Chapter 17

Wild Turkey (*Meleagris gallopavo*)

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I. INTRODUCTION –

A. History in Wyoming – The wild turkey was not historically found in Wyoming. Wild turkeys from New Mexico were released near Laramie Peak in 1935 (Hengel et al., 1999). The introduction program was expanded in the 1950's when birds were released in the following additional areas: Black Hills, base of the Big Horn Mountains, Big Horn Basin, and throughout Platte County. Since then, the species has thrived and now provides abundant opportunity for hunters in much of the eastern half of the state.

Taxonomists have identified 5 subspecies of wild turkey (Kennamer et al., 1992). Most introductions in Wyoming were the Merriam's (*M. g. merriami*) subspecies. In more recent years, the Rio Grande (*M. g. intermedia*) subspecies has also been introduced. Some eastern wild turkeys (*M. g. sylvestris*) were released near Laramie Peak in the 1960s. Both Merriam's and Rio Grande turkeys evolved in the west and are well adapted to the arid conditions and patchy cover found throughout Wyoming. Unauthorized releases (both intentional and unintentional) from game farm birds have also taken place. Typically, these involved the eastern subspecies and domestic turkeys including the bronze variety. Landowners wanting to increase wild turkeys on their properties were also responsible for several releases. As a result of hybridization, a number of turkeys throughout the state have morphological characteristics of more than one subspecies.

B. Current Status – Wild turkeys occupy most of the suitable habitats in the eastern half of Wyoming and the Big Horn Basin. It is likely wild turkeys were historically absent from Wyoming because natural foods were not dependably available during winter. Food availability in winter continues to be the limiting factor for turkey populations in the state. Throughout much of Wyoming, wild turkeys are closely associated with ranch compounds in the winter where they are either fed by landowners or have access to waste grain scattered by cattle feeding operations. In spring, the turkeys typically disperse into areas surrounding the ranch compounds, where they nest and rear broods.

Beginning in 1996, the Game & Fish Department began to release Rio Grande wild turkeys in areas where the Merriam's subspecies had not fared well. The Rio subspecies was primarily released along river bottoms that more closely resemble the habitats in which it evolved. In contrast, Merriam's turkeys evolved in pinyon pine/juniper and mountain foothills habitat.

C. Natural History Information –

1. Identification – There is no completely reliable method other than genetic analysis to distinguish the various subspecies of wild turkey. This is particularly true in Wyoming and other locations where subspecies have likely interbred. Some general guidelines are available to identify subspecies, but these are somewhat subjective and not entirely accurate. The following guidelines are based on tail and body feather coloration (Stangel et al., 1992):

   a. Merriam's wild turkey – Tips of tail feathers and tail coverts are nearly white. May range to off-white or cream. In general, body feathers are blacker than those of either the eastern or Rio Grande subspecies.

   b. Rio Grande wild turkey – Tips of tail feathers and tail coverts are tan or yellowish. Body feathers are typically more copper than the Merriam's.

   c. Eastern wild turkey – Tips of tail feathers and tail coverts range from tan to reddish brown (darker than either the Rio Grande or Merriam's).

2. Reproduction – The peak of breeding activity has not been well documented in Wyoming. Based on casual observations, it appears sexual activity can begin in male birds as early as February. Hens appear to become most receptive between late March and early May.

   To a degree, the dates hens breed can be inferred from nest initiation dates published by Rumble and Hodorff (1993). In the Black Hills, most hens initiated nests the last week and a half of April and the first week of May. Once a nest is initiated, hens typically lay one egg per day until all eggs are laid. Hengel and Anderson (1990) determined hens laid an average clutch of 12 eggs near Laramie Peak. Rumble and Hodorff (1993) determined the average clutch in the Black Hills was 9. Hens begin to incubate after the last egg is laid and typically sit on the nest 28 days. The median dates of hatching were May 27 in one year of Hengel's study and June 1 in the other year (Hengel and Anderson, 1990). Rumble and Hodorff (1993) observed a high proportion of yearling hens attempted to nest in the Black Hills. However, yearling hens were not as successful as adults. General breeding statistics are summarized below:

Breeding Activity:	Late March through Early May
Nest Initiation: (first nest attempts)	Mid-April through mid May (Rumble and Hodorff, 1993; Hengel and Anderson, 1990)
Nest Incubation:	Late April through late May (Rumble and Hodorff, 1993; Hengel and Anderson, 1990)
Average Clutch Size:	9 to 12 (Rumble and Hodorff, 1993; Hengel and Anderson, 1990)

3. Survival – Hengel and Anderson (1990) determined 36% of poults survived to 8 weeks of age. Survival estimates from other studies were similar, ranging from 38% to 46% by 4 weeks after hatching (Hubbard, 1997; Vangilder and Kursejeski, 1995). Annual survival of adult wild turkeys has also been studied widely (Hubbard, 1997; Lint et al. 1995, Godwin et al. 1995, Vangilder 1995, Vangilder 1992), except in Wyoming. Virtually every study concluded adult survival rates can vary substantially from year to year. On average, annual survival rates of adult hens and gobblers were 60% and 57%, respectively.

II. CENSUS –

A. Winter Counts –

1. Rationale – During spring, summer, and fall, wild turkeys typically scatter in small flocks along drainages and throughout forested lands. Attempting to survey populations at these times is inefficient because the potential for observing an adequate sample is low. In winter, turkeys tend to congregate in ranch compounds where they are fed or have access to waste grain. During that period, the birds are easy to observe and count because they spend lengthy amounts of time on feeding sites. Winter counts can provide a general index to detect trends and annual fluctuations in a turkey population. However, many factors influence the number of birds present at a particular count site, so winter counts should not be viewed as a census technique. For example, a larger proportion of turkeys may remain away from artificial feeding sites during mild winters, or birds may move to a different feeding site that is unknown to managers (Hoffman et al., 1993). Personnel must count turkeys at the same locations and approximate times each year to maintain a consistently valid index. Any location that is removed from or added to the counts should be noted in a completion report or the winter count report. Although birds may not use particular sites during the course of several years, it is important to visit all sites each year and note the absence of birds to assure the counts are done consistently.

2. Application – Hoffman et al. (1993) recommended counting turkeys during late February and early March. By that time, most of the winter mortality has taken place, but the birds are still concentrated. However, in the Black Hills sizes of winter flocks often decrease in late February as turkeys begin to leave feeding sites. During particularly open winters, turkeys may not have congregated on feeding sites by December and many birds begin to disperse in March. To assure wintering flocks are counted when they reach peak size, we recommend conducting winter counts in January or February. Counts should also be completed over a relatively short period (2 to 3 weeks) to reduce potential biases from double-counting or missing birds that move between feeding sites. Clusters of feeding sites with potential for daily interchange should all be counted on the same day. At sites where turkeys are fed, counts should be done when the landowner is feeding to assure nearly all the birds

are present. Landowners may be willing to count the turkeys on their property and this can save considerable time and effort. However, personnel should only use counts from landowners who express a genuine interest. Otherwise, the counts are likely to be estimates rather than an actual count.

3. Analysis of Data – Series of annual winter counts can be plotted to detect population trends or changes within comparatively limited areas such as drainages or particular ranches. However, inferences about trends throughout larger areas are less reliable because it is unlikely managers know all locations of winter feeding sites and often they cannot survey them within a particular counting period. During mild winters the problem is compounded because many birds may remain dispersed due to the availability of natural feed.

4. Disposition of Data – Annual winter counts from each count site should be recorded on a spreadsheet. Note any counting sites that were added or deleted in a particular year. Normally, data from winter counts should be summarized and analyzed in a job completion report (JCR) prepared each year. The data summaries should cover at least the most recent 5-year period. Names and locations of all count sites should be listed in the JCR. Any sites that were added or removed from the counts should be identified. If a JCR is not prepared, the biologist should retain file copies of data summaries and reports.

B. Winter Classifications –

1. Rationale – Turkeys are classified in winter to estimate sex ratios within a population. Age ratios, however, cannot be reliably determined because by winter, young of the year are too large to be accurately distinguished from adult hens. Although covert characteristics have been used successfully to age some subspecies, the technique is not proven for Merriam's turkeys (see Section VI, Aging and Sexing). In addition, the technique would be difficult to apply where large flocks congregate (Hoffman et al., 1993). For this reason winter classifications are not a good tool to estimate production. Winter classifications may also under represent the proportion of males, because they tend to be more mobile than hens at that time of year (Hoffman et al., 1993). However, classification bias is not likely a problem at artificial feeding sites since nearly all the birds in an area congregate at these locations.

   The literature does not provide consistent direction regarding an ideal tom:hen ratio in winter. Biologists believe a ratio of 1 tom to 3 hens is fairly healthy. If ratios of 1:1 or higher are documented during winter classifications, managers should act quickly to harvest more toms in the area. Several populations in southeast became extirpated after the tom:hen ratio reached or exceeded 1:1. If too many toms are present, they harass hens excessively during the breeding and nesting season, and displace them from food in the winter. Excessive tom:hen ratios tend to develop in areas where turkey harvest is heavily restricted or precluded. In such cases, it is important to advise landowners about the potential consequences.

2. Application – Turkeys should be classified at the time winter counts are done in January or February. Small groups can be easily classified by recording numbers and sexes on a tally sheet. If groups of 50 or more birds are encountered, it is helpful to use a tape recorder or have an assistant record data. An observer can classify very large groups of birds (≥150) effectively by arriving at the feeding site before birds are present. The birds can be classified as they move onto the site rather than while they are milling around.

3. Analysis of Data – It is important to maintain classification records associated with individual sites, because the principal use of these data are to track local sex ratios to determine if additional male harvest is warranted. If classification data from broader areas are combined, sex ratio estimates may not be as useful because localized problems may skew the overall ratio, or the averaging effect of several classifications may obscure a localized problem.

4. Disposition of Data – Data from winter classifications should be entered and maintained in spreadsheets developed for this purpose. Include data fields for the name and location of each count site and annual data including numbers of hens and toms classified and a tom:hen ratio for the site. Each year, results of winter classifications should also be summarized and analyzed in a job completion report. List names and locations of all count sites and identify any sites that were added or removed from the counts. If a JCR is not prepared, the biologist should retain file copies of data summaries and reports.

C. Brood Counts –

1. Rationale – Brood counts are normally done to assess annual reproduction (poult production). The information can also be useful for hunting season forecasts, based on a general correlation between brood counts and hunter success the subsequent fall and spring (Wunz and Ross 1990). At times, managers have also attempted to develop inferences about population densities (Bartush et al. 1985). However, brood data are not useful for this purpose unless a rigorous sampling protocol is consistently followed each year. In Wyoming, brood counts are done strictly to determine annual production. No attempt is made to estimate population densities or to depict trends. Personnel in northeast Wyoming attempted to standardize brood count routes beginning in 1994. The routes were surveyed annually from 1994-1997. Ultimately, too few birds were classified along the routes to be useful for monitoring population trends, or to develop reliable estimates of average brood sizes. After 1997, personnel resumed collection of brood data by recording incidental encounters.

2. Application – Data from brood counts are used to estimate the poult:hen ratio. As with any composition ratio, a large sample must be classified over a representative area to produce a reliable metric. However, sampling effort does not have to be consistent each year, because the data are not used to

develop inferences about population densities or trends. Accordingly, personnel can record sightings of turkey broods as they are incidentally encountered during other field activities, to increase the sample size. Broods typically are mobile and visible from the beginning of July to fall. However, by September poults are nearly as big as, and difficult to distinguish from hens. Therefore, brood counts should be conducted between early July and late August. Natural mortality of poults is high in early summer, so broods observed during earlier counts are considerably larger than broods observed later. If counts are conducted over too long a period, the attrition of brood sizes may confound managers' abilities to detect any real differences in poult production from year to year (Hubbard et al., 1999; Vangilder and Kurzejeski, 1995). Therefore, biologists should conduct counts during the same 1-month window each year. The data set used for annual comparisons should not include any broods observed outside the 1-month window. In northeast Wyoming, turkeys are more mobile and visible in August than July. Therefore, August is the most appropriate window for conducting brood counts in Wyoming.

At times, observers have attempted to distinguish between successful and unsuccessful hens by counting hens accompanied by broods in mixed flocks. However, such determinations are often difficult to make in the field, and inaccurate classifications can severely bias estimates of the number of successful hens. Consequently, this approach is not recommended.

3. Analysis of Data –The chief objective of brood counts is to assess annual reproduction in a population. Wunz and Ross (1990) determined the ratio of poults to successful hens had no correlation with hunter success in the fall or spring, whereas the ratio of poults to total hens did. Brood count data are analyzed by tracking records over several years to establish average production and a normal range of variation. After several years of records are compiled, data from each successive year can be compared to determine if production is above or below average. These data can also be compared against production figures published in the scientific literature.

4. Disposition of Data – Refer to Section II.B.4 (Census – Winter Counts) of this Chapter.

D. Spring Gobble Counts –

1. Rationale – Spring gobble counts can provide an index to the abundance of male wild turkeys (Lint et al., 1995; Porter and Ludwig, 1980). The intent is to compare relative abundance of toms from year-to-year, to detect trends over time. Therefore, a consistent sampling effort is essential. Lint et al. (1995) also determined spring gobble counts were closely correlated with the number of harvested toms. Both gobble counts and tom harvests were related to overall population trends. Since the Wyoming Game & Fish Dept. estimates

tom harvest annually, gobble counts would be a duplication of effort and are not done in the State.

2. Application – Consult Lint et al. (1995), Kurzejeski and Vangilder (1992), and Porter and Ludwig (1980).

III. HARVEST SURVEY –

A. Rationale – The Wyoming Game & Fish Department conducts a harvest survey annually by mail to estimate wild turkey harvest, hunter effort and success. The data are used for several management purposes including: track population status and trends, determine future license quotas, and provide fiscal information for the Department Annual Report.

B. Application – The Biological Services Section conducts an annual survey to estimate turkey harvest during fall and spring seasons. Survey cards are mailed to all hunters who were issued a limited quota turkey license, and to a random sample of general license holders. Harvest statistics are estimated using an extrapolation process, and are summarized in a harvest report.

C. Analysis of Data – Hunting success is correlated generally with the abundance of turkeys; therefore harvest data can be used to gauge the relative size of a turkey population. When turkeys are abundant, hunter success increases and effort typically decreases. If both sexes can be taken (as in fall hunting seasons), harvest statistics should be tracked separately. Field checks of harvested turkeys are not providing a useful means to verify the reliability of the mail survey. Although field checks are occasionally used to identify possible concerns with the big game harvest survey, turkey hunters are generally more dispersed, making it difficult to obtain an adequate sample of harvest data through field contacts.

D. Disposition of Data – Refer to Section II.B.4 (Census – Winter Counts).

IV. TRAPPING AND TRANSPLANTING –

A. Trapping Considerations – Trapping wild turkeys can be very time-consuming. Planning and coordination alone require a great deal of effort. Enough personnel must be on site to handle the captured birds quickly and efficiently, but too many people may cause the birds to become wary and avoid the trapping location. Turkeys that are fed in ranch compounds throughout the winter can appear quite tame, but quickly recognize unusual activity. If a trapping operation is unsuccessful, the birds can become extremely nervous and un-trappable for several days. To avoid spooking the target birds, all personnel involved in a trapping operation need to be stealthy from the outset. Some important considerations for planning a trapping operation are outlined below:

1. Have a roster of personnel to assist the trapping operation well in advance.

2. If the birds will be exported to another state, be sure all necessary permits and other paperwork are completed. A contact person from the other state should be available during the trapping operation to answer questions about shipping, transfer of the birds, blood testing, or other items.

3. The person supervising the operation needs to be aware of any disease testing required by the other state. Typically, blood samples will be drawn at the trapping site and sent to the receiving state via overnight mail. The trapping leader must have the correct shipping information.

4. Notify the Wyoming Game & Fish Department's Veterinary Services Section several months prior to the trapping operation. The trapping supervisor needs to ensure adequate blood letting supplies are available on site.

5. Schedule trapping operations on Monday, Tuesday, and/or Wednesday to assure the blood tests can be completed and the birds released promptly. If the receiving state's veterinary lab agrees to process samples on a weekend, it is acceptable to trap later in the week.

6. If birds are to be moved instate, no blood work is required, but Veterinary Services should still be notified in case they would like blood samples for other reasons.

7. An adequate supply of shipping boxes must be present at the trapping location. The person organizing a winter trapping operation should contact one of the state's NWTF technical committee representatives in late summer or early fall to assure enough boxes will be available.

8. Line the bottom of each shipping box with an absorbent material. In the past, newspaper has been used, but straw or wood chips work better to keep boxed turkeys dry and clean. Sawmills are an excellent source of free wood chips.

9. Test the trap beforehand to be sure it is in good working order. Adjust or repair any components that aren't working properly.

10. Pre-bait the trap with grain (corn, oats) for several days. If turkeys are being captured on private property, the landowner can acclimate the birds by feeding them in and around the trap.

11. Immediately move captured turkeys into shipping boxes. Turkeys left in the traps while other birds are processed can be injured.

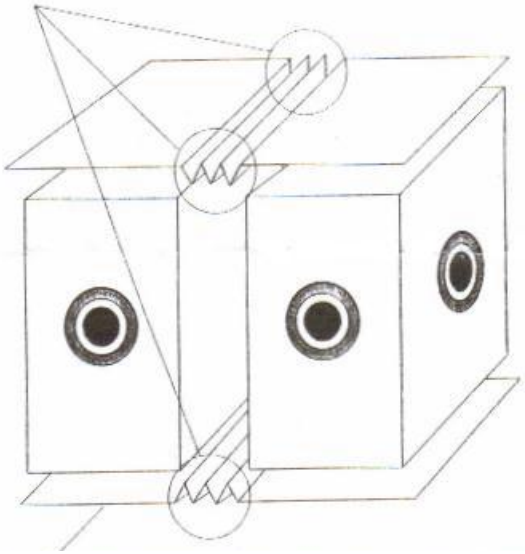
12. Place turkeys into shipping boxes feet first. The bird's head must be upright and mobile before the box is sealed. In the past, mortalities have resulted from improper containment when birds' heads were tucked under their breasts. Birds in this position may not be able to raise their heads upright within the confinement of the box.

13. Suitable equipment must be on hand to transport the birds. Horse trailers work well. Assure sufficient space is maintained between shipping boxes to allow proper ventilation. Boxes can be stacked two high, provided they are stable and will not fall over during shipping.

14. The NWTF has an agreement with Delta Airlines to ship turkeys. Contact the airline 2 days in advance so cargo handlers can prepare for the birds. Transportation to the airport is the responsibility of the trapping operation. A truck or a horse trailer is normally used for this purpose. If the turkeys will be driven to an airport in a neighboring state, the trapping supervisor needs to review the other state's regulations governing the shipment of wildlife and notify the appropriate contact within that state.

15. If the turkeys will be shipped by air, the transport boxes must be fitted with a device that prevents them from tipping over in transit. The structure in Fig. 1 has worked well in the past.

Step 1. Tape the folds together



Step 2. After the birds have been banded and blood taken (if necessary), their next stop is the airline. Tape the bottom spacer.
Step 3. Tape the top spacer.
Step 4. Tape around the top and bottom.
Step 5. Tape over the top and bottom, both directions.

Fig. 1. Cardboard spacers improve airflow to turkeys during transport. Spacers are available through the NWTF Conservation Programs Department. *Source: Cardoza et al. (undated) – National Wild Turkey Federation Technical Bulletin No. 3.*

B. Transplanting – Managers generally transplant wild turkeys to increase hunting opportunities. An agreement should be negotiated with landowners who receive birds to assure the public will be granted access for hunting. If the birds are released onto private land adjoining accessible public land, an access agreement may not be necessary because the birds will likely move onto the public land. Evaluate habitat conditions at the release site beforehand to assure the area is suitable to sustain a population of wild turkeys. Food sources and roost sites are essential (refer to Section V on habitat requirements). If food availability is limited during winter, this can be corrected by establishing food plots provided the transplant operation is planned far enough in advance.

C. Marking techniques – Transplanted turkeys need not be marked unless a study of some type is planned in conjunction with the transplant operation. Birds are typically captured and marked to study population characteristics including habitat use, home range, production and survival. Use of radio transmitters to mark birds should be cleared through the Biological Services Section to avoid frequency overlaps with other studies in the area.

1. Radio Backpacks – Refer to discussions in Hubbard (1997) and Wilson and Norman (1995).

2. Leg Bands – Leg bands are an inexpensive and effective means to identify birds that are handled during trapping operations. Band returns from harvested birds can provide managers with valuable insights about movements or dispersal. The biologist should maintain records of all band numbers and colors used in his district. The preferred band size for wild turkeys is No. 24.

D. Trapping Techniques – Several techniques have been used effectively to capture wild turkeys. The organizer of each trapping operation should select the method most suited to the specific circumstance and the objectives of the project.

1. Rocket Net –

a. Rationale – The rocket net can be used to capture a large number of turkeys in a single deployment. Rocket nets are most effective at sites where turkeys have been habituated to artificial feeding and are concentrated as a result.

b. Application –

i. Test fire the net before setting it up at a particular location to ensure there are no shorts in the circuitry and the battery is sufficiently charged.
ii. Lay the net out and stake it at the trapping location a couple of days bin advance so the birds can acclimate to it. Pre-bait in front of the net for several days so the birds become accustomed to feeding in that location.

iii. Fold the net back onto itself in small sections similar to an accordion. This will assure it unravels freely, without tangles, when it is fired.
iv. Aim the middle rockets straight forward and angle the outer rockets 2-3 degrees away from the firing line of the net. The angle cannot be too great or the rockets will deflect inward toward the center of the net when they reach the end of their tethers.
v. The evening before trapping, lay the detonation wire out on the ground. Tape all connections along the detonation wire or cover them with rocks to avoid frost buildup overnight. Frost can interfere with proper detonation.
vi. All personnel involved with trapping and handling the birds must be concealed, but able to access to the net quickly after it is fired. It is critical for personnel to remain well hidden and quiet as wild turkeys easily become nervous and wary.
vii. After the net is fired, personnel should immediately cover its edges to prevent the birds escaping from underneath. Quickly transfer captured turkeys into transport boxes lined with straw or wood chips.

2. Drop Net –

a. Rationale – The drop net is another alternative used to capture a large numbers of turkey in a single deployment. The number that can be caught depends on the size of the net. In Wyoming, high winds often limit the size of the net that can be used effectively. Ramsey (1968) and Glazener et al. (1964) determined nets of 60' x 60' to 75' x 75' were optimum in Texas. Drop nets can be used in places where firing a rocket net would be inappropriate or dangerous, for example towns or residential areas.

b. Application –
i. Select prospective trap sites along movement routes or at feeding sites.
ii. Remove all debris that might hold the net up or cause it to tangle. Clear a 10-foot border from around the outer edge of the net as well
iii. Pre-bait trap sites with grain. Scatter bait evenly under the net, but not within 10 feet of the outer edge. By keeping bait 10 ft and more inside the net edges, fewer birds will escape when the net is dropped. Don't attempt to trap until turkeys are visiting the site regularly.
iv. Schedule trapping operations prior to 1 March because turkeys may lose interest in the bait once breeding activity begins.
v. Suspend the net at least 8 feet off the ground. Some birds may refuse to walk beneath a net that is suspended lower.
vi. The net mesh should be 3 to 3.5 inches. Turkeys tend to slide out from under nets of smaller mesh, but become too tangled if the mesh is larger.
vii. After the net is dropped, turkeys can be calmed by laying burlap or plastic tarpaulins over the top.

viii. Personnel should monitor the number of birds under the net. When too many birds are present, the net may not stay down and more birds could escape.

3. Walk-in Trap –

   a. Rationale – The walk-in or funnel trap can be useful when time, budget, or personnel are limited, or if the landowner does not want a large crowd on his property. Dimensions vary, but 4'x 8'x10' is sufficient to capture a reasonable number of birds, while being portable enough to transport in the back of a pick-up truck. Traps can be constructed from 4'x 4'x 6' wire panels (Davis, 1994). One person can set up a funnel trap and handle the turkeys, but the method will not capture as many birds by comparison to a rocket or drop net.

   b. Application –

      i. Pre-bait the trap site with grain. Birds should be using the baited sites before the trap is set up.
      ii. Construct trap panels and the funnel well before trapping is scheduled.
      iii. Modular portions of the trap should be assembled at or near the bait site 2 to 4 days before the trapping. The trap should be completely assembled before dawn the day trapping is scheduled to begin.
      iv. Traps can be made larger by attaching more panels at one end. A greater number of turkeys can potentially be captured, however excessively wide traps may sag in the middle.
      v. Traps usually become effective within 2 days after they are set up. Check them 2 to 3 times per day during cool weather. If the temperature is warm, check traps more frequently (every 2 to 3 hours).
      vi. Use a 10-foot hook to remove birds from one end of the trap.
      vii. On average, traps captured 10 birds per day in Texas. This number may increase with a larger trap size. However, rocket nets or drop nets may be more appropriate if a large number of birds must be captured in a short time.
      viii. Turkeys commonly injure their heads by jumping and attempting to fly in funnel traps. Opaque tarps can be placed over the trap to minimize injuries as birds are being removed.

4. Chemical Immobilization – Several drugs can be used to immobilize turkeys. These include tribromoethanol, alpha-chloralose, and methoxymol. The Wyoming Game & Fish Dept. does not typically use drugs to capture wild turkeys because other methods have proven safer and more effective. Anyone interested in chemically immobilizing turkeys should contact Veterinary Services. Consult Williams et al. (1973) for a detailed discussion regarding the use of drugs to capture wild turkeys.

V. WILD TURKEY HABITAT –

A. Habitat Requirements – Several studies have described habitats used by Merriam's wild turkeys in Wyoming and in the Black Hills of South Dakota – consult Rumble and Anderson (1996 a, b, c), Rumble and Anderson (1993 a, b), and Hengel and Anderson (1990). Other studies of Merriam's turkey habitats include Flake et al. (1995), Wakeling and Rogers (1995), Hoffman et al. (1993), Shaw and Mollohan (1992), and McCabe and Flake (1985). Habitats used by Rio Grande turkeys have not been specifically studied in Wyoming, but studies done elsewhere include Keegan and Crawford (1997), Beasom and Wilson (1992), Ransom et al. (1987), and McCabe and Flake (1985).

B. Habitat Evaluation – A protocol for evaluating turkey habitat has not been developed specifically for Wyoming. Managers should consult the references cited above to obtain guidance with respect to turkey habitat requirements. For the most part, a dependable winter food supply is the limiting factor that must be present to sustain viable turkey populations in Wyoming. Turkeys adapt well to the nesting and roosting sites that are available so long as an adequate food supply is available in the area.

C. Habitat Improvement – In most cases, turkey habitats in Wyoming are improved by providing or enhancing food sources. A publication entitled, "Plantings for Wild Turkeys," available from the Wyoming Game & Fish Department, lists specific plants useful for turkey food plots in eastern Wyoming, Montana, Colorado, and western Nebraska. Additional information about turkey habitat and food plants is provided in "Habitat Needs and Developments for Wild Turkeys," Habitat Extension Bulletin No. 24 (Hengel 1994). Grain plots consisting of wheat, oats, or millet are good food sources for turkeys in winter. Food plots should be established in locations that do not accumulate drifting snow and remain accessible. Bailed grain can also be used as "mobile food plots." Grain bales can be placed away from ranch compounds to prevent turkeys from congregating near buildings and causing problems. At times, contracts have been developed with landowners to leave a portion of their grain crop standing or to bale grains for use as winter feed.

VI. AGING AND SEXING –

A. Age –

1. Distal Primaries –

a. Adult: all ten distal primaries are well rounded, with white barring extending to the end of the feathers.

b. Juvenile: the ninth and tenth distal primaries or only the tenth have pointed tips and the white barring does not extend to the tips of the feathers.

2. Rectrices –

   a. Adult: all tail rectrices are the same length, resulting in an even contour when the feathers are fanned out.

   b. Juvenile: the middle tail rectrices are longer than the outer rectrices (the middle juvenile feathers are first to molt and be replaced). At approximately 1.5 years, all rectrices will be equal length.

3. Upper, Major Secondary Coverts –

   a. Adult: the secondary coverts form a well-rounded, "moon" shape.

   b. Juvenile: the secondary coverts are shorter and of unequal length, forming an uneven contour. All juvenile coverts will be molted by 1.5 years.

B. Sex –

1. Breast Feathers –

   a. Male: tips of the breast feathers are flattened and black on males.

   b. Female: tips of the breast feathers are rounded and light brown or crème colored.

2. Leg –

   a. Male: the tarsus is approximately 6 inches long and bears a spur.

   b. Female: the tarsus is approximately 4-5 inches long and has no spur.

3. Beards – Although female wild turkeys do not generally have beards, the presence of a beard is not conclusive evidence of sex. Depending on the population, from one to twenty-nine percent of females may develop beards (Pelham and Dickson, 1992).

VII. DISEASE – Davidson and Wentworth (1992) provide a comprehensive treatise of the diseases and parasites that afflict wild turkeys.

VIII. SETTING HUNTING SEASONS – Strickland et al. (1994:463) recommended the following factors should be considered for setting wild turkey hunting season throughout the United States. Each manager should decide which factors are most important or pertinent in his area of responsibility.

Spring Hunting Season	Fall Hunting Season
Tradition (public expectations)	Tradition (public expectations)
Hunter densities (hunting quality)	Seasons that either coincide with or avoid deer season
Landowner tolerance	Landowner tolerance
Seasons that coincide with the peak of gobbling	Turkey population size
Turkey population size	Brood surveys
Access to turkey areas (weather)	Fall hunt may adversely affect the turkey population
Season timed to coincide with hens incubating	Access to turkey areas (weather)
Season ends before peak of hatch	Literature on turkeys
Literature on turkeys	

A. Spring Hunting Seasons – Only male wild turkeys are harvested during spring hunting seasons. Since turkeys are polygamous breeders, the removal of males does not typically affect the productivity of a population. Some managers have speculated heavy hunting pressure before hens breed in the spring could reduce productivity and increase the vulnerability of toms (Widner et al., 1998; Hoffman et al., 1993; Kurzejeski and Vangilder, 1992). In response, a number of states moved the opening date of hunting season later in the spring. However, it is doubtful hunting pressure in Wyoming has ever been sufficient to impact turkey breeding. Data from the Wyoming portion of the Black Hills have indicated there is no benefit from opening the hunting season later. Prior to 1989, the spring turkey season in the Black Hills opened the first Saturday in April. From 1989 through 1992, the opening date was changed to April 1. Under both season structures, the opening date preceded the peak of breeding, which typically occurs in mid-April. To avoid possible disruption of breeding, from 1993 through 1999 the annual opening date was delayed to April 20. Despite opening the season later during the 6-year period, an increase in turkey productivity was not detectable in the region. Miller et al. (1997) concluded later opening dates may needlessly restrict hunting opportunity without measurably benefiting the turkey population. In some areas of Wyoming spring season may be delayed, giving turkeys time to disperse away from winter feeding sites in ranch compounds.

B. Fall Season – In some circumstances, fall hunting seasons can potentially impact the size and productivity of a turkey population. Hen harvest in areas with good access and heavy hunting pressure could lead to a population decline (Pack et al., 1999; Little et al., 1990). However, excessive hen harvest is unlikely throughout much of Wyoming because access to private lands is limited and in the Black Hills, much of the fall turkey harvest is opportunistic and incidental to deer hunting. Managers in southeast Wyoming attempted an experiment that limited fall harvest to bearded turkeys only. However, landowners began to complain about the lack of hen harvest when turkey populations increased following several good hatches.

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