

## **SPECIES ACCOUNT – BUFFLEHEAD (b-buff), COMMON GOLDENEYE (b-cogo), BARROW'S GOLDENEYE (b-bago)**

---

### **GeneralGeneral**

Bufflehead (*Bucephala albeola*; BUFF), Common Goldeneye (*Bucephala clangula*; COGO) and Barrow's Goldeneye (*Bucephala islandica*; BAGO) are duck species which nest in tree cavities. All three species are green-listed in the province. Males are strongly marked in black and white, while females are more cryptic. They inhabit the study area during the breeding season, and migrate west to winter on the sea coast. Insects and their larvae form the majority of the diets of all three species during the summer.

### **Critical Seasons Critical Seasons**

1 season, growing, defined as April (04) to September (09).

-during the dormant season all species winter along the coast.

### **Migration Migration**

**BAGO** and **BUFF** migrate to breeding habitats in interior in April where they congregate on larger ice-free lakes before pairs move to breeding lakes by May. The adult males leave the breeding females as soon as incubation is underway and congregate in all-male flocks from the end of May til mid-June (Campbell *et al.* 1987). **COGO** northward migration in BC starts in mid-March in the south and continues into May in the northern part of province. The fall migration through coastal areas of southern BC occurs in mid-November (Munro and McTaggart-Cowan 1947).

### **Densities Densities**

**BAGO** - for lakes <10 ha, 0.77 pairs/ha, for lakes >10 ha, 0.29 pairs/ha (central BC; Savard 1987). **COGO** - .08/km<sup>2</sup> in open boreal forest in BC (Bellrose 1980).

**BUFF** - up to 10 pairs/km<sup>2</sup> in some parts of BC (Erskine 1972).

### **Diets Diets**

- all three species feed primarily on animal matter in wetland areas. Preferred prey includes damselfly and dragonfly nymphs, caddis fly larvae, water boatmen and midge larvae (Bellrose 1978); crustaceans and mollusks (Eadie *et al.* 1995).

### **Nests Nests**

**COGO** usually nests in tree cavities excavated by Pileated Woodpeckers (PIWO); also uses crow nests, marmot burrows, at times ground cavities are also used (several authors cited in Savard 1987). **BUFF** is smaller in size and can use Northern Flicker (NOFL) cavities (Gauthier 1993). **BAGO** = ?? (most records from nestboxes). All species will return year after year to the same nest site.

### **Territoriality Territoriality**

**COGOs** defend fixed breeding territories and the degree of territoriality may depend on the breeding density. Brood territories are often, but not always, adjacent to the nest site. Early-nesting females establish territories nearest their nest site; late-nesting females may be excluded to more distant areas or different water bodies. Brood territory density in BC averaged 0.17 broods/km of shoreline (Eadie *et al.* 1995).

**BUFF** males defend a breeding territory which is fixed area of water near the shore with definite boundaries, from which conspecifics are excluded, averaging 0.56 ha on ponds (Gauthier 1993). Male territory defence weakens and dies as the female incubates. After hatching, females defend a brood territory averaging 0.52 ha, with territory size inversely related to density of food and brood (Gauthier 1993).

## **CALIBRATION AND STANDARDIZATION IN BC**

---

### **Provincial Distribution**

**BUFFs** are found along the provincial coast and are widely distributed throughout the interior, from sea level to at least 1900m. Large concentrations are found around southern Vancouver Island in winter and early spring (Campbell *et al.* 1987).

**BAGOs** are distributed all along coastal BC, and are widely distributed throughout the interior but concentrated in south-central portion of the province. **BAGO** records occur from sea level to 2400 m elevation (Campbell *et al.* 1987).

**COGOs** are widely distributed throughout the southern third of the province, becoming more sporadic through sub-boreal and boreal forest regions. The species occurs from 180-1550 m elevation (Campbell *et al.* 1987).

### **Best Habitats**

- aspen parklands in Chilcotin-Cariboo for **BAGO** (Savard 1987); best habitats for other species unknown

**BGC Units** -all zones

**Habitat Units**- OW, LA, RI and wetlands for feeding and cover; stands with moderate to large-diameter trees adjacent to aquatic habitats for breeding. Do not use non-vegetated terrestrial habitats, alpine or subalpine areas or young forest.

**Structural Stages** - 6-7 for nesting; no structural stages for aquatic habitat

### **Information Sources Information Sources**

- some general habitat relationships for the Southern Interior Ecoprovince (Ritcey *et al.* 1988)
- status report for **BAGO** (Savard 1987)
- AOU publications for **COGO** (Eadie *et al.* 1995) and **BUFF** (Gauthier 1993).

### **Information Gaps Information Gaps**

- **BAGO** -molting and staging habitat requirements unknown; most BC breeding records are from nest boxes, so little is known on natural cavity requirements
- **COGO** -few interior breeding records are supported by photos or field notes so knowledge of the precise breeding distribution of species is sketchy (Campbell *et al.* 1987); ecology from fledging to first breeding is virtually unknown (Eadie *et al.* 1995).

## **SEASONAL NEEDS AND KEY HABITAT REQUIREMENTS**

---

**Assumptions** all three species are limited by the availability of reproductive habitat; aquatic habitats provide feeding (FD) and thermal /security habitat (ST).

In the absence of other information, nest cavities used by **BAGO** are assumed to be similar to those used by **COGO**.

As the three species are to be modelled as a unit, it is assumed that differences between the species' habitat requirements are not significant.

It is assumed that recorded habitat preferences reflect habitat requirements, and that habitat preferences are reflected in changes in individual fitness.

### **Limiting Habitat Limiting Habitat**

- cavity-nesting duck population levels are related to the availability of nesting sites (Dow and Fredga 1983; Eadie *et al.* 1995; Gauthier 1993). For **BUFF**, competition for food with fishes may also be limiting (Gauthier 1993)

### **Dormant Habitat**

- all three species winter along sea coast inlets out of the study area.

## **Growing Habitat Attributes**

### **Nesting Habitat**

cavities: entrance 9 cm diameter, min. 25 cm deep, 19 cm wide, optimal density of potential nest sites is 12+/acre (Rodrick and Milner 1991); within 1 km of suitable rearing habitat; more open sites are susceptible to predation (Savard 1987).

#### **BUFF**

- uses Northern Flicker habitat (mixed forests) near small lakes, rivers or permanent ponds; does not use cavities with broken tops (Gauthier 1993)
- in interior BC, ponds used for nesting have only a small fringe of emergent vegetation or none at all (Gauthier 1993).
- nests in live or dead trees, aspen, lodgepole pine, cottonwood, and spruce, in order of popularity ; up to 14 m in height (Gauthier 1993)
- up to 200 m from water=s edge, and from 60 cm to 14 m above ground (Campbell *et al.* 1987).

#### **BAGO**

- prefers deciduous trees with PIWO cavities
- nests 3-440 m from water, natural nests 0-6 m from ground.

#### **COGO**

- breeds on wetlands, lakes and rivers bordered by forests mature enough to provide suitable cavities (Eadie *et al.* 1995).
- types of forest stands bordering aquatic habitats do not appear to be a factor in breeding site choice (Eadie *et al.* 1995).
- both coniferous and deciduous trees are used for nesting (Eadie *et al.* 1995).
- will use PIWO cavities, cavities formed by broken tree limbs, and hollow tops of standing trees (Eadie *et al.* 1995).
- records of nesting cavities up to 1.3 km from water; may be up to 13 m above ground (Eadie *et al.* 1995).
- oligotrophic lakes with surface area between 1.5 and 20 ha used extensively (Eadie *et al.* 1995).
- prefer lakes with clear water and good visibility and with relatively low or simple shoreline configurations lacking significant emergent or submerged vegetation (Eadie *et al.* 1995).
- availability of abundant invertebrate prey appears to influence choice of habitat (Eadie *et al.* 1995).
- often avoid habitats where competitor fish are present (Eadie *et al.* 1995).

### **Rearing Habitat**

- shallow wetlands with 50-75% cover and abundant downed logs or low islands; marshy edges with emergent vegetation provide cover for ducklings; **BAGO** prefer alkaline lakes to freshwater and seem to be limited to highly productive ponds (Savard 1984). **COGO** often moves broods from nesting lake to rearing lake, depending on lake size and productivity; nesting and rearing lakes may be up to 10 km apart (Eadie *et al.* 1995); prefers lakes, rivers, and to lesser extents, ponds, sloughs, creeks and marshes; often on oligotrophic lakes (Campbell *et al.* 1987); fishless lakes preferred to minimize competition for insects (Eadie *et al.* 1995).

### **Molting Habitat**

All species congregate on larger lakes to molt in mid-July-early September.

### **Feeding Habitat**

- ponds (OW), rivers (RI), wetlands and littoral and deep water zones of lakes (LA).

### **Confounding Factors**

**BAGO** -often intraspecific *parasitic egg-laying* by females (Savard 1987); *defends territories* against conspecifics AND other waterfowl species (Eadie *et al.* 1995; Savard 1987); *female aggression* limits brood density on lakes (Savard 1986) and may result in brood amalgamation (Eadie *et al.* 1995); *high population density* results in interference at nest sites, leading to nest desertion (Savard 1987); duckling survival is greatly reduced when hatching coincides with *cold and rainy weather* (Savard 1986). **BAGO** *exclude BUFF* from territories (Savard 1987); female *Goldeneyes very difficult to i.d.* in breeding season (Campbell *et al.* 1987; Cannings *et al.* 1987); *nestbox provision* can greatly affect breeding habitat suitability; **COGO** *infanticide* has been observed, directed against both

conspecific broods and those of other duck species (Eadie *et al.* 1995); Starlings may displace **BUFF** from nests (Gauthier 1993).

## **SUMMARY OF KEY SEASONAL HABITAT ATTRIBUTES (TABLE D1)**

Nesting habitat (RP) is mature to old riparian forest with a deciduous component within 500 m of lakes, ponds or rivers, with smaller ponds more valuable than larger lakes; rearing, feeding and molting habitat is ponds, lakes, wetlands and slow perennial streams; preferably fishless; larger lakes are favoured for molting and for loafing pre and post breeding.

**Table D1. Summary of growing season habitat requirements for cavity-nesting ducks in the study area.**

Habitat Use	Specific Attributes Required	Structural Stage
Nesting (RP)	average dbh>20 cm mixed stand presence of aspen, lodgepole pine or cottonwood within 500 m of suitable aquatic habitats	6-7
Thermal/Security (ST) (includes molting habitat)	aquatic habitats	-
Feeding (FD)	oligotrophic aquatic habitats for COGO productive small lakes for BAGO no fish present	-

## **ECOSYSTEM UNIT VALUES AND ASSUMPTIONS**

- ratings are provided only for the growing season as the birds are not in the study area during the dormant season.
- there are no water bodies within the small amount of ESSF in the study area, so this portion of the study area is rated nil for all uses.
- it is assumed that the regional field guide (Banner *et al.* 1993) accurately predicts attributes of ecosystem units.

### **Nesting Habitat (RP)**

**Best units:** Structural Stages 6-7 of: SBSmc2 05 (cottonwood and aspen present), 07 ( aspen present), 09 (cottonwood present), 10 (cottonwood present).

**Moderate units:** Structural Stages 6-7 of: SBSmc2 01(large trees), 06 (moderate tree growth)

**Poor to nil units:** SBSmc2 12, 03, 02, 31, 51, CA, WT due to poor tree growth; younger seral stages of other units.

### **Feeding (FD), Security and Thermal Habitat (ST)**

**Best Units:** Lakes (LA), ponds (OW), river (RI), Carex Fen (CF).

**Moderate Units:** SBSmc 31 (CF), 12 (SS), 07 (BF) and WT (wetlands) due to the presence of standing water.

**Poor to nil units:** all other terrestrial units.

**Table D2. Preliminary best ecosystem units of the SBSmc2 for cavity-nesting ducks in the Morrison study area.**

Habitat Use	Ecosystem Unit	Symbol/Code
Nesting (RP)	Twinberry-Colts foot	TC/05
	Scrub birch-Feather moss	BF/07
	Spruce-Devil's Club	SD/09
	Spruce-Horsetail	SH/10

Habitat Use	Ecosystem Unit	Symbol/Code
Thermal/Security (ST)	Lake	LA
	Shallow open water	OW
	River	RI
	Carex Fen	CF
Feeding (FD)	Lake	LA
	Shallow open water	OW
	River	RI
	Carex Fen	CF

## DRAFT ECOSYSTEM RATINGS

### Rating Scheme

- 6 class - 1= very high quality, 2 = high quality, 3= moderate, 4=moderate to low, 5=low, 6=nil.

### Preliminary Ecosystem Ratings for Cavity-nesting Duck Habitat in the Growing Season (Appendix 1).

- rate for **RP** (reproduction) for nesting habitat, **ST** (security - thermal) for loafing/molting/cover habitat, **FD** (feeding) for feeding habitat.

**Map Adjustments** waterbodies < 0.5 ha in area should be rated 5 FD;5ST;6RP.

- Nesting habitat (RP) polygons must contain water >.5ha OR be adjacent to a polygon containing water>.5ha, or else they should be rated 6 for RP.

### Field Sampling Scheme

Habitat attributes important to cavity-nesting ducks may be recorded according to Table D3.

**Table D3. Field sampling scheme for cavity-nesting duck habitat in the Morrison study area.**

Attribute	Sample method
deciduous present	vegetation plot
average tree dbh	wildlife tree form
presence of snags	wildlife tree form
presence of suitable water in polygon	*record water surface area, depth and description of aquatic vegetation and debris

\*non-standard data to be recorded in addition to regular plot data.

**Appendix D1. Preliminary habitat capability ratings for cavity-nesting ducks in the Morrison study area.**

structural stage	site unit						
	01 SB	02 PH	03 BM	05 TC	06 SO	07 BF	09 SD
0	6	6	6	6	6	6RP;5FD;5SH	6
1	6	6	6	6	6	6RP;5FD;5SH	6
2	6	6	6	6	6	6RP;5FD;5SH	6
3	6	6	6	6	6	6RP;5FD;5SH	6
4	6	6	6	6	6	6RP;5FD;5SH	6
5	5RP;6FD;6SH	5RP;6FD;6SH	5RP;6FD;6SH	4RP;6FD;6SH	5RP;6FD;6SH	6RP;5FD;5SH	5RP;6FD;6SH
6	4RP;6FD;6SH	5RP;6FD;6SH	4RP;6FD;6SH	4RP;6FD;6SH	4RP;6FD;6SH	5RP;5FD;5SH	4RP;6FD;6SH
7	4RP;6FD;6SH	5RP;6FD;6SH	4RP;6FD;6SH	3RP;6FD;6SH	4RP;6FD;6SH	5RP;5FD;5SH	4RP;6FD;6SH

structural stage	site unit							
	10 SH	12 SS	51 AV	31 CF	WT	LA	OW	RI
0	6RP;5FD;5SH	4FD;4SH;6RP	6	32FD;3SH;6RP	32FD;3SH;6RP	2FD;2SH;6RP	2FD;2SH;6RP	4FD;3SH;6RP
1	6RP;5FD;5SH	4FD;4SH;6RP	6	3FD;3SH;6RP	32FD;3SH;6RP			
2	6RP;5FD;5SH	4FD;4SH;6RP	6	3FD;3SH;6RP	32FD;3SH;6RP			
3	6RP;5FD;5SH	4FD;4SH;6RP	6	3FD;3SH;6RP	32FD;3SH;6RP			
4	6RP;5FD;5SH	4FD;4SH;6RP						
5	5RP;5FD;5SH	4FD;4SH;6RP						
6	4RP;5FD;5SH	4FD;4SH;6RP						
7	3RP;5FD;5SH	4FD;4SH;6RP						

## REFERENCES

- Bellrose, F. C. 1980. Ducks, geese and swans of North America. Rev. ed. Stackpole Books, Harrisburg, PA ( as cited in Eadie *et al.* 1995).
- Campbell, R.W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, and M. C. McNall. 1989a. The Birds of British Columbia. Volume 1. Nonpasserines. Royal BC Museum and Environment Canada, Canadian Wildlife Service.
- Cannings, R. A., R. J. Cannings and S. G. Cannings. 1987. Birds of the Okanagan Valley, British Columbia. Royal British Columbia Museum, Victoria, BC.
- Dow, H., and S. Fredga. 1984. Factors affecting reproductive output of the Goldeneye duck. *J. Animal Ecology* 53 (3): 679-692.
- Eadie, J. M., M. Mallory and H. G. Lumsden. 1995. Common Goldeneye. *In* The Birds of North America, No. 170. (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, and The American Ornithologists= Union, Washington, DC.
- Erskine, A. J. 1972. Buffleheads. *Can. Wildl. Serv. Monogr. Ser. No. 4.* (As cited in Gauthier 1993).
- Gauthier, G. 1993. Bufflehead. *In* The Birds of North America No. 67. (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, and The American Ornithologists= Union, Washington, DC.
- Munro, J. A., and I. McTaggart-Cowan 1947. A review of the bird fauna. *Spec. Publ. No. 2., Prov. Mus. Of British Columbia, Victoria* (as cited in Eadie *et al.* 1995).
- Ritcey, R., D. Low, R. Howie and A. Harcombe. 1988. Wildlife Habitat Handbooks for the Southern Interior Ecoprovince. Volume 6: Species-habitat relationship models for birds. Wildlife Habitat Research WHR-33, Wildlife Report No. R-20. BC Ministry of Environment, BC Ministry of Forests, Wildlife Habitat Canada.
- Rodrick, E. and R. Milner (eds.). 1991. >Cavity-nesting Ducks=. Management Recommendations for Washington=s Priority Species. Washington Department of Wildlife Management, Fish Management and Habitat Management Divisions.
- Savard, J. P. 1987. Status report on Barrows Goldeneye. Environment Canada, Canadian Wildlife Service Technical Report Series No. 23.