

Eastern Black Rail Call-Response Survey Protocol for Range-Wide Monitoring

Version 1.1 (April 2023)

Background/Purpose

This document describes a targeted call-response survey protocol with the end goal of population estimation and trend estimation at the national and state levels. It is not appropriate for monitoring trends at smaller spatial scales. This protocol is based on the Standardized North American Marsh Bird Monitoring Protocol (Conway 2011) and has been tailored to specifically focus on detecting Black Rails. Some projects addressing specific objectives may require modification of this protocol; we encourage users to retain as much consistency with this protocol as possible for comparison to national data sets.

Suggested Citation

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Location of Survey Resources

A copy of the survey protocol, playback recordings (survey playback file and volume testing file), data entry spreadsheet, and editable datasheet are available here:

<https://www.fws.gov/EasternBlackRailSurveyProtocol>. Call-type examples, surveyor training files, and versions of the playback recording in different formats and volumes are available here: [Resources - Eastern Black Rail Call-Response Survey Protocol](#).

Survey Methodology

Playback Recording

The playback begins with 15 seconds of a silent preparation period before the start of survey so that surveyors can get into position after starting the recording. After the preparation period, the playback begins with five passive minutes followed by two minutes of intermittent playback, one minute of silence, another minute of playback and a final minute of silence, for a total of ten minutes (Table 1). Each minute with playback includes 15 seconds of calls followed by 15 seconds of silence repeated twice. The first minute is only the *kickee-doo/kic-kic-kerr* (KKD) call, the second minute and third minute include a mix of KKD, *churt* and *grr-grr-grr*. Recordings include calls from several individuals with different pitch and frequency. Each 15 seconds playback segment is unique, and a segment should not be repeated. The survey minute number is softly announced at the beginning of each minute of the playback recording. The 10-minute playback recording does not include heterospecific calls; however, additional minutes including heterospecific calls, additional black rail calls, or breaks can be added following the conclusion of minute 10. A standard playback file is available which we recommend using for purposes of standardization. If a project chooses to construct its own playback file or add additional periods of black rail vocalization, we suggest including only KKD, *churt*, and *grr-grr-grr* calls. The *ink-ink-ink* adult calls and chick calls should not be included in playback recordings.

Table 1. The minute by minute structure of the playback recording used in this protocol, including which calls are used during each minute. Each 15-second segment of BLRA playback should contain a unique combination and variation of calls, rather than repeating the same calls from previous 15-second segments. Minutes 11 and 12 are optional and can be adjusted to meet additional project goals.

<u>Minute</u>	<u>Description</u>
-0:15-0	15-second preparation period
0-1	passive
1-2	passive
2-3	passive
3-4	passive
4-5	passive
5-6	<i>kickee-doo</i> ; 15 seconds of playback and 15 second break (2x)
6-7	<i>churt</i> and <i>grr-grr-grr</i> ; 15 seconds of playback and 15 second break (2x)
7-8	break
8-9	<i>kickee-doo</i> ; <i>churt</i> and <i>grr-grr-grr</i> ; 15 seconds of playback and 15 second break (2x)
9-10	break
10-11	optional; heterospecific calls, black rail calls, or break
11-12	optional; heterospecific calls, black rail calls, or break

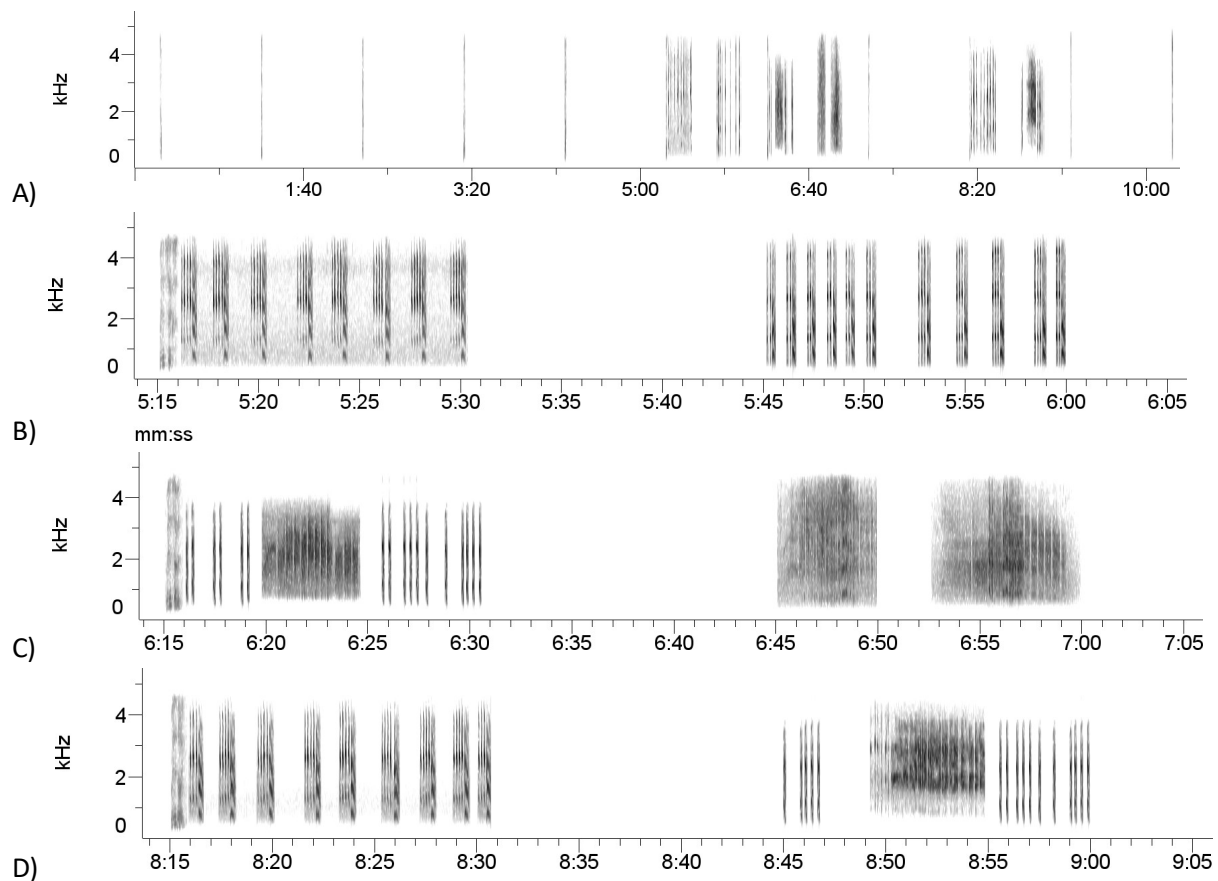


Figure 1. Spectrogram of provided 10-minute playback recording. A) shows the complete playback file. B-D) closer views of the black rail vocalization periods.

Survey Point (Point)

A survey point is the location where the surveyor stands while listening for responses. Points should be placed in potential habitat that is reliably accessible. Key characteristics of black rail habitat include appropriate vegetation structure, moist to 4 cm deep water, and enough topographic variation to create slightly higher patches. Potential habitat should be identified using land cover data and/or satellite imagery. Preliminary point selection should be followed up with ground truthing prior to initiating surveys.

Points should be placed a minimum of 400 m apart. For wetlands accessible only by roads or dikes, points can be placed every 400 m along the linear path. In highly fragmented landscapes (e.g., impounded wetlands) or expanses where you can access the marsh directly, points should be placed a minimum of 400 m apart in any direction.

One of the biggest demands on a time budget while doing surveys is commuting between points, often requiring travel by boat, vehicle, or on foot through marshy environments. Points should be grouped together in routes that minimize travel time and maximize survey time. Unless it is critical to determine if a specific area or piece of property is occupied, it is generally recommended to survey more points spaced closer together, versus fewer spread out over a large geographic area. In addition, avoid choosing points where access varies too highly over the season. For example, it is acceptable to have a route which can only be done at high tide, if it can be done consistently during each survey window, but a point that can only be reached at extreme high or low tides should be excluded.

Survey Period (Time of Day)

Survey periods are the times of day when surveys are conducted. The optimal time for surveying for black rails may vary regionally and among habitat types as daily vocalization patterns appear to be highly variable among subspecies and populations (Eddleman *et al.* 2020). Survey periods vary among regions and projects and should target times of day when relatively low background noise levels allow surveyors to hear black rails. See definitions of background noise levels in the Datasheet Codes and Definitions. Surveyors should not survey at background noise level 4. If possible, survey at background noise level 0-2, but we recognize that some sites will always have background noise level 3. In some areas, loud calls by frogs make it very difficult to hear rails during the night and in other areas background noise from wind is the largest issue and the wind speed tends to decrease at night. Nocturnal survey periods are typically used in mid-Atlantic states and in Colorado, whereas crepuscular survey periods are preferred in the Southeastern and Gulf regions.

Crepuscular Survey Period: 30 minutes before sunrise to 3 hours after sunrise; 3 hours before sunset to 30 minutes after sunset. Frequently used in Alabama, Colorado (dusk and nocturnal), Florida, Georgia, Louisiana, Mississippi, Oklahoma, South Carolina, Texas, and in parts of North Carolina.

Nocturnal Survey Period: between 30 minutes after sunset and 30 minutes before sunrise. Frequently used in Colorado (dusk and nocturnal), New Jersey, Maryland, Virginia, and in parts of North Carolina.

Survey Window (Time of Year)

The seasonal timing of surveys should be based on the breeding phenology, which varies regionally (Table 2). A minimum of 5 survey repetitions should be completed at each point within the breeding season, although 6 repetitions are recommended if logistically possible based on the increase in power

to detect trends. Additional repetitions during the late breeding season can be added to increase statistical power, but should not replace the 5-6 repetitions within the recommended 3-month period. Surveys should be timed to coincide with the first three months of the breeding season, after most migrants are likely to have departed from the area and before young of the year are likely to be vocalizing. The breeding season has been divided into bimonthly survey windows (1) Feb 16-28/29; (2) Mar 1-Mar 15; (3) Mar 16-31; (4) Apr 1-15; (5) Apr 16-Apr 30; (6) May 1-15; (7) May 16-31; (8) Jun 1-Jun 15; (9) Jun 16-30; (10) Jul 1-Jul 15; (11) Jul 16-Jul 31; (12) Aug 1-15; and (13) Aug 16-31. Surveys should be conducted a minimum of 7 days apart and spaced throughout the breeding season. Please refer to Table 2 for the recommended starting period based on your location (i.e., if you are located in North Carolina, your breeding season surveys would begin during period 6 and end during period 11).

Table 2. Estimated first 3 months of the Eastern Black Rail (*Laterallus jamaicensis jamaicensis*) breeding season dates by state.

State	Start Date	End Date
Florida		
<ul style="list-style-type: none"> ● Everglades (area from Lake Okeechobee south) ● North and central interior, Gulf coast saltmarsh 	16 Feb	15 May
	16 Apr	15 Jul
Gulf Coast (Texas, Louisiana, Mississippi, Alabama)	16 Mar	15 Jun
South Carolina	16 Apr	15 Jul
Georgia	16 Apr	15 Jul
Colorado	16 Apr	15 Jul
New Jersey	16 Apr	15 Jul
Oklahoma	1 May	31 Jul
North Carolina	1 May	31 Jul
Virginia	1 May	31 Jul
Maryland	1 May	31 Jul

Repetition Across Years

In general, once points are established, it is preferable that these points be visited in each of these periodic surveys. This allows for direct comparisons in changes of both the habitat and bird occupancy over time. Additional points may be added within and across properties as priorities shift, habitat is restored, etc. However, a point should only be dropped if the habitat becomes unsuitable (see “Temporary or Permanently Unsuitable Survey Points” below). For instance, this can occur if a wetland completely dries up, is overrun by woody growth, is converted into another type of habitat, or tidal high marsh shifts to tidal low marsh or open water. For discussion of how often to repeat surveys across years see the FAQ section.

Surveyor Training Recommendations

All surveyors should receive training on survey methods and black rail call recognition prior to completing surveys. All surveyors must be proficient at identifying black rails by their common calls (*kickee-doo/kic-kic-kerr*, *churt*, *grr-grr-grr*, and *ink-ink-ink*) and be familiar with the calls of common marsh bird species and other animals in the survey area. Spectrograms and labeled audio recordings of a

variety of black rail call types are available by request or can be found at [Resources - Eastern Black Rail Call-Response Survey Protocol](#). Training recordings are also available in the Resources folder and can be used to simulate surveys. Surveyors should practice estimating distance to focal birds by using a broadcast unit placed in the marsh as a simulation. A range finder or measuring tape can be used to calibrate distance estimation skills prior to beginning surveys. Distance buffer maps for each survey point can also be used to aid in distance estimation. Where feasible, natural resource agencies and organizations should collaborate to provide resources and support consistent training within each state.

A single surveyor should complete a datasheet at each survey point. A second person may accompany the surveyor for safety or training purposes but must not point out calls or birds or interact with the surveyor until the survey has been completed. Once all of the points for that night/morning are completed, the participants may discuss their observations, but the data should not be altered; obvious mistakes should be noted but not changed.

Inexperienced surveyors should complete at least one “trial run” prior to initiating surveys so that they are familiar with using the datasheet and recording the data appropriately. When possible, inexperienced surveyors should shadow experienced surveyors prior to conducting surveys independently. Surveyors-in-training who are accompanying experienced surveyors should clearly note “Training Survey” on their datasheet and their data should not be entered into the database.

Broadcast Equipment and Placement

A call-broadcast player with the playback recording is required. Equipment can consist of one player with file storage and speakers combined (e.g., FoxPro NX4 gamecaller) or a device with the file and a separate speaker (e.g., phone and wireless speaker). Regardless of the configuration, the speaker portion should be double-ended to broadcast in all directions. Prior to arriving at the first survey point, broadcast volume (sound pressure) should be measured one meter in front of the speaker. The volume should be approximately 80 dB – 90 dB (loudest calls ~90 dB) at one meter. If the volume is lower or if the sound quality is distorted, replace the batteries. A version of the survey playback recording that does not include the initial 5 minute passive period will also be provided and should be used for testing.

The call-broadcast player should be raised (by hanging or with a stand) parallel to the ground at approximately 120 cm above ground three meters from the survey point (at which the surveyor(s) are standing). If on a dike or road, the unit should be perpendicular to the dike, with the speaker (cone speaker for FoxPro NX4 gamecaller) facing the widest extent of potential black rail habitat or pointed north if habitat is suitable in all directions.

Weather and Background Noise Restrictions

Surveys should only be conducted when wind speed is <10 kts (<20 kmph; <4 on Beaufort Scale) and not during periods of sustained rain or heavy fog. Surveyors should postpone surveys if they believe high winds or other uncommon background noises are decreasing the detectability of marsh birds. If wind speed increases to >10 kts during the survey or sustained rain begins while the survey is already underway, surveyors should stop the survey. The remaining points should be surveyed on another date within the survey window.

Data Collection

Datasheet and Data Entry

A PDF version of the standardized datasheet is included at the end of this protocol. An editable version of the datasheet and a corresponding Excel spreadsheet for data entry are also available.

General and Weather Information

At the first survey point, prior to initiating playback and beginning of the survey, record the date, survey window number, route name or code (optional), and surveyor name. Measure and record the starting temperature (°F) prior to starting the survey at each point.

At each survey point, record the survey point name or code, background noise (codes below), wind speed (average knots/hour averaged over 30 seconds using a Kestrel), sky condition (National Weather Service code number), and start time (initiation of playback) at the beginning of each survey. If a Kestrel is not available, use the Beaufort Wind Scale (<https://www.spc.noaa.gov/faq/tornado/beaufort.html>) to record wind conditions and clearly indicate that the Beaufort scale was used.

Recording Detections of Black Rails

When a black rail is detected, write BLRA in the Species column. In each minute-by-minute detection column, record “1” if a black rail is heard, “S” if it is seen (including flying), “1S” if it is heard and seen, or “0” if there are no detections during the minute. Use a separate row for each individual black rail. Additional rows can be used to record notes about observations. If no black rails are detected at a point, write NO BLRA in the Species column. If you are uncertain if you heard a black rail at a point, record NO BLRA in the species column and use additional rows to record notes about your observation.

Surveyors may have difficulty determining whether a call is coming from a new individual or an individual previously detected already from the survey point. Black rails often approach playback to investigate other calling birds (Legare *et al.* 1999). In general, be conservative and assume that a call is from the same bird if the call came from the same general location (i.e., a similar direction and not too far from the location of the original call).

Recording Types of Call

Record all types of calls given by each black rail that is detected in the *Call Type* column on the datasheet. List call types in the order in which they were initially heard. Common adult call types include *kickee-doo/kic-kic-kerr* (KKD/KKR), *grr-grr-grr* (GRR), *churt* (CHR), and *ink-ink-ink* (INK).

Different call types have different functions and may indicate pairing status and stages of the nesting cycle in a local area (allowing refinement of local survey windows). Detection probability and observer bias may differ with different call types and accuracy of distance estimation may vary with call type.

Black Rail Detections Outside of Survey or Between Points

If black rails are only detected from the survey point before or after the call-response survey, record data about the detection on the datasheet, but note the detection occurred outside of the playback period rather than entering data in the minute columns. If you detect a black rail between survey points, record data on the datasheet and also record coordinates from the location where you were standing when you detected the rail. Add a point to future surveys if feasible.

Recording Secondary Focal Species (Optional)

We suggest surveying black rails only to allow surveyors to focus all of their attention on listening for black rails. If it is necessary to record detections of other marsh bird species to meet additional project objectives, additional high priority species can also be included. For these secondary species, do not collect minute-by-minute data for each individual. Instead, use a row on the datasheet to note the species was present or to record the total number of individuals detected during the survey. Clearly indicate which species are included in the survey. Surveyors should listen for and record all black rail and secondary focal species included in the survey throughout the entire 10-12 minute playback recording.

Temporary or Permanently Unsuitable Survey Points

If the habitat surrounding a survey point is unsuitable during a field season, the point should still be visited at least one time during a breeding season, and the reason the point is unsuitable should be documented. On the datasheet, record “Not Surveyed - Habitat Unsuitable” in “Species” field and explain the reason as a comment. Use additional rows if necessary. If the point is no longer surrounded by potential habitat and is unlikely to become suitable again (such as in the case of sea level rise) the point can be completely removed in subsequent seasons. However, if the habitat is likely to be restored or managed, the point should be surveyed once each breeding season during subsequent years of survey work.

Data Storage and Management

The U.S. Fish & Wildlife Service’s (Service) eastern black rail recovery coordinator will implement a yearly data call via a Microsoft Access form which will collect the data in a range-wide Eastern Black Rail Survey Database. The form will be adapted from this protocol’s standardized datasheet and excel spreadsheet. Data submitted will be used to inform recovery efforts for the subspecies, including the 5-year status review process. The Service also plans to post this survey protocol and datasheet to the South Carolina Ecological Services website <https://www.fws.gov/office/south-carolina-ecological-services> and link to it on the subspecies’s official profile page <https://www.fws.gov/species/eastern-black-rail-laterallus-jamaicensis-jamaicensis> as well as other relevant websites.

Data Entry

Field data should be entered into the standardized Excel data entry spreadsheets and submitted to the USFWS Recovery Lead (Morgan Wolf, morgan_wolf@fws.gov) via email by December 1 of the survey year. The template for the standardized data entry spreadsheet can be downloaded from the following webpage: <https://www.fws.gov/EasternBlackRailSurveyProtocol>.

Survey Supply Checklist

- Clipboard, printed datasheets on Rite-in-the-Rain paper (or tablet with data collection form), pencils (including spares)
- Printed protocol including Survey Supply Checklist and Quick Reference Codes and Definitions
- First aid kit
- Bug protection - head net, bug jacket and/or spray, pants and long-sleeved shirt
- Snake chaps (if working in venomous snake habitat)
- Route maps
- Handheld GPS
- Kestrel Wind Meter (optional but useful, make sure model includes a thermometer)
- Mirrored sighting compass (undeclinated)
- Call-broadcast unit with amplified speakers with broadcast sequence loaded (FoxPro NX4 gamecaller or similar)
- Stand or hook for hanging speaker
- Headlamps and/or spotlight (alternative: phone flashlight)
- Spare batteries for GPS, call-broadcast unit, and lights
- Sound level meter (decibel meter) – available as app for phone, several free options including NIOSH Sound Level Meter App by the National Institute for Occupational Safety and Health for iOS or Decibel X
- Rangefinder (optional)
- Sunrise/sunset timetable <http://www.sunrisesunset.com/calendar.asp>

Batteries in the call-broadcast unit should be changed or re-charged frequently (before sound quality declines). Spare batteries should be carried on all surveys. If available, a spare call-broadcast unit (additional gamecaller) should be carried in case the primary unit fails to operate.

Datasheet Codes and Definitions

Date: DD Month YYYY (e.g., 15 May 2020)

Background noise: 0 = no noise; 1 = faint noise; 2 = moderate noise (probably cannot hear some black rails beyond 100m *during >30 seconds of the survey*); 3 = loud noise (probably cannot hear some black rails beyond 50m *during >30 seconds of the survey*); 4 = intense noise (probably cannot hear some black rails beyond 25m *during >30 seconds of the survey*; **too much background noise for survey**).

Sky: 0 = clear or a few clouds; 1 = partly cloudy or variable sky; 2 = cloudy or overcast; 4 = fog/smoke; 5 = drizzle; 8 = showers; do not survey during rain showers

Wind speed: use Kestrel if available (average knots/hour over 30 seconds); >10 kts is too windy

Beaufort wind scale (use only if Kestrel is not available): 0 = smoke rises vertically; 1 = wind direction shown by smoke drift; 2 = wind felt on face, leaves rustle; 3 = leaves & small twigs in constant motion and light flag extended; 4 = raises dust and loose paper, small branches are moved; 5 = small trees with leaves sway, crested wavelets on inland waters (**too windy for survey**).

Temperature: use Kestrel or an alternative portable thermometer (°F)

Start Time: time when playback recording started, 24 hour format

Playback survey:

Species: Record "BLRA" if a black rail is detected at the survey point. Record "NO BLRA" if there were no black rail detections.

Minutes detected: In the appropriate column for each minute, write "0" if black rail was not detected, "1" if the black rail was heard, "S" if the black rail was seen, and "1S" if both heard and seen. Make note if black rail was detected before or after playback survey and collect all data except Minutes Detected. If no black rails are detected, species is recorded as "NO BLRA", minute columns can be left blank.

Detected at previous point: Record "yes" (detected previously) or "no" in box for each black rail.

Distance: Record estimated number of meters between the survey point and the location where the black rail was initially detected. Printed or electronic maps with buffer distance rings, range-finders, or measurements using digital maps (e.g., Avenza) can be used to improve distance estimation.

Direction: From the survey point, use a compass to determine the direction and record in degrees.

Comments: No dedicated field. Use rows of datasheet for noting comments as needed. If you may have heard a black rail but are uncertain, record notes about the observation on additional rows of the datasheet.

Black Rail Call Types:

Common Calls by Adults

kickee-doo/kic-kic-kerr (KKD/KKR, various spellings including ki-ki-doo)

*grr-grr-grr (GRR)**

churt (CHR)

ink-ink-ink (INK)

*Surveyors should be familiar with both *grr-grr-grr* types (monotone and chattering), but it is unnecessary to differentiate between types during surveys. Examples of less common call types are available in the Resources folder but are very rarely heard during surveys.

Temporary or Permanently Unsuitable Survey Points

If the habitat surrounding a survey point is unsuitable, record "Not Surveyed - Habitat Unsuitable" in the "Species" field and explain the reason in the "Notes" field. Points that are unsuitable throughout a field season should still be visited at least one time during the breeding season.

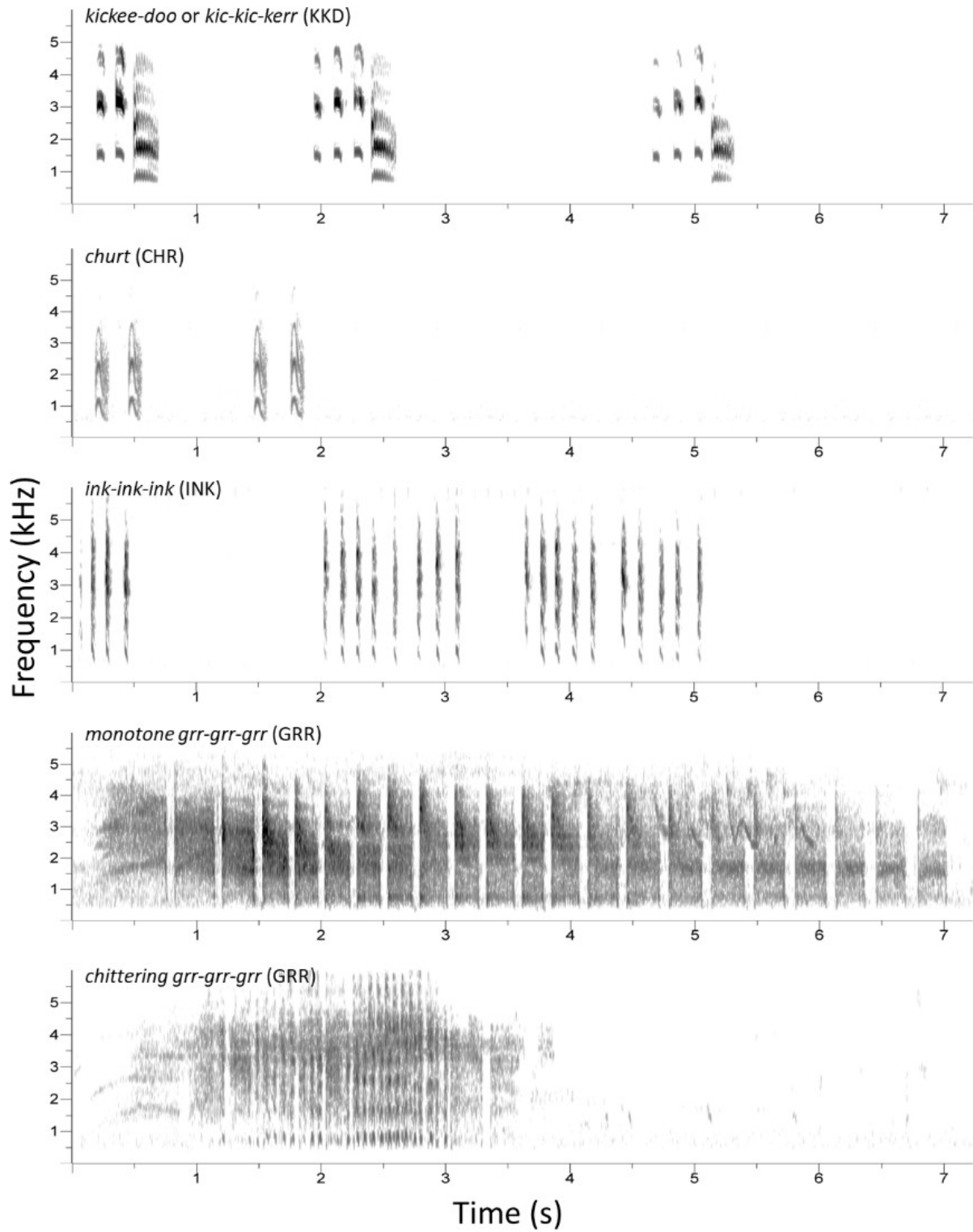


Figure 2. Spectrograms and codes for common Eastern Black Rail call types. Recordings were collected in South Carolina

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Frequently Asked Questions

Basis for Call-Response Survey Protocol

- This black-rail-specific call-response survey protocol is largely based off of the Standardized North American Marsh Bird Monitoring Protocol (NAMBMP; Conway 2009, 2011), which provides a basis for using call-response to improve detectability for secretive marsh birds. This protocol is consistent with the NAMBMP in many ways such as utilizing a 5-minute passive period, recording individual detections, and recommending point spacing (minimum of 400 m) to minimize double counting individuals. However, general marsh bird surveys have been found to be ineffective at detecting black rails (Wilson et al. 2009). Therefore, multiple region/state-specific modified black rail survey protocols have been developed. This protocol focuses specifically on black rails in order to increase probability of detection and to standardize across the range. The protocol uses a standardized single-species (black rail) call-broadcast and is targeted toward optimal survey periods when local information is available.

- Standardized marsh bird monitoring resources can be found at <https://www.cals.arizona.edu/research/azfwru/NationalMarshBird/>

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Explanation of Call-Playback Recording Structure

- Five minutes of passive listening at the beginning of the sequence is included for two primary reasons. Passive listening allows for data collection and analysis of detections prior to broadcast calls/response. ELBRA are known to move in response to broadcast calls, which violates assumptions necessary for many statistical analyses. Second, a five minute passive period is consistent with the National Marsh Bird Monitoring (Conway 2011) and the Saltmarsh Habitat and Avian Research Program (SHARP) protocols, which are conducted broadly throughout the eastern black rail's (EBLRA) range. Additionally, data from Texas and Colorado indicate that over 50% of ELBRA are detected during a four and five minute passive period, respectively. South Carolina and the Firebird Project also documented EBLRA detections during the passive period.
- Option to include additional minutes with heterospecific calls or additional black rail calls. Allows for both consistency and customization.
- The *kickee-doo/kic-kic-kerr* (KKD), *churt*, and *grr-grr-grr* calls were selected for the playback recording because these calls are commonly given by black rails during both the breeding and nonbreeding seasons. KKD and *churt*, in particular, transmit clearly

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across the distances relevant for the surveys. Calls associated with sensitive stages such as brood rearing (e.g., *ink-ink-ink*, *chek-chek-chek*, and chick vocalizations) should not be included because they may cause undue distress to breeding rails.

- This playback structure is appropriate for use anywhere within the EBLRA range because there is no evidence currently that responses to local calls differ from responses to exotic calls. The Firebird project found no statistical difference in responses of EBLRAs across the Gulf Coast between EBLRA calls from the Eastern United States (Colorado) and BLRA calls from South America (Peru).
- It is highly recommended that all observers adhering to this protocol use the associated playback file. Using the same playback structure in a standardized approach will reduce any potential bias in responses by ensuring all birds are subject to the same call types for the same duration. Additionally, it ensures that all surveys are conducted for the same amount of time and that all observers have the same amount of time within the survey during passive periods for listening.

Site Selection

- This document does not address the details of site selection, such as what constitutes potential habitat, what minimum amount of habitat is required at a point, and sample size of points. A site selection process will be developed in the next phase of the protocol development effort. In the meantime, researchers and managers should familiarize themselves with what constitutes potential habitat for their area of interest as this varies across the range.

Reason for Latitudinal Differences in Daily Timing of Surveys

- Although little data exist on the optimal time to survey across the range, we used expert opinion from multiple states as well as some preliminary data from North and South Carolina to demonstrate that there are latitudinal differences in the best time of day to detect birds. The current hypothesis is that birds vocalize most often when they are best able to be heard over ambient noise levels. In northern locations this appears to be at night when the background noise is at the lowest level. However, in the south where multiple amphibians vocalize at night, the quietest periods are often during the crepuscular hours (despite the morning bird chorus). More research should be done to document peak calling times across the range.

Justification for Number of Repetitions Within and Among Years

- While there is limited literature published on the number of surveys to do at a single point during the breeding season, and that number may vary given a project's objective, it appears that 5-6 repetitions is the best balance between logistical feasibility and boosting detection rates and analytical power. Conway et al. 2002 estimated that 5-12 surveys were required to have a 90% chance of detecting a California black rail if a point was occupied, while Tolliver et al. 2018 estimated that 8 surveys would be required under mean environmental survey conditions to ensure a 95% chance of detecting a black rail if a point was occupied in Texas. With low detection probabilities in general across the range and the conservation status and therefore importance of surveys, 5-6 surveys is likely the best compromise.

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- Although ideal, organizing and funding yearly surveys may be difficult if not impossible for some locations and states. Therefore we are recommending repeating surveys every 2-3 years in core areas, and broader state-wide surveys every 5 years. Ideally, a state-wide survey would be done in two years with some (if not all) points visited in both years. However, resources and logistics may prevent this, so the state-wide collection should be done in as few consecutive years as possible. A core area is defined as an area of known black rail occupancy within the past five years.
- Resurveying at least every 5 years is desirable to inform federal species status reviews. Shorter intervals between surveys provide more power to track trends, and may be particularly important in areas that either host important black rail populations or are subject to rapid climate and habitat changes.

Area of Inference

- This protocol is designed to monitor the EBLRA across its range. It is not suitable for monitoring trends on individual properties. If a state wishes to monitor trends on the state level, they should conduct a power analysis to determine what level of change they want to detect and over what timeframe, and therefore how many points would be needed within their state.

Training Recommendations and Resources

- Recognizing Call Types. All surveyors should learn to recognize the four most common EBLRA call types (*kickee-doo/kic-kic-kerr*, *churt*, *grr-grr-grr*, and *ink-ink-ink*) prior to completing surveys. Surveyors should also learn the standardized terminology used throughout this protocol. Spectrograms and labeled audio files can be found here: [Resources - Eastern Black Rail Call-Response Survey Protocol](#). Uncommon call types such as *twrrrr* and vocalizations by chicks are heard very rarely, so it is not essential for surveyors to be familiar with these calls. Although EBLRA throughout the subspecies range use the same types of calls, there is variability among individuals and it is important to learn to recognize the full range of variations. EBLRA often call softly or are heard from a distance of 100 m or more, so it is necessary to be able to recognize faint calls. Additional recordings of EBLRA calls can be found on Xeno-canto [Black Rail \(*Laterallus jamaicensis*\) :: xeno-canto](#) and the Macaulay Library by the Cornell Lab of Ornithology [Black Rail Sounds, All About Birds, Cornell Lab of Ornithology](#). It is important to note that these additional sources may not use the standardized names and calls of other species may be included in the recordings along with EBLRA calls. Surveyors should also become familiar with the calls of other common species in the habitat they will be surveying.
- Recording Detections. After becoming familiar with the common call types, surveyors should practice following the protocol and filling out datasheets prior to conducting official surveys. If possible, new surveyors should accompany experienced surveyors and receive in person training. Surveyors can also practice some components of the survey by using ARU recordings to simulate listening for EBLRA in the field using Practice recordings (survey simulation instructions and audio files) created by SCDNR can be found here: [Resources - Eastern Black Rail Call-Response Survey Protocol](#).

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- Distance Estimation. All surveyors should practice estimating distances in marsh habitat that is similar to the sites where they will conduct surveys. There are several approaches that can be used to determine if estimates are accurate. Printed or digital maps showing imagery and buffer distance rings (e.g., 25 m, 50 m, 100 m, 200 m, 400 m) from individual survey points can help surveyors determine if they are estimating accurately during training and can also be used as distance estimation tools during surveys. Electronic rangefinders can be useful in some habitat types (e.g., mix of herbaceous vegetation and large shrubs) but typically do not perform well in open grasslands. In addition to estimating distances to visual, surveyors can use a call broadcast device to practice identifying the location of the rail. Visually identify the location where the bird appears to be calling from and estimate the distance to that location instead of estimating distance based on call volume. It is difficult to simulate hearing real EBLRA because the volume at which they call varies and often is just higher than the ambient noise level. The call-broadcast volume used during the surveys is unrealistically loud. During training, surveyors should not walk into or use excessive playback near potential EBLRA habitat.

Equipment Recommendations

- double-ended playback device - volume adjustment can be made to the audio file before adding to playback device - examples used in the past include JBL Flip Waterproof Bluetooth speaker (models 4-6 have been field tested) paired with a phone, Foxpro game callers which store the playback file on the unit itself [the NX4 is no longer available, but similar double-ended models should suffice; *note: Foxpro products are not waterproof])
- Lithium batteries or premium NiMH batteries (e.g., Eneloop Pro), rechargeables can be very efficient and produce much less waste
- wind meter, specifically a model with a temperature sensor if possible (ex., Kestrel 2000 Pocket Wind Meter Plus) - if a wind meter is not available the following options can help: 1) a cheap thermometer mounted to the speakers (as long as the speakers do not heat up) or other piece of external equipment, 2) a piece of flagging or lightweight flag attached to a pole (can be the pole used to hang the playback equipment) to make determining Beaufort scale easier, especially for night time surveys
- Any GPS with reasonable accuracy and waterproofing should work, ex., Garmin GPSMAP (various models), Garmin Oregon series, Garmin eTrex models (*note: some GPS models such as eTrex have character limits over 10 which can limit point naming conventions). For road based surveys, a standard Garmin automotive GPS may work sufficiently well.

Recording Secondary Focal Species

- It is critical that the primary focus of EBLRA surveys on detection of EBLRA. Many EBLRA calls are difficult to detect and may be missed when observers are focused on other bird calls. Recording data on datasheets can distract observers as well. Therefore, we do not generally recommend collecting detections for other species. However, partners in some regions have survey objectives that include one or two additional focal marsh birds. Therefore, this protocol allows for additional species broadcast calls, but only at the end

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of the 10 minute standardized EBLRA broadcast. This allows for a rangewide standardized broadcast focused on EBLRA.

- It is important to identify additional focal species prior to initiating field surveys and ensure that observers are trained for all the focal species calls. Any study that is recording multiple species should clearly note which additional species are being recorded.

Additional Variables for Analysis

- Data available online are not entered by surveyors, but can be added to data sets after the field season for analysis purposes. These data include lunar phase for all sites and tidal stage for tidally influenced areas. Typically these data can and should be queried and downloaded in batch files at time of analysis.
- Lunar phase categories on a scale of 0-15: 0 = no moon and 15 = full moon. Days 14 – 1 reflect the progressive decrease in moonlight during the waning and, inversely, days 1-14 reflect the progressive increase in moonlight during waxing (Spear et al. 1999). Data are available online on websites such as <https://www.almanac.com/astronomy/moon/calendar>.

Autonomous Recording Units (ARUs)

- ARUs typically are not used during call-response surveys unless the objective is to compare detection methods. Recommendations and guidelines for the use of ARUs are being developed separately from call-response survey protocol. Reach out to Christy Hand (handc@dnr.sc.gov) or Heather Levy (hlevy@talltimbers.org) to be added to the Eastern Black Rail ARU Team.

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