Heron and Egret Project

Monitoring Handbook

2023 Season

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About the Project

Graceful and cosmopolitan, herons and egrets are beloved icons of wetland ecosystems and are widely recognized by the scientific community as indicators of wetland health. Such recognition is well-justified by several aspects of their ecology, including their position as top consumers in the wetland food web. Herons and egrets utilize large landscapes for foraging, including those impacted by human activity, so their rates of survival and reproduction likely reflect conditions occurring at broad scales and over a mosaic of habitats. They are also vulnerable to disturbance, especially at nesting sites, and are sensitive to environmental pollutants, particularly those that become concentrated in their prey. Monitoring the reproductive performance of herons and egrets is a powerful tool for conservation planning across large areas. As these species depend on extensive wetland and upland foraging habitat, as well as upland nesting and roosting areas, their survival and reproductive rates can provide insight into the health of the broader, surrounding landscape.

In 1990, Audubon Canyon Ranch (ACR) launched the Heron and Egret Project with the primary goal of applying current and historical information on status of herons and egrets to wetland conservation concerns throughout the San Francisco Bay area. Specifically, volunteer observers and ACR staff biologists team up to collect data on local and regional trends in nesting abundance and reproductive performance. These data provide an indication of heron and egret responses to landscape change and therefore provide insights into processes that sustain or threaten wetland systems.

What data do we collect?

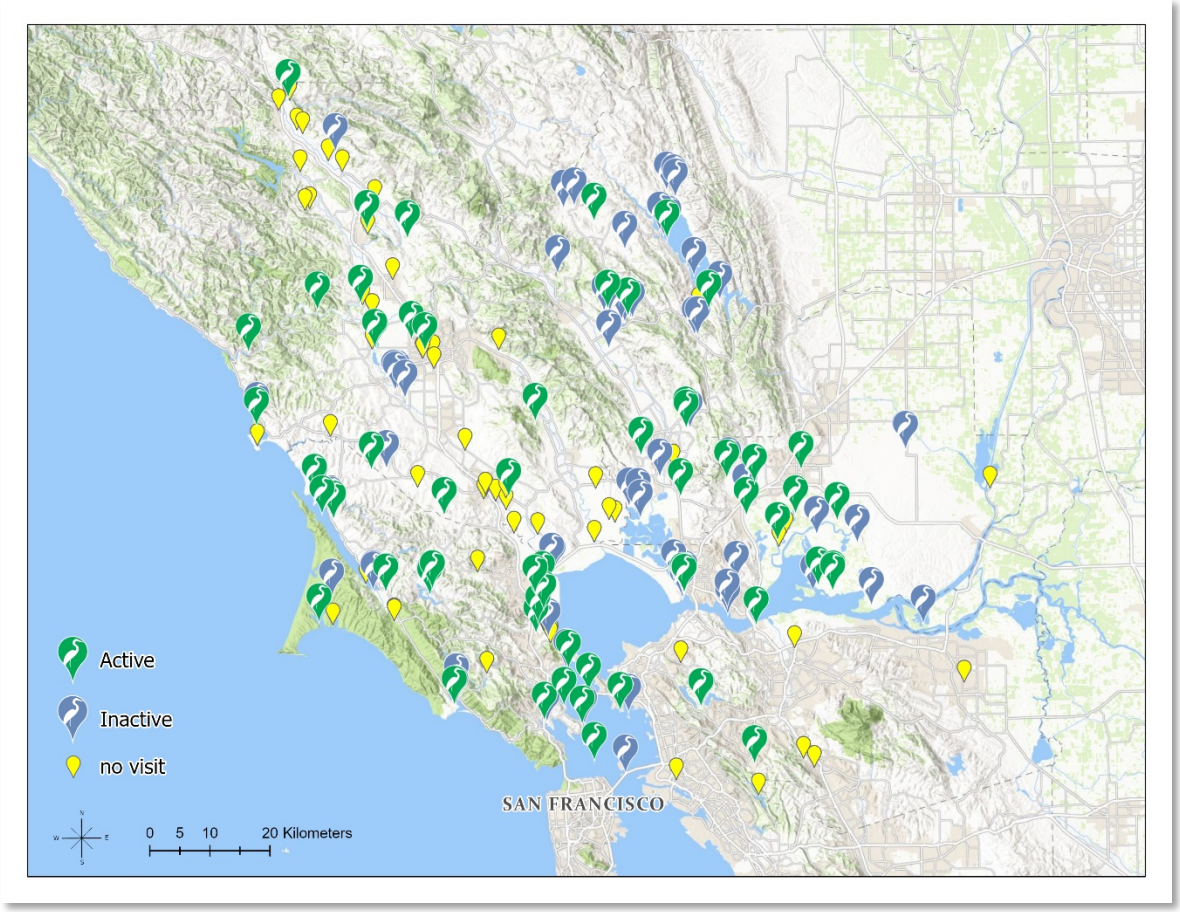
During the spring (March through June) Heron and Egret Project observers collect information on the number of breeding birds, the timing of nesting, and the number of offspring produced per nest at each colony site. We also record observations of potential nest predators near the site and any evidence of disturbance to the nesting birds. It is critical that all Heron and Egret Project observers collect the same data, carefully following these instructions, so that we can compare data among colonies and over time.

What species we monitor?

Focal species for this project are Great Egret, Great Blue Heron, Snowy Egret, Cattle Egret, and Black-crowned Night-Heron. As Double-crested Cormorants occasionally nest in or near heronries, we also opportunistically collect data on the number of breeding birds of this species. *See Focal Species Accounts* in this handbook for more information on the life histories of these birds.

What is the fieldwork schedule?

Individuals or small teams of observers "adopt" one or more heronries (nesting sites) in the study area, making six scheduled visits throughout the spring. In any given year, there are about 70 active heronries in our area, which includes the counties of Marin, Sonoma, Napa, and Solano. We also monitor a small number of sites in Alameda and Contra Costa Counties. A partner organization, San Francisco Bay Bird Observatory (SFBBO) coordinates similar monitoring in the South Bay counties of San Francisco, San Mateo, Alameda, Contra Costa, and Santa Clara. Together, these data provide a San Francisco Bay area-wide picture of nesting distributions, productivity, and intra-seasonal timing of nesting.



The distribution and status of North Bay heronries in 2022.

To facilitate comparisons among sub-regions of this large study area, observers are asked to make their observations within survey windows we call **Regional Observation Periods**.

Observers must commit to one visit during each of the Regional Observation Periods.

2023 REGIONAL OBSERVATION PERIODS
March 3–5 (Fri–Sun)
March 18–20 (Sat–Mon)
Mar 31–April 2 (Fri–Sun)
May 6–May 8 (Sat–Mon)
June 2–4 (Fri–Sun)
June 17–19 (Sat–Mon) *This visit may not be necessary if your site only has Great Blue Herons*
Please note: additional observation periods are necessary for sites with Snowy Egrets, Cattle Egrets, and Black-crowned Night-Herons. Young of these species can leave the nest platform 10-14 days after hatching. Because of this, weekly, rather than monthly visits will greatly improve the quality of your data. If you are observing a site with any of these species, please visit as close to weekly as possible.

What equipment do I need?

Accurate observations require binoculars and a spotting scope with at least 20x magnification. Although observers may be able to see into nests with binoculars alone, the extra magnification and stable view provided by a scope and tripod will greatly enhance what can be seen.

If you do not have a spotting scope, please contact Barbara Wechsberg by email or phone (see *Program Contacts*). We encourage observers to purchase their own scope. ACR research volunteers have access to discounts at some optics retailers and we can provide this information upon request. In addition, we have a limited number of spotting scopes available for short-term loan.

Other essential field gear:

- this Handbook
- data forms and maps
- any panoramas or colony site diagrams you have opted to make
- clipboard, pen/pencil
- permits (if needed)
- access instructions to your site
- water and snacks
- sun protection (such as hat, sunscreen)
- observer parking placard
- cell phone

You may also want the following:

- camera
- field guides
- a device (phone or tablet) with the Survey123 app and the HEP2023 form installed (see *Submit your data* in this handbook for more information)

Is Training available?

A pre-season orientation meeting is offered each year. In addition, new observers are usually paired with experienced "mentor" observers for in-the-field training. Our staff biologists are also available to answer questions via phone, email, and in the field (by appointment). *If you have any questions about how to collect your data, please get in touch with us as soon as possible.* You can even call or text us from the field. We will be happy to hear from you!

The 2023 pre-season training is being offered online, via the Zoom meeting platform. This meeting is scheduled for **Wednesday, February 8th, from 5:00 p.m. to 6 p.m.**

This meeting is required for all new observers, and highly recommended for all returning observers. If you have not already registered, please do so using this link.

If you need any help navigating Zoom or getting set up to join the meeting, please get in touch with Barbara Wechsberg (see *Program Contacts*).

All observers are required to review the Monitoring Handbook (this document) and the supplementary online materials posted on our project website: https://www.egret.org/north-bay-nest-monitoring.

How to set up your Monitoring Program

Start by making a plan

Check the List of Site Coordinators and Observers for your colony assignment(s). You can find this list on our project website here: https://www.egret.org/observer-roster. Let us know as soon as possible if we need to make any changes to your assignment or if you need contact information for your partners.

If you are a Site Coordinator, it is your responsibility to inform other field observers on your team about access requirements and to coordinate team or individual observations. The Site Coordinator checks with the team to ensure that all observation requirements are met and that all data are submitted to the Cypress Grove Research Center at the end of the season.

If you have been assigned a partner, please get in touch with them and make a plan to visit your site once during each of the Regional Observation Periods (more for some species). If you are unable to make one of your visits, please contact us *in advance* so we can help make sure your site will be covered. If you don't have a partner assigned by ACR, consider bringing a friend. This is not only a good safety practice; it will also make your experience more enjoyable and improve the quality of your data. Birding with a buddy encourages you to spend more time at your heronry, and the more time you spend, the more you will see!

Before you leave home, spend some time scouting your site "virtually." Visit our online map of the heronries located here: https://www.egret.org/herons-egrets/map-of-the-heronries/. Find your site and spend some time planning out good vantage points for viewing (hint: change the basemap from "streets" to "imagery" for more context). Google Maps is also a good resource for figuring out site context and driving directions. If you are not sure where the nests were last year, please contact us ASAP and we will provide you diagram of your nesting site.

Choose your observation time to maximize viewing conditions. Locations that tend to get very windy or hot in the afternoons should be observed in the morning. Plan your visit for times when you can be sure to have sufficient daylight for both viewing and safety.

Once in the field, get oriented!

Before you begin, remember: Be cautious. Watch for alert postures when you approach a colony and retreat if there is any indication of disturbance. Herons and egrets are especially sensitive to disturbance early in the season. Our best approach is to treat these beautiful birds with cautious respect.

With the above in mind, enjoy exploring your colony site! First, locate the main nesting trees and check for activity, then take a long look around the "neighborhood" of your heronry (up to 100 meters from the outermost nests) to make sure the birds have not expanded their range. Please do this search even if you have monitored this colony in previous years and you feel familiar with where the birds "always" nest. Birds may occupy new trees at any time during the nesting season, especially after nest failures or other disturbance. Remember to check all sides of nesting trees.

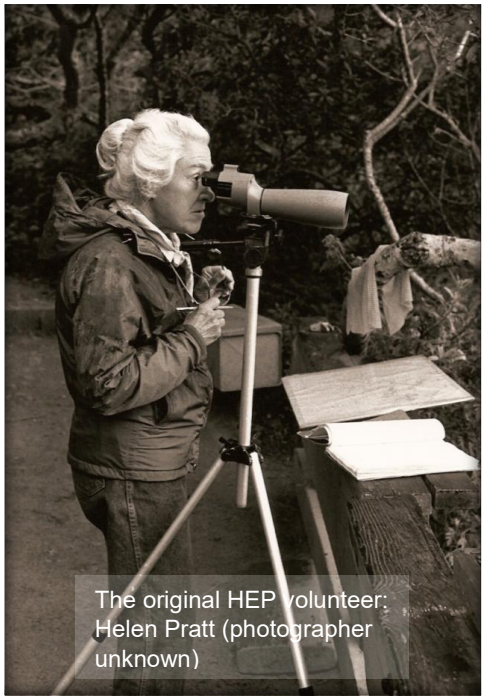
Always keep an eye out for herons and egrets coming and going to and from places where you have not seen nests before—these birds may show you an area with previously undiscovered nests! It is also a good idea to check the heronries map for nearby inactive sites, and keep an eye out in these areas for recolonization throughout the season. If a new focal species shows up at your site during the season, please record the required data for that species and alert us by phone or email as soon as you can.

Once you have discovered the full extent of the colony site, spend some time observing the active nests from a few different spots until you have found good vantage points. It is important to take time to find the best views, but *be careful to avoid double counting nests if you are using multiple vantage points to view your colony!* Keep in mind that even changing your position a few feet can dramatically alter your view of the colony. Selecting a few clearly visible reference nests can help you stay oriented, as can working with a partner. Make sure you see the entire colony on each site visit.

Don't forget to record the location of the good vantage points for future visits (for both you and other future observers).

Heronry monitoring in Suisun Marsh. Pictured: John Kelly and Sarah Millus.

Data to collect on each colony visit


The original HEP volunteer: Helen Pratt (photographer unknown)

On each visit, use the field form included in this handbook to record your data. Be sure to fill in all parts of the form including date, visit start and end times, the names of the observers, and any conditions (such as weather) that may impact your ability to see the nests. Once you have completed your observation, and before leaving your colony site, submit your data to our online database using a smartphone app called Survey123 (see *Submit Your Data* in this handbook for instructions on how to do this*)*.

A full survey consists of the following four steps. **Each step must be completed on every visit.**

1) a complete tally of all active nests for *each species* nesting at your site
2) for Great Blue Herons and Great Egrets only, a tally of the number of nests at each nesting stage
3) for Great Blue Herons and Great Egrets only, a tally of the number of Stage 4 broods of each size category. ***Please only include Stage 4 broods! Brood sizes at other stages cannot be included.***
4) notes on potential nest predators and disturbances, as well as any other relevant notes

Observe your site using your spotting scope, making multiple slow and careful scans of the entire colony for each species and each of steps 1-3.

It helps to have a partner who can record numbers for you, draw your attention to hard to see nests, help you determine stages, and count broods.

Throughout your visit, maintain awareness of the entire colony and always be on the lookout for behaviors or events that might help locate hidden nests or determine the status of hard to see nests. Such behaviors may include adults landing on hidden nest sites, feedings, and nest reliefs. You will often need to pause your count so that you can get a better look at a nest where one of these behaviors is happening—you may not get another chance for such a good look at a nest!

Keep in mind that visibility can vary quite a bit among visits. There may be times when a nest platform is difficult to see due to changes in foliage, heat waves, wind, and different sun angles. Your available vantage points may not be ideal. Patience, maintaining keen awareness of the colony, and quick work with binoculars or scope are

key! Just the right breeze can move foliage out of your way long enough to see an incubating adult. Sometimes a bill or tail poking slightly over the rim will be the only indicator a bird is present and incubating. Chicks will become more visible when adults feed them. If your site has viewing challenges, please plan extra time to allow for nature to provide a better view.

You may wish to make a colony site diagram, or nest panorama. This can be help you keep track of the locations of nests at your site. The nesting panorama is a landscape sketch or photograph that indicates the location of the nests. Multiple panoramas may be helpful if you view from different vantage points. Excellent panoramas can be created by making enlarged photocopies of photographs. Sketches or print-outs from Google Maps may also be useful.

An example of a simple nest panorama created from a photograph. Be sure to remember where you stood (your vantage point) when making your panorama! Your location can dramatically affect your view.

Step 1: Tally active nests

For all focal species present at your site (Great Blue Herons, Great Egrets, Snowy Egrets, Cattle Egrets, Black-crowned Night-Herons, and Double-crested Cormorants), tally the number of **active nests**. This is the number we use to estimate the abundance

of nesting pairs at your site. A nest is **active** if you observe any sign that a pair bond has been established, even if you cannot see the actual nest platform.

For Great Blue Herons, Great Egrets, Snowy Egrets, Cattle Egrets, and Double-crested Cormorants, signs of pair bond include:

1) two adults close enough to touch (on the same nest platform)
2) nest building*
3) copulation
4) incubation (adult lying low in the nest for long periods)
5) the presence of eggs or chicks

*A Black-crowned Night-Heron nest is active if you observe any of the above criteria, *except for nest building*. Night-Herons can begin building flimsy nests before pair bond. Instead, look for an adult on or maintaining a well-built nest (able to hold at least two eggs) to confirm a pair bond has been established.

See the *Active Nests* field card at the end of this handbook for visual examples.

Please do not include in your tally:

- Empty nests with no adults or chicks in them (i.e. last year's nests), but please check carefully for hidden adults or chicks!
- Nests with only a single adult standing on it *if no other signs of pair bond are observed.* If you do see single adults attending a nest site after April 1st, it is likely that this is an active nest, so please spend adequate time observing such nests and add them to your tally if you observe any of the above signs of pair bond.

Don't forget to check the vicinity of your colony site to look for nests where you might not have seen them before. Report all nests within 100 meters as belonging to your colony. Any nests established more than 100 meters from the outer edge of your original site should be tracked as a separate sub-site. Please contact us as soon as possible if you have a new sub-site at your colony location.

Please use the checkbox on the form to indicate whether or not your count is complete. A count is complete if you have tallied all nests for each of the six study species. Your count should be complete unless you had to discontinue due to bad weather or some other unforeseen circumstance*. If you have sub-divided your nesting site to make your observations easier, the data should be compiled so that the report you submit includes all the observations made by you and your team members.

*If you discontinued your survey, please plan to make a second attempt as close as possible to the Regional Observation Period.

Step 2: Tally stages in clearly observed nests

For Great Blue Heron and Great Egrets only, tally the number of nests you see at each stage. This metric tells us how far along nesting has progressed at your site, and this is what we use to compare intra-seasonal timing across the study area.

- Please only include nests in your tally that you can see well enough to confidently identify the nest stage. Don't worry if you cannot assign a stage to every active nest you see, but include as many as you can.
- Please do not include in this tally any active nests that have not yet progressed to Stage 1. Please also do not include empty nests, as these are not active.

Stage Definitions (see also *Stages* field card in this handbook)		
Guardian Period	**Stage 1**	Egg laying, incubation, adult lying down for long periods, egg turning, defecation, nest relief. **One or more adult continuously at the nest**.
	Stage 2	Hatching, downy chicks, feeding low in the nest. **One or more adult continuously at the nest**. This stage is hard to detect! The sounds of chicks begging for food may be the only indication that a nest is no longer in Stage 1.
	Stage 3	Chicks usually standing, most down replaced by juvenal plumage, **one or more adult continuously at the nest**. Beware, adults may be temporarily flushed off the nest!
Post-guardian Period	**Stage 4**	**Adults not continuously at the nest**, chicks rarely off the nest platform.
	Stage 5	Chicks often **off the nest** ("Branchers"). **Adults not continuously at the nest.**

Keep in mind that nest stages refer to the nest, not to individual chicks. Stages are defined by a combination of traits that include chick age and development but are primarily centered around the behavior of the adults.

Step 3: Tally Stage 4 brood sizes

For all **Stage 4** Great Blue Heron and Great Egret nests where the entire brood can be clearly seen (you are confident there are no hidden chicks) tally the number of broods of each size category (1 chick, 2 chicks, etc.). We use these numbers to calculate the

mean number of chicks per nest at each colony site, and this is our measure of reproductive success each for each colony.

- This tally does not need to include every nest at the colony: only include Stage 4 nests with clearly observed broods.
- Please do not include any nests in this tally that are not at Stage 4!

Step 4: Predators, disturbance, and notes

Record and describe observed or inferred signs of disturbance (e.g., a nest fallen from a tree, depredated chicks, a nest tree falling or being cut down, sources of human disturbance, etc.) in this section. Please include any observed responses of the birds, such as alert postures, nest failures, or site abandonment. Indicate which responses were observed by which ardeid species. Record observations of potential nest predators in the area and indicate whether you observed signs of avian predators nesting within 100 meters of your colony site.

Submit your data

Enter your data into the online database

At your nesting site, you should use a paper site visit form (included in this handbook) to record your tallies. Once your observations are complete, and before leaving your colony site*, please submit your data to our online database. By entering your data for us, you are dramatically improving the speed at which we can analyze and report the results of this study. We are very grateful for this extra assistance!

Data can be entered using Survey123 in two ways:

1. by using our mobile app on your tablet or phone (preferred)
2. using the web browser on your computer

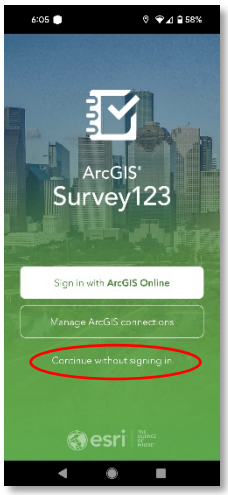
*We encourage you to enter data into the mobile app while in the field, as it helps check for completeness of the data as you go. If you opt to enter your data into Survey123 after leaving the nesting site, then please do this as soon as possible, before any subsequent site visits.

At this time, we request that you always fill out a paper Colony Site Visit Form on each of your visits. These physical datasheets are needed as a critical back-up and will enable us to detect any problems with the online portal. They are also very helpful for keeping track of large numbers of nests during your observations!

Instructions for entering data using the Survey 123 smartphone app:

Download and install the Survey123 mobile app and the current (2023) form.

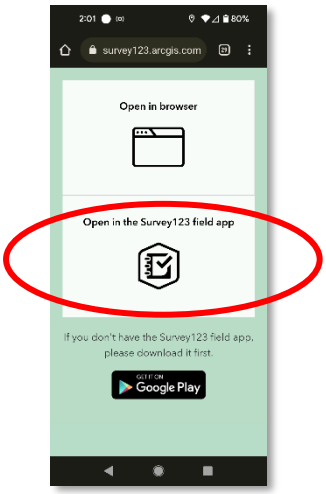
1. Internet connectivity is required to install both the app and form, so you should do this before leaving for your site. The Survey123 app is free and available for iOS and Android smartphones and tablets. The app can be found by searching for "Survey123" in Apple's App Store, the Google Play Store, the Amazon app store, or the Windows app store.Once the app is installed on your device (smartphone or tablet) from your favorite app store, open the app, and when prompted to log in choose "continue without signing in."



2. Next, download the HEP 2023 survey form. This is the form you will use to enter your data using the app. To locate the form, tap the QR code icon to the right of the search bar.

3. When the QR reader opens, point your camera at the QR code image below. Your device needs to have a camera for this to work.**

4. Make sure the camera can see the entire QR code. Once it does, it will automatically read the code and launch Survey123. The HEP 2023 form should automatically download. You will be given a choice to open the form in a browser or in the Survey124 app. Choose “Open in the Survey123 field app.”



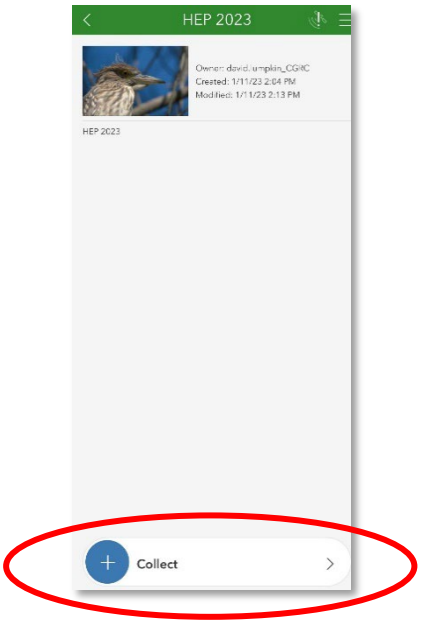
5. Once the form is downloaded to your device, you can enter data in areas without cellular reception or wifi. If you do not wish to enter data yet, you can close this form by tapping the “X” at the upper left corner of your screen. When in the field, you can re-open the form by opening the Survey123 app and clicking on the icon labeled HEP 2023 (with the young Black-crowned Night-Heron photo).

**If your device doesn’t have a camera, or the QR code is not working for you, follow steps 1-3 above to install the Survey 123 app. Then tap this link (or open a browser window and navigate to the following: https://arcg.is/1ySnPW0). When prompted, choose “Open in the Survey123 field app” to open and download the form in the app.

Enter your data.

Once you have completed your observation, it's time to enter the data!

1. Open the Survey123 app on your mobile device.
2. Tap the HEP 2023 survey icon to launch the form.
3. To start entering data, tap the "collect" button at the bottom of the screen.



4. The design of app is very similar to the paper Colony Site Visit Form. However, the app does look slightly different and some fields will be hidden from you until they are needed.
5. Enter your observations into the form as detailed below. Note that fields marked with a red asterisk are required, and the form will not allow you to submit the data if these fields are ignored.

Site Conditions

Select Colony: Select the colony you are visiting from the drop-down list. Begin typing in your site name or number to find it more quickly. Does your location have multiple subsites? If so, *then please submit a separate form for each subsite on each visit. Please do this even if a subsite was inactive*. Before you begin, make sure you know the correct site or subsite name. If you are unsure, please see the Map of the Heronries or contact Emiko Condeso, Emiko.Condeso@egret.org.

Date: The date of your observation will populate automatically. Check this for accuracy and adjust to reflect your true observation date.

Start time: Your start time will populate automatically but be sure to check this for accuracy and adjust to reflect your true start time.

Recording Observer: Select the recording observer's name.

Observer 2: Select the second observer's name, if there is more than one observer. Note that additional fields will appear if you need them (e.g. Observer 3, Observer 4…). If an observer's name is not in the picklist, select "other" and enter that person's full name in the box that appears. *Let us know if an observer's name is missing so that we can add their name to the database*.

Nest Visibility: Describe viewing conditions, including notes on conditions that limit visibility (e.g. glare, rain, etc.).

Step 1: Tally active nests

For each species present at the time of your survey, enter the number of *active nests*.

Answer the question: *Did you make a complete count of all nests you could find for the 6 species?* If you select "No," you will be prompted to explain why the survey was not a complete count.

You should have a complete colony count unless you had to discontinue for unforeseen reasons (e.g. it started to rain). If you are working in a team and are responsible for a subset of the colony, you must *work with the site coordinator to compile the data into a complete record before submitting to Survey123.*

Step 2: Tally stages in clearly observed nests

For Great Blue Herons and Great Egrets present at the time of your survey, record the number of nests at each stage. The fields to enter these data will appear only after you have entered an active nest number greater than zero in step 1.

Step 3: Tally stage 4 brood sizes

For Great Blue Herons and Great Egrets only, enter the number of Stage 4 broods of each size class. The fields for these data will only appear if you have indicated the presence of Stage 4 nests in step 2 (above).

Step 4: Provide notes on Predators and Disturbances

Indicate (yes/no) the presence of potential nest predators within 100m of the colony. If you check "yes," a list of potential predator species will appear. Check the boxes that apply. If the species you observed is not on the list, select "other" and a text box will appear for you to manually enter your species.

Indicate (yes/no) if signs of disturbance were noted. If you check “yes,” several more questions will appear. Please answer the questions to the best of your ability and describe the disturbance you have noted in detail.

If multiple instances of disturbance were noted, you will be prompted to add a second instance (or third, and so on).

Survey end time

The end time will auto-populate but be sure to check that this reflects your actual end time. The form will not allow the end time to be before the start time or greater than 12 hours after the start time. If you see the error “End time must be after start time, cannot be longer than 12 hours,” check both your start and end times for accuracy.

The form will also ask you if you were able to report both your start and end times. This is to remind you that reporting accurate start and end times is important and helps us to quantify survey effort. If you forgot to enter a start or end time, please go back and fil it in before hitting the “submit” button.

6. Scroll up and review all data you entered, then submit your data by tapping the check mark at the bottom right-hand corner of the screen. If you have wifi or cellular reception, the data will immediately be uploaded to our database. If you do not have wifi or cellular reception at your field site, the app will check for errors and then prompt you to store your completed data in your “outbox.” When you return to an area with internet connectivity, you can instruct the app to submit your data. To do this, open the Survey123 app, open the HEP 2023 survey form, and tap on the Outbox icon at the bottom of the screen. You should see your competed, but unsubmitted survey listed. Tap it, and when prompted to edit your survey, tap “Yes.” Review the data, and then tap the checkmark at the bottom right corner of the screen to submit your data. Once your data has been successfully submitted, please check the box in the upper left-hand corner of your paper data form indicating you have submitted the record through Survey123.

Instructions for entering data from home using a web browser:

If you are not able to use the Survey123 app, then you can enter data on your home computer.

1. You will need internet connectivity to enter the data. On your home computer, open a window using your favorite web browser and navigate to https://www.egret.org/submit-your-data.
2. Scroll down until you see the HEP 2023 form.

3. Enter your data directly into the form from this page. Follow the detailed instructions for completing the form given above in step 5 of the previous section.
4. Once you have filled out the form, click the submit button at the bottom of the page, and your data will be delivered to our database. If you need to submit another form, hit the "refresh" button on your browser and a blank form will load.

If any of the validation rules in the form do not permit you to enter data as you recorded on the field form, get in touch with us ASAP so we can talk through the issues and ensure recording of data on future visits fits the requirements of the form.

Thank you so much for your contributions to the Heron and Egret Project! If you have questions about data entry, please contact David Lumpkin, david.lumpkin@egret.org.

Mail in your hard-copy forms

After the final regional observation period, and all your data are entered in Survey123, make hard-copy or digital duplicates of all your forms. Mail the originals to:

Cypress Grove Research Center
ATTN: Barbara Wechsberg
P.O. Box 808
Marshall, CA 94940

Please keep your back-up copies just in case the originals are lost in the post. You will also want something to refer to if we call you with questions during our data entry process. Please do your best to mail in your data by July 31st.

Thank you for your contributions to this research project!

Focal Species Accounts

Great Blue Heron

Adapted from Herons and Egrets of Audubon Canyon Ranch by Helen Pratt (1993) and the Birds of North America species account by Ross G. Vennesland and Robert W. Butler (2011)

Great Blue Herons are long-legged, long-necked birds adapted for wading in shallow water such as lake edges, marshes and tidal flats and for capturing fish, frogs, small crustaceans and other aquatic prey. They also sometimes hunt for small rodents, grasshoppers, snakes and lizards in grassy fields. The Great Blue Heron is the largest North American wading bird. It stands up to four feet tall, weighs about five pounds, and has a wing span of 6 feet. In spite of its name, it looks grey under most viewing conditions. But when seen in flight from above, if the light is right, the wing feathers take on a bluish cast.

Great Blues begin to occupy nesting sites throughout the Bay Area in late-January or early February. Egg laying generally starts in late February or early March and peaks sometime in March. Eggs are greenish-blue, and two to five are laid per clutch. They are about as big around as a large chicken egg but they are longer and somewhat more pointed. Eggs are laid at two to three day intervals.

Incubation starts sometime between laying of the first and second egg. The adults alternate incubation duties, and the first egg hatches in from 25-29 days, usually between 27 and 28 days. The second egg hatches within 24 hours of the first and the succeeding eggs hatch at two to three day intervals depending on the laying interval.

Chicks are sparsely covered with grey down on hatching. Both parents feed the young. Heron parents feed their chicks about four times during the daylight hours. They may also bring food to the young once or twice during the night.

During incubation and for approximately the first three weeks after hatching, an adult is always present at the nest. When the chicks are between three and four weeks of age, the nest is sometimes unattended by an adult, and after the chicks are four weeks old, the adults are at the nest only long enough to feed the young. The age at which the chicks are left unguarded can vary and depends on factors such as the presence of predators near the heronry and food availability in the environment.

Adults feed their newly hatched young by regurgitating food into the nest and the chicks pick it up and gulp it down. As the chicks increase in size and strength, they seize their parents' bills on their own at feeding time and try to pull them down into the nest, perhaps hoping to hasten the delivery of food. Food for young herons continues to be dropped into the nest (rather than directly into the mouths of the chicks) until they reach independence.

Not all chicks survive to independence. In broods of three or more, the chicks that hatch later are smaller and weaker than their older nest mates. Older chicks

aggressively peck the younger ones at feeding time and force them away from the food. When the adults bring plenty of food, all the chicks in the brood survive, but if food is limited, the younger chicks die. Successful adults usually raise two young, sometimes three and rarely four.

Heron young take their first long flight at about the age of eight weeks but usually remain at the nest and are fed by the parents for two or three weeks longer. Mortality of the young in the first months after leaving the nest is high. Estimates for Great Blue Heron mortality during the first year range from 65-76% although Bayer found that mortality for nestlings banded at National Wildlife Refuges in the west was only 33%. He suggested that fledglings from these refuges suffered less harassment. Some individuals can live a long time. The oldest heron recovery on record was 23 years of age.

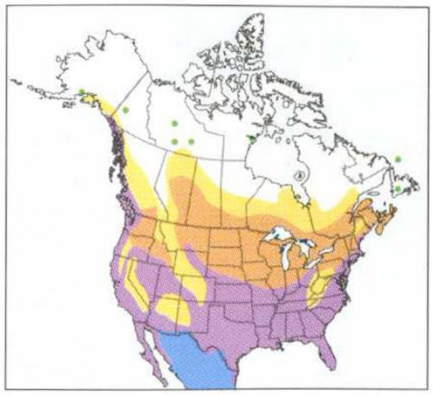
Like other *ardeids*, Great Blue Herons were hunted for their plumes in the early 20th century. Although populations appear to have recovered substantially, the species is still vulnerable to the impacts of climate change and habitat loss.

Great Blue Heron

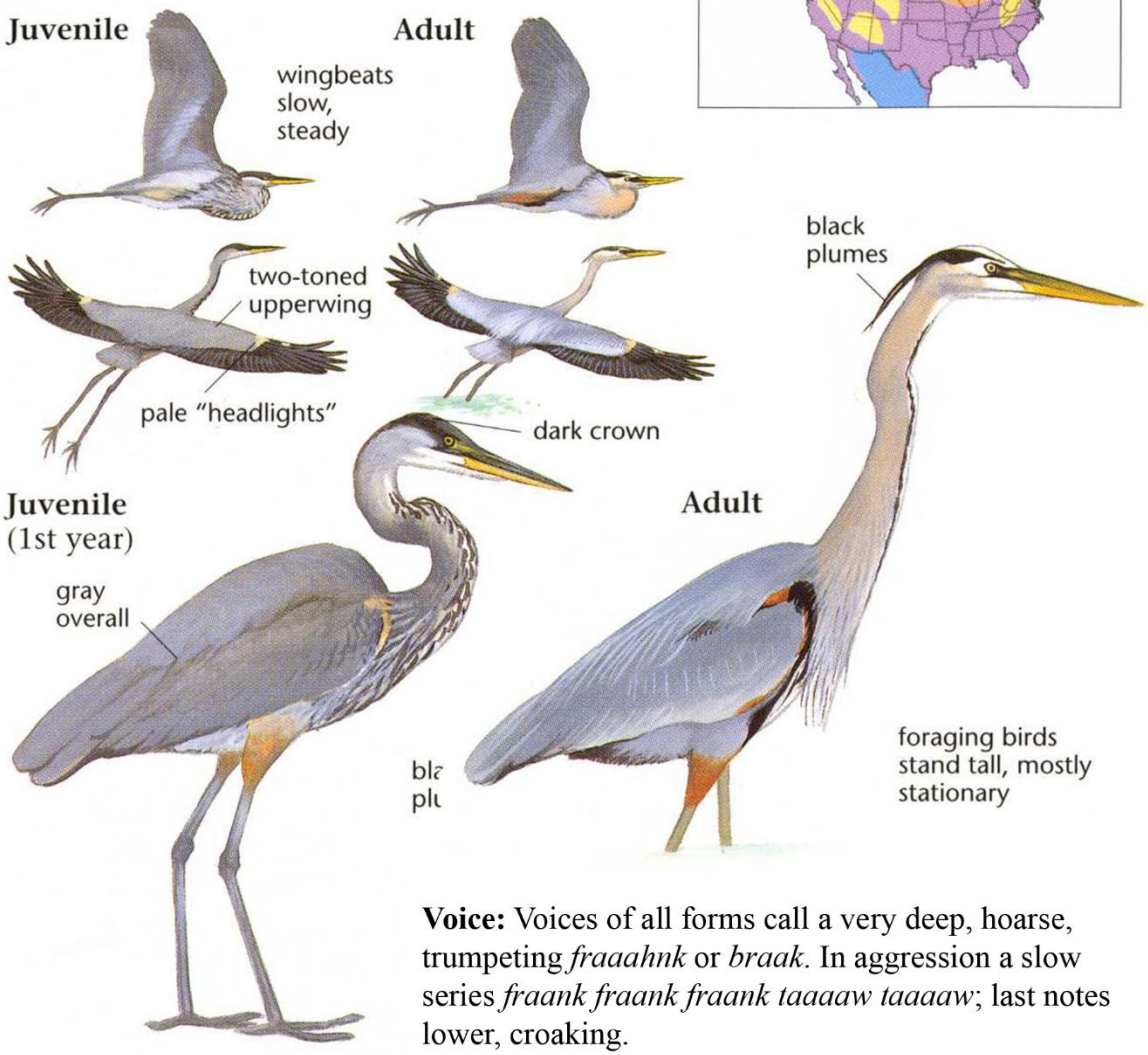
Ardea herodias

L 46" WS 72" WT 5.3 lb (2,400 g) ♂>♀

Large, sturdy; heavy bill.



DARK MORPH



Voice: Voices of all forms call a very deep, hoarse, trumpeting *fraaahnk* or *braak*. In aggression a slow series *fraank fraank fraank taaaaw taaaaw*; last notes lower, croaking.

Adapted from Sibley, David A. 2001. *National Audubon Society The Sibley Guide to Birds*. Chanticleer Press, Inc., New York.

Great Egret

Adapted from Herons and Egrets of Audubon Canyon Ranch by Helen Pratt (1993) and the Birds of North America species account by Donald A. McCrimmon Jr., John C. Ogden, and G. Thomas Bancroft (2011)

Great Egrets are iconic and widely recognized wetland birds. Like other *ardeids,* they were widely hunted during the early 20th century for their plumes. Decimation of egret populations inspired the formation of several conservation organizations, including the National Audubon Society. Adapted for wading and hunting in shallow freshwater and estuarine habitats, Great Egrets are generalist feeders, with a diet that includes fish, frogs, and small crustaceans, as well as small rodents, grasshoppers, and small reptiles.

The Great Egret weighs about two pounds and has a wingspan of 4 1/2 feet. It is all white and is distinguished by long plumes or "aigrettes" that grow from the shoulder and can be elevated and spread fan-shaped during pair formation displays. During breeding, the skin around the eyes (lores) turns bright lime green.

Great Egrets are more variable in their timing of nesting than Great Blue Herons. They usually arrive at nesting sites throughout the Bay Area in mid-March and start laying in the fourth week of March. Their laying peak is sometime in April. Like Great Blue Herons, Great Egrets lay two to five greenish-blue eggs. The eggs are about as big around as a small chicken egg, but they are longer and somewhat more pointed. Eggs are laid at two to three day intervals.

Incubation starts sometime between laying of the first and second egg. The adults alternate in incubating, and the first egg hatches in from 25-29 days, usually between 27 and 28 days. The second egg hatches within 24 hours of the first and the succeeding eggs hatch at two to three day intervals depending on the laying interval.

Chicks of both species are sparsely covered with white down on hatching. Both parents feed the young. Egret parents feed their chicks three or four times during the day but probably not during the night.

During incubation and for the first three weeks after hatching an adult is always present at the nest. When the chicks are between three and four weeks of age, the nest is sometimes unattended by an adult, and after the chicks are about four weeks old, the adults are at the nest only long enough to feed the young. The age at which the chicks are left unguarded can vary and depends on factors such as the presence of predators near the heronry and food availability in nearby foraging grounds.

Egrets feed their newly hatched young by regurgitating food into the nest, where the chicks pick it up and gulp it down. As the chicks increase in size and strength, they seize their parents' bills on their own at feeding time and try to pull them down into the nest, perhaps hoping to hasten the delivery of food. After egret chicks are large enough

to grasp their parents' bills in this way, food goes directly into the mouths of the young instead of being deposited in the nests.

Not all chicks survive to independence. In broods of three or four, the chicks that hatch later are smaller and weaker than their older nest mates. Older chicks aggressively peck the younger ones at feeding time and force them away from the food. When the adults bring plenty of food all the chicks in the brood survive, but if food is limited, the younger chicks die. Successful adults usually raise two young, sometimes three and rarely four.

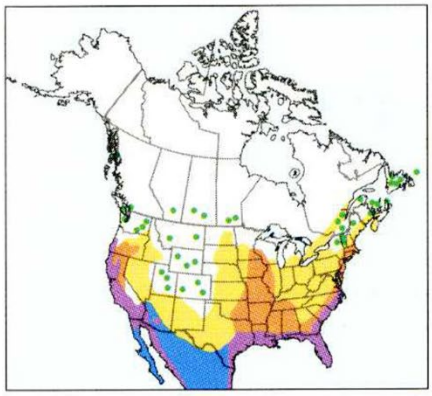
Egret young are able to fly at about seven weeks of age but usually do not leave the nest until they are 10-12 weeks old. Mortality of the young in the first months after leaving the nest is high. A study of Great Egret mortality found that 76% of the fledglings died in their first year. After the first year, mortality declines to around 36% in the second year and 22% each year afterward. Some individuals can live a long time; the oldest egret on record was recovered at age 22.

Great Egret

Ardea alba

L 39" WS 51" WT 1.9 lb (870 g) ♂>♀

Tall, extremely slender, and long-necked.



Voice: Very deep, low, gravelly *kroow,* grating unmusical *karrrr,* and other low croaks; fading at end; lower and coarser than Great Blue Heron without trumpeting quality.

Adapted from Sibley, David A. 2001. *National Audubon Society The Sibley Guide to Birds*. Chanticleer Press, Inc., New York.

Snowy Egret

Adapted from The Birds of North America species account by Katharine C. Parsons and Terry L. Master (2000)

Snowy Egrets are one of our most beautiful egrets; their delicate, recurved back plumes were once highly prized for use in ladies hats, leading to decimation of their numbers by hunters in the late 1800s-early 1900s. After the feather trade was abolished, “Snowies” apparently made a remarkable recovery in numbers, even extending their historical range in some areas. Despite this comeback, Snowies are currently designated a species of concern. Sensitivity to factors that influence prey density and availability such as wetland destruction and fragmentation, has led to population declines in recent years. As wetlands face existential threats, so do Snowy Egrets.

Snowy Egrets are medium sized birds, with all white plumage, black bill, black legs, and bright yellow feet. Immature and nonbreeding adults have duller greenish-yellow feet. Adults in breeding plumage develop long plumes on the lower back and breast. The bright yellow skin of the lores and feet turn red at the height of breeding.

Snowy Egrets may take a wide variety of prey items, including worms, insects, crustaceans, amphibians, and fish; however studies have shown their diet as a whole to be somewhat specialized, composed of about 75% fish and 25% crustaceans. They generally prefer to feed in shallow, brackish habitats.

Breeding is initiated when males select nest sites and advertise for females. The timing of egg-laying varies, but can begin as early as late-March (perhaps more typically in April and May). The usual clutch size is 3-5 eggs pale greenish blue eggs; both sexes incubate. Hatching occurs in 20-21 days and hatchlings are covered in white down.

From hatching until approximately 10 days old, the young are brooded continuously. After this, the nest is attended by at least one parent about half the time. Chicks are capable of leaving the nest as early as 10 days old, but are known to stay close to the nest site until 6-7 weeks of age.

Both parents feed chicks. Adults regurgitate food into the nest. When chicks are about five days old, young will grasp the parent’s bill to stimulate the adult to regurgitate food directly into the chick’s mouth. Snowy Egrets usually have one brood per season, though they will re-nest if the initial nest fails. In the San Francisco Bay area, the average brood size is two young per nest.

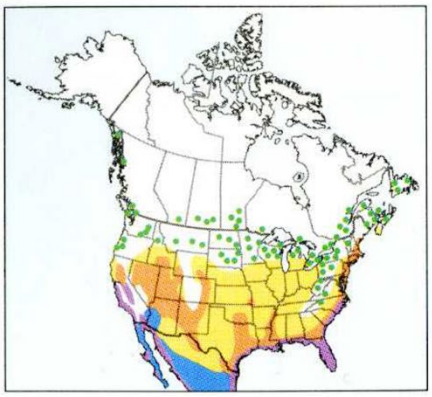
The oldest recovered Snowy Egret was 22 years old.

Snowy Egret

Egretta thula

L 24" WS 41" WT 13 oz (360 g)

Small and slender; yellow feet contrasting with dark legs distinctive.

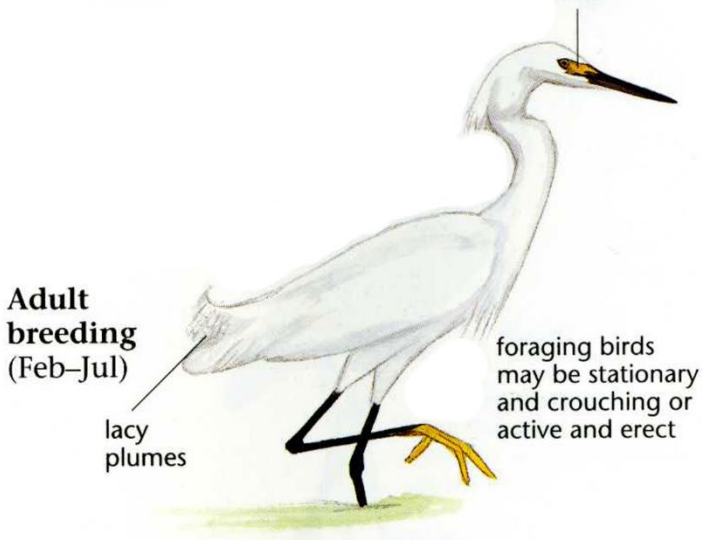


Adult

Juvenile
(Jul–Apr)

Juvenile
(Jul–Apr)

adult nonbreeding (Aug–Jan) similar



Adult breeding
(Feb–Jul)

foraging birds may be stationary and crouching or active and erect

Voice: Hoarse, rasping *raarr* or nasal *hraaa* very similar to Little Blue Heron; higher and more nasal than Great Egret. In flight occasionally a hoarse cough *charf*.

Adapted from Sibley, David A. 2001. *National Audubon Society The Sibley Guide to Birds*. Chanticleer Press, Inc., New York.

Cattle Egret

Adapted from The Birds of North America species account by Raymond C. Telfair II (2019)

Cattle Egrets are gregarious white wading birds, easily recognized by their characteristic upright posture and exaggerated strut. They are well-known for their association with lawns, fields, and pastures. Originally from Africa, the range of cattle egrets has expanded since the late 1800s—reaching North America in the late 1950s.

Cattle Egrets are stocky and whitish, with a short-necked appearance. Nonbreeding birds have yellow bill, lores, and irises, and greenish-yellow legs. During the breeding season they develop orange-buff colored plumes on head, lower back, and chest. At the height of breeding, legs, bill, and iris become red, and lores become purple-pink.

Cattle Egrets have a broad diet that is mostly grasshoppers, crickets, moths, and fish taken in shallow water. They often forage in close association with grazing cattle or other livestock. Birds will nest in trees, shrubs, or reeds. The average clutch size is three to four eggs. Both sexes incubate the sky blue eggs, and hatching occurs in 22-25 days. Young chicks have bluish-gray skin and white down.

Chicks are attended constantly until they are about 12-15 days old. At 14 days post-hatch, chicks frequently leave the nest but remain nearby to be fed. Chicks can fly at 25 days post hatch. Cattle Egrets generally have one brood per season, but like our other species of herons and egrets, will re-nest if the initial nest fails.

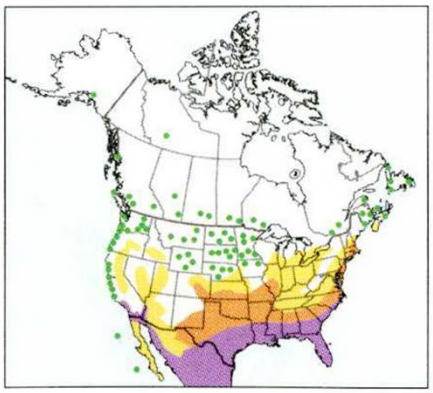
The oldest known Cattle Egret was 23 years old (South Africa). The average lifespan is unknown, but band recoveries suggest that most birds live on the order of eight to ten years.

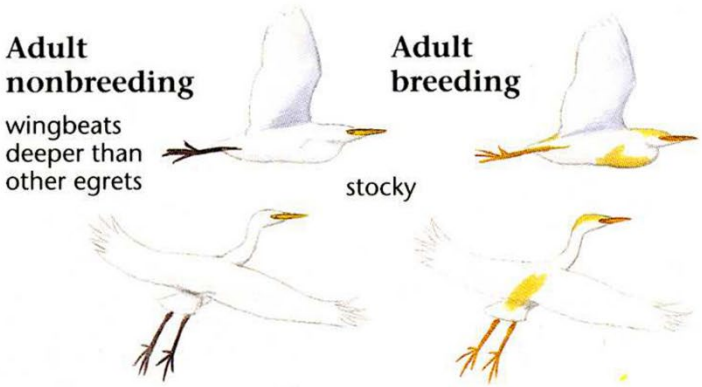
Cattle Egret

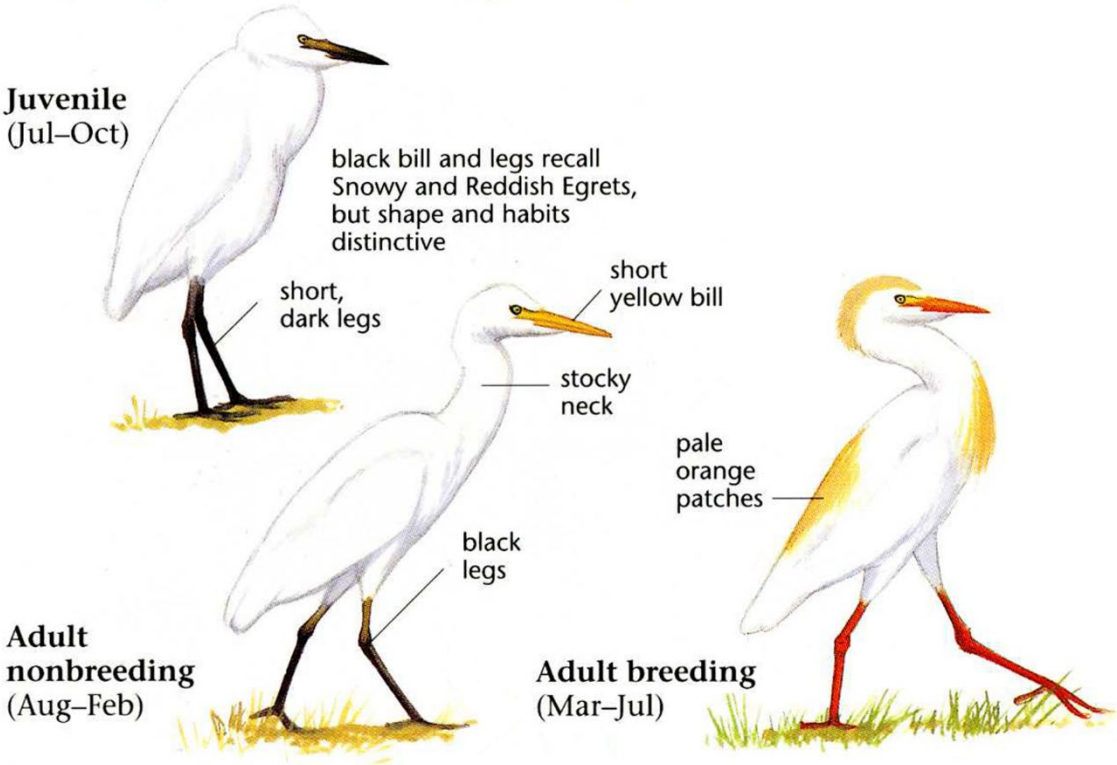
Bubulcus ibis

L 20" WS 36" WT 12 oz (340 g)

Shorter-necked and shorter-billed than other white egrets.







Voice: Short croaks or quacks on breeding grounds; generally silent elsewhere. Most common year-round call a subdued, nasal quack *brek* or *rick rak;* occasionally a short, soft moan.

foraging birds walk slowly with exaggerated head-bobbing, usually following livestock or tractors; never in water

Adapted from Sibley, David A. 2001. *National Audubon Society The Sibley Guide to Birds*. Chanticleer Press, Inc., New York.

Black-crowned Night-Heron

Adapted from The Birds of North America species account by Roger L. Hothem, Brianne E. Brussee, and William E. Davis Jr. (2010)

Black-crowned Night-Herons are a cosmopolitan species that breeds on every continent except Australia and Antarctica. They are nocturnal, usually feeding from evening to early morning in shallow ponds, creeks and marshes. During the breeding season, birds also feed during the day to meet the extra food demand of their young.

Black-crowned Night-Herons are medium sized, with a stocky build and relatively short neck and legs. Both males and females have a distinctive black cap and back, with gray wings and body. The bill is predominantly black and the eyes are red. Legs are yellow for most of the year but become pink at the height of the breeding season. Juvenile birds are brown with white spots above and pale below with striped underparts.

Breeding is initiated when males select nest sites and advertise for females. Black-crowned Night-herons may choose to nest in many different substrates, including trees, shrubs, and marsh reeds. Males may engage in light nest building before pair formation. The first greenish-blue egg is usually laid four to five days after pair formation and additional eggs are laid at two day intervals. Both parents incubate and hatching occurs in 23-26 days.

When adults arrive to feed, chicks grasp the adult's bill, which stimulates the parents to regurgitate. Food is fed directly to young chicks, but later may be dumped into the nest. Nestlings are brooded by adults for the first 10 days after hatching. By 12 days post-hatch, both parents are actively foraging most of the day.

Both parents feed the young at the nest; chicks are fed mostly fish, but also amphibians, crustaceans, insects, and other nestlings. Young are fed by regurgitation, which is initially given directly to young chicks, and later delivered into the nest cup.

Young can leave the nest platform in 12-14 days and can fly 6 weeks post-hatch. Black-crowned Night-Herons usually have one brood per season, though they will re-nest if the initial nest fails.

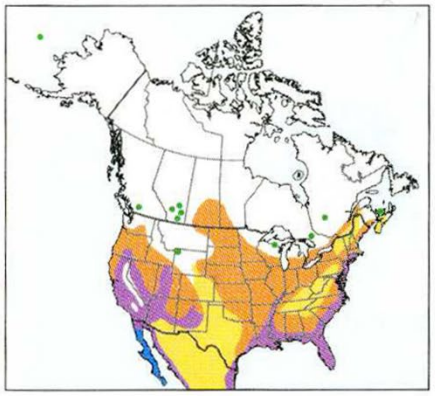
The oldest recovered Black-crowned Night-Heron was 21 years old.

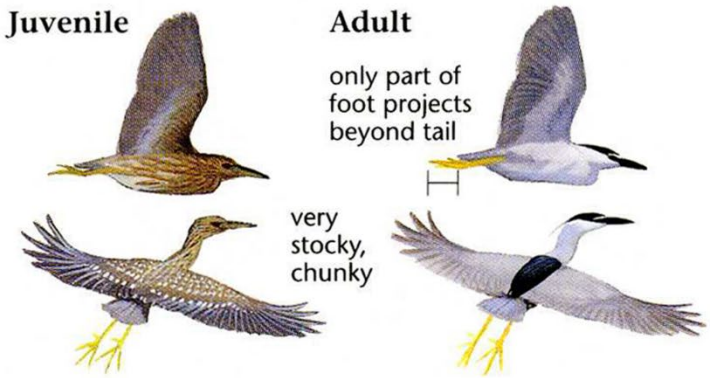
Black-crowned Night-Heron

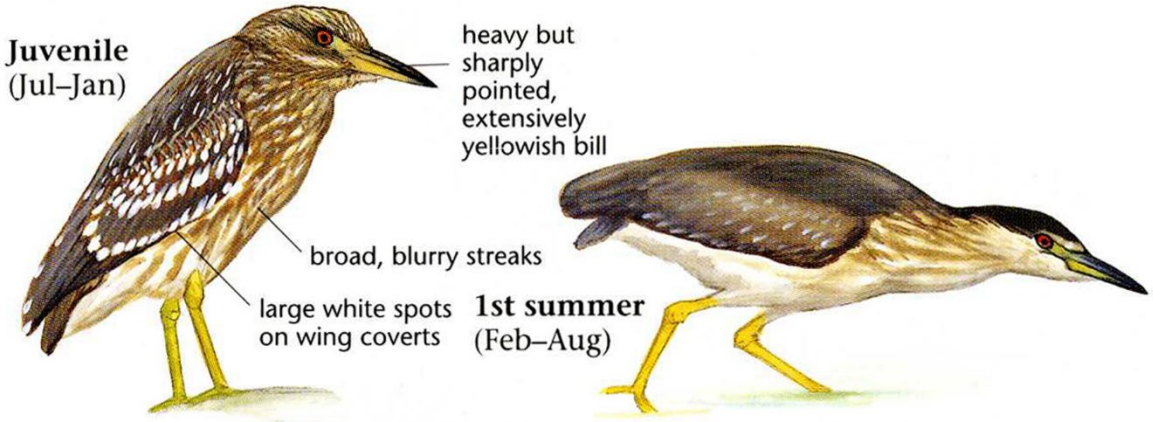
Nycticorax nycticorax

L 25" WS 44" WT 1.9 lb (870 g)

Very stocky, large-headed, and short-necked.







Voice: Common call in flight a flat, barking *quok* or *quark*. Other calls of similar quality given in nesting colony.

Typical sleeping posture of Black-crowned, with bill tucked into breast feathers.

Adapted from Sibley, David A. 2001. *National Audubon Society The Sibley Guide to Birds*. Chanticleer Press, Inc., New York.

Heron and Egret Courtship Behaviors

Behavior	Description	Significance
Stretch	Lifts head and closes bill to vertical (GBHE may howl at peak). The head is then brought down with lateral swaying and bent legs.	Typical courtship display accentuates plumes; often as part of **greeting ceremony.**
Snap	Moves head forward and down, neck extended, then snaps bill shut, usually with legs bent. May be done in conjunction with **stretch**.	Typical display used in different contexts, usually not directed at anyone; general advertisement.
Twig Shake	Slowly extends neck, grasps twig with bill and shakes. Resembles nest building behavior.	General advertisement.
Arched Neck	Erect neck feathers and head plumes, curves neck with bill downward.	Usually used by moving heron as threat display.
Upright Neck	Bill up, neck extended.	Antagonistic or threat display.
Crest Raising	Erect head plumes.	Common threat display.
Forward	Lifts wings, retracts head and rocks forward, stabbing toward another birds. Rapid tail-flicking in egrets.	Antagonistic or territorial display, sometimes used by young chicks in nest.
Circle Flights	Flies in large circle with neck extended, returning to original perch.	Used in identification and appeasement.
Landing Calls	Given when landing on nest, as part of **Greeting Ceremony**.	Recognition, pair-bonding.
Supplanting	Aerial display; flies at other perched bird and lands on its vacated perch.	Aggressive display, may end in fight.
Bill Duels	By newly paired birds, male stabs at relatively submissive female. Eventually decreases intensity as tolerance develops. Female may hold the male's bill.	Strengthens pair-bonding.
Bill Clappering	Rapid chattering of bill with or without contact with another bird.	Maintains close, un-aggressive contact with mate.
Wing Preen	Moves bill along primaries as if preening, but does not touch feathers. Orients towards male.	Pair-bonding, un-aggressive close contact.
Greeting Ceremonies	General term for behaviors when bird returns to nest and mate. May include **Landing Call**, **Stretch**, and **Bill Clappering**.	Recognition, strengthens pair bond.

These behaviors generally occur in specific stages:

- Unpaired males do **Snap** and **Stretch** displays (general advertisements), along with aggressive behaviors (**Supplanting, Arched** and **Upright Neck**).
- When a potential mate arrives, displays change to **Wing Preen, Bill Clappering,** and **Stretch.**
- The initial paired stage includes **Bill Duels** and more **Bill Clappering.**
- Once the pair bond is established, **Greeting Ceremonies** occur such as **Landing Call, Stretch** and **Bill Clappering.**
- **Greeting Ceremonies** continue through incubation and parental stages.

What should I do if I find a chick on the ground?

It is not unusual to find chicks on the ground beneath heronries. These chicks may range in age from days to weeks old. As difficult as it is for us to witness, this is usually a normal part of the breeding cycle for herons and egrets. Herons and egrets do not wait until the entire clutch of eggs is laid before incubating, therefore hatching is asynchronous, resulting in a brood with chicks of different ages. For example, Great Blue Herons usually begin incubating between the first and second egg, and the first two chicks to hatch are about 24 hours apart in age. In a clutch of four, the third and fourth eggs are incubated as they are laid, and usually hatch two or three days apart. This results in a brood where the oldest two chicks are much bigger and stronger than the younger chicks. When the chicks are fed, competition among the chicks can be intense, particularly in lean years. The oldest chicks have a competitive advantage during feedings. When food is limited, the youngest chicks may die of starvation or fall from the nest as a result of the scramble for food. There are many theories as to how the strategy of asynchronous hatching, followed by brood reduction, evolved. One theory is that it helps ensure that parents, unable to predict future food supply at the time of egg laying, raise the maximum number of chicks that the environment can support.

It is also true that the process of fledging for herons and egrets is an incremental one in which older chicks make short forays away from the nest, landing on nearby branches or in adjacent trees. In more natural environments, where there is an understory structure of shrubs or small trees, there is some protection for these chicks and for younger chicks that have fallen from the nest platform. In urban landscapes, however, this understory is often absent, leaving fallen and fledging chicks with no cover or means to climb back up to the nest. In these environments hazards such as traffic and terrestrial predators pose additional risks to the chicks.

If you find a chick on the ground at your heronry, spend some time observing the chick to determine if it needs rescue. Older chicks, in particular, may be off the platform, but not in distress.

If your assessment of the situation is that the bird is injured or in an unsafe environment, you may decide to take it to a bird rescue facility. If you do so, we urge you to first call the rescue facility to make sure they can take the bird. You should also ask for instructions for how handle and transport the bird.

Please note that adult herons and egrets can cause serious injury, especially to your eyes. We do not recommend handling adult birds unless you have prior experience and personal protective gear (such as long sleeves, **eye protection**, and gloves).

Bird Rescue Facilities:

Sonoma County

The Bird Rescue Center
707-523-2473
3430 Chanate Road
Santa Rosa CA 95404

Some helpful information on how to handle birds in need of rescue, particularly herons and egrets: https://www.birdrescuecenter.org/rescuing-birds-faq/#toggle-id-14

Marin County
Wildcare
Living with Wildlife Hotline: 415-456-SAVE (7283)
Administration: 415-453-1000
76 Albert Park Lane
San Rafael, CA 94901

Solano County

International Bird Rescue
San Francisco Bay Center
707-207-0380
4369 Cordelia Road
Fairfield, California 94534

Research Volunteer Responsibilities

Research volunteers collect and record data for observational studies. They assist with bird counts, nest site monitoring, data entry, and other research activities. Research volunteers must have the requisite field skills for each study, including proficiency in bird identification and interpretation of written protocols. Data entry volunteers must give attention to detail and have knowledge of the research process. These and other research activities are carried out under the direction and supervision of research staff.

Research Volunteer Code of Conduct

I understand and agree that all volunteers must observe certain standards of behavior while at work that will protect the interests and safety of all other volunteers, staff, visitors and the organization. I understand and agree that generally, no conduct that is unproductive, unsafe, inconsiderate, or illegal will be permitted. I further understand and agree that some examples of conduct that is expected of volunteers includes, but is by no means limited to:

- Conducting myself professionally, ethically, honestly, and with integrity in all situations.
- Treating fellow volunteers and staff fairly and impartially.
- Dressing appropriately for my assigned task.
- Signing and abiding by ACR's Policy against Sexual and Other Workplace Harassment.
- Performing tasks only if I may do so safely and appropriately.
- Participating in program evaluations and surveys as requested.
- Safeguarding all confidential information.

Research volunteers are required to read, complete, sign, and submit the ACR Volunteer Agreement. The agreement may be accessed and submitted on line using this link: ACR Volunteer Form

A hard copy of the form may also be requested by emailing barbara.wechsberg@egret.org and submitted by mail to Cypress Grove Research Center, P.O. Box 808, Marshall, CA 94940.

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440.935.1991 (mobile)
david.lumpkin@egret.org

To report unlawful activity near a nesting site, call the California Department of Fish and Wildlife*:
1-888-334-CalTIP (2258)
http://www.wildlife.ca.gov/Enforcement/CalTIP
*please also inform Heron and Egret Project staff

In case of an emergency:

- Be sure you are safe!
- Call 911
- Contact the Heron and Egret Project staff to inform them of any emergency as soon as possible.