



ARROWHEAD SPRINGS PIPELINE
SPECIAL USE PERMIT 7285 RIGHT-OF-WAY
FINAL DRAFT ADAPTIVE MANAGEMENT PLAN
ARROWHEAD SPRINGS

Nestlé Waters North America Inc.

December 2017

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Introduction

Nestle Waters North America Inc. (NWNNA) has prepared this voluntary Final Adaptive Management Plan (AMP) as specified by the United States Forest Service's (USFS) Project Proposal for the renewal of Special Use Permit #7285 (SUP).¹ The project proposal, which was published for public comment on 17 March 2016, provided that NWNNA would prepare an AMP within 30 days of the final issuance of the SUP. NWNNA has prepared this AMP based on data and information gained from 31 separate biological and hydrological studies conducted in the Project Area over the past 2 years. These studies are referenced below under the heading *Supporting Studies Conducted in 2016 and 2017*. This AMP reflects data and information developed by those studies and a scientific assessment of conditions in the Project Area.

PURPOSE

The purpose of this voluntary Arrowhead Springs Pipeline Right-of-Way (ROW) AMP is to establish objective data collection targets and specific criteria that may be used to evaluate the effects of activities associated with SUP #7285, and provide an informed framework to adapt project operations to meet applicable San Bernardino National Forest (SBNF) objectives. The framework includes both interim efforts to address local or regional climatic conditions, as well as the research necessary for the development of a long-term AMP that implements science-based triggers and actions.

BACKGROUND

NWNNA holds senior, state-regulated appropriative water rights to the spring waters of Strawberry Canyon. Consistent with those rights, NWNNA operates and maintains a 4 -inch diameter, stainless steel spring water pipeline that crosses a portion of the SBNF for the purpose of conveying spring water from the spring sites down gradient to storage tanks located on private land outside of the SBNF boundaries. The Arrowhead spring sites and a portion of the pipeline are located within Strawberry Canyon. The water collected at the spring sites flows freely by the force of gravity alone. No pumps are used to collect or convey spring water in this collection and transmission system. NWNNA holds valid water rights to the spring water collected and conveyed in the pipeline, and has documented continuous use of that water for more than 120 years.

The SBNF has permitted NWNNA's use of a 5-foot wide ROW corridor across a portion of SBNF for the placement and maintenance of the pipeline since 1930. NWNNA uses 80 percent of the water that flows through the water pipeline for its business purposes. A local Native American Tribe has the rights to the remaining 20 percent of the spring water collected by NWNNA at Strawberry Canyon spring sites, for the Tribe's use and economic benefit. Currently, when available spring water exceeds the needs of both the Tribe and NWNNA, that water is discharged back into Strawberry Creek from the private land near the location of the storage tanks, outside of SBNF lands, consistent with historic practices.

No new project-related facilities, construction, or operations are currently planned within Strawberry Canyon. Project activities are limited to operation and maintenance of existing infrastructure. If a

¹ See "Nestle Waters Special Use Permit Proposed Action," Section 2.8, p.4, dated March 18, 2016, at <https://www.fs.usda.gov/project/?project=48530>.

significant change in the existing infrastructure operation and maintenance program is required due to extraordinary conditions, NWNA will consult with SBNF to establish appropriate monitoring associated with those activities. Extraordinary conditions include, but are not limited to, fire, landslide, tree-fall, and other events which may result in damage or destruction of existing infrastructure.

DATA COLLECTION AND MONITORING

The Strawberry Canyon watershed covers an area of approximately 745 acres, ranging in elevation from 2,900 to 6,150 feet above sea level. The pipeline ROW is 5 feet wide along the length of the pipeline and constitutes an area of approximately 2.7 acres, occupying a relatively small fraction of the watershed. Given the natural variability of conditions observed in the watershed, relatively little historical and temporal data exist to determine the nature and extent of any relationship between operation and maintenance of the pipeline ROW and overall conditions in Strawberry Canyon. NWNA proposes to study that relationship in order to assess the impacts of the SUP.

Effective adaptive management is heavily dependent on monitoring data describing appropriate and relevant baseline site-specific conditions that may be used to establish effective triggers and govern management decisions. The dataset required to support effective adaptive management must incorporate both natural seasonal and multi-year variability. Such a dataset is essential to help prevent errors that could result from comparing conditions under inconsistent circumstances (such as using data collected during a drought year to establish triggers for management actions during an unusually wet year). A minimum of 5 years of data collection is required to establish a scientific and statistically valid baseline of conditions existing within the canyon. This AMP provides for monitoring and data collection to be conducted over a period of 5 years that will establish scientifically valid baseline conditions and characterize the relationship between operation and maintenance of the existing pipeline ROW on current streamflow and riparian conditions in Strawberry Canyon.

To facilitate the development of this AMP, NWNA conducted more than 30 focused studies and undertook an intensive data collection program following the March 17, 2016 proposed renewal of the SUP. The purpose of the studies and data collection program was to characterize current conditions in Strawberry Canyon and identify key indicators of stream and riparian health, and the best locations to monitor those conditions. The findings generated from these studies provide a snapshot of conditions existing in Strawberry Canyon during 2016 and 2017, and form the basis for the monitoring protocols included in this AMP. Key findings from these studies include:

1. Soil and vegetation conditions within and along the ROW are generally consistent with steep riparian habitat along an intermittent canyon stream;
2. Vegetation communities existing along the ROW and Strawberry Creek are consistent with those to be expected along an intermittent stream in the arid San Bernardino Mountains;
3. Stream flow is intermittent in Strawberry Canyon and varies widely in response to seasonal and regional climatic changes;
4. No threatened, endangered, proposed, or candidate species (TEPCS) occur within the Project Area;
5. No designated critical habitat areas occur within the Project Area; and
6. Unoccupied potential TEPCS habitat occurs within the Project Area.

These findings were used to develop the monitoring criteria, interim triggers, actions, and post-action assessment described below.

This AMP is based on a scientific analysis of existing biological and hydrologic conditions in Strawberry Canyon, is responsive to regional and local climatic inputs, and will also serve to produce data describing attributes of natural hydrologic and riparian systems. This AMP is intended to be modified to incorporate site-specific observations and to revise triggers, actions, and monitoring to further protect existing riparian resources as additional site-specific data become available.

Initial Management Action

SENSITIVITY TESTING

In conjunction with this AMP, Nwana will conduct testing to characterize the degree of connection between the points of diversion and key riparian resources and surface water flow within Strawberry Canyon. Very little historical data presently exist that describe the relationship between spring water collection in the upper reaches of the Canyon, surface water flows lower in the Canyon, and riparian resources existing in the Canyon. Nwana will voluntarily conduct shut-in tests, allowing water to accumulate in the aquifer to the extent possible, at each of the five spring sites once during the 5-year duration of the AMP. The shut-in tests will last for a minimum of one month duration, and will be conducted during the dry season when the stream flow hydrograph and groundwater elevations are expected to be naturally declining in the region. Each shut-in test will be accompanied by additional monitoring to identify potential influences resulting from the shut-in test on stream flow and groundwater levels within the Canyon.

Adaptive Management Objectives, Monitoring, Triggers and Actions

In addition to the voluntary preliminary measures and testing described above, the NWNA AMP includes a series of voluntary objectives derived from standards provided in the Land Management Plan (LMP) for the Southern California National Forests (September 2005). Although NWNA holds senior, state-regulated appropriative water rights to the spring waters of Strawberry Canyon, NWNA is voluntarily offering to design the objectives of this AMP based on LMP standards. Each objective includes:

1. Stated Forest Plan objective;
2. Monitoring components to create baseline dataset;
3. Interim Trigger point(s);
4. Action(s) in response to each trigger; and
5. Monitoring to assess effects of actions.

This AMP includes four stated objectives derived from the Southern California National Forest LMP, together with triggers, actions, and monitoring programs to achieve those objectives. Each of these elements is described in detail below.

OBJECTIVE 1 WATER STANDARDS

Land Management Plan, Part 3 Design Criteria for the Southern California National Forests (September 2005), S46: Surface water diversions and groundwater extractions, including wells and spring developments, will only be authorized when it is demonstrated by the user, and/or agreed to by the Forest Service, that the water extracted is excess to the current and reasonably foreseeable future needs of forest resources.

- a. Consideration of beneficial uses, existing water rights, and the absence of other available water resources will be part of the water extraction application.
- b. Approved extractions and diversions will provide for long-term protection and reasonable use of surface water and groundwater resources.
- c. Feasibility and sustainability assessments should be appropriately scaled to the magnitude of the extraction or diversion proposed.

Objective 1 Applicability Summary

Design Criteria S46 is intended to be applied to new surface water diversions or groundwater extraction applications. The SUP requested by NWNA requests renewal of the existing special use permit granting use of an existing pipeline ROW through SBNF lands, not a request for new or expanded water collection. Nevertheless, NWNA recognizes that the purpose of this Design Criteria is to improve the condition of the forest and NWNA will implement monitoring, triggers, and actions associated with this Design Criteria even though the intended application of the Design Criteria does not apply to existing projects such as the renewal of a special use permit. Water conveyed through the pipeline is collected by NWNA in accordance with applicable senior water rights owned by NWNA and administered by the

State of California, and request for continued use of the pipeline ROW does not constitute an extraction application.

Spring water collected from the Arrowhead Springs is distinct from other waters in that it is collected from unique springs that have been used for more than 120 years to support local water-related businesses. The location and character of Arrowhead Springs water constitute unique attributes; no other water source exists that may replace the Arrowhead Springs.

Water from Arrowhead Springs is used exclusively for uses recognized as “beneficial” under California law.

NWNA collects spring water that flows to the surface by the force of gravity alone, without the application of pumps or other external force. NWNA has a continuing interest in the long-term protection and reasonable use of water resources within Strawberry Canyon.

The data collection, monitoring, interim triggers, and actions associated with Objective 1 are compliant with the intent of Objective 1, are appropriately scaled to the magnitude of water collection in Strawberry Canyon, and are protective of water resources and biological resources within the Canyon.

Objective 1 Monitoring Components

The purpose of the monitoring components described in this section is to collect data over a period of 5 years that may be used to develop a scientifically-valid seasonal multi-year baseline describing water resource conditions within Strawberry Canyon. These data will characterize the nature and extent of the relationship between operation of the pipeline ROW and water resources in Strawberry Canyon and may be used to establish appropriate science-based triggers and actions under future revisions of this AMP, and that may be used to support development of groundwater and surface water models.

- a. Calculate, or reference published calculations indicating the self-calibrating Palmer Drought Severity Index (scPDSI) for the Project Area on a quarterly basis. The Western Regional Climate Center (WRCC) or equivalent may serve as a source for scPDSI values.
- b. Monitor groundwater elevation at key locations within Strawberry Canyon, to the extent feasible. Locations may include, but are not limited to, areas above and below the fault at the Spring 10, 11, & 12 locations and the drainage below Spring 7. To limit disturbance in the Canyon, no tracked, wheeled, or skid mounted equipment will be used to install groundwater elevation monitoring equipment. Groundwater elevation monitoring will be limited to that which can be conducted using equipment installed using hand tools only.
- c. Develop watershed scale water balance on an annual basis that incorporates precipitation data, estimated groundwater inflow and outflow, estimated infiltration, evapotranspiration, surface water outflow, water use or diversion by others, and spring water collection.
- d. Conduct quarterly stream condition study using selected criteria described in the document titled “Stream Condition Inventory, Technical Guide, Pacific Southwest Region” (July 2005), Version 5.0 (SCI). Monitoring criteria will include extent of surface flow, surface water flow rate and channel dimensions, and parameters associated with macroinvertebrate sample collection to identify and quantify characteristics of existing stream flow within Strawberry Canyon. Applicable riparian monitoring criteria are addressed below under Objectives 2 and 3.

- e. Measure stream flow on Strawberry Creek quarterly at the confluence of Strawberry and East Strawberry Canyons.
- f. Conduct annual water quality testing to confirm compliance with Santa Ana Region Basin Plan, Chapter 4 published by the Santa Ana Regional Water Quality Control Board (SARWQCB, 2016). Water samples are to be collected from Strawberry Creek at the confluence of Strawberry and East Strawberry Canyons. The SARWQCB water quality criteria for Strawberry Creek is 475 milligrams per liter (mg/L) total dissolved solids (TDS).

Objective 1 Interim Triggers

The planned data collection described below, Objective 1, represents a substantial effort to collect data that do not presently exist. Without these data it is not possible to establish with scientific certainty a connection between NWNA's pipeline ROW and activities in Strawberry Canyon and the resource condition. Because these data have not yet been collected, they cannot yet be used to support site-specific triggers. Consequently, interim triggers are included below that are based on regional climatic conditions that have a direct effect on conditions in Strawberry Canyon. These triggers may be revised in the future once the necessary data are collected to support triggers based on site-specific measurements. The interim triggers described below are based on the scPDSI, which provides a scientifically objective and reasonable indication of potential drought stress conditions that is commonly used by the United States Department of Agriculture (USDA) and USFS in support of natural resource assessment and management decisions.

Interim Trigger A-1

The scPDSI indicates that moderate drought conditions (scPDSI score between -2.0 and -2.99) exist at Strawberry Canyon.

This trigger indicates that an unusually low amount of precipitation has been received and surface flows in the Canyon may be affected by changing climatic inputs.

Interim Trigger B-1

The scPDSI indicates that severe drought conditions (scPDSI score between -3.0 and -3.99) exist at Strawberry Canyon.

This trigger indicates that low precipitation conditions persist and surface flows in the Canyon may decline further as a result of changing climatic inputs.

Interim Trigger C-1

The scPDSI indicates that extreme drought conditions (scPDSI score of -4.0 or less) exist at Strawberry Canyon.

This trigger indicates that low precipitation conditions have persisted for some time and surface flows in the Canyon are likely to be impacted by changing climatic inputs.

Objective 1 Interim Actions

The actions described below will be implemented to generate data that will describe the effects of reduced spring water collection, and changing climatic inputs on surface flows.

Interim Action A-1

When Trigger A-1 is reached, reduce spring water collection by 10 percent as measured at the borehole meters.

Interim Action B-1

When Trigger B-1 is reached, reduce collection an additional 10 percent as measured at the borehole meters.

Interim Action C-1

When Trigger C-1 is reached, reduce collection by an additional 10 percent as measured at the borehole meters.

The above Objective 1 Interim Actions A-1 through C-1 are not intended to be cumulative with the actions described below for Objectives 2, 3, or 4.

Objective 1 Response Monitoring:

The monitoring described in this section will be conducted to assess the effects of Actions A-1, B-1, and C-1.

- a. Following Interim Action A-1:
 - i. Continue quarterly monitoring.
 - ii. Log piezometric pressure at boreholes as an indication of the piezometric surface above the boreholes.
- b. Following Interim Action B-1:
 - i. Continue quarterly monitoring.
 - ii. Increase frequency of surface water flow and groundwater elevation monitoring to monthly.
 - iii. Log piezometric pressure at boreholes as an indication of the piezometric surface above the boreholes.
- c. Following Interim Action C-1:
 - i. Continue quarterly monitoring.
 - ii. Increase frequency of surface water flow and groundwater elevation monitoring to monthly.
 - iii. Log piezometric pressure at boreholes as an indication of the piezometric surface above the boreholes.
 - iv. Measure water quality parameters at the confluence monthly.

OBJECTIVE 2 RIPARIAN STANDARDS

LMP, Part 3 Design Criteria for the Southern California National Forests (2005), S47: When designing new projects in riparian areas, apply the Five-Step Project Screening Process for Riparian Conservation Areas (RCAs) as described in LMP Appendix E – Five-Step Project Screening Process (Five-Step Process) for RCAs.

The data collection, monitoring, triggers, and actions associated with Objective 2 comply with the Five-Step Process and are protective of riparian resources within the Canyon.

The purpose of the Five-Step Process is to evaluate potential impacts from newly proposed projects in RCAs that include perennial and intermittent streams, lakes, and wetlands, and to allow only those actions that maintain or improve long-term aquatic and riparian ecosystem health including quantity, quality, and timing of stream flows. The Five-Step Project Screening Process includes consideration of physical factors such as soil characteristics, groundwater and surface water characteristics, geology and geologic hazards, slope and stream characteristics, and biological factors (see species guidance documents in LMP Part 3, Appendix H).

Objective 2 Applicability Summary

Design Criteria S47 is intended to be applied to new projects located within riparian areas. The SUP renewal requested by NWNA does not constitute a new project, but rather requests renewal of the special use permit granting use of an existing pipeline ROW through SBNF lands. The existing pipeline ROW does pass through areas that may qualify as RCAs as defined in Forest Service Handbook 2059.22, Chapter 2 (USFS, 2005). Although the Arrowhead SUP seeks reauthorization of an existing ROW rather than authorization of a new project, NWNA recognizes that the Five-Step Project Screening Process provides value in that it will allow existing RCAs to be identified, protected, and maintained. Since 2016, NWNA has voluntarily collected much of the data required to perform the Five-Step Analysis and is committed to perform the analysis when all necessary data have been collected.

Objective 2 Monitoring Components

The purpose of the monitoring components described in this section is to collect data over a period of 5 years that may be used to develop a scientifically-valid seasonal multi-year baseline describing riparian conditions within Strawberry Canyon. These data will characterize the nature and extent of the relationship between operation of the pipeline ROW and riparian resources in Strawberry Canyon and may be used to establish appropriate triggers under future revisions of this AMP.

- a. Semi-annual – Survey, record, and evaluate riparian conditions at test plots within Strawberry Canyon, and control plots located at areas where water extraction is not occurring and are similar with respect to size, slope, channel gradient, number, and type of tributaries, location, soils characteristics, land cover, topography, aspect, hydrology, geology, land-use, etc. Plot locations may include, but are not limited to, areas above and below the fault at the Spring 10, 11, & 12 locations, the drainage below Spring 7, and the drainage above the meadow area. Data collection will include:
 - i. Measurement of rooting depth at piezometers set back from the stream channel.
 - ii. A functional assessment of the riparian habitat to compare the functions of the test plots to reference standard (control plots) sites. Variables including species composition, distribution, health, density (relative frequency of shrubs and trees), and the vertical structure of the community will be measured and compared at each plot on a semi-annual basis.
- b. Annually – Perform aerial photographic analysis of canopy, vegetation diversity, distribution and general riparian conditions including overall health at key riparian areas within Strawberry

Canyon. The comparison will be made using aerial imagery captured by drone photography and compared to the previous year flight photographs by high resolution computer analysis.

- c. Annually – Perform aerial photographic analysis of riparian conditions at a control plot location at locations where water extraction is not occurring and where similar with respect to size, slope, channel gradient, number, and type of tributaries, location, soils characteristics, land cover, topography, aspect, hydrology, geology, land use, etc. The Control Site will be compared to the Study Site to determine any patterns of changes that may be due to an environmental response related to operation of the pipeline ROW.

Objective 2 Interim Triggers

The planned data collection described above under the heading Objective 2 Monitoring Components, represents a substantial effort to collect data that do not presently exist. Without these data it is not possible to establish with scientific certainty a connection between NWNA’s pipeline ROW and activities in Strawberry Canyon and the particular resource condition. Because these data have not yet been collected, they cannot yet be used to support specific triggers. Consequently, interim triggers are included below that are based on regional climatic conditions that have a direct effect on conditions in Strawberry Canyon, and on analysis of aerial imagery of riparian areas within the Canyon. These interim triggers may be revised in the future once the necessary data are collected to support triggers based on site-specific measurements.

Interim Trigger A-2

Comparison of test plots in Strawberry Canyon to control plots at locations where water extraction is not occurring shows more than a 25 percent decrease of riparian habitat associated with stream conditions at two or more of the test plots for two consecutive semi-annual surveys. Comparison criteria will include quantitative number of species, density of selected key species, and percent cover of riparian habitat (shrubs/trees) based on the following procedure:

1-square meter (m²P) quadrat analyzed at each plot to count seedlings and saplings; the point-centered quarter method of vegetation sampling at each plot: the distance to the mid-point of the nearest tree and the nearest shrub from the sampling point is measured in four directions (one in each of the four quarters established at the sampling point through a cross formed by two perpendicular lines through the point).

This trigger indicates that riparian resources may be locally stressed.

Interim Trigger B-2

Comparison of aerial photography shows more than a 30 percent decrease in canopy cover, selected species composition, distribution, and health from the previous year’s photography, that is not reflected at the control plot, and changes cannot be associated with seasonal changes, climatic inputs, or other identifiable outside influences such as fire, flood, debris flow, or landslide, etc.

This trigger indicates that riparian conditions in Strawberry Canyon may have experienced substantial changes relative to the previous year.

Objective 2 Interim Actions

The interim actions described below will be implemented to generate data that will describe the effects of reduced spring water collection, and changing climatic inputs on surface flows on riparian resources.

Interim Action A-2

When Trigger A-2 is reached, reduce spring water collection by 10 percent as measured at the borehole meters.

Interim Action B-2

When Trigger B-2 is reached, reduce water collection by 30 percent. If Trigger A-2 has not been reached, reduce water collection by 20 percent as measured at the borehole meters.

The above Objective 2 Interim Actions A-2 and B-2 are not intended to be cumulative with the actions described below for Objectives 1, 3, or 4.

Objective 2 Response Monitoring

The monitoring described in this section will be conducted to assess the effects of Actions A-2, and B-2.

- a. Following Action A-2:
 - i. Continue semi-annual monitoring.
 - ii. Log groundwater elevation changes daily at piezometer locations.
 - iii. Log piezometric pressure at boreholes as an indication of the piezometric surface above the boreholes.
- b. Following Action B-2:
 - i. Continue quarterly monitoring described.
 - ii. Complete aerial photographic analysis on annual basis.
 - iii. Log groundwater elevation changes daily at piezometer locations.
 - iv. Increase aerial photography comparison of test and control plots to semi-annual frequency.
 - v. Log piezometric pressure at boreholes as an indication of the piezometric surface above the boreholes.

OBJECTIVE 3 SPECIES STANDARDS

LMP, Part 3 Design Criteria for the Southern California National Forests (2005), S11: When occupied or suitable habitat for a TEPCS is present on an ongoing or proposed project site, consider species guidance documents (see [LMP Part 3] Appendix H) to develop project-specific or activity-specific design criteria. This guidance is intended to provide a range of possible conservation measures that may be selectively applied during site-specific planning to avoid, minimize, or mitigate negative long-term effects on TEPCS and habitat. Involve appropriate resource specialists in the identification of relevant design criteria and appropriate species lists. Include review of species guidance documents in fire suppression or other emergency actions when and to the extent practicable.

LMP, Part 3 Design Criteria for the Southern California National Forests (2005), S24: Mitigate impacts of on-going uses and management activities on TEPCS.

Objective 3 Applicability Summary

Design Criteria S11 and S24 provide guidance for projects that may include management of TEPCS and potential TEPCS habitat within the Project Area. Studies conducted by NRNA, and confirmed by SBNF, have demonstrated that no TEPCS occur within the Project Area. No designated critical habitat occurs within the Project Area. Unoccupied potential TEPCS habitat occurs within the Project Area.

The data collection, monitoring, triggers, and actions associated with Objective 3 conform to the guidance provided in design criteria S11 and S24 and are protective of biological resources within the Canyon.

Objective 3 Monitoring Components

The purpose of the monitoring components described in this section is to collect data that may be used to develop a scientifically-valid seasonal multi-year baseline describing habitat conditions within Strawberry Canyon. These data will characterize the nature and extent of the relationship between operation of the pipeline ROW and habitat conditions in Strawberry Canyon and may be used to establish appropriate triggers under future revisions of this AMP.

- a. Conduct monitoring to develop a baseline of habitat and associated species in Strawberry Canyon over a period of 5 years.
 - i. Semi-annual – Conduct presence/absence surveys for non-TEPCS species identified with habitat present, including amphibian/reptile, fish, mammals (wildlife cameras), and avian point counts.
 - ii. Biannually – Conduct presence/absence surveys for TEPCS species identified with habitat present, both plant and animal.
 - iii. Quarterly – Benthic macroinvertebrate population analysis – Biological metrics of the macroinvertebrate communities to form Index of Biological Integrity (IBI) values at each site.
- b. Monitor habitat and associated species in the control plot(s).
 - i. Semi-annual – Conduct presence/absence surveys for non-TEPCS species identified with habitat present, including amphibian/reptile, fish, mammals, and avian point counts.
 - ii. Quarterly – Benthic macroinvertebrate population analysis – Biological metrics of the macroinvertebrate communities to form IBI values at each site.

Objective 3 Interim Triggers

Interim Trigger A-3

More than a 30 percent decrease of expected aquatic life forms (benthic macroinvertebrates) and communities and selected IBI values, and selected non-TEPCS species in existing riparian areas for at least two sample plots; based on comparison to the same plot during the same quarter of the previous year, and a similar decline is not observed in the control plot(s), and changes cannot be associated with seasonal changes, climatic inputs, or other identifiable outside influences such as fire, flood, debris flow, or landslide, etc.

Interim Trigger B-3

More than a 40 percent decrease of expected aquatic life forms (benthic macroinvertebrates) and communities and selected IBI values, and selected non-TEPCS species in the existing riparian areas for at least two sample plots, based on comparison to the same plot during the same quarter of the previous year, and a similar decline is not observed in the control plot(s), and changes cannot be associated with seasonal changes, climatic inputs, or other identifiable outside influences such as fire, flood, debris flow, or landslide, etc.

Objective 3 Interim Actions

Interim Action A-3

When Trigger A-3 is reached, reduce spring water collection by 10 percent as measured at the borehole meters.

Interim Action B-3

When Trigger B-3 is reached, reduce water collection an additional 20 percent. If Trigger A-3 has not been reached, reduce water collection by 20 percent as measured at the borehole meters.

The above Objective 3 Interim Actions A-3 and B-3 are not intended to be cumulative with the actions for Objective 1, 2, or 4.

Objective 3 Response Monitoring

The monitoring described in this section will be conducted to assess the effects of Actions A-3 and B-3.

- a. Following Action A-3:
 - i. Continue quarterly surveys for macroinvertebrate analysis.
 - ii. Continue semi-annual presence/absence surveys for non-TEPCS species identified with habitat present, including amphibian/reptile, fish, mammals, and avian point counts.
 - iii. Continue biannual presence/absence surveys for TEPCS species identified with habitat present.
 - iv. Log groundwater elevation changes daily at piezometer locations.
 - v. Log piezometric pressure at boreholes as an indication of the piezometric surface above the boreholes.
- b. Following Action B-3:
 - i. Continue quarterly monitoring for macroinvertebrate analysis.
 - ii. Continue semi-annual presence/absence surveys for non-TEPCS species identified with habitat present, including amphibian/reptile, fish, mammals (wildlife cameras), and avian point counts.
 - iii. Continue biannual presence/absence surveys for TEPCS species identified with habitat present.
 - iv. Log groundwater elevation changes daily at piezometer locations.
 - v. Increase aerial photography comparison of test and control plots to semi-annual frequency.
 - vi. Log piezometric pressure at boreholes as an indication of the piezometric surface above the boreholes.

OBJECTIVE 4 INVASIVE SPECIES STANDARDS

LMP, Part 1, Southern California National Forest Vision (2005). Goal 2.1. Reverse the trend of increasing loss of natural resources due to invasive species. Forest Service Manual direction for Invasive Species management guidance is provided in FSM 2900, effective December 5, 2011. This guidance sets forth National Forest System policy, responsibilities, and direction for the prevention, detection, control, and restoration of effects from aquatic and terrestrial invasive species.

Objective 4 Applicability Summary

LMP Goal 2.1 was created to address the loss of forest resources to invasive plant and animal species. Operation and maintenance of the existing pipeline ROW will not introduce any invasive species to the Strawberry Canyon watershed. However, Nwana understands that the purpose of this goal is to improve the condition of the forest and to prevent further degradation of the forest resulting from invasive species, and is committed to assisting SBNF with reduction of invasive species within the Project Area, to the extent feasible.

The data collection, monitoring, triggers, and actions associated with Objective 4 conform to the stated purpose of Goal 2.1 and are protective of forest resources within the Canyon.

Objective 4 Monitoring Components

The purpose of the monitoring components described in this section is to collect data that may be used to identify, quantify, and map existing occurrences of priority invasive plant and animal species within the Project Area and document with GIS polygon shapefiles or GPS coordinates.

- a. Compile a priority invasive plant and animal list based on species that are included in California Invasive Plant Council (IPC) list of species considered to be High and Medium threat to ecological systems, and are not already ubiquitous throughout the Project Area. This list will be compiled in consultation with USFS botany and wildlife specialists.
- b. Conduct annual survey of Project Area to identify, quantify, and remove the species listed on the priority invasive plant and animal list from Project Area. Provide annual report of monitoring and control efforts including names of workers/surveyors, date, method of control, and location.

Objective 4 Triggers

Trigger A-4

Cover, quantity, or extent of current infestations are significantly increasing within the Project Area, and the changes cannot be associated with seasonal changes, climatic inputs, or other identifiable outside influences such as fire, flood, debris flow, or landslide, etc.

Trigger B-4

New invasive species have been identified within the Project Area, and the changes cannot be associated with seasonal changes, climatic inputs, or other identifiable outside influences such as fire, flood, debris flow, or landslide, etc.

Objective 4 Actions

Action A-4

Consult with USFS botany and biology specialists to determine most effective control/eradication methods within the Project Area allowed by agency policy and direction when Trigger A-4 is reached. Conduct treatment activities identified during consultation.

Action B-4

Consult with USFS botany and biology specialists to determine most effective control/eradication methods within the Project Area allowed by agency policy and direction when Trigger B-4 is reached. Following consultation, initiate control within the Project Area as soon as possible within the time period for most effective treatment.

- a. Remove biomass containing reproductive potential (root segments, seeds, or flowers that could develop into viable seed) from Project Area.
- b. Remove adult, juvenile, or larval forms of animals from Project Area.

Objective 4 Response Monitoring

- a. Following Action A-4
 - i. Continue annual monitoring.
 - ii. Monitor and re-treat when necessary to control or eradicate newly identified invasive plant and/or animal infestations.
- b. Following Action B-4
 - i. Continue annual monitoring.
 - ii. Monitor and re-treat when necessary to control or eradicate newly identified invasive plant and/or animal infestations.

Supporting Studies Conducted in 2016 and 2017

1. Chambers Group, 2016a. Biological Technical Report.
2. Chambers Group, 2016b. Endangered Species Report: Least Bell's vireo.
3. Chambers Group, 2016c. Sensitive Species Report: Mammals (San Bernardino flying squirrel, White-eared pocket mouse, Fringed myotis and pallid bat).
4. Chambers Group, 2015d. Endangered Species Report: Southwestern willow flycatcher.
5. Chambers Group, 2016e. Endangered Species Report: Coastal California gnatcatcher.
6. Chambers Group, 2016f. Endangered Species Report: Arroyo toad.
7. Chambers Group, 2016g. Sensitive Species Report: Willow flycatcher (migrant).
8. Chambers Group, 2016h. Sensitive Species Report: Fish Surveys (Santa Ana speckled dace, arroyo chub, trout).
9. Chambers Group, 2016i. Endangered Species Report: Yellow billed cuckoo.
10. Chambers Group, 2016j. Sensitive Species Report: Reptiles (Orange-throated whiptail, Southern rubber boa, Three-lined boa, San Bernardino ringneck snake, San Bernardino mountain kingsnake, coastal horned lizard).
11. Chambers Group, 2016k. Sensitive Species Report: Raptor nests and sightings (raptor/goshawk/CA spotted owl).
12. Chambers Group, 2016l. Sensitive Species Report: Amphibians (Large-blotched ensatina, San Gabriel slender salamander, spadefoot toad).
13. Chambers Group, 2016m. Plant Report Part 1: Rare Plants & Invasive Species Mapping.
14. Chambers Group, 2017a. Supplemental Plant Report Part 2: Rare Plants & Invasive Species Mapping.
15. Haley & Aldrich, 2016a. September 2016 Monthly Water Report and Summary of Biological Survey Schedule with Respect to Special Use Permit # 7285, 5 October 2016.
16. Haley & Aldrich, 2016b. September 2016 Stream Condition Inventory Materials Submitted in Support of Renewal of Special Use Permit #7285, 21 October 2016.
17. Haley & Aldrich, 2016c. October 2016 Monthly Water Report and Summary of Biological Survey Schedule with Respect to Special Use Permit #7285, 7 November 2016.
18. Haley & Aldrich, 2016d. November 2016 Monthly Water Report and Summary of Biological Survey Schedule with Respect to Special Use Permit #7285, 5 December 2016.

19. Haley & Aldrich, 2016e. Surface Water Model of the Strawberry Canyon Drainage Area.
20. Haley & Aldrich, 2017a. December 2016 Monthly Water Report and Summary of Biological Survey Schedule with Respect to Special Use Permit #7285, 5 January 2017.
21. Haley & Aldrich, 2017b. January 2017 Monthly Water Report and Summary of Biological Survey Schedule with Respect to Special Use Permit #7285, 6 February 2017.
22. Haley & Aldrich, 2017c. February 2017 Monthly Water Report and Summary of Biological Survey Schedule with Respect to Special Use Permit #7285, 6 March 2017.
23. Haley & Aldrich, 2017d. March 2017 Monthly Water Report and Summary of Biological Survey Schedule with Respect to Special Use Permit #7285, 5 April 2017.
24. Haley & Aldrich, 2017e. April 2017 Monthly Water Report and Summary of Biological Survey Schedule with Respect to Special Use Permit #7285, 5 May 2017.
25. Haley & Aldrich, 2017f. March 2017 Stream Condition Inventory Materials Submitted in Support of Renewal of Special Use Permit #7285, 8 May 2017.
26. Haley & Aldrich, 2017g. May 2017 Monthly Water Report and Summary of Biological Survey Schedule with Respect to Special Use Permit #7285, 5 June 2017.
27. Haley & Aldrich, 2017h. June 2017 Monthly Water Report and Summary of Biological Survey Schedule with Respect to Special Use Permit #7285, 5 July 2017.
28. Haley & Aldrich, 2017i. July 2017 Monthly Water Report and Summary of Biological Survey Schedule with Respect to Special Use Permit #7285, 7 August 2017.
29. Haley & Aldrich, 2017j. August 2017 Monthly Water Report and Summary of Biological Survey Schedule with Respect to Special Use Permit #7285, 5 September 2017.
30. Haley & Aldrich, 2017k. June 2017 Monthly Water Report and Summary of Biological Survey Schedule with Respect to Special Use Permit #7285, 5 October 2017.
31. Haley & Aldrich, 2017l. June 2017 Monthly Water Report and Summary of Biological Survey Schedule with Respect to Special Use Permit #7285, 6 November 2017.

References

1. Frazier J.W., K.B. Roby, J.A. Boberg, K. Kenfield, J.B. Reiner, D.L. Azuma, J.L. Furnish, B.P. Staab, S.L. Grant 2005. Stream Condition Inventory Technical Guide. USDA Forest Service, Pacific Southwest Region – Ecosystem Conservation Staff. Vallejo, CA. 111 pp.
2. United State Department of Agriculture, Forest Service, Pacific Southwest Region. Land Management Plan: Southern California National Forests Vision. R5-MB-075, September 2005.
3. Wells, N., Goddard, S., Hayes, M.J. A Self-Calibrating Palmer Drought Severity Index. 17pp. 15 June 2004.