**MENDOCINO COUNTY WATER AGENCY**
COURTHOUSE
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May 22,1991

Ross Swenerton
State Water Resources Control Board
Division of Water Rights
P.O. Box 2000
Sacramento, CA 95812-2000

Dear Mr. Swenerton;

I would like to express my concerns regarding the Navarro River. My analysis of the USGS Navarro River gaging station record from 1951 to 1988 indicates that there has been a statistically significant decline in the annual minimum flows (see Figure 1).

The USGS gage is located between Philo, CA and Navarro, CA at an elevation of 4.79 feet above sea level. The drainage area above the gage is 303 square miles. A gage was also operated on a tributary to the Navarro, Rancheria Creek, near Booneville from 1959 to 1968. Unfortunately, the gage on the tributary was not operated long enough to provide statistically significant information.

I applied two simple models to the minimum annual flow series for the Navarro River gage (daily average flow). The first model used annual runoff to predict the minimum annual streamflow. For the purposes of this model, runoff is defined to be the total annual flow in acre-feet divided by the drainage area in acres and is thus measured in feet.

Runoff is used in this model as an index to the change in hydrologic conditions in the watershed. Essentially, runoff is an estimate of the amount of precipitation that was turned into streamflow during the water year (October 1 - September 30). It can be expected however that years with nearly equal total precipitation will have markedly different values for runoff due to differences in antecedent conditions, storm intensity and storm timing.

The first model explained 41.62% of the variance in the minimum annual flow series. The t-value, that is the ratio of the coefficient to its standard error, was 5.07 (absolute values

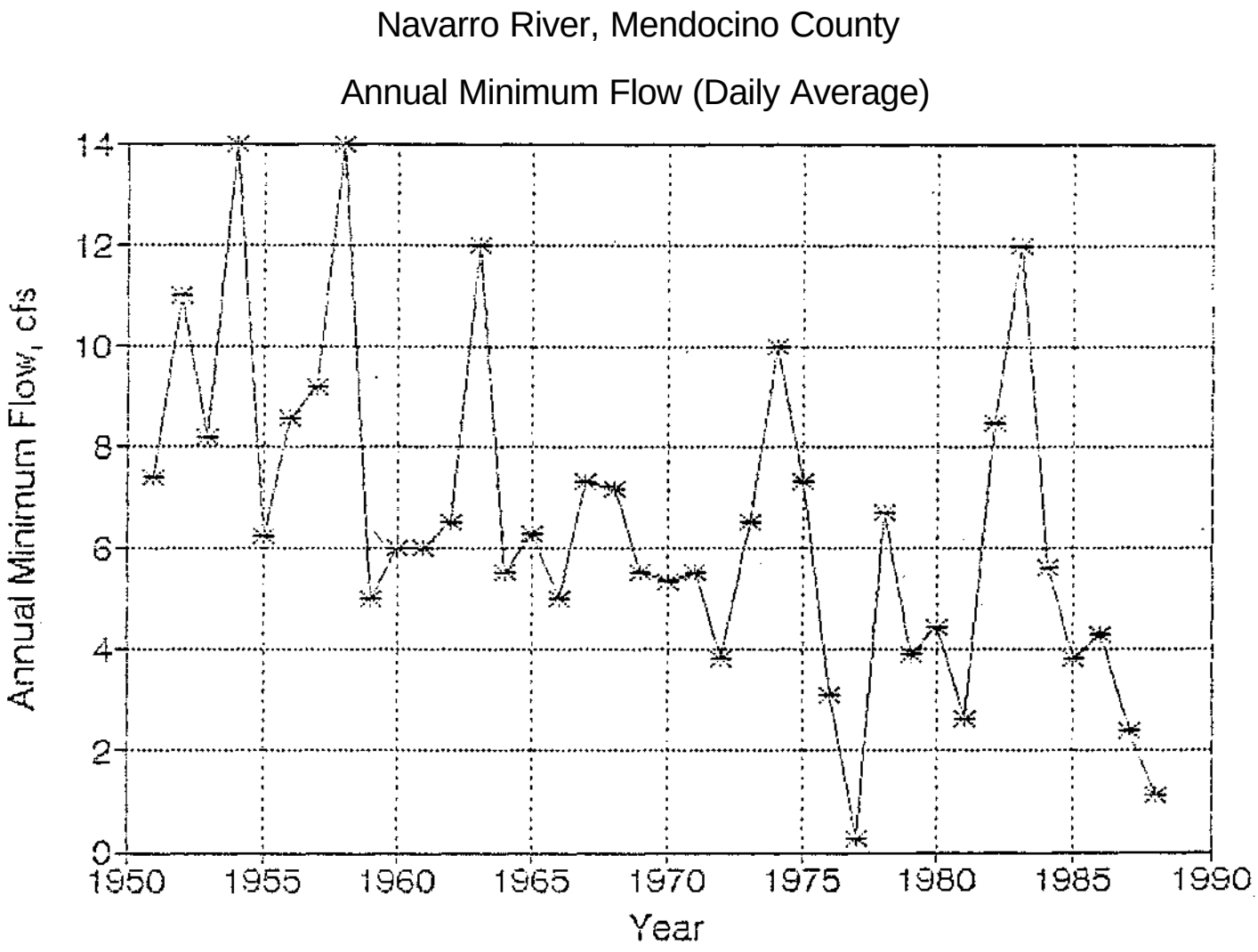


Figure 1. Minimum annual flow (daily average) in the Navarro River at the USGS gage near Navarro, CA. Note the progressive decline in the minimum annual flow with time.

| WATER Year | Annual RUNOFF feet | MIN Flow Cfs |
|---|---|---|
| 1951 | 2.31 | 7.40 |
| 1952 | 2.30 | 11.00 |
| 1953 | 2.25 | 8.20 |
| 1954 | 1.94 | 14.00 |
| 1955 | 0.94 | 6.20 |
| 1956 | 3.34 | 8.60 |
| 1957 | 1.20 | 9.20 |
| 1958 | 3.57 | 14.00 |
| 1959 | 1.19 | 5.00 |
| 1960 | 1.24 | 6.00 |
| 1961 | 1.33 | 6.00 |
| 1962 | 1.41 | 6.50 |
| 1963 | 1.99 | 12.00 |
| 1964 | 0.78 | 5.50 |
| 1965 | 2.98 | 6.30 |
| 1966 | 1.42 | 5.00 |
| 1967 | 2.24 | 7.30 |
| 1968 | 1.16 | 7.20 |
| 1969 | 3.13 | 5.50 |
| 1970 | 2.66 | 5.30 |
| 1971 | 1.90 | 5.50 |
| 1972 | 0.70 | 3.80 |
| 1973 | 2.30 | 6.50 |
| 1974 | 4.03 | 10.00 |
| 1975 | 2.25 | 7.30 |
| 1976 | 0.45 | 3.10 |
| 1977 | 0.09 | 0.23 |
| 1978 | 3.00 | 6.70 |
| 1979 | 1.07 | 3.90 |
| 1980 | 2.20 | 4.40 |
| 1981 | 0.90 | 2.60 |
| 1982 | 3.70 | 8.50 |
| 1983 | 4.89 | 12.00 |
| 1984 | 2.29 | 5.60 |
| 1985 | 0.99 | 3.30 |
| 1986 | 2.54 | 4.30 |
| 1987 | 0.78 | 2.40 |
| 1988 | 1.00 | 1.10 |

MIN vs Runoff
Regression Output:

| | |
|---|---|
| Constant | 2.801312 |
| Std Err of Y Est | 2.481358 |
| R Squared | 0.416247 |
| No. of Observations | 38 |
| Degrees of Freedom | 36 |
| | Runoff |
| X Coefficient(s) | 1.887012 |
| Std Err of Coef. | 0.372445 |
| t | 5.066548 |

MIN vs Runoff & Year
Regression Output:

| | | |
|---|---|---|
| Constant | 293.4212 | |
| Std Err of Y Est | 1.889233 | |
| R Squared | 0.677935 | |
| No. of Observations | 38 | |
| Degrees of Freedom | 35 | |
| | Runoff | Year |
| X Coefficient | 1.845896 | -0.14752 |
| Std. Err of coef. | 0.280673 | 0.027663 |
| t | 6.576678 | -5.3328 |

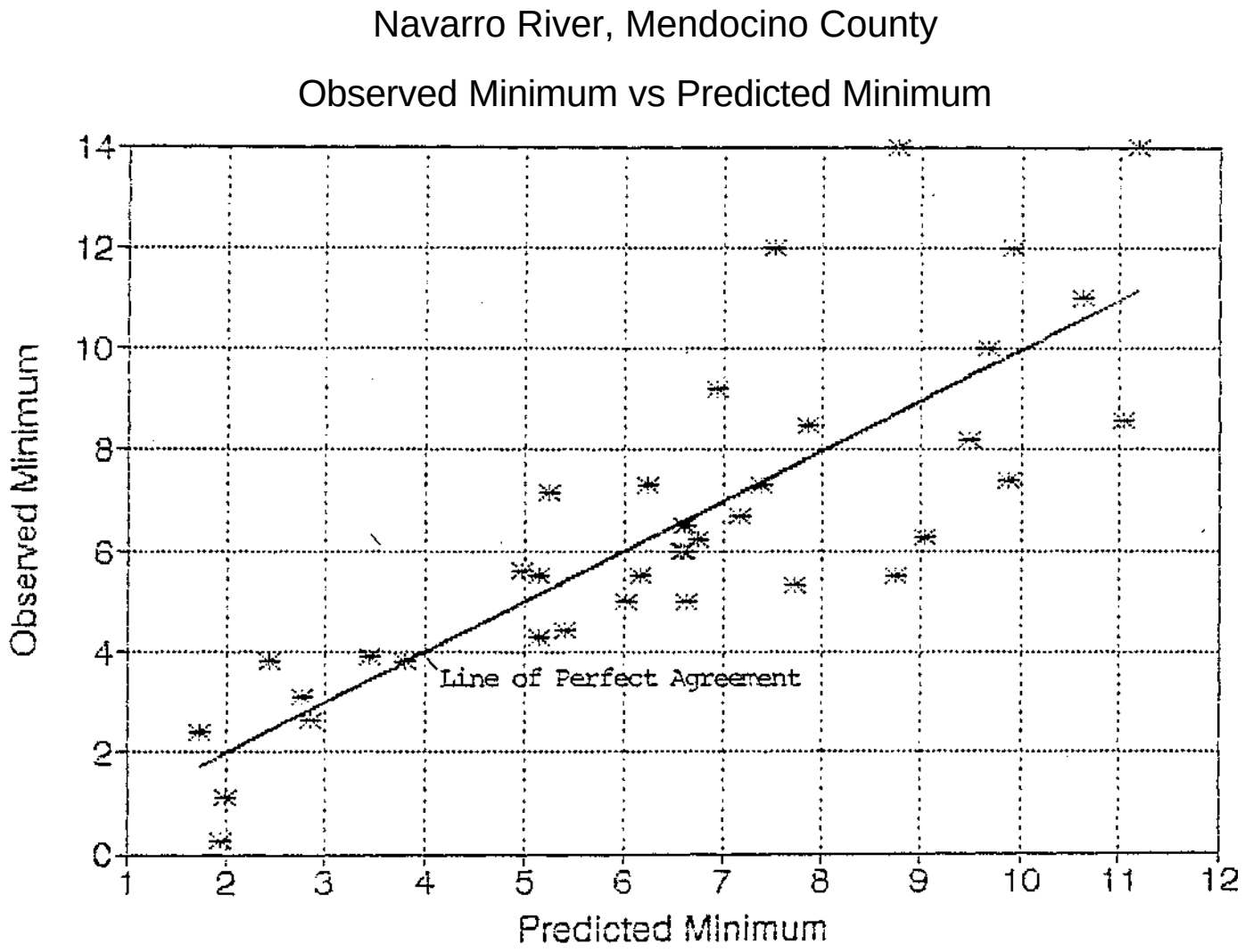


Figure 2. Observed minimum annual flow (daily average) versus predicted minimum annual flow from the model;

Minimum = 1.846 (Annual Runoff) - 0.147 (Year) + 293.42

R-sq. = 0.678, Std. Err. = 1.869

# Fort Bragg Rainfall

Precipitation Years 1911 to 1990

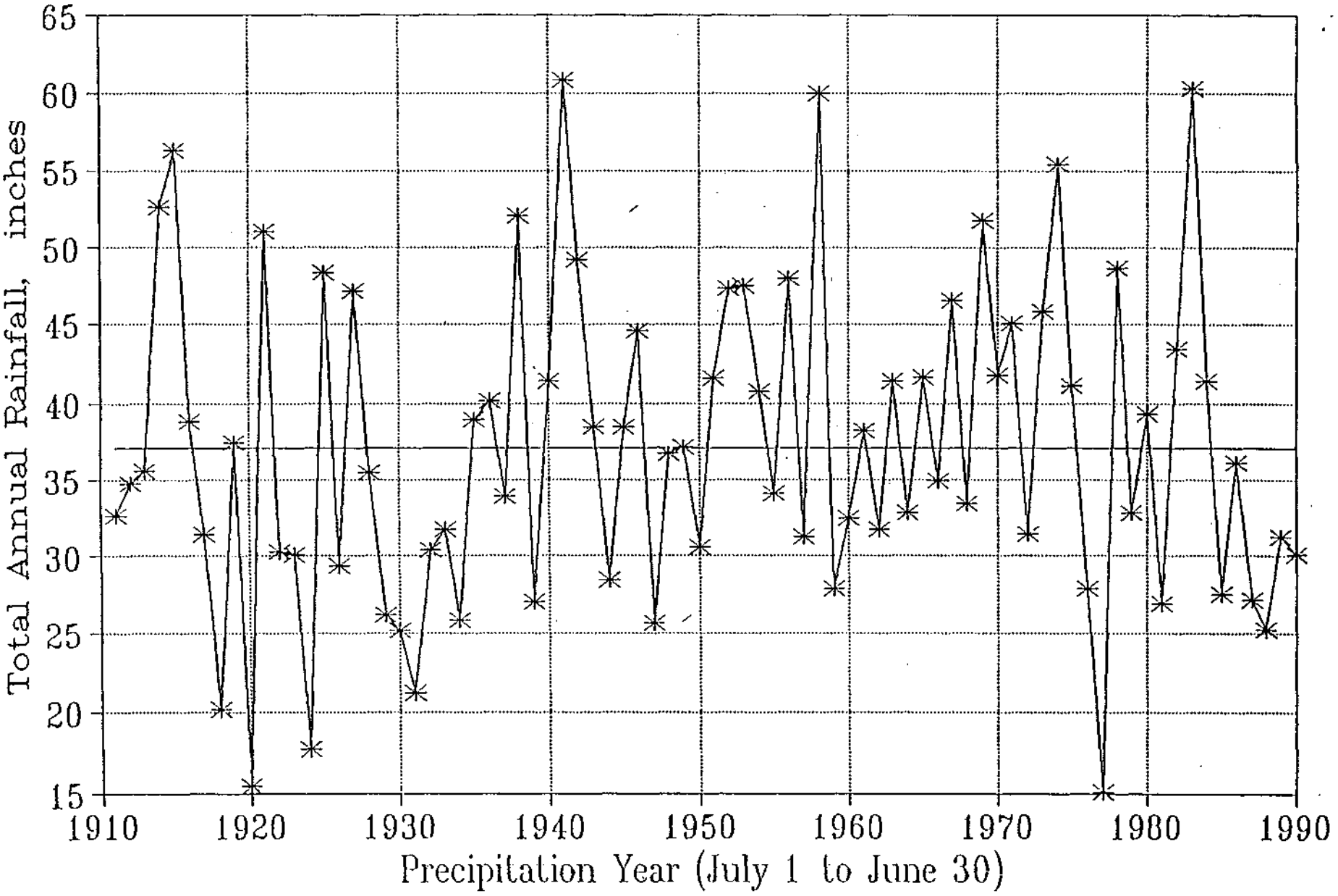


Figure 3. Fort Bragg precipitation, 1911 to 1990. Note the absence of any clearly defined long term trend.

ADDENDUM March 11, 1991

# EXPLANATION OF SEASONS OF UNAVAILABILITY ON FULLY APPROPRIATED STREAM SYSTEMS

Decision No.: 1281 County: Mendocino
Source: Anderson Creek
Tributary: Navarro River
Remarks: The decision concluded based on stream flow measurements unappropriated water only existed until about July 31 of an average year (Decision 1258, Page 3).

Decision No.: 1516 County: Mendocino
Source: Robinson Creek
Tributary: Russian River
Remarks: The decision concluded unappropriated water was available in the amounts requested, however the season of diversion for irrigation should be limited to April 1 through June 30 in the amount of 0.13 cfs and frost protection from March 15 to May 15 in the requested amount of 1.56 cfs (Decision 1516, Page 2). In addition, the applicant had an alternate water supply. The decision concluded there was no unappropriated water available from July 1 through October 31 (Decision 1516, Page 3).

Change the ending season of unavailability to October 31 on the declaration.

Decision No.: 1545 County: Mendocino
Source: Feliz Creek
Tributary: Russian River
Remarks: The decision concluded from the available flow records there was no unappropriated water available from August 1 through October 31 in most years.

# NAVARRO RIVER NEAR NAVARRO, CALIF.
## Max, Mean, Min Flows (cfs) WY1951-1991