

Water Temperature Monitoring  
Of The  
Klamath River Mainstem

Progress Report Number Two

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## **PROGRESS REPORT #2**

PROJECT TITLE: Water Temperature Monitoring of  
the Klamath River Mainstem

REPORTING PERIOD: January 1, 1993 through December 31, 1993

COOPERATIVE AGREEMENT: 14 - 43 - 0001 - 92663

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WATER TEMPERATURE MONITORING  
OF THE KLAMATH RIVER MAINSTEM

**PROGRESS REPORT #2**

This is the second progress report submitted to the U.S. Fish and Wildlife Service (USFWS) concerning the activities conducted under the terms of Cooperative Agreement Number 14-48-0001-92663. This progress report, including the narrative portion, invoice, and data summaries are for the period of January 1, 1993 through December 31, 1993. This progress report describes the activities that have been initiated and/or completed during this reporting period, for the Water Temperature Monitoring of the Klamath River Mainstem Project.

As was previously described in the first progress report, the water temperature monitoring instruments were purchased and prepared for their anticipated deployment in the Spring of 1993. However, the site specific locations for placement of the water temperature monitoring devices could not be positively identified until such time as water flows in the Klamath River had dropped to a level comparable to the average flows experienced during the summer months. Due to a series of late spring storms, the Klamath River remained high until June 1993. Once the site specific monitoring locations were positively identified, personnel from the Tribal Department of Natural Resources (DNR) along with an underwater team from the Klamath National Forest were scheduled to install (drill and glue) permanent anchors for the monitoring instruments at each of the deployment sites. Following the installation of these permanent anchors at each of the deployment sites, the temperature monitoring instruments were then programmed and deployed in July 1993. Each water temperature monitoring instrument gauge was deployed in a protective metal cage which is suspended approximately one foot above the Klamath River bottom.

While in the preparation phase of this project, Tribal DNR personnel made numerous contacts with various entities, agencies and individuals throughout the Klamath Basin in an attempt to generate support and cooperation for the project. As a result of these initial contacts, Pacific Power and Light Company (PP&L) along with the California Department of Fish and Game (CDFG) offered to share water temperature data from Ryan temperature gauges located at two of this project's originally proposed monitoring locations (below Link River Dam and below Iron Gate Dam). Following more detailed discussion on this matter, PP&L also agreed to retrieve the data from below Keno Dam and from two additional monitoring stations which are located below Boyle and Copco Dams.

At the same time, both the Salmon River and Oak Knoll Ranger Districts offered to the tribe the use of one Ryan water temperature gauge each, for deployment below the Scott and Shasta Rivers.

In an effort to efficiently utilize the services of the Klamath National Forest underwater drilling team and to take advantage of all available and offered water temperature monitoring equipment, four additional monitoring stations were established above and below the Shasta River and one below the Scott and Salmon rivers. As a result of these cooperative efforts, the scope of this years water temperature monitoring project was expanded to include six new or additional monitoring stations at no additional cost. The increased number of data collection sites and the opportunity to coordinate this water temperature monitoring project with other agencies and entities in the basin added an unexpected work load on project staff and resulted in a delay of the submission of this report until such time as the data could be retrieved and verified for consistency. Currently, the California Department of Fish and Game is in the process of providing us with updated water temperature data retrieved from the monitoring station located directly below Iron Gate Dam.

From July through November of 1993, water temperature data was collected below Link River, Keno, Boyle, Copco and Iron Gate Dams in the upper Klamath River Basin. Water temperature data was also collected above and below the Shasta, Scott and Salmon Rivers, along with sites above the Trinity River and at the mouth of the Klamath River just upstream from its confluence with the Pacific Ocean.

Two out of the twelve water temperature monitoring devices, which were deployed in 1993, were tampered with prior to data retrieval. The temperature recording devices located at the monitoring stations above the Shasta and Trinity rivers were removed from their underwater locations and subsequently abandoned near the surface of the River. As a result of this tampering, the water temperature data generated by these recording devices could not be regarded as reliable for the purpose of this report. The first tampering incident may be attributed to the curiosity of a local gold miner who had moved into the immediate area and set-up a dredge mining operation just prior to the tampering incident. It is also believed that the person(s) responsible must certainly have utilized underwater diving equipment, (due to the nature of the tampering) and upon removing the device from its anchor and bringing it to the surface realized what it was and abandoned it at the site. The nature of the second tampering incident was attributed to the heavy recreational use of the immediate area by swimmers and fishermen alike.

To avoid these problems in the future, metal signs will be attached on the outside of the protective cages indicating the nature of the instrument enclosed. This approach should prevent future problems above the Shasta River monitoring station. However, to avoid additional problems at the monitoring station located above the Trinity River, a new site was selected and the permanent fixed anchors have been installed making it ready for deployment in the spring of 1994.

In the project plan we had originally prescribed year around deployment of the seven water temperature monitoring instruments purchased for this project. However, based on our observations to date, we believe that some of the monitoring station locations do not provide adequate protection for the deployed temperature recording device during high winter flow events. Thus, to avoid potential loss or damage of these expensive water temperature monitoring instruments, we have decided to deploy and monitor only the Link River site, Iron Gate Dam, above the Scott River, above the Salmon River and at the mouth of the Klamath River throughout the winter months. In addition to this, and due to the often extremely dangerous task of accessing the temperature monitoring instruments in the mainstem river below Iron Gate Dam, we have programmed the instruments to record data at two hour intervals so that the computerized data memory will be able to survive the winter without being retrieved and deploying another device in its place. Data retrieval and downloading of the over winter deployed instruments will take place sometime in the spring of 1994 (as flow conditions allow), when redeployment of the additional temperature monitoring devices is planned.

### **Recommended Changes in the Statement of Work**

The first year of this water temperature monitoring project has proven to be very successful in establishing permanent water temperature monitoring deployment sites and in developing a cooperative inter-agency strategy for data collection and retrieval throughout the Klamath River Basin. This years pilot efforts have created many new opportunities for data collection coordination with other agencies and entities in the Klamath River Basin as well as bringing about the standardization of data collection methodologies which will lead to improvements in data consistency in the upcoming season as well as for many years to come.

In addition to the seven monitoring locations originally approved and funded for this project, six additional data collection sites have been added at no extra cost. In order to retrieve the temperature data from all 12 monitoring stations on a continuous basis, more than the three temperature recording instruments currently being provided by the Karuk Tribe are needed in order to facilitate the simultaneous retrieval and deployment of the temperature recording instruments.

The seven temperature monitoring instruments which were purchased for this project, are rotated in and out of the twelve stations as needed and are not solely or exclusively used in the seven originally proposed monitoring stations. Therefore, the Project Manager / Principal Investigator for this water temperature monitoring project is presently recommending that Task 2 be amended in order to clarify that the seven water temperature monitoring devices purchased for this project will also be used in other alternative sites and locations throughout the project area as needed or required.

**Original Language:**

Task 2 - Purchase seven Ryan TempMentor water temperature gauges for placement in monitoring stations 1-7.

**Proposed Additions / ~~Proposed Deletions~~:**

Task 2 - Purchase seven Ryan TempMentor water temperature gauges for placement in monitoring stations 1-7 or in other designated monitoring stations, as deemed necessary and appropriate.

It is not feasible to retrieve water temperature data from recording devices that are deployed in the mainstem Klamath River during the winter months due to high water flows. In order to improve water temperature data transfer between cooperating entities and still produce progress reports in a timely manner, the Principal Investigator would further recommend that Task 3 and Task 4 be amended, as described below, to accommodate for these special circumstances.

Original Language:

Task 3 - Collect and continue the water temperature measurements from all seven monitoring stations on a quarterly basis.

**Proposed Additions / ~~Proposed Deletions~~:**

Task 3 - Collect and continue the water temperature measurements from all seven monitoring stations ~~on a quarterly basis.~~ from spring to winter. Collect and continue the winter water temperature monitoring from selected sites until the following spring.

## **Original Language:**

Task 4 - Publish the continuous water temperature measurement results on a four-month schedule, in order to document basin-wide water temperature conditions and alert fishery managers of potential fish survival problems.

## **Proposed Additions / ~~Proposed Deletions~~:**

Task 4 - Publish the continuous water temperature measurement results on a ~~four~~ **six-month** schedule, in order to document basin-wide water temperature conditions and alert fishery managers of potential fish survival problems.

These proposed changes seem reasonable given the additional water temperature monitoring stations which have been included for analysis along with the recognized complexity and difficulty of retrieving water temperature data during the winter months. The opportunity to coordinate the collection of water temperature data with Pacific Power and Light, California Department of Fish and Game and the U.S. Forest Service this past year has demonstrated the potential for data collection to continue, following the completion of the initial two year study, with a relatively minor annual investment or commitment of restoration dollars.

## **Planned Activities**

During the months ahead, the Principal Investigator for this project will evaluate the water temperature data collected in 1993 and begin to isolate any changes in mainstem water temperatures that may exist by stream reach (**Program Objective B**). We have obtained a spreadsheet program that converts Ryan TempMentor data into Lotus 123 and U.S. Geological Survey (USGS) water temperature reporting format, from the staff hydrologist at the Happy Camp (USFS) Ranger District. The Principal Investigator will also be evaluating the potential of displaying the water temperature data in the USGS water temperature reporting format along with accessing USGS stream flow data. USGS flow data may be useful in determining if water temperatures are affected by stream flows from Lost River, Keno and Iron Gate Dams (**Program Objective C**). Other information such as pH, dissolved oxygen and other possible water quality related data will be evaluated for potential incorporation into the spring 1994 report (**Program Objective D**).