

SEPARATION OF CANADA AND CACKLING GEESE IN COLORADO

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Introduction

Canada Goose, the most familiar and widespread goose in North America, has been generally little studied by birders because of its abundance and ease of identification. For years, Colorado birders have discerned varying degrees of size and shape among Canada Geese within the state. For most birders, though, separation of subspecific groups within the complex of white-cheeked goose was difficult and ignored for being unnecessary. (For the purposes of this paper, we use the term "white-cheeked goose" to refer to both Canada and Cackling goose in combination. In doing so, we hope to eliminate possible confusion in using the common name "Canada Goose" in reference to both pre-split Canada Goose and post-split Canada Goose.) Most species with such an extensive range, however, display clinal differences in size, shape, and plumage patterns between somewhat genetically clustered groups. With the American Ornithologists' Union's (AOU) determination in 2004 that the "Canada Goose" was comprised of more than one species, splitting it in two (Banks et. al 2004), the issue of separating Canada Goose from Cackling Goose became the forefront of identification pitfalls.

There is general, though not unanimous, agreement that the white-cheeked goose complex is comprised of 11 subspecies, seven within Canada Goose (*Branta canadensis*) and four within Cackling Goose (*Branta hutchinsii*). Though some argue that many more subspecies, and even species splits, are necessary, we here follow the current AOU taxonomy. Generally, Cackling Geese are small birds of the tundra [one subspecies is roughly the size of Mallard (*Anas platyrhynchos*)], while Canada Geese inhabit boreal forest (intermediate-sized and larger birds) and points south (very large birds). Birds from the Pacific coast (both Cackling and Canada geese) tend to be much

darker, more saturated in color, than eastern birds. All geese that breed in the lower 48 states are Canada Geese (*sensu stricto*) and uniformly large and pale.

Herein we present findings of research conducted on the separation of Canada and Cackling geese in Colorado, with special emphasis placed on the nuances of subspecific identifications between the two species. Though the purpose of this article was to potentially reduce confusion regarding how to separate the two species in the field, others who may have maintained that the task was readily easy will hopefully gain a better understanding that separation between the two can oftentimes be very problematic.

Methodology

The authors utilized numerous reference materials, in-depth analysis of birds in the field and of photographed individuals, and discussions with others with expertise on goose identification in the course of preparing this paper. Specimens of white-cheeked geese, many from Colorado, were examined at the collections housed at the Denver Museum of Nature and Science (DMNS; see back cover), and which were identified by the late Dr. Allan Phillips (see below). For the most part, we consider these specimen identifications as correct unless noted otherwise.

We examined identification characteristics of seven subspecies of white-cheeked geese known or predicted to occur in Colorado: Giant (*B. c. maxima*), Moffitt's (*B. c. moffitti*), Interior (*B. c. interior*), and Lesser (*B. c. parvipes*) among the Canada Geese, and Cackling (*B. h. minima*), Richardson's (*B. h. hutchinsii*), and Taverner's (*B. h. taverneri*) among the Cackling Geese. Races of white-cheeked geese not covered in this essay include Atlantic Goose (*B. c. canadensis*), Vancouver Goose (*B. c. fulva*), Dusky Goose (*B. c. occidentalis*), and Aleutian Goose (*B. h. leucopareia*), only the last being a form of Cackling Goose. Note that because the AOU opted to use the existing name of one of the subspecies of Cackling Goose as the species name, we are forced to use the repetitive nominal form of "Cackling Cackling Goose" to separate that subspecies from others of the same species.

Results

We have capsulated our findings to group methods of identification from general to more advanced methodologies useful to distinguish Colorado Canada and Cackling geese. These include: a discussion of those tools useful in identification; basic tenets used to generally separate the two species; a primer on those critical and subtle traits used to potentially recognize the various subspecies of both species; and analysis of the separation of the two most difficult subspecies within Canada and Cackling geese in Colorado.

Considerations in Separation of Canada and Cackling Geese

At issue for birders attempting to identify white-cheeked geese to subspecies (or races; we use the two terms interchangeably) is that subspecific identities are based on breeding ranges, where most birds segregate by genetic lineage. In migration and on wintering grounds, it is problematic to use field identification models when no knowledge of the natal grounds of the bird(s) in question is known. This is the case in Colorado.

Many field guides illustrate only one example of white-cheeked goose, while others depict three or four of the 11 races; thus, oversimplifying the complexity of these taxon. Even within subspecies, there are subpopulations and gradual changes in appearance so that it is difficult to define the characteristics of that subspecies without looking at a broad geographic sample. Members of different subspecies of the same species are capable of breeding with each other and of producing fertile offspring.

Is the separation between Canada and Cackling geese simply a matter of large vs. small? At times, but for Colorado birders, size is not the sole criterion necessary to identify these two species, as we must contend with a medium-sized set of geese that blur the definitions of large and small. Although separation of these two species has been traditionally (prior to the taxonomic split) based on structure and plumage patterns, modern studies have turned to comparison of DNA, a tool not available to field observers. The new focus of using interpretations of genetic evidence is often more straightforward in studies of taxonomy, however, than in trying to draw hard lines between populations differing by degrees or shades of coloration and size. It seems reasonable to assume that groups that look different and have different DNA may be different species. But what do birders do when the DNA indicates speciation, but the birds appear similar?

Of the many field characters that have been proposed for separating Cackling Goose from Canada Goose, the four that have been used most often are bill size and shape (most accurate means), overall body size and structure, neck length, and plumage pattern. Overall body size and proportions (including neck length) are helpful, but require views from many angles and positions and it is necessary to have some direct size comparison to provide identification value. Fortunately, their gregarious nature usually allows for such during field observations. As geese have high pair and family fidelity, when a suspect goose is observed, birders should determine whether a mate or siblings are in association as size differences may simply be an artifact of sexual variation.

Secondary features that might be used in identification include presence or absence of a white neck collar (at the juncture between the neck and breast), presence or absence of a dark chinstrap (from the base of the mandible to the throat), voice, and wing shape. Of these secondary criteria, voice appears to have the strongest value, whereas, the presence or absence of a white neck collar or a dark chinstrap have limited usefulness due to inter- and intraspecific variation. Observers should use voice cautiously, however, as apparently the pitch of a goose's call can vary by sex and possibly position of the neck when calling (Sibley 2004). Voice should not be used to identify a single bird, but can be helpful when attempting to identify an entire flock. Wing shape is of very limited utility and is useful at times only when attempting to separate some subspecies within an individual species (Sibley 2004).

Many references utilize body weight as an indicator of subspecies, though in the field, slight differences in weight are impossible to detect and we find the feature nearly useless for identification purposes. Weights vary by time of year, food supply, sex, age, and general condition of the bird, and consequently are of little value in making racial distinctions. Rather, we provide body weights only for use in general comparative analysis between subspecies. Within races and age classes of white-cheeked geese, males are typically larger than females in weight, height, wing length, tail length, and length of exposed culmen (the distance between the edge of feathering at the top of the bill to the bill's tip). Age can also express differences, especially in plumage pattern as young of the year birds in both species have more smudged borders between the black neck and gray breast, as well as having greater light fringing to the upperpart feathers.

Morphological variation Canada and Cackling geese subspecies, as well as differences within given subspecies, compounds the problem of attempting to use size and shape alone for species identification. Typically, though, Cackling Geese are small and robust with short, thick necks, have small, bluntly triangular bills, and square heads; whereas, Canada Geese are long-bodied, wide, and long-necked, and have long, dished bills and more rounded heads. It is the overlapping medium-sized and medium-proportioned birds within each species that cause the greatest confusion and creates the need to understand the effects of subspecific variation. Unfortunately, introductions and reintroductions of geese from mixed stocks have muddled the traits of many Canada Goose populations. Likewise, the difficulty in studying breeding populations of Cackling Geese, because of their tundra breeding locations, has led to only rough delineations of subspecific range and the amount of cross-breeding between Cackling Goose subspecies is not fully known.

As if inherent variation were not enough, observers have to contend with a variety of weather conditions and behavior. As an example, when asked to describe a given goose observed at different times, birders may disagree about whether the bird was "thin-necked" or "thick-necked," "long-billed" or "short-billed," "tall" or "short." Such discrepancies are common in that the appearance of geese can change substantially due to behavior, posture, and environmental conditions. When alert, all geese crane their necks high, which can suggest that a Cackling Goose is long-necked. Likewise, when napping or cold, Canada Geese can compact their bodies and fluff their feathers, exhibiting the stocky profile of a Cackling Goose.

General Separation Between Most Cackling and Canada Geese in Colorado

Prior to in-depth discussions on the specific characteristics of various subspecies of Cackling and Canada geese in Colorado, we must first provide general information about the two species, relative to Colorado. Two subspecies of Canada Goose are commonly present in Colorado, Moffitt's Canada Goose, which is mostly resident, and the migrant and winter resident Lesser Canada Goose. The race of Cackling Goose found commonly in the state is the migrant and winterer Richardson's Cackling Goose.

Separation of Richardson's Cackling Goose and Moffitt's Canada Goose is quite easy. Richardson's is a small, compact, and robust goose, with a thick, short neck, square head, and short, triangular bill. Moffitt's is large, long, thin-necked, fairly round-headed, and has a long, somewhat dished bill (i.e., with a concave culmen). Figures 1-3 (see also the front cover) depict comparisons between Cackling and Canada geese where identification is straightforward (Richardson's vs. Moffitt's).

Racial Determination of Canada and Cackling Geese in Colorado

Canada Goose

As noted, four subspecies of Canada Goose occur, or have the potential to, in Colorado. Two occur commonly: Moffitt's, the large form that breeds in the state, and Lesser. We here lump Moffitt's with a third subspecies, Giant, as the genetic makeup of large geese in Colorado seems to be a mixture of both. The fourth, Interior, is known from historical records and is considered to have potential to occur in the state again.

Moffitt's/Giant Canada Goose

Moffitt's was apparently historically restricted to the western slope, but through introductions of mixed lineage large Canada Geese from game farms to Front Range locales, the genetic and phenotypic characteristics of many populations of breeding geese in Colorado have become diluted. Moffitt's is

known to intergrade extensively with Giant Canada Goose where the two populations meet (Mowbray et al. 2002). However, our identification discussion for breeding Colorado geese will use the classic Moffitt's as a template, with the caveat that not all birds nesting in the state will match these characteristics.

Moffitt's Canada Goose is a large goose, averaging only slightly smaller in size than the largest Canada Goose subspecies, Giant, though overlap does occur (Fig. 4). The typical weight range of Moffitt's is 7 to 10 lbs (3150g to 4500g), whereas Giant Canada Geese average between 9.7 and 12 lbs (4400g to 5400g; Mowbray et al. 2002). Most Moffitt's have rounded heads, long, dished bills, a white cheek patch often hooked toward the rear crown, and long necks. Apparently, some may exhibit white on the forehead (Mowbray et al. 2002). Intermountain birds may possess a dark chin strap, though that feature is usually lacking in this race (Mowbray et al. 2002). The neck is long and relatively thick, though when alert, can appear quite thin. The breast is usually very light, though there is considerable individual variation. Few possess a white neck collar and most display a very clean break in coloration between the breast and neck. However, as with all white-cheeked geese, the distinctiveness between the breast and neck border is related to age, with juveniles displaying a greater degree of blending in coloration between the breast and neck.

Based on the proximity of the range of Giant Canada Goose (eastern Great Plains and Upper Midwest) to Colorado, it is probable that the subspecies occasionally occurs in eastern Colorado (see below). Separation of pure forms of Giant and Moffitt's is difficult and somewhat subjective. Giant does average larger in size, though only on very hefty adult males is a size difference appreciable. As with Moffitt's, Giant is rather pale overall, particularly on the underparts; there seems to be little difference in underparts pattern between the two races. In all aspects, including bill, neck, body, and leg length, Giant appears very large. Also, as with Moffitt's, the bill of Giant is long and somewhat dished and the head shape is quite rounded, lacking the squared appearance of most Cackling Geese; the forehead may be marked with white. The long bill commonly displays pink or pinkish undersides to the mandible. The white cheek patch is hook-shaped, angling from the chin toward the eye and then posteriorly and, in our experience, seems to extend somewhat higher up the sides of the head than on other Canada Goose races. The patch also usually extends forward on the chin to meet the base of the bill, accentuating its extent (Mlodinow et al. 2006, Hanson 1997). The call of both Moffitt's and Giant are similar and are generally a loud, relatively deep 'hrONK'.

Lesser Canada Goose

Lesser Canada Goose is the commonest goose that migrates to Colorado in fall, overwintering primarily east of the Rocky Mountains (Figs. 5-8). Lesser is typically smaller than Moffitt's Canada Goose overall and is one of the confounding medium-sized geese. Lesser is also the most difficult white-cheeked goose in Colorado to identify as its moderate size and shape overlap with Moffitt's Canada Goose and with Richardson's Cackling Goose. To further compound the problem, hybridization is known with Taverner's Cackling Goose in western Alaska and with Richardson's Cackling Goose through large areas of that form's range. Finally, Lesser has been known to intergrade with Canada Goose races to the south, including Giant and Moffitt's Canada Geese (Sibley 2004). These last two intergrades could cause confusion, as they seem large for Lesser but small for Moffitt's Canada Goose.

The head shape of Lesser Canada Goose is similar to that of a miniature Moffitt's, being gently sloped and rounded, but usually more delicate. The bill is long and slender, usually dished, and slopes evenly to the forehead, though shorter and smaller in all proportions to Moffitt's. As noted by Krueger (2005), the length of a Lesser bill along the bottom of the lower mandible is roughly equal to 70-75% of the width of the side of the head. The slope of the culmen is not as steep as in Cackling Geese, even Taverner's, the most similar-appearing Cackling Goose subspecies. Examinations by Krueger (2005) suggest that on some individual Lesser, the difference between the slope of the culmen and forehead is virtually imperceptible, with an almost continuous slope line to the rounded crown. Deuel (2004) described the bill of Lesser as larger and lower than that of Taverner's.

In body shape, Lesser is shorter and not as wide as larger races, like Moffitt's or Giant. Lessers typically average between 5.5 and 8 lbs (2500 to 3600g; Mowbray et al. 2002). Lesser Canada Goose is always larger than Cackling Cackling Goose, but can overlap the size of Taverner's Cackling Goose and Moffitt's Canada Goose. Based on body size similarities, we believe that some smaller female Lesser may even overlap in size with larger males of Richardson's Cackling Goose. Hybridization with Richardson's has been postulated, and if correct, could be the source of occasional "small geese" that do not fit the primary indicator model for this subspecies (Krueger 2005). Neck length is moderate and between that of Moffitt's and most Cackling Geese. All Lessers are thin-necked in contrast to Cackling Geese, although remember that neck shape is highly variable due to posture. Some Lessers often appear short-legged, especially when in a relaxed posture, a characteristic different from that of the larger Moffitt's and Giant.

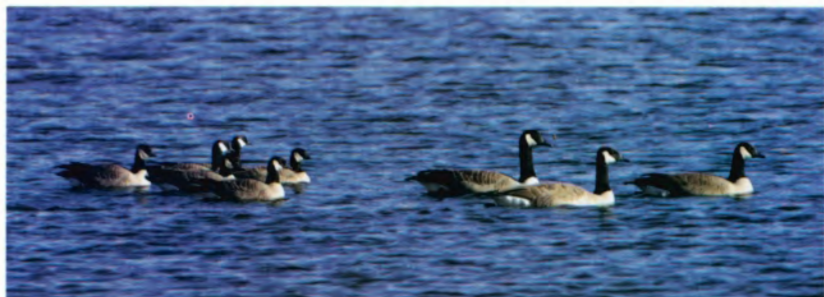


Figure 1. Richardson's Cackling Geese on left, Moffitt's Canada Geese on right. Note square head, short, thick neck, short bill, and small bodies of the Cackling Geese compared to the long-bodied, long, thin-necked, round-headed, and long-billed appearance of the Canada Geese. *Photo courtesy of Bill Schmoker, Larimer County, CO, November 2005.*



Figure 2. Richardson's Cackling Goose in foreground, Moffitt's Canada Goose to rear. Despite Cackling Geese generally being short-necked and thick-necked, note that in alert behavior, the neck can appear quite long and thin. *Photo courtesy of Bill Schmoker, Weld County, CO, November 2004.*



Figure 3. In flight, note the small triangular bill, small head, short-neck, and small size of Richardson's Cackling Goose (uppermost bird) compared to the larger Moffitt's Canada Goose. *Photo courtesy of Bill Schmoker, Weld County, CO, November 2004.*



Figure 4. Note long, dished bill, long, relatively thick neck, and light upper breast pattern of this Moffitt's that is presumed "pure" (based on location: Washington), that is, with no Giant influence. *Photo courtesy of Steve Mlodinow, Thurston County, WA, April 2006.*



Figure 5. Lesser Canada Goose. Note long body, long legs, short neck, and moderately-sized bill. White neck collar is not significant in identifying Lesser. *Photo by Larry Semo, Standley Lake, Jefferson County, CO, December 2005.*

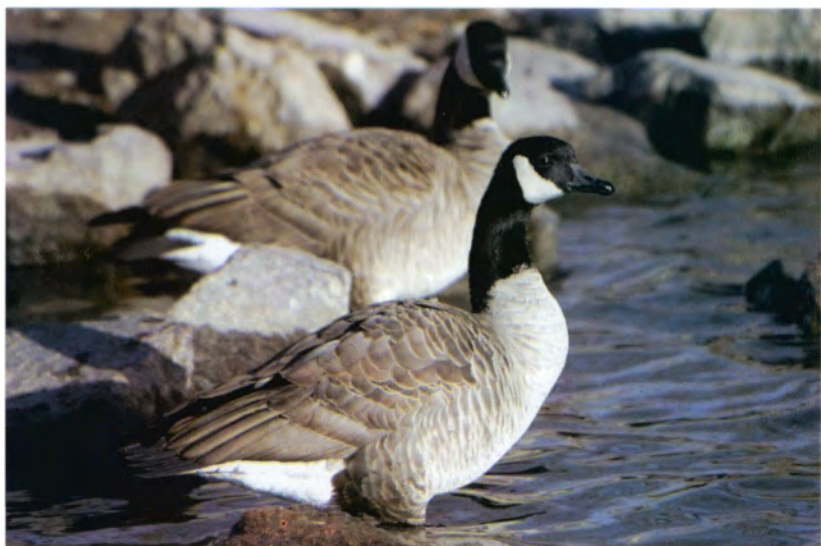


Figure 6. Lesser Canada Goose. Note stocky profile, bright, white breast, relatively short, thick neck, and dished bill of moderate length. *Photo by Larry Semo, Prospect Park, Jefferson County, CO, January 2006.*



Figure 7. Lesser Canada Geese. Note short, thick necks, bills of moderate length, and bright chests. Bill length eliminate Richardson's Cackling Geese. *Photo taken by Larry Semo, Denver County, CO, January 2006.*



Figure 8. Lesser Canada Geese. Note short, thick neck, and bill of moderate length. Head shape and neck length are reminiscent of Richardson's Cackling Goose, though overall body size and bill size and shape rule out Cackling Goose. *Photo taken by Larry Semo, Denver County, CO, January 2006.*



Figure 9. Interior Canada Goose. Note darker gray breast in comparison to that of Moffitt's/Giant Canada Geese and the longer bill than Lesser. *Photo taken by Larry Semo, Burnett County, WI, November 2005.*



Figure 10. Richardson's Canada Goose (with Mallard). Note small size, short, triangular bills, square heads, and light breasts. Also note variation in presence and extent of white neck collars, indicating the lack of importance of that trait for use in separation. *Photo courtesy of Tony Leukering, Larimer County, CO, March 2006.*



Figure 11. Richardson's Cackling Geese. Note second bird from left. When alert, Cackling Geese can raise their necks substantially, suggesting Lesser Canada Goose. *Photo by Larry Semo, Larimer County, CO, March 2006.*



Figure 12. Colorado's first accepted Cackling Cackling Goose, with Mallard. Collected 15 April 1949 near Colorado Springs, El Paso County, CO. *Photo by Larry Semo, Denver Museum of Nature and Science, February 2006.*



Figure 13. Cackling Cackling Goose, with Moffitt's/Giant. Note very small size in all aspects and very dark breast and underparts. *Photo courtesy of Andrew Spencer; Arapahoe County, CO, January 2002.*



Figure 14. Note rounded head, relatively long-necked look, short, stubby and convex bill, and unicolored breast and underparts on this Taverner's Cackling Goose. *Photo courtesy of Tony Leukering, Thurston County, WA, February 2006.*



Figure 15. Taverner's and Cackling Cackling Geese. Cackling Cackling Geese are the two smaller birds in the center foreground. Those with long, outstretched necks represent Taverner's Cackling Geese. Besides the long necks, note the larger size, small, pin-headed look, and concolor underparts. Size could indicate Lesser Canada Goose, but bill size and shape eliminate Canada Goose. *Photo courtesy of Steven G. Mlodinow, Thurston County, WA, March 2006.*

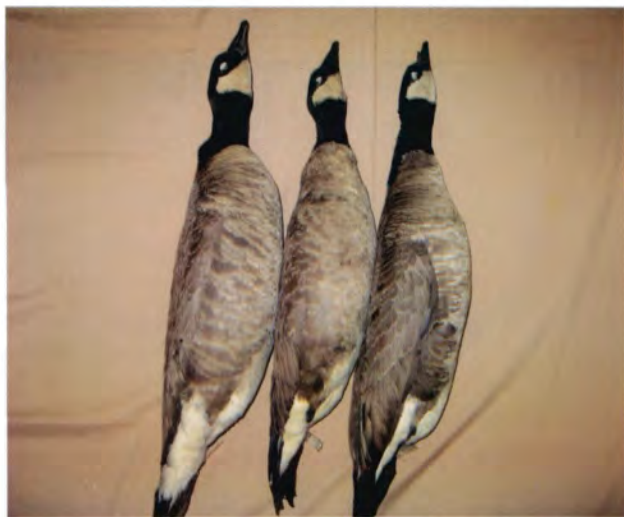


Figure 16. From left to right: Lesser Canada Goose (female), Lesser Canada Goose (female), Taverner's Cackling Goose (male). Note their similarity in size. With these Colorado specimens (if the identification is correct), separation of the two species is based on bill size and shape, with Taverner's Cackling Goose having a shorter bill. *Photo taken by Larry Semo at DMNS, February 2006.*

The breast of Lesser is typically bright whitish as with Moffitt's, being usually lighter on the breast and flanks than Taverner's; some individuals, though, can approach the coloration of Taverner's. The coloration is characterized as varying between a light brown-gray and light plain gray, with some tannish tones. The underparts of most Lessers become increasingly darker from the upper breast through the belly. Some birds are relatively dark from the neck through the belly. The upperparts of Lesser are mostly brownish, with adult birds displaying crisp rows of pale feather edgings. Lesser can have white neck collars, full or partial, which can vary in thickness. The distinctiveness of neck collars can also be indicative of age, with juveniles showing much more reduced and blurrier borders between the black neck and whitish neck collar. Birds in relaxed postures can have their neck collars hidden. Individuals exhibit variability in a black chin stripe separating the white cheeks. When present, it may be full (but always narrow) or partial, but the presence or extent of a chin stripe is not indicative of Lesser. As with other Canada and Cackling goose subspecies, darker individuals within a population usually display a more complete chin stripe than do lighter-patterned birds.

Little description of voice of Lesser is available, but referenced material and observations by the senior author suggest that the typical call is similar to the loud 'honk' of Moffitt's, but slightly higher-pitched.

Interior Canada Goose

Interior Canada Goose is most likely rare in the state, though it is difficult to distinguish in Colorado; there are few specimen records identified to such (Fig. 9). In size it fits between and overlaps Lesser and Moffitt's/Giant, with average weights being 9 to 10 lbs (4080 to 4500g; Mowbray et al. 2002). In contrast to most Lesser and Moffitt's/Giant Canada geese, which usually have light gray breasts, most interior are somewhat darker-breasted, being medium grayish-brown or slaty gray-brown, although some birds are lighter-breasted. The mantle is also somewhat browner and darker in general, with the darker upperparts continuing uninterrupted to the black of the neck. The feather edges on the dorsum also average slightly darker. Interior Canada Geese seldom have white neck collars. Their voice seems indistinguishable from that of Moffitt's/Giant. Considering the extent of variation within races of Canada Goose, identification of Interior in the state should be dealt with very cautiously; it is doubtful that it can be identified in the field in Colorado with any confidence. As an example, if the identification of the DMNS specimens by Dr. Phillips is correct for Interior Canada Geese in Colorado, the authors found no visible separation between them and some Lesser and Moffitt's Canada Geese. In deference to Dr. Phillips, however, morphometrics and soft-part measurements vary considerably between fresh and aged specimens.

Cackling Goose

Three races of Cackling Geese have been identified from Colorado. Richardson's Cackling Goose is the regular migrant and uncommon wintering Cackling Goose across the eastern half of Colorado; it is much rarer in western Colorado (see Righter and Semo 2006 this issue). The "Cackling" Cackling Goose has occurred a few times and most likely will again. Also, specimens of small white-cheeked geese taken in Colorado have been identified by Dr. Allan Phillips as those of Taverner's Cackling Goose. We are unsure if the identification by Dr. Phillips is correct or what the potential for future occurrence of this race is in Colorado. Each of these subspecies is discussed below.

Richardson's Cackling Goose

Richardson's is a small, stocky goose, larger in size than a Mallard, averaging larger than the Cackling race of Cackling Goose, and generally smaller in all proportions than Lesser Canada Goose (Figs. 10 and 11). Mowbray et al. (2002) list weight ranges for Richardson's of 4.2 to 4.8 lbs (1900 to 2180g). The race is short-legged in length and in proportion to the body compared to all Canada Goose subspecies.

In most views, Richardson's appears quite square-headed in contrast to the appearance of most Canada Geese. The forehead is relatively steep, though not vertical, and the crown is flattened extending rearward to a pointed rear peak that angles steeply to the nape. The bill is triangular and smaller than those of Canada Goose, which have a gentle and longer-sloped aspect (less than 45 degrees) to the culmen (Krueger 2005). The bill is relatively narrow when viewed head-on, narrower than that of Taverner's Cackling Goose. Most do not possess a black chin stripe, though darker individuals are more likely to exhibit that feature. Richardson's has a short, thick neck, noticeably shorter than those of the larger Canada Goose subspecies such as Moffitt's, and not as thin-appearing as that of Lesser. In all ages, the border between the black neck and light upper breast is typically diffused.

Richardson's shows moderately dark upperparts with distinct, crisp, pale feather edgings. Some references suggest that the upperparts have a silvery cast, though that can be dependent upon lighting. This crisp, scalloped pattern can be evident on the breast and flanks of many birds as well. Generally, the underparts are a silvery white, very similar to that of some Lessers, though that taxon are generally darker-breasted. The voice of Richardson's Cackling Goose seems to be a high-pitched 'hrink', higher pitched and of lower duration than that of Canada Geese.

Cackling Cackling Goose

This, the smallest and most compact of the Cackling Goose races, was the original Cackling Goose named for its high-pitched, cackling calls (Figs. 12 and 13). Though the breeding and wintering ranges lie in the Pacific Northwest, a few have occurred in Colorado and areas farther east. When first confronting a Cackling Goose, one will note its very small size (2.4 to 3.9 lbs (1100 to 1750 g); Mowbray et al. 2002), which is smaller than Richardson's (appearing even smaller in flight), and its very dark breast and underparts.

The bill is very short (stubby) and triangular, even smaller than on most Richardson's, with its base, culmen, and lower edge of the lower mandible having approximate equal lengths. The culmen is sometimes very slightly concave, and is similar in shape to that of Ross's Goose (*Chen rossii*). The forehead is steep, but the remainder of the head is rounded to the nape area. The white cheek patch is triangular, large, and typically extends in a "hook" as with larger races of Cackling Goose and Canada Goose. Cackling Cackling Goose frequently has a full chin stripe dividing the white cheeks, although some possess only a partial stripe and some have none at all.

The neck is short and thick, with some birds sporting a distinct white neck collar, whereas it is nearly lacking on others. The breast and belly are very dark, darker than on Taverner's, with the upper breast characteristically being dark brown with deep rusty tones (many birds exhibiting a purplish sheen) blending into the black neck. Juvenile coloration is more variable than is that of adults, though they rarely show this latter trait. In contrast to those of other races, the breast of Cackling Cackling Goose is usually the darkest part of the underparts. The flanks are somewhat lighter than the remainder of the underparts and display latitudinal and relatively dark stripes throughout. The upperparts are uniformly brown. The mantle pattern is reminiscent of that of Emperor Goose (*Chen canagica*), with the individual feathers having dark, subterminal bands and being terminated by a white strip; juveniles may not show this trait. Though the body of minima is small and compact, the legs seem long. The call is a high-pitched "yip"-like cackle, quite unlike the deeper "honk" of all the Canada Goose subspecies. Cackling Cackling Geese generally appear long-winged and in flight the wings appear to be pushed forward, while Richardson's has long wings that usually are swept back and are more pointed than larger geese (Sibley 2004).

Observers should be cautious in simply labeling a very small, dark, white-cheeked goose as a Cackling Cackling Goose, as identification requires a combination of all traits. There are small, relatively dark Cackling Geese that

have been seen in Colorado that from a distance appear to be of this race, yet closer observation indicates possible introgression of characters from other races.

Taverner's Cackling Goose

Taverner's Cackling Goose is large for a Cackling Goose, and according to Mowbray et al. (2002) averaging between 4.8 and 6.3 lbs (2180 to 2870 g; Figs. 14 and 15). Most Taverner's are slightly longer-bodied and longer-legged than are Richardson's, though the two races exhibit clinal differences and some level of introgression may account for individual variation. Taverner's, though still small-billed, are distinctly thicker-billed than are either Richardson's or Cackling Cackling Geese. A somewhat consistent bill trait of Taverner's is that the lower and upper mandibles are usually swelled and convex, similar in shape to that of a Snow Goose (*Chen caerulescens*). Additionally, the length along the bottom of the lower mandible is about one-half or slightly less than the width of the side of the head (Krueger 2005). Compared to other Cackling Geese in Colorado, the forehead of Taverner's also differs slightly from that of Cackling and Richardson's, being on average more sloped than either. The crown shape is similar to that of Cackling Cackling Geese, but appears more rounded than Richardson's. What seems to be quite noticeable, is that Taverner's Cackling Geese seem small bodied, but are pin-headed and have quite long necks (Krueger 2005). Compared to most Richardson's Cackling Geese and Lesser Canada Geese, the breasts of most Taverner's Cackling Geese are a dark gray and often appear mottled, though rarely (seemingly), some Taverner's can have breast seemingly as bright as Richardson's Cackling Geese. The color of the breast on some individual Taverner's gradually darkens toward the belly and contrasts with a darker belly, which normally has more brownish tones than the breast. The breasts of Taverner's are usually dingier, and always more pale than Cackling Cackling Goose. The belly and flanks of Taverner's are generally the same color as the breast, though in many, the chest is actually the lightest portion of the underparts. The upperparts of Taverner's are moderately dark, consisting of brown mantle feathers lacking dark subterminal bands. Some birds have mantle feathers that show white terminal bands, but those bands are usually not as distinct as on either Cackling or Richardson's Cackling Geese. Though noted as being longer-legged than Richardson's, most Taverner's appear short-legged in proportion to body size (Krueger 2005). The call of Taverner's seems to be more of a "whoop" than the high pitched "hrink" of Richardson's.

At Issue: Taverner's Cackling Goose vs. Lesser Canada Goose

Taverner's Cackling Goose and Lesser Canada Goose are the two medium-sized white-cheeked goose races that can appear most similar despite being

different species (Fig. 16), although birders living within the normal range of both believe separation is possible (Steven G. Mlodinow, pers. comm). Though apparently rare in Colorado, birders should be aware of the potential of Taverner's Cackling Goose to occur. It differs slightly in size and color, with Taverner's being, on average, smaller and darker-breasted than Lesser Canada Goose. Taverner's Cackling Goose and Lesser Canada Goose are the most widespread and abundant breeding white-cheeked goose subspecies in Alaska, the former wintering primarily in Washington and Oregon. Considering the size, structure, and plumage variation within Lesser Canada Goose, identification of Taverner's Cackling Goose in Colorado is extremely difficult as overlap of plumage characters in these two forms is nearly complete. Special attention should be paid to any small group of closely-associated birds that all display Taverner's qualities, as they may, indeed, be Taverner's.

Compared to the oval-headed Lesser Canada Goose, the forehead of Taverner's Cackling Goose has a steeper angle with a rounded transition to crown, in contrast to the more gently sloped transition from culmen to forehead of Lesser. Almost all Taverner's have a thin, full or partial, black chin stripe separating the white cheek patches. When considering a goose that could be either a Taverner's Cackling Goose or a Lesser Canada Goose, a bird without a chin stripe is probably a Lesser, whereas a bird with a chin stripe may be either. Taverner's has a shorter, thicker neck than does Lesser, but beware of those Lessers in a relaxed posture that may give the appearance of being short-necked. A large proportion of Taverner's seem to show thin, white neck collars; again, this is variable, but when possessing a neck collar, it is never thick and complete.

Most Taverner's are generally darker on the breast and flanks than are Lessers, although some birds can be quite light, even more so than on many Lessers. The upper breast color is often (though not always) darker than that of Lesser – darker grayish with some brown tones, whereas Lesser is more tan; Taverner's is never as light-colored on the upper breast as are typical Lessers, though the breast saturation on some Taverner's can approach that with some Lesser Canada Geese.

Discussion

At this point, it is comprehensible that many birders may be confused about the potential to separate Canada and Cackling Geese in Colorado. Indeed, that was somewhat the authors' intention as it is a conundrum that birders do, and will, confront now and for the immediate future. But in the same manner, we did not want to imply that no white-cheeked geese in Colorado can be identified. It

is our hope that some disconcertion may be now alleviated with the knowledge that a certain faction of Cackling Geese in Colorado can be quite effortless to identify. Richardson's Cackling Geese are easily separable from Moffitt's Canada Geese, and can usually be identifiable when alone or within an intraspecific Richardson's flock. Birders will experience difficulty, however, with lone Richardson's Cackling Geese that appear large or when Richardson's are associated with Lesser Canada Geese. At issue is how to separate Lesser Canada Goose, a common migrant and winterer in the state, from Richardson's and the rarer Taverner's Cackling Goose. Richardson's and Taverner's are the heart of the problem and distinguishing them from Lesser can be difficult. Birders should remember that when looking for Richardson's in a flock of white-cheeked geese, scan the birds for a smaller goose with a squarish-looking head shape, smaller triangular bill, and lighter breast. Separation of Richardson's Cackling Goose from Lesser Canada Goose is generally not too difficult, as long as birders have sufficient views to discern bill size and shape, and the structure of each bird. Taverner's Cackling Geese will look similar in size to Lesser Canada Geese, but will have shorter, more convex bill shapes, and will appear long-necked and pin-headed.

Our discussion offers subtle differences that may be useful in separation of the two species and the races within each, but requires additional field and specimen testing. Some medium-sized geese in Colorado may not be identifiable. The difficulty for Colorado birders is that the genetic divisions of the various races (and subsequently species) of white-cheeked geese are based on breeding populations far distant to Colorado. With no knowledge of where a given goose hatched, we are resigned to use the best available criteria for use in separation. Birds at a distance may have to go unidentified and that is not a reflection of a birders skills, but rather what little we know and how similar Lesser Canada Geese and Richardson's and Taverner's Cackling Geese may be to each other. Although a percentage of white-cheeked geese are identifiable to subspecies and therefore to species, some unknown percentage cannot be confidently identified and should be termed "white-cheeked geese".

Generically lumping unidentified geese is warranted not only for those geese that express structure and plumage inconsistencies to either species due to a lack of current knowledge of the breadth of variation within each race or species, but especially for those variably introgressed hybrids, which only mtDNA sequencing can sort out. For many birders, especially on Christmas Bird Counts and other census or index surveys, there may be a sense of humility by reporting unidentified geese. The response should be quite the contrary, however, in that misidentifications are as significant an error as unidentified birds. Precedents have been set of generically lumping

unidentified species, such as dowitcher spp., *Plegadis* spp., jaeger spp., scaup spp. and others. Just because the "Canada Goose" was a simple identification yesteryear does not mean so today and if identification cannot be determined with certainty, one should label those birds as white-cheeked geese. Unless one is a student of *Branta canadensis* or *hutchinsii* subspecies identification, we encourage most birders to use the probability of occurrence when separating observations of Canada and Cackling Geese in Colorado, with two races of Canada Goose (Moffitt's and Lesser) and one race of Cackling Goose (Richardson's) occurring regularly in Colorado.

At benefit to Colorado birders is that white-cheeked geese are abundant and fond of anthropogenic areas, offering birders close and extensive views, whereby birders can pay attention to those subtleties of goose separation such as posture, size, shape, etc. Vagrant races of Canada and Cackling geese have, and will again, be found in Colorado and their identification is important to the avifaunal history of the state. When looking for vagrant white-cheeked geese, wayward birds have been found to segregate themselves within flocks of other geese (Steven G. Mlodinow, pers. comm.). If a stray white-cheeked goose is present, pay close attention to which other birds it associates with, as in many cases, vagrants will migrate as family groups. But remember that the distribution of both species is dynamic and not fully known. Today's knowledge regarding the distribution and identification of the two species and the various races may not be the same in the future and identification criteria useful in Colorado may not transcend to other areas as other regions may experience birds that are at disparate clinal extremes within Cackling and Canada geese and their respective races. Our birding predecessors held the separation between Long- and Short-billed dowitchers to simply be as the names implied, yet today we acknowledge that the length of a dowitcher's bill is by no means the solution. Such is the case with those white-cheeked geese, which until recently were uninspiring, but rather are quite fascinating, and we guarantee readers that more information regarding identification is forthcoming. We encourage birders to report and document races of rare white-cheeked geese races to the authors and to the Colorado Bird Records Committee. We also solicit birders to submit photographs of questionable white-cheeked geese to the authors for use in further research on the subject.

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The following references were used in support of the material presented in this discussion. We encourage readers to peruse these sources for additional information on identification of Cackling and Canada Geese.

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Additional suggested reading

Though not cited, additional references utilized in the course of this research that can provide birders with identification information are presented below.

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