



United States Department of the Interior

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In Reply Refer To:
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X00-2019-F-
2135

July 8, 2020

Michael Johnsen
U.S. Department of Transportation
Federal Railroad Administration
Attention: Kevin Wright
1200 New Jersey Avenue, SE., MS-20
Washington D.C., 20590

Subject: Biological Opinion for the Dallas to Houston High-Speed Rail; Dallas, Ellis, Navarro, Freestone, Limestone, Leon, Madison, Grimes, Waller, and Harris counties, Texas

Dear Mr. Johnsen:

This document transmits the U.S. Fish and Wildlife Service's (Service) Biological Opinion based on our review of the effects of the proposed Dallas to Houston High-Speed Rail Project (Project) on the federally endangered large-fruited sand-verbena (*Abronia macrocarpa*) (LFSV) and the federally endangered Navasota ladies'-tresses (*Spiranthes parksii*) (NLT) pursuant to section 7(a)(2) of the Endangered Species Act of 1973 (Act), as amended (16 U.S.C. 1531 *et seq.*). There is no critical habitat for either the LFSV or NLT within the Project's Action Area. We originally received a request for formal consultation on December 13, 2019. However in order to fulfill the formal Section 7 process as outlined under the Act, we requested additional species and project-specific information in order to complete our Biological Opinion. We received a revised Biological Assessment on April 28, 2020. Although we received an updated request for formal consultation on January 9, 2020, upon agreeance with the federal action agency, Federal Railroad Administration (FRA), we jointly agreed to provide a final Biological Opinion on or before July 1, 2020.

In your letter, you requested our concurrence that the proposed action was not likely to adversely affect the interior least tern (*Sterna antillarum*), whooping crane (*Grus americana*), and the Houston toad (*Anaxyrus houstonensis*). We concur with these determinations under Section 7 of the Act, contingent on the implementation of the species-specific measures outlined in Appendix A. There is no suitable habitat within the Action Area for the piping plover (*Charadrius melodus*) or red knot (*Calidris canutus rufa*) and therefore, it was not necessary to conduct consultation under Section 7 of the Act. You further have determined that this action will not

affect the West Indian manatee (*Trichechus manatus*), golden-cheeked warbler (*Setophaga chrysoparia*), or Texas prairie dawn (TPD) (*Hymenoxys texana*) and these species will not be addressed further in this Biological Opinion. The Project does include counties with the potential geographic range of the Texas fawnsfoot (*Truncilla macrodon*); however, this species is a candidate and therefore not afforded protections under the Act. The Service has advised FRA that should the species become listed under the Act, reinitiation of Section 7 consultation may be required.

This Biological Opinion is based on information provided in the June 2020 Biological Assessment (Revision 4); telephone conversations between calendar years 2016 and 2020 with staff from FRA, Texas Central Railroad (TCRR; the applicant), and the environmental consultant (AECOM); conversations with species experts; and, other sources of information (Endangered Species Consultation Handbook, species recovery plans, 5-Year Reviews, etc.). Literature cited in this Biological Opinion is not a complete bibliography of all literature available on the species of concern and any county-wide activities that could include, but are not limited to, agriculture and urban development and/or private land activities (i.e. livestock grazing, oil and gas, mining activities, etc.) and their effects, or on other subjects considered in this opinion. A complete administrative record of this consultation is on file at the Service's Texas Coastal Ecological Services Field Office (TCESFO) in Houston, Texas, and is available upon request.

CONSULTATION HISTORY

The following is a brief summary of the consultation history for the Project:

October 8, 2014 – Agency workshop to discuss the Environmental Impact Statement (EIS).

August 10, 2016 – The Service's Texas Department of Transportation (TxDOT) liaison contacted the TCESFO regarding HSR and survey protocols for LFSV, NLT, and TPD. Reports and species information provided by TCESFO leads in August 2016.

August 2016 – A call scheduled with TCESFO plant leads, AECOM, and TCRR to discuss plant habitat assessment and survey approaches.

October 31-November 15, 2016 – AECOM conducted year 1 of surveys for NLT and provided to the Service in 2017 (letter dated March 2, 2017).

March 21, 2017 – The Service was notified by AECOM that reference population for LFSV was in bloom; plans to conduct a 2017 season survey.

April 21, 2017 – TCESFO received files from AECOM for year 1 survey report for LFSV.

June 5, 2017 – Notification from the Austin ESFO that internal Service review shifted project managers.

July 17, 2017 – FRA scheduled a webinar with TCESFO leads and the Service's TxDOT liaison to discuss a version of the Draft EIS (DEIS).

August 11, 2017 – The TCESFO lead for the Houston toad provided comments and feedback regarding the DEIS, the species modeling and habitat assessment, and minimization measures.

August 2017 – The project was added to the Service's consultation tracking system (TAILS).

August 22, 2017 – A joint call between the TCESFO lead for the Houston toad and AECOM regarding the species' survey results from 2017.

September 21, 2017 – FRA sent request to agencies to review/comment on proposed preferred alternative (Build Alternative A) within DEIS by September 29, 2017.

December 1, 2017 – AECOM conducted year 2 of surveys for NLT between October 23 – November 3, 2017, and provided results to the Service.

December 14, 2017 - AECOM provided technical memo to Houston toad lead for nocturnal audio surveys between February 10 - May 25, 2017.

December 22, 2017 – The U.S. Army Corps of Engineers, Ft. Worth District, published a public notice for review and comment for Section 404 permit (SWF-2011-00483) related to the Project.

December 23, 2017 - The U.S. Army Corps of Engineers, Galveston District, published a public notice for review and comment for Section 404 permit (SWF-2014-00412) related to the Project.

January 2018 – Correspondence from the new Service project lead from the Arlington ESFO, informing the TCESFO species lead of his new role.

March 5, 2018 – AECOM provided 2017 LFSV survey memo and survey plan documents, as well as their response to DEIS comments on the LFSV.

March 9, 2018 – AECOM recommended removing the canopy cover from the habitat suitability mapping for the LFSV.

March 9, 2018 – Coordination between TCESFO and Service's project lead in Austin, Texas, regarding comments to DEIS.

June 14, 2018 – Correspondence from Service's project lead in Austin, Texas, regarding upcoming conference call with FRA to discuss species in consultation. Confirmation that NLT individuals were found during Year 1 of surveys, but no individual LFSV or Houston toads.

End of June 2018 – TCESFO became lead for Project.

July 10, 2018 – Received year 2 of LFSV surveys via email from AECOM.

August 9, 2018 – In-person meeting with TCESFO and AECOM (FRA on phone) regarding species-specific survey results.

November 7, 2018 – AECOM provided technical memo to Houston toad lead for nocturnal audio surveys between February 9 - May 17, 2018.

February 13, 2019 – AECOM provided survey results of year 3 of NLT surveys that were conducted between October 15 and 26, 2018.

February 14, 2019 – Meeting with FRA, AECOM, and TCESFO to discuss NLT.

February 21, 2019 - Call with TCESFO, AECOM, and FRA to discuss formal consultation process and schedule.

March 20, 2019 - Meeting with FRA, AECOM, and TCESFO to discuss NLT population found near Madison County.

May 1, 2019 – Email coordination from TCESFO to Centerpoint Energy regarding potential NLT individuals within their right-of-way (ROW).

May 3, 2019 – TCESFO received year 3 of survey results for LFSV from AECOM.

May 16, 2019 – Draft of FRA's Biological Assessment provided to NLT-species lead with TCESFO to review and provide comment.

May 23, 2019 – Conference call with TCESFO, FRA, and AECOM regarding LFSV survey results and biological assessment.

July 11, 2019 – TCESFO sent email to orchid experts regarding NLT and habitat variables in model. One species expert responded on July 14, 2019, with survey specifics.

August 8, 2019 – Ongoing discussions with NLT species lead, FRA, and AECOM regarding potential opportunities for offsetting disturbance.

August 27, 2019 – NLT species lead sent comments to FRA and AECOM regarding ratios of offset and offset opportunities.

September 11, 2019 – Meeting with TCESFO, FRA, and AECOM to discuss details of habitat modeling and suitable offset ratios for NLT.

December 13, 2019 – FRA sent a corrected request on letterhead (and in-person via AECOM), requesting formal consultation with the Service.

January 9, 2020 – Conference call between TCESFO, FRA, and AECOM on DEIS and offsets for LFSV and NLT.

January 15, 2020 – TCESFO sent comments on Houston toad and LFSV to AECOM addressing language in Draft Biological Assessment.

January 21, 2020 – Conference call between TCESFO, FRA, and AECOM regarding offsets for LFSV and NLT.

February 7, 2020 – Service received a revised Biological Assessment from FRA addressing comments to Houston toad and LFSV.

February 11, 2020 – Project call regarding offset for LFSV and NLT.

March 11, 2020 – TCESFO lead contacted Austin ESFO regarding Texas fawnsfoot and its geographic range, habitat needs, listing status, etc.

March 12, 2020 – TCESFO received new proposed offset language from FRA and TCRR for LFSV and NLT.

March 27, 2020 – TCESFO provided feedback to FRA on most February 2020 draft of the Biological Assessment in order to make complete.

March 27-31, 2020 – TCESFO contacted lead biologist for whooping crane, regarding species migration information and avoidance and minimization measures.

April 2, 2020 – TCESFO sent updated whooping crane measures to AECOM for review/comment.

April 20, 2020 – TCESFO contacted interior least tern regarding species' listing status and avoidance and minimization measures.

April 28, 2020 – TCESFO received email from AECOM with clean version of Biological Assessment and appendices for species discussed in Project.

April 29, 2020 – Joint conference call with TCESFO and FRA regarding status and completion date for the Biological Opinion. Agreed with FRA that a final Biological Opinion would be delivered on or before July 1, 2020.

May 7, 2020 – Received draft placeholder language from AECOM regarding offsets for LFSV and NLT to be inserted in Final Environmental Impact Statement (FEIS). TCESFO sent comments back via email on May 12, 2020.

May 8, 2020 – Phone discussion between Service lead for NLT and AECOM regarding avoidance and minimization measures for NLT individuals located in Madison County.

May 12, 2020 – AECOM provided TCESFO with May 2020 compiled version of the Biological Assessment that will be attached to FEIS.

June 4, 2020 – TCESFO received email correspondence from AECOM and TCRR regarding offset language for LFSV and NLT for final biological assessment.

June 11, 2020 – Conference call with TCESFO, AECOM, FRA, and TCRR regarding offsets for LFSV and NLT to finalize language. Offset language was agreed to by all parties on the call for LFSV and NLT and be incorporated into the biological assessment.

June 19, 2020 – TCESFO received the final Biological Assessment from AECOM and FRA.

June 29, 2020 – TCESFO provided a copy of the Draft Biological Opinion to FRA for review and comment.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

Regulations implementing the Act (50 CFR 402.02) define “action” as “all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by federal agencies of the United States or upon the high seas.”

The following is a summary of the proposed action and a detailed description can be found in the U.S. Department of Transportation’s (USDOT) FRA Biological Assessment in Sections 1.1 and 1.2 (USDOT FRA 2020a), as well as the FEIS.

The Service understands that FRA is the lead federal agency and that FRA has approved a Rule of Particular Applicability (RPA) to enable effective safety oversight of the operation of a high-speed passenger rail (HSR) system. In its petition to FRA for rulemaking, Texas Central High-Speed Railway, LLC’s (TCRR) and its affiliates’ propose to construct and operate a 240-mile (mi) (386 kilometer (km)) HSR closed-corridor system that would intersect Dallas, Ellis, Navarro, Freestone, Limestone, Leon, Madison, Grimes, Waller, and Harris counties, Texas (the Project). Three stations are proposed as part of the Project: two terminal stations within Dallas (Dallas County) and Houston (Harris County) and one intermediate Brazos Valley Station (Grimes County). The HSR ROW would vary in width with an average width of 328 feet (ft) and a minimum ROW of 100 ft that would include the track, overhead catenary system (catenary), access roads, and security fencing. The double-track system would be constructed using a combination of at-grade/embankment, retained fill, retained cut, and a bridge-like structure, called viaduct. Approximately 55 percent of the HSR line would be constructed on viaduct which would allow for movement underneath the rail system. This Biological Opinion analyzes the effects of the construction and operation of the 240-mi HSR system within the Action Area.

Early coordination with the Service’s transportation liaison and the Austin Ecological Services Field Office (ESFO) - resulted in the TCESFO taking the lead for the entire proposed HSR system. Coordination also included staff from the Austin and Arlington ESFO, where needed, along with other regional species leads.

The Project would also intersect streams, wetlands, and open water (pond) that are considered waters of the U.S. (WOTUS) and are regulated by the U.S. Army Corps of Engineers (Corps) under the regulatory authority of the 404 Clean Water Act. The Project spans both the Galveston

(permit SWG-2014-00412) and Ft. Worth District's (permit SWF-2011-00483). The Service submitted its most recent comments on both permits on April 30, 2020, addressing concerns solely on the WOTUS. At this time, the Corps has not issued either permit.

Conservation Measures

FRA has made the following determinations pursuant to Section 7(a)(1)(A) of the Act (Table 1). These determinations have been developed in concert with experts and species leads, and based on the best scientific information available for each species and current best management practices.

Table 1. Species Considered for Project (see Table i, in USDOT FRA 2020a).

<i>Species</i>	<i>Status</i>	<i>Determination of Effect</i>
West Indian Manatee	Threatened	No Effect
Golden-cheeked Warbler	Endangered	No Effect
Interior Least Tern	Endangered	May Affect, Not Likely to Adversely Affect
Whooping Crane	Endangered	May Affect, Not Likely to Adversely Affect
Houston Toad	Endangered	May Affect, Not Likely to Adversely Affect
Texas Fawnsfoot	Candidate	No Effect Determination Warranted for Candidate Species
Large-fruited Sand Verbena	Endangered	May Affect, Likely to Adversely Affect
Navasota Ladies' Tresses	Endangered	May Affect, Likely to Adversely Affect
Texas Prairie Dawn	Endangered	No Effect

The FRA has determined the action "may affect, but is not likely to adversely affect" the interior least tern, whooping crane, and the Houston toad. For these species, conservation measures will be implemented by TCRR on behalf of FRA with the intent to avoid and minimize adverse effects to these species resulting from the proposed action; see Appendix A for these conservation measures. For the LFSV and NLT, TCRR on behalf of FRA has agreed to mitigate for the effects of the proposed action by implementing the following:

Large-fruited sand-verbena (section 3.3.4 of USDOT FRA 2020a):

A total of 116 ac (46.9 ha) of modeled suitable habitat was not accessible during the three consecutive years of species-specific surveys within the Action Area, and TCRR on behalf of FRA has agreed to offset impacts to LFSV within the Action Area in Freestone and Leon counties, Texas. The offset would include the preservation of compensatory mitigation lands through fee purchase or conservation easement of 116 ac at a 1:1 ratio in modeled suitable habitat where surveys could not be undertaken due to inability to access private property.

Regarding these offsets:

- TCRR on behalf of FRA will obtain and post adequate financial assurances prior to initiating construction, to provide sufficient funds for habitat or conservation easement acquisition, transaction costs, and long-term management in perpetuity.

- TCRR on behalf of FRA will develop a monitoring and management plan for all compensatory mitigation properties and establish a conservation easement for protection in perpetuity. Each conservation easement will be held by an accredited third-party land trust (i.e. member of either the National Land Trust Alliance or Texas Land Trust Council). TCRR will make the conservation easement agreement available to the Service for review prior to execution.
- TCRR on behalf of FRA will obtain compensatory mitigation before construction begins in modeled LFSV suitable habitat in Freestone and Leon counties where three years of surveys have not been conducted, unless otherwise approved by the Service.
- Compensatory mitigation property (fee property or conservation easements) may be donated to an accredited third-party conservation organization or land trust (i.e. member of either the National Land Trust Alliance or Texas Land Trust Council). TCRR on behalf of FRA shall include a financial endowment with the property donation that is sufficient to provide perpetual management (including monitoring and maintenance) for the conservation of the LFSV at the donated property. TCRR would make the donation agreement available to the Service for review prior to execution.

Additionally, avoidance and minimization measures for the LFSV within the Action Area in Leon and Freestone counties, will be implemented by TCRR on behalf of FRA:

- ***Avoid Transporting Nonnative Seed.*** During vegetation clearing and construction, TCRR will ensure off-road vehicles (ORV) and equipment are free of plant debris and seeds before entering and leaving worksites in Freestone and Leon counties, if known LFSV individuals are found, to avoid potential transport of nonnative seed to construction areas. TCRR will restore sites with native seed mixes certified as “weed free.” If native seeds cannot be used, then the area will be left bare. If left bare, the areas would be stabilized by other appropriate control measures in compliance with the Texas Pollutant Discharge Elimination Systems (TPDES) permit requirements. Measures that could potentially introduce nonnative species; smother plants or rosettes; and/or, alter hydrology of habitat into or out of habitat should not be used.
- ***LFSV Site Training.*** Site training will occur prior to and during construction. TCRR will hire a qualified biologist to develop appropriate environmental awareness training that TCRR will administer to all site personnel before beginning work on the Project. The training will include the definition of “take” relative to protected species, the potential presence of protected species, reporting requirements, and measures to be taken to minimize impacts to the natural environment. TCRR will hire staff to train all site personnel on identification of the species prior to starting work within potential LFSV habitat. TCRR will document training activities and retain documentation for the duration of construction. The documentation will include names of site personnel undergoing training, names of trainers, name of qualified biologist that developed the curriculum, dates and duration of training, and curriculum materials.
- ***Minimize Limits of Disturbance.*** During construction, TCRR shall minimize disturbance to vegetation by using previously disturbed areas when feasible for staging and equipment storage and limiting driving speeds in sensitive areas. Sensitive habitats are areas intended to be avoided by the Project and may include:
 - Areas identified that provide habitat for protected species.
 - Areas adjacent to habitats of protected species.

- When feasible, areas that include Texas Natural Diversity Database (TXNDD) Element of Occurrence Records (EOs).

In addition, TCRR will ensure disturbed ground is rehabilitated as soon as possible following construction activities to minimize exposure of bare ground susceptible to colonization by nonnative plants.

Navasota ladies'-tresses (section 3.3.5 of USDOT FRA 2020a):

A total of 570 ac (230.7 ha) of modeled suitable habitat was not accessible during the three year survey period within the Action Area. Of these 570 ac, 167 ac (67.6 ha) were modeled as optimal habitat and 403 ac (163.1 ha) marginal habitat. Proposed compensatory mitigation would include preservation at a ratio of 1:1 for the 167 ac of modeled optimal habitat and 1:0.5 for the 403 ac of modeled marginal habitat¹ where surveys could not be undertaken due to inability to access private property. Regarding these offsets:

- TCRR on behalf of FRA will obtain and post adequate financial assurances prior to initiating construction, to provide sufficient funds for habitat or conservation easement acquisition, transaction costs, and long-term management in perpetuity.
- TCRR on behalf of FRA will develop a monitoring and management plan for all compensatory mitigation properties and establish a conservation easement for protection in perpetuity. Each conservation easement will be held by an accredited third-party land trust (i.e. member of either the National Land Trust Alliance or Texas Land Trust Council). TCRR will make the conservation easement agreement available to the Service for review prior to execution.
- TCRR on behalf of FRA will obtain compensatory mitigation before construction begins in modeled NLT suitable habitat in Freestone, Limestone, Leon, Madison, and Grimes counties where three years of surveys have not been conducted, unless otherwise approved by the Service.
- Compensatory mitigation property (fee property or conservation easements) may be donated to an accredited third-party conservation organization or land trust (i.e. member of either the National Land Trust Alliance or Texas Land Trust Council). TCRR on behalf of FRA shall include a financial endowment with the property donation that is sufficient to provide perpetual management (including monitoring and maintenance) for the conservation of the NLT at the donated property. TCRR would make the donation agreement available to the Service for review prior to execution.

During the 3 years of presence-absence surveys conducted by AECOM for FRA, 25 individual NLTs were found on a single parcel within the Action Area in Madison County in a transmission line ROW (USDOT FRA 2020a). To avoid and minimize effects to these plants, TCRR on behalf of FRA will implement the following measures within the Action Area in Madison County:

- **Exclusion Fencing.** TCCR will place and maintain exclusion fencing, prior to construction, around the avoidance area to ensure site personnel do not come in direct contact with the known population. No construction activities would occur within the

¹ This ratio is consistent with TxDOT projects "TxDOT. Widening of US Hwy 79", "TxDOT Construction of 9.6 miles of SH6", "TxDOT. Widening of 15.8 miles of SH21 and US Hwy 190", "TxDOT, New 8.3-mile 4-lane US Hwy 79", and "TxDOT. Improvements to CR169 (road approaches to two new bridges on Mathis Creek)". USFWS. *Navasota Ladies'-Tresses (Spiranthes parksii) 5-Year Review: Summary and Evaluation*. Austin, Texas: U.S. Fish and Wildlife Service, 2009.

avoidance area. As of June 2020, the Project schedule has not been defined to a level to identify when these potential activities would specifically occur outside of the avoidance area of this specific NLT population; however, they will not coincide with the blooming period of the NLT (September-November). The design and construction of the reroute will not affect the current drainage into and out of the NLT avoidance area.

- ***Maintenance of Habitat Features.*** The existing tree line around the population will be maintained as to preserve 9.25 ac (3.7 ha) of habitat which includes approximately 3.4 ac (1.4 ha) of forested area and 80 ft of tree line on both sides of the transmission line ROW. Furthermore, the existing road segment would be abandoned in place north of the population to avoid disturbance to the NLTs.
- ***Avoid Transporting Nonnative Seed.*** During vegetation clearing and construction, TCRR will ensure ORV and equipment are free of plant debris and seeds before entering and leaving worksites in Madison County, to avoid potential transport of nonnative seed to construction areas. TCRR will restore sites with native seed mixes certified as “weed free.” If native seeds cannot be used, then the area will be left bare. If left bare, the areas would be stabilized by other appropriate control measures in compliance with the TPDES permit requirements. Measures that could potentially introduce nonnative species; smother plants or rosettes; and/or, alter hydrology of habitat into or out of habitat should not be used.
- ***NLT Site Training.*** Site training will occur prior to and during construction. TCRR will hire a qualified biologist to develop appropriate environmental awareness training that TCRR will administer to all site personnel before beginning work on the Project. The training will include the definition of “take” relative to protected species, the potential presence of protected species, reporting requirements, and measures to be taken to minimize impacts to the natural environment. Prior to and during construction, TCRR will hire staff to train all site personnel to avoid fenced areas of the known NLT individuals. TCRR will document training activities and retain documentation for the duration of construction. The documentation will include names of site personnel undergoing training, names of trainers, name of qualified biologist that developed the curriculum, dates and duration of training, and curriculum materials.
- ***Minimize Limits of Disturbance.*** During construction, TCRR will minimize disturbance to vegetation by using previously disturbed areas when feasible for staging and equipment storage and limiting driving speeds in sensitive areas. In addition, TCRR will ensure disturbed ground is rehabilitated with native vegetation as soon as possible following construction activities to minimize exposure of bare ground susceptible to colonization by nonnative plants.
- ***Dust suppression techniques.*** During construction, TCRR will cover and/or treat disturbed areas with dust suppression techniques, including but not limited to soil binders, sprinkling, watering and/or chemical stabilizer/suppressants. This will also include effectively controlling fugitive dust emissions by the application of water, presoaking, or other dust suppression technique during all clearing, grubbing, scraping, excavation, grading, cut and fill, and demolition activities. If winds are greater than 25 miles per hour (40 kilometer per hour), TCRR will either soak the exposed work area or suspend dust-generating activities.

Action Area

The Action Area is defined at (50 CFR 402.02) as “all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action. The Service has determined that the Action Area for this project include the Limits of Disturbance (LOD) of the Preferred Alternative which includes Segments 1, 2A, 3A, 4, and 5; see Figure 1 below for more detail (USDOT FRA 2020a). More detail on Segment locations, see Section 1.2.1. – 1.2.8 within the Biological Assessment (USDOT FRA 2020a). The Action Area also includes these additional areas:

- Construction of rail infrastructure, access roads, drainage swales, and ancillary facilities (e.g., stations [Dallas Terminal Station, Brazos Valley Intermediate Station and Houston Northwest Mall Terminal Station]; trainset maintenance facility and maintenance of way (MOW) facilities; traction power substation; maintenance roads; and, signal houses).
- Relocation or alteration of existing utilities, easement locations (i.e., underground pipelines, aboveground electrical transmission lines, or existing roads), or roads.
- Construction of new electrical transmission lines.
- Temporary construction areas needed for staging locations (i.e. construction laydown and workspace areas) and modifications to existing utility easements (e.g., pole adjustments of electrical utilities or cathodic protection). Also, areas that would require temporary construction easements.
- Stream, wetland, and/or open water habitats that would be traversed by rail infrastructure, access roads, ancillary facilities, and/or temporary workspace areas.

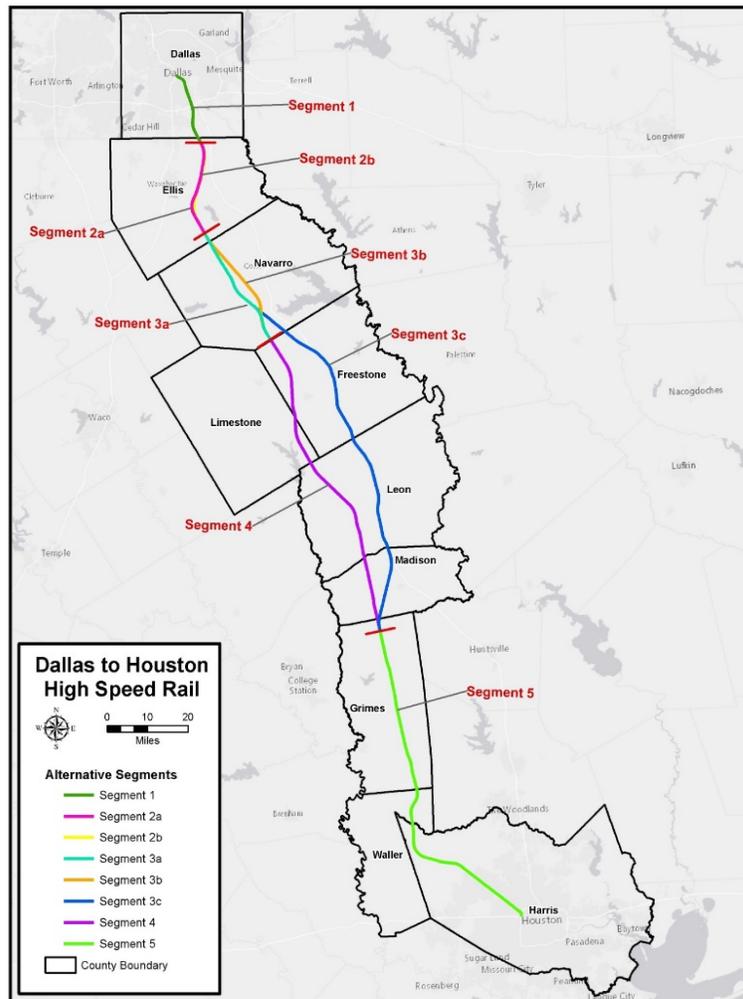


Figure 1. Project Route Alternatives, including the Preferred Route along Segments 1, 2A, 3A, 4, and 5 (see Figure 1.2-1 in USDOT FRA 2020a)

STATUS OF THE SPECIES AND CRITICAL HABITAT

Per Section 7 regulations of the Act (50 CFR 402.12(g)(2)), it is the Service’s responsibility to “evaluate the current status of the listed species or critical habitat.”

To assess the current status of the species, it is helpful to understand the species’ conservation needs which are generally described in terms of the reproduction, numbers, and distribution (RND). The Service frequently characterizes the RND via the *resiliency* (ability of a species/population to withstand stochastic events – numbers, growth rates); *redundancy* (ability of a species to withstand catastrophic events – numbers of populations and their distribution); and, *representation* (variation/ability of a species to adapt to changing conditions). These are collectively referred to as the three R’s.

Large-fruited sand-verbena

The LFSV was listed as an endangered species without critical habitat on September 28, 1988 (53 Federal Register (FR) 37975 – 37978). At the time of listing, the Service assigned the LFSV a species recovery priority number (RPN) of 2. However with increased recovery efforts, a better understanding of the species life history, and documentation of additional populations, the Service reassigned the LFSV with a RPN of 8 (medium degree of threat, high recovery potential, and the listed entity is a species) (USFWS 2010). The LFSV is endemic only to the post oak savannah ecoregion in Texas and is known from nine populations range-wide, all of which are located on private lands, in Freestone, Leon, and Robertson counties (Figure 2 below).

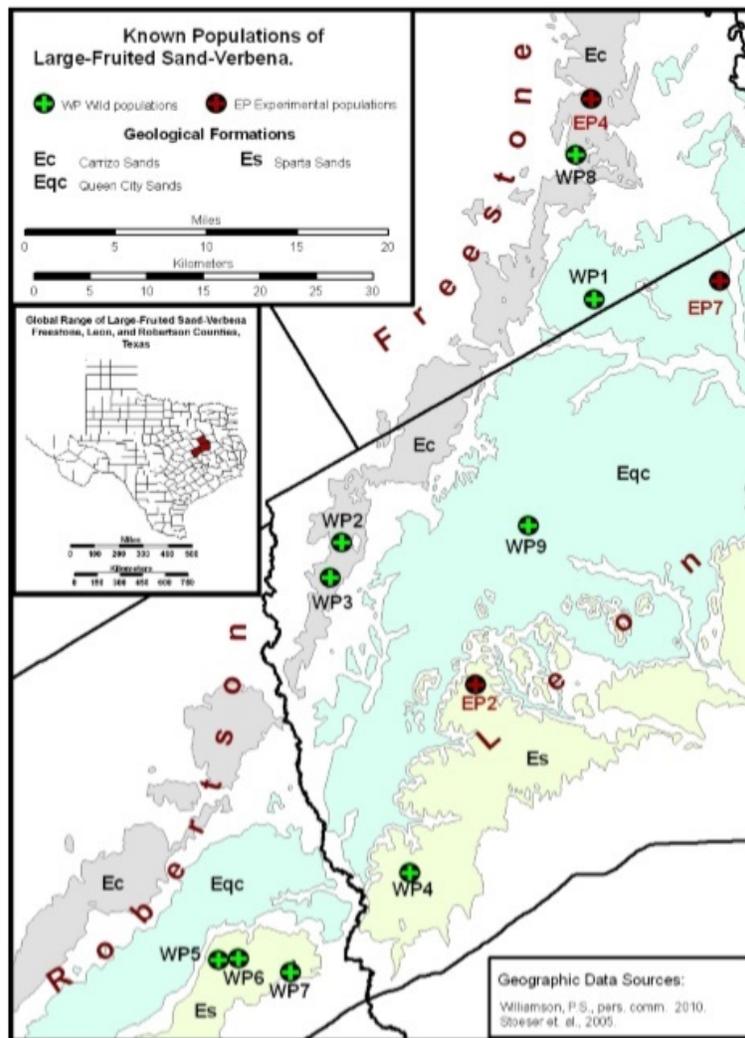


Figure 2. Global Range of the Large-Fruited Sand-Verbena (source: USFWS 2010).

The species' Environmental Conservation Online System (ECOS) profile, Service's most recent 5-Year Review (2010), Recovery Plan (1992), and other pertinent species' literature can be found on our ECOS website at: <https://ecos.fws.gov/ecp0/profile/speciesProfile?slId=1882>. To date, the state (TPWD) has also funded several LFSV-directed projects on the species' biology, ecology, and life history through Traditional Section 6 grants (Williamson 1996, 2002, 2008);

those can be accessed on their website at:

<https://tpwd.texas.gov/business/grants/wildlife/section-6/projects/plants>.

Distribution

The LFSV is an edaphic endemic found in the post oak savanna region of eastern Texas. The nine documented wild populations are separated by no more than 50 miles (mi) (80 kilometers (km)) each. LFSV is restricted to a specialized habitat of deep sandy and sometimes acidic soils of the Arenosa, Silstead, Padina, Pickton, and Wolfpen series (Kennedy *et al.* 1990; Williamson 1996, 2002), derived from the Eocene geological formations known as the Carrizo Sand, Sparta Sand, and Queen City Sand (U.S. Department of Agriculture (USDA) 1989, Stoesser *et al.* 2005). Known populations occur on sand dunes (often referred to “sandy blowouts”) within openings in a mosaic landscape of a post oak savannah and grassland (Poole *et al.* 2007). LFSV is known from sites where bare ground is greater than 50 percent and with a soil pH from 4.8 - 6.6 (USFWS 2010). Soil parameters, percent vegetation cover, and associated plant species at known sites can be found in more detail in Tables 6, 8, and 9 of the 5-Year Review (USFWS 2010).

Reproduction

LFSV will reproduce sexually and is an obligate-outcrosser, relying on moth species of the families Sphingidae and Noctuidae for pollination (Williamson *et al.* 1994). LFSV plants usually form rosettes from October through February, then begin flowering with the peak of anthesis and fruit set in April and May, followed by senescence (ageing and ultimately plant death) of the above-ground portion from mid-May or June until October (Williamson 1996). The species may occasionally flower into the fall (Kennedy *et al.* 1990, Corlies 1991, USFWS 1992). During the summer months, the plants perenniate as taproots found at depths of 0.4 - 4.7 in (1 to 12 cm) (Williamson 1996). Seed dispersal range in the wild is extremely limited (usually less than 3.28 ft (1.0 m)). The known populations possess a relatively high amount of genetic diversity, considering their isolation and extreme endemism. However, the populations are genetically distinct, and there is little or no gene flow between them. The structure of known populations indicates that recruitment occurs regularly at all sites, and one population is slowly recolonizing a severely-disturbed portion of formerly-occupied habitat (USFWS 2010). Although LFSV anthocarps (small, one-seeded fruit) are wind-dispersed, the majority fall within 11.8 in (30 cm) of the parent plant, thus perhaps explaining the species’ “clumped-contagious” spatial distribution in occupied habitats (Williamson 1998). “Clumped-contagious” distribution means that the presence of one individual indicates a high probability that there are others nearby (USFWS 2010).

Abundance

At the time the Recovery Plan was published, only three populations of LFSV were known from private lands. Surveys conducted in 1990 (Kennedy *et al.* 1990), 1996, and 2008 (Williamson) focused on surveying new sites in Texas for additional populations. To date, there are now nine known wild populations on private lands (USFWS 2010). Three experimental populations have also been successfully established on private land. The total known population size has increased from 35,250 individuals in 1996 to 94,509 individuals in 2008 (Williamson 1996, 2008).

Recovery Goals and Needs

The criterion to downlist the species from a listed status of endangered to threatened under the Act, states that at least 20 healthy, stable populations with a minimum of 600 plants in each, must be located or established, on 25 ac (10.1 ha) of habitat each. These populations should be distributed throughout the natural, potential geographic range of the LFSV. The species may be delisted if the downlisting criterion of 20 populations is maintained for at least 10 years. In addition, long-term agreements and management plans should be in place that will ensure their continued protection (USFWS 1992, USFWS 2010). Based on new information from Williamson (2002, 2008) and Goodson (2007), significant progress towards the species recovery has been made over the last 18 years, indicating that the recovery criteria should be revised but also that full recovery of LFSV is possible.

Stressors

Primary threats to the LFSV include destruction and modification of habitat including clearing of vegetation for petroleum exploration and residential development within habitat; conversion of native grassland to improved pastures of introduced grasses; conversion of open grassland to woodland or food plots; and, over-stocking of grazing animals. Additionally, other incompatible land use practices include herbicide application from October to April; mowing from February to April; ORV use within populations from October to April; and, broad-scale insecticide use (which could kill pollinators) (Williamson 2008).

Climate change may be a factor affecting the LFSV; however, we do not know whether these changes that have already occurred have affected populations or its distribution, nor can we predict how the species might be affected by the type and degree of climate changes in the future. Due to the species' endemism, rising temperatures might enable the species to survive further north than at present, but might also reduce the southern limit of the range. Similarly, changes in the frequency and amount of precipitation could favor a shift in geographic range or habitat type. However, the discontinuous nature of the populations and potential habitat, the limited seed dispersal range, and the existence of new, anthropogenic barriers to migration could impede the spontaneous movement of the range. Changes in temperature and rainfall amounts and patterns could alter the species' competitive advantage in the unique micro-habitats it now inhabits in relation to competition from nonnative grasses. The susceptibility of LFSV to competition from parasites and pathogens could increase however, we cannot predict how the species will respond or adapt to these changes.

Navasota ladies'-tresses

The NLT was listed as endangered May 6, 1982 (47 FR 19539) without critical habitat. A member of the orchid family (Orchidaceae), the NLT reaches 8 - 15 in (20.3-38.1 cm) tall and has a single row of small blooms (0.25 in (0.64 cm)) wound loosely around the top third of the slender inflorescence (Poole and Riskind 1987, USFWS 1984, Campbell 1995). Two other common ladies'-tresses species may be found in the same habitat as NLT, thus conducting surveys during the appropriate time of year and identifying key morphological characteristics is essential to correctly identify the NLT (USFWS 2009, TPWD 2020). The species' was originally assigned an RPN of 2 (meaning a high degree of threat, a high recovery potential, with a listed entity as a species) (USFWS 1984). However, the Service updated the RPN to an 8C due to an increase in the knowledge of the species' biology and ecology; a change in the degree of

threat; and, a potential conflict with economic activity (USFWS 2009). NLT is known from 13 Texas counties (Figure 3) on private and state lands with almost all potential habitat on privately-owned lands (USFWS 2009). There are 24 small protected reserves, of which 21 resulted from Section 7 consultation with the Service (USFWS 2009). The status of some of these reserves is unknown as some are not permanently protected.

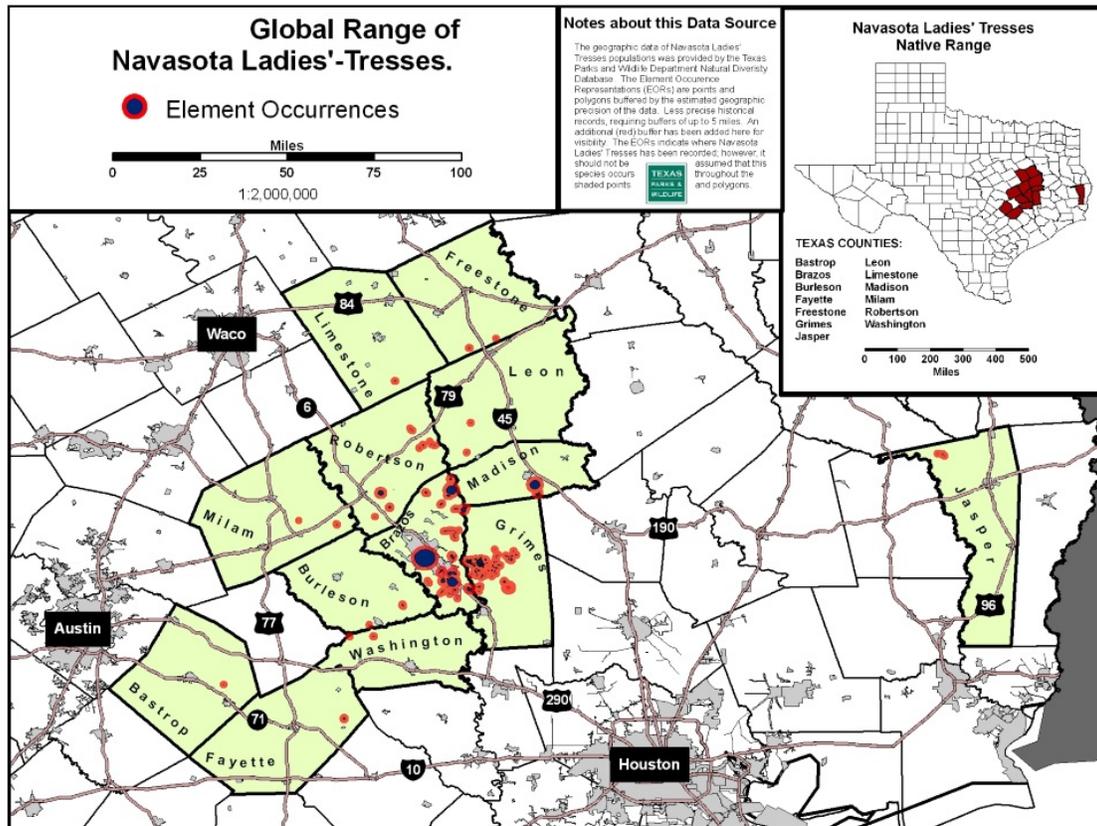


Figure 3. Global Range of the Navasota Ladies'-Tresses (source: USFWS 2009).

The species' ECOS profile, Service's most recent 5-Year Review (2009), Recovery Plan (1984), and other pertinent species' literature can be found on our ECOS website at:

<https://ecos.fws.gov/ecp0/profile/speciesProfile?sid=1570>. To date, the state (TPWD) has also funded NLT-directed projects through Traditional Section 6 grants on the species' monitoring and management along Texas ROWs (Poole and Janssen 1997); development of digital geologic data (Strom 2002); and, the population structure and dynamics (Manhart 2006). These reports can be accessed directly from the TPWD website at:

<https://tpwd.texas.gov/business/grants/wildlife/section-6/projects/plants>.

Distribution

The species is an edaphic endemic dependent on ephemeral seeps with sandy soils, and found mainly in small clearings within post oak savanna in central east Texas. Often found along naturally eroded slopes of the upper reaches of drainages and ephemeral streams, NLT can occasionally be found near the margins of seeps and swales (Tejas Ecological Surveys 2001, Poole *et al.* 2007, Hammons *et al.* 2009). NLT's ecology is intertwined with its mycorrhizae

(fungi), like other orchids, which complicates the understanding of its breeding system and genetics (see USFWS 1984 and 2009 for more detail). Plants are often found under canopy gaps, where the woody and herbaceous vegetation are less dense than surrounding areas (USFWS 2009). Associated plant species can be found in the 5-Year Review (Table 6, in USFWS 2009). When NLT was listed in 1982, it was known only from Brazos County however it has now been confirmed in a total of 13 Texas counties including: Bastrop, Brazos, Burleson, Fayette, Freestone, Grimes, Jasper, Leon, Limestone, Madison, Milam, Robertson, and Washington. The Jasper County location consists of a few plants in two small sites in Angelina National Forest and is disjunct from the other populations being 114 mi (183 km) east of the nearest population in Madison County (Bridges and Orzell 1989). The known range of the species spans 210 mi (338 km) east to west, and 110 mi (177 km) north to south.

Reproduction

Flowering in NLT occurs in mid-October to mid-November, and fruits form until the first frost, usually in late November. Each fruit contains thousands of tiny seeds. Its linear basal leaves are usually absent by bloom time, but the inflorescent stalk has several leaf like sheathes (USFWS 1984, Poole and Riskind 1987, Campbell 1995). Pollination may occur regularly with NLT, however due to its unusual biology, sexual reproduction is rare and most individuals at a site are clonal. This means that even if many plants are found, the effective genetic population size often is one individual. A “population” may consist of one or many sites among which gene flow, such as pollination or seed dispersal, may occur. Geographic clusters of interacting populations may be considered “meta-populations,” and the geographic area of a meta-population is a “macro-site.” Large expanses of unsuitable habitat, cropland, or urban and residential development may serve as barriers to gene flow. Therefore, while individual sites may have too few individuals to meet the criterion of minimally sustainable populations, a group of sites may function as components of a larger, more viable population if their proximity and the continuity of habitat allow for gene flow from site to site (USFWS 2009). Updated information regarding the pollination and reproduction of the NLT can be found in the 5-Year Review (USFWS 2009).

Abundance

To date, there are a total of 11,537 NLT individuals globally (USFWS 2009). The individuals observed includes plants derived from TPWD’s TXNDD EOs. There are currently 141 EOs for the NLT; however, TPWD is currently in the process of revising its EOs to conform to the standard published by NatureServe (2002) related to separation distances between EOs. Consequently, many of the 141 EOs for NLT have been recombined into a smaller number of geographically-larger EOs, however the total number of populations this represents will stay the same (USFWS 2009).

Recovery Goals and Needs

The 1984 Recovery Plan states that in order to downlist the species from endangered to threatened, that “the establishment and securing of two safe sites containing portions of the existing NLT population, through cooperative agreements, purchases, easements or other means of obtaining management rights, and through preparation and implementation of management plans” needed to occur. Since then, the regionally-approved recovery team has discussed a revision of this recovery plan, as the species will not recover solely through the establishment of these two sites. An updated plan should address the extensive amount of new information on the

species' biology, ecology, and management, as well as the recovery criteria (USFWS 2009). The 1984 plan does not have sufficient criteria nor meet current recovery planning guidance requirements (USFWS 2009).

As part of the Department of Interior's Agency Priority Performance Goal to develop quantitative delisting criteria for those species' lacking such in their recovery plan, the Service developed the following criterion for both downlisting and delisting in 2019 for the NLT (USFWS 2019a):

Downlisting Criterion 1: One or more viable populations or metapopulations occur in each of the seven USGS Hydrologic unit code (HUC) 8-digit watersheds within its known range. To be considered viable, each population or metapopulation will consist of at least 1,500 mature individuals, and will total at least 10,500 individual plants across the seven HUCs.

Downlisting Criterion 2: The populations or metapopulations that meet criterion 1 occur in protected natural areas. Protected natural areas include lands owned by federal, state, or local government agencies, or by private landowners, that are legally protected for the purpose of conserving native plants and animals and their habitats. Examples include, but are not limited to, state parks, state natural areas, and state wildlife management areas, conservation easements on private lands, lands owned and managed for conservation by non-profit organizations, and legally-binding long-term management agreements with other public agencies or private landowners. To be considered under this criterion, the potential habitats of NLT must be managed in a manner that promotes the continued survival of this species.

Delisting Criterion 1: The criteria for downlisting to threatened, described above, have been met: One or more populations or metapopulations, each consisting of consisting of 1,500 or more mature individuals, occur in protected natural areas within each of the 7 HUC-8 watersheds of the species' geographic range.

Delisting Criterion 2: Periodic monitoring indicates that the minimum viable population level of 1,500 individuals within each protected natural area remains stable or increases over a period of at least 39 years. Monitoring (censuses) of each protected natural area must be conducted annually for the first 10 years and subsequently every 5 years up to the 39 year timeline.

In addition to the amended downlisting and delisting quantitative criteria from 2019, the following is established in the Services' 1984 recovery plan and includes the following: 1) remove immediate threats to NLT by protecting the major population systems from threats posed by human modification of the habitat and impact from collecting; 2) minimize long-term threats to NLT through development of a base of information that is relevant to recovery; and, 3) develop public awareness, appreciation, and support for protection and recovery of NLT.

Stressors

NLT is threatened primarily from the loss and/or modification of habitat, stemming from mining, landfill, and pipeline related operations, highway construction, and various private development

projects that have not required Section 7 consultation with the Service. Even where the species' habitat remains secure, habitat quality is declining as a result of a dense woody understory replacing the herbaceous component of the post oak savanna region. This "thicketization" has occurred throughout this region, and elsewhere, and is attributed to a greatly reduced frequency of wildfire and to poor rangeland management techniques (USFWS 2009).

Previous Related Consultations

There are several formal consultations related to the LFSV and/or NLT across our Ecological Services region (includes Texas as well as three other states). No projects specifically address the construction of a railroad system and potential effects to the LFSV or NLT; however, linear-type projects (pipelines, transmission lines, roads/highways, etc.) are listed below as they could have similar effects. Only relevant Biological Opinions or habitat conservation plans that pertain to effects within this Project's Action Area have been included. These consultations reflect those submitted into our ECOS database to date and are listed in reverse chronological order in Table 2 below. Final Biological Opinions are available upon request from the TCESFO.

Table 2. Summary of Biological Opinions related to linear-type-projects involving the large-fruited sand-verbena (LFSV) and/or Navasota ladies'-tresses (NLT) within pertinent counties of the Project's Action Area (USFWS 2009, 2020).

Consultation Code	Conclusion Date	Project Name	County	Species	Project-related Disturbance (in acres (ac) of habitat and plants)
02ETTX00-2017-F-1748	Nov 2018	Targa Downstream LLC / Grand Prix South Pipeline	Ellis, Freestone, Hill, Johnson, Leon, Madison, Navarro	LFSV, NLT	52.8 ac of habitat (LFSV); 504.2 ac of habitat (NLT)
21450-2011-F-0184	Jan 2012	Oncor Electric Habitat Conservation Plan	100 Texas counties including Leon, Limestone, Freestone, Grimes	LFSV, NLT	5.5 ac of habitat (LFSV); 943 ac of habitat (NLT)
21450-2002-F-0589	Jan 2003	TxDOT widening of State Highway (Hwy) 21 Kurten to North Zulch, U.S. Hwy 190	Madison, Brazos	NLT	15.03 ac of habitat
21450-2001-F-0557-R001	Sept 2001	XTO Energy Pipeline (Formerly Cross Timbers)	Freestone, Leon, Limestone, Robertson	NLT	2.43 ac of habitat
21450-2000-F-0413	Feb 2000	USDOT Longhorn Pipeline	Crane to Houston	NLT	5.2 ac of habitat
21450-1999-F-0055	Jan 2006	TxDOT US 79 from FM 1512 to IH 45 (Jewett to Buffalo, Texas)	Leon	NLT	64.87 acres of habitat
21450-1997-F-0098	Apr 1997	Riley #1 Central Delivery Point to Bear Grass CDP Pipeline	Anderson, Leon, Freestone, Robertson	LFSV, NLT	No effect for LFSV; 1.96 ac of habitat (NLT)
21450-1996-F-0291	Nov 1997	Rockland Pipeline Company, Plum Creek Pipeline	Freestone, Leon	LFSV, NLT	1.44 ac of potential habitat

There are no formal consultations addressing critical habitat as no critical habitat has been designated for either the LFSV or NLT.

ENVIRONMENTAL BASELINE

Regulations implementing the Act (50 CFR 402.02) define the environmental baseline as the condition of the listed species or its designated critical habitat in the action area, without the consequences to the listed species or designated critical habitat caused by the proposed action. The environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process. The consequences to listed species or designated critical habitat from ongoing agency activities or existing agency facilities that are not within the agency's discretion to modify are part of the environmental baseline.

Status of the Species and Critical Habitat within the Action Area

Large-fruited sand-verbena

The LFSV is listed in two Texas counties within the Action Area, including Freestone and Leon, in Segments 3C and 4. Mapping efforts by FRA and AECOM determined that there were a total of 22,248 ac (9,003 ha) and 79,870 ac (32,322 ha) of suitable habitat county-wide within Freestone and Leon counties, respectively (E. Lee, pers. comm. 2020). Currently we have records of three known documented EOs for the LFSV within these counties (TPWD 2014), but none can be found within the Action Area. The nearest EO within Freestone County was reported approximately 18.0 mi (29.0 km) east of Segment 4. The remaining two EO records are both reported in Leon County, each west of Segment 4, with one approximately 3 mi (4.8 km) west and the other approximately 7.8 mi (12.6 km) west (the reference site at Hilltop Lakes) of the Action Area. Additionally, there are three established introduced populations within these counties but also, none are located within the Action Area (USFWS 2010).

Habitat suitability mapping and three years of presence/absence surveys were completed within the Action Area (Segments 3C and 4) from 2017-2019. The Service worked with FRA to identify suitable habitat variables for the LFSV. These suitable habitat parameters are based on the current and best scientific information for the species, yet could vary should more information become available in the future. Suitable habitat parameters for the LFSV include:

- Post oak woodlands vegetation;
- Soils comprised of 70-100 percent sand and 0-15 percent clay at depths of 0-4.7 in (0-12 cm);
- Soils with a pH of 4.8-6.6 at depths of 0-4.7 in (0-12 cm); and,
- Areas over the Carrizo Sand, Sparta Sand, and Queen City Sand geologic formations (USDOT FRA 2017).

Areas of habitat characterized as “dense canopy cover” or “dense canopy cover with thick understory” were removed after the 2017 survey (AECOM 2017a, USDOT FRA 2020a) in coordination with the Service. FRA conducted surveys for LFSV during its’ flowering season

and a reference site (Hilltop Lakes, Leon County) was assessed prior to surveys to ensure the species was indeed blooming. Surveys conducted from 2017 to 2019 (USDOT FRA 2017, AECOM 2018, and AECOM 2019a) did not identify any individual plants within the Action Area in those acres that were accessible (USDOT FRA 2020a, see Table 3 below). Due to access limitations, only 13 ac (5.2 ha) of the 129 ac (52.2 ha) total mapped acres of suitable LFSV habitat within the Action Area were surveyed consecutively from 2017-2019 (USDOT FRA 2020a). FRA determined that there are 116 ac (46.9 ha) of suitable habitat for the LFSV that were not accessible during any part of the survey efforts from 2017-2019.

Table 3. Modeled and Surveyed Acres of Suitable LFSV Habitat within the Action Area (see Table 3.2.7-1, in USDOT FRA 2020a).

Year	Segment	Total Modeled Suitable Habitat Acreage to be Impacted	Surveyed Acreage	Acres not surveyed
2017	4	445	64	381
2018	4	144	23	121
2019	4	129	13	116

The landscape within the Action Area is predominately rural landscape, and includes farmland and woodland, interspersed with roads, railroads, oil and gas wells, some residential development, and cleared utility ROWs. The species is primarily susceptible to habitat destruction and modification of its sparsely vegetated oak woodland habitat (Poole *et al.* 2007) within the Action Area. Conversion of forested areas to agriculture and overgrazing by livestock resulted in the removal and degradation of suitable habitat, and the likely reduction and extirpation of local populations. Road construction, oil and gas wells, and utility ROWs would also have likely reduced the available habitat within the Action Area. All sites are privately-owned and consistent tracking of the species' population data nor the extent of current or past stressors within the Action Area has occurred. Therefore, we cannot clearly define the amount of habitat that has been reduced and/or fragmented within the Action Area.

Navasota ladies'-tresses

The NLT is listed in five Texas counties within Segments 4 and 5 of the Action Area, including Freestone, Grimes, Leon, Limestone, and Madison counties. Mapping efforts by FRA and AECOM determined that there was a total of 847,819.28 ac (343,100.29 ha) of marginal and optimal NLT habitat within these counties (E. Lee, pers. comm. 2020; see Table 4 below). Currently, of the 64 EO records for the NLT within these counties (of which may constitute one or more "sites"), none can be found within the Action Area (USDOT FRA 2020a).

Table 4. County-wide acreages of modeled suitable NLT habitat within counties located within the Action Area (E. Lee, pers. comm. 2020).

County	Acres of Suitable Habitat
<i>Freestone County</i>	<i>104,969.17</i>
Marginal	51,751.84
Optimal	53,217.34
<i>Grimes County</i>	<i>276,618.93</i>
Marginal	214,944.77
Optimal	61,674.15
<i>Leon County</i>	<i>264,120.95</i>
Marginal	152,627.49
Optimal	111,493.46
<i>Limestone County</i>	<i>1,038.64</i>
Marginal	573.67
Optimal	464.97
<i>Madison County</i>	<i>201,071.59</i>
Marginal	146,548.35
Optimal	54,523.24

Habitat suitability mapping and three years of presence/absence surveys were completed within the Action Area from 2016-2018. Optimal habitat included areas where all habitat parameters were met, and marginal habitat included areas with all but one habitat parameter. The Service worked with FRA to identify suitable habitat parameters for the NLT. These parameters are based on the current and best scientific information for the species, yet could vary should more information become available in the future. Suitable habitat parameters for the NLT include:

- Post oak woodlands vegetation;
- Soils comprised of 50-90 percent sand at depths of 0-3.54 in (0-9.0 cm);
- Soils comprised of 0-20 percent clay at depths of 0-3.54 in (0-9.0 cm);
- Soils with a pH of 5.1-6.5 at depths of 0-3.54 in (0-9.0 cm); and,
- Areas with elevations between 197-361 ft (60.0-110.0 m) above mean sea level.

FRA conducted surveys in coordination with two orchid experts during the NLT's peak flowering season and when reference populations (Twin Oaks Landfill, Grimes County) were in bloom. No individual NLT plants were observed during the fall 2016 survey (USDOT FRA 2016). During the 2017 and 2018 surveys, a total of 25 individuals were observed, all in Segment 4 of the Action Area in Madison County (AECOM 2017b, AECOM 2019b, and USDOT FRA 2020a). Twenty one individuals were observed in optimal habitat (USDOT FRA 2020a). Due to access limitations and changes in the limits of disturbance, FRA determined that there were a total of 570 ac (230.7 ha) mapped as optimal or marginal suitable habitat not accessible to surveyed for three consecutive years (Table 5 below) (USDOT FRA 2020a).

Table 5. Modeled and Surveyed Acres of Suitable NLT Habitat within the Action Area (see Table 3.2.8-1, in USDOT FRA 2020a).

Consecutive Years Surveyed	Segment	Habitat Suitability*	Total Modeled Suitable Habitat Acreage to be Impacted	Surveyed Acreage	Acres not surveyed
3	4	Optimal	144	65	79
	4	Marginal	297	102	195
	5	Optimal	152	64	88
	5	Marginal	364	156	208
		<i>Total</i>	957	387	570

The habitat within the Action Area is predominately rural, dominated by farming and ranching and interspersed with development from transportation (roads, railroads), residential, and industrial (lignite mining) development; oil and gas development and related activity; and, cleared utility ROWs. The NLT is primarily susceptible to habitat destruction and modification of its sparsely vegetated oak woodland habitat (Poole *et al.* 2007) within the Action Area. Conversion of forested areas to agriculture and overgrazing by livestock resulted in the removal and degradation of suitable habitat, and the likely reduction and extirpation of local populations. Even where habitat remains, the invasion of dense woody understory reduces the viability of that habitat for NLT. Herbivory by deer, squirrels, and perhaps other herbivores has been documented to cause a significant amount of damage to flower stalks (USFWS 2009). The development pressures mentioned above would also have likely reduced the available habitat within the Action Area. All sites are privately-owned and consistent tracking of the species' population data nor the extent of current or past stressors within the Action Area has not occurred. Therefore, we cannot clearly define the amount of habitat that has been reduced and/or fragmented within the Action Area.

No critical habitat has been designated for the LFSV or the NLT.

EFFECTS OF THE ACTION

In accordance with 50 CFR 402.02, effects of the action are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of all other activities that are caused by the proposed action. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action (see §402.17).

Large-fruited sand-verbena

The construction, maintenance, and operation activities associated with the Project could affect the LFSV and its habitat within the Action Area. A total of 116 ac (46.9 ha) of potential suitable

habitat was identified within the Action Area in Freestone and Leon counties. Anticipated construction is planned to occur between 2020 and 2024. TCRR anticipates this project becoming fully operational in 2026. Daily train maintenance activities would occur on the track or on the permanent ROW each evening, as required (TCRR 2020a). Ongoing maintenance would occur for the life of the Project.

The primary stressors for the LFSV within the Action Area associated with construction-related activities include the direct loss of habitat and/or its fragmentation, and the direct loss or impact to the LFSV seeds/seedbank. Land clearing and grubbing will permanently remove and/or reduce the quality of habitat and its necessary features. Additionally, the expansion of existing roads within the Action Area to allow for the transit of heavy equipment and machinery may reduce the quality and quantity of habitat. The direct killing of individual flowering plants or rosettes could impact the LFSV across its range by reducing: the number of individuals in a population; a population as a whole; the future migration of individuals to new areas within suitable habitat; foraging opportunities for known pollinators; and, any genetic novelties or variation of individual plants within or among a population. However, since there is a lack of any genetic information on the population dynamics of the LFSV, we cannot draw any reasonable conclusions on the effects to its representation at this time. Clearing and grubbing activities will include stripping a layer of topsoil and stockpiling for future use, if feasible (TCRR 2020b). Direct loss of the species' seedbank could occur during these activities, effecting the resiliency of the LFSV to future stochastic events, reducing future reproductive opportunities, and impacting the representation across its range. Indirect effects of land clearing, soil disturbance, and introducing foreign material/seed from other sites (during material hauling; see TCRR 2020b) could result in an increase of nonnative invasive species within suitable LFSV habitat and adjacent habitats. The colonization and spread of these nonnative species outcompetes LFSV for water, light, and space resources and alter suitable habitat variables.

Exposure to dust, air particles, and/or hazardous wastes could occur during construction-related activities and could directly kill plants and effect its seedbank. It may be necessary to alter existing oil and gas infrastructure within the Action Area (TCRR 2020a) thereby, introducing opportunities for LFSV or its habitat to be impacted by a spill or release of hazardous materials, as well as soil disturbance and the introduction of nonnative invasive species.

Activities associated with the ongoing operation and maintenance within the Action Area could affect the LFSV. Site restoration and revegetation, and maintenance plans have not been finalized and would be detailed in the Landscaping Plan (AS-MM #5, in USDOT FRA 2020b). Maintenance will likely include mowing and/or herbicide use. Any LFSV plants growing within the mowed area would likely be destroyed. Timing and frequency of mowing is important as mowing of LFSV during blooming reduces its reproductive output potential. Introduction of nonnative invasive grasses can be introduced by persons or equipment should mowing machinery not be cleaned prior to entering the habitat within the Action Area. Altering mowing timing and frequency may be beneficial to the LFSV since it may respond favorably to light disturbance (USFWS 2010) and may reduce encroachment from nonnative invasive species. Herbicides may occasionally be needed to control woody growth in the Action Area. The type, timing, frequency, and mode of application of herbicides would likely directly affect LFSV plants, its seeds/seedbank, and habitat. Aerial application could cause drift, killing plants within

and adjacent to the Action Area and may indiscriminately kill known pollinating moth species (during the LFSV blooming period) and/or other pollinators visiting the LFSV.

TCRR on behalf of FRA will offset the loss and disturbance to 116 ac (46.9 ha) of suitable LFSV habitat within the Action Area in Freestone and Leon counties, by agreeing to preserve lands through either fee purchase or conservation easements through an accredited third-party land trust at a ratio of 1:1. TCRR on behalf of FRA will post adequate financial assurances and will obtain offsets (compensatory mitigation) prior to beginning construction in modeled LFSV suitable habitat within these counties. The Service will have an opportunity to review the conservation easement agreement and/or the donation agreement prior to its execution. Securing 116 ac (46.9 ha) will likely provide extreme recovery benefit to the LFSV and its overall viability if easements are at, or near, the habitat threshold stated in the downlisting recovery criteria.

Navasota ladies'-tresses:

The construction, maintenance, and operation activities associated with the Project could affect the NLT and its habitat within the Action Area. A total of 570 ac (230.7 ha) of potential suitable habitat were identified within the Action Area in Freestone, Grimes, Leon, Limestone, and Madison counties. Of those acres, a total of 167 ac (67.6 ha) were mapped as optimal and 403 ac (163.1 ha) were mapped as marginal for the NLT. See the LFSV section above for details on the anticipated construction windows.

The primary stressors for the NLT within the Action Area associated with construction-related activities include the direct loss of habitat and/or fragmentation and the direct loss or impact to its seeds/seedbank. Land clearing and grubbing will permanently remove and/or reduce the quality of habitat and its necessary features. Additionally, the expansion of existing roads within the Action Area to allow for the transit of heavy equipment and machinery may reduce the quality and quantity of habitat. The direct killing of individual adult flowering plants or rosettes could impact the species' redundancy and representation across the range by reducing future migration to new areas of suitable habitat; reducing foraging opportunities for potential pollinators; and, reducing any genetic novelties of such individuals within a population or a population itself. Rosette leaves support the formation of storage tubers between November and March that sequester resources in preparation for sending up a leafless bloom stalk at some future time. It is believed that plants often require more than one year of photosynthate storage to successfully send up a bloom stalk. Thus, if local conditions have not been favorable for forming sufficient below-ground reserves or soil or habitat is disturbed such that storage of these materials is not feasible, the plant may not bloom (Wilson 1993). Clearing and grubbing activities will also include stripping a layer of topsoil and stockpiling for future use, if feasible (TCRR 2020b). NLT are extremely slow-growing and long-lived. Individual plants depend on a symbiotic relationship with soil fungi that is established before the seed germinates. The NLT is not known to have a well-established seedbank (Wilson 1993) and therefore, any direct loss would likely effect the resiliency and representation of the NLT. Indirect effects of land clearing and/or soil disturbance; changes in the soil horizon; and, introducing foreign material/seed from other sites (during material hauling; TCRR 2020b) could result in an increase of nonnative invasive species within suitable NLT habitat. The colonization and spread of these nonnative species could outcompete the NLT for water, light, and space resources and alter suitable habitat

variables. Modification of natural or preexisting drainages within the Action Area could change the availability of moisture, causing a significant effect on NLT.

Exposure to dust, air particles, and/or hazardous wastes could occur during construction-related activities and could directly kill plants. It may be necessary to alter existing oil and gas infrastructure (TCRR 2020a), thereby introducing opportunities for NLT or its habitat to be impacted by a spill or release of hazardous materials.

Activities associated with the ongoing operation and maintenance within the Action Area could affect the NLT. Site restoration and revegetation, and maintenance plans have not been finalized and would be detailed in the Landscaping Plan (AS-MM #5, in DOT FRA 2020b). Maintenance will likely include mowing and/or herbicide use. Any NLT plants growing within the mowed area would likely be destroyed. Timing and frequency of mowing is important as mowing of NLT during blooming reduces its reproductive output potential. Introduction of non-native invasive grasses can be introduced by persons or equipment should mowing machinery not be cleaned prior to entering the habitat within the Action Area. Altering mowing timing and frequency may be limit effects to NLT. Herbicides may occasionally be needed to control woody growth in the Action Area. The type, timing, frequency, and mode of application of herbicides would likely directly affect NLT plants and rosettes, its seeds/seedbank, and habitat. Aerial application could cause drift, killing plants within and adjacent to the Action Area and may indiscriminately kill potential pollinators. Since NLT is associated with drainages, herbicides could have an effect on local water quality if appropriate measures are not taken.

In an effort to avoid and minimize effects to the 25 individual NLT plants observed in Madison County, TCRR on behalf of FRA has committed to institute measures that include: installing an exclusion fence; maintaining habitat features; avoiding the transport of nonnative seed; site training for workers; minimizing the LOD; and, initiating dust suppression techniques. For more detail on these measures, see the 'Conservation Measures' section above for the NLT. These measures will appreciably reduce impacts to the 25 individuals observed during the three years of NLT surveys.

TCRR on behalf of FRA will offset the loss and disturbance to 570 ac, of which includes 167 ac (67.6 ha) of modeled optimal habitat and 403 ac (163.1 ha) of modeled marginal habitat within the Action Area in Freestone, Limestone, Leon, Madison, and Grimes counties, by agreeing to preserve lands through either fee purchase or conservation easements with an accredited third-party land trust at a ratio of 1:1 for optimal habitat and 1:0.5 for marginal habitat. TCRR on behalf of FRA will post adequate financial assurances and will obtain offsets (compensatory mitigation) prior to beginning construction in modeled NLT suitable habitat within these counties. The Service will have an opportunity to review the conservation easement agreement and/or the donation. Conserving these acres would assist with the species' Downlisting Criteria 1 and recovery actions through the conservation of the post oak savanna ecosystem and NLT specific habitat needs. These offsets would also contribute to the overall recovery needs of the species.

CUMMULATIVE EFFECTS

Cumulative effects are those “effects of future State or private activities, not involving federal activities, that are reasonably certain to occur within the action area” considered in this Opinion (50 CFR 402.02).

FRA points to the ongoing and future energy development project by Mid-South Synergy Solar Power in rural areas of Grimes, Walker, Madison, Montgomery, Brazos, and Waller counties. This project provides both residential and commercial solar power² within these counties. These developments may potentially impact habitat for listed species assessed in FRA’s biological assessment, including the LFSV and NLT; however, this project may not require consultation with the Service under Section 7 should a federal nexus be lacking. Similarly, oil and gas pipelines and other planned projects that may enter into the Action Area may also not require consultation under Section 7 of the Act (USDOT FRA 2020a).

The Service is not aware of other state, tribal, or local actions that are reasonably certain to occur within the action area at this time; therefore, no cumulative effects are anticipated.

CONCLUSION

After reviewing the current status of the LFSV and NLT, the environmental baseline within the Action Area, the effects of the proposed action, and the cumulative effects, it is the Service’s Biological Opinion that the action, as proposed, is not likely to jeopardize the continued existence of the LFSV or NLT. No critical habitat has been designated for the LFSV or NLT; therefore, none will be adversely modified.

We base this conclusion on the following:

- Modeled suitable habitat for LFSV for Leon and Freestone counties totaled 102,118 ac (41,326 ha) while modeled suitable habitat within the Action Area in these two counties totaled 126 ac (51 ha). After three years of consecutive species surveys on acres that were accessible, 116 ac (46.9 ha) of suitable habitat within the Action Area were not accessed and surveyed. While the amount of disturbance of 116 ac of LFSV habitat exceeds the size of a single known extant population or the amount of acres of known EOs for the species range-wide, this expected disturbance is approximately 0.11 percent of the total modeled suitable habitat within Freestone or Leon counties. Therefore, we do not anticipate that this scale of habitat loss will significantly reduce the overall viability of the LFSV or its RND.
- TCRP on behalf of FRA has agreed to offset the loss of 116 ac (46.9 ha) for the LFSV by conserving acres under permanent protection within the species’ known geographic range. Since all known LFSV EOs and additional acres of suitable habitat are all on private lands, offsets put forward by TCRP may aid in finding new populations and/or areas of potential reintroduction. Since so few sites are known for LFSV and none are under permanent protections, these offsets will provide significant benefit to the species. Offsets of this nature will assist in meeting Recovery Action 1.0 for the species (USFWS 1992).

² See MidSouth Electric Co-Op, online at: <https://midsouthelectric.com/midsouthsolarenergy/>.

- Modeled suitable habitat for NLT within Freestone, Limestone, Leon, Madison, and Grimes counties totals 847,819.28 ac (343,100.29 ha) of marginal and optimal habitat (E. Lee, pers. comm. 2020). Within the Action Area, only 957 acres were mapped as suitable, and 570 ac were not accessible and not consecutively surveyed for three years. This expected disturbance is approximately 0.067 percent of the total modeled suitable habitat within the Action Area, and therefore we do not anticipate that this scale of habitat loss will significantly reduce the overall viability of the NLT or its RND.
- TCRR on behalf of FRA has agreed to offset the loss and/or disturbance of 570 ac of optimal and marginal habitat for the NLT by conserving acres under permanent protection within the species' known geographic range. Since known EOs and additional acres of suitable habitat are under private and state-owned lands, offsets put forward by TCRR may aid in finding new populations. Many of the more recently discovered sites for NLT have concentrated around the Bryan/College Station (Brazos County) area because of the University, and these offsets may explore new areas of the species range. Permanent protections afforded by these offsets will provide benefit to the species via Recovery Action 1 (USFWS 1984). Offsets of this nature will assist in meeting recovery actions for the species.
- TCRR on behalf of FRA will institute measures to avoid and minimize potential impacts to the 25 NLT individuals found during species-specific surveys in Madison County.
- The Service is not aware of state, tribal, or local actions that are reasonably certain to occur within the Action Area at this time that would cumulatively impact the LFSV or NLT.

The conclusions of this Biological Opinion are based on full implementation of the Project as described in the Description of the Proposed Action section of this document, including any conservation measures that were incorporated into the project design.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulations pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm" is further defined (50 CFR § 17.3) to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. "Harass" is defined (50 CFR § 17.3) as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. "Incidental take" is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

Sections 7(b)(4) and 7(o)(2) of the Act generally do not apply to listed plant species. However, limited protection of listed plants from take is provided to the extent that the Act prohibits the

removal and reduction to possession of federally listed endangered plants from areas under Federal jurisdiction, or for any act that would remove, cut, dig up, or damage or destroy any such species on any other area in knowing violation of any regulation of any State or in the course of any violation of a State criminal trespass law.

Since the Action Area is under private landownership and no portion is within Federal jurisdiction, Sections 7(b)(4) and 7(o)(2) do not apply for this project for either the LFSV or the NLT.

AMOUNT OR EXTENT OF TAKE

The Service does not anticipate the proposed action will incidentally take any LFSV or NLT as prohibitions under Section 9 of the Act do not apply to listed plants. However, the Project's effects on the LFSV and the NLT have been evaluated herein for the Service's jeopardy analyses.

EFFECT OF THE TAKE

In this Biological Opinion, we have determined that the proposed action will not result in jeopardy to the LFSV or NLT.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

Large-fruited sand-verbena:

- Maintenance activities developed as part of the Landscaping Plan within the Action Area, should coincide with the species biology and ecology. We recommend that mowing activities occur outside of the LFSV blooming and fruiting/seeding season. Mowing should be at a height of 10 in or higher for maintenance. The use of pesticides during this timeframe should also be avoided or minimized as to reduce impacts to pollinating species and other plant associates within the LFSV habitat.
- Equipment and machinery should be cleaned, the maximum extent practicable or necessary, prior to entering any areas identified as either suitable habitat so as to avoid the introduction of nonnative species.
- Promote public support for conservation and recovery of the LFSV through displaying public signage or other forms of public outreach on associated train and terminal locations (see Recovery Action 7, in USFWS 1992). Information could include ways to support conservation and recovery of endangered and threatened species and their habitats.

Navasota ladies'-tresses:

- Maintenance activities developed as part of the Landscaping Plan within the Action Area, should coincide with the species biology and ecology. We recommend that mowing activities should be scheduled to avoid the blooming season September - December, or February - May when the species produces above-ground rosettes (USFWS 2009). Mowing should be at a height of 10 in or higher for maintenance. The use of pesticides during this timeframe should also be avoided or minimized as to reduce impacts to potential pollinating species and other plant associates within the NLT habitat.
- Equipment and machinery should be cleaned, the maximum extent practicable or necessary, prior to entering any areas identified as either suitable habitat so as to avoid the introduction of nonnative species.
- The NLT Recovery Team, is currently seeking support for a contract to prepare a new recovery plan. Service personnel provided a draft Recovery Outline to the recovery team in June 2007, for the purpose of guiding recovery efforts until a new recovery plan is finalized; this outline remains in draft form.

Landscaping to benefit the LFSV, NLT, and/or their habitats:

- Spot treatment of invasive species within the ROW or MOW is appropriate, if activities are conducted outside of the blooming/seeding periods for the LFSV and NLT. We recommend minimizing the use of herbicides and pesticides. Should herbicides and/or pesticides be needed within the ROW or MOW, we recommend that contractors will use only appropriate treatments and application methods that limit impacts on non-target species (e.g., low volume basal and foliar applications, narrow-spectrum herbicides, and herbicides with low environmental persistence); adjacent acres of habitat; nearby streams and drainages, or WOTUS; and, comply with the Service's guidelines for pesticide application, including but not limited to, "Recommended Protection Measures for Pesticide Applications in Region 2 of the U.S. Fish and Wildlife Service" (USFWS 2004). Coordination with the TCESFO on best management practices is recommended.
- Disturbed areas will be returned to approximate preconstruction contours, where practicable, based on baseline survey data, with the intent to minimize impacts to hydrology and avoid adverse indirect impacts to the covered species.
- Disturbed areas will be reseeded with native species unless specifically prohibited by the landowner. The Project will be monitored to ensure that the reseeded achieves sufficient native vegetation cover and in areas where sufficient cover is not achieved, the reseeded process will be repeated. Site-appropriate species will be selected by qualified biologists to achieve perennial vegetative cover, either through selection of perennial species or a combination of warm and cool season annuals.

Texas fawnsfoot:

The Texas fawnsfoot is currently a candidate species as the Service found listing was warranted but precluded by higher priority actions (USFWS 2011, USFWS 2019b). To date, the Service is reviewing the need for protection of the Texas fawnsfoot under the Act. This Biological Opinion does not cover the Texas fawnsfoot but the Service has advised FRA and TCRR that should the species become listed in the future, that initiation of Section 7 consultation could be applicable. FRA was not able to conduct species-specific aquatic surveys as access was limited. TCRR on behalf of FRA has committed to conduct surveys for the Texas fawnsfoot, per TPWD protocol

(see Appendix C) closer to the construction of the Project. Should individuals be found, they will be relocated under a TPWD permit; a Section 10 permit with the Service may be required if this species becomes listed in the future.

Since freshwater mussels have limited mobility and will not be able to avoid any adverse conditions potentially created in the Action Area, we recommend TCRR on behalf of FRA institute certain precautions. These best management practices are in full in Appendix B, and include such measures as avoiding these habitats; using silt fences or filter fabric to reduce sedimentation within creeks and tributaries; and, timing of construction activities.

Avian Species including Migratory Birds:

TCRR on behalf of FRA will monitor any strike occurrences should any wildlife/bird mortality be observed during operation, recording and documenting such events for a period of five years (USDOT FRA 2020a). However, since birds may be covered under the Migratory Bird Treaty Act (MBTA), reporting should continue during the life and operation of the Project, not for a period of 5 years. Upon locating a dead, injured, or sick listed avian species (including those covered by the MBTA) notification should be made to the TCESFO (#281-286-8282) within three working days of its finding. Written notification to the TCESFO should then be made within five calendar days and include the date, time, and location of the animal, a photograph if possible, and any other pertinent information. Care must be taken in handling sick or injured animals to ensure effective treatment and care, and in handling dead specimens to preserve the biological material in the best possible state.

For the Service to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

REINITIATION NOTICE

This concludes formal consultation on the LFSV and NLT. As provided in 50 CFR §402.16, reinitiation of consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (2) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this Biological Opinion or written concurrence; or (3) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

This Biological Opinion does not cover the Texas fawnsfoot but the Service has advised FRA and TCRR that should the species become listed in the future, that initiation of Section 7 consultation could be applicable.

The Service understands that FRA is the lead federal agency for this Project. Any additional mitigation sites resulting from other agency permitting are not covered by this consultation. If

FRA chooses to incorporate those mitigation sites into the Project, the Service recommends that FRA reinitiate any necessary consultation procedures pursuant to Section 7 of the Act.

Please refer to the consultation number, 02ETTX00-2019-F-2135, in future correspondence concerning this Project. Should you require further assistance or if you have any questions please contact Amber Bearb at amber_bearb@fws.gov or 281-212-1501.

Approved:



Charles Ardizzone, Field Supervisor
Texas Coastal Ecological Service Field Office – Clear Lake

July 8, 2020

Date

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APPENDIX A

USFWS CONCURRENCE WITH SECTION 7 DETERMINATIONS

The FRA requested our concurrence that the proposed action was “may affect, but is not likely to adversely affect” the interior least tern (*Sterna antillarum*), whooping crane (*Grus americana*), and the Houston toad (*Anaxyrus houstonensis*). TCRR on behalf of FRA agreed to implement avoidance and minimization measures outlined below and listed in sections 3.3.1, 3.3.2, and 3.3.3, respectively, in FRA’s Biological Assessment (2020a) for these species. With the implementation of these measures, we concur with FRA’s determination that the proposed Project “may affect, but is not likely to adversely affect” the interior least tern, whooping crane, and Houston toad. Reporting requirements listed below, should be submitted directly to the TCESFO annually for each species. This concurrence is based on the information provided by FRA and TCRR; coordination meetings and materials; coordination with the Service’s species’ experts; and, is contingent upon the implementation of the conservation measures.

Interior Least Tern (ILT) (section 3.3.1 of USDOT FRA 2020a):

- ***Coordination and Inspection for Suitable Habitat and Nesting ILT in all counties.*** Prior to the start of construction activities, TCRR will hire a qualified biologist with experience in identifying avian species to inspect all suitable habitats and open sand bars or gravel areas during the species breeding season, defined as April 1 through August 31. TCRR will coordinate with the Service to ensure appropriate timing, frequency, and duration of surveys. Inspections will occur by a qualified biologist/environmental inspector immediately prior to construction to determine the presence or absence of nesting ILT. If nesting ILTs are identified during inspections, TCRR will contact the Service to determine species avoidance measures. Due to the Jewett Mine occurring within Segment 4 of the Preferred Alternative, where ILT have been documented to nest, and prior to and throughout construction, TCRR will coordinate with the Jewett Mine operators to obtain the latest data on known nesting locations to avoid impacts to this species.
- ***Site Training.*** Site training will occur prior to and during construction. TCRR will hire a qualified biologist to develop appropriate environmental awareness training that TCRR will administer to all site personnel before beginning work on the Project. The training will include the definition of “take” relative to protected species, the potential presence of protected species, reporting requirements, and measures to be taken to minimize impacts to the natural environment. TCRR will also hire staff to train all site personnel on identification of the ILT prior to starting work within ILT habitat. TCRR will document training activities and retain documentation for the duration of construction. The documentation will include names of site personnel undergoing training, names of trainers, name(s) of qualified biologist(s) that developed the curriculum, dates and duration of training, and curriculum materials.
- ***ILT Sensitive Habitat Areas.*** Prior to vegetation clearing, TCRR will hire a qualified biologist to determine the placement of flagging and/or fencing of sensitive habitats and install signs signaling the need for avoidance of these areas to avoid unnecessary adverse impacts and preclude construction impacts from occurring within the area. Sensitive habitats are areas intended to be avoided by the Project and may include:

- Areas identified that provide habitat for protected species.
- Areas adjacent to habitats of protected species.
- Areas where shorebird rookeries and nests are located.
- All lakes, wetlands, estuaries, lagoons, streams, and rivers.
- Riparian corridors.
- When feasible, areas that include TPWD TXNDD EOs.
- **Construction and Nesting Season.** TCRR will avoid construction activities within a buffer not to exceed 1,300 ft during ILT breeding and nesting season (April 1 through August 31).
- **Water quality.** The Project will be required to meet various general compliance measures specific to water quality and contamination regulations. To prevent degradation of waterways that may supply important foraging habitat for the ILT, TCRR will obtain a Section 401 Water Quality Certification; General Construction Permit (TXR150000) and Multi-sector General Permit (TXR050000); Stormwater Management/Stormwater Pollution Prevention Plan. TCRR will also implement a Hazardous Materials Management Plan and Spill Prevention Control and Countermeasure Plan to address potential construction and operational impacts to water quality and sensitive ILT habitat. TCRR will coordinate with the Service on this plan prior to its approval, should there be any potential impacts to sensitive ILT habitat.
- **Minimization of Lighting and Noise.** TCRR will implement a Construction Noise Control Plan if ILT are present at the Jewett Mine. Artificial lighting during construction will be limited at night to the degree that work can be safely completed. Similarly, lighting will be focused downward to lessen the impact to migratory birds including ILT.

Whooping crane (WHCR) (section 3.3.2 of USDOT FRAa):

- **Suitable Habitat Ground Surveys for WHCR.** TCRR will hire a qualified biologist with experience in identifying avian species to inspect all suitable migratory stopover habitats that may be impacted, including palustrine and emergent wetlands, and adjacent cropland prior to vegetation clearing during the species migration season, defined as April 6 through May 2 and September 28 through November 11 (Pearse *et al.* 2020). This qualified biologist/environmental inspector will have “stop work” authority. Inspections shall also occur by a qualified biologist/environmental inspector immediately prior to construction to determine the presence or absence of WHCR in suitable stopover habitat. If migrating WHCR are detected using stopover habitat within 1,000 ft of the Action Area, then construction near that location would be directed to cease work by the qualified biologist/environmental inspector until the whooping crane vacates the area and is no longer within 1,000 ft, unless otherwise agreed to by FRA and the Service.
- **Site Training.** Site training will occur prior to and during construction. TCRR will hire a qualified biologist to develop appropriate environmental awareness training that TCRR will administer to all site personnel before beginning work on the Project. The training will include the definition of “take” relative to protected species, the potential presence of protected species, reporting requirements, and measures to be taken to minimize impacts to the natural environment. TCRR will hire staff to train all site personnel on identification of the WHCR within its’ stopover habitat before site personnel can begin work on the Project. TCRR will document training activities and retain documentation for the duration of construction. The documentation will include names of site personnel

undergoing training, names of trainers, name of qualified biologist that developed the curriculum, dates and duration of training, and curriculum materials.

- **WHCR Sensitive Habitat Areas.** Prior to vegetation clearing, TCRR will hire a qualified biologist to determine the placement of flagging and/or fencing of appropriate sensitive WHCR stopover habitats and install signs signaling the need for avoidance of these areas to avoid unnecessary adverse impacts and preclude construction impacts from occurring within the area. Sensitive WHCR stopover habitats are areas intended to be avoided by the Project and may include lakes, emergent wetlands, streams, rivers, and adjacent open upland habitats including agricultural areas.
- **Equipment Storage During Construction.** Equipment, such as a mechanical crane, when not in use will be laid down to its lowest position at night and during periods of inclement weather. If any equipment cannot be lowered below 15 ft above ground, then it will be marked or flagged to alert migrating WHCR of its position to avoid collisions.
- **Water quality.** The Project will be required to meet various general compliance measures specific to water quality and contamination regulations. To prevent degradation of waterways that may supply important stopover foraging habitat for the WHCR, TCRR will obtain a Section 401 Water Quality Certification; General Construction Permit (TXR150000) and Multi-sector General Permit (TXR050000); Stormwater Management/Stormwater Pollution Prevention Plan. TCRR will also implement a Hazardous Materials Management Plan and Spill Prevention Control and Countermeasure Plan to address potential construction and operational impacts to water quality and sensitive WHCR habitat. TCRR will coordinate with the Service on this plan prior to its approval, should there be any potential impacts to sensitive WHCR habitat.
- **Minimization of Lighting and Noise.** TCRR will implement a Construction Noise Control Plan should WHCR be present on any stopover habitat. Artificial lighting during construction will be limited at night to the degree that work can be safely completed. Similarly, lighting will be focused downward to lessen the impact to migratory birds including WHCR. TCRR will coordinate with the Service on this plan prior to its approval, should there be any potential impacts to sensitive WHCR habitat.
- **Reporting.** TCRR has agreed to monitor, record, and document any wildlife/bird mortality and strike occurrences, during the Projects' operation for a period of five years. Inspections will occur at each terminal station after each arrival. Additionally, records of any obvious wildlife electrocutions/mortality related to the overhead catenary system will be recorded and documented for a period of five years after initial operation. Data would be available to the Service upon request.

Houston toad in Leon County (section 3.3.3 of USDOT FRA 2020a):

- **Avoid Transporting Nonnative Seed.** During vegetation clearing and construction, TCRR will ensure ORV and equipment are free of plant debris and seeds before entering and leaving worksites in Leon County, to avoid transport of nonnative seed to construction areas. TCRR will restore sites with native seed mixes certified as "weed free." If native seeds cannot be used, then the area will be left bare. If left bare, the areas would be stabilized by other appropriate control measures in compliance with the Texas Pollutant Discharge Elimination System (TPDES) permit requirements.
- **Construction Monitoring for Houston Toad.** Prior to and during construction, TCRR will hire one or more qualified biologists working under the direction of at least one

biologist whom holds federal and state permits for the Houston toad, to survey, capture, transport, relocate and monitor suitable habitat for the species. TCRR will coordinate with Service to ensure appropriate timing, frequency, and duration of monitoring to ensure no lethal take occurs.

- ***Exclusion of Houston Toad During Construction in Leon County.*** TCRR will erect physical exclusion (silt fence or other physical barrier to anurans) at the boundary of work areas located within Houston toad habitat to exclude entry by Houston toads. Daily monitoring by a qualified biologist and maintenance of this perimeter is necessary to ensure integrity of exclusion measures. Active monitoring and trapping (e.g., pitfall traps and cover boards) should continue within the exclusion barrier and particularly following precipitation events. Within 24 hours following rain events, cumulatively of 2 in (5.1 cm) or more, a qualified biologist will inspect the site before work can resume. TCRR will deploy a qualified biologist to monitor construction activities within all areas identified as Houston toad habitat within the Action Area in Leon County. During construction, should an unexpected Houston toad be encountered, TCRR will cease work in that area immediately. The permitted biologist will secure the area containing the Houston toad and consult FRA and Service. The permitted biologist will hold an appropriate Service recovery permit to survey, capture, transport, relocated, and monitor Houston toads.
- ***Site Training.*** Site awareness training will occur prior to and during construction. TCRR will hire a qualified biologist to develop appropriate environmental awareness training that TCRR will administer to all site personnel before beginning work on the Project. The training will include the definition of “take” relative to protected species, the potential presence of protected species, reporting requirements, and measures to be taken to minimize impacts to the natural environment. Prior to and during construction, TCRR will hire staff to train all site personnel on identification of the Houston toad prior to starting work within Houston toad habitat. TCRR will document training activities and retain documentation for the duration of construction and provide copies to Service upon request. The documentation will include names of site personnel undergoing training, names of trainers, name of qualified biologist that developed the curriculum, dates and duration of training, and curriculum materials.
- ***Cover Open Trenches.*** During construction, TCRR will ensure that open trenches are covered overnight and/or inspected every morning by a qualified biologist to ensure that no Houston toads or other wildlife are trapped. During construction, TCRR will ensure that escape ramps are placed in any open trenches when needed to ensure that wildlife, including Houston toads, can escape. Should wildlife become trapped, a permitted biologist hired by TCRR will free the wildlife before construction can resume. The permitted biologist will hold an appropriate Service 10 recovery permit to survey, capture, transport, relocated, and monitor Houston toads.
- ***Downed Tree, Log and Stump Removal within Houston Toad Habitat in Leon County.*** The qualified biologist hired by TCRR will inspect downed trees and logs to be moved, removed to a staging area, mulched, disturbed by a falling tree that is scheduled to be cut, or otherwise disturbed to determine if any Houston toads are sheltering beneath, per Service guidance. In addition, during removal of any stumps, the qualified biologist shall inspect the area prior to removal and monitor the activity during removal.

- ***Mowing Height Restriction within Houston Toad Habitat in Leon County.*** During operation and maintenance of the HSR within Leon County, TCRR will set any mowing equipment used for clearing grass, forbs and small-diameter woody vegetation to a height of at least 5 in (12.7 cm) above the ground to minimize the loss of cover for the Houston toad and other anurans.
- ***Water quality.*** The Project will be required to meet various general compliance measures specific to water quality and contamination regulations. To prevent degradation of wetland and streams that are important habitat components to the Houston Toad, TCRR will obtain a Section 401 Water Quality Certification; General Construction Permit (TXR150000) and Multi-sector General Permit (TXR050000); Stormwater Management/Stormwater Pollution Prevention Plan. TCRR will also implement a Hazardous Materials Management Plan and Spill Prevention Control and Countermeasure Plan to address potential construction and operational impacts to water quality and sensitive Houston toad habitat. TCRR will coordinate with the Service on this plan prior to its approval, should there be any potential impacts to sensitive Houston toad habitat.

APPENDIX B

BEST MANAGEMENT PRACTICES TO AVOID OR MINIMIZE EFFECTS TO THE TEXAS FAUNSFoot

Best Management Practices For Projects Affecting Rivers, Streams And Tributaries

The project crosses or potentially affects river, stream or tributary aquatic habitat. Therefore the Service recommends implementing the following applicable Best Management Practices:

1. Construct stream crossings during a period of low streamflow (e.g., July - September);
2. Cross streams, stream banks and riparian zones at right angles and at gentle slopes;
3. When feasible, directionally bore under stream channels;
4. Disturb riparian and floodplain vegetation only when necessary;
5. Construction equipment should cross the stream at one confined location over an existing bridge, equipment pads, clean temporary native rock fill, or over a temporary portable bridge;
6. Limit in-stream equipment use to that needed to construct crossings;
7. Place trench spoil at least 25 feet away landward from streambanks;
8. Use sediment filter devices to prevent movement of spoil off right-of-way when standing or flowing water is present;
9. Trench de-watering, as necessary, should be conducted to prevent discharge of silt laden water into the stream channel;
10. Maintain the current contours of the bank and channel bottom;
11. Do not store hazardous materials, chemicals, fuels, lubricating oils, and other such substances within 100 feet of streambanks;
12. Refuel construction equipment at least 100 feet from streambanks;
13. Revegetate all disturbed areas as soon as possible after construction to prevent unnecessary soil erosion. Use only native riparian plants to help prevent the spread of exotics;
14. Maintain sediment filters at the base of all slopes located adjacent to the streams until right-of- way vegetation becomes established;
15. Maintain a vegetative filtration strip adjacent to streams and wetlands. The width of a filter strip is based on the slope of the banks and the width of the stream. Guidance to determine the appropriate filter strip (stream management zone, SMZ) width is provided below; and
16. Direct water runoff into vegetated areas.

SMZ WIDTH

SMZ widths should consider watershed characteristics, risk of erosion, soil type, and stream width. SMZ widths are measured from the top of each bank and established on each side of the stream. Erosion risk is increased with sandy soil, steep slopes, large watersheds and increasing stream widths. Recommended primary (refers to ephemeral streams) and

secondary SMZ (refers to intermittent, braided, and perennial streams, lakes, and ponds) widths are provided in the table below.

Stream Width (Feet)	Slope (Percent)	Primary SMZ (Feet)	Secondary SMZ (Feet)
<20	< 7	35	0
<20	7-20	35	50
<20	>20	Top of slope or 150	75
20-50	<7	50	0
20-50	7-20	50	50
20-50	> 20	Top of slope or 150	75
> 50	< 7	Width of stream or 100 max.	0
> 50	7-20	Width of stream or 100 max.	50
> 50	> 20	Top of slope or 150	75

PERMIT REQUIREMENTS

A permit may be required from the U.S. Army Corps of Engineers should fill material be placed in wetlands or other waters of the United States. Should such a permit be required, the BMP's contained in this enclosure, as well as other conservation provisions, may become permit conditions. Additional permit requirements may apply, depending upon the nature of individual projects.

Literature Cited

Arkansas Forestry Commission. 2001. Draft Arkansas Forestry Best Management Practices for Water Quality Protection.

APPENDIX C

TPWD PROTOCOL FOR TEXAS FAWNSFOOT

Kills and Spills Team, Freshwater Mussel Survey and Relocation Protocols

Can be accessed at:

https://tpwd.texas.gov/publications/pwdpubs/media/pwd_lf_t3200_1957.pdf.