COLUMBIA BASIN FISH & WILDLIFE COMPENSATION PROGRAM

Breeding Inventory and Habitat Assessment of Great Blue Herons in the Columbia River Basin

PREPARED BY

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FOR

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and

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BREEDING INVENTORY AND HABITAT ASSESSMENT

OF GREAT BLUE HERONS IN THE COLUMBIA RIVER BASIN

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THE WEST KOOTENAY NATURALISTS

Executive Summary

In April of 2002, Pandion Ecological Research Ltd. and the West Kootenay Naturalists initiated a Great Blue Heron breeding inventory and habitat assessment project in the Columbia Basin. This project was funded by the Columbia Basin Fish & Wildlife Compensation Program and was intended to provide information to update heron breeding population estimates and distribution information and assist resource management agencies with habitat protection and enhancement decisions. Project objectives included the following: (1) establish a public awareness campaign and heron "sighting network"; (2) survey active, historical and good potential heron breeding sites; (3) co-ordinate volunteers to assist with field surveys; (4) conduct habitat assessments at active breeding sites; (5) produce a report with general and site-specific recommendations; (6) liaison with relevant agencies; and (7) extend the results of this initiative to Basin residents.

A total of 352 sightings from 185 different contributors across the Columbia Basin were received from April to November of 2002. This high level of public response assisted in identifying the locations of heron breeding sites and prioritizing areas for field surveys. A total of 488 hours (61 person-days) were spent by biologists conducting ground-based and aerial field surveys. These hours were supplemented by an additional 240 volunteer person-hours (30 person-days) contributed by the West Kootenay Naturalists and affiliated volunteers.

Thirty breeding sites (17 active and 13 historical) were found during this inventory and all but one of these sites were detected during ground-based surveys. Of the 17 active breeding sites, eight were located in the West Kootenay, eight in the East Kootenay and one in the Robson Valley. Active nest colonies had from 1–21 nest trees (mean ± SE = 6.8 ± 1.3) with 1–66 (15.2 ± 4.8) active nests. A total of 259 active heron nests were tallied (92 in the West Kootenay, 165 in the East Kootenay and two in the Robson Valley), and 85% of these were within six colonies. Colonies tended to be somewhat larger in the East Kootenay, with more trees and greater numbers of active nests. Reproductive success averaged 2.32 ± 0.10 young per successful nest, based on a sub-sample of 57 visible nests. At least four active sites failed to produce young and three of these four sites were in the West Kootenay. Reasons for the nest failures could not be determined conclusively, however three of the four sites were subject to disturbance within 500 m of the nests during the breeding season. A comparison of 2002 results with data from a 1982 heron breeding survey indicates that numbers of active nests have changed little (266 in 1982 to 259in 2002), while average colony size has decreased substantially (from 35.0 ± 7.9 total nests in 1982 to 19.2 ± 5.6 in 2002), and numbers of active sites have increased (9 in 1982 to 17 in 2002). Conclusions regarding long-term heron population trends based on this comparison are limited, due to differing methods and geographic scope of the surveys.

Breeding sites were located an average of 222 ± 67 m (4–1,300 m) from a water body and closest water bodies included large to small rivers (30%), small lakes and wetland complexes (23%), reservoirs (13%), large creeks (7%) and large lakes (3%). Nest stands were characterized as cottonwood deciduous (47%), coniferous (47%), and mixed (6%). Breeding sites were in mature (73%), young (20%), and old forest (7%) structural stages and tended to have high crown closure (69 ± 4.5%). Black cottonwood (*Populus balsamifera*) comprised 54% of all nest trees, and all other nest trees were conifers (six species total). Nest trees tended to be live trees of large diameter and height, relative to trees available in surrounding stands. Almost half (47%) of the active heron breeding sites were located on private land, with the remainder in provincial wildlife management areas (29%), on crown land (18%), or in parks (6%). Other observations pertaining to heron populations and disturbance factors are discussed, and both general and site-specific recommendations for heron habitat protection and monitoring are provided.

Table of Contents

List of Tables

List of Figures

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1.0 Introduction and Background

The Great Blue Heron (*Ardea herodias*) is a large and distinctive wading bird found throughout North America (Butler 1997). Two subspecies occur in British Columbia: *A.h. fannini* is found in coastal areas and *A.h. herodias* inhabits the interior. Both subspecies are provincially blue-listed because of their vulnerability to habitat loss and disturbance associated with development in prime breeding and wintering habitats (Gebauer and Moul 2001). In the interior, herons nest along the margins of lakes, slow-moving rivers, wetlands and sloughs in small to large breeding colonies (Campbell et al. 1990; Butler 1992), and occasionally as single pairs (Machmer 1996; Butler 1997). They typically breed and roost in mature black cottonwood (*Populus balsamifera*) or coniferous stands along lakeshores, on lake islands, in wooded swamps, or other isolated locations near shallow water foraging habitat (Vermeer 1969; Forbes et al. 1985; Butler 1992). Interior herons eat primarily fish (Forbes 1987a; Machmer 2002), but other prey (e.g., amphibians, reptiles, invertebrates, small mammals and birds) likely also form part of their diet (Butler 1992). As cool weather and freezing conditions approach, some herons from the interior migrate south, while others remain around ice-free watercourses with adequate food supply (Campbell et al. 1990).

Valley bottom riparian and wetland areas in the Columbia Basin represent important breeding and wintering areas for interior herons (Gebauer and Moul 2001; Machmer 2001; 2002). Forbes et al. (1983; 1985) compiled information on 19 breeding colonies known in the Columbia Basin prior to 1983. Some of these sites were altered by the construction of power dams and other land developments (Thurber Consultants Ltd. 1980; S. Forbes, B. Herbison, pers. comm.) and many previously active heron colonies are no longer occupied. Furthermore herons, when disturbed, frequently abandon breeding sites and a systematic effort is required to locate new nesting colonies (Gebauer and Moul 2001). Systematic monitoring has not been conducted in the Basin since the work by Forbes and others in the early 1980s. Such monitoring is essential to estimate population trends and to identify critical breeding and/or wintering sites for habitat protection, management, restoration and enhancement purposes.

Herons are sensitive to disturbance, particularly during the early stages of nest selection, nest building, pair formation and egg laying (Quinney 1983; Butler 1992; Vos et al. 1985; Vennesland 2000). Although some colonies habituate to non-threatening disturbances (Anderson 1978; Webb and Forbes 1982; Vos et al. 1985; Gebauer 1995a), colony abandonment resulting from nearby human activity has been documented (Werschkul et al. 1976; Kelsall and Simpson 1979; Forbes et al. 1985b; Mueller and Glass 1988; Summers 1996). A first breeding attempt involving five incubating pairs at Waldie Island near Castlegar, B.C. failed in June of 2001 due to persistent human disturbance on the island during the early incubation period (Ed Beynon, pers. comm.). Systematic identification of active heron breeding sites throughout the Columbia Basin, coupled with a public awareness campaign to reduce disturbances will promote local stewardship, habitat protection, enhancement, and restoration efforts aimed at this blue-listed species. Furthermore, monitoring of active nests and nesting success for this top-of-the-food-chain predator will provide a benchmark against which to measure the effects of future environmental perturbations in the Basin (e.g., Elliott et al. 1988 and 1989).

In April of 2002, Pandion Ecological Research Ltd. in collaboration with the West Kootenay Naturalists (WKNs) initiated a Great Blue Heron breeding inventory in the Canadian portion of the Columbia Basin. This inventory was funded by the Columbia Basin Fish & Wildlife Compensation Program (CBFWCP). It was intended to provide vital background information to update heron breeding population estimates and distribution information for the Columbia Basin and assist resource management agencies with habitat protection and enhancement decisions regarding this listed species.

1.1 Objectives

The specific objectives of this project were to:

1. Establish a public awareness campaign and Great Blue Heron "sighting network" in the Columbia Basin;
2. Conduct an inventory of active, historical, and good potential heron breeding sites in the Columbia Basin;
3. Co-ordinate selected volunteers to assist with compilation of breeding sightings and participation in field surveys;
4. Conduct assessments of active sites to describe their habitat and site characteristics, current land uses, and status;
5. Produce a report that summarizes all project components and includes general and site-specific recommendations for habitat protection and enhancement;
6. Liaison with relevant agencies and update them on local inventory data, and monitoring and management efforts; and
7. Extend the results of this initiative to Basin residents to promote awareness, stewardship and conservation efforts directed at this species, its habitat, as well as specific sites of importance.

Project activities completed to date (objectives 1-5) are described in this report. It should be noted that heron sightings are still being submitted and compiled. Extension and liaison activities are ongoing and will be completed by the end of March 2003.

1.2 Survey Area

The survey area for this inventory encompassed most of the Columbia Basin, as defined by the program mandate of the Columbia Basin Fish & Wildlife Compensation Program . This area includes the East and West Kootenays and the Robson Valley (roughly bordered by the Fraser River at McBride in the north, Upper/Lower Arrow Lakes to the west, and the Elk River to the east) but excludes the Okanagan, Similkameen and Flathead drainages.

The project time frame and budget did not permit systematic aerial and ground-based surveys of the entire study area during the breeding period (April to early July). Areas were therefore prioritized for field inventory based on (1) the nature and frequency of reported heron sightings, (2) the quantity and quality of nearby heron breeding sites (as determined from recent cottonwood and other available mapping from CBFWCP), and (3) ease of access. Locally-based volunteers were solicited to assist with heron monitoring in areas that project biologists could not survey.

2.0 Methods

1. Beginning in April of 2002, a public awareness campaign and "report-a-heron-network" targeting residents of the Columbia Basin was jointly established by Pandion Ltd. and the West Kootenay Naturalists (WKNs). This campaign involved the following components:

    a. Colour-laminated posters with heron information requests (Appendix 1) were displayed at 150 public libraries, post offices, and on community information boards throughout the Columbia Basin.
    b. Posters were also included in information packages mailed to 65 outdoor groups operating within the Basin (Appendix 2). The information package also contained a WKNs letter

(Appendix 3) informing them of the heron inventory initiative and requesting their cooperation.

c. Marlene Machmer (MM) designed a heron data form posted on the CBFWCP web site (www.cbfishwildlife.org) in early May with links to "heron project". Data inputted on-line to this web page was automatically downloaded to MM for follow-up.
d. Additionally, MM requested information from approximately 75 wildlife and habitat management personnel, consultants and/or naturalists throughout the Basin (Appendix 4).
e. MM compiled a database of information of heron sightings submitted by email, telephone, web and in-person. The database includes the following fields: date sighting was reported, mode of reporting, name of contributor and contact information; sighting location (general and specific description) and UTMs (approximated from descriptions); type of sighting (active or historical nesting, number of adult or juvenile herons observed, etc.); and what follow-up actions were taken (e.g., phone call, email, site visit).
f. Ed Beynon of the WKNs coordinated volunteers to assist with the compilation and emailing of sightings and participation in field surveys.
g. With the assistance of Barry Bartlett (CBFWCP), heron information requests and articles appeared in approximately 12 Basin newspapers (Appendix 5). This media coverage was supplemented with feature articles in the CVWMA June "Wetlander" and the CBFWCP July "Update".
h. MM participated in an interview and solicited heron information on the CBC Radio Morning Show in late June of 2002.
i. MM gave a presentation to the West Kootenay Naturalists in April & November of 2002, and to the Nelson Naturalists on January 14, 2003. She will also be presenting at the Columbia Mountains Institute Annual General Meeting in early April of 2003.

2. Ground-based surveys (RIC 1998) were conducted at historical, current, and good potential heron breeding sites in the Columbia Basin, based on tips obtained from all sources described above and information in Forbes et al. (1985) and later summarized by Gebauer and Moul (2001). Surveys were conducted during the incubation and nestling periods (May–July). Survey areas were generally accessed by vehicle, and more intensive follow-up searches were conducted on foot or by kayak, canoe or mountain bike. Potential nesting areas were approached cautiously to minimize disturbance, particularly early in the nesting period (May to mid-June). Once nesting was confirmed, the observer retreated and quietly observed the nesting area from a vantage with a spotting scope and binoculars. All potential breeding sites were visited at least once during the season to quantify abundance (based on the total number of nests visible and the number of active nests). A nest was considered active during the breeding season when birds were present in the nest and/or eggshells or feces were observed on the ground below the nest (Moul et al. 2001).

3. Ground-based surveys were supplemented with a fixed-wing aircraft survey of the Revelstoke Reservoir and Kinbasket Lake on May 16, 2002. This survey covered the main reservoir from Revelstoke to Mica, and included the lower Jordan River, lower Downie Creek (to its confluence with Sorcerer Creek), and Goldstream River (to Stitt Creek). The Kinbasket Lake survey included the main lake, Bush Arm, Columbia Reach and the lower Blaeberry River to the town of Golden. A fixed-wing aircraft survey of the Creston Valley Wildlife Management Area was conducted on June 5, 2002, in conjunction with their regular spring waterfowl inventories.

4. A second ground-based visit to active breeding sites was undertaken in late June to early July to determine whether these sites were successful. A nest was considered successful if one or more chicks were observed in the nest (Moul et al. 2001). Nest visibility was a limiting factor (particularly in some dense coniferous stands), and the number of chicks per successful nest was determined only at nests with good visibility.

5. The locations of all active and historical breeding sites were determined using a GPS device (*Garmont eTrex*) and mapped by Ian Parfitt (CBFWCP). Assessments of breeding habitat and site characteristics were conducted during the first and second visits to unoccupied and active breeding sites, respectively. The following site and habitat parameters were recorded during field visits: estimated distance from water and closest water body; dominant forest type and structural stage (as defined by BC Ministry of Environment, Lands and Parks and BC Ministry of Forests 1998); slope and aspect; mean crown closure (defined as the average of four readings taken with a spherical densiometer in the middle of a colony); nest tree species; and estimated diameter [dbh in cm], height [m] and decay class (BC Wildlife Tree Committee 2001) of ≤5 randomly selected nest trees. The biogeoclimatic zone/variant and land designation and ownership status for each breeding site was subsequently determined from maps with the assistance of Ian Parfitt. A photo record was established for active and historical breeding sites, as well as other areas of interest encountered during our surveys.

6. Copies of this report and associated databases will be distributed to land management agencies within the Basin and province-wide. MM will also prepare a spreadsheet summarizing relevant information on active/historical heron breeding sites for submission to the Conservation Data Centre in Victoria. The WKNs have committed to preparing nest record cards for submission to the BC Nest Record Scheme (Campbell 1997).

3.0 Results and Discussion

3.1 Public Awareness Campaign and Heron Sighting Network

A database of all Great Blue Heron sighting information compiled from all sources is provided in Appendix 6. Approximate UTMs were assigned to each sighting described in Appendix 6 and these are mapped by observation type (possible nesting location, observation of one or multiple adults and/or juveniles) in Figure 1. A total of 352 sightings from 185 different contributors were submitted from April 18 to November 13, 2002.

Of the sightings reported, 161 (45.7%), 115 (33.0%), 49 (14.1%) and 27 (7.8%) were submitted by email, telephone, on-line and in person, respectively. Sighting submissions were highest from May to August; they peaked in June (89 sightings), followed by a decline in July (58) and a slight increase again in August (77). Note that 46.6% (164) of all sightings were submitted after July 6, when our fieldwork ended. Although many post-breeding sightings corresponded to locations that were visited earlier during the breeding season, several new potential breeding areas were reported.

A total of 65 tips (18.5% of the total sighting reported) describing potential heron nesting activity were received and many of these involve multiple sightings corresponding to the same heron colony. The majority of reported sightings were of one or more adult herons: 130 sightings (36.9%) of individual herons and 137 sightings (38.9%) of groups of herons together. Sightings involving one (19 sightings or 5.4%) or more (5 sightings or 1.4%) juveniles were uncommon and the latter are almost certainly underestimated due to difficulties in distinguishing juveniles from adult birds. Juvenile sightings corresponded to the period from June 29 to November 12, 2002 and almost all were submitted after our fieldwork was completed.

Observations of herons were widespread along major river systems south of Golden in the East Kootenay, and south of Revelstoke in the West Kootenay (Figure 1). For the most part, concentrations of sightings

correspond well with the locations of confirmed colonies (Figure 2). The largest concentrations were reported along the Kootenay River valley (from southwest of Nelson to the U.S. border), and an abundance of participating observers residing in this corridor likely contributed to these results. Nevertheless, two breeding sites were confirmed along this corridor, and it is likely that there are additional active sites. Many sightings were received for the sparsely populated Arrow Lakes (e.g., Nakusp, Burton, Fauquier, Deer Park, Galena, Beaton, Trout Lake), but no breeding sites were confirmed in this portion of the Basin. Sightings results suggest that both the Lower and Upper Arrow Reservoirs merit more intensive inventory effort during the 2003 breeding season. Similarly, some heron activity was reported in the Mica, Duncan, and Kaslo areas, but no breeding sites were found here in 2002. Several sites in the East Kootenay (e.g., St. Mary's River, Kimberley, Fernie, Bull River, Jaffray, Wardner and Newgate areas) had multiple heron observations, but no confirmed breeding activity. Five sightings received were outside the study area and corresponded to locations near Christina Lake, Salmon Arm, Vernon (two sightings) and Salem, Oregon.

In summary, the sightings database helped establish and fine-tune the location of selected heron breeding colonies. The nature, timing and frequency of sightings received have also provided us with criteria to prioritize areas for future survey. Sightings received in July 2002 or later (particularly those involving potential nesting colonies, juveniles and large groups of herons) should be followed up. The public awareness campaign was a success on many levels, and it is important to acknowledge the assistance and contributions of volunteers. Recommendations for how to do this are provided in section 4.0.

At least 185 people across the Basin actively participated in this project and public involvement in such monitoring initiatives can be an effective searching tool. It is however important to distinguish between involving the public in the reporting of heron sightings, as opposed to the public conducting systematic monitoring at heron colonies. Encouraging the public to enter colonies (to count numbers of active nests, chicks and fledged young) is not an appropriate strategy given the blue-listed status of this species and its demonstrated sensitivity to human disturbance near nest sites (Butler 1992; Vennesland 2000 and references therein).

3.2 Ground-Based and Aerial Surveys

A biologist survey log that lists areas surveyed by date, surveyor, and survey methods used is provided in Appendix 7. A similar volunteer log describing the areas surveyed by WKNs appears in Appendix 8 along with contact information for all volunteers participating in field surveys (Appendix 9). A total of 488 hours (61 person-days) were spent by biologists conducting field surveys (ground-based and aerial combined). These hours were supplemented by an additional 240 volunteer person-hours (30 person-days) contributed by the WKNs and affiliates.

A total of 30 breeding sites (17 active and 13 historical) were found during the course of this inventory (Table 1). These sites are mapped in Figure 2 and information pertaining to their locations, breeding activity, reproductive success and habitat characteristics is provided in Appendix 10.

With the exception of the Goat River site in Creston, all breeding sites were found during ground-based surveys. Interestingly, a coniferous stand with an active colony located near the Revelstoke airport was traversed several times during our aerial survey, but it was not detected from the air by three spotters. Ground-based follow-up searches were required to establish the location of this active site, and nest visibility was extremely low from the ground as well. All of the nests at this site were located in live western redcedar trees. It was concluded that heron nests found in closed-canopy coniferous stands (such as those found along much of the Revelstoke Reservoir and Kinbasket Lake) would be difficult to detect from the air. Our aerial survey of the Revelstoke Reservoir, Kinbasket Lake and Columbia Reach to

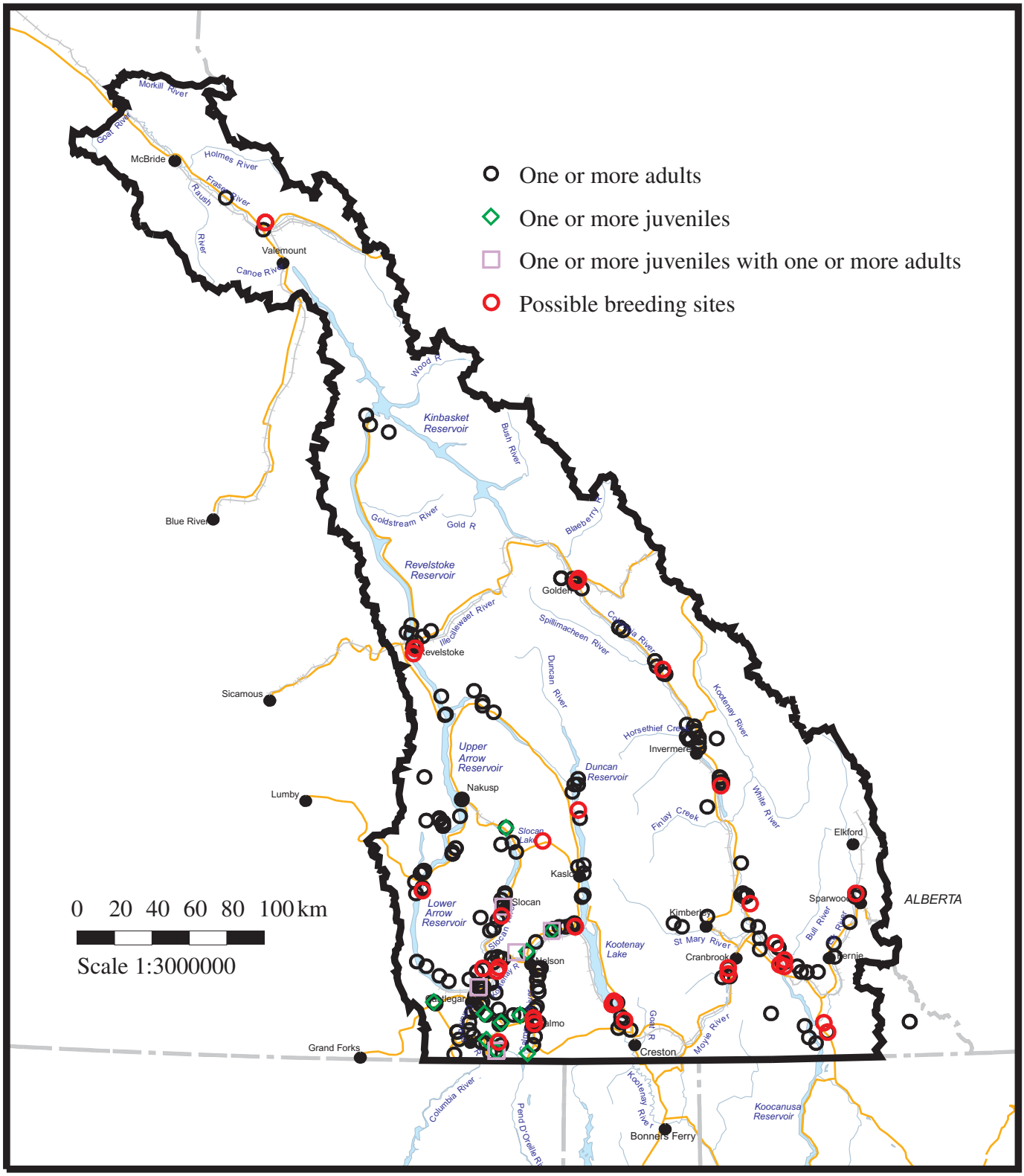


Figure 1. Locations of potential breeding sites and observations of one or more adult and juvenile herons based on information provided by all sources in Appendix 6.

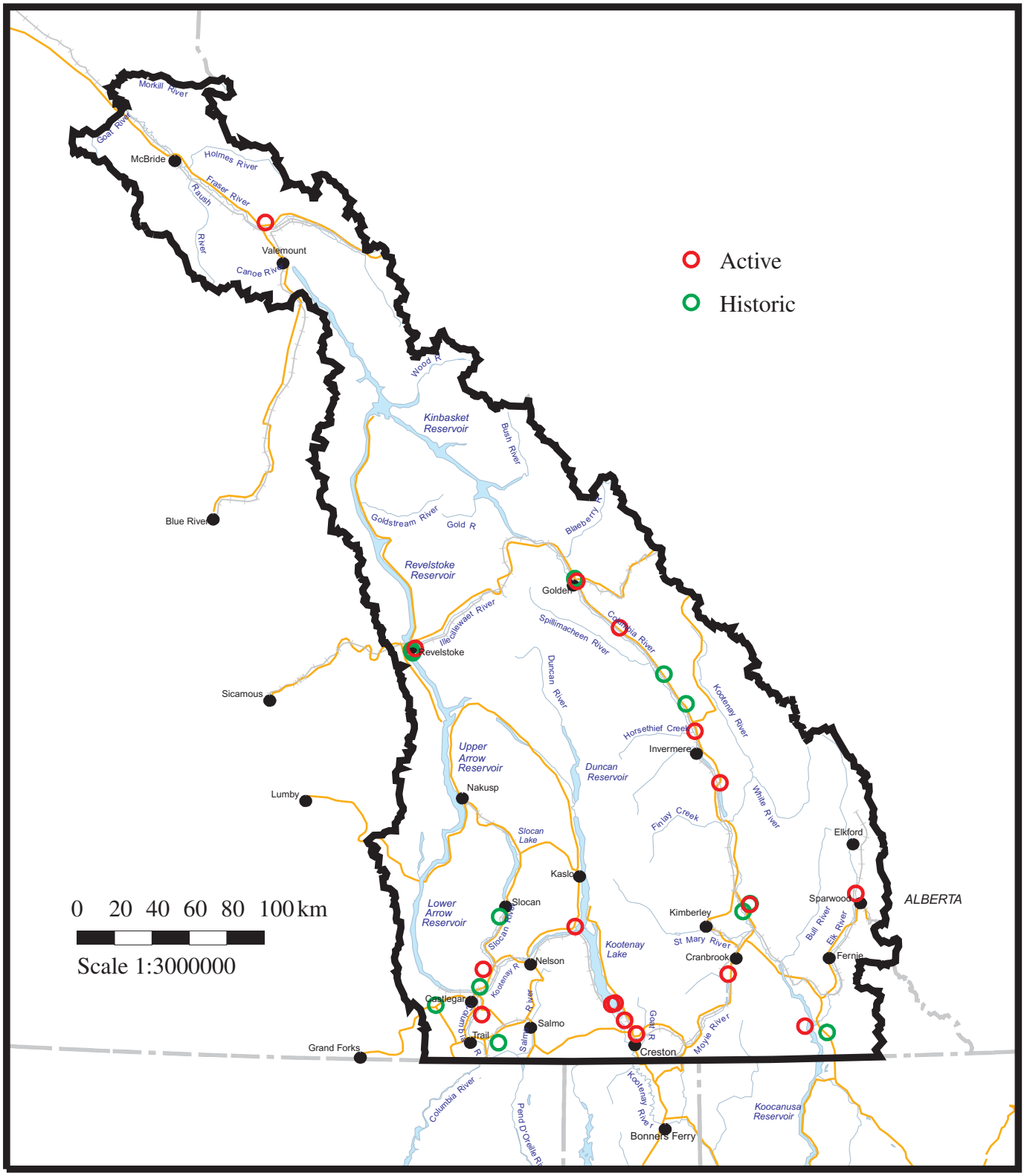


Figure 2. Locations of 17 active and 13 historical heron breeding sites found in the Columbia Basin.

Table 1. Summary of 2002 breeding site visits, nest activity, and reproductive success (RS) for successful nests (17 active and 13 historical sites).

Breeding Site	Visit 1 Date	Active	Succ.	# Trees	# Nests	# Active Nests	Visit 2 Date	# Succ. Nests	Mean RS	Last Active
Leach Lake	09-May	y	y	21	67	53	30-Jun	21	2.52 ± 0.13	2002
Creston West	12-May	y	y[1]	3	5	4	30-Jun[1]	-	-	2002
Proctor	13-May	y	y	1	2	2	20-Jun	2	2.00 ± 0.00	2002
Revelstoke	16-May	y	y	13	14	9	25-Jun	8	1.90 ± 0.20	2002
Dutch Creek	22-May	y	y	9	51	41	1-Jul	8	1.29 ± 0.29	2002
Nicholson	23-May	y	y	8	17	16	1-Jul	3	2.67 ± 0.88	2002
Parson	24-May	y	y	11	77	66	3-Jul	8	1.88 ± 0.29	2002
Wilmer	29-May	y	y	12	25	25	1-Jul	fledged[9]	-	2002
Goat River	05-Jun	y	y[1]	3	18	18	30-Jun[1]	-	-	2002
Gold Creek	14-Jun	y	y	8	10	3	5-Jul	1	3.00 ± 0.00	2002
Moyie Lake	07-Jun	y	y	2	8	4	30-Jun	4	2.25 ± 0.25	2002
Sparwood	06-Sep	y	y[2]	7	12	9[2]	11-Jul	8[2]	-	2002
Valemount	10-Jun	y	y[3]	3	3	2[2]	22-Jun	2[3]	3.50 ± 0.50[2]	2002
Duck Lake	12-May	y[7]	n	3	5	0	30-Jun	0	-	2002
Saughum Lake	04-Jul	y	n	4	6	1	2-Jul	0	-	2002
Champion Lake	10-Jun	y	n	3	2	2	1-Jul	0	-	2002
Goose Creek	24-Jun	y[8]	n	4	4	4	24-Jun	0	-	2002
Golden	23-May	n	n	1	1	0	no revisit	-	-	2000
Brisco	24-May	n	n	≥1[4,5]	1	0	no revisit	-	-	1999
Thompson's Landing	30-May	n	n	≥1[4]	0	0	no revisit	-	-	1998
Saughum Lake 2	06-Jun	n	n	1[6]	≥2	0	no revisit	-	-	1999
Mud Lake	10-Jun	n	n	1	1	0	no revisit	-	-	1996
Perry Siding	11-Jun	n	n	1	1	0	no revisit	-	-	1998
Begbie Falls	10-Jun	n	n	1	0	0	no revisit	-	-	1992
Begbie 1 & 2	12-Jun	n	n	2	0	0	no revisit	-	-	1992
Edwards Lake	13-Jun	n	n	5	5	0	no revisit	-	-	1998
Cherry Creek	31-May	n	n	4[5]	4	0	no revisit	-	-	unknown
Norbury Lakes	07-Jun	n	n	2[6]	2	0	no revisit	-	-	1998
Waldie Island	01-May	n	n	1	5	0	25-Jun	-	-	2001
Pend d'Oreille	21-Jun	n	n	1	4	0	no revisit	-	-	1998

[1] No ground-based access on second visit due to flooding (dense undergrowth prevented access by kayak); stand watches conducted from a vantage suggest that these sites were still active and therefore likely produced some young. [2] Nest success data provided by M. Graham (nests were reported after the breeding season was over). [3] Reproductive success data provided by M. Callas and C. Pooli. [4] Heron nest trees down; chewed by beaver. [5] Heron nest tree occupied by breeding Bald Eagle. [6] Heron nest trees broken or fallen over. [7]Apparently active in April according to M. McMann, pers. comm. [8] Fresh eggshells at nest base. [9]Heron present at the colony until June 23, 2002, so likely fledged some young (D. DeHart, pers. comm.).

Golden did not uncover any heron breeding sites, although several raptor (Osprey [*Pandion haliaetus*], Bald Eagle [*Haliaeetus leucocephalus*], and Red-tailed Hawk [*Buteo jamaicencis*] nests were detected. An aerial survey of the Creston Valley on June 5, 2002 did confirm the locations of all three breeding sites previously found during ground-based surveys. An additional breeding site on the Goat River was also found during this survey.

The historical sites included in Table 1 are sites where active heron nesting was reported in past years (i.e., their exact locations could be verified by land management agency personnel and/or nearby residents). Almost all still had some evidence of nesting activity (old nest, marked/flagged tree, chewed or blown over nest tree, etc.), but these sites were last occupied anywhere from 1992 to 2001. An attempt was made to explore the potential reasons for abandonment and, in many cases, possible reasons were established (see Appendix 10). These included tree removal by beavers (n = 2), nest tree usurped by Bald Eagles (n = 2), harvesting activity (n = 2), and tree breakage, heron shooting, and human disturbance (n = 1 each). Potential causes for abandonment could not be determined for five of the sites.

Comparing Figures 1 and 2 provides a good indication of where additional surveys should be conducted. The Fauquier, Burton, and Beaton areas on Lower and Upper Arrow Lakes as well as Trout, Armstrong and Staubart Lakes had several clusters of multiple sightings during the breeding season. No breeding sites have been found in these areas to date, although an abundance of suitable cottonwood habitat is available. There are also likely active breeding sites along the Slocan and Pend d'Oreille Rivers, based on the timing and frequency of adult and juvenile sightings received, the habitat quality, and the fact that both areas support historical breeding sites. Numerous sightings were compiled for the Genelle and Marsh Creek areas. It is unclear whether herons from these areas are the same individuals originating from Champion Lakes, or whether additional breeding sites may be present in the Genelle area. The Salmo Valley has a history of heron breeding activity and many sightings were submitted from the area close to a historical colony south of Hellroaring Creek. The latter site was partially cut in the late 1990s and has not been occupied since then (D. Walshaw, pers. comm.). The approximate location of a new breeding site has been established based on intensive observation and there are likely at least two pairs there. Unfortunately, the property owner would not give permission to access this area and confirm occupancy. The Mud Lake and Nancy Green Lake corridor also has consistent heron activity during the breeding season. Harvesting took place near the historical Mud Lake nest in winter 1996 and no further breeding activity has been recorded there (Machmer 1996).

In the East Kootenay, additional sampling effort is required in the St. Mary's River, Grasmere to Jaffray, Bull River, Wardner and Windermere Lake areas. An active colony is likely present near the mouth of Howell Creek in the Flathead drainage, but access and ground-based visibility were very low in June 2002 when we visited this site during spring freshet. It would best be surveyed by fixed-wing aircraft during the month of April, prior to the leafing-out of the cottonwoods. Due to time constraints, the Robson Valley was not an area emphasized during 2002 surveys and a concerted effort will be required to adequately cover this area in future.

3.3 Nest Activity and Reproductive Success

A total of 259 active heron nests were found (92 in the West Kootenay, 165 in the East Kootenay and two in the Robson Valley; Table 2). Of the 17 active breeding sites, eight were located in the West Kootenay, eight in the East Kootenay and one in the Robson Valley. Active colonies had from 1–21 nest trees (mean ± SE = 6.8 ± 1.3) with numbers of active nests ranging from 1–66 (mean ± SE = 15.2 ± 4.8). Six colonies accounted for 85% of all active nests found. Colonies in the East Kootenay tended to be somewhat larger, with more trees and greater numbers of active nests (Tables 1 and 2).

Table 2. Summary of heron nest trees, nests, active nests, reproductive success (RS) and nest failure data for active breeding sites in the East Kootenay, West Kootenay, and Robson Valley.

Active Breeding Site Location	**# Nest Trees** mean ± SE (range)	**# Nests** mean ± SE (range)	**# Active Nests** mean ± SE (range)	**Mean RS** mean ± SE (range)	**% Sites Failed**
West Kootenay (8 sites; 92 active nests)	6.4 ± 2.5 (1 – 21)	14.6 ± 7.8 (2 – 67)	11.5 ± 6.3 (1 – 53)	2.31 ± 0.11 (1 – 3)	38% (3 of 8)
East Kootenay (8 sites; 165 active nests)	7.6 ± 1.2 (2 – 12)	25.8 ± 8.9 (6 – 77)	20.6 ± 8.0 (1 – 66)	2.22 ± 0.18 (1 – 4)	13% (1 of 8)
Robson Valley (1 site; 2 active nests)	3 (–)	3 (–)	2 (–)	3.50 ± 1.4 (3 – 4)	0% (0 of 1)
Overall (17 sites; 259 active nests)	6.8 ± 1.3 (1 – 21)	19.2 ± 5.6 (2 – 77)	15.2 ± 4.8 (1 – 66)	2.32 ± 0.10 (1 – 4)	24% (4 of 17)

Reproductive success averaged 2.32 ± 0.10 young per successful nest, based on a sub-sample (n = 57) of visible nests. These rates fall within the range of variation for reproductive success reported for 15 Great Blue Heron colonies in southwestern BC from 1977–1981 (overall mean of 2.5 and a range of 2.2–2.8 young per successful nest; Forbes et al. 1985).

Reproductive success rates were comparable for the East and West Kootenay and higher rates were reported for the two nests in the Robson Valley. Interior herons fledge from late June to mid-July (Forbes et al. 1983), and some sites fledged young prior to our second visit (e.g., D. DeHart, pers. comm.). Our counts may therefore have excluded some young already flying. Furthermore, herons exhibit seasonal clutch size decline (Pratt and Winkler 1985), and our relatively late second visit likely biased our sample towards broods born later in the season. Earlier and repeated counts during weeks five, seven and nine (as recommended by Moul et al. 2001) would be required to avoid this problem in future inventories.

The percent of active breeding sites that failed to produce young was a minimum of 24% overall (four of 17), and three of four sites that failed were in the West Kootenay. Reasons for the nest failures could not be determined conclusively, however three of four sites that clearly failed were subject to disturbance within 500 m of active nests during the breeding season. The frequency and duration of these disturbances varied considerably and activities included: partial cutting and progressive marsh drainage (Goose Creek), road-building and heavy equipment activity (Saughum Lake), and dyke brushing activity (Duck Lake). No apparent disturbance was noted at the Champion Lakes breeding site during 2002.

Data from Forbes et al. (1983) and later standardized by Moul et al. (2001) were used to provide a rough comparison of heron nesting activity in 2002 with nesting activity recorded during the last survey of a similar area (Table 3). Because the 2002 data represent a "snapshot" in time, a similar "snapshot" was required from earlier surveys. Survey data from the year 1982 were chosen for comparison, because this year had the greatest number of entries for comparable sites. Table 3 indicates that the number of active and total heron nests has changed little since 1982 (a decrease of 266 to 259 for active nests and an increase of 315 to 323 for total nests). However the average size of known colonies has decreased markedly (from 35 total nests in 1982 to 19 in 2002). Note that the 1982 data set is based on a number of assumptions (Moul et al. 2001) and different methods were used to survey a much wider area during 2002. For the latter reasons, conclusions regarding long-term population trends based on comparisons in Table 3 are limited. It does appear that the number of heron breeding sites within the East and

Table 3. Comparison of the number of heron nests and active nests in 2002 with those surveyed in 1982 (based on data standardized by Moul et al. 2001).

Area	2002 Active Sites	# Nests	# Active	1982 Active Sites	# Nests	# Active
West Kootenay	Revelstoke[1]	14	9	Revelstoke[1]	12	12
	Proctor	2	2	-	-	-
	Champion Lake	2	2	-	-	-
	Goose Creek	4	4	-	-	-
	Duck Lake	5	0	Duck Lake	54	54
	Goat River	18	18	Goat River	30	25
	Leach Lake	67	53	-	-	-
	Creston West	5	4	-	-	-
Sub-total		**117**	**92**		**96**	**91**
East Kootenay	Moyie Lake	8	4	Moyie Lake	11	11
	Dutch Creek	51	41	Fairmont	45	35
	Nicholson	17	16	Golden	4	4
	Parson	77	66	Parsons	75	60
	Wilmer	25	25	-		
	-	-	-	Brisco north	54	40
	Saughum Lake	6	1	-	-	-
	-	-	-	St. Mary's River	30	25
	Gold Creek	10	3	-	-	-
	Sparwood	12	9	-	-	-
Sub-total		**206**	**165**		**219**	**175**
Robson Valley	Valemount	3	2	-	-	-
Sub-total		**3**	**2**		**0**	**0**
Total nests		**326**	**259**		**315**	**266**
No. colonies		**-**	**17**		**-**	**9**
Colony size (mean ± SE)		**19.2 ± 5.6**	**15.2 ± 4.8**		**35.0 ± 7.9**	**29.6 ± 6.5**

[1] Breeding sites with the same names shown side by side in Table 3 do not necessarily represent the same point locations, however they are located within a similar geographic area and are shown for ease of comparison.

West Kootenays has increased from 9 in 1982 to 17 in 2002. However, this result is very sensitive to the year selected for comparison (there was considerable year to year flux in the numbers and locations of colonies sampled; see data in Forbes et al. 1983). It is also sensitive to the geographic scope of the survey area and precise survey methods used and these are not detailed in Forbes et al. Given our larger survey area and our intensive consultation effort, there is no evidence to suggest that heron nesting activity has increased in the Basin since the early 1980s. In fact, the number of active nests appears to have remained relatively constant, while the size of colonies has decreased substantially. Studies report that smaller colonies have much higher variability in reproductive success and are more susceptible to nest failure (Forbes et al. 1985b; Butler et al. 1995). Similarly, Gebauer (1995) found a positive correlation between heron productivity and colony size, so this decrease may have negative implications for breeding success.

The CBFWCP conducted opportunistic monitoring of heron colonies in the Columbia wetlands in June of 1993-1995 (Table 4). Colonies were visited once per year in June, all colonies were not visited in all years, and only active nests were counted in some years, making it difficult to use this data for comparative purposes. Table 4 does suggest that the number of total and active nests at Dutch Creek was higher in 2002 than in previous years, and that the total number of nests has declined at the Wilmer, Parsons and Nicholson colonies relative to previous years. The Brisco and Thompson's Landing colonies are no longer active.

Table 4. Summary of heron breeding site data gathered by the CBFWCP from 1993-1995 and in 2002.

	1993		1994		1995		2002	
Breeding Site	**# Nests**	**# Active**	**# Nests**	**# Active**	**# Nests**	**# Active**	**# Nests**	**# Active**
Dutch Creek	30	16	43	failed	36	15	51	41
Wilmer	-	-	-	-	41	40	25	25
Brisco	38	10	33	12	-	25	0	0
Parsons	91	45	-	34	-	33	77	66
Thompson's Landing	-	-	7	0	7	0	0	0
Nicholson	27	0	-	0	-	-	17	16

3.4 Breeding Site Habitat Assessment

Active and historical breeding sites were found in the following biogeoclimatic variants: PPdh2 (n = 4 or 13.2%); IDFun (n = 2 or 6.6%); IDFdm2 (n = 8 or 26.7%); ICHxw (n = 5 or 16.7% of sites); ICHdw (n = 5 or 16.7%); ICHmw2 (n = 1 or 3.3%); ICHmw3 (n = 3 or 9.9%); MSdk (n = 1 or 3.3%); and SBSdh (n = 1 or 3.3%). Breeding sites were located an average of 222 ± 67 m (range of 4–1,300 m) from a water body, and over 75% of sites were found within 200 m of water. Closest water bodies ranged from rivers (n = 9 or 30% of sites) to small lakes and wetland complexes (n = 7 or 23.3% each), to reservoirs (n = 4 or 13.3%), large creeks (n = 2 or 6.7%) and large lakes (n = 1 or 3.3%). Often, multiple water bodies were associated with the same breeding site and further evaluation would be required to confirm where individuals were feeding. Two "islands" were included in our sample, however at least four additional sites in the Columbia wetlands were located on levees inundated for the bulk of the breeding season, and these essentially function as islands.

Active and historical nesting stands were characterized either as deciduous (cottonwood), coniferous, or mixed stands (Figure 3a). The proportion of coniferous nest stands we observed (47%) tended to be higher than that suggested in Forbes et al. (1983). In terms of structural stage, 73% of sites were classified as mature, with the remaining 20% and 7% in young forest and old forest stages, respectively (Figure 3b). Crown closure in these stands tended to be high (overall mean ± SE = 69 ± 4.5%), but a wide range (25–93%) was observed. Over 80% of the breeding sites were located on flat ground, and the remaining sites had negligible slopes (overall mean ± SE = 3.3 ± 1.4%).

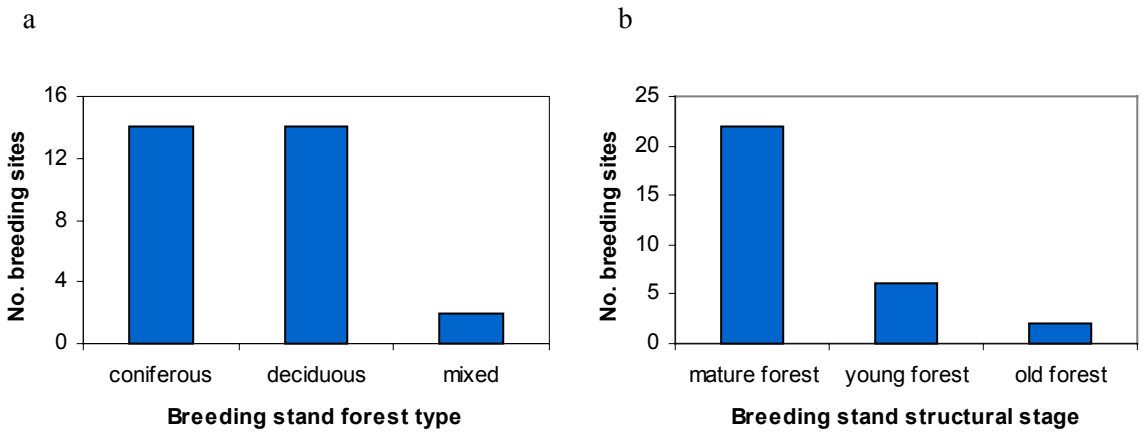
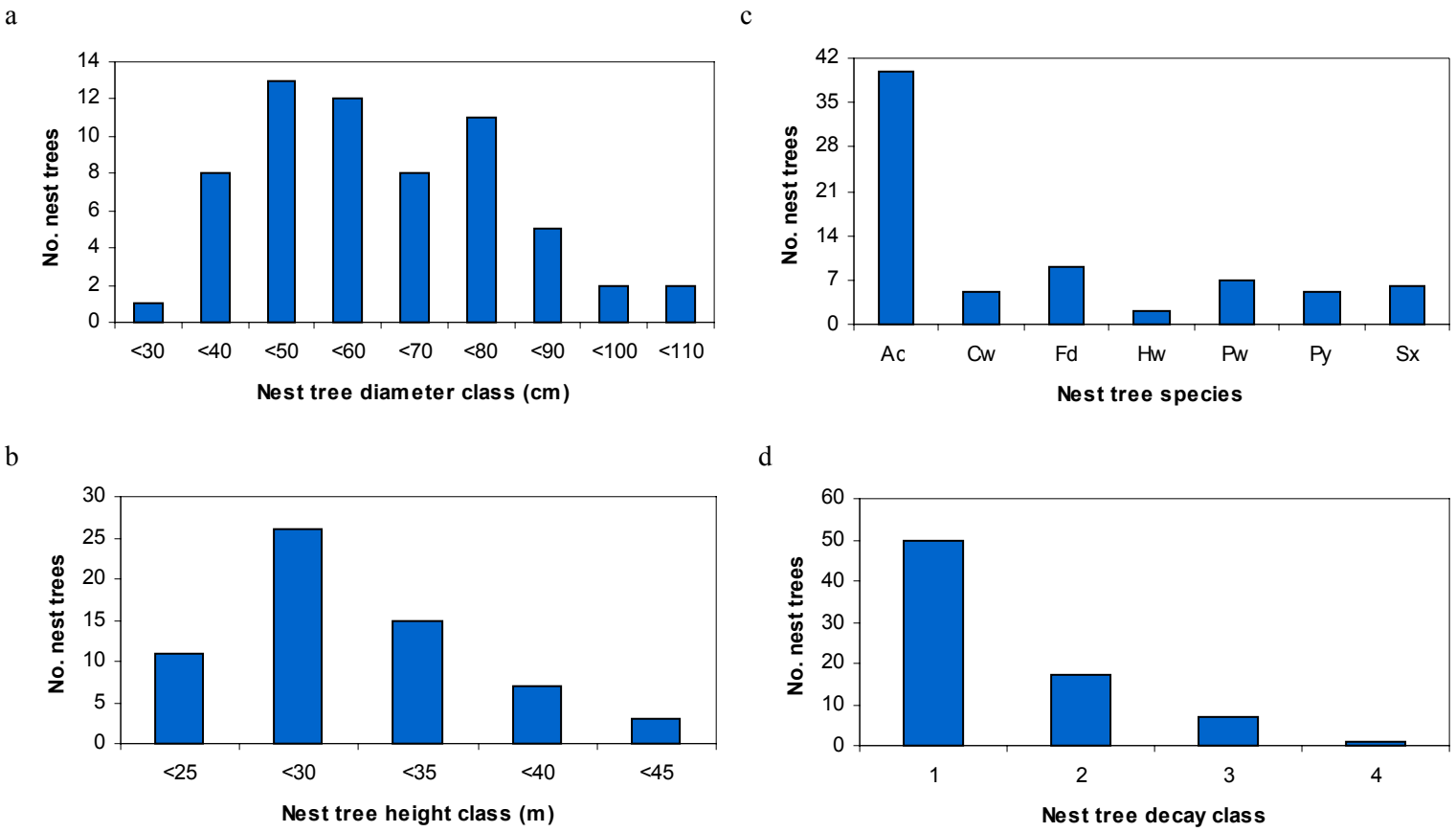


Figure 3. Forest types (a) and structural stages (b) of active and historical heron nesting stands.

Figure 4. Diameters (estimated breast height in cm), heights (estimated in m), tree species, and decay classes of a random sub-sample of heron nest trees in active and historical nesting stands.



The diameter at breast height (cm), height (m), and decay class of a minimum of 64 sample nest trees (≤5 per nest stand) was visually estimated during nest visits. Sample sizes differ slightly by parameter because flooding occasionally obscured the base of a tree and hindered diameter estimation, but tree species and decay class could still be determined. Diameter, height, decay class and tree species distributions of nest trees are shown in Figure 4 (a-d). A wide range of nest tree sizes were used by herons, however most trees were of relatively large diameter and height (Figure 4a,b). The sizes of random trees were not measured for comparison, however it appeared that herons were selecting trees of large diameter and height, relative to what was available in the surrounding stands. Herons nested in seven tree species (Figure 5c). Black cottonwood (*Populus balsamifera; Ac*) comprised 54% of all nest trees. Coniferous species combined [Douglas-fir (*Pseudostuga menziesii; Fd*), western white pine (*Pinus monticola; Pw*), hybrid white spruce (*Picea glauca x engelmannii; Sx*), ponderosa pine (*Pinus ponderosa Py*), western red cedar (*Thuja plicata; Cw*) and western hemlock (*Tsuga heterophylla; Hw*)] accounted for 46% of the total. The vast majority of nest trees were alive, but a few had recently died (Figure 4d). Historical breeding stands tended to have more dead trees and whether these trees had already died at the time they were first used for nesting is unknown.

3.5 Other Observations

During our surveys, it was apparent that beavers had chewed and cut down nest trees at several breeding sites, and particularly those within the Columbia wetlands. For example, in the Thompson's Landing and Brisco colonies (see photos in Appendix 11), beavers cut down almost all of the nest trees and were very likely responsible for heron abandonment. Beaver activity was noted at several currently active breeding sites as well (i.e., Nicholson, Wilmer, Parson). Wire mesh has already been applied to the bases of selected nest trees at Nicholson, but additional protection of nest trees is warranted at this site, as well as at the Wilmer and Parson sites. Nearby dominant cottonwoods that could function as recruitment nest trees in the event of nest tree failure are quite limited at these sites. Physically protecting the bases of existing nest trees from beavers is the easiest and most cost-effective method to ensure suitable breeding habitat in the short term. It is important to recognize that beavers also benefit heron populations by creating a patchwork of large and small swamps and wet meadows that can function as nesting and foraging sites (Johnson and O'Neill 2000). However, in some portions of the Columbia wetlands, the supply of older cottonwood stands appears to be declining (Jamieson and Hennan 1998), and a cottonwood recruitment strategy will be required to ensure that adequate densities and distributions of these valuable habitat elements are maintained through time.

Several active and historical heron colonies (e.g., Wilmer, Brisco, Edwards Lake, Cherry Creek) are currently being used for nesting by Bald Eagles (see photos in Appendix 11). Interactions between herons and eagles were frequently observed. On May 21 and 29, 2002, an adult Bald Eagle nesting in the Wilmer heron colony was observed repeatedly making incursions into heron nests, while resident herons circled and vocalized loudly nearby. On May 29th, the eagle was observed landing on two heron nests and visibly "stomping" its talons within the nest cup. The eagle then flew off from the nest with a heron chick while adult herons continued to circle and vocalize. On May 23 and June 30, 2002, a Bald Eagle nesting within 200 m of the Nicholson colony was observed making incursions at this colony. Several adults vacated their nests and flew off in response to the eagle attacks on May 23rd. On June 30th, adult herons at Nicholson vocalized loudly in response to the eagle, but they were unable to drive it off and it remained in the nest stand for several hours. Marcell Gates (a resident of Golden) observed an adult eagle feeding on a freshly dead heron on July 5, 2002 at this same rookery (Appendix 6).

Bald Eagle predation on heron nestlings, juveniles and adults has frequently been reported in British Columbia (Simpson and Kelsall 1978; Forbes et al. 1985; Forbes 1987b; Simpson et al. 1987; Norman et al. 1989; Butler et al. 1995; Butler 1997; Vennesland 2000). Such predation is responsible for reduced breeding productivity and increased abandonment of colonies (Norman et al. 1989; Vennesland 2000).

Both the Nicholson and Wilmer colonies fledged some young in 2002 (pers. obs. and D. DeHart pers. comm., respectively). However unlike other colonies, the Wilmer rookery was completely vacant by June 30th. This colony may well have fledged earlier than the others, but we suspect it was to some extent impacted by the resident nesting Bald Eagle.

3.6 Land Status of Breeding Sites

The proportional breakdown of breeding sites for all sites and active sites only is shown in Figure 5. Considering all sites, most are located on crown and private land (n = 10 each). Seven are protected within designated provincial Wildlife Management Areas (WMAs) and two are managed by other land management agencies (i.e., The Nature Trust of BC). One site is located within a provincial park. When only active breeding sites are considered, close to half are on private land and clearly, working cooperatively with private landowners should be a priority to protect these sites.

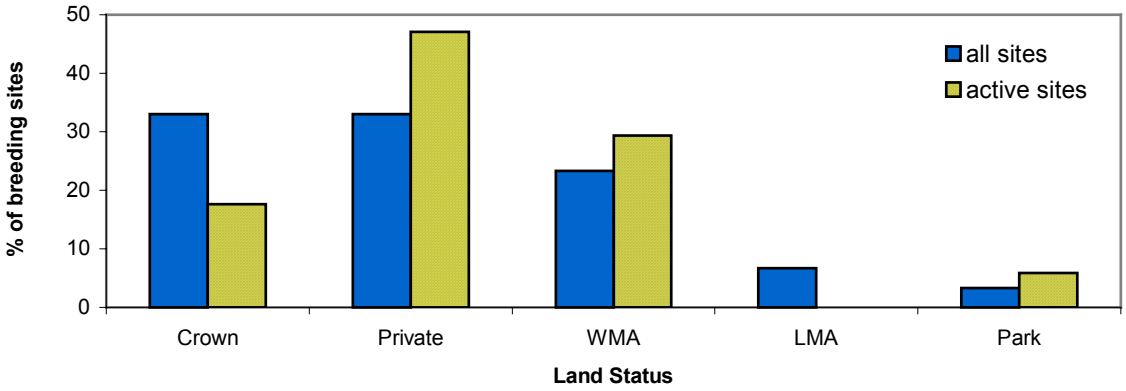


Figure 5. Proportional (%) breakdown of the land/ownership status of heron breeding sites and active breeding sites only (WMA = provincial Wildlife Management Area; LMA = Land Management Agency).

The Great Blue Heron, its' nests and eggs are protected year-round from direct persecution and harassment by the *British Columbia Wildlife Act* and the *Migratory Birds Convention Act*. Close to half of heron nest stands in the Columbia Basin are located in mature coniferous stands, and there is a potential conflict between forestry operations and heron habitat protection. Under the *Forest Practices Code*, some critical nesting and foraging habitats could be addressed through the establishment of *Old Growth Management Areas* (OGMAs), *Riparian Management Areas* (RMAs), *Wildlife Tree Patches* (WTPs) and *Wildlife Habitat Areas* (WHAs). Nest stand "no disturbance buffers" are not currently enabled under the latter designation (Paige 2002 draft), however licensees may voluntarily maintain a buffer to minimize disturbance and protect the integrity of nesting habitat.

Half of the active breeding colonies in the Columbia Basin are located on private land, and therefore cannot be addressed under the *Forest Practices Code*. The BC Ministry of Water, Land and Air Protection has developed *Best Management Practices* for heron colonies in Region 1 on Vancouver Island (see Paige 2002 draft). These voluntary guidelines outline how developers can help to protect breeding herons in existing developed areas, however no such guidelines are currently available for breeding herons in the interior.

4.0 Recommendations

4.1 General Recommendations

We feel it is important to continue with this heron breeding inventory from April to July 2003 in order to increase confidence in our survey results, follow up late season sightings from 2002, and place greater emphasis on monitoring of reproductive success:

- Follow up sightings received after early July 2002 as early as possible in 2003. Emphasis should be placed on (a) areas where breeding activity was apparent but not confirmed in 2002, (b) reports of potential nesting colonies, and sightings of large groups of herons and juveniles that were not followed up in 2002, and (c) additional information received in 2003.

- Conduct earlier and repeated counts (weeks 7 and 9 or weeks 5, 7 and 9, depending on funding availability) to determine reproductive success at active colonies from 2002 and any new colonies found in 2003.

- Formally acknowledge the effort of all contributors and volunteers in Appendices 4, 6, 8 and 9 with a card sent by mail or email attachment. The card could include explicit instructions for further volunteer participation in 2003. This should be supplemented with an article summarizing the project outcome and main findings for submission to interested newspapers in the Columbia Basin.

- Several rookeries in the Columbia Basin (and particularly those in the Columbia wetlands) have been impacted by beaver activity. The CBFWCP should encourage and fund non-profit societies, outdoor groups, youth groups, etc. to undertake cottonwood protection projects under their direction. These projects should focus on active heron rookeries (e.g., Nicholson, Wilmer, Parson), and would involve wrapping the bases of nest trees and adjacent veteran and dominant cottonwoods with wire mesh. They should be conducted after herons have vacated their rookeries, preferably in September to February.

- The CBFWCP should continue to place a strong emphasis on the inventory and management of riparian cottonwood habitat as part of its program mandate. The development of a Basin-wide cottonwood management and recruitment strategy should be undertaken, to ensure that adequate densities and distributions of these valuable habitat elements are maintained through time. This strategy must also address private land and provide an incentive program to promote protection of veteran cottonwood stands. On crown land, penalties for cottonwood removal are currently negligible (Tracy Pearce, MOF, Castlegar, pers. comm.), and a public lobby to drastically increase and enforce existing penalties should be promoted.

- An assessment of the current and future impact of Bald Eagle disturbance at heron colonies in the Columbia Basin is recommended. This would involve intensive observation of Bald Eagle activities and impacts at a sub-sample of heron rookeries (selected on the basis of ease of visibility from a distance) coupled with a review of historical Bald Eagle population data and/or field inventory for the Basin.

It is critical to ensure that all landowners and land managers whose properties support active heron breeding sites are made aware of their presence, habitat requirements, breeding schedules, and sensitivity to disturbance.

- This would best be accomplished with the development of a brochure briefly describing Great Blue Heron status, habitat requirements, breeding schedules and sensitivity to disturbance in the Columbia Basin. The brochure should also provide guidelines for "best management practices" near heron breeding colonies. Until such a brochure is in place, it is recommended that landowners be contacted directly.

- Private landowners whose properties support active nests should be contacted by the regional Rare and Endangered Species Biologist (or some other designate) immediately to: (a) inform them of the presence of active nests; (b) provide them with some basic information regarding heron status, habitat requirements, breeding schedules, and sensitivity to disturbance; (c) discuss any already initiated or imminent plans for development or habitat alteration in the vicinity of active nests; (d) cooperatively explore management options for minimizing breeding disturbance and conserving and/or enhancing habitat.

- Similarly, forest companies and land management agency personnel responsible for the management of property supporting an active heron nesting site should be contacted by the regional Rare and Endangered Species Biologist (or some other designate) and informed of its presence and current status. Where development is planned, opportunities for the designation of OGMAs, RMAs, WTPs, WHAs, and/or "no disturbance buffer zones" (i.e., ≥300 m radius; Vennesland 2000) during the breeding season (early March to August) should be explored with them. In addition to protection of breeding habitat, protection of nearby feeding habitat is critical (Paige 2002 draft) and should be emphasized in the delineation of areas above. Licensees should refer to the new Standards for Management of Identified Wildlife (Paige 2002) to be released in January 2003 and also consider designation of voluntary buffers to supplement these guidelines.

- Best management practices or "guidelines" provided to landowners should include (but not be limited to) the following:

    1. Minimize disturbance to the core nesting area (i.e., ≈300 m radius area) during the breeding season (March 1 to August 31).
    2. Maintain important structural elements for nesting and foraging (i.e., suitable nest trees, non-fragmented forest around nest trees, wetland characteristics for foraging if applicable, roost trees, and ground barriers to exclude mammalian predators) within the core area.
    3. Maintain integrity of foraging habitats and maintain adjacent roosting trees.
    4. In areas where human disturbance is a concern, restrict access during the breeding season and maintain or incorporate boundaries (e.g., ditches, fences, water) that may act as barriers to humans wherever possible (see Carlson and McLean 1996). [Landowners willing to establish such barriers should be given funding consideration by the CBFWCP, or other funding agencies].
    5. Do not develop roads or trails or recreational structures or facilities within the core area. Limit access to existing roads and trails during the breeding season (March 1 to August 31)
    6. Do not conduct harvesting or silvicultural activities within the core area.
    7. Do not develop recreational trails, structures or facilities within the core area.
    8. Avoid mechanized activities in the core area during the breeding period (March 1 to August 31).
    9. Where permanent activities or habitat modifications take place within the core area, vegetative screening should be planted or maintained between the activity/modification and the colony. Where possible, the trees/shrubs planted should be a mixture of deciduous and coniferous, and half should be of the same species currently used for nesting. Consider constructing a fence or other barrier between the activity and vegetative screening. [Landowners willing to establish such barriers should be given funding consideration by the CBFWCP, or other funding agencies].

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Appendices

1. **Heron Information Poster**
2. **Outdoor Group Mailing List (CDrom format only)**
3. **West Kootenay Naturalists Letter**
4. **Other Contacts List (CDrom format only)**
5. **Summary of Media Coverage**
6. **Heron Sighting Database (CDrom format only)**
7. **Biologist Survey Log (CDrom format only)**
8. **Volunteer Survey Log (CDrom format only)**
9. **Volunteer Contact List (CDrom format only)**
10. **Breeding Site Database (CDrom format only)**
11. **Photo Record**

INFO WANTED ON:

GREAT BLUE HERON

NEST & COLONY LOCATIONS OR SIGHTINGS

IN THE COLUMBIA BASIN FOR AN INVENTORY SPONSORED BY:

COLUMBIA BASIN FISH & WILDLIFE COMPENSATION PROGRAM AND THE WEST KOOTENAY NATURALISTS

Please call: (250) 354-0150

Email: mmachmer@netidea.com

Report sightings on line: cbfishwildlife.org

April 10 , 2002

The West Kootenay Naturalists' Association is sponsoring a project entitled "*Breeding Inventory and Habitat Assessment of Great Blue Herons in the Columbia River Basin*". This program is funded by the Columbia Basin Fish and Wildlife Compensation Program and conducted by Pandion Ecological Research Ltd. with assistance from naturalist volunteers. Blue-listed herons have not been comprehensively surveyed in the basin since 1983, and this species is declining in coastal and southern jurisdictions. We feel that it is important to obtain good baseline data at this time, as a benchmark against which to measure potential future changes.

One component of the project is to establish a Great Blue Heron "sighting network" in the Columbia Basin and draw on the local knowledge of residents to refine the inventory. Residents are asked to telephone (250 354-0150), email (mmachmer@netidea.com), or submit their heron sightings on line (www.cbfishwildlife.org) from late April 2002 to March 2003. Sightings that are of interest include locations of heron nests, breeding colonies, and large groups of herons repeatedly feeding within an area. Sightings will be followed up from late April to early August as part of this inventory. Biologist Marlene Machmer (Pandion Ecological Research Ltd.) is responsible for field investigations and there are opportunities for volunteers to assist on this project. We may also be looking for motor boats or canoes suitable to access heron habitat in your areas. If any of your members are willing to provide these, or accompany Marlene, please contact her directly (250 354-0150 or mmachmer@netidea.com). Please help us publicise the need to report sightings among your club membership and among the general public by placing the enclosed poster in suitable public areas and mentioning this program at club meetings and in club newsletters.

In addition to the sighting network mentioned above, overall objectives of this project are to:

- Conduct a systematic inventory of historical, active and good potential heron breeding sites in the basin.
- Conduct assessments at active breeding sites to describe their habitat and site characteristics, current uses and land status.
- Produce a summary report that includes recommendations for habitat protection and/or enhancement to promote heron habitat conservation in the Columbia Basin.
- Update land management agencies on local inventory and monitoring efforts.
- Extend the results of this project to basin residents to promote awareness and conservation efforts directed at this species, its habitat, as well as specific sites of importance.

Thanks for helping us help the herons.

Ed Beynon, President West Kootenay Naturalists' Association

Appendix 5. Summary of Media Coverage (contact CBFWCP for copies of articles)

Spring 2002 – BC Naturalists Newsletter

May 2002 – Creston Advance

May 15, 2002 – Cranbrook Townsman

May 15, 2002 – Kimberley Bulletin

May 22, 2002 – Golden News

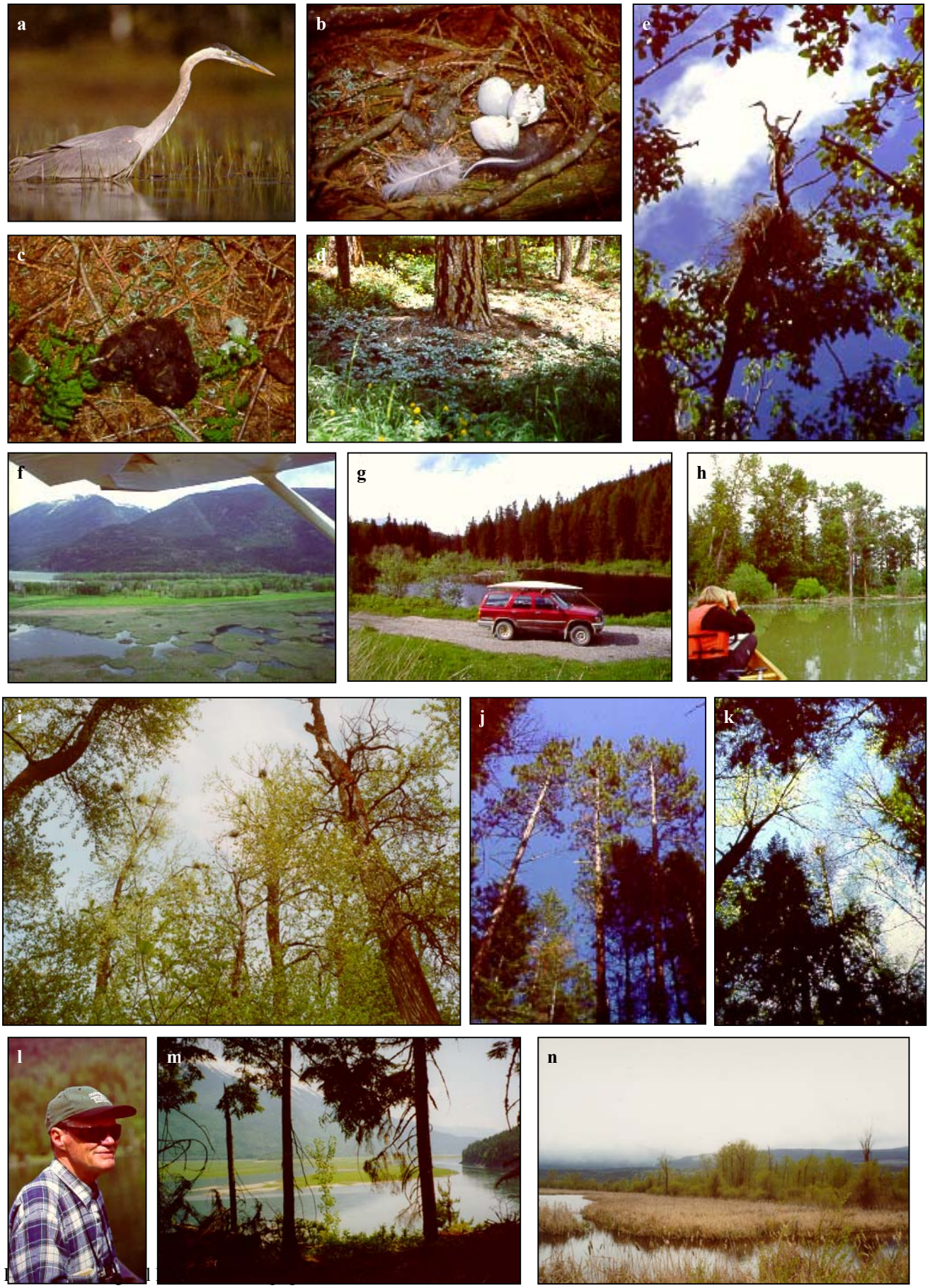
May 22, 2002 – Valley Echo

May 23, 2002 – Arrow Lakes News

May 24, 2002 – Castlegar Citizen

June 5, 2002 – Trail Times

July 25, 2002 – Valley Voice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a. Great Blue Heron foraging.
b. Eggshells and feathers at base of nest tree.
c. Bolus containing regurgitated prey remains.
d. Whitewash at base of nest tree.
e. Brood on nest.
f. View of Creston Valley from fixed wing aircraft.
g. Vehicle/kayak surveys.
h. Canoe survey of the Columbia wetlands.
i. Nest colony in cottonwood deciduous habitat.
j. Nest colony in coniferous habitat.
k. Nest colony in mixed habitat.
l. Ed Beynon, West Kootenay Naturalists.
m. View from historical Begbie Creek colony.
n. Heron nesting colony and surrounding habitat in the Columbia wetlands.
o. Bald Eagle nest (left) in center of heron nesting colony.
p. Bald Eagle nest in historical heron colony.
q. Bald Eagle nest with chick in historical heron colony.
r. Heron nest trees felled by beaver in historical nesting colony.
s. Floating remains of heron nest trees in historical nesting colony.
t. Large cottonwood in wetlands with beaver chew.