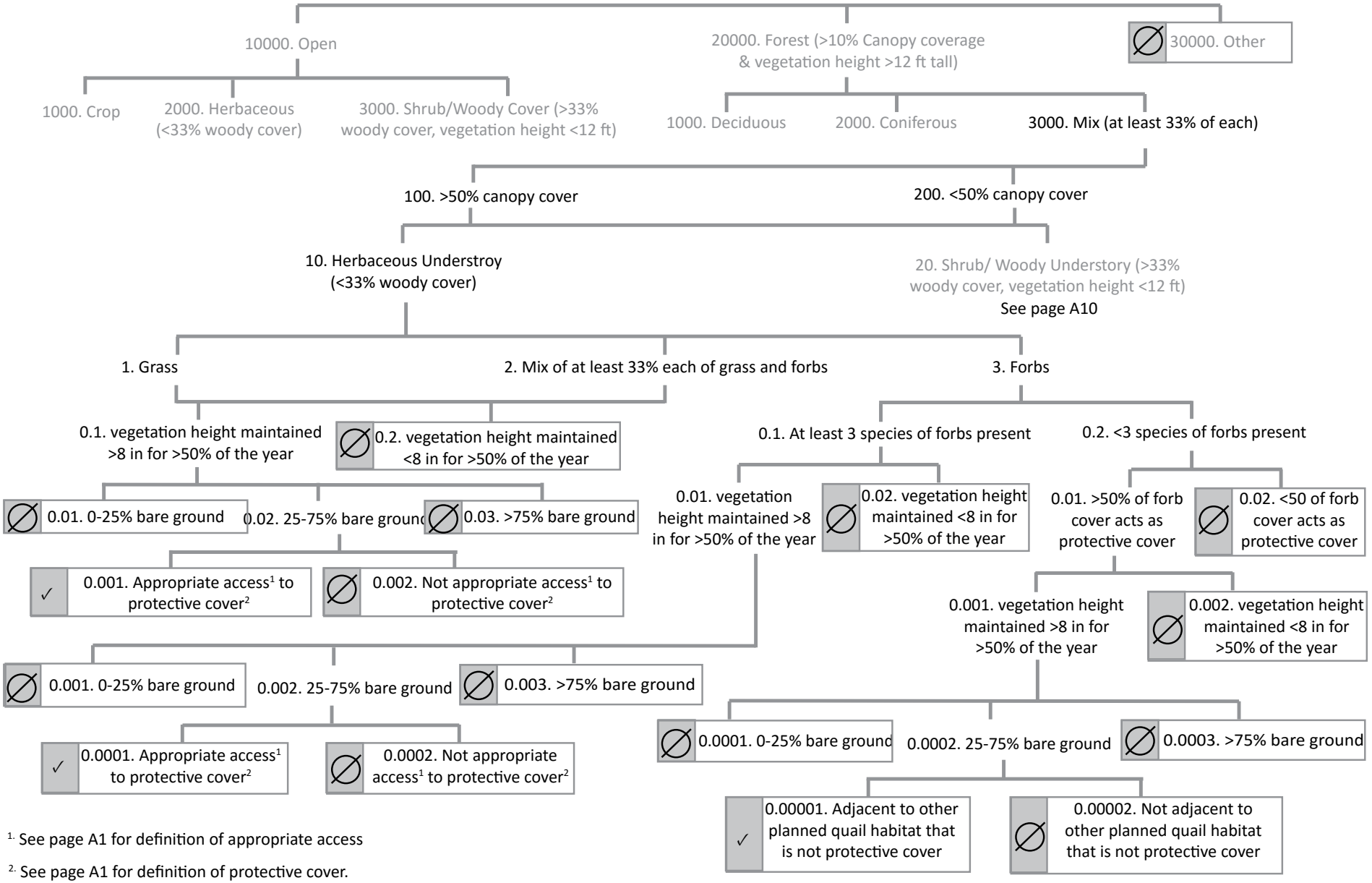
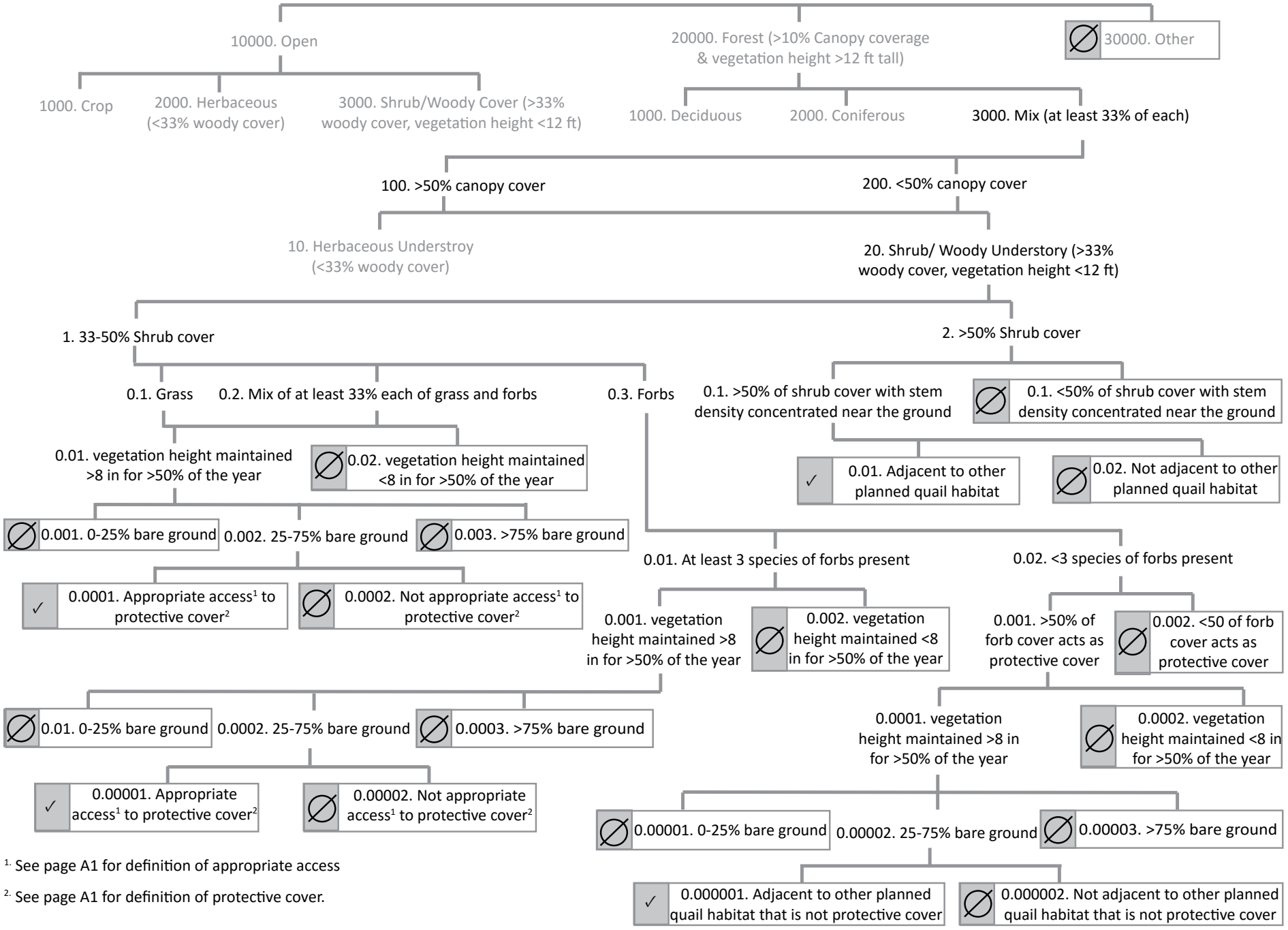


[1.] See page A1 for definition of appropriate access

[2.] See page A1 for definition of protective cover.



[1.] See page A1 for definition of appropriate access

[2.] See page A1 for definition of protective cover.

Training

Introduction

Training is an essential process for all monitoring programs. Observers must understand protocols and terminology to collect accurate and consistent data. The NBCI has and will continue to provide training opportunities and resources for the CIP Habitat Monitoring. However, they recommend focal area coordinators develop their own training program for observers on their own projects. The training program should use both in office training and in field training. Below are recommendations on how to develop a CIP Habitat Monitoring training program.

Office Training

The purpose of in office training should be to provide basic background information for the CIP Habitat Monitoring and to provide reference material that observers can use whenever needed. The NBCI CIP Habitat Monitoring Manual is a great starting point for the in office training. Focal Area Coordinators should have observers should review the first three sections. The first section (CIP Overview) helps observers understand the big picture and why monitoring is important. The second section (Important Characteristics of Bobwhite Habitat) explains the importance of bare ground and protective cover to bobwhite. Identifying these two attributes are considered the most difficult aspect of the habitat monitoring. The third section (CIP Habitat Monitoring Protocol) explains what data is collected and how to collect it.

In the future, more training resources will be available at www.quailcount.org. Videos will provide more details on selected topics. These videos will be especially useful to help observers indentify protective cover or measure bare ground. There will also be a photo reference library. The photo library will help observers learn to estimate herbaceous cover, bare ground, differences in shrub stem densities and other characteristics. These materials could be used prior to in field training or to help answer questions that are brought up in the field.

Focal area coordinators may need to develop their own material. Maps of the focal area, reference area, and survey points are important. If access to private property is required, include those details with the maps. Additionally, it is helpful to provide instructions for turning in data, who is responsible for each point, when data should be collected and how progress will be tracked.

Field Training

Field training should consist of an introduction, a practice and a review. Start with a brief overview of the habitat monitoring protocol. Including, how to fill out the data sheets and label patches. Following the overview and any questions, spend time showing how to estimate bare ground. Removing live vegetation with hand clippers can be a great way to illustrate the importance of looking under grasses and forbs. The introduction is also a good time to discuss protective cover. Find areas of shrubs or forbs that may act as protective cover and others that do not. Highlight the difference between areas that do and do not make good protective cover.

Observers participating in a field training program held in Kentucky.

Observers should practice collecting the data at a few points in the reference area and focal area. Start with easy areas that have little variation (most likely the reference area). This will build confidence and experience before attempting complicated areas. Experiencing many scenarios during the practice is important. Therefore, use multiple small areas (e.g., mapping a 50 m radius circle) instead of a few large areas (e.g., mapping a 250 m radius circle).

Split the observers into small groups and have each observer complete each practice point independently. Instructors can remain at one point for the whole training or rotate with a group. They should be available for questions, but should avoid helping map the area. The idea is to see how the observer will do by himself or herself. When everyone finishes, bring the group together and compare results. If there are large differences, discuss why that occurred and answer any questions. Over time, observers should identify the same number of patches at each point and be within ±15% for each value in the data sheet.

The review is used to make sure all observers are comfortable collecting data and to answer any remaining questions. Instructors should provide feedback and discuss common mistakes that occurred during the practice. It is also a good time to discuss issues specific to the program (e. g. survey dates, private property access, etc.).

Field trainings should last 2-4 hours depending on the experience of the observers; however, instructors should expect to spend more time planning. Prior to conducting in-field training, instructors should be familiar with the habitat monitoring protocol and have tested it in the field.

Conclusion

Good training is necessary to collect high quality data, and proper planning is required to conduct good training. Many people have been trained using the methods discussed above. Following all of the above recommendations is not required. However, any training program must have knowledgeable instructors and should be well planned.