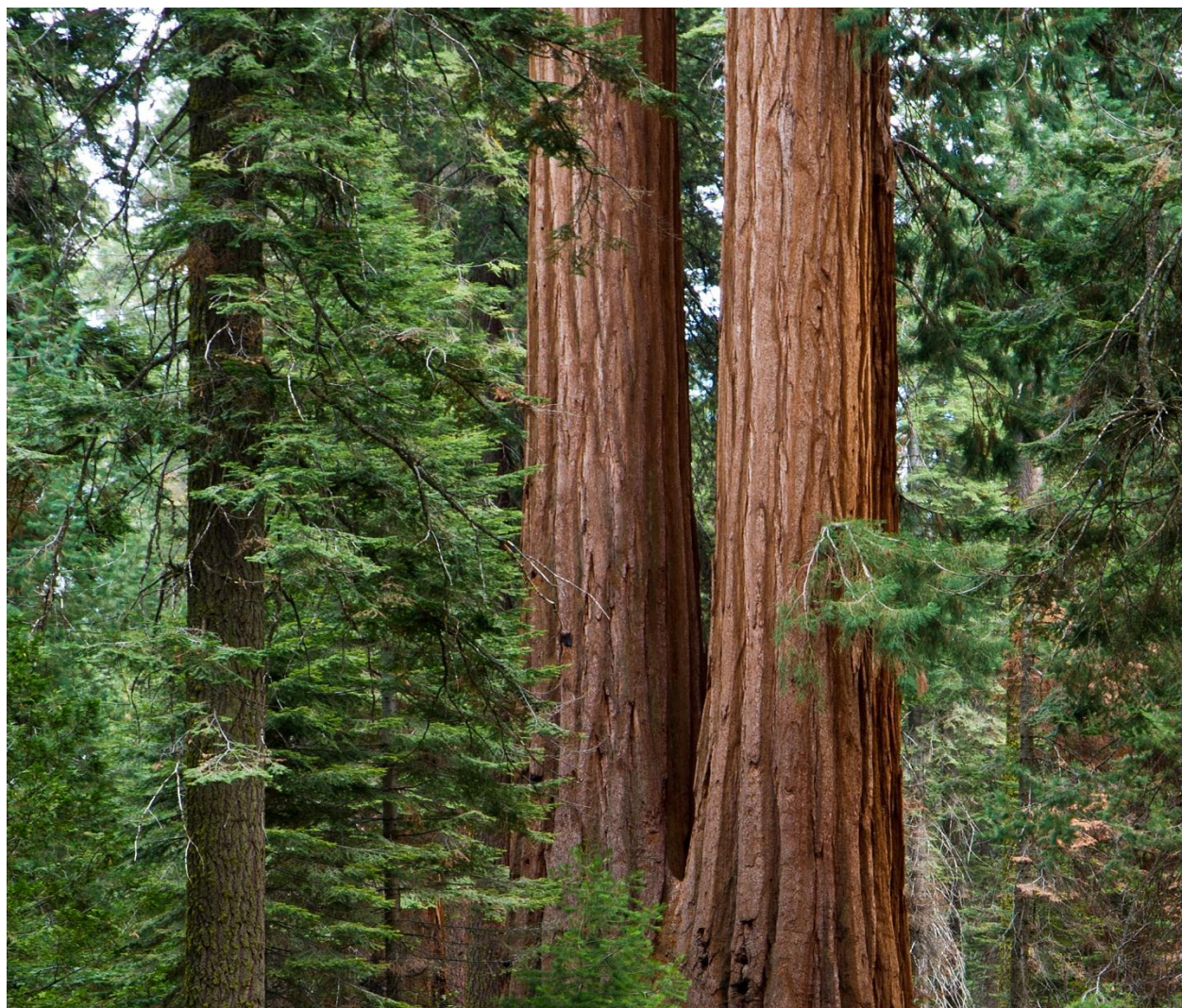




A Natural Resource Condition Assessment for Sequoia and Kings Canyon National Parks

Appendix 15c - Animals of Conservation Concern, HUC Assessment Methods

Natural Resource Report NPS/SEKI/ NRR—2013/665.15c



ON THE COVER

Giant Forest, Sequoia National Park
Photography by: Brent Paull

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Natural Resource Report NPS/SEKI/ NRR—2013/665.15c

Daniel Boiano, Daniel Gammons, Erik Meyer
Sequoia and Kings Canyon National Parks
47050 Generals Highway
Three Rivers, CA 93271

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U.S. Department of the Interior
National Park Service
Natural Resource Stewardship and Science
Fort Collins, Colorado

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Brown Bear

Historic data were obtained from the SEKI wildlife observation database. From 1877 to 1924, six brown bears were recorded in four watersheds (Figure 1). The last observation was documented in a monthly report to the SEKI superintendent. This bear was located in the Middle Fork Kaweah River HUC.

To determine the condition of the HUCs for brown bear, we:

1. Created a point shapefile of all brown bear locations from the SEKI wildlife observation database.
2. Selected for the watershed units that had brown bear locations within each HUC boundary.
3. Determined HUC condition according to the following rules:
 - Good – brown bear occupancy reflective of pre-European settlement condition in HUC units with observations
 - Moderate – brown bear occupancy equal to the condition in each HUC units with historic observations
 - Poor – brown bear extirpation or declining occupancy in HUC units with observations
 - No Information – no information exists for this species in a HUC unit

To determine the trend of the HUCs for brown bear, we:

1. Determined HUC trend according to the following rules:
 - Improvement – there was an increase in brown bear observations within each historically occupied HUC
 - No change – there was an equal number of brown bear observations within each HUC compared to historic observations
 - Decline – there were less or zero brown bear observations within each HUC compared to historic observations
 - No Information – no information exists for this species in a HUC unit

To determine the confidence of the HUCs for brown bear, we:

1. Determined the HUC trend according to the follow rules:
 - High– a high degree of certainty exists based on observations, surveys, scientific literature, and conspicuousness of the species
 - Medium– a moderate degree of certainty exists based on observations, surveys, scientific literature, and conspicuousness of the species
 - Low– a poor degree of certainty exists based on observations, surveys, scientific literature, and conspicuousness of the species
 - No Information – no information exists for this species in a HUC unit

All HUCs lacking an observation were identified as having no information for condition, trend, and confidence. We concluded this even if a respective HUC was within the expected range of an extirpated species. It's likely that the brown bear occurred in parts of six additional watersheds-Lower South Fork Kings River, Upper South Fork Kings River, Roaring River, North Fork Kaweah River, East Fork Kaweah River, and Golden Trout Creek-Kern River. However, they were excluded due to the absence of historic observations.

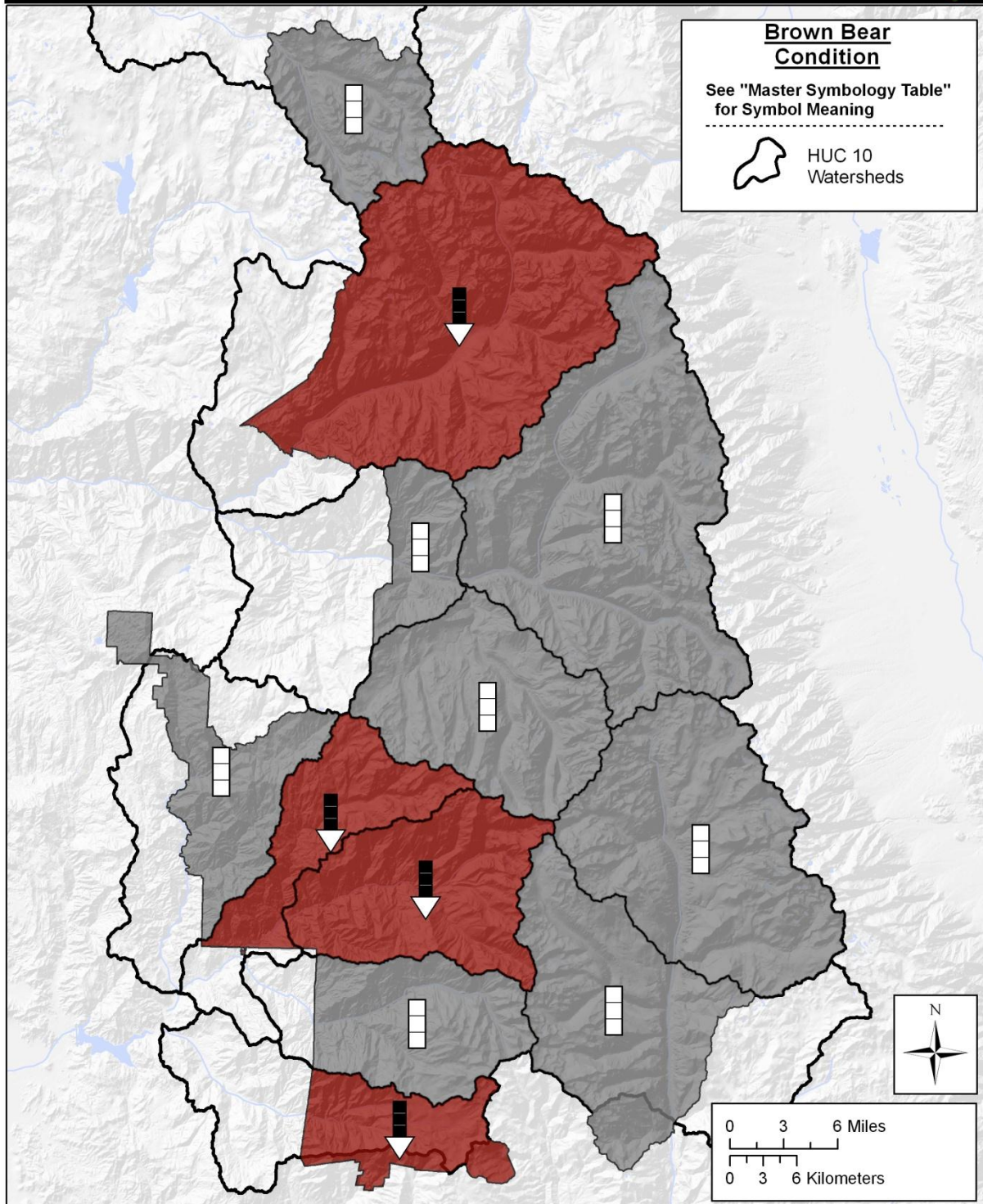


Figure 1. Brown bear (extirpated) condition.

California Condor

Historic data were obtained from the SEKI wildlife observation database. From 1899 to 1981, 42 California condors were recorded in eight watersheds (Figure 2). The last observation was made by a wilderness ranger in 1981 in the Rock Creek-Kern River HUC.

To determine the condition of the HUCs for California condor, we:

1. Created a point shapefile of all California condor locations from the SEKI wildlife observation database.
2. Selected for the watershed units that had California condor locations within each HUC boundary.
3. Determined HUC condition according to the following rules:
 - Good – California condor occupancy reflective of pre-European settlement condition in HUC units with observations
 - Moderate – California condor occupancy equal to the condition in each HUC units with historic observations
 - Poor – California condor extirpation or declining occupancy in HUC units with observations
 - No Information – no information exists for this species in a HUC unit

To determine the trend of the HUCs for California condor, we:

1. Determined HUC trend according to the following rules:
 - Improvement – there was an increase in California condor observations within each historically occupied HUC
 - No change – there was an equal number of California condor observations within each HUC compared to historic observations
 - Decline – there were less or zero California condor observations within each HUC compared to historic observations
 - No Information – no information exists for this species in a HUC unit

To determine the confidence of the HUCs for California condor, we:

1. Determined the HUC trend according to the follow rules:
 - High– a high degree of certainty exists based on observations, surveys, scientific literature, and conspicuousness of the species
 - Medium– a moderate degree of certainty exists based on observations, surveys, scientific literature, and conspicuousness of the species
 - Low– a poor degree of certainty exists based on observations, surveys, scientific literature, and conspicuousness of the species
 - No Information – no information exists for this species in a HUC unit

All HUCs lacking an observation were identified as having no information for condition, trend, and confidence. We concluded this even if a respective HUC was within the expected range of an extirpated species. It is likely that this species occurred in parts of 3 additional watersheds- Middle Fork Kings River, Lower South Fork Kings River, and Golden Trout Creek-Kern River. These HUCs are located downstream or adjacent to the formerly occupied HUCs. However, they were excluded due to the absence of historic observations.

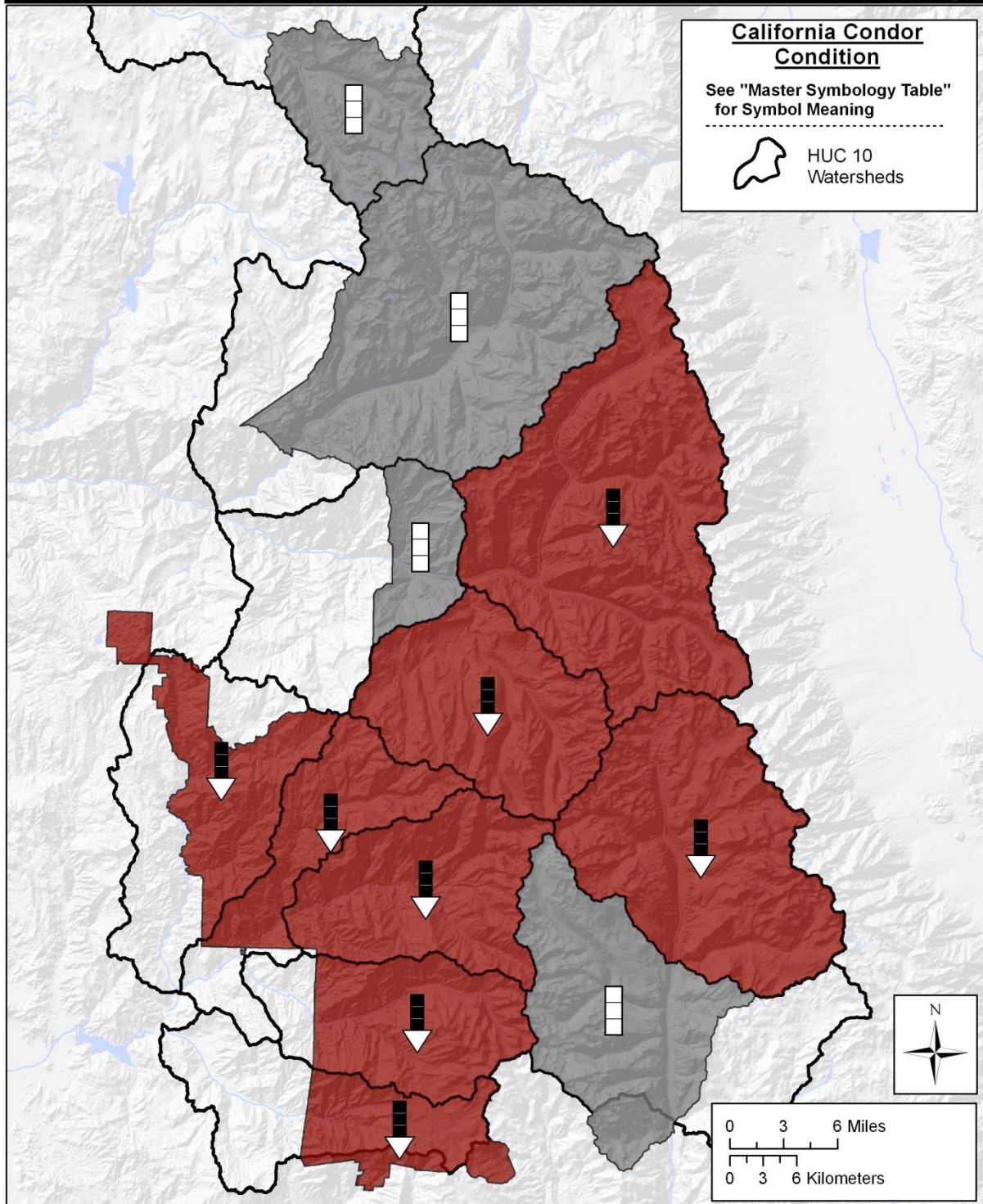


Figure 2. California condor (extirpated) condition.

Foothill Yellow-legged Frog

Historic data were obtained from the SEKI wildlife observation database. Three foothill yellow-legged frog (FYLF) observations were recorded in the park in two watersheds (Figure 3). The last observation was made in 1970 by a former park biologist. The observer reported to see many recently metamorphosed frogs in Alder Creek. In subsequent years, multiple failed attempts have been made to relocate extant populations of this species. A recent review of FYLFs for the updated California Amphibian and Reptile Species of Special Concern list spatially depicts this frog in the Kaweah River drainage with museum collections and observations recorded in the California Natural Diversity Database and the Biogeographic Information and Observation System.

To determine the condition of the HUCs for FYLFs, we:

1. Created a point shapefile of all FYLF locations from the SEKI wildlife observation database.
2. Selected for the watershed units that had FYLF locations within each HUC boundary.
3. Determined HUC condition according to the following rules:
 - Good – FYLF occupancy reflective of pre-European settlement condition in HUC units with observations
 - Moderate – FYLF occupancy equal to the condition in each HUC units with historic observations
 - Poor – FYLF extirpation or declining occupancy in HUC units with observations
 - No Information – no information exists for this species in a HUC unit

To determine the trend of the HUCs for FYLFs, we:

1. Determined HUC trend according to the following rules:
 - Improvement – there was a significant increase in FYLF observations within each HUC compared to historic observations
 - No change – there was no significant difference in FYLF observations within each HUC between current and historic observations
 - Decline – there was a significant decrease in FYLF observations within each HUC compared to historic observations
 - No Information – no information exists for this species in a HUC unit

To determine the confidence of the HUCs for FYLFs, we:

1. Determined the HUC confidence according to the follow rules:
 - High – a high degree of certainty exists based on observations, surveys, scientific literature, and conspicuousness of the species
 - Medium – a moderate degree of certainty exists based on observations, surveys, scientific literature, and conspicuousness of the species
 - Low – a poor degree of certainty exists based on observations, surveys, scientific literature, and conspicuousness of the species
 - No Information – no information exists for this species in a HUC unit

All HUCs lacking an observation were identified as having no information for condition, trend, and confidence, even if a respective HUC was within the expected range of an extirpated species. It's important to note that this frog was widespread in most foothill drainages from the Oregon border to Los Angeles County (Jennings and Hayes 1994). This includes all foothill habitat in the Sierra Nevada. It is therefore likely that this frog occurred in parts of five additional watersheds: Middle Fork Kings River, Lower South Fork Kings River, North Fork Kaweah River, East Fork Kaweah River, and South Fork Kaweah River. However, these HUCs were excluded due to the absence of historic data.

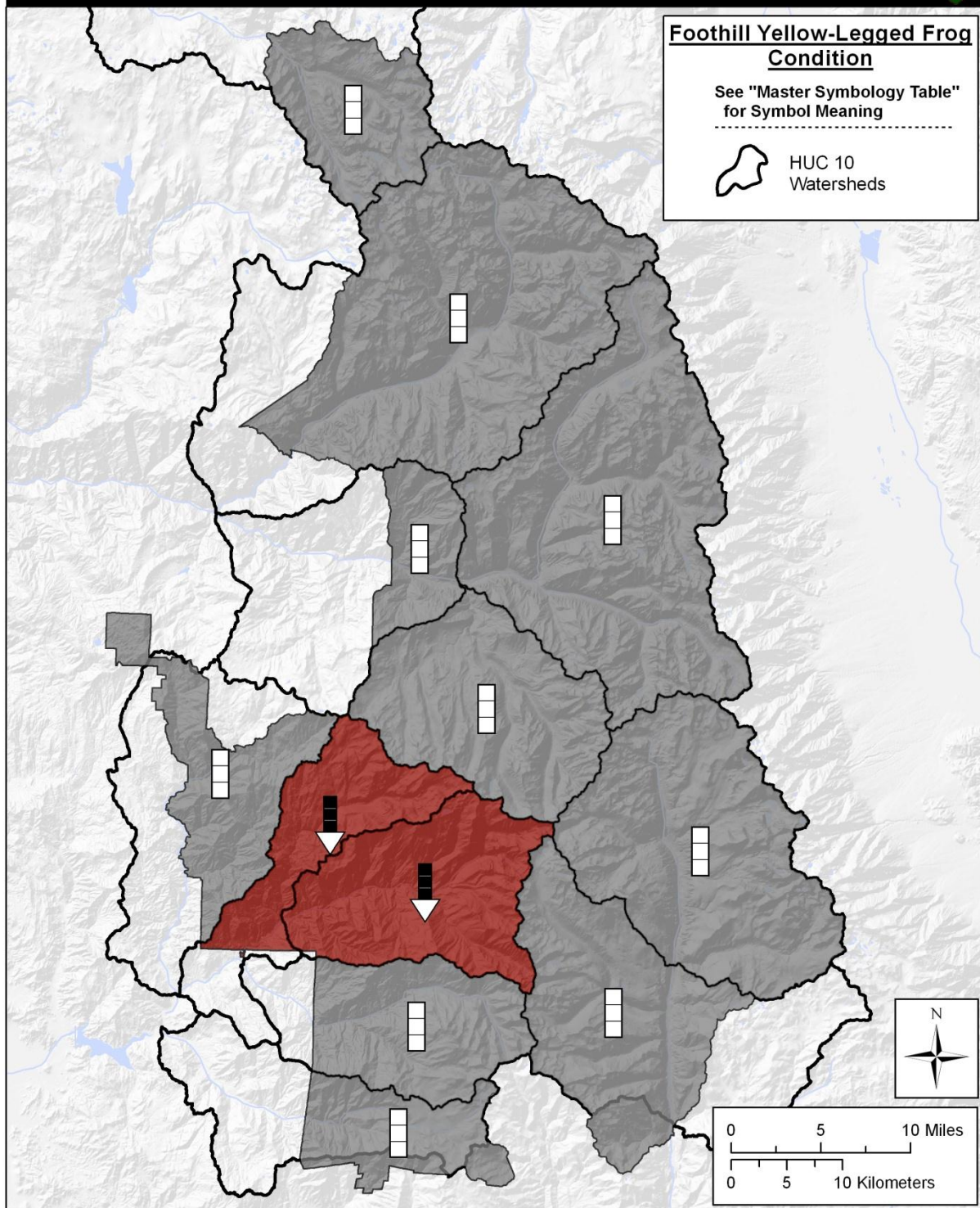


Figure 3. Foothill yellow-legged frog (extirpated) condition.

Bighorn Sheep

Data were obtained from the United States Fish and Wildlife Service (USFWS) and California Department of Fish and Game (CDFG). These data sources provided information on critical habitat and the census of ewes since bighorn sheep reintroduction (1995) into several critical habitat units within SEKI. Bighorn sheep are found in six park watersheds (Figure 4).

To determine the condition of the HUCs for bighorn sheep, we:

1. Obtained a polygon shapefile of designated bighorn sheep critical habitat.
2. Edited the critical habitat shapefile to include area only within SEKI. The shapefile was further edited to split critical habitat units that spanned more than one HUC unit. The final version included a recalculation of habitat area in the edited polygon herd units.
3. We identified which herd units were occupied by bighorn sheep using CDFG data
4. Determined HUC condition according to the following rules:
 - Good – >66% of critical habitat within a HUC is occupied by bighorn sheep
 - Moderate – between 33% and 66% of critical habitat within a HUC is occupied by bighorn sheep
 - Poor – <33% of critical habitat within a HUC is occupied by bighorn sheep

To determine the trend of the HUCs for bighorn sheep, we:

1. Obtained a census of the number of ewes present in each of the monitored herd units from 1995 to 2010.
2. Determined trend of each herd unit according to the following rules:
 - Occupied herd units received a score of “increase” if the 2010 ewe count was greater than the 1995 ewe count, indicating that the population has grown since monitoring began. Because all occupied herd units grew during this time, they received a score of “increase.”
 - All unoccupied herd units were assigned a score “decrease” since these units were formerly occupied by sheep (USFWS 2007).
3. Determined HUC trend according to the following rules:
 - Improvement – the majority of herd units within a HUC were increasing
 - No change – there were an equal number of herd units within a HUC that were increasing and decreasing
 - Decline – the majority of herd units within a HUC were decreasing

To determine the confidence of the HUCs for bighorn sheep, we:

1. Determined the HUC trend according to the following rules:
 - High– a high degree of certainty exists based on observations, surveys, scientific literature, and conspicuousness of the species
 - Medium– a moderate degree of certainty exists based on observations, surveys, scientific literature, and conspicuousness of the species
 - Low– a poor degree of certainty exists based on observations, surveys, scientific literature, and conspicuousness of the species
 - No Information – no information exists for this species in a HUC unit

For more than 30 years, bighorn sheep have been annually monitored by CDFG using aerial flights for mark-resight surveys. In addition, this species is listed by the USFWS as federally endangered. Consequently, data availability and confidence are relatively high compared to other terrestrial wildlife species in SEKI.

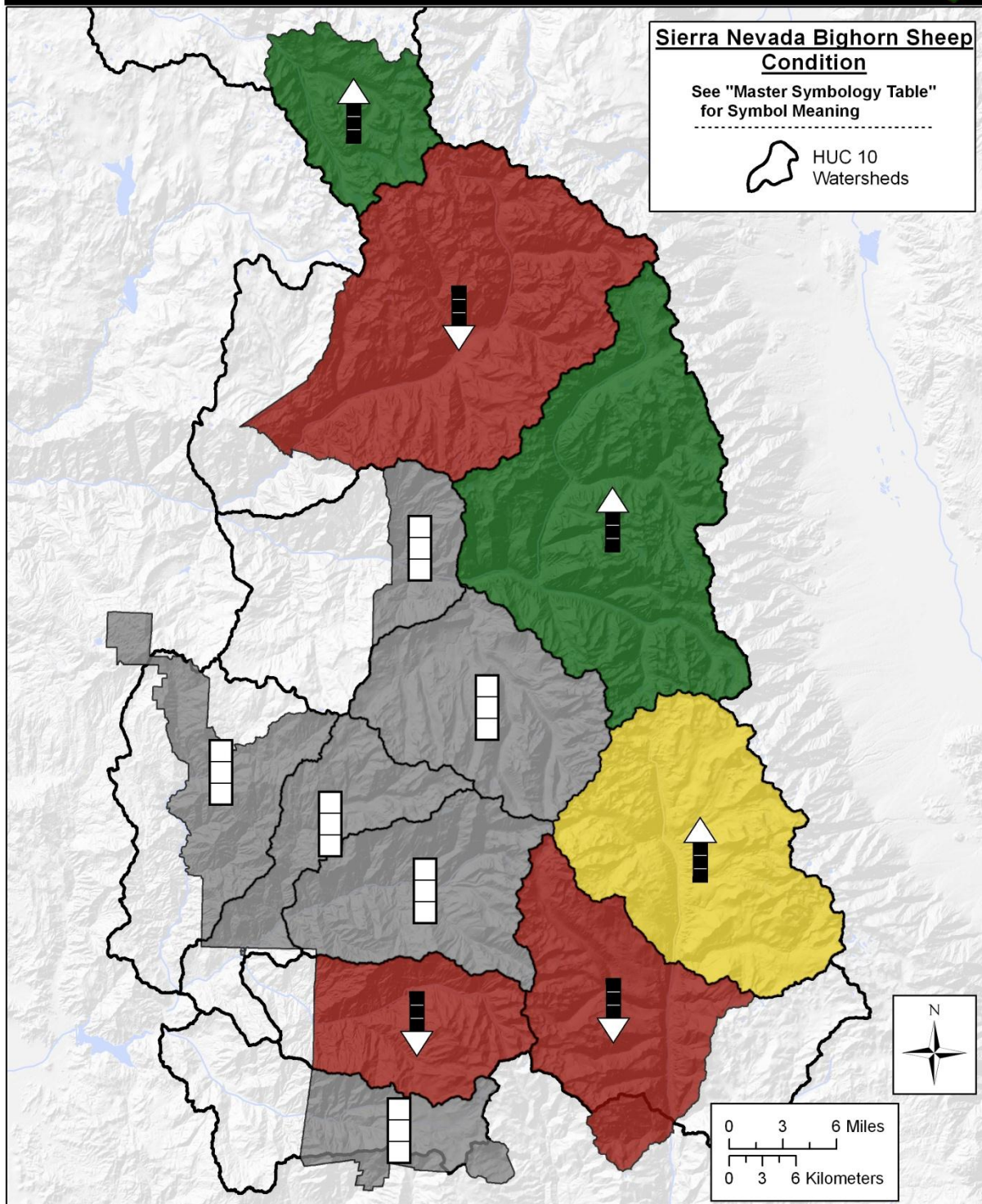


Figure 4. Sierra Nevada bighorn sheep condition.

Mountain Yellow-legged Frog

Data were obtained from Dr. Roland Knapp, published studies and the SEKI wildlife observation database. Initial mountain yellow-legged frog (MYLF) surveys by Dr. Knapp took place from 1997 to 2002. This census included surveying all lentic water bodies in SEKI. All lentic water bodies that contained MYLFs in the initial survey (n=567) were resurveyed by Dr. Knapp from 2004 to 2007. Ensuing MYLF surveys were completed by Dr. Knapp from 2007 to 2010, but were only conducted in the northern most HUC units. To capture MYLF distribution prior to the Knapp surveys, we first referred to a study that concluded an approximate 50% decline of MYLFs in SEKI from 1955 to 1993, with losses concentrated in the Kaweah watershed, including extirpations from some drainages (Bradford et al. 1994). Second, we referred to the SEKI wildlife observation database, in which there were 397 MYLF observations dating from 1960 to 2008. Historically, MYLFs occupied all 12 HUCs in SEKI (Figure 5).

The reference condition is considered to be the presence and abundance of MYLFs that existed in SEKI in the mid-1800s, before European settlement of this area. MYLFs were considered to be widespread and abundant during the reference period.

To determine the condition of the HUCs for MYLFs, we:

1. Considered the background decline of MYLFs in SEKI as approximately 50% by 1993, including significant losses in the Kaweah HUCs, as concluded by Bradford et al. (1994).
2. Created a spreadsheet from the Knapp data of 567 MYLF-containing lentic water bodies. The spreadsheet included the initial survey (1997 to 2002) and the presence or absence of MYLFs in the final survey (2003 to 2010) for each water body.
2. Generated a point shapefile by Lake ID (Knapp code) of the 567 MYLF-containing lentic water bodies that included the information synthesized in the aforementioned spreadsheet.
3. Selected for all MYLF-containing lentic water bodies that were within a respective HUC unit. The resulting selection was exported into a new shapefile that identified the MYLF-containing water bodies within each park HUC. In ArcMap, column statistics were performed for each HUC unit to count the number of MYLF-containing lentic water bodies in the initial survey and the number of MYLF-containing lentic water bodies in the most recent survey.
4. Created a point shapefile of all records of MYLFs from the SEKI wildlife observation database. These data were used to capture MYLF locations prior to the initial Knapp surveys.
5. Determined HUC condition according to the following rules:
 - Good – there was an increase, no change, or a <5% decrease in MYLF presence in the HUC compared to the reference condition.
 - Moderate – there was a 5-19% decrease in MYLF presence in the HUC compared to the reference condition. Also, there was a similar distribution of initial Knapp surveys to historic observations recorded in published studies and the SEKI wildlife observation database.
 - Poor – there was a 20% or greater decrease in MYLF presence in the HUC compared to the reference condition. If MYLFs were not found in a HUC during the initial Knapp survey, we relied on historic observations recorded in published studies and the SEKI wildlife observation database to investigate HUCs with MYLF extirpations.
 - No Information – no information exists for this species in a HUC unit

To determine the trend of the HUCs for MYLFs, we:

1. Determined HUC trend according to the following rules:

- Improvement – there was a >5% positive change in MYLF presence in the HUC from the initial to the most recent Knapp surveys. In addition, abundances in individual lakes would indicate an improvement from the initial survey.
- No change – there was little to no change in MYLF presence and abundance in the HUC from the initial to the most recent Knapp surveys.
- Decline – there was a >5% negative change in MYLF presence and abundance in the HUC from the initial to the most recent Knapp surveys. If historic observations recorded in published studies and the SEKI wildlife observation database showed significantly more MYLF-occupied water bodies than the initial Knapp survey, the HUC was also identified as having a declining trend.
- No Information – no information exists for this species in a HUC

To determine the confidence of the HUCs for MYLFs, we:

1. Determined the HUC confidence according to the following rules:
 - High – a high degree of certainty exists based on observations, surveys, scientific literature, and conspicuousness of the species
 - Medium – a moderate degree of certainty exists based on observations, surveys, scientific literature, and conspicuousness of the species
 - Low – a poor degree of certainty exists based on observations, surveys, scientific literature, and conspicuousness of the species
 - No Information – no information exists for this species in a HUC unit

The MYLF dataset is perhaps the best record SEKI has for a vertebrate species. Their decline in abundance and occupancy at lentic water bodies has been documented since the 1920s. As a result, MYLFs have been the focus of decades of research and monitoring. It's important to note that this analysis only took into account the status of MYLF in lentic water bodies. However, this species also utilizes lotic and wetland environments, particularly in the lower elevation portions of their range. The lack of information on MYLF status in the HUCs dominated by lotic and wetland habitat lead to lower confidence scores for North Fork Kaweah River, South Fork Kaweah River, and Lower South Fork Kings River.

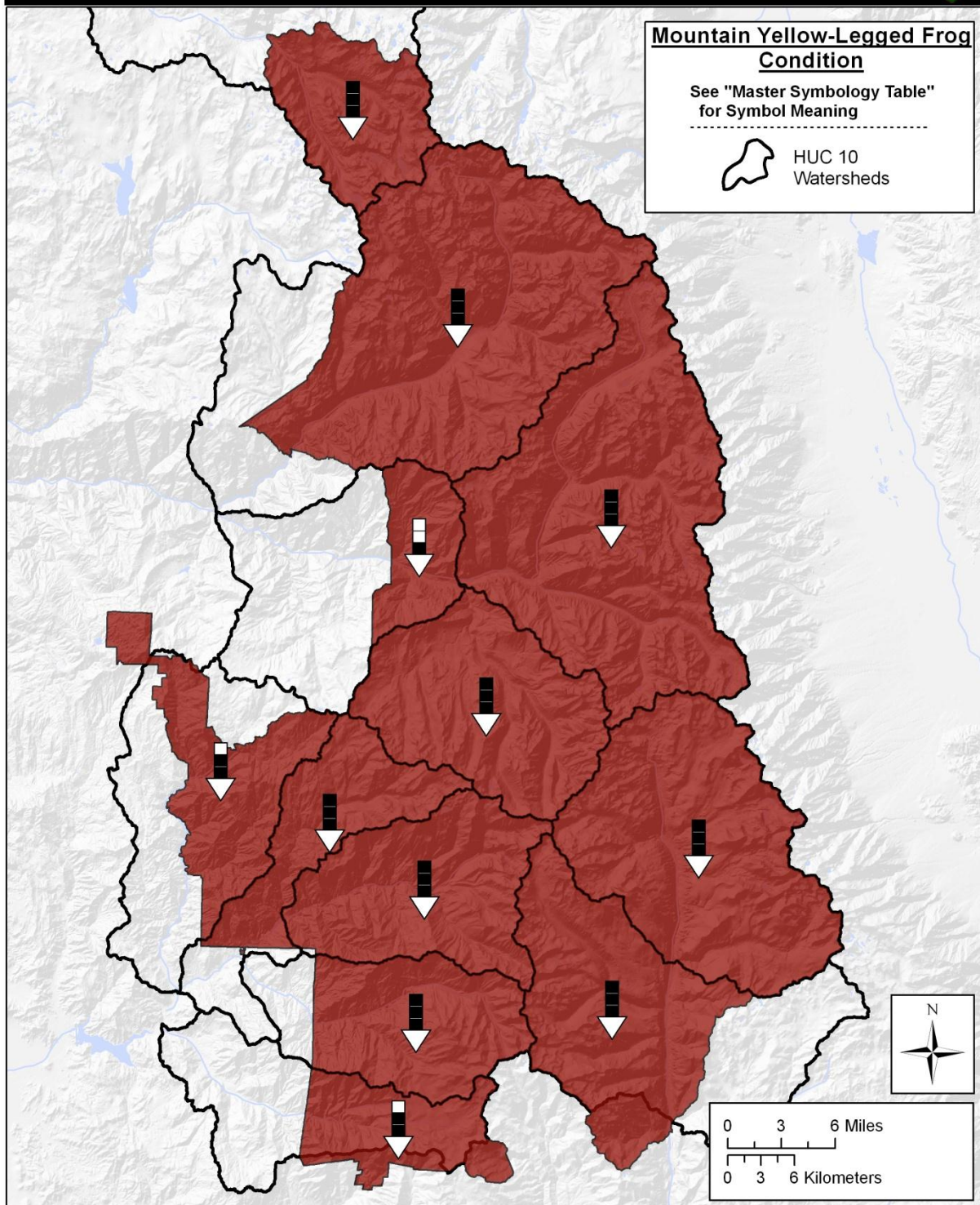


Figure 5. Mountain yellow-legged frog condition.

Native Fish

Data were obtained from SEKI Kaweah fish monitoring stations, ENTRIX, Inc., CDFG South Fork Kings River monitoring stations, Erickson et al. (2010), and the SEKI wildlife observation database. There are six Kaweah fish monitoring stations within native fish habitat in Sequoia National Park. There have been four to five surveys conducted at each location from 1980 to 2007. In 2006, ENTRIX, Inc. (Entrix 2007) completed a snorkeling survey of fish on the Middle Fork Kaweah River, with sample sites from downstream of the park boundary to approximately one mile upstream of the confluence with the Marble Fork Kaweah River. This work was conducted as part of the *Aquatic Studies Report for the Kaweah No. 3 Hydroelectric Project*. This report also determined the trend of fish from previous contract work on this river. There are four CDFG monitoring stations in the Upper South Fork Kings River HUC. There have been one to two surveys conducted at each location from 1985 to 2006 (CDFG unpublished data). The SEKI wildlife observation database was used to obtain locations of extirpated or rare native fish species such as California roach, hardhead, Sacramento pikeminnow, prickly sculpin and riffle sculpin. We also relied on a recent report regarding Kern River rainbow trout genetics (Erickson et al. 2010). Little Kern River golden trout was excluded from this analysis since its native range is outside of all 12 major HUC units in SEKI. However, one population of Little Kern golden trout is considered native within the park boundary, in the headwaters of the Little Kern River. Existing data suggest that this population has poor condition and declined trend, with high confidence (Stephens 2007). Historically, native fish may have occupied portions of seven HUC units (Figure 6).

To determine the condition of the HUCs for native fish assemblages, we:

1. Referred to the most recent Kaweah fish monitoring report for all Kaweah River HUCs. We concluded that the condition in the initial survey in 1980 was more reflective of historic conditions than the most recent survey in 2007.
2. Referred to data provided by CDFG in the South Fork Kings River monitoring stations.
3. Referred to the ENTRIX report and prior data related to the hydroelectric project on the Middle Fork Kaweah River.
4. Referred to *Genetic Assessment of Kern River Rainbow Trout* by Erickson et al. (2010) for status of native Kern River rainbow trout.
5. Referred to the SEKI wildlife observation database for historic locations of potentially extirpated species.
6. Determined HUC condition according to the following rules:
 - Good – there was an increase or no change in native fish composition from the initial to the most recent fish surveys; no extirpations of native fish species; and no genetic introgression between native and nonnative species.
 - Moderate – a minority of the surveyed native fish sites exhibit a negative change in native fish composition. This can include decline in abundance, absence of a native species, suspected absence of a native species, or genetic introgression between native and nonnative species.
 - Poor – a majority of the surveyed native fish sites exhibit a negative change in native fish composition. This can include decline in abundance, absence of a native species, suspected absence of a native species, or genetic introgression between native and nonnative species.
 - No Information – no information exists for this species in a HUC unit

To determine the trend of the HUCs for native fish assemblages, we:

1. Determined HUC trend according to the following rules:
 - Improvement – there was an increase in native fish composition from the initial to the most recent native fish surveys. In addition, native fish abundance in individual sites

would indicate an improvement from the initial survey, and surveys would include the presence of all native species expected to be at each respective site.

- No change – there was no change in native fish composition from initial to the most recent native fish survey within each HUC. In addition, surveys would include the presence of all native species expected to be at each respective site.
- Decline – There was a decline in native fish composition from the initial to the most recent native fish survey within each HUC. In addition, the HUC would include one or more of the following: decline in abundance, absence of a native species, suspected absence of a native species, or genetic introgression between native and nonnative species.
- No Information – no information exists for this species in a HUC unit

To determine the confidence of the HUCs for native fish assemblages, we:

1. Determined the HUC confidence according to the following rules:
 - High– a high degree of certainty exists based on observations, surveys, scientific literature, and conspicuousness of the species
 - Medium– a moderate degree of certainty exists based on observations, surveys, scientific literature, and conspicuousness of the species
 - Low– a poor degree of certainty exists based on observations, surveys, scientific literature, and conspicuousness of the species
 - No Information – no information exists for this species in a HUC unit

All HUCs lacking an observation were identified as having no information for condition, trend, and confidence, even if a respective HUC was within the expected range of native fish species. It's important to note that the SEKI wildlife observation database includes one record of Sacramento pikeminnow in the Lower South Fork Kings River and one record of prickly sculpin in the Middle Fork Kings River. The ENTRIX report observed one Sacramento pikeminnow in the Middle Fork Kaweah River just downstream of the park boundary. Those species, along with hardhead, California roach, and Sacramento sucker may have been historically present in all low elevation streams in the following HUCs: Middle Fork Kings River, Lower South Fork Kings River, North Fork Kaweah River, Marble Fork Kaweah River, Middle Fork Kaweah River, East Fork Kaweah River, and South Fork Kaweah River. However, many of these species were excluded in the abovementioned HUCs due to the absence of historic data. It's also important to note that the exact native range of Kern River rainbow trout is unknown. Native fish may have been excluded from the Rock Creek-Kern River HUC.

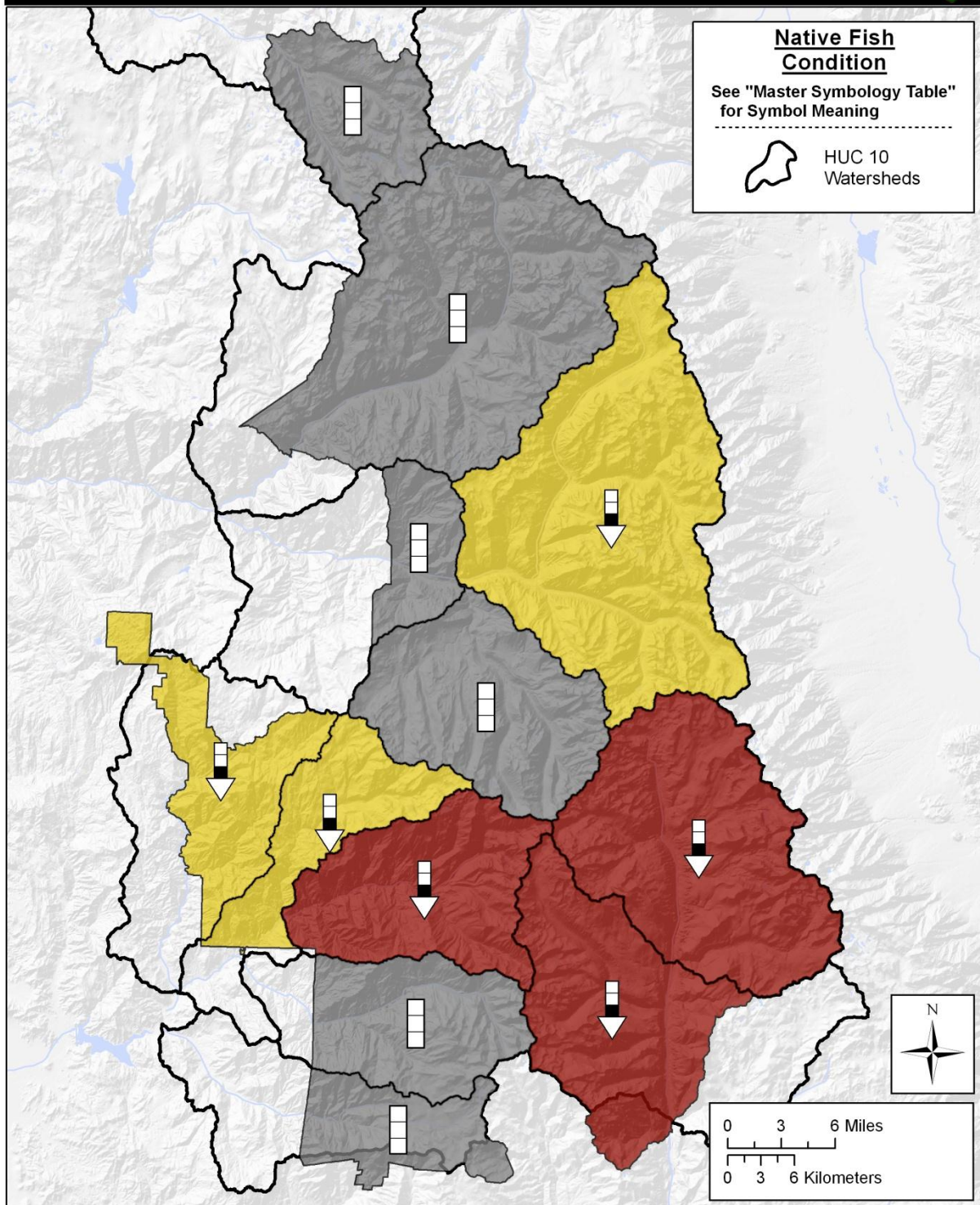


Figure 6. Native fish condition

Nonnative Fish

Data were obtained from the Dr. Roland Knapp high elevation lake inventory project (Knapp unpublished data), SEKI Kaweah fish monitoring stations (NPS 2010), ENTRIX, Inc. (2007), CDFG South Fork Kings River monitoring stations (CDFG unpublished data), Erickson et al.(2010), and the SEKI wildlife observation database. The most extensive dataset was compiled by the Knapp project. For this project, all lentic water bodies in SEKI were surveyed for the presence of fish. This dataset identified nonnative fish in lentic water bodies in 11 of 12 HUC units. All additional datasets listed above were used to further assess the number of water bodies, elevations, and HUCs that contain nonnative fish (Figure 7), as well as the number of nonnative fish species present per HUC.

To determine the condition of the HUCs for nonnative fish, we:

1. Using the Knapp database as our primary data source, created two lentic polygon shapefiles- one of fish-containing lentic water bodies and one of fishless water bodies. We selected water bodies from each shapefile within each HUC. Using column statistics in ArcMap, we quantified the number and area of nonnative fish containing water bodies in each HUC unit.
2. We referred to all additional reports and datasets to identify nonnative fish in high and low elevation streams. These reports also identify nonnative fish species other than those found in high elevation water bodies.
3. Determined HUC condition according to the following rules:
 - Good – <5% of total lentic area contains nonnative fish; or <5% of stream miles are likely occupied by nonnative fish within a HUC
 - Moderate – 5-19% of total lentic area contains nonnative fish; or 5-19% of stream miles are likely occupied by nonnative fish, which have not extirpated a native species within a HUC
 - Poor – 20% or greater of total lentic area contains nonnative fish; or 20% or greater of stream miles are likely occupied by nonnative fish; or nonnative fish have extirpated a native species within a HUC
 - No Information – no information exists for this species in a HUC unit

To determine the trend of the HUCs for nonnative fish, we:

1. Determined HUC trend according to the following rules:
 - Improvement – there is evidence that nonnative fish are not reproducing; or, restoration efforts are in place to move a HUC unit toward *Good* or *Moderate* condition.
 - No change – there was no change in nonnative fish distribution in each HUC. Also, nonnative fish did not degrade aquatic and terrestrial ecosystems compared to the reference condition.
 - Decline – there was an increase in nonnative fish distribution in each HUC, or nonnative fish degraded aquatic and terrestrial ecosystems compared to the reference condition, which is ongoing due to reproducing populations of nonnative fish within each HUC.
 - No Information – no information exists for this species in a HUC unit

To determine the confidence of the HUCs for nonnative fish, we:

1. Determined the HUC trend according to the following rules:
 - High– a high degree of certainty exists based on observations, surveys, scientific literature, and conspicuousness of the species
 - Medium– a moderate degree of certainty exists based on observations, surveys, scientific literature, and conspicuousness of the species
 - Low– a poor degree of certainty exists based on observations, surveys, scientific literature, and conspicuousness of the species

- No Information – no information exists for this species in a HUC unit

Like the MYLF dataset, this may be one of the most complete datasets on vertebrates within SEKI. Ten of 12 HUC units have nonnative fish present in lentic water bodies (present in lotic habitat in all 12 HUC units). In these ten HUCs, fish were found in 20-60% of the total area of lentic habitat. High elevation streams were excluded from our analysis due to lack of information. At a minimum, we assume that nonnative fish are present in all streams and rivers downstream of lentic habitat that contains nonnative fish. Nonnative fish are also present at each stream survey location within native fish habitat at low elevations, including hatchery rainbow trout. We therefore assume that every native rainbow trout population within low elevation habitat has hybridized with nonnative rainbow trout varieties.

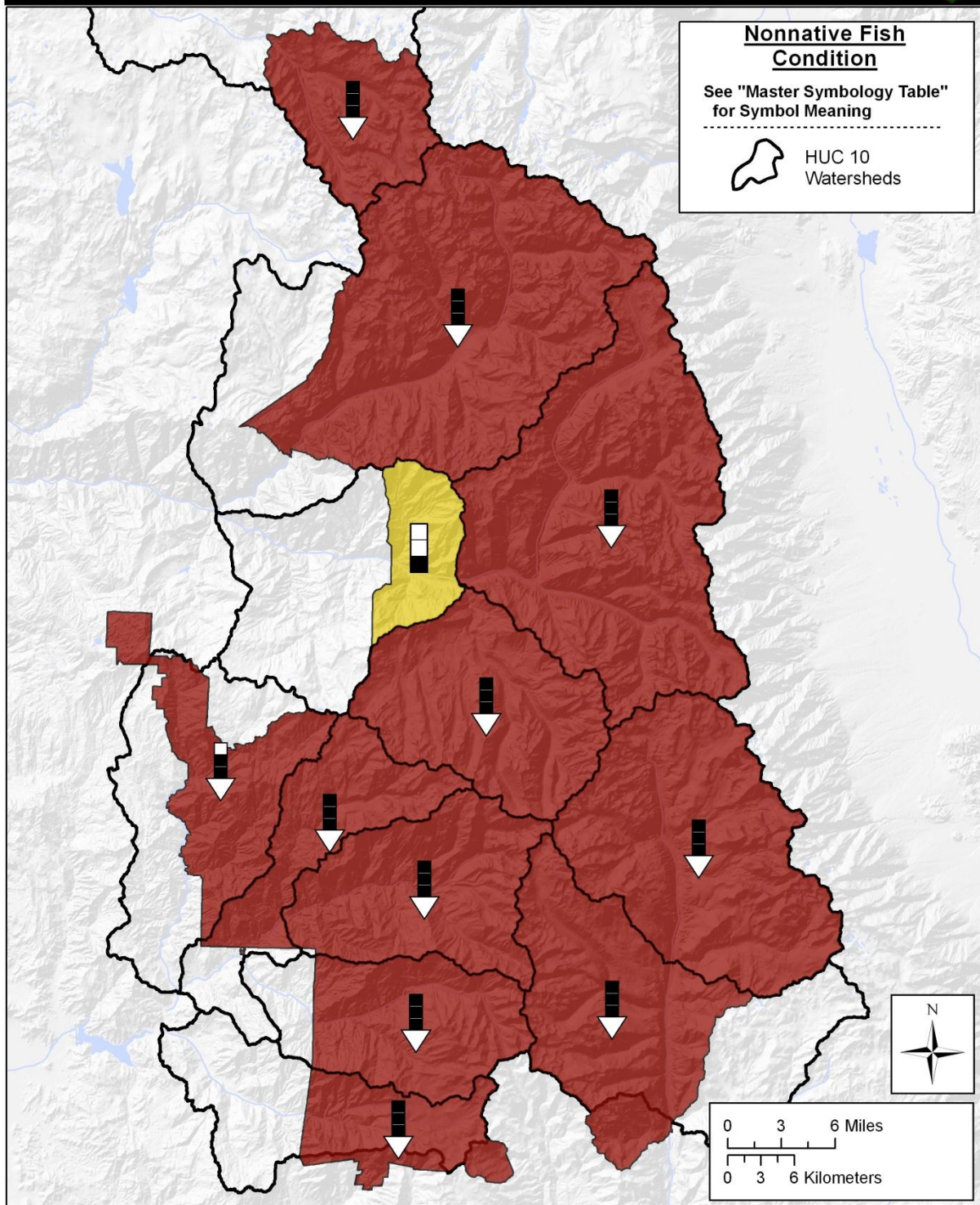


Figure 7. Nonnative fish condition

Sensitive Species Rollup

Data for the sensitive species rollup have been described for each species in the above species specific methods. All sensitive native species were included in the rollup analysis. Nonnative fish were excluded. Each HUC was included in the rollup analysis (Figure 8).

To determine the rolled up condition of the HUCs for sensitive native species, we:

1. Assigned scores* for each category: good = 3, moderate = 2, and poor = 1
2. Each HUC was averaged based on the values from the individual sensitive species scores
3. Determined HUC condition according to the following rules:
 - Good – average score of 2.35 to 3.00
 - Moderate – average score of 1.68 to 2.34
 - Poor – average score of 1.00 to 1.67

To determine the rolled up trend of the HUCs for sensitive native species, we:

1. Assigned scores* for each category: Improvement = 3, No Change = 2, and Decline = 1
2. Each HUC was averaged based on the values from the individual sensitive species scores
3. Determined HUC trend according to the following rules:
 - Improvement – average score of 2.35 to 3.00
 - No change – average score of 1.68 to 2.34
 - Decline – average score of 1.00 to 1.67

To determine the rolled up confidence of the HUCs for sensitive native species, we:

1. Assigned scores* for each category: High = 3, Medium = 2, and Low = 1
2. Each HUC was averaged based on the values from the individual sensitive species scores
3. Determined the HUC confidence according to the follow rules:
 - High – average score of 2.35 to 3.00
 - Medium – average score of 1.68 to 2.34
 - Low – average score of 1.00 to 1.67

*All species were weighted equally for the rollup analysis.

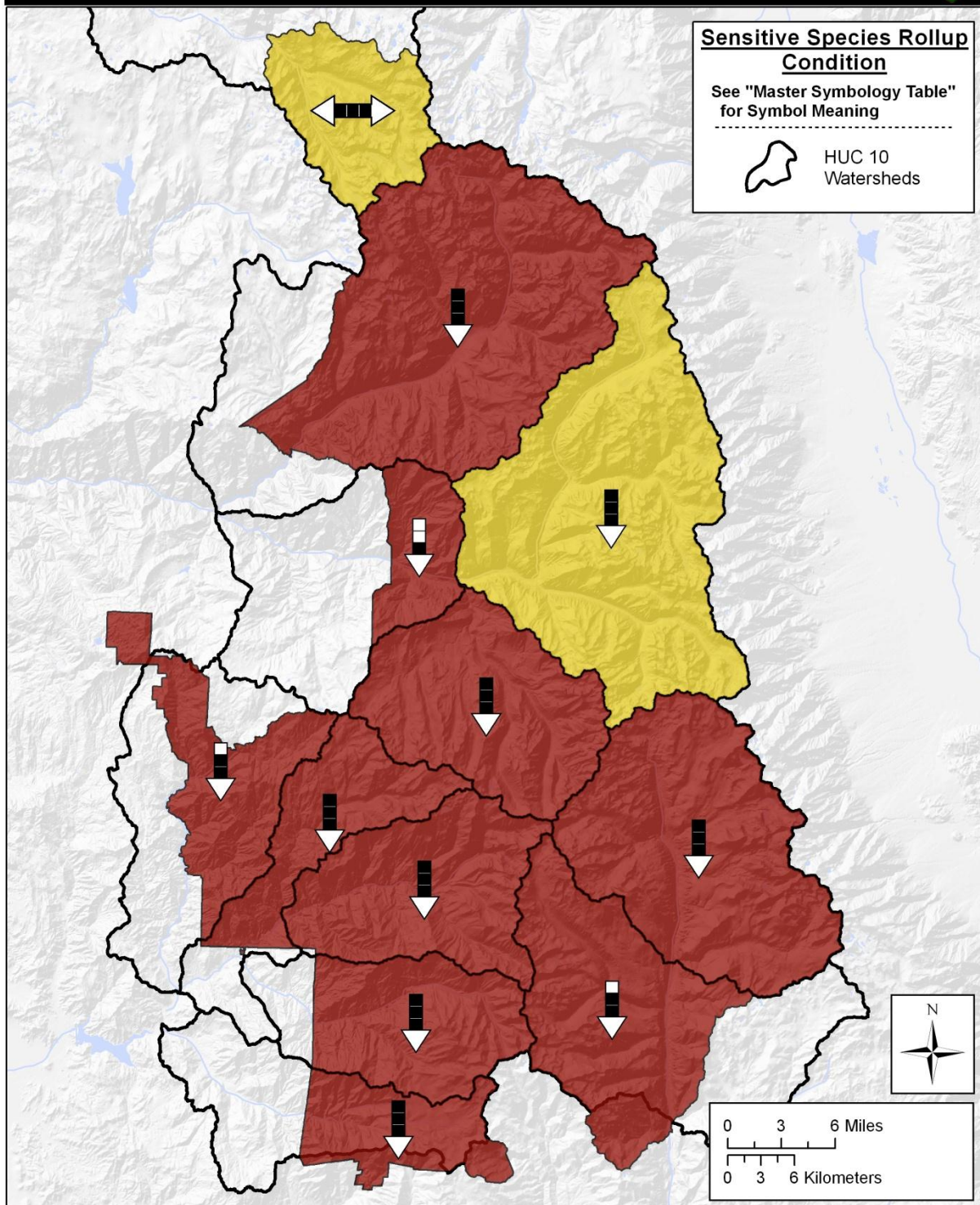


Figure 8. Sensitive species rollup condition.

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Natural Resource Stewardship and Science
1201 Oakridge Drive, Suite 150
Fort Collins, CO 80525

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