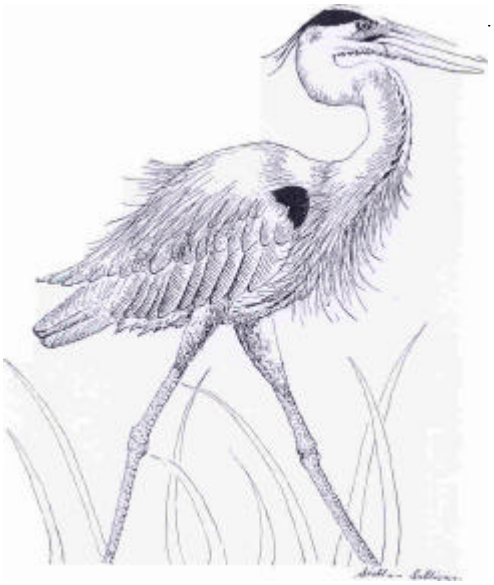

Great Blue Heron

Ardea herodias

Last updated: 1999

Written by Timothy Quinn and Ruth Milner

GENERAL RANGE AND WASHINGTON DISTRIBUTION

Great blue herons are found throughout most of North America south of 55 north latitude and into much of Central and South America. Breeding pairs on the Pacific coast occur only to about 52 north latitude. Distribution of great blue herons within Washington is state-wide (see Figure 1).

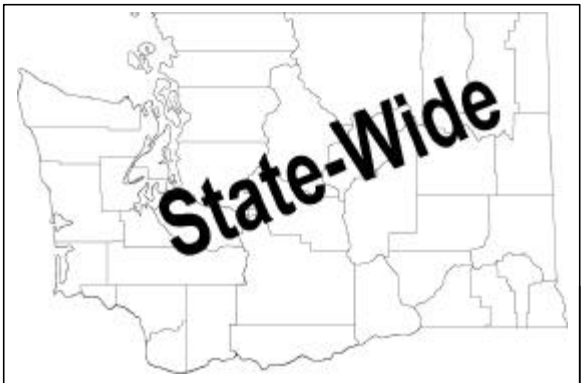

Figure 1. The great blue heron, *Ardea herodias*, occurs throughout Washington. Map derived from the literature.

RATIONALE

Great blue herons can be vulnerable because of their tendency to aggregate during the breeding season. The availability of suitable great blue heron breeding habitat is declining as human population increases in Washington State. In addition, great blue herons may abandon breeding colonies or experience reduced reproductive success when disturbed by humans.

HABITAT REQUIREMENTS

Great blue herons occur near most types of fresh and saltwater wetlands including seashores, rivers, swamps, marshes, and ditches. They are found throughout Washington but are most common in the lowlands.

Nesting

Great blue herons are colonial breeders that nest in a variety of deciduous and evergreen tree species. Nests are usually constructed in the tallest trees available, presumably to reduce the risk of predation by mammals (Butler 1992, Carlson 1995), but may also be located in bushes and in artificial structures (Bruce 1986, Blus et al. 1980) when trees are absent (Henny and Kurtz 1978). In King and Kitsap counties, great blue herons nested at heights

ranging from 9-26 m (30-85 ft) in the tallest trees available (Jensen and Boersma 1993). A British Columbia study found that most great blue heron nests occurring in trees were located >14 m (46 ft) in height. No nests were found under 10 m (33 ft) (Mark 1976). Great blue herons in western Oregon nested at heights ranging from 7-25 m (23-82 ft) (Werschkul et al. 1976).

Feeding

Great blue herons feed on a wide variety of aquatic and marine animals found in shallow waters. Great blue herons also feed on mice and voles (Calambokidis et al. 1985, Butler 1995), which were an important food for nestlings in Idaho (Collazo 1981) and may be an important food for British Columbia great blue herons during winter (Butler 1995).

At large spatial scales (e.g., great blue heron home range), the location of great blue heron colonies is probably best explained by the distribution of foraging habitat (Gibbs 1991, Jensen unpublished data, see human disturbance below for smaller scale considerations). Although great blue herons may forage up to 29 km (18 mi) from a colony, most forage within 2-5 km (1-3 mi) of the colony (Short and Cooper 1985, Butler 1995). The number of nests per colony in British Columbia (Butler 1991), Oregon (Werschkul et al. 1977, Bayer and McMahon 1981), Maine (Gibbs 1991), and Washington (Jensen unpublished data) were positively correlated with the amount of nearby foraging habitat, and in Maine were negatively correlated with the costs of foraging at greater distances (km flown/ha of wetland visited).

Feeding territory size and location may vary from year to year (Hoover and Wills 1987). The availability of alternative foraging and nesting habitat within close proximity of known foraging sites is probably critical to great blue heron reproductive success. Butler (1995) suggested that food availability strongly affects great blue heron survival, the spacing of their colonies, and their use of habitat. Moreover, great blue heron food supply may be limiting, particulary in areas where foraging areas freeze during winter (Butler 1992).

Colonies usually exist at the same location for many years, and productivity (number of fledglings/nesting herons) may be positively related to the number of years colonies have been in use (Butler 1995). Great blue herons may relocate their colonies in response to increased predation on eggs and young by mammals and birds such as eagles (Jensen unpublished data), declines in food availability (Simpson et al. 1987), or human disturbance. Jensen (unpublished data) suggested that 2 of the 5 King County colonies monitored in 1991 were abandoned in late spring due to bald eagle predation, but Butler (1995) found that there was no relationship between the location of great blue heron colonies and the location of areas with high densities of nesting eagles. Thus, abandonment of colonial nesting areas due to predation pressure from eagles may be regionally specific. Great blue heron colonies built in spruce or Douglas-fir trees may damage host trees over time, which may also influence colony relocation (Julin 1986).

LIMITING FACTORS

The availability of nesting habitat in close proximity to suitable foraging habitat limits great blue herons. The availability of alternative foraging sites could be critical to nesting success.

Great blue herons are generally sensitive to human disturbance and are frequently the target of vandalism (Parker 1980, English 1978). The type and extent of human disturbance can affect great blue heron colony site selection (Gibbs et al. 1987, Watts and Bradshaw 1994). In Virginia, great blue herons chose colony sites further from roads and human structures than would be expected by chance; a pattern that was apparent up to 400-800 m (1312-2625 ft) from colonies (Watts and Bradshaw 1994). Great blue heron colonies have been abandoned in response to housing and industrial development, highway construction, logging, vehicle traffic, and repeated human intrusions (Leonard 1985, Parker 1980, Kelsall and Simpson 1979, Werschkul et al. 1976). In King and Kitsap counties, Jensen (unpublished data) found that great blue heron colony size decreased as distance to the nearest human disturbance within 300 m (984 ft) decreased, and as the amount of human development within 300 m (984 ft) of the colony increased. Nests occupied first in each of 3 King County colonies in 1991 were furthest from development and had more than twice as many fledgling than nests closer to development (3.13 versus 1.51 young/nest) (Jensen unpublished data).

Other studies suggested that great blue herons may habituate to non-threatening repeated activities (Webb and Forbes 1982, Vos et al. 1985, Calambokidis et al. 1985, Shipe and Scott 1981). Thus, different great blue herons may have different tolerance levels to disturbance depending on disturbance history and type (Simpson 1984). Although the effects of visual and auditory buffers have not been well studied, topographic or vegetation obstructions may ameliorate some types of disturbance (Webb and Forbes 1982).

MANAGEMENT RECOMMENDATIONS

We suggest that the most effective way to conserve great blue herons in Washington is through comprehensive land-use planning that considers the needs of all species. In the absence of comprehensive land-use plans, we recommend the protection of existing great blue heron colonies using colony site-specific management plans. Colony site-specific management plans are based on general recommendations from current research, knowledge of the colony, surrounding land uses, and landowner goals. The Washington Department of Fish and Wildlife can assist in development of these management plans. All plans designed to conserve great blue heron colonies should consider the following factors, among others:

The colony's size, location, relative isolation, and the degree of habituation to disturbance (Henny and Kurtz 1978, Bowman and Siderius 1984). Colonies located in close proximity to existing human activities may tolerate more disturbance than colonies located in undisturbed areas (Simpson 1984, Webb and Forbes 1982, Bowman and Siderius 1984). While it is currently unclear how colony size affects reproductive success (Butler 1995), larger colonies may be more stable and are probably indicative of more or better foraging habitat and higher productivity (number of fledglings/nesting herons) than smaller colonies. Should priorities need to be set, larger colonies should receive more protection than smaller colonies.

Great blue herons are less tolerant of disturbance during the pre-nesting and courtship periods, becoming progressively less likely to temporarily leave or abandon nests after laying eggs (Kelsall 1989, Bowman and Siderius 1984, Rodgers and Smith 1995). To protect colonies from human disturbance, most studies reviewed by Butler (1992) recommended a minimum 300 m (984 ft) buffer zone from the periphery of colonies in which no human activity occurs during the courtship and nesting season (15 February to 31 July). Many authors of these studies, however, make recommendations in the absence of data showing the effects of human disturbance on nesting great blue herons. Moreover, colonies in Washington have been established or continue to persist within 300 m (984 ft) of human disturbance. Following experimental work on the disturbance of nesting great blue herons in Ontario, Canada, Vos et al. (1985) recommended that a 250 m (820 ft) buffer zone (their greatest flushing distance) plus 50 m (164 ft) for a total of 300 m (984 ft) would be suitable to minimize disturbance to nesting great blue herons. In a similar study on flushing distance in Florida, Rogers and Smith (1995) recommended a distance of 100 m (328 ft) to avoid disturbance to nesting great blue herons from motorboats and humans on foot.

In the absence of comprehensive land-use and/or colony site management plans, we recommend the establishment of permanent, year-round minimum protection areas (buffers) of 250-300 m (820-984 ft) from the peripheries of colonies (Bowman and Siderius 1984, Quebec 1986 *in* Kelsall 1989, Vos et al. 1985, Buckley and Buckley 1976, Pullin 1988, Short and Cooper 1985, Parker 1980). All human activities likely to cause colony abandonment should be restricted in this buffer year-round. All human activities likely to cause disturbance (flushing and other behaviors that may reduce fitness) to nesting great blue herons should be restricted in this buffer area from the beginning of courtship behavior through fledging (15 February to 31 July) unless site specific nesting chronology is known (J. Kelsall, personal communication) in which case timing of restrictions should reflect this knowledge. In addition, we concur with Butler's (1991) recommendation that activities such as logging or construction should not occur within 1,000 m (3,281 ft) of a colony and no aircraft should fly within a vertical distance of 650 m (2,133 ft) during the nesting season unless those activities can be shown to have no effect on great blue heron fitness.

Since the proximity of nesting habitat to foraging habitat is important to great blue heron fitness (Butler 1995), the loss or degradation of nesting habitat may be a problem if alternative great blue heron nesting habitat becomes limited. We recommend that several alternative forested stands at least 4 ha (10 ac) in size with dominant trees at least 17 m (56 ft) in height be left in the vicinity of existing great blue heron breeding colonies (Parker 1980, Jensen

and Boersma 1993). Large colonies (>50 nests) would likely require more alternative nesting habitat. J. Kelsall (personal communication) suggested leaving large nesting trees in the center of an area having 300 m (984 ft) or more of isolation during the breeding season.

Important foraging areas within a minimum radius of 4 km (2.5 mi) of colonies should be protected from development (Hoover and Willis 1987). In addition, each foraging area, particulary those that are intensively used, should have a surrounding buffer zone of at least 100 m (328 ft) (Short and Cooper 1985). Human activities that reduce the value of foraging sites should be minimized in these buffer zones. Buffer zones may be critical for foraging areas that are surrounded by intense human development (Short and Cooper 1985, Hoover and Wills 1987).

Organochlorine, organophosphate, and carbamate insecticides can be highly toxic to birds, mammals, and fish, and their use should be avoided near great blue heron colonies and upland/wetland foraging habitat (McEwen et al. 1972, Grue et al. 1983, Grue et al. 1986, Smith 1987). Synthetic pyrethroids (e.g., permethrin) are low in their toxicity to birds and mammals and may be used as alternatives. However, they are highly toxic to fish and should be kept out of water systems (Grue et al. 1986, Smith and Stratton 1986). The use of any insecticide (Smith 1987) or herbicide (Santillo et al. 1989) should be avoided in great blue heron nesting or foraging habitat unless it has been shown to have no effect on great blue heron fitness. Appendix A provides useful contacts to help assess the use of pesticides, herbicides, and their alternatives.

Buffer zones around great blue heron colonies (300 m [984 ft]) and foraging areas within 4 km (2.5 mi) of colonies (100 m [328 ft]) should be free of pesticides (Brown 1978, Smith 1987). Suggested buffer widths for insecticide spray application near foraging areas range from 31-500 m (102-1,640 ft) (Kingsbury 1975, Payne et al. 1988, Terrell and Bytnar-Perfetti 1989), but in general buffer widths should increase as the toxicity of the treatment compound increases. Determination of buffer widths should account for pesticide droplet size and volume and meteorological conditions (Kingsbury 1975, Brown 1978, Payne et al. 1988).

Efforts to increase awareness of great blue heron nesting colonies should concentrate on inventories, information exchange, and education. Used and abandoned colony sites should be inventoried regularly and mapped by local and state agencies. Reproductive success should be monitored, particularly if it is likely to be affected by bald eagles and/or human disturbance.

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PERSONAL COMMUNICATIONS

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KEY POINTS

Habitat Requirements

- Great blue herons are colonial breeders that nest in tall (>7 m [23 ft]) deciduous or evergreen trees near fresh and saltwater wetlands.
- Great blue herons typically nest at heights ranging from 9-26 m (29-85 ft).
- Great blue herons feed on aquatic and marine animals found in shallow water, and sometimes on mice and voles from upland habitats. They usually forage within 2-5 km (1-3 mi) of their breeding colony site.
- Alternative nesting and feeding habitat is probably critical to great blue heron reproductive success.
- Great blue herons that have experienced few disturbances may not tolerate human activities near their colonies. However, great blue herons that have been frequently or consistently exposed to disturbance may be more tolerant of human disturbances.

Management Recommendations

- Wherever possible, a habitat protection buffer at least 300 m (984 ft) wide should be established around the periphery of a colony. All human activities likely to cause colony abandonment should be restricted in this buffer year-round, and all human activities likely to cause disturbance to nesting great blue herons should be restricted in this buffer area from 15 February to 31 July.
- Site specific management plans should be developed for each great blue heron colony whenever activities that might affect that colony are proposed. Such plans should consider the following:

    - The colony's size, location, relative isolation, and degree of habituation to disturbance;
    - Topographic or vegetative features surrounding the colony that might ameliorate the effect of human disturbance;
    - The availability of foraging areas and their proximity to the colony site;
    - Proximity of forest lands that could be used as alternative colony sites;
    - Land-use patterns and potential for long-term availability of nesting and foraging habitat.

- Stands of large trees at least 17 m (56 ft) high and at least 4 ha (10 ac) in size that can be buffered from disturbance should be left in the vicinity of great blue heron breeding colonies as alternative nesting habitat.
- Foraging areas, especially wetlands, within a minimum radius of 4 km (2.5 mi) of colonies should be protected from development and should have a surrounding disturbance free buffer zone of at least 100 m (328 ft).
- Attempts should be made to keep all pesticides out of great blue heron foraging and nesting habitat, and associated buffer zones. Refer to Appendix A for contacts useful when assessing pesticides, herbicides, and their alternatives.
- Activities such as logging or construction should not occur within 1,000 m (3,281 ft) of a colony, and no aircraft should fly within a vertical distance of 650 m (2,133 ft) during the nesting season.
- Alternative forested stands at least 4 ha (10 ac) in size with dominant trees at least 17 m (56 ft) in height should be left in the vicinity of existing great blue heron breeding colonies.