Chapter 13

BLUE GROUSE AND RUFFED GROUSE (*Dendragapus obscurus and Bonasa umbellus*)

Harry Harju

I. CENSUS –

A. Production Surveys –

1. Rationale – Random brood counts are a survey method used to assess the reproductive success of blue or ruffed grouse. Unfortunately, these counts are done too late in the year to be considered in setting or adjusting hunting seasons. If the sample size is large enough, the counts can help identify important habitats used by broods and can provide insight to the potential quality of hunting in the fall.

2. Application – Random brood counts can be conducted on foot, from horseback or from a vehicle and should cover all portions of the brood-rearing area. A good pointing dog is invaluable to locate broods. If a flushing dog is used, it should be trained to walk very close to the observer. Each time a grouse is seen, record the species, location, age, sex and habitat on a wildlife observation form. If a count is incomplete, circle the number of birds recorded.

   The time frame for these surveys is July 15 to August 31. Warm, clear days are best for brood counts. The best results are obtained by searching for broods in the first two and last three hours of daylight. When a well-trained dog is used, counts can be conducted throughout the day.

3. Analysis of Data – Refer to chapter 12 (Sage-grouse), Section II.B (Brood Production).

4. Disposition of Data – All records of brood observations are forwarded to Regional Wildlife Management Coordinators for proofing, and then entered into the Wildlife Observation System Database.

B. Harvest Survey –

1. Rationale – Harvest data may be obtained in several ways, each suited for differing purposes and precision. The best methods are wing collections and the harvest survey questionnaire.

   Harvest data enable managers to monitor population trends, hunting pressure, chick survival to fall, annual changes in production, sex ratios of adults, hunter success and

the number of birds harvested. This information is used predominantly for answering questions from the public, industry and federal agencies.

2. Application – Refer to Chapter 12 (Sage-grouse), Section II.B.3 (Wing Collections) for additional information on wing barrels.

   Hunter Field Checks: Hunter field checks are inefficient and usually produce disappointingly small samples. Any major effort to contact hunters in the field should only be undertaken to fulfill data requirements for special studies.

   Wing Barrels: Wing barrels are 20 to 30 gallon metal barrels attached horizontally to a pipe which slides over a metal fence post. A guy wire attached to the back prevents the barrel from turning. A semi-circular opening is cut from the top half of one end of the barrel, enabling hunters to place the wings inside. A sign next to the barrel instructs, "Hunters, please deposit one wing from each grouse you harvested" (Hoffman and Braun 1975).

   Wing barrels are placed in locations passed by a large number of grouse hunters. Wing barrels work well in mountainous areas because there are few major ingress and egress routes. A small number of barrels can collect wings from relatively large areas.

   Wings should be removed from the barrels on Friday and Sunday evenings and immediately after holidays. Locations of barrels and dates of collections should be written on the collection sack or tags attached to the wings. Data from wings provide information on harvest trends, age and sex composition, and hunting pressure.

3. Analysis of Data – Changes in the proportion of young birds in the harvest can indicate an increase or decrease in survival of young. When young survival to fall is low, it is reasonable to expect a decrease in reproducing adults the following year. However, blue grouse are territorial and long-lived under current harvest pressures, therefore changes in survival of young probably don't affect the following year's production in most cases.

   Hunters do not select specific ages or sexes of blue and ruffed grouse. Therefore, we can presume harvest proportions represent the sex and age composition of the population. The sex ratio of adults, percentage of hens that nested successfully, and average size of broods can be determined from wings of harvested grouse.

   Yearly trends in the number of birds harvested per hunter and total harvest can indicate relative sizes of populations among years if weather was comparable. An increase in birds taken per hunter indicates more birds were available, hence an increase in the population. Conversely, a lower hunter success may indicate a decrease in available birds. Wing data that indicate a higher proportion of young in the harvest generally correspond to higher production and hunter success. Occasionally, factors such as weather cause the birds to move or change their habits,

making them more or less accessible to hunters. At such times hunter success may give a false reading of population changes.

C. Age and Sex Determination –

1. Rationale – The sex and age composition of the harvest represents the sex and age composition of grouse populations in the fall. This in turn indicates the population trend and the influence of adverse weather upon survival of young birds to the fall.

2. Application –

Aging Blue Grouse: (June 1967).

Physical Characteristics:

Lower Jaw (Patterson 1952). Support the entire weight of the dead bird by clasping the lower jaw (mandible) and shake it.

Juvenile: The lower mandible breaks.
Adult: The lower mandible does not break.

Flexibility of Breastbone (Patterson 1952). Push on the tip or end of the breastbone (sternum) with one finger.

Juvenile: The tip of the breastbone may be easily bent with one finger.
Adult: The tip of the breastbone is rigid and blunt.

Cranium (Westerskov 1956). Hold the bird's head is held between the index and middle finger and press the thumb on the forehead.

Juvenile: The cranium breaks.
Adult: It is not possible to press in the brain case.

Plumage Characteristics:

Outer primary Feather (Boag 1965)

Juvenile: The two outer primary feathers (#9 and #10) are pointed and new in appearance.
Yearling: The two outer primary feathers (#9 and #10) are pointed and old in appearance.
Adult: The two outer primary feathers (#9 and #10) are rounded.

Contour Feathers (Tabor 1963)

Juvenile: The contour feather shaft is streaked with dull white.

Adult: The contour feather shaft is streaked with dark.

Breast (Tabor 1963)

Juvenile: The breast is a pale buff or white.
Adult: The breast is a dark brown.

Outer Tail Feather (Petrides 1942). This measurement is taken one-half inch below the tip of the feather.

Juvenile: The outer tail feather is more rounded at the tip, shorter and narrower, 3/4 to 7/8 inch wide.
Adult: The outer tail feather is more square-tipped, longer and wider, 1¼ to 1½ inches wide.

Total Length of Plucked Outer Tail Feather (Bendell 1955)

Juvenile Male: The total length of the plucked outer tail feather is 132 to 152 mm.
Adult Mail: The total length of the plucked outer tail feather is 162 to 194 mm.
Juvenile Female: The total length of the plucked outer tail feather is 111 to 134 mm.
Adult Female: The total length of the plucked outer tail feather is 138 to 161 mm.

Tail feathers of blue grouse in southeastern Wyoming have grey bands at the tip, while those in northwestern Wyoming have only grey flecks on the tip.

Primary feather development and Auditory Region (Juvenile age in weeks) (Smith 1963). The primaries are numbered one to ten, from the inside to the outside of the wing. This follows the sequence in which they are molted. The outer primaries are shed and replaced last. Grouse molt only through primary #8 in their first fall. The latest-shed primary is indicated by a gap or a growing, replacement feather that is blue at the base. The number of the latest-shed primary is most reliably determined by counting backward from the outermost primary, since the division between primaries and secondaries is sometimes confusing.

A key for determining juvenile age in weeks by primary replacement follows:

Primary #8 not emerged:
Primary #1 with blood. . . . . 1 week old
Primary #2 bloodless. . . . . 2 weeks old
Primary #8 emerged:

Primary #1 dropped.	3 weeks old
Primary #2 dropped	3-4 weeks old
Juvenile feather emerging in capital tract	4 weeks old
Primary #3 dropped	4-5 weeks old
Primary #4 dropped	5-6 weeks old
Primary #5 dropped	5-7 weeks old
Secondary #8 dropped	5 weeks old
Total length of rectrices (tail feathers) 120 to 271 mm	6 weeks old
Total length of rectrices 272 to 485 mm	7 weeks old
Primary #6 dropped	7-8 weeks old
Total length of rectrices 486 to 720 mm	8 weeks old
Primary #7 dropped	9-10 weeks old
Secondary #2 dropped	9 weeks old
Total length of rectrices 721 to 921 mm	9 weeks old
Total length of rectrices 922 to 1082 mm	10 weeks old
Primary #8 dropped	11 weeks old
Total length of rectrices 1083 to 1190 mm	11 weeks old
Auditory region of males, well defined circles of post-juvenile feathers	12 weeks old
Auditory region of males, areas of post-juvenile feathers enlarging	13 weeks old
Auditory region of males, area of post-juvenile feathers enlarging and beginning to merge with those in capital tract	14 weeks old
Auditory region of males, post-juvenile feathers cover head and neck	15 weeks old

Adults	Rounded condition of primaries #9 and #10.
Yearlings	Pointed condition of primaries #9 and #10.

Primary Feather Development (Juvenile Age in Weeks) (Zwickel, 1966)

Classification for rating each primary follows:

E (empty) = an empty feather follicle.

P (pulp) = a new feather in which the vane has not yet broken from the quill. (From the time the vane breaks from the quill until the feather stops growing, the development is estimated in relation to a fully grown primary. For instance, a feather in which the vane has just broken from the quill represents 1/8 grown. The other categories used are 1/4, 1/3, 1/2, 2/3, 3/4, and 7/8 grown).

F (full) = a fully-grown feather, one in which all bluish color (the blood) is gone from the lower end of the quill.

A key for determining age of young blue grouse beyond 2 weeks old follows:

PRIMARY NUMBERS								
AGE WEEKS	***1***	***2***	***3***	***4***	***5***	***6***	***7***	***8***
2	E	-	-	-	-	-	-	-
3	P	E	-	-	-	-	-	-
4	2/3	1/3	P	-	-	-	-	-
5	3/4	2/3	1/3	P	-	-	-	-
6	F	7/8	3/4	1/2	P	-	-	-
7	F	F	F	3/4	1/2	1/4	-	-
8	F	F	F	7/8	2/3	1/2	E	-
9	F	F	F	F	7/8	2/3	1/4	-
10	F	F	F	F	F	3/4	1/2	P
11	F	F	F	F	F	7/8	3/4	1/4
12	F	F	F	F	F	F	3/4	1/2
13	F	F	F	F	F	F	7/8	3/4
14	F	F	F	F	F	F	F	3/4
15	F	F	F	F	F	F	F	3/4
16	F	F	F	F	F	F	F	F

Average length (mm) of fully grown primaries:

PRIMARY NUMBERS								
SEX	***1***	***2***	***3***	***4***	***5***	***6***	***7***	***8***
MALE	108	117	125	139	156	162	161	158
FEMALE	104	112	118	129	144	149	148	145

Plumage Characteristics:

Cervical Air Sac (Over 6 weeks of age) (Caswell 1954):

Male: The male cervical feathers have a white base and are tipped with bluish black

Female: The female cervical feathers lack the white base and are bluish brown in color.

Head, Nape and Interscapular Feathers (Ridgeway 1946):

Male: The male has no barred feathers.

Female: The female has some barred feathers.

Minor Primary Coverts (Mussehl 1963). The minor primary coverts (Tectrices) are immediately under the alula.

Male (Adult): The male coverts are gray with less pronounced or no mottling.
Female (Adult): The female coverts are blotched with brown mottling, particularly along the rachis or center.

Length of Primary Feathers (Mussehl 1963). Measure the lengths of primaries #1, #3 and #5, which are usually fully developed by September. The measurements are made from the point of insertion to the tip of the feather.

The primaries are numbered one to ten from inside to outside. This follows the sequence in which they are molted. The outer primaries are shed and replaced last. Grouse molt only through primary #8 in their first fall. The latest-shed primary is indicated by a gap or a growing, replacement feather which is blue at the base. The number of the latest-shed primary is most reliably determined by counting backward from the outermost primary, since the division between primaries and secondaries is sometimes confusing.

Male (Adult): The total value (Z) is greater than the general mean (Zm) of the #1, #3 and #5 primaries.
Female (Adult): The total value (Z) is less than the general mean (Zm) of the #1, #3 and #5 primaries.

Zm = General mean of the #1, #3 and #5 primaries
(Zm = 0.440525).

Z = total value of the #1, #3 and #5 primaries.

Z1 = Total value of primary #1.

Z3 = Total value of primary #3.

Z5 = Total value of primary #5.

Z = Z5 + Z3 – Z1

Measure the first (Z1), third (Z3) and fifth (Z5) primaries. Convert their lengths to primary feather values, and then apply the above formula.

PRIMARY FEATHER VALUES

FIFTH FEATHER

Length (mm)	Total Value
140	0.111580
141	.11237
142	.113174
143	.113971
144	.114768
145	.115565
146	.116363
147	.117159
148	.117956
149	.118753
150	.119550
151	.120347
152	.121144
153	.121941
154	.122739
155	.123535
156	.124332
157	.125139
158	.125926
159	.126723
160	.127520
161	.128317
162	.129114
163	.129911
164	.130708
165	.131505
166	.132302
167	.133099
168	.133896
169	.134693
170	.135490
171	.136287
172	.137084
173	.137881
174	.138678
175	.139475
176	.140272
177	.141069

THIRD FEATHER

Length (mm)	Total Value
110	0.337370
111	.340437
112	.343504
113	.346571
114	.349638
115	.352705
116	.355772
117	.358839
118	.361906
119	.364973
120	.368040
121	.371107
122	.374174
123	.377241
124	.380308
125	.383375
126	.386442
127	.389509
128	.392576
129	.395643
130	.398710
131	.401777
132	.404844
133	.407911
134	.410978
135	.414045
136	.417112
137	.420179
138	.423426
139	.426313
140	.429380
141	.432447
142	.435514
143	.438581
144	.441648
145	.444715
146	.447782
147	.450849

FIRST FEATHER

Length (mm)	Total Value
90	0.080460
91	.081354
92	.082248
93	.083142
94	.084036
95	.084930
96	.085824
97	.086718
98	.087612
99	.088506
100	.089400
101	.090294
102	.091188
103	.092082
104	.092976
105	.093870
106	.094764
107	.095658
108	.096552
109	.097446
110	.098340
111	.099234
112	.100128
113	.101022
114	.101016
115	.102810
116	.103704
117	.104598
118	.105492
119	.106386
120	.107280
121	.108174
122	.109068
123	.109962
124	.110856
125	.111750
126	.112644
127	.113538

PRIMARY FEATHER VALUES (continued)

FIFTH FEATHER

Length (mm)	Total Value
178	.141866
179	.142663
180	.143460
181	.144257
182	.145054
183	.145851
184	.146648
185	.147445
186	.148242
187	.149039
188	.149836
189	.150633
190	.151430

THIRD FEATHER

Length (mm)	Total Value
148	.453916
149	.456983
150	.460050
151	.463117
152	.466184
153	.469251
154	.472318
155	.475385
156	.478452
157	.481519
158	.484586
159	.487653
160	.490720

FIRST FEATHER

Length (mm)	Total Value
128	.114432
129	.115326
130	.116220
131	.117114
132	.118008
133	.118902
134	.119796
135	.120690
136	.121584
137	.122478
138	.123372
139	.124266
140	.125160

Example:

The first (Z1), third (Z3) and fifth (Z5) primaries are found to be:

Z1 = 109mm. Z3 = 128mm. Z5 = 160mm.

These are converted to total values from the table:

Z1 = 0.097446 Z3 = 0.392576 Z5 = 0.127520

The values for Z5 and Z3 added together total 0.520096; subtracting Z1 from this sum gives a value of 0.422650. This value is less than the general mean (Zm = 0.440525), accordingly it is a female wing.

Aging Ruffed Grouse: (June 1967).

Physical Characteristics:

Lower Jaw (Patterson 1952). Support the entire weight of the dead bird by clasping the lower jaw (mandible) and shake it.

Juvenile: The lower mandible breaks.
Adult: The lower mandible does not break.

Flexibility of Breastbone (Patterson 1952). Push on the tip or end of the breastbone (sternum) with one finger.

Juvenile: The top of the breastbone may be easily bent with one finger.
Adult: The tip of the breastbone is rigid and blunt.

Cranium (Westerskov 1956). Hold the bird's head between the index and middle fingers and press the thumb on the forehead.

Juvenile: The cranium breaks.
Adult: It is not possible to press in the brain case.

Plumage Characteristics:

Outer Primary Feather (Tabor 1963)

Juvenile: Primaries #9 and #10 are pointed and the same color as other primaries; primary #8 is rounded, with sheathing at the base (Fig. 4).
Yearling: Primaries #9 and #10 are pointed and worn; primary #8 has sheathing at base (Fig. 4).
Adult: Primaries #8, #9 and #10 are rounded, with sheathing at their bases (Fig. 4).

Width of the Shaft of Primary #9 [Spring] (Dorney 1957). The width of the shaft of primary #9 is measured where the larger proximal barbs begin.

Yearling Male: The width of the shaft is 0.117 inch or less.
Adult Male: The width of the shaft is 0.117 inch or more.

Length of the Central Tail Feather [Spring] (Dorney 1957).

Yearling Male: The width of the shaft of the central tail feather is 0.087 inch or less.
Adult Male: The width of the shaft of the central tail feather is 0.092 inch or more.

Length of a Single Barb of the Central Tail Feather (Dorney 1966). See section under sexing.

Primary Feather Development – Juvenile Age in Weeks (Tabor 1963). The primaries are numbered one to ten, from inside to outside. This follows the sequence in which they are molted. The outer primaries are shed and replaced last. Grouse molt only through primary #8 in their first fall. The latest-shed primary is indicated by a gap or a growing, replacement feather that is blue at the base. The number of the latest shed primary is most reliably determined by counting backward from the outermost primary, since the division between primaries and secondaries is sometimes confusing.

A key for determining juvenile age in weeks by primary replacement follows:

PRIMARY FEATHERS

1		2		3		4		5		6		7		8	
A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
wk	wk	wk	wk	wk	wk	wk	wk	wk	wk	wk	wk	wk	wk	wk	wk
2	7	3	7	4	9	5	10	6	11	7	11	9	14	10	17

A= Primary begins growth. B=Primary is fully grown.

Plumage Characteristics:

Tail Length (Edminister 1947).

Male: The length of the tail is 159 mm or more.
Female: The length of the tail is 146 mm or less.

Color of the Bare Spot Over the Upper Eyelid (8-14 week old chicks and older) (Palmer 1959).

Male: Bare spot over the upper eyelid is subdued orange to bright red-orange.
Female: The bare spot over the upper eyelid has little or no color.

Tail Band (Bump et al. 1947).

Male: The black band on the tail is unbroken in the center.
Female: The black band on the tail is generally broken on the two central feathers, especially on the underside (Fig. 1).

Length of Central Plucked Tail Feathers (Hale 1954).

Male: The length of the plucked central tail feather is 150 mm or more.
Female: The plucked central tail feather is 149 mm or shorter.

II. DISTRIBUTION –

A. Field Observation –

1. Rationale – Distribution data are useful to define management units and to identify important habitats. These data provide basic information needed to carry out any grouse management program.

2. Application – Grouse can be observed any time of year, but most often from spring through fall. Any observation of a grouse should be recorded on a wildlife

observation form (Appendix I-E). The activity of the bird(s) at the time of observation should be recorded.

Both species of grouse are difficult to observe in large numbers. Indirect observations including tracks, droppings, feathers, nests, eggs or other signs should be recorded, including location, estimated season of use, and sex and activity if discernable.

Grouse are most readily observed on foot or horseback, and in some places from vehicles. Following light snows, blue and ruffed grouse are easy to locate by tracks.

Blue grouse are most readily observed during mild, clear weather in early morning or late afternoon. In fall and spring light snow is helpful especially when temperatures are freezing or above, since grouse leave the trees to feed. Blue and ruffed grouse may feed through the middle of the day during fall and winter.

III. TRAPPING, MARKING AND TRANSPLANTING –

A. Trapping – Capturing large numbers of grouse quickly is virtually impossible because both species are somewhat solitary or form small flocks of less than 15 birds. Capture with a cannon net is infeasible within their preferred habitats. Grouse have been captured in mist nets strung on the ground and from poles, but this is time-consuming and inefficient.

Noose Capture – Blue grouse have been captured with a noose on a long pole. (Zwickel and Bendell 1967). A noose has also been used to capture sage grouse hens lured within range by distress calls of young sage grouse. A fiberglass or light pole at least 16 feet long is used.

The pole bears a noose of plastic coated 80# test steel leader. The noose is placed around the grouse's neck and drawn tight as the bird tries to escape. The worker then places the bird in a fabric (e.g., cotton, burlap) bag and marks it. Chicks and hens have been captured in a landing net with an 8-10 foot handle. Both are attracted by distress or locator calls of young blue grouse.

B. Marking – Refer to Appendix VII (Marking Techniques)

IV. HABITAT MANAGEMENT – An effective habitat management program requires identification of seasonal habitat preferences and assessment of habitat conditions. Although seasonal ranges of blue grouse have been described within some portions of Wyoming, development of general guidelines for habitat management are impractical due to the vast diversity in topography and vegetative composition of grouse habitats. The literature indicates grouse vary widely in habitat selection and we know little about how habitat modifications such as burns, clear cuts, and herbicide treatments affect grouse.

V. FOOD HABITS – Food habits of forest grouse have been studied extensively in most habitat types. Further studies are of doubtful value except in conjunction with specific research projects. The Department's Laboratory should be involved with all phases of a food habits investigation other than initial collection of samples and gross analysis. Two standard techniques are suitable to determine food habits of blue and ruffed grouse:

1. Crop analysis
2. Fecal analysis

Various adaptations of these techniques are described in Litvaitis et al. (1994:266) and the references they cite. If an investigation of food habits is planned, the project should last at least three years and should employ both of the aforementioned techniques. Habitat cover types should be accurately mapped each year of the study. A seasonal voucher collection of available plant species is also necessary. Finally, an accurate map and record of sample locations should be maintained.

Fecal Analysis – Types of plants ingested by spruce grouse have been successfully identified from fecal samples (Gurchinoff 1969) and this method would probably work for blue or ruffed grouse. Fecal samples could yield data on seasonal food habits without the need to collect and sacrifice birds.

VI. DAMAGE CONTROL – Forest grouse are not known to cause damage.

VII. POPULATION MANAGEMENT – Current knowledge about management of blue and ruffed grouse populations is summarized in Chapter 17, Harvest Management, in Research and Management Techniques for Wildlife and Habitats (Strickland et al. 1994). Harvest management can be summarized fairly succinctly: All game birds produce surpluses of young. The primary factor affecting numbers of birds available for harvest is the number of young produced. Changes in the length of hunting seasons and the bag limit are unnecessary because participation by hunters declines when there are few grouse, thus reducing harvest. The converse is true when grouse are abundant.

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