ITEM 7 - ATTACHMENT 1

Contents of the Smith River Plain Water Quality Management Plan

This attachment provides additional detail on the sections of the draft Smith River Plain Water Quality Management Plan (SRPWQMP). The Plan is currently being drafted by Regional Water Board staff and some of the content may change following input from the December 19, 2019 information item and the development team partners. The following discussion goes section by section through the Plan providing a brief summary of its content and some excerpts of draft language.

1. Program Management and Watershed and Resource Overview

This section provides an overview of the Smith River watershed including the land uses and natural and cultural resources it supports. It also provides a summary of relevant Regional Water Board programs, coordination with other agencies, and local restoration efforts. Some examples of draft text from the document is provided below:

The Smith River Watershed encompasses about 700 square miles in the northwest corner of California and the Smith River itself is the largest undammed river in California. The river and its tributaries provide high quality habitat for salmonids and other aquatic and riparian species. The Smith River Plain, the focus of the SRPWQMP, is a coastal plain located at the lower end of the Smith River watershed near the mouth of the mainstem river. The drainage network of the Smith River Plain is comprised of several small coastal tributaries and the Smith River estuary.

The Tolowa Dee-ni’ Nation is the original steward of the Smith River Plain and surrounding marine environment, which is the primary provider of sustenance and wellbeing for Tolowa Dee-ni’ people and has been integral to the lifeways of the Tolowa Dee-ni' since time immemorial. The Smith River and its estuary provide crucial habitat for aquatic trust and cultural keystone species such as salmon, lamprey, halibut and other flatfish species, crab species, and shark species. Beyond providing habitat for species central to the continuum of the past and present traditions of the Tolowa Dee-ni’, the river and estuary themselves serve as crucial environmental trust resources for cultural, ceremonial, and subsistence beneficial uses for the Tolowa Dee-ni' Nation.

Easter lily bulb operations are located in the Smith River Plain approximately 10 miles North of Crescent City. The area is uniquely suited to growing lily bulbs with year-round mild temperatures, rich alluvial soils, and plentiful rainfall. Bulbs have been grown in the area since the end of World War I, but production greatly expanded after World War II when Japanese exports were cut off. Ninety-five percent of the world’s Easter lily bulbs are grown in Southwest Curry County, Oregon and Northwest Del Norte County, California, amounting to around 11 million bulbs annually. The industry is an important part of the economy in Del Norte County. Approximately 1500 - 1600 acres in the Smith

River Plain are used for cultivation. Since the bulbs are grown in a rotation with forage, only about 375 acres are planted to Easter lilies in a given year, with another 375 acres in a state of transition in preparation to receive the following year's crop.

There are two species of fish that use the Smith River Plain that are listed as threatened or endangered on the Federal and California Endangered Species Lists; coho salmon and tidewater goby. Coho salmon are listed as threatened under the Federal Endangered Species Act (ESA) and the California ESA, and tidewater goby are listed as endangered under the Federal ESA. The National Marine Fisheries Service (NMFS) has also designated the Smith River, including all tributaries to the Smith River Plain, as critical habitat for the coho salmon and the Tillas Slough tributary as critical habitat for tidewater goby under the ESA. Critical habitat includes those areas that are essential to the conservation of ESA-listed species and which may require special management considerations or protections. The tributaries to the Smith River Plain include both natal and non-natal rearing areas for juvenile coho salmon. Tributaries and sloughs near the estuary provide vital habitat for juveniles and fry that are swept downstream during high flow events. The use of this habitat increases survival of juveniles, which increases overall productivity and life history diversity of the coho population.

2.1 Description of Lily Bulb Operations

This section of the Plan describes the lily bulb operations in the Smith River Plain including seasonal activities such as field preparation, pesticide and fertilizer applications, and irrigation methods. Understanding the seasonal activities leads to a better understanding of how those activities can potentially affect water quality. Below is an excerpt from the draft Plan:

The lily bulb crop is part of a four-year rotation with grass-clover, which is used as forage. Typically, the fields are used as forage for livestock for two years and for the cultivation of lily bulbs for two years. The typical Easter lily/pasture rotation begins in spring when fields are converted from pasture to lily bulb fields. The fields are in some stage of preparation until planting begins in August. Preparation includes tillage of established pasture, application of lime, soil fumigation, and hilling before final planting is completed by the end of late fall. Bulbs remain in the ground for a minimum of 11 months and up to 14 months prior to harvest, which typically begins in August and finishes by November. Since lily bulbs are grown year-round, growers apply a variety of pesticides to combat different pests in each season. After harvest, the bulbs are either moved to a freshly prepared field that was converted from forage the previous spring, or they are packaged for shipment. Fields previously used to grow lilies are then planted to pasture and managed for forage over the next 1 to 3 years.

2.2 Risks to Water Quality

This section describes the risks to water quality posed by lily bulb operations associated with the seasonal activities described in the previous section. It describes the fate and transport of pesticides used by lily bulb growers in the environment, the environmental

conditions of the Smith River Plain affecting the delivery of pesticides, and the results of the Regional Water Board monitoring from 2013-2017. Understanding the risks to water quality helps to select the appropriate management practices. Excerpts from the text of the draft Plan follows:

Lily bulb cultivation in the Smith River Plain can present several risks to water quality and aquatic life. The primary risk being addressed by the SRPWQMP is from chemicals being transported from fields in stormwater runoff and delivered to surface waters. The area receives an average of 75 inches of rain annually, primarily from October through March, and there are several storms per year that produce considerable runoff from fields. If agricultural chemicals are transported from fields they can become concentrated enough in the water column to result in toxicity in streams that can cause chronic effects on aquatic life, such as reproduction rates, growth and impaired behavior, and if in high enough concentrations, more acute effects, such as death. Pesticides can also act synergistically, where individual pesticides may be below critical levels, but combined can still result in toxicity in the stream.

The Regional Water Board's water quality monitoring documented the presence of several pesticides used in lily bulb cultivation in some of the coastal tributaries of the Smith River during storm events. The results were documented in the January 2018 *Smith River Plain Surface Water and Sediment Monitoring Report*. Between 2013 and 2015, the lab analysis of surface water samples detected 17 pesticides in samples that were analyzed for over 200 pesticides. Out of the 17 pesticides detected, 5 exceeded the US Environmental Protection Agency (USEPA) 2017 Aquatic Life Benchmarks: diuron (herbicide), imidacloprid (insecticide), permethrin (insecticide), tebuconazole (fungicide), and mirex (insecticide). Out of 30 samples collected between 2013 and 2017, five samples from Delilah Creek and one from Tillas Slough exceeded the California Toxics Rule standard for dissolved copper. Some surface water samples also exhibited varying levels of seasonal toxicity associated with agricultural chemicals, primarily in the Tillas Slough watershed, and in particular in Delilah Creek.

Given the environmental conditions and nature of chemicals applied, the January 2018 report showed pesticides and copper are likely being delivered to surface waters during stormwater runoff events either dissolved in water or attached to eroded soil particles. In addition to the water quality monitoring results, it is clear from staff site visits during storm events and photo documentation that riparian areas are degraded and, in some cases, lack native vegetation. Staff also observed direct hydrologic connections between many fields where chemicals are being applied and the drainage network to the Smith River and its tributaries.

2.3 Water Quality Management Practices

This section of the Plan provides a menu of management practices applicable to lily bulb operations in the Smith River Plain for the protection of water quality. The documented practices are based on those successfully implemented by growers, with grower's input, and based on practices in the literature adapted to the unique conditions of the Smith River Plain. The practices documented in this section include erosion

control measures, streamside protections, nutrient control, and pesticide application practices. The types of practices vary based on the phase in the rotation a given field is in.

Since the Regional Water Board's monitoring report was released in January 2018, lily bulb growers have been implementing new and refined practices to protect water quality. The most significant change in practice is the increase in vegetated buffer strips between lily bulb fields and streams. The buffers serve two primary purposes depending on the drainage direction and orientation of rows. Newly expanded buffers that are installed at the downgradient end of the field act as filters for sheet flow runoff during storm events and trap sediment before it can be delivered to waterways. Buffers alongside fields next to streams do not intercept runoff, but rather serve to buffer any pesticide drift during application. Both types of buffers are being implemented more consistently and have been greatly increased in some areas in response to the water quality monitoring results documented in the January 2018 report. The implementation of these practices lowers the planted acreage on a given field, reduces the amount of pesticides being applied, and provides stream protections and filtration of pollutants in field runoff.

Another area where growers have improved their practices is in the pesticide application equipment. Growers have adjusted the nozzle size and pressure to reduce drift and more precisely target chemical applications. The adjustments have allowed growers to use less pesticides, especially copper, which has resulted in greater protection of water quality and also less cost to the grower. Finally, another recent practice is to split larger fields into two or three smaller fields. As a result, where one large field may have been used to grow bulbs in the past, now only one-half or one-third of the area is used for bulbs, while the remaining area is kept in pasture. The smaller newly created fields will be rotated through in subsequent growing seasons, which lowers the total acreage of bulbs in that part of the Smith River Plain for a given growing season. Reducing the field sizes in this way lessens the intensity of chemicals being applied in a certain area, which increases the capacity of the environment to assimilate any pollutants running off fields during storm events. It also allows the fields remaining as pasture to be used as a filter or space where stormwater can infiltrate before reaching streams.

In addition to these newly implemented practices, growers also have a series of practices they have already been implementing to protect water quality and/or meet other regulatory requirements. For example, proper storage and disposal of pesticides is something growers have been practicing for many years to satisfy state and county pesticide regulations. Growers also monitor wind conditions and precipitation forecasts to plan pesticide and fertilizer applications. Another long-term practice is managing the amount of stormwater running onto a field, which keeps it from contacting chemicals applied to the fields.

Staff continue to work with growers to adapt management practices from the literature to the site-specific conditions in the Smith River Plain. Some examples of other practices currently being implemented and documented in the Plan include grassed

waterways, plant residue tillage management, vegetative barriers, stormwater diversion, contour farming, precision land forming, row arrangement, and enhancing soil infiltration. A more complete detailing of these practices is still in development. The results of upcoming water quality monitoring will also inform the selection of practices and help to prioritize the specific fields where additional practices may be needed.

3. Water Quality Management Practice Monitoring and Reporting

This section of the report describes the program to monitor and report the implementation of water quality management practices. The program requirements include regular visual inspections, photo documentation, reporting, and record keeping. Annual reporting is used to assess the effectiveness of individual water quality management practices and contributes to the overall success of the SRPWQMP. The fields used for lily bulb cultivation in the Smith River Plain have been given a unique field identification number. Growers will identify which phase of the lily bulb/pasture rotation each field is in. As planned, practices will be keyed to the field identification numbers and shown on a publicly available map.

The annual report will include:

- A checklist documenting the field level practices being implemented and identification of the specific fields where they are implemented.
- A checklist documenting practices being implemented operation-wide. This list will be updated annually to reflect any changes in management.
- Documentation of widths of riparian areas next to streams and any filter strips or other buffers provided between the edge of field and the riparian area.
- Certification that the required visual inspections have been completed.
- Photo documentation of the types of practices being implemented.

While growers conduct their own visual inspections of their practices, Regional Water Board staff will also inspect operations and work with lily bulb growers to ensure practices are implemented and functioning as designed.

4. Adaptive Management Water Quality Monitoring

This section of the Plan outlines a water quality monitoring strategy designed to inform several key objectives:

1) To characterize ambient conditions, particularly for copper, both upstream and downstream of agricultural operations.
2) To assess the effectiveness of management practices.
3) To group pesticides that share similar fate and transport characteristics in order perform more limited analysis on a smaller set of representative analytes. This approach is necessary to minimize the high cost of pesticide analysis and still be able confidently determine the presence or absence of the broad range of chemicals used in lily bulb cultivation.

4) To provide monitoring data for parameters needed to run the Biotic Ligand Model, which provides an assessment of copper toxicity in the ambient environment.

The monitoring effort will build upon previous monitoring efforts to assess water quality in streams that provide aquatic habitat in the Smith River Plain, further assess sources, and attempt to better establish background conditions. The monitoring plan includes twelve sampling locations and describes the purpose, rationale, parameter list, and sampling frequency for each sampling location. The sample results will provide feedback to growers, the Regional Water Board, our partners, and the public, and show where practices are working or where practices may need to be enhanced or adapted to address a particular water quality concern. The monitoring results will improve the understanding of the timing and locations of impacts on water quality from seasonal agricultural activities.

The monitoring will be coordinated with other ongoing monitoring including the Tolowa Dee-ni' Nation's assessment of the risk of bioaccumulation of chemicals in aquatic species in the Smith River estuary. The National Marine Fisheries Service has agreed to sample the Smith River station above Highway 101. All other stations will be sampled by Regional Water Board staff. The Regional Water Board has assumed responsibility for the cost of the water quality monitoring program for 2019-2020 and 2020-2021 water years. The estimated analytical cost for the program is approximately $60,000 per year. The final extent, cost, and timeframe of the adaptive management monitoring plan will depend on available resources, cost of lab analysis, availability of monitoring group members, the frequency of sampling, and the cooperation of private landowners in providing access to the sample sites.

Monitoring results for organic pesticides will be compared against USEPA threshold concentrations for the protection of aquatic life. The target concentration for dissolved copper to protect aquatic life is not as straightforward as those for the other pesticides because metal ions such as dissolved copper can form complexes with a number of inorganic ligands. The total concentration of soluble metal in the water column is the sum of the free metal ion and of the metal contained in the complexes. A large fraction of copper in natural water exists in these complexed and biologically unavailable forms. Dissolved and free metal ion concentrations that are more relevant to producing a toxic effect may be lowered by reaction with ligands and particulate matter in the receiving water. Natural waters with high concentrations of organic matter and particles will reduce the concentration of dissolved and bioavailable metal being released from bound forms.

The complexities of copper speciation in the water column complicates the development of adaptive management thresholds protective of aquatic life. In order to account for the variability of copper toxicity in the natural environment, the USEPA recommends using an empirical model to determine copper criteria on a site-specific basis. The model is called the Biotic Ligand Model and uses a set of ten variables to account for the effect of ligand complexation and competition with other ions for binding sites on the organic

ligand located on the gill surface of fish. A “ligand” is an ion or molecule that interacts with a metal, such as copper, to form a larger complex. A “biotic ligand” is a ligand that is part of an organism, such as a receptor site on the gill of a fish. In order to use the Biotic Ligand Model to develop site specific adaptive management endpoints, it is necessary to establish a range of typical values for the parameters that serve as the model inputs. These parameters will be collected as part of the Regional Water Board’s adaptive management water quality monitoring program with the goal of establishing a site-specific endpoint that is protective of aquatic life in the Smith River Plain. The target toxicity endpoint will be updated as more data is collected through monitoring to establish the water quality factors affecting the bioavailability of copper. In the meantime, a simplified relationship between water hardness and copper will be used to adaptively manage the SRPWQMP.

5. Stakeholder Process and Program Implementation

This section will describe the roles and responsibilities of the SRPWQMP development team members in implementing the Plan. It will also outline opportunities for stakeholder involvement.