D. W. KELLEY & Associates aquatic biology

October 31, 1984

MEMO: Don W. Kelley

TO: Richard Rogers

SUBJECT: Walker Creek

Dear Dick;

At noon of October 29, Paul Bratovich, Bill Cox of the Department of Fish and Game, and I, met Phil Ritter, who is a consultant to the San Francisco Foundation, on Walker Creek. We looked at it in several places through the old Synanon Reach, which is now owned by the San Francisco Foundation. Our purpose was to explain our concerns to Phil and to answer his questions about the stream.

I had not visited Walker Creek since just after the very destructive flood of 1982, and had never walked along any of it since the MMWD began maintaining a permanent summer flow after Soulajule Reservoir was built. Our visit on Monday was both encouraging and frustrating.

First of all, the streamflow which was about 5 cfs as required, looks superb. If we could solve the problems of too much sediment from bank erosion and the restoration of more shade along the stream, I am sure healthy salmon and steelhead runs could be restored.

I do not believe this will happen until cattle are excluded from a large percentage of the streambed. The permanent flow has encouraged bands of riparian willow and alder, but in many places these plants have been browsed so heavily by the cattle that they are less than a foot tall and will never provide shade. The fairly extensive planting by the District, using Javis-Grunsky funds, has been heavily browsed, and most of the trunks of alder and willow have almost no limbs left on them.

Willows and alders growing along the edge of the stream are important for three reasons. First of all, they provide shade. Several years ago we estimated that, at 5 cfs, the stream needs to be at least half shaded to keep the summer water temperatures low enough for rearing juvenile salmon and steelhead. Short reaches without shade are OK, but long, unshaded reaches simply allow the water temperatures to get too high.

The roots of the riparian vegetation very effectively prevent the banks from caving in. This bank cavein is the result of the banks being saturated and falling in of their own weight, combined with current velocities during the winter carrying away the caved in portion. The banks of Walker Creek where there is well developed and healthy riparian vegetation are very stable, even though they arc often very steep.

The riparian vegetation supports insect populations that provide much food for the juvenile fish. More food means that the stream can support

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many more fish and they will grow larger and survive better once they are in the ocean.

If our promise to restore Walker Creek as a viable salmon and steelhead stream In Marin County is to be fulfilled, it is essential that fencing to exclude cattle from all but watering and crossing points be started. The obvious place to start is along the San Francisco Foundation's own property. Fencing can be done so that the cattle can cross and have plenty of access for drinking. The program need not be at all incompatible with the continuation of grazing.

A large amount of the sand and soil in the stream comes from upstream on the Gabinini Ranch. Fencing to limit cattle to designated watering places is also needed there. The lower end of Salmon Creek is particularly bad.

Phil Ritter asked whether it would be useful to begin the fencing project on the San Francisco Foundation Property without any promise of doing the same thing upstream. My response was that it must be done to set an example for others and for the County. There is no need for more investigation or for the development of a long-range watershed management plan. If we wait for that, much of the riparian vegetation that has started and was planted will be destroyed.

Don W. Kelley

D. W. KELLEY & Associates aquatic biology

October 12, 1984

MEMO TO: Don W. Kelley

FROM: Paul Bratovich

SUBJECT: Walker Creek Survey

On October 3, 1984, Bill Cox (CF&G), Eric McGuire (MMWD), and Paul Bratovich (D. W. Kelley & Associates), surveyed Walker Creek and lower Arroyo Sausal from Soulajule Reservoir downstream to within about 1.5 miles of the confluence of Chileno Creek. The purpose of the survey was to qualitatively assess instream flow, instream habitat, riparian vegetation, and streambed, streambank, and overall watershed conditions.

In general, streamflow (4.6 cfs) at the time of observation provided fairly good depths, velocities, and riffle-pool sequences for salmonid habitat. Maintenance of summer flows has encouraged volunteer propagation of riparian vegetation. Such vegetation is small, not yet providing cover or shade. It has been retarded and in places destroyed by cattle grazing.

Parts of Walker Creek are partially or densely shaded as a result of overhanging riparian vegetation. Woody debris, protruding root wads, and submerged limbs provide a fair amount of instream cover in places.

Streambed conditions in Walker Creek are unfavorable for salmonids. The streambed is largely comprised of sand and other fine materials. Cobble and boulders which should provide important habitat for salmonid rearing in many of the pools and deeper glides are almost entirely covered with sand and other fine materials. Cobble and boulders in many of the riffles, which should provide important fish food-producing habitat and juvenile rearing areas, are highly embedded. The present condition of the streambed is the major factor adversely affecting aquatic habitat in Walker Creek.

Sediment delivery into Walker Creek stems from at least two major sources which are obvious to casual observation: streambanks and grazing lands. Streambank instability, erosion, and failure is evident along the creek. Streambanks are also collapsed and downgraded where cattle utilize major access paths into the creek. In several places, accelerated runoff has created slope failure, gullying, and downcutting. To a lesser extent, off-road vehicle use has also disrupted the watershed. Recreational use of motorcycles and ATVs on the Gabanini property has exposed and loosened sand and soil, which could be carried into the creek during periods of storm runoff.

Flow augmentation in Walker Creek has provided much more suitable instream flows for salmonids than previously existed. That is an important first step in restoring the coho salmon and steelhead trout populations in the creek. But that is not enough. Until erosion control, riparian plant restoration, and effective watershed management procedures are implemented, flow augmentation will probably be of limited benefit to the fishery resources of Walker Creek.

Site-specific comments and accompanying map (Figure 1) follow.

1. Water stored in Soulajule Reservoir was not turbid. Water transparency near the dam was estimated to be 6-8 feet.

2. Discharge water from Soulajule Reservoir into lower Arroyo Sausal was not: turbid. The creek at this location exuded a strong sulfurous odor, characteristic of hydrogen sulfide. Eric McGuire said that he believed discharge waters were being drawn from one of the lower ports at the time, and that hydrogen sulfide concentrations were known to occur within the hypolimnion of the reservoir. Dense clumps of filamentous green algae and patches of duckweed were observed in the creek. At 1145 hrs, air and water temperatures were 62.5° F and 62.0° F, respectively. Bill Cox measured dissolved oxygen concentration of the water at 5.5 ppm. Streambed surface substrate was comprised of much 16-32 mm angular cobble, not highly embedded.

3. Fairly good cover and shade provided by overhanging willow and alder trees (Figure 2). Pastures and slopes beyond the riparian zone are exposed and virtually denuded from overgrazing by cattle. In this area, minor slope failures, slumps and downcutting are evident, which are indicative of accelerated runoff. Streambed surface substrate is highly embedded and contains a large amount of sand and soil.

4. Very little shade or riparian cover. Streambank is trodden and downgraded in places from cattle access into the creek. Streambank failures are evident. Streambed surface substrate is comprised of much sand and soil. Rocks are highly embedded.

5. Dense overhanging riparian vegetation provides good cover and shade. Several series of riffle-pool sequences, combined with suitable water depths and velocities, appear to provide good salmonid habitat. The substrate, however, is comprised of fairly small and highly embedded materials. The streambed surface in the pools and slower glides is almost entirely covered by silt and sand.

6. Dense overhanging riparian vegetation provides good cover and shade (Figure 3). Fallen trees, submerged limbs, and protruding root wads also provide good instream cover. Attractive riffle-pool sequences and suitable instream flow provide good salmonid habitat. Streambed

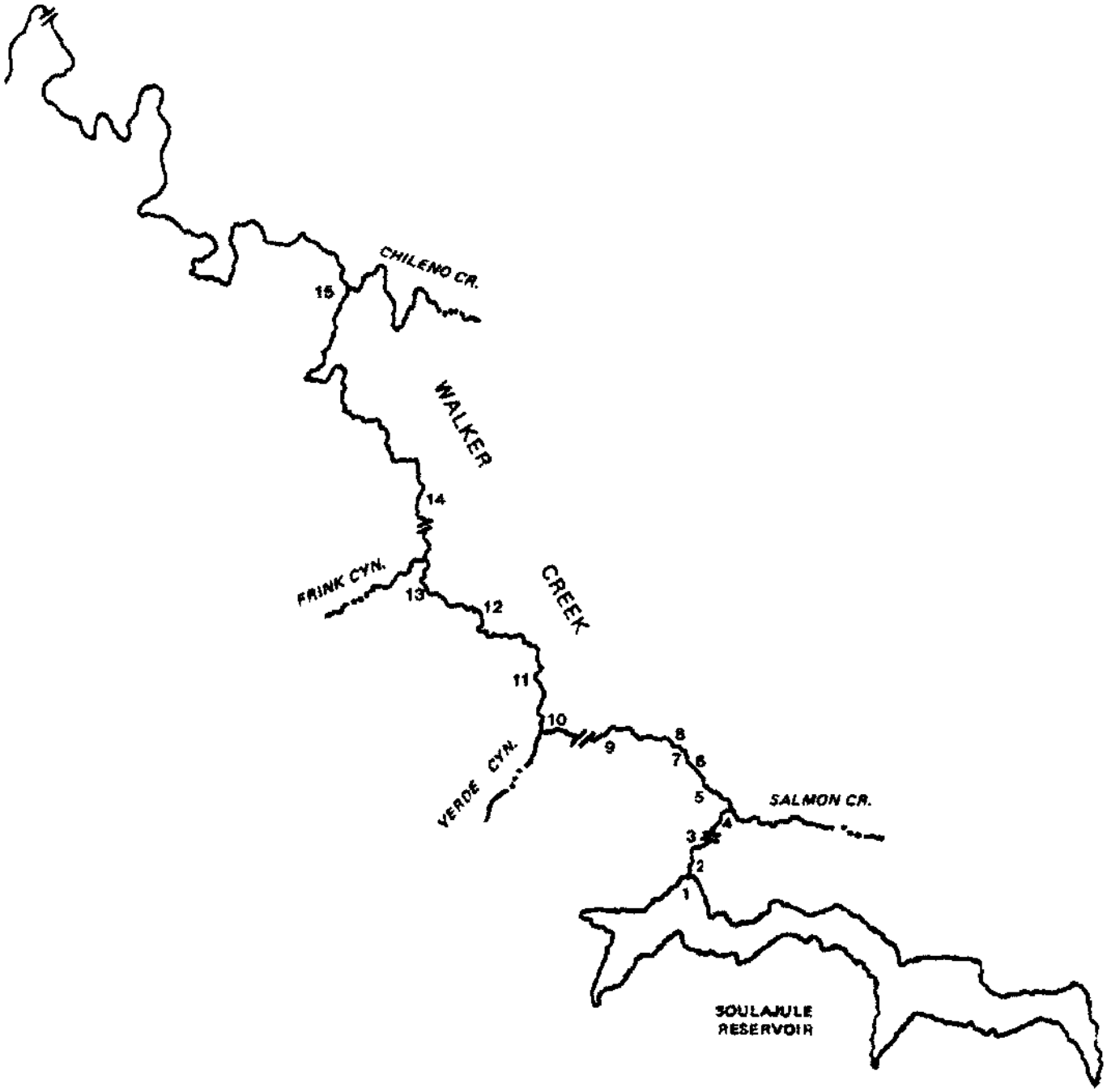

Figure 1. Soulajule Reservoir and Walker Creek, Marin County, California. Numbers refer to site-specific observations and comments included in text.

surface substrate contains some 16-32 mm angular cobble, roughly 40-50 percent embedded in sand. This area also contains several exposed sand and gravel bars with considerable amounts of sediment in storage. Some volunteer riparian vegetation has occurred along the wetted perimeter of the gravel bars.

7. Very steep streambanks on the south side of the creek where downcutting has occurred up to an estimated 30-40 feet (Figure 4). Such streambanks arc largely comprised of sand and other fine materials, unstable and prone to failure. It appears as if moderate winter streamflows eroded the base of these streambanks, and silt and sand sloughed off into the creek. Streambed surface at these locations and downstream is covered with sand. Slopes above streambanks are exposed and virtually denuded, from overgrazing by cattle and the recreational use of off-road vehicles.

8. Very steep streambanks on the south side of the creek where downcutting has occurred up to an estimated 30-40 feet (Figure 5). Streambanks, although steep, are densely vegetated with grasses, shrubs, willow and alder trees, and appear to be stable. Slopes above streambanks are wooded.

9. Virtually no cover or shade provided by riparian vegetation (Figure 6). Streambanks are mainly comprised of sand and other fine materials, unstable and prone to failure. The streambanks are, in places, trodden and downgraded from cattle access into the creek. Surface substrate is comprised of sand and other fine materials, and is highly embedded. The north side of the creek contains extensive sand and gravel bars with large amounts of sediment in storage. Some volunteer riparian vegetation has occurred along the wetted perimeter of the sand and gravel bars, but presently is too small to provide cover or shade.

10. See comment 9. Also, it is evident that cattle have heavily grazed the willow cuttings that were planted by the Marin Conservation Corps in the winter of 1982/83. These willow cuttings are bare, exhibit no new growth, and remain approximately 1.5 feet tall. Farther up on the streambank, where cattle could not reach them, the cuttings have developed leaves and grown to 3-4 feet in height.

11. Very little cover or shade provided by riparian vegetation. Streambank degradation has occurred from cattle access into the creek. Streambed surface substrate is almost entirely comprised of sand and other fine materials. Pools and deeper glides are largely loaded with sand and fines.

12. See comment 11. Also, slopes and pastures beyond the riparian zone are exposed and virtually denuded from overgrazing by cattle. Downcutting and gullying are evident, indicative of accelerated runoff and increased suspended sediment loading of the creek.

13. Partial shade and cover provided by overhanging riparian vegetation. Some volunteer riparian vegetation has occurred along the wetted perimeter of the streambanks and the sand and gravel bars. Alders planted along the streambank have thrived and grown to 30-40 feet in height. The creek water remains quite clear, although the streambed surface is covered with sand and fines.

14. Fairly good cover and shade provided by overhanging riparian vegetation. Fallen trees and submerged limbs also provide good instream cover. There is an apparent gradient change here, and the stream assumes a more meandering nature. Several riffle-pool sequences and suitable instream flow appear to provide relatively good salmonid habitat. The streambed surface, however, is almost entirely covered with sand and other fine materials. Also, streambank failures are evident in places.

15. Instream observations were not conducted below site 14. From a distance, however, the creek both upstream and downstream of the confluence of Chileno Creek appeared to be densely overgrown with riparian vegetation.