Mountain Yellow-legged Frog
[Southern California Distinct Population Segment]
(Rana muscosa)

5-Year Review:
Summary and Evaluation

Photo Credit: Adam Backlin, USGS

U.S. Fish and Wildlife Service
Carlsbad Field Office
Carlsbad, CA

May 6, 2019
5-YEAR REVIEW
Mountain Yellow-legged Frog
[Southern California Distinct Population Segment]
(Rana muscosa)

I. GENERAL INFORMATION

Species: Mountain Yellow-legged Frog [Southern California Distinct Population Segment]
Date listed: July 2, 2002
FR citation(s): 67 FR 44382–44392 (July 2, 2002)
Classification: Endangered species
Critical habitat: 81 FR 59045–59119 (September 14, 2006)

Methodology used to complete the review:

In accordance with section 4(c)(2) of the Endangered Species Act of 1973, as amended (Act), the purpose of a 5-year review is to assess each threatened species and endangered species to determine whether its status has changed and it should be classified differently or removed from the Lists of Threatened and Endangered Wildlife and Plants. The U.S. Fish and Wildlife Service (Service) evaluated the biology and status of the Mountain Yellow-legged Frog [Southern California Distinct Population Segment (MYLF) as part of a Recovery Plan (RP) to inform this 5-year review. Finally, based on this synthesis and the threats identified, we herein recommend a prioritized list of conservation actions to be completed or initiated within the next 5 years.

Work done for recovery of the mountain yellow-legged frog has largely resulted from the cooperative effort of numerous partners, including the U.S. Geological Survey, California Department of Fish and Wildlife, U.S. Forest Service, California Department of Transportation, Institute for Conservation Research-San Diego Zoo, Los Angeles Zoo, and the Henry Doorly Zoo. Collaborative efforts between these partners helped to inform the recovery plan for this species which the 5-year review is based on (USFWS 2018a, b, c). The recovery plan represents our evaluation of the best available scientific information, including the resource needs and the current and future condition of the species. Independent peer reviewers and partner representatives reviewed the biological species report before we used it as the scientific basis for this 5-year review.

FR Notice citation announcing the species is under active review:

A notice announcing initiation of the 5-year review of this taxon and the opening of a 60-day period to receive information from the public was published in the Federal Register on June 18, 2018. Information relative to the mountain yellow-legged frog was incorporated.
II. REVIEW ANALYSIS

Application of the 1996 Distinct Population Segment (DPS) policy:

The Act defines “species” as including any subspecies of fish or wildlife or plants, and any DPS of any species of vertebrate wildlife. This definition of species under the Act limits listing as a DPS to species of vertebrate fish or wildlife. The 1996 Policy Regarding the Recognition of Distinct Vertebrate Population Segments under the Endangered Species Act (USFWS 1996, p. 4722) clarifies the interpretation of the phrase “distinct population segment” for the purposes of listing, delisting, and reclassifying species under the Act.

The Service listed mountain yellow-legged frog (Rana muscosa) in southern California as a DPS in 2002 (USFWS 2002, p. 44382). This determination was based on the geographic isolation of this population in relation to the remainder of the species to which it belongs, the significance of the population segment to the species to which it belongs, and the population’s conservation status in relation to the Act’s standards for listing (USFWS 2002, p. 44384). For additional information regarding this determination please refer to the discussion in the final listing rule (USFWS 2002, p. 44384).

Biology and Life History:

Mountain yellow-legged frogs (Rana muscosa) are medium-sized amphibians in the family Ranidae (true frogs). Adult mountain yellow-legged frogs are about 40 to 80 millimeters (mm) (1.5 to 3 inches (in)) from snout to urostyle (the pointed bone at the base of the backbone) (Zweifel 1955, p. 230; Jennings and Hayes 1994a, p. 74). Females are slightly larger (up to 95 mm (3.75 in)) than males (up to 85 mm (3.35 in)) on average (Wright and Wright 1949, pp. 424–430). The skin pattern of mountain yellow-legged frogs is variable, ranging from discrete dark spots that can be few and large, to smaller and more numerous with a mixture of sizes and shapes, to irregular patches or a poorly defined network (Zweifel 1955, p. 230) (Figure 1). Body color is also variable, usually a mix of brown and yellow, but often with gray, red, or green-brown. The belly and ventral surface (underside) of the hind limbs range in hue from pale lemon yellow to an intense sun yellow.

Southern Rana muscosa, which historically was widely distributed in at least 166 known populations across four mountain ranges in southern California, are currently considered to be extant in 10 small populations distributed disproportionately across three mountain ranges (Figure 1). Most populations are isolated in the headwaters of streams or tributaries due to the extensive distribution of predatory nonnative trout in historical habitat; thus, it exists in a highly fragmented environment. Such isolation and fragmentation followed by the prevention of successful recolonization increases the potential for extirpation of the remaining populations. The Species Biological Report for the southern California distinct population segment of the mountain yellow-legged frog describes the life history and biology of the species in more detail (USFWS 2018a).
Figure 1. Current distribution of the mountain yellow-legged frog.
Conservation Efforts:

Extensive collaboration with numerous Federal, State, and private agencies has supported recovery related activities for southern *Rana muscosa*. Such activities include: 1) monitoring extant populations; 2) surveying suitable habitat for additional populations; 3) research of ecological requirements and biological characteristics; 4) salvage operations for at-risk populations or tadpoles from drying pools; 5) captive propagation programs at the San Diego, Los Angeles, Fresno, and HDZ zoos; 6) habitat assessments for reestablishment and potential nonnative trout removal; 7) trout barrier construction; 8) nonnative trout removal operations; 9) monitoring of released individuals; 10) genetics research; 11) testing for infectious disease (*Bd* and viruses); 12) closures to public access and fencing to reduce recreational pressures at extant populations; and 13) other recovery-related activities.

Partners supporting these important recovery-related activities include USGS, USFS (Angeles and San Bernardino National Forests), CDFW (Regions 5 and 6), California Department of Parks and Recreation (CDPR), University of California James Reserve, ICR, LAZ, HDZ, Caltrans, Riverside County, and the Service. The coordinated effort of these partners to provide greater information specific to the DPS has been important for making informed decisions regarding threat abatement and recovery options on a rangewide scale. Many of the activities listed above are ongoing and contribute to our knowledge of the southern *Rana muscosa* population to help conserve this imperiled species.

Five-factor Analysis:

The final listing rule (USFWS 2002, pp. 44382–44392) identified the following threats to southern *Rana muscosa*: recreational impacts (hiking, mountain climbing, camping, swimming, stocking of trout for fishing, and suction dredge mining for gold), dumping of trash and release of toxic or hazardous materials into occupied stream reaches, wildfire, predatory nonnative species (trout and bullfrogs), disease, and threats associated with small population size (genetic, demographic, and environmental stochasticity, and natural catastrophes). Each threat is classified according to the five listing factors identified in section 4 of the Act. The 2012 5-year review for southern *R. muscosa* (USFWS 2012, pp. 1–78) identified five additional threats since listing including cannabis cultivation, fire suppression activities, nonnative plants, climate change affecting temperature and precipitation, and contaminants. The Species Biological Report for the southern California distinct population segment of the mountain yellow-legged frog describes these threats in more detail (USFWS 2018a). A summary of threats impacting the mountain yellow-legged frog at each occurrence is indicated in Table 2.

**Factor A: Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range**

Threats to the habitat of southern *Rana muscosa* remain ongoing throughout the range, though impacts occur to varying degrees in each occupied area. Wildfires are the most significant threat rangewide, as they could occur at any time and may impact any population. The USFS actively manages and monitors many impacts associated with recreation, such that the number of impacted localities has been reduced since listing; however, recreation remains a constant concern. Cannabis cultivation has been detected at five occupied sites since listing. Due to the difficulty in monitoring these sites, the extent of this impact is unknown, although exposure to contaminants at cultivation
sites is a serious concern. Repeated impacts to southern \textit{R. muscosa} occupied habitat due to roadwork activities have occurred since listing. This has resulted in sedimentation of habitat in two occupied areas. Although threats to the habitat persist on a rangewide scale, many of these threats are controllable. Reduction of impacts has been successful at some locations through management decisions (i.e. closing and/or managing recreational areas, enforcing a moratorium on suction dredge mining, and removing cannabis plantations).

**Factor B: Overutilization for Commercial, Recreational, Scientific, or Educational Purposes**

Overutilization is not a threat at this time. Since listing, authorized collecting of southern \textit{Rana muscosa} took place during emergency salvages post-wildfire, to save tadpoles from drying habitat, and to preserve genetic representation of the dwindling City Creek population. Due to the uncertainties related to the small sizes of most southern \textit{R. muscosa} populations, future collection of individuals may be necessary to assist captive breeding and augmentation or to prevent loss of individuals that might otherwise perish in the wild (i.e., in drying pools). Long-term recovery of this DPS may require breeding between populations in captivity to increase genetic robustness of bottlenecked or inbred populations. Therefore, additional collection of individuals may be necessary, though such activity will be permitted or authorized such that it does not constitute a threat to recovery.

**Factor C: Disease or Predation**

At listing, predation by nonnative trout (rainbow trout (\textit{Oncorhynchus mykiss}) and brown trout (\textit{Salmo trutta})) was thought to be one of the principal causes of the rangewide decline of southern \textit{Rana muscosa} (USFWS 2002, p. 44388). Trout are widespread across the historical range of the DPS and currently occupy habitat immediately downstream of southern \textit{R. muscosa} at all occupied sites and upstream at one site (i.e., Tahquitz Canyon watershed). All remaining extant localities remain isolated in fishless headwaters of tributaries (Backlin, 2012, pers. comm.). In addition, bullfrogs and crayfish may become more of a threat as southern \textit{R. muscosa} populations expand. Although mentioned as a potential concern in the listing rule, there was no indication that animals were sick with either viral, bacteria, or fungal diseases. Since listing, all populations have tested positive for the amphibian fungal pathogen, \textit{Bd}, which may have also been a reason for the decline of the southern \textit{R. muscosa}. Thus, both disease and predation are widespread concerns of great significance.

**Factor D: Inadequacy of Existing Regulatory Mechanisms**

In the listing rule, regulatory mechanisms thought to have some potential to protect southern \textit{Rana muscosa} included: (1) the California Environmental Quality Act (CEQA); (2) section 1603 of the California Department of Fish and Wildlife Code (California Lake and Streambed Alteration Program); (3) the National Environmental Policy Act (NEPA); (4) section 404 of the Federal Clean Water Act; (5) local land use processes and ordinances; and, (6) the Federal Endangered Species Act in those cases where southern \textit{R. muscosa} occurs in habitat occupied by a listed wildlife species (USFWS 2002, p. 44388). The listing rule provides an analysis of the level of protection that was anticipated from those regulatory mechanisms.

Since listing, the State of California has listed southern \textit{Rana muscosa} as endangered under the California Endangered Species Act (CESA), critical habitat has been designated under the Act, and one habitat conservation plan (HCP), the Western Riverside County Multiple Species Habitat
Conservation Plan (Western Riverside County MSHCP; see Conservation Efforts – Habitat Conservation Plans below for a description of this HCP), for which southern \( R. \) muscosa is a covered species, was permitted and is currently being implemented. Several State and Federal mechanisms provide a conservation benefit to southern \( R. \) muscosa. At this time, the Act is the primary Federal law that provides protection for southern \( R. \) muscosa since its listing as endangered in 2002, while CESA is the primary State law providing protection to the species since 2013. Critical habitat was designated throughout the range of southern \( R. \) muscosa in 2006, including unoccupied areas essential for the conservation of the species. Other Federal and State regulatory mechanisms provide discretionary protections for the species based on current management direction, but do not guarantee protection for the species absent its status under the Act. Therefore, in absence of the Act, other laws and regulations have limited ability to protect the species. Inadequacies in provisions or implementation of regulatory mechanisms are not currently considered a threat to the species.

**Factor E: Other Natural or Manmade Factors Affecting Its Continued Existence**

Small population size was the only Factor E threat thought to be impacting southern \( Rana \) muscosa at listing. This threat continues to be of critical importance. New threats identified since listing that may be impacting southern \( R. \) muscosa include changes in climate (increase in temperature affecting productivity, disease resistance, emergence cues, and changes in precipitation affecting water level and dispersal ability) and contaminants. There is a possibility that UV-B radiation, pesticides, and acid precipitation have also contributed to the decline of the DPS; however, there is very little information regarding these threats, therefore they are not described below.

At listing, southern \( Rana \) muscosa was thought to have a high extinction risk because of the small size and isolation of the remaining seven populations (USFWS 2002, p. 44389). Two additional populations have been discovered in the San Jacinto Mountains since listing and frogs have been reestablished at Hall Canyon. The risk of extinction to the DPS remains high because all 10 populations are small and highly isolated, and the additional populations do not appreciably increase the representative abundance or distribution of the listed entity. Small populations are vulnerable to extirpation (local extinction) from environmental, demographic, and genetic stochasticity (random, natural occurrences), and unforeseen (natural or unnatural) catastrophes (Shaffer 1981, p. 131).

The extinction risk of a species represented by few small populations is magnified when those populations are also isolated from one another. This is especially true for species whose populations function in a metapopulation structure, whereby dispersal or migration of individuals to new or formerly occupied areas is necessary. Connectivity between these populations is essential to increase the number of reproductively active individuals in a population; mitigate the genetic, demographic, and environmental effects of small population size; and recolonize extirpated areas. Genetic data indicate that there is no migration occurring between the small, highly isolated southern \( Rana \) muscosa populations (Schoville et al. 2011, p. 6) and functional self-sustaining metapopulations no longer exist. However, since analysis of this data the nonnative trout removal effort in Dark Canyon and Fuller Mill Creek allows for these occurrences to more easily exchange individuals. Southern \( R. \) muscosa would likely recover from stochastic events under historical circumstances where more and larger populations exist in closer proximity to one another. Currently, however, metapopulation dynamics are severely inhibited, possibly preventing the natural recovery of populations through recolonization. Therefore, southern \( R. \) muscosa is likely to be significantly affected by small population size.
Changes in climate could impact mountain yellow-legged frogs in several ways, because southern *Rana mucosa* spend the first 2 years of their life as tadpoles and are dependent on perennial stream flow. In the summer, reduced snowpack and enhanced evapo-transpiration following high temperature events may dry out pools, which otherwise would have sustained tadpoles (Lacan et al. 2008, p. 220) and may also reduce fecundity (egg production) (Lacan et al. 2008, p. 222). Predicted increases in mean annual temperatures, high temperature events, and potentially decreased precipitation could also diminish the volume and timing of water availability to support all lifestages. Furthermore, earlier snowmelt could cue emergence from hibernation and breeding earlier in the year, on average, advancing this primary signal for breeding phenology in montane and boreal habitats (Corn 2005, p. 61). This may have both positive and negative effects. Additional time for growth and development may render larger individuals more fit to overwinter; however, earlier breeding may also expose young tadpoles to killing frosts in more variable conditions of early spring (Corn 2005, p. 60). Conversely, severe winters would force longer hibernation times and could stress individuals by reducing the time available for them to feed and breed.

Contaminants are a potential threat to southern *Rana muscosa*. It appears there has been some exposure to nitrogenous pollutants in the San Gabriel and San Bernardino Mountains (Fenn and Bytnerowicz 1993, p. 277; Fenn et al. 2005, p. 269), although the impacts on southern *R. muscosa* have not been measured. It is hypothesized that such pollutants contributed to the decline of the DPS, and may continue to limit dispersal potential. Water quality testing at extant localities has not identified contaminants; however, only basic variables are tested (pH, conductivity, dissolved oxygen), except at reestablishment sites where more extensive testing has occurred. Pesticides, herbicides, and nitrogen-based fertilizers may have been used directly adjacent to streams where cannabis cultivation sites are planted (Devils Canyon, Bear Gulch, Vincent Gulch, and City Creek). Any waterways where these contaminants are used in the future should be tested to evaluate the effects on southern *R. muscosa*. Impacts may also result from the use of fire retardants to suppress wildfires, which contain nitrogen compounds and surfactants.

Due to the threats associated with small populations, a changing climate (increases in temperature and changes in the volume and timing of precipitation), and contaminants, **Factor E** threats continue to threaten southern *R. muscosa*. 

2019 5-year Review for mountain yellow-legged frog
Table 1. Current status and threats impacting the Mountain yellow-legged frog.

<table>
<thead>
<tr>
<th>Occurrence*</th>
<th>Detected at Listing</th>
<th>Last Detected</th>
<th>Current Status</th>
<th>Current Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>San Gabriel Mountains</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Devils Canyon</td>
<td>Yes</td>
<td>2015 (tadpoles only)</td>
<td>presumed extant</td>
<td>Factor A: Cannabis cultivation; Factor C: Bd; Factor E: Small population size; climate change.</td>
</tr>
<tr>
<td>Little Rock Creek</td>
<td>Yes</td>
<td>2018</td>
<td>extant</td>
<td>Factor A: Recreation; wildfire; Factor C: Bd; Factor E: Small population size; climate change.</td>
</tr>
<tr>
<td>Big Rock Creek</td>
<td>Yes</td>
<td>2018</td>
<td>extant</td>
<td>Factor A: Wildfire; Factor C: Bd; Factor E: Small population size; climate change.</td>
</tr>
<tr>
<td>Vincent Gulch</td>
<td>Yes</td>
<td>2018</td>
<td>extant</td>
<td>Factor A: Cannabis cultivation; wildfire; Factor C: Nonnative trout; Bd; Factor E: Small population size; climate change.</td>
</tr>
<tr>
<td>Bear Gulch</td>
<td>Yes</td>
<td>2011</td>
<td>presumed extant</td>
<td>Factor A: Cannabis cultivation; wildfire; Factor C: Nonnative trout; Bd; Factor E: Small population size; climate change.</td>
</tr>
<tr>
<td>San Bernardino Mountains</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>East Fork City Creek</td>
<td>Yes</td>
<td>2018</td>
<td>extant</td>
<td>Factor A: Cannabis cultivation; habitat impacts during roadwork; wildfire; Factor C: Bd; Factor E: Small population size; climate change.</td>
</tr>
<tr>
<td>San Jacinto Mountains</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fuller Mill Creek</td>
<td>Yes</td>
<td>2018</td>
<td>extant</td>
<td>Factor A: Recreation; wildfire; Factor C: Nonnative trout; Bd; Factor E: Small population size; climate change.</td>
</tr>
<tr>
<td>Dark Canyon (Upper North Fork San Jacinto River)</td>
<td>No</td>
<td>2018</td>
<td>extant</td>
<td>Factor A: Recreation; wildfire; Factor C: Nonnative trout; Bd; Factor E: Small population size; climate change.</td>
</tr>
<tr>
<td>Tahquitz/Willow Creeks</td>
<td>No</td>
<td>2013</td>
<td>presumed extant</td>
<td>Factor C: Nonnative trout; Bd; Factor E: Small population size; climate change.</td>
</tr>
<tr>
<td>Indian Creek/ Hall Canyon</td>
<td>No</td>
<td>2016</td>
<td>presumed extant</td>
<td>Factor A: Wildfire; Factor C: Nonnative trout downstream; Bd may be present; Factor E: Small population size; climate change.</td>
</tr>
</tbody>
</table>

*All occurrences occur on Federal lands managed by the U.S. Forest Service.*
Recovery Criteria:


Since listing, the implementation of a wide array of conservation efforts, including habitat acquisition, nonnative trout removal, recreational closures, disease research, extensive surveys and monitoring, education outreach, and captive breeding and reestablishment has created the foundation for recovery of southern Rana muscosa. These efforts have been conducted through the cooperative efforts of partners, including U.S. Geological Survey, California Department of Fish and Wildlife, U.S. Forest Service, California Department of Transportation, Institute for Conservation Research-San Diego Zoo, Los Angeles Zoo, and the Henry Doorly Zoo. Collaborative efforts with this working group have helped to inform completion of the Recovery Plan for the southern California distinct population segment of the mountain yellow-legged frog that was recently finalized in December 20, 2018 (USFWS 2018 a, b, c). Though these criteria have just been established, we will continue to work with our partners to further reduce threats and improve conditions for the mountain yellow-legged frog.

III. SYNTHESIS

Southern Rana muscosa, which historically was widely distributed in at least 166 known populations across four mountain ranges in southern California, are currently considered to be extant in 10 small populations distributed disproportionately across three mountain ranges. Most populations are isolated in the headwaters of streams or tributaries due to the extensive distribution of predatory nonnative trout in historical habitat; thus, the species exists in a highly fragmented environment. Such isolation and fragmentation followed by the prevention of successful recolonization increases the potential for extirpation of the remaining populations. Each population is small and highly susceptible to stochastic events, especially wildfire, which devastated the East Fork City Creek population. Measures have been taken to reduce the impact of certain threats, including recreation, nonnative trout, and stochastic extinction. However, these threats and other threats to the habitat remain, including illegal activities (cannabis cultivation and suction dredge mining), and legal activities (recreational activities, fire suppression activities, and roadwork construction). Wildfire and changes in climate (temperature and precipitation) have a high likelihood of affecting southern Rana muscosa and its habitat; however, the timing and options available to reduce these threats are either limited or unclear. Disease is also a concern rangewide. Providing sufficient representation, resiliency, and redundancy across the historical range through the reestablishment of additional populations may be the best way to address these threats. The small population sizes and loss of potential metapopulation dynamics are a great impetus for threat abatement. Populations have proved to be sensitive to both the presence of threats, as well as their amelioration. Two populations have responded positively to restoration efforts (through nonnative trout removal and recreational closures). Increasing such efforts should be prioritized to prevent extirpation of small populations, expand the area available to all existing populations, and reconnect subpopulations to ultimately recreate local metapopulation dynamics. Southern Rana muscosa faces a high degree of threat with a high potential for recovery, therefore proactive efforts are needed to aid in
the continued survival and recovery of this critically endangered species. Southern *Rana muscosa* remains in danger of becoming extinct throughout its range and no status change is recommended at this time.

IV. RESULTS

Recommended Classification:

- [ ] Downlist to Threatened
- [ ] Uplist to Endangered
- [ ] Delist (Indicate reasons for delisting per 50 CFR 424.11):
  - [ ] Extinction
  - [ ] Recovery
  - [X] Original data for classification in error
- [X] No change is needed

**New Recovery Priority Number:** No change.

V. RECOMMENDATIONS FOR FUTURE ACTIONS

The recommended actions listed below are to be completed over the next 5 years. Successful implementation of these actions will reduce threats to southern *Rana muscosa* and provide information to better understand the biological and physical factors limiting the population growth and distribution in southern California. We recognize that conservation of this taxon will require cooperation and coordination with partners (Federal, State, and local agencies) to minimize impacts from current threats, aid future restoration, and maximize effectiveness of limited funding.

1. Create and sign a Memorandum of Agreement (MOA) with MYLF working group, USGS, USFS, ICR, USFWS, and CDFW to memorialize this working partnership and continue to help facilitate recovery of the mountain yellow-legged frog.

2. Stabilize populations in each Management Unit using captive breeding and reestablishment, with the goal of at least two new occurrences within each Management Unit
   - a. San Jacinto Management Unit
      e.g., Tahquitz/Willow 2 Creeks and Andreas or Murray Canyon
   - b. San Bernardino Management Unit
      e.g., Bluff Lake and Sugarloaf Pond
   - c. San Gabriel Management Unit
      e.g., Bear Creek and Fish Fork
3. Evaluate translocation within the wild as a recovery tool. Select at least two sites to evaluate direct translocation, potentially including Cooper Canyon and Devil’s Canyon

4. Implement trout removal to increase the number of reestablishment sites. Conduct trout removal at two sites for mountain yellow-legged frog reestablishment, with one site in the San Gabriel Mountains and one site in the San Bernardino or San Jacinto Mountains.

VI. REFERENCES CITED


Personal Communications:

U.S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW

Mountain Yellow-legged Frog
[Southern California Distinct Population Segment]
(Rana muscosa)

Current Classification: Endangered

Recommendation resulting from the 5-year Review:

___ Downlist to Threatened
___ Uplist to Endangered
___ Delist (Indicate reasons for delisting per 50 CFR 424.11):
   ___ Extinction
   ___ Recovery
   ___ Original data for classification in error
___ X No change needed

Review Conducted By: Carlsbad Fish and Wildlife Office

FIELD OFFICE APPROVAL:

Acting Field Supervisor, Fish and Wildlife Service
Approve SCOTT SOBIECH Digitally signed by SCOTT SOBIECH Date: 2019.05.06 10:27:38 -07'00' Date __________