

April 24, 1994

TO: Water Commission

FROM: R. A. Kinzie (HAK) (H)

RE: Restoration of Flow in Windward O'ahu Streams

The closing of large scale sugar agriculture on O'ahu will bring about many changes in the economy, demographics and natural resource utilization patterns on the island. It is important that we view these changes not only as potential disruptions of business as usual, but also as opportunities to change how we have been operating in the past and to bring about positive adjustments in the way we prepare for the future.

One of the greatest opportunities made possible by this change is the potential to restore the natural condition of several Windward O'ahu streams. Since the last century, the basic premise of stream use throughout the State has been extractive - taking water from the watershed of origin to some other region. With the closing of O'ahu Sugar the opportunity to reverse this century long trend is becoming a possibility. For the first time in the history of water use in the State, the option to re-water instead of de-water streams is a real alternative.

If we take advantage of this opportunity what will the consequences be? The first answer is that we simply cannot predict with any degree of precision. With our very long history of extractive use we have become experts in identifying the negative effects of de-waterment on natural stream systems but at no time in the past have we have the chance to follow events in the restoration of a natural watershed with the return of water to the normal channel. However we can make some first approximations of potential positive and negative impacts. Some of these belong to the realm of agriculture, fisheries, economics and demographics, areas with which I have little expertise, so I will only list them. In areas of stream and nearshore ecology with which I have some familiarity I can go into a bit more detail.

1) Wetland Agriculture: The potential for increased taro production is the most obvious, and a very important potential that could immediately benefit from the restoration of flow to Windward O'ahu streams. Besides the impetus to diversified agriculture, the re-establishing of wetland ecosystems is likely to provide ancillary benefits to water fowl and other species that utilize these habitats.

2) Flooding: There could be concern that with flows returned to normal, especially in Waiahole stream where a ten-fold increase in base flow might take place, that flooding following heavy rains could

increase. However under the present situation, the tunnels do not take any significant amount of storm peak discharge, so flood waters are already retained on the windward side. No noticeable increase in flooding is likely under the conditions when the base flows are returned to normal.

3) Maintenance of channel: In channels that have had reduced flows for extended periods, the efficiency of the channel is often degraded because of incursion of riparian vegetation and the inability of the reduced flows to transport potentially damming debris down stream. This accumulation of materials, rooted or deposited in the stream bed, actually increases the potential for flooding in high flow conditions. With a restored flow, riparian vegetation will be kept well back from the channel and most debris will be moved downstream in a natural manner rather than accumulating in upstream reaches.

4) Habitat restoration: Windward streams have probably always had the richest populations of native stream life - o'opu, hihiwai 'opae etc. on O'ahu. While a century of channel modification and de-waterment has taken its toll, several Windward O'ahu streams retain some remnant of their native stream biotas. There is strong evidence that recruitment back to these streams from the marine planktonic larval stages is occurring even today. The State Division of Aquatic Resources has found evidence that the rarest of the Hawaiian o'opu - o'opu alamo'o still can be found in some windward O'ahu streams, even though it had been thought that this species was extirpated on O'ahu.

Not only has de-watering of streams reduced habitat for native species, but many alien freshwater species e.g. "Tilapia" and other cichlids, armored catfish and other released aquarium fishes seem to inhabit stream reaches with sluggish flows. Restoration of a stream to its original flow and temperature regimes might well favor native species and reduce the impact of exotics. If flows are restored, the potential for re-establishment of native populations from the marine larval pool would become a real possibility. At the least, this would be an important opportunity to study the question of whether stream biotas can recover after water is returned to a stream, a question that has State-wide implications. But there is also the potential that Windward O'ahu Streams could recover to the extent that they not only provide the opportunity for people on O'ahu to see how intact Hawaiian streams look, but also they could again support functioning populations of native stream animals that contribute to the larval pool in the sea that replenishes all of the streams in the State.

5) Impacts to the receiving basin: Augmented flows will impact Kane'ohē Bay, the receiving basin, particularly in the northernmost section. Negative impacts could include increased sedimentation and decreased salinity in this semi-enclosed, shallow estuarine area. Because sediment loads are more a result of land use practices than base flow it is unlikely that, after an initial readjustment period, there will be any long term net increase in sediment delivered to

Kane'ohē Bay. To minimize sedimentation effects, it would be advisable to give attention to development and maintenance of streamside vegetation and to insure that appropriate land use practices are encouraged in the drainage basin, particularly in the lower reaches.

There would be a permanent lowering of salinity, particularly in the Bay waters at the stream mouths. However, these sites, and the entire Kane'ohē Bay basin, are in fact estuaries and lower than oceanic salinities are already characteristic of the Bay. Many important fisheries species in the Bay, moi, Samoan crabs, bait fish etc. are primary (mullet, aholehole) or facultative (e.g. papio) users of estuaries. Several of these species are important aquaculture species today and were major fishpond species in the past. An increase in the area of estuarine portions of Kane'ohē Bay has the potential of increasing the fishery for these species. Again, at the minimum this would be an opportunity for study of how these important species might respond to augmentation of their habitat, but there is also the potential for a real increase in yield when the natural estuarine conditions are reestablished.

6) Public Use: Unlike residents of Maui Hawai'i and Kaua'i, O'ahu residents have, for several generations, never had the opportunity to see what a natural Hawaiian stream system flowing from the mountains to the sea could look like. The region that will be affected by the re-watering of Windward O'ahu streams has been designated for extensive park development. The City and County is in the process of acquiring significant portions of bayside property for the development of parks. Additionally, the State is proceeding with the development of a cultural Park at Kahana. With proper coordination and planning the Waiahole and Waikane watersheds and estuarine areas have the potential to be developed into socially and culturally important assets, not only for the farmers and fishermen in the area, but all the people of O'ahu. Stream restoration in Waiahole and Waikane coupled with the State's plans for Kahana Valley present the opportunity to provide a place where, on their own island, the people of O'ahu could have the opportunity to experience in a substantial area, not a tiny sliver of land, how the Island's natural and human activities are based on the continuous and uninterrupted flow of water from the mountains to the sea.

This great potential may not be realized on this Island again, so it is imperative to begin planning now. This restoration project is also conceptually extremely simple - just add water.