**Standard Banding Conditions for Eastern Black Rail (*Laterallus jamaicensis jamaicensis*)**

**Version 1.0**

Image: Christine Hand, SCDNR

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**Capture and banding of eastern black rails (black rails) may only take place if an individual holds a valid bird banding permit issued by the U.S. Geological Survey (USGS), Bird Banding Lab under the Migratory Bird Treaty Act, and a Threatened Species Recovery Permit issued by the U.S. Fish and Wildlife Service (USFWS) under the U.S. Endangered Species Act. A permitted bander must be present and have the authorization on their banding permit stating they may band black rails. On 10/08/2020, the U. S. Fish and Wildlife Service announced threatened species status for this subspecies under the Endangered Species Act of 1973. Existing banding permittees with authorization to band all species or to band black rails, even if issued prior to this announcement, must obtain a Section 10 Recovery Permit for banding of eastern black rails. This is administered by the USFWS Ecological Services (https://www.fws.gov/endangered/permits/recovery-permits-contacts.html).**

**When the section 10 permit is approved, the bander must provide this to the USGS Bird Banding Laboratory (BBL) so that the BBL can evaluate the permit in question and decide whether it should be updated to show that this listed subspecies may be captured and banded. In order to collect feathers or blood, use mist nets, or apply radio transmitters, additional authorizations must be added to the permits by the BBL and USFWS. Banders engaged in research activities must coordinate with the USFWS, BBL, and their corresponding state agency to determine that all necessary authorizations are in place prior to initiation of such research activities.**

**Goal:** Any bird capture technique is associated with a risk of injury or mortality to birds. Further, activities that take place within emergent wetlands or grasslands have the potential to leave behind short-term vegetation impacts. Threatened and / or endangered bird species require additional permits, authorizations, and precautions in order to plan for safe capture and the application of bands

and possibly auxiliary markers. This document provides guidance for updating (or applying for new) authorization to capture and band eastern black rails (above). It also provides a list and description of used and accepted techniques for the capture of eastern black rails. Each capture technique described below includes prescriptions intended to minimize the likelihood of direct or indirect harm to eastern black rails and their habitat.

Researchers may find different capture techniques that have been used on similar species, but never attempted with eastern black rails. Those methods should be vetted and authorized by the BBL prior to their use with eastern black rails. Following the capture technique descriptions, this document outlines steps and procedures required for safe handling and banding of captured eastern black rails.

**I. Capture Techniques for Eastern Black Rails**

Capture adult eastern black rails using:

A) The Bottle Line Method, at night, during the non-breeding season only;

B) Hand or Hand Net Capture Using Auditory Lure, at night;

C) The Mist Net Method Accompanied by Auditory Lure, daylight hours; and

D) The Walk-in Trap, Accompanied by Drift Fencing, during daylight hours.

**A. Bottle Line Method (Night, Non-breeding Season)**

For examples of the use of the bottle line method, see Haverland (2019), Tsao et al. (2009), Morris et al. (2017), and Butler et al. (2010). This method is exclusively performed at night and is appropriate for use during the non-breeding season only. It is most effective in short vegetation when used on California black rails (< 0.5 m). Eastern black rails may be captured using this method in taller vegetation but researchers should be aware that a detection trade-off may exist, with birds being more difficult to detect in taller vegetation than relatively short vegetation (see Haverland 2019). Observers must wear headlamps or carry spotlights or flashlights that they will use to guide their travel, locate, and capture rails.

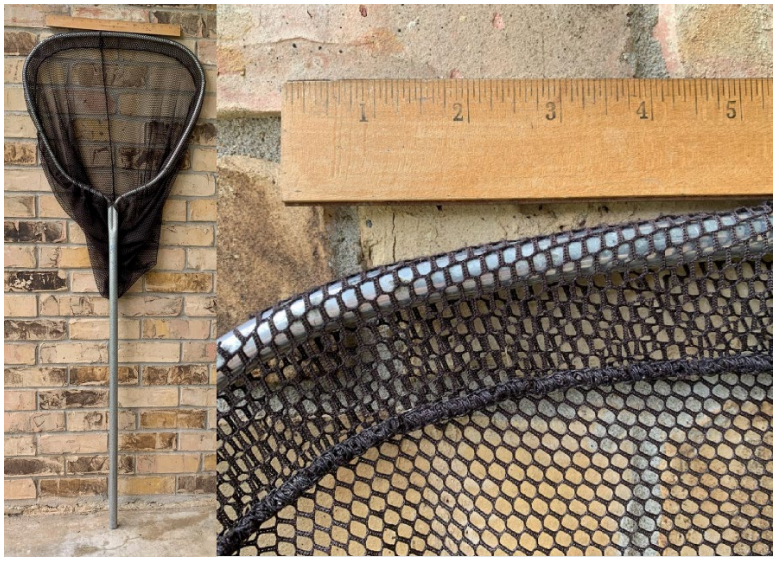
When using this method, a bottle line crew is staffed by one observer on each end of a line to which plastic bottles (i.e., soda bottles) are attached. Bottles are attached at a spacing roughly 0.5-1.5 m apart along the line. Observers are spaced at roughly 5.0 m intervals. Metal bottles or cans, or any non-flexible, hard container, are not acceptable line attachments. The bottles contain as few as 3 noise making devices such as jingle bells or small gravel. The observers on each end of the line drag it slowly through the area of interest, looking carefully for rails that are making brief flights from the vegetation or moving through or on top of the vegetation. Those pulling the line should look ahead and to their side while dragging the line while maintaining a slight “u” formation. Additional observers may walk behind the bottle line, and should be watching the area immediately around the line and in the body of the “u” behind those dragging the line for moving rails.

The bottle line technique functions by disturbing black rails and causing them to move through the vegetation that provides them with overhead cover. They may not emerge for capture, so observers must learn to spot movements of vegetation that belie the presence of a moving black rail. Black rails

may sometimes resemble mice with their movements, as they may "wiggle" through the vegetation. In addition, observers should learn to identify the bird in flight because they can flush from the vegetation and make brief flights before resuming cover. Often the rail will emerge from vegetation and move across it, and this is the time when observers may capture the bird using a capture net (see Figure 1 below). It is important to recognize that not all rails will emerge from vegetation and that banding crews may not be able to spot a bird for safe capture though they can see it moving in the vegetation. In this event, they will have to refrain from capture attempts. Attempting to confine and capture a rail that is not completely visible may result in mortality or injury to the bird.

Upon flushing a rail, observers may safely capture it for banding using a capture net: a hand net with soft, small-diameter mesh such as a bait net (Figure 1). These capture nets have capture frames the same size as traditional landing nets used by anglers, but the capture bags have a small mesh size (for example, mesh openings of 5 mm x 5 mm) that prevents escape. The soft mesh used on these bait nets will also not be abrasive to the bird's skin or damage feathers. Mesh size may vary so long as it is small enough in diameter to confine a black rail; however, the material must be soft and non-abrasive. Monofilament or coarse threads such as those found on traditional landing nets are inappropriate because birds may become entangled in the net and sustain injury. Upon capturing a bird, observers will place it in a bird holding bag and band it approximately 20 feet behind the bottle line prior to release. If a GPS position is recorded for the spot from which the bird was originally detected and flushed, the bird should be returned there. Regardless of which release option is chosen, the bander should ensure that the bottle line will not pass over the release site when activities resume.

**Figure 1**. A landing net with soft, small diameter mesh that is used for capturing eastern black rails. The soft capture fabric with small openings is beneficial because it lessens the chance of feather damage or chafing of a captured bird's skin. Also, the openings are too small to allow a black rail to become entangled in the material, further decreasing the chance of inadvertent injury. A 15-inch ruler is included for scale. Images: USFWS, J. Wilson




**Hazards**

Hazards to be cognizant of include injury or mortality of birds due to unsafe capture practices using bare hands or capture nets, and inadvertent trampling of the birds by observers. When placing a net over a

bird that is on top of the vegetation, care should be taken to ensure that the bird does not become injured by the frame of the net. The presence of people using a bottle line is a disturbance to this migratory bird and should only be permitted for research or monitoring projects. Repeated use of the same pathway when applying the bottle line technique may result in short term vegetation impacts and should be avoided. Short term vegetation impacts may also result from a large number of participants present for banding (i.e., in excess of the specified line spacing), which then kneel or sit on the ground during this activity. Bottle line crews should be aware of this and endeavor to minimize vegetation impacts during their activities.

**Prescriptions to follow:**

1) Bottle line crews must be trained by someone that has experience in the use of bottle lines for black rail capture. A permitted bander with authorization to band black rails must be present. Untrained crews may not attempt to operate a bottle line and capture birds without receiving thorough training first. If someone is being trained during a capture operation, they can shadow the permitted bander until the bander determines their training is complete, at which time they may then participate.

2) During the training of individuals or teams, trainees should demonstrate that they can spot rails prior to being allowed to capture them. This is best done by allowing them to shadow someone skilled in capture using this technique, and watch them safely capture the birds. Individuals that have no prior experience handling birds will need extra training from a permitted bander to ensure that they understand how to safely handle birds prior to being allowed to handle black rails.

3) Crowd control must be exercised by the bander in charge, as large assemblages of participants may increase the chance of inadvertent trampling of black rail, or unneeded foot traffic that impacts vegetation in black rail habitat. Bottle line crews should consist of no greater than 4 people evenly spaced along a 15-m line. Shorter lines may be used with fewer people observing the same spacing. Some banders may find it helpful to have additional people “flank” the bottle line, walking to either side of it and slightly ahead of it so as to detect black rails that are moving perpendicular to the line path. If so, the additional people should maintain the same spacing as if also part of the bottle line. If additional people need to participate or be trained, the bander may consider “benching” team members: some team members will leave the survey site and wait nearby, while other people will assume their place in the bottle line team. This will allow the bander to maintain control over the number of people helping with the bottle line at any time. Those active team members not pulling the bottle line or flanking the line should walk approximately 2 m behind the bottle line and focus their search efforts primarily on detecting black rails that are disturbed by the line. This lessens the likelihood of overlooked birds but also decreases the chance that an observer will collide with or crush a bird.

4) As stated above, capture nets with a large catch area similar to what is found on angler landing nets will be used for capture. Birds will not be captured by hand during bottle line searches for black rails.

5) Team members will not use capture nets to corral or steer black rails for capture.

6) Team members must be patient and not attempt capture until the rail is spotted on vegetation or (perhaps rarely) on a bare substrate, at which time they can carefully capture the bird. This may require slowly following a bird that is moving vegetation until it emerges into the open for capture.

7) Running to pursue a bird is not necessary and increases the chance of mortality or injury to a bird; therefore, **running should not be done**. **Never** attempt the capture of a bird that is flying- this is likely to cause injury to the bird.

8) Capture with a capture net is done by following these steps:

a) 1-2 team members may approach the detected rail;

b) When the rail is completely exposed, one person may slowly and cautiously approach the bird, scanning the surrounding vegetation for other rails that may also flush, and center the net over the rail about 1 foot from the surface of the vegetation;

c) The person quickly lowers the net to the surface of the vegetation to make a seal between the net and ground and trap the rail, and **lowering the net is done without force**; and

d) When sealing the net in this manner, if the person slightly taps the frame to the vegetation, again with no force, the bird may flush or run into the bag of the net. At this point, the person may use their hand to seal the opening of the net by constricting the bag of the net approximately halfway down, after ensuring the bird is in the lower bag. This creates a temporary holding bag from which the bird can be transferred to a traditional holding bag.

To reiterate, it is very important to move the net during capture without force; hitting a rail with the rim of a net can kill it. Also, never make extensive sweeping movements with a hand net to capture a bird, as this may cause injury or mortality. Again, lower the net quickly and without force from a height of approximately 1 foot above the bird. Lastly, never use the capture net to disturb vegetation in order to flush the bird from cover, or trap it when the bird is concealed, as this may cause mortality or injury.

e) Birds should be processed at least 20 feet behind the bottle line to reduce further disturbance to captured birds when bottle line operations resume. Alternatively, in cases where the initial detection or capture of any bird was documented, they may be banded there.

f) While waiting for processing, birds will be held in bird holding bags and these bags will be held by appointed team members. If multiple birds were captured at the same time, the people holding birds in bags should remain stationary, by the bander so that the next bird is always available for processing and that no bird injuries result from accidental falls by the people holding bags. By remaining stationary during bird banding, team members will also limit habitat impacts to the banding site. **Never** store a bird bag containing a bird on the ground as this can lead to inadvertent injury or mortality for the bird.

g) After captured birds have been banded, they should be released at the banding site behind the bottle line, or in cases where the initial detection or capture of the birds is archived, at these locations. Prior to resuming use of the bottle line the bander should verify that the route to be followed will not pass over the release site.

h) The bottle line technique is only suitable for the non-breeding months to avoid impacts to active nests or chicks. The remaining capture methods detailed in this document are designed to isolate specific birds for capture while lessening impacts to active nests and chicks are suitable for the breeding months and chick-rearing periods.

i) Visits to the same study plots should be spaced by a minimum of 4 weeks. No greater than 5 visits or coverages of the same plot should be done per season.

j) Team members should monitor their activities for vegetation impacts to black rail habitat. Repeated use of the exact path previously utilized, kneeling or sitting on the grass and storing equipment there, and unnecessary walking around the banding location can result in short term vegetation impacts.

k) Team members should be aware that their activities may leave behind a scent trail that can be located by predators or possibly attract the attention of feral hogs. Restroom breaks should take place away from black rail habitat, preferably where roads or firebreaks are present.

l) This method should not be used when the temperature is less than 40 $^{o}$F or when rain is present. California black rail researchers find it helpful to bring a hand warmer stored inside a holding bag so that they may provide additional warmth to the birds if they believe it beneficial.

**B. Hand or Hand Net Captures Using Auditory Lures (Night, Primarily Breeding Season)**

For an example of this method in use, see Haverland (2019). This method is appropriate for use during the breeding season only and may be completed by 1-2 people. Black rails may approach a playback (of black rail vocalizations) at night, coming to the feet of someone using a playback device that has been put on the ground at a location surrounded by overhead cover but with a slight gap present that allows the person to monitor the device from above. One person must kneel at the playback device and intermittently (not constantly) play the black rail vocalizations. All present must remain perfectly silent until a responsive bird arrives at the playback device. At this point the bird may be captured by the kneeling person using a small hand net such as an aquarium net (Figure 2), so long as the mesh is as described above for the Bottle Line Method. In the case of an experienced bander that has handled many birds, it may be slowly and carefully captured by hand.

This method should be attempted only after banders have located vocal individuals responsive to playback the same night, and tolerant of approach. Birds that move away from the playback will not approach or engage the device aggressively enough to permit capture, and so should not be targeted for capture. Focusing only on the birds that approach and engage the playback lessens the chance of harm or disturbance to nesting rails or needed cover, and increases the chance of successful capture. Prior scouting will also help the bander estimate how many home ranges are proximal to their trapping location and help with capture site establishment. If research designs allow, this method may be used to trap next to or near edges (i.e., next to roadsides or firebreaks), which would further lessen disturbance to nesting birds.

**Hazards**

Hazards to be aware of when using this method include accidents directly involving capture; accidental crushing or impact to birds that have approached the playback without being detected; inadvertent

harm to chicks or nests; excessive disturbance to the birds by the presence of repeated auditory playbacks within their home range; and short term vegetation impacts by repeated access or by kneeling in multiple spots for capture attempts.

**Prescriptions to follow:**

1) Intermittent playbacks focused on individual birds will be discontinued after 45 minutes. Varying playbacks to "converse" with a vocal bird and lowering the volume as the bird approaches may help lure vocal birds close enough to the speaker to capture them.

2) Do not pursue and reinitiate playbacks in instances of birds that have apparently moved away from the initial playback. Only birds that are engaged with the playback should be targeted for capture.

3) Teams should be limited to 1-2 people per targeted bird; more people increase the chance of inadvertent injury to undetected birds. Additional, separate pairs of trained teams or single individuals may engage multiple birds simultaneously.

4) Responsive birds may best be drawn to the playback by turning off all lights save a dim one that illuminates the sound source; however, teams must remain still if using this approach and turn their other light sources on in order to check their surroundings prior to moving again.

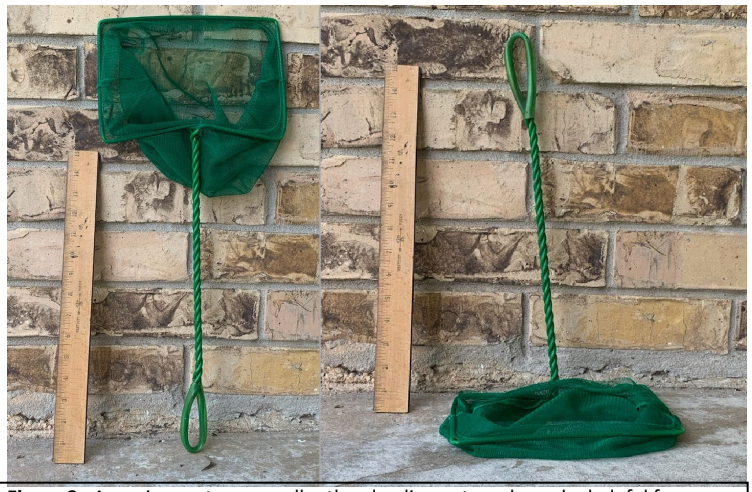


**Figure 2.** Aquarium nets are smaller than landing nets and may be helpful for hand or hand net captures so long as they have mesh consistent with that described in the bottle line method. Upper left: An aquarium net next to a 15-inch ruler. Upper right: An aquarium net with handle bent for careful capture of black rails. Image: USFWS, J. Wilson

5) Small aquarium nets (Figure 2) may be used to capture rails using this method if a hand net is desired for tight spaces (i.e., between clumps of grass); bending the handle upwards and facing the opening of the net down towards the ground will allow an observer to slowly, carefully lower the net after centering it over a responsive bird. The net should be held in place by the person next to the sound source, and when the bird approaches, lowered without force to contain the bird.

6) If someone is capturing by hand, they must kneel in place next to the sound source and keep their hands

approximately 1 foot above the ground. Capture must be done by slowly moving the hands without force, and by creating a cup of the hands and fingers within which to contain the bird.

7) Do not return to attempt capture of the same bird more than 2 times during the same month (this includes attempts made within the same night). Prior to attempting capture, banders should spend time listening for and noting the location of vocal birds. Establishing responsiveness prior to attempting capture will increase the chance of success and decrease the potential for vegetation impacts or disturbance to the birds.

**C. Mist Net Method Accompanied by Auditory Lure (Day, Primarily Breeding Season)**

There are two approaches for using auditory lures in conjunction with mist nets to capture black rails during the nesting season. Both approaches focus on breeding adults and are a less disruptive option for capturing these individuals than systematic searches with a bottle line. Both methods involve the use of two 6-9 m mist nets, but a single mist net up to 12-m in length may be used. The recommended mist net mesh size is 30 mm. People using this method must be trained in the use of mist nets and have the mist net authorization on their banding permit.

The first mist net technique is the "simple mist net." This method was developed by California black rail researchers at University of California-Berkley. See Girard et al. (2010), Gamboa (2011), Hall (2015), and (Hall and Beissinger 2017) for thorough explanation and examples of research utilizing this technique. This method works well in tall vegetation (> 0.5 m) when standing water is not present in the potential net lane area. It may be implemented by as few as 3 people. During daylight hours, a mist net is mounted on poles within approximately 10 m of a vocalizing eastern black rail, and the bird is lured or driven to the mist net.

The second method is the "v-net." This method involves two mist nets arranged in a V orientation, accompanied by playback initially and then by an attempt to drive the bird into the net array, if the playback alone does not result in capture. It has been successfully used to capture six species of *Laterallus* rails in the Neotropical region (Depino and Areta 2019) and eastern black rails in South Carolina. Using shorter nets (6-m or 9-m, or adding a third pole in the middle to effectively create a 12-m "v") may again help researchers use this approach when working near standing water, or sensitive vegetation. See Depino and Areta (2019) for a thorough description of this approach.

Regardless of whether the simple mist net or v-net approach is chosen, the basic steps required are the same. Individuals or team members will need to: 1) identify a trapping location; 2) establish a net lane; 3) erect the mist net; 4) attempt capture by auditory lure; and 5) if that fails, attempt to drive the rail(s) into the net.

**Identify a trapping location.—**Researchers may wish to attempt capture immediately following detection of a black rail; however, investment in identifying specific locations of vocalizing birds prior to this will likely increase the probability of capture success. In South Carolina, black rails have been captured using this technique while taking advantage of black rail runways or trails. This effort was immensely successful because of prior knowledge of where birds would be traveling, and by placing nets to overlap these pathways.

**Net lane establishment.--**There are two options for establishing net lanes, which may be used for either method. Powered equipment may not be used for either. The option chosen should not create wallows or generate puddles of water. The researcher must pick the option that best fits their location. For the first option, people will line up and walk several times along a straight line where the net will be erected, placing their feet in a single-file line to create a narrow net lane that allows overhead cover immediately adjacent to the mist net.

The second option will work anywhere but is necessary for locations with fragile or organic marsh soils that are prone to forming pits or pools of water due to human foot action. With this approach, a measuring tape secured to a mist net pole is extended across the intended net lane, and the net pole

locations are adjusted until a route is identified that will require minimal damage to vegetation. The measuring tape is then lowered near the ground and any vegetation that touches the measuring tape and would interfere with the net is tied back using natural fiber twine or trimmed using scissors. Walking up and down the net lane can be used to flatten finer vegetation unless the soil is soft and ruts would be formed. In particular, seed heads that would become entangled in the net should be trimmed or secured. If specific plants are an issue, an additional mist net pole can be used to adjust the shape to avoid the plants.

**Erecting the mist net.—**Persons using this method must be authorized in the use of mist nets and familiar with the proper way to erect them between two or more poles, depending on how the net array will look. The next step for either method is securing the bottom of the mist net to the ground. To do this, the bottom trammel of the net is secured to the ground using push pins or clips (such as thin metal wickets cut to half their length or 4" landscape fabric pins), as black rails may pass beneath an untethered net. South Carolina researchers using the pinning approach documented by Depino and Areta (2019) found it helpful in capturing eastern black rails: after pinning the bottom trammel to the ground, they set the next nearest trammel about 2 cm above the ground in order to generate a pocket of net that the birds may enter.

**Capture using only an auditory lure.--**Finally, a wireless speaker used for broadcasting black rail vocalizations (playbacks) is left at the base of the net as close as possible to where the rail was last heard. Alternatively, two wireless speakers that are operated remotely may be used. The first, previously placed on the same side of the net as the vocal black rail, is used to lure the black rail to the vicinity of the net at which point its use is discontinued. The other speaker, previously placed on the other side of the net, is then used to further lure the bird into the net. This variation requires the use of multiple speakers but in South Carolina, its use proved advantageous and resulted in captures without having to employ the next step below. Users should flag the speakers or tie ropes to them so they can relocate them when the capture attempt has concluded.

Following the creation of the net lane, placement of wireless speakers, and establishment of the mist net, the team is ready to begin their capture attempt. The first attempt to capture targeted black rails must be done using playback only. To do this, individuals or teams may use their speakers to intermittently broadcast black rail calls for a 20-30 minute period prior to attempting to use the bottle line. Throughout this time, no more than 2 people may be positioned at opposing ends of the mist net to watch the net and monitor it for black rails that enter the net lane. The net should be watched continuously and be carefully inspected if a previously vocal rail suddenly becomes quiet. An additional person may stay next to the net lane and operate the playback equipment. If one of the two net observers sees a black rail enter the net, they may quickly and carefully approach the rail, being watchful for other rails that may have entered the net or the net lane unobserved, and cup their hands around it in the net **using no force** in order to contain the rail. If no captures are made in this manner prior to the end of the 20-30 minute playback period, and the rail is evidenced by vocalizations to be within 1-2 m of the mist net, the team may then opt to drive the black rail(s) into the net. Up to this point, it is possible to perform auditory lure capture with only one or two people present. The next step requires more than one person to be present if driving the bird into the net is needed.

**Capture by driving the rail(s) into the net.--**Researchers may use the bottle line to drive the rail into the net, with only two people pulling the line and no additional people following it or flanking it.

Alternatively, they may use the clapping approach detailed by Depino and Areta (2019) to drive the bird into the net, but not exceed two individuals that approach the net and clap in this manner. In other words, a bottle line may be pulled as described below, by two people, or one to two people may carefully approach the net clapping as in Depino and Areta (2019). For either choice, an additional person should be positioned to watch the net and stop activity if a bird enters the net during the driving attempt. Regardless of the choice, the targeted black rail should be within 1-2 m of the net when driving is attempted. If a bottle line is to be used, the net observers will have placed the line 5-10 m from the net and parallel to it, prior to assuming their roles for the playback period. If a flushing attempt is needed, they then only need to slowly walk to each end of the line, pick it up, and approach the net.

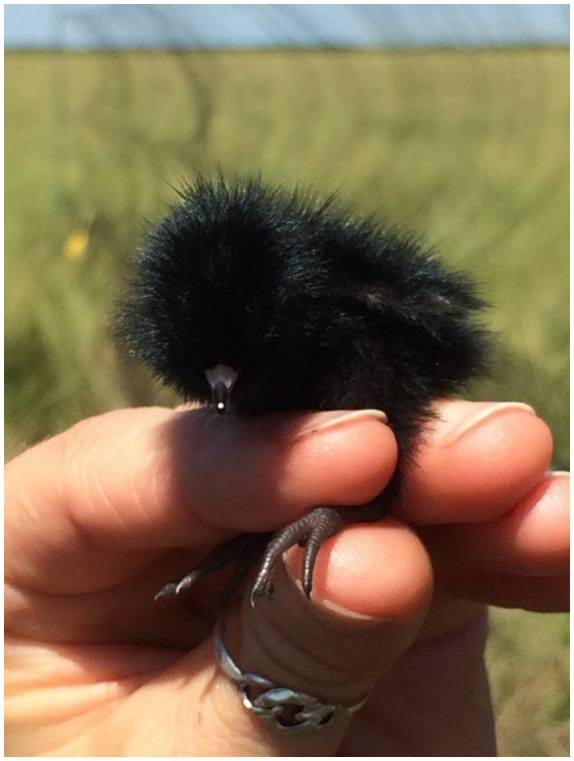
For the bottle line flush or drive, three people are needed: two to operate the line and one to watch the net. The person that operated the playback equipment may easily remain in place at one end of the net, monitoring the length of the lane to spot any rails that emerge and enter the net. Those operating the bottle line will then move very slowly (more so than they could normally and casually walk through the same habitat), dragging the bottle line towards the net and using a sawing motion to increase disturbance and flush the bird into the net. The length of the bottle line is such that the observers may stretch it in a straight line between each other and walk to the outside edge of each mist net pole.

Whether black rails are being driven to the net by the bottle line method or the clapping method, the net monitor must keep watch on the net and act quickly if a black rail enters it. If the net monitor sees a black rail enter the net, they will signal for the bottle line to stop. They will then quickly and carefully approach the rail while taking care to notice any other rails that may have been captured but not detected (including chicks), and cup their hands around the rail in the net to safely confine it until it can safely be removed from the net. While confining the rail within cupped hands, the person handling the bird should make sure that they are able to hold the rail above the soil layer, and are able to raise the rail and the mist net mesh above the ground without causing the mist net to pull against or injure the rail. Removing anchor pins may be needed to facilitate this. If only one bird was detected during playbacks, the bottle line approach should be immediately discontinued when the net monitor stops its motion and approaches the captured rail. If other rails were detected, the net monitor may quietly maintain a cup around the captured bird while the bottle line crew finishes approaching the net, at which time any captured rails may be removed and placed directly into holding bags.

**Hazards**

Hazards to consider with this method involve inadvertent crushing of or injury to birds that were attracted to the auditory lure, while checking the net or dragging the bottle line, and disturbance of

**Figure 3**. An eastern black rail chick, only several days old as evidenced by the egg tooth. This chick was captured and held by an experienced black rail bander, during a capture attempt using the mist net method accompanied by auditory lure, July 2015, in coastal Texas. Use of the mist net method requires training by an experienced practitioner. Image: USFWS, J. Wilson



nesting or brooding birds in proximity to the capture operation. Also, net lane establishment is a short-term impact to vegetation within eastern black rail habitat as are other actions that compress vegetation in eastern black rail habitat. People using this technique must be careful to insure that no rutting or wallowing occurs, as such long-term impacts are not acceptable.

**Prescriptions to follow:**

1) Prior to setting up mist nets, the core of the presumed territory should be identified. Net placement is critical to success, and positioning the mist net(s) in the area where the rails are most responsive may decrease the amount of time and disturbance needed to capture the rail(s).

2) If scouting in advance reveals trails or tunnels through the grass, which may be used for travel by black rails, then placement of a shortened net

centered to bisect these trails or tunnels may be effective.

2) Researchers may use a mist net 12-m or less in length. In cases when they have firmly identified the location of the identified black rail, the shorter lengths allows for less habitat impact and also helps avoid hazards for net establishment, such as standing water. Mist nets may be purchased in smaller lengths such as 9-m or 6-m. While the v-net method is well-described, South Carolina researchers altered the array of nets by forming “t” deployments in order to accommodate terrain they needed to avoid. So long as two nets are utilized, the pattern of net establishment is not crucial so long as researchers are not expanding the footprint of the net deployment.

3) While dragging the bottle line observers should search the vegetation in front of them for movement that suggests a rail is present and avoid walking close to detected birds.

4) When using push pins to anchor the net, researchers should ensure that the pins are completely imbedded in the ground to prevent injury to black rails. California researchers paint the tops of these pins with bright paint so that they are visible, and may be removed quickly when capture efforts conclude.

5) When finished dragging the bottle line, observers **must** view the length of the mist net from both ends prior to walking its length and be vigilant for chicks or adults that may have been overlooked as they check the length of the net, and as they disassemble the net to move their operation. Note that a chick of several days age has the size and appearance of approximately two small black cotton balls and

observers must be alert for them when attempting to flush net breeding black rails in this fashion (Figure 3).

6) Solicitations and capture should be attempted for no greater than 30 minutes (approximately 2 bottle line drags) prior to moving to another territory. Playbacks should be used in an intermittent fashion to avoid needless stress to the rails and to increase the likelihood of them approaching the net. The appropriate sequence includes vocalizations no greater than 10-20 seconds in duration, with a minimum of 2-5 minutes between each vocalization period during the playback session.

7) No greater than two net lanes should be established within a perceived territory. This method is designed for use within a small flushing grid of no more than 10x12 m. **Do not** expand this grid as attempts to drive rails from greater distances than described are ineffective, generate needless stress to the targeted birds, and compound any habitat impacts from increased foot travel. **Do not** attempt bottle line capture of rails that are farther than 1-2 m from the mist net.

8) Researchers must begin each capture attempt using only auditory lures to draw the rails into the net, prior to attempting to flush them into the net. California and South Carolina researchers have been able to capture black rails using both variations of the mist net method without having to pull the line toward the net, or drive birds using the clapping method, resulting in less disturbance and impact to vegetation. Having the bottle line positioned for use prior to luring the bird to the net will allow researchers to use the bottle line flush only if needed.

9) This method and its use of auditory lures is expected to be most effective during the breeding months when black rails are most vocal. It should not be widely applied for capture during non-breeding months when specific locations of birds are unknown; in these case, the bottle line method at night is most appropriate. However, in cases where specific locations of eastern black rails are known, such as radio-telemetered birds that need recapture, or the occasional vocal and responsive non-breeding black rail, this method is safe to use outside the breeding months.

**D. Walk-in Traps Accompanied by Drift Fencing (Day or Night, Year-round)**

This method was piloted by researchers working with black rails in Arizona and Florida. It may be used at any time of year. This method may be used at any hour, so long as traps are checked frequently enough to release bycatch and minimize ill effects for black rails (see below). See Legare and Eddleman (2001) and Flores and Eddleman (1991) for details on trapping methodology and examples of its use.

Though labor intensive, this method may be accomplished by as few as two observers. This method involves the use of a drift fence, along which double-door walk-in traps are stationed. Traps must be checked frequently during each daily or nightly session to lessen stress on captured birds. Traps should be constructed with vinyl or nylon coated hardware cloth to minimize bird injury from scraping on the sharp hardware cloth. Traps should have shade cloth to cover at least ½ the trap from the sun when deployed during the day. Occasionally, auditory lures have been combined with this method (Flores and Eddleman 1991). Auditory lures should be used only in the non-breeding season if they are paired with drift fences. Outside the breeding season, if banders wish to do this, they should not use the lures to excess or leave the traps unattended. By-catch of other animals should be expected and this method should be cross-evaluated for other listed species such as reptiles or small animals. Care should be exercised when storing traps and drift fences to prevent animals from occupying them while in storage.

Snakes and glass lizards are susceptible to capture in the netting and hardware cloth during active trapping.

**Hazards**

Hazards to consider include injury or mortality due to prolonged retention in walk-in traps, temperature stress, trap flooding, and injury or mortality due to red imported fire ant activity. When working within tidally-influenced areas, researchers should be aware of tidal cycles (day and night) and depths and ensure that no traps will become flooded. Repeated visits to monitor traps may result in trampled vegetation, which would be a short-term impact to eastern black rail habitat. Not all sites would be suitable for repeated trap checking because of vegetation impacts from foot traffic and drift fence placement. Organic or deep mud substrate sites should use a different trapping method to avoid habitat damage.

**Prescriptions to follow:**

1) During daytime trapping, traps should be checked at a minimum of 4 times per 12 hour day (one hour after sunrise, again at approximately 10 a.m., again mid-afternoon, and again at one hour preceding sunset. The bander should assess temperatures and the potential for heat stress and include additional trap checks to their protocol if they are concerned that impacts will occur to the birds. Concealing traps with vegetation will increase trap success and provide additional shade for captured birds; however, the shade cloth for the trap is still required.

If trapping is attempted at night, traps should be checked at the same frequency. Trapping at night may not be productive in all locations. For example, in Florida, research involving radio telemetry of black rails demonstrated that the birds were not active at night. Trapping using these prescriptions during the day was most effective.

2) Unless traps will be checked through the night, banders or their team should close the traps at sunset and reopen prior to sunrise in order to reduce bycatch and stress on any captured birds.

3) Banders or their team should not establish traps near fire ant mounds or foraging ants that may enter the traps.

4) Banders should place traps with an awareness of tidal cycles and depths to ensure that traps will not become flooded.

5) Sites characterized by organic or deep mud substrates are not suitable for trapping with this method. Researchers should consider vegetation impacts and minimize them to the best of their ability.

6) If auditory lures are added on occasion, the duration of a single lure application should not exceed 30 minutes. Do not apply auditory lures more than 2 times per month within the same perceived breeding home range.

7) When trapping during the breeding season, teams should anticipate capture of no greater than one adult male and female (presumably the same breeding pair) and remove the drift array and traps following these captures. This will reduce the stress of repeated capture for individual birds.

**II. Banding of Eastern Black Rail**

**Banding prescriptions to follow:**

1) Sizing bands: as of 08/04/2020, the BBL recommends band sizes 1D, 2, and 1A. Current band size recommendations are updated periodically by the BBL and may be viewed on their website at Current Band Size Recommendations. Permitted banders should always bring and use a leg gauge to determine which size is appropriate for any bird in hand.

2) Band placement: as of 08/04/2020, the BBL instructs band placement on the tibiotarsus (upper leg) of sora and Virginia rail. The BBL does not specify this for eastern black rail, leaving the default placement on the tarsometatarsus (lower leg, Figure 4). However, either upper (see Figure 5) or lower leg placement of bands is acceptable for the BBL (Danny Bystrak, USGS BBL, personal communication). Banders should be aware that they may capture eastern black rails with bands previously placed on either the upper or lower leg and check the entire leg prior to placing a new band on any captured bird.

3) All equipment for banding must be brought into the field for banding so that captured birds may be processed quickly and released at the capture site.

4) Black rails may not be carried in holding bags while other capture attempts are made. They should be banded at the time of capture and released. While equipment is being unpacked for banding, the birds should be held in a bird holding bag that is held by a designated observer that remains stationary until the bird is taken for processing by the bander. Do not hold more than one black rail / holding bag at a time. Holding bags may not be used to hold a bird more than one time per session and must be cleaned prior to the next use, either by thorough machine washing or disinfection with bleach solution followed by three days' airing to eliminate vapors from the bags.

**Figure 4.** Eastern black rail with tarsometatarsus (lower leg) band placement (this bird is with chicks). Presently no information exists to document that either lower leg or upper leg band placement is harmful to eastern black rails. Documentation of injuries should be shared with the BBL. Image: SCDNR, Christy Hand

5) While birds are being held for banding or being processed, observers should function quietly and efficiently to minimize stress to the captured bird by reducing holding time and noise.

6) Banders shouldmonitor captured birds for signs of stress, such as drooping heads, drooping eyelids, accelerated breathing, fluffed feathers, and so on. Birds that begin to show the initial signs of stress should be released if the bander judges that they are viable.

7) When releasing black rails, banders should gently place them on the ground on top of or adjacent to dense cover, so that they may quickly regain the dense overhead cover they require. Releases from the hand (i.e., tosses into the air) which are sometimes used for other bird species are unacceptable for black rails (Figure 5).

8) When photographs of birds in the hand are needed for research, the most conservative and safe bird holds should be used whenever possible (i.e., bander's hold). If a "photographer's hold" is necessary, the person holding the bird (ideally the bander) must be experienced in safely doing so. Rails may attempt to squirm or struggle, so to avoid injury the photographer's hold should only be used when absolutely necessary for the briefest time possible and never solely to obtain stock images of black rails. Researchers wishing to photograph a bird may be able to do this when the bird is released (Figure 5). When positioned to release a banded bird, a researcher kneeling as shown in Figure 5 may place the bird held in the bander's grip onto an open hand immediately above the vegetation. Photographs may be taken quickly of the bird while still in the open hand, prior to its departure. This will keep the bird close to the ground so that when it leaves the hand it can safely enter vegetative cover, or make a short flight from the hand directly above the ground. Banders should ensure that this process is completed within a minute or less.

9) If a bander suspects injury has taken place, or that a stressed bird is not viable, they should contact a licensed wildlife rehabilitator (failing that, a veterinarian) for care and transport instructions. Banders should ascertain the presence and contact information of local rehabilitators and/or veterinarians prior to beginning their work so that they have a plan for what to do if injuries to birds occur.

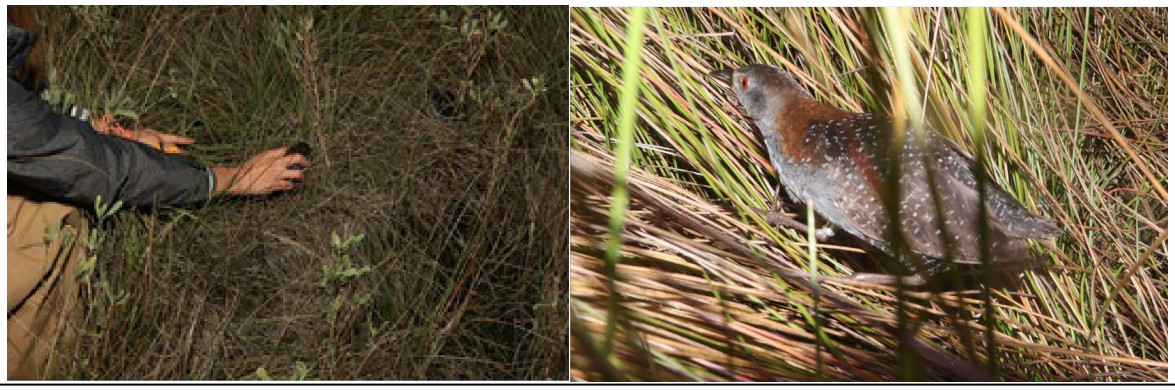


**Figure 5.** Using a "bander's grip" someone is releasing a black rail by gently placing it on top of dense vegetative cover (left photo). A black rail released in this manner may walk (right photo) or make a short flight way from the release site before disappearing into cover- or disappear beneath plant cover immediately following release. Note the optional "above joint" placement of the band on this individual. Resumption of capture activities following a release should be planned to avoid disturbance to the release site. Images: USFWS, W. Woodrow

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