Commodore Park Great Blue Heron Colony Report, 2014

Mike Marsh and Deborah Andrews
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Abstract

Background

The Commodore Park Great Blue Heron Colony, located in a 3.9-acre public park close to the Hiram M. Chittenden Locks of Seattle, Washington, grew from 7 nests to 62 active nests in May 2013. The sudden growth was due to the abandonment of the Kiwanis Ravine Heronry located 0.17 mile south of Commodore Park. In May 2013, eagle predation caused all herons to leave the 86 nests in Kiwanis Ravine. Within the next 2 weeks, herons added about 55 new nests to the 7 already established in Commodore Park. Approximately 87 herons fledged in 2013.

2014 Methods

Two heron monitors observed and gathered 2014 breeding data for the Commodore Park Colony from late January to early August. Mike Marsh and Deborah Andrews visited the site semi-weekly or weekly, observed the nests, herons, and their activities with binoculars and a scope, recorded data on prepared forms, and transferred the data to spreadsheets. Individual nests were identified using photographs taken from 4 established viewing positions. Monitors recorded and analyzed data on staging, nest claiming and/or building, courting, copulation, incubation, hatching and care of growing young, and fledging.

2014 Results

- Staging was first seen on January 29, 2014 at the old fuel dock east of the heronry
- Pair formation occurred over a five-week period, with incubation beginning in two nests on March 21.
- 70 nests were seen occupied throughout the season
- 59 were active nests (herons incubated eggs in nests)
- 48 were successful nests (herons fledged from nests) – 81% success rate
- An estimated 105 to 116 herons fledged (Sample A & Sample B data)
- Early nesters (or "pairs nesting early") contributed most to colony success.

2014 Approximate Colony Nesting Time Frames

Staging:	First seen on January 29
Nest selection/building:	Began around March 1
Courting and copulation:	Photos taken March 12 (see report)
Incubation:	Started about March 21 – April 16 (a 40-day time period)
Hatching:	April 16 – May 26
Fledging:	Predicted beginning around June 20
End of Season:	August 1

Commodore Park Great Blue Heron Colony Monitoring Report, 2014

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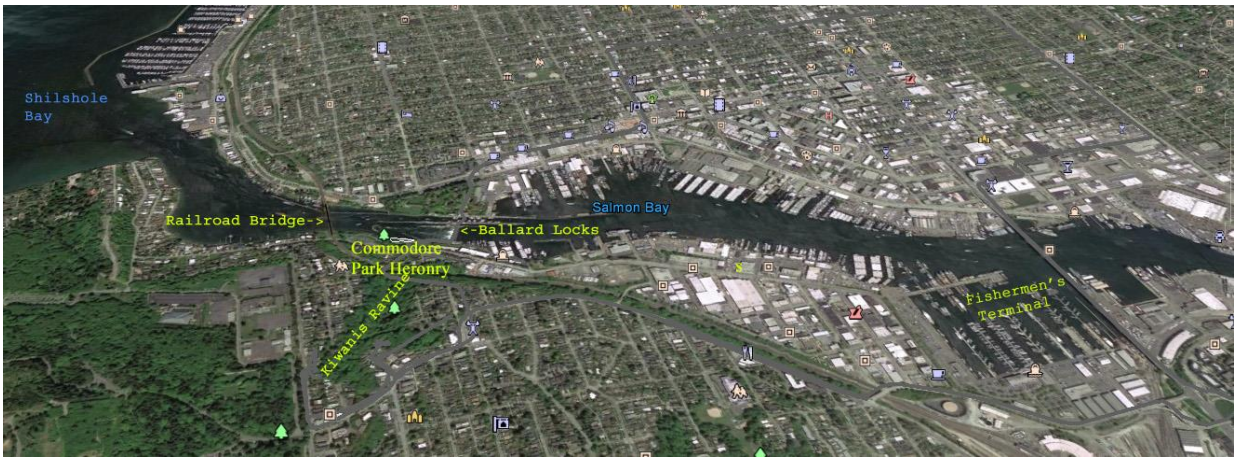
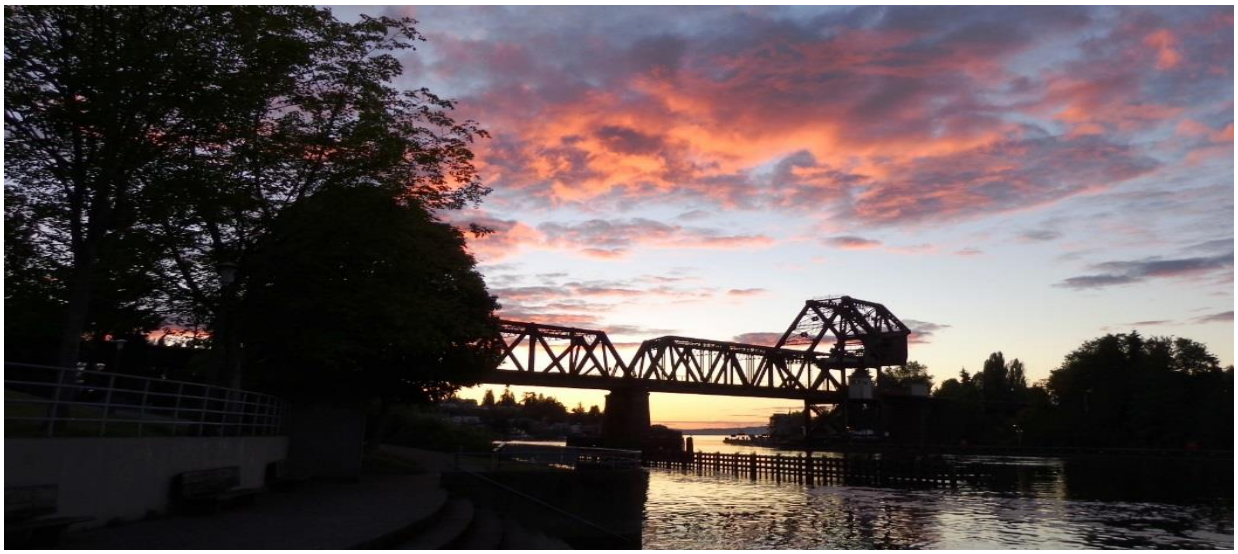


Introduction

The Commodore Park Great Blue Heron Colony is located in a small 3.9-acre public park in the Magnolia neighborhood of Seattle, Washington. The 70 nests, constructed in the branches of 31 western red alder trees, rise above the Hiram M. Chittendam Locks (or Ballard Locks) and the marine estuary below the Lake Washington Ship Canal. A popular scenic walkway winds along the estuary below the nests. The park is often noisy from Ballard Locks loudhailers calling out instructions to commercial and recreational boats, small boat air horns blasting messages to the locks, and Amtrak, SoundTransit, and BNSF trains roaring over the Salmon Bay Bridge.

Looking east at Lake Washington Ship Canal, part of heronry in trees, and walkway taken in early March, 2014

Taken from same position in June



Looking west from the Locks Dam at the BNSF Railroad Bridge over estuary and Salmon Bay. Tall trees to the south hold the nests; Shilshole Bay and Puget Sound are due west beyond the bridge. Photo by Phil Maser

HISTORY OF THE KIWANIS RAVINE COLONY THAT MIGRATED TO COMMODORE PARK IN 2013

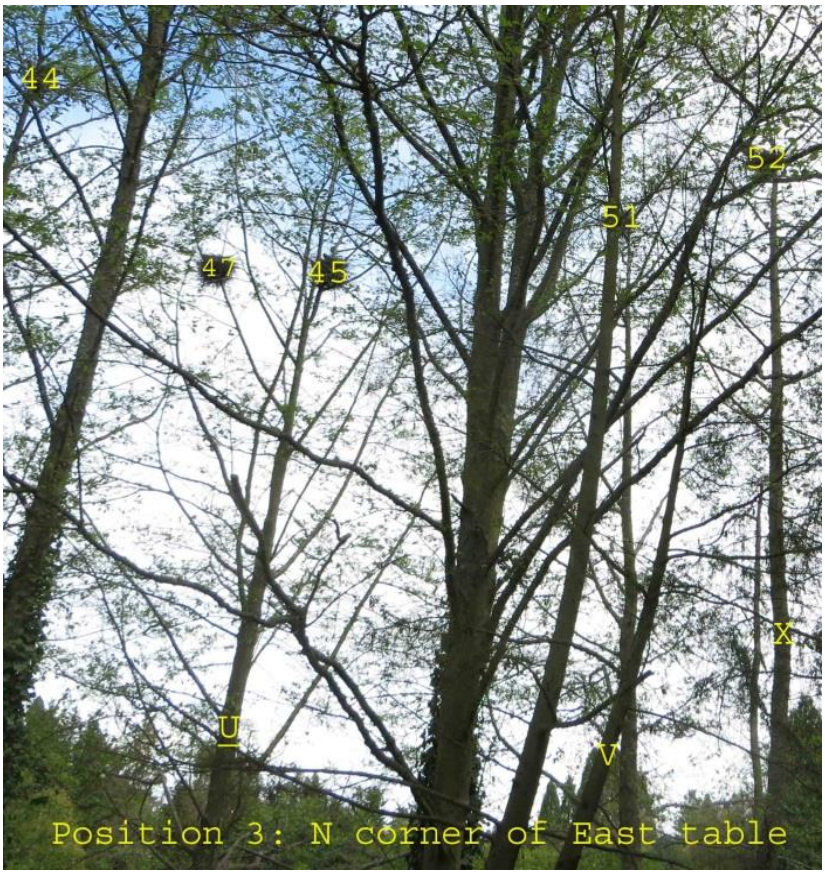
Since 1982, great blue herons had built a generally increasing number of nests to raise their young in Kiwanis Ravine. Pam Cahn, the Kiwanis Ravine heron monitor for 10 years, counted 86 active nests in 2012. A few herons had also built 6 to 8 nests at Commodore Park, approximately 275 meters or 0.17 mile from the center of the Kiwanis heronry. In April and early May 2013, however, herons abandoned the Kiwanis Ravine heronry after several predation events by an immature eagle. Over a two-week period beginning around May 1, rapid nest building occurred in Commodore Park. This late nesting meant that heron broods fledged 1 or 2 months later than usual.

Cahn counted a minimum of 62 active nests and 87 fledglings at Commodore Park in 2013. Cahn is a member of the Heron Working Group.

2014 MONITORING

Mike Marsh and Deborah Andrews conducted 2014 heron monitoring which included on-site field observation and data collection, analysis, and reporting. Marsh earned his doctorate in Zoology and is a board member of Heron Habitat Helpers (HHH), a local non-profit organization. Andrews is also a HHH Board Member with a Master's in Adult Education. They both trained with Cahn at the beginning of the 2014 season. At Cahn's suggestion, they considered how to map the nest trees. The trees are on a steep slope and some herons were already perched in them, so they could not tag the trees.

Their solution was to photograph sections of the heronry from 4 positions, and then use photo-editing software to identify each tree trunk and to number each nest. Part of the reference photo for Position 3 appears below. Nest trees were marked with letters, and nests with numbers.



On-site field observation consisted of semi-weekly or weekly nest observations taken from the 4 designated positions described above. Monitors looked through binoculars and a 20-40 telescope to search high in the trees. A yellow beak sticking out of a nest probably meant a heron was incubating, for example, or tiny fluffs of fuzz sticking up meant eggs had hatched. Using a clipboard and pencil, monitors wrote down data on paper forms and transferred them to an Excel spreadsheet later. Marsh compiled the final numbers and created the tables and graphs in the following pages.

2014 COMMODORE PARK NESTING SEASON

Commodore Park Colony's 2014 nesting season lasted approximately 6 months, from the end of January to the end of July.

STAGING THROUGH INCUBATING
-End of January through end of April-

Staging is the early gathering of herons in locations near the nesting area. One wonders if they know what they are "here" for. Staging began in late January at a nearby abandoned fuel dock by the Ballard Locks. By February 23, some herons had moved to a huge cypress tree which looked directly across the Locks to the existing colony nests.

A portion of the heronry with at least 20 herons standing or sitting in nests on March 8, 2014

It is difficult to distinguish sexes in great blue herons because plumage is similar in both. Males are somewhat larger and their beaks are usually slightly longer.

By March 1, herons, usually males, began selecting existing nests in Commodore Park, and if necessary, remodeling them. Some herons built new nests. Standing in their nests, males attract females and ward off other herons looking for a nest. Both sexes are choosey about their mate for each breeding season.

Once a pair bond is established, the male brings twigs broken from nearby trees or taken from unoccupied nests. The female places them carefully on the nest.

It takes about 10 days for an egg to form and be laid after copulation, and incubation takes about 27 days (Butler 1997). Therefore, from copulation to egg hatching is approximately 5 weeks.


Courting ritual captured on March 12; soon after, copulation.

Incubation is shared by the adult pair. Since the female must acquire extra energy to use in forming her eggs, it is likely that in the first several days she will be off the nest longer than the male while she finds food. Nest exchanges, when one adult of a pair takes over incubating from the other, are somewhat ritualized. Both birds stand, and the arriving bird looks the eggs over and appears to turn them carefully with its beak while the other bird watches before flying off to feed.

Incubation begins soon after the first of the 3 to 5 eggs are laid, and there are usually 2 to 3 days between the laying of successive eggs. Herons begin incubating after the first egg is laid, which means that the chicks are 2 to 3 days apart in development.

On March 17, monitors observed 39 occupied nests, and a week later, 46 occupied nests. In 2014, a total of 70 different occupied nests were seen during the breeding season. A 20-40 power telescope was often useful in determining if a nest was occupied.

According to our monitoring records:

- March 21, incubation was first observed, so hatching in this nest would be anticipated 27 days later on April 16. **The most reliable indication of when a brood is likely to fledge (fly away from the nest) is the first observation of incubation.**
- March 31, monitors counted the largest number of incubation starts (14).
- April 15, a heron began building a new nest.
- April 23, 54 nests were incubating.
- Also on April 23, the latest incubation began in two nests. One of these, nest 69 in tree F, fledged by July 20, the date of our last complete survey.

Thus, start of incubation in different nests was spread over more than 40 days.

Two second nestings were observed. Incubation began in Nest #45 on March 31. An eagle attack (see Eagle Predation, below) was seen on May 2, and a nest exchange, presumably the beginning of a second nesting, was seen May 6. This nesting was apparently unsuccessful.
In another case, nest (#44) which was occupied March 15 through March 20, was unoccupied and progressively disassembled, then missing through March 31. A nest was built and occupied in the same position 4/8, and incubation was observed 4/15. The period of inactivity makes it likely that this nest location was used by two different pairs.

HATCHING THROUGH FLEDGING - **Late April through Late July/Early August**

A second nesting produced the above chick; it didn't survive, probably due to eagle predation. Photo by Phil Maser

Two chicks turning into "tweens"

On April 24, Cahn heard the first call of newly-hatched heron chicks. Andrews found egg shells down by the estuary walkway.

On May 6, monitors saw their first nestlings (two, in nest #51). **According to Butler (1997), fledging of young could be expected to occur about six weeks after hatching.** Because of the span of time between the first and last nest establishment, we expected fledging from the different nests to occur over a five-week period beginning around June 20.

The last complete survey was July 20. Marsh visited for ½ hour on July 24, and saw five young herons on four nests, but did not search for other nests. Andrews visited on August 5, saw only empty nests, and heard no calling by young herons. They assumed that all juveniles had fledged, and that the 2014 heron breeding season ended before August 1.

Loss of Nestling Chicks

As noted, incubation starts when the first egg is laid. There is a 2-to-3 day time span between the laying of eggs, so the youngest chick may not hatch until 6 or more days after the oldest. As the chicks in a nest mature, the ones that hatch first will be largest and strongest, and will probably get more of the food brought to the nest, at least, after parents no longer regurgitate food into their mouths. Unless food is very abundant, this may mean that younger chicks do not survive, either being pushed from the nest or simply starving. Monitors saw evidence of both types of chick loss. On June 15 they saw a chick in nest 54 that was apparently dead, with flies buzzing above it. Two living chicks were also present in the nest. On another occasion a dead juvenile was observed hanging from a branch below several nests.

Eagle Predation

A third source of chick loss, besides being shoved out of the nest or starving to death, is predation, for example by eagles.

The following is hearsay. HHH members emailed Andrews when they witnessed eagle attacks, and three men who frequented the park informed Andrews of eagle visits and attacks. In the words of one of the men, 50% of the time the eagles terrorized, and 50% they carried away chicks and juveniles. The eagles often arrived in the early morning (5:30 am +) or at dusk (8:30 pm +). The first sighting was June 7. HHH members sent eagle-visit photos: see below.

Photo by Kathleen Atkins 6:30 am June 20 – see eagle to left in trees

On June 24 at 8:30 pm, Andrews witnessed an eagle visit to the heronry and heard all the herons scream in unison. The eagle landed in a nest and sat for 10 minutes, and then flew to another nest and sat for another 5 minutes. It then flew away without incident.

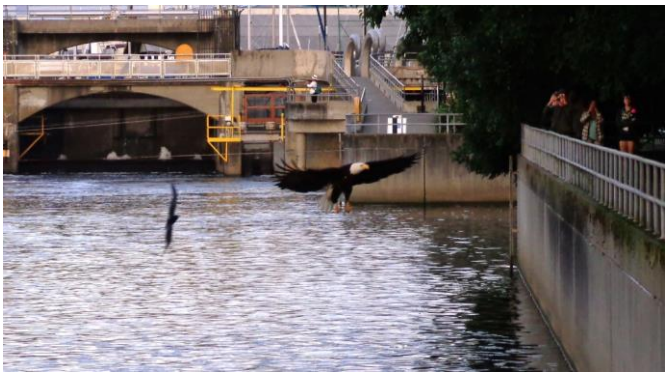


Photo on June 30 by Phil Maser

Photo on June 30 by Miller Myers

In the photos above, an eagle had snatched a newly-fledged heron from a nest, but then dropped it on the sidewalk below. The eagle flew back and landed on the railing above the juvenile, but after a while it flew away, perhaps because of the presence of people watching and taking pictures. The juvenile was left to live another day.

After tallying the information received by Andrews, it appears that eagles visited the colony 25 times. More than 1 eagle was involved, since both juvenile and adult eagles were seen at different times.

Disturbance by Humans

Herons are sensitive to disturbances, especially in the early weeks of the nesting season. Heron research workers and Washington Department of Fish and Wildlife recommend that people maintain a distance of 500 feet or more from active heronries in natural settings. The herons of Commodore Park, however, have chosen to live in much closer proximity to human activity. Many of these herons probably lived in Kiwanis Ravine, an area hidden from the general public, in years preceding 2014. Because Commodore Park is only 0.17 mile away from the ravine and was probably part of the herons' flight pattern, perhaps the noise of the trains and loudhailers from the Locks were familiar sounds, not new disturbances.

However, unfamiliar sounds were very disturbing to them. On March 15, a drone or similar model aircraft flew close to the heronry three or four times, spooking the herons so that they flushed from their nests and were gone for several minutes each time. An operator was not visible. Marsh contacted WA Fish & Wildlife, and Corps of Engineers security staff was notified. Two days later, A Seattle Parks Department employee used a loud leaf blower near the heron colony. The disturbance caused the herons to flush and leave the nests for about four hours. Measures to protect the herons from disturbance included asking Seattle Parks Department employees not to use mechanical equipment near the heronry during the nesting season, and posting signs requesting visitors to be quiet for the herons.

The Seattle Parks Department joined us in protecting the herons by reducing park maintenance noise that scared herons away from the nests. The park did not mow the lawns directly under the nests during the breeding season, and quit using leaf-blowing equipment around the heronry after the heron-flushing scare. They also created and posted informative signs around the heronry.

Nesting Success

An important aspect of nest monitoring is to learn how many young successfully fledge at each heronry. Since monitors do not observe all the time and because they could not easily see into the nests due to nest height and tree foliage, they could not know how many young flew from each nest.

What is an "active nest"?

One or more herons occupied 70 nests during the 2014 breeding season. If all nests that were occupied are counted as "active", 69% of the nests in our colony were successful, while 88% of the colonies studied by Butler were successful. However, **Butler describes active nests as those in which eggs were laid.** Incubation was observed in 59 Commodore Park nests, showing that eggs were laid, and meeting his criterion as active nests by inference. Incubation was never observed in 11 nests, although herons occupied them early in the breeding season. Two birds were seen in 7 of these at least once, indicating that a pair had been formed, while in the other 4, only one bird was ever seen. We have called these nests "failed early", and have not included them in comparisons with other reports of nesting success. At least 10 of the nests in which incubation was observed were not occupied until after April 2, thus birds which were seen at the "failed early" nests may have moved to other nests and bred

there. If we exclude the 11 “failed early” nests, then our count of “active nests” becomes 59, and the proportion of successful nests to active nests is 81%.

Eleven of these 59 nests were in a doubtful category although incubation was observed in these nests. Because of their poor visibility, largely because of the growth of foliage, there had been more than 5 occasions of “failure to observe”, AND chicks at Stage 5 were not seen in them AFTER 60 days from the presumed date of hatching. It is possible that young may have fledged from these nests, but our inability to observe them late in the season left this in doubt. The remaining 48 nests were considered “successful.” We assumed that at least some of their young had fledged.

Table 1. History of nests observed in the colony

	Description	Nest Count
PF	Probably Fledged, in Sample A (see below)	40
x, PF	Probably Fledged, NOT in sample	8
	All successful nests	**48**
FN	Nesting success unknown, Sample A	7
x, FN	Nesting success unknown, NOT in Sample A	4
	All Active Nests	**59**
FNe	Nests failed early before incubation was observed	11
	All Nests	**70**

It takes just 60 days from the date of hatching for a heron chick to grow to fledging stage – to be ready leave the nest. At this stage (called Nest Stage 5) the young are fully feathered; their wing feathers have grown out completely. They are flapping to exercise their wings, sometimes while standing on a branch beside the nest, and appear ready to fly.

When Marsh and Andrews saw young at this stage and 6 weeks had passed since the presumed date of hatching, they considered the nest **successful**. They assumed that when they saw no young in that nest on a later date, the herons had flown from the nest successfully. Sometimes, though not usually, they saw young herons fly back and land at a nest.

If herons incubated at a nest earlier, but the nest was vacant (no chicks, or adults tending chicks) beginning on observation days before the presumed 60 days after hatching had passed, the nest was considered **failed**, but was not in the Nest Failed Early category of Table 1.

Two samples of the most visible nests were used to estimate total colony production (Table 2). Sample A was composed of all nests which were missed (failure to observe) fewer than 6 times from first occupancy to the expected time of fledging (87 days from first observation of incubation). Another sample, Sample B (Table 2) was selected based on the observer's best judgment after reviewing nest histories for completeness. While Sample B was chosen on somewhat different criteria than Sample A, there is considerable overlap between the two.

Table 2. Estimates of colony productivity based on the two different nest groups, Sample A and Sample B

Number of nests	Number of Young	Average young per nest	Estimated colony production	Nest Category
47	84	**1.79**	**105.6**	Fledged young, **Sample A** (includes 7 poorly observed nests)
38	75	**1.97**	**116.2**	Fledged young, **Sample B** (Col B, includes 3 poorly observed nests)
8	12	1.5	88.5	Fledged young per Successful Nest NOT in Sample A

Colony Success – Production of Young **Number of Fledglings:**

Sample A included 40 successful nests, and 7 possibly failed nests which, while they were missed less than 6 times altogether, they were not seen in the last two or 3 observation sessions prior to their expected fledging date, so that their success was unknown.

Sample B, whose members overlapped substantially with Sample A, included 35 successful nests and 3 possibly failed nests. Examination of the histories of the "Possibly failed" nests in Sample A" suggested that 3 could possibly have fledged young, 2 were unlikely to have fledged, and 2 were very unlikely to have fledged.

Among 11 nests not included in Sample A because of gaps in their record of observations, 7 were observed with stage 5 young in the nest within 2 weeks before the fledging due date, while 4 had gaps in their records in the last month before they would have fledged. All 4 of these had stage 4 or stage 3 young when last observed, and would possibly have fledged young,

Both samples were chosen from the group of 59 active nests, in which incubation was observed or in which chicks at some Nest Stage were seen.

In the 47 nests of Sample A, a total of 84 chicks at stage 5 were counted (there were more chicks in some of these nests earlier, but those could not be counted as having

reached fledging stage). In the 38 nests of Sample B, 75 chicks at stage 5 were counted.

In Row 1 of Table 2, the Number of Young Seen in Sample A nests was divided by the Number of Nests to obtain 1.79 as the Average Number per Nest for Sample A. This Average number would be higher if we included only the known successful nests, but our method to estimate the success of the colony's 59 active nests requires that we include all nests meeting our sampling criterion.

In Row 2, using the same procedure, we obtain 1.97 as the Average Number of Young per Nest for Sample B. Notice that Sample B contained only 3 inadequately observed nests, while Sample A contained 7. The larger number of uncertain nests in Sample A contributed to the lower average number there.

The next row shows that there were only 12 young for the 8 nests that were considered successful, but were not included in Sample A because there were too many omissions of viewing data. The Average Number of Young per Nest was only 1.5 for this group. This variation in count of young in the 3 different groups shows the uncertainty of projections based on small numbers such as these.

Estimates of colony productivity use the number of young seen in each nest at nest Stage 5. Using this measure, the most conservative estimate of number of young fledged in this heronry is 96 (Row 5, Table 2), the number actually seen at Nest Stage 5 in nests. However, both **Sample A and Sample B** were selected from the total number of 59 active nests that were not seen to fail early (incubation was never observed in **all but one of** the "failed early" nests). We can use this total number of active nests, multiplied by the average numbers of young per nest from Sample A and Sample B, respectively, to make estimates of the production of young for the colony as a whole.

We do this in the "Projected Number Fledged" column by multiplying 59 by the Average Number Per Nest in Row 1 for Sample A, and in Row 2 for Sample B.

The projection for the total number fledged using Sample A is 105.6. The projection from Sample B is 116.2.

It is most likely that between 105 and 116 young fledged successfully from the Commodore Park heronry.

Relating Nest Success to the date Incubation was first observed (Table 3)

Butler found that herons nesting later in the year were less successful than those that nested earlier. He showed, by repeated seining, that food was less available in July and August than in June; small fish using the eelgrass beds where the herons found food were scarcer, larger, and thus perhaps less easily caught. Butler (1997, p. 94) wrote that

herons nesting in the first week of the breeding season on Sidney Island lost 16% of their broods, thus 84% were successful. Birds nesting in the third and fourth weeks lost 33%, while those nesting in the fifth to eleventh weeks lost 60% of their broods.

In March, 25 nests incubated at Commodore Park. Four of these failed to raise any young to fledging (stage 5 young were not seen in these nests on or after 60 days from presumed hatching), and 21 probably had young that fledged. The success of those early nests, expressed as the ratio: numbers of nests that we presumed fledged to that of nests that started incubating in March, was 84%, and the average number of young at stage 5 was 2.29 per successful nest, or 1.92 per active nest.

Out of the thirty-four nests that began incubating in April, 9 probably failed, while 25 probably fledged at least 1 young. The success ratio of these late nests was 71%, and the average number of young in successful nests at stage 5 was 1.88, or 1.38 fledglings per active nest.

Notice the compounding effect of a lower ratio of successful nests together with a lower proportion of young fledging per successful nest.

Thus if nesting later inevitably leads to lower nesting success in terms of young raised per successful nest, and if the proportion of successful nests to active nests also falls, then if a greater proportion of herons delays nesting, it would reduce colony success.

If the data are analyzed by the week (Table 3), the results are uneven, but show a generally declining percentage of successful nests and of young fledged per active nest, although the average number of young fledged per successful nest fluctuates unevenly. Table 3.

Table 3. Nest success of 59 active nests by date of nesting. Weekly numbers of young fledged from successful nests and from active nests.

Week Incubation began						
March	29-Mar	5-Apr	12-Apr	19-Apr	Totals for	
21 to 28	4-Apr	11-Apr	18-Apr	25-Apr	2014	
13	22	7	12	5	59	N active nests (excluding "failed early"
26	38	12	15	5	96	N of young fledged
11	19	7	9	2	48	N successful nests
85%	86%	100%	75%	40%	81%	Percent successful nests
2.36	2	1.71	1.67	2.5	2.00	Average fledged from successful nests
2	1.73	1.71	1.25	1	1.63	Average fledged from active nests

The number of young fledged from active nests (last row) is the most important measure relating to colony success. Clearly, early nesters contributed more to the success of this heronry in 2014.

How does nest success in the Commodore Park heronry compare to success in other heronries?

The number fledged per active nest in our study was 1.63 (Table 3). Butler reported a very similar rate, an average of 1.7 herons fledged per active nest in SW British Columbia. (Butler, 1997, Table 15, page 85). However, there was a considerable difference in how these numbers were achieved. The average number fledged per successful nest in his studies was 2.4, compared with 2 in our study. On the other hand, more active nests were successful (81%) in Commodore Park, while only 71% were successful in the BC studies referenced by Butler.

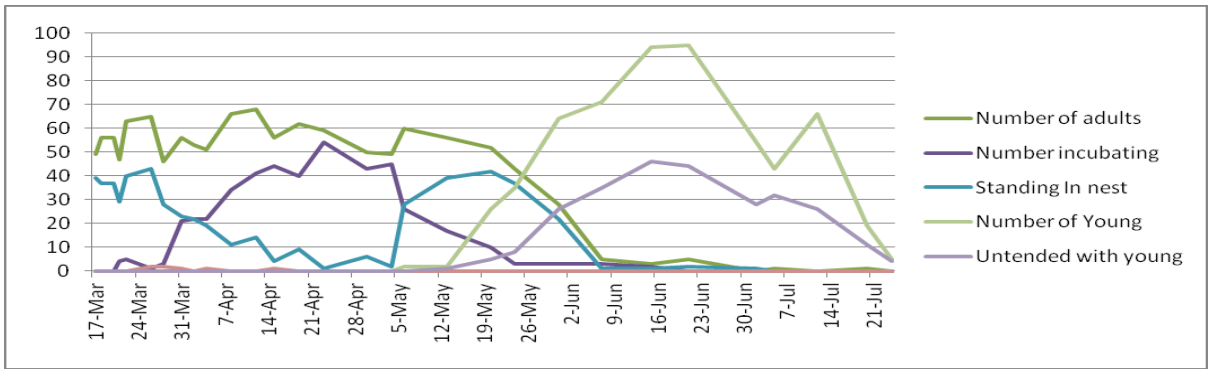
Visualizing the sequence of 2014 colony activity– Chart A

A summary line graph or chart of activity at the Commodore Heronry appears below. It is compiled from results of our semi-weekly visits. The height of each line above the base on a date (shown below the bottom line) is the number, as shown by the scale at the left border of the chart, of herons or events seen at that time. It is important to remember when looking at the chart that each nest started at a different time, from early March to the end of April. Thus different nests are at different stages on a given date. Early nesters will be feeding chicks while late nesters are still incubating.

In March, the number of adults present is around 60, while the number of “standing in nest” observations is about 40. This indicates that often 2 birds are standing in the nest together. Courtship and mating are the usual activities early in the season. The number standing in nests declines, and the number incubating rises as eggs are laid in late March and early April. The number of birds incubating reaches a peak in late April, and at this time the count of birds is barely higher than the number incubating – nearly all the birds seen are incubating – mere lumps on the nests with perhaps a yellow beak poking out.

In mid-May, downy young begin to appear in nests (note the line called “Number of Young”; there were more there than we could see at first), and the number incubating (some of the “incubating” birds are brooding newly hatched young) drops. A week or two later a line called “untended with young” rises as young chicks reach an age when they can keep themselves warm. These rapidly growing chicks, according to Butler, need the most food between 2 and 4 weeks of age. The reason that the number of adults seen has diminished is that both parents are rushing back and forth from feeding areas getting food for the young.

Chart A. Frequency of Events Observed during Heron Observations



Conclusion

We hope that this report will encourage others to keep and report nesting activity and success in other heronries, or join us in observing this one. It is important to keep records on the nesting activity of all Great Blue Heron colonies in Washington so that trends of change in these southern populations of our subspecies, *Ardea herodias fannini*, will be known to all who are interested, as well as to wildlife managers entrusted with their continued survival.

Summary Data for the 2014 Commodore Park Heronry:

- Staging began on January 29, 2014 at the old fuel dock east of the heronry
- No herons were seen or heard in the nests on August 5
- 70 nests occupied throughout the season
- 59 active nests (herons incubated eggs)
- 48 successful nests (herons fledged) – 81% success rate (48/59)
- 105 to 116 herons fledged (Sample A & Sample B data)
- Early nesters (or "pairs nesting early") contributed most to colony success.

Reference

Butler, R.W. 1997. The Great Blue Heron. University of British Columbia Press, Vancouver, Canada.

Deborah Andrews

Mike Marsh

Deborah Andrews and Mike Marsh took photos unless otherwise noted.

Heron Habitat Helpers (HHH) members took credited photos.