Appendix D
Alternatives Analysis

Alternatives Analysis
Regional Board staff conducted a detailed evaluation of the various alternatives to determine how best to implement the ELS Provision of the freshwater ammonia objectives. These alternatives were not just hypothetically considered, rather staff took the analytical steps that would be needed to implement the alternative in order to assess the alternative's feasibility and suitability. A number of options were evaluated.

a) SPWN as a Proxy for ELS Present

This alternative describes the approach recommended by staff to the Board at the April 23, 2002 Board Meeting. It stated that waters with the "SPWN" designation (Spawning, Reproduction, and/or Early Development) are equivalent to ELS present waters. The rationale for this was that water bodies with the beneficial use designation SPWN are defined as those that "support high-quality, aquatic habitats suitable for reproduction and early development of fish." This definition seemed to convey that "ELS" and "SPWN" specified the same set of waters. Early Life Stages of fish were assumed present year-round if the water body had the SPWN designation unless a site-specific study justified a seasonal provision.

U.S. EPA supports the use of beneficial use designations where they are detailed enough to accurately identify ELS present waters. U.S. EPA believes that tailoring the ammonia criteria to different classes of water bodies would be the most efficient means of administering the ammonia criteria ELS-absent provision. State and Tribal programs with refined, biologically based designated use classification systems are best structured for this approach. Refining the designated use to reflect the presence or absence of early life stages may involve an upfront investment of resources but in the long term, U.S. EPA believes it significantly reduces the administrative burden of having to repeatedly revise the standards on a site-specific basis. Refined, biologically based use classification systems enable States and Tribes to efficiently tailor numerous criteria to water bodies with shared characteristics. Refined, biologically based use classification systems also more clearly communicate the intended water quality goals of a water body to the public.

Pros:
This is a simple and clean approach. It would not require any additional fieldwork or research but would benefit from the research already done to determine which water bodies were appropriate for the SPWN designation.

Cons:
Based on further research, staff determined that the SPWN beneficial use designation and the ELS present condition do not describe the exact same subset of waters. Therefore, continuing to use the SPWN designation to protect ELS would require that the Regional Board undertake a detailed region-wide beneficial use survey to re-evaluate and update the SPWN designations to apply to warm- and cold-water habitat, as ELS applies to both temperature regimes. This would potentially "water down" the SPWN designation, which is intended to protect "high quality habitat" and cold-water species, not necessarily characteristic of all ELS present waters.

b) Either SPWN or COLD as a Proxy for ELS Present

This is similar to the alternative recommended by staff to the Board at the April 23, 2002 Board Meeting; however, it adds in a second beneficial use designation as a proxy for the ELS present

condition. Under this alternative it would be assumed that either the SPWN or COLD beneficial use designation was an adequate proxy for the ELS present condition.

Again, U.S. EPA supports the use of beneficial use designations where they are detailed enough to accurately identify ELS present waters.

Pros:
Again, this is a simple and clean approach. It would not require any additional fieldwork or research but would benefit from the research already done to determine which water bodies were appropriate for the SPWN and COLD beneficial use designations.

Cons:
The same drawbacks that apply to using the SPWN designation as a proxy for ELS present would apply here because most waters that have the SPWN beneficial use designation also have the COLD beneficial use designation. Again, the percentage of water bodies in the LA Region where the COLD and SPWN beneficial uses are correlated is 83%.

c) Seasonal ELS for All Water Bodies

This approach would aim to identify the time frames during the year when early life stages are most likely not to be present in numbers that, if chronic toxicity did occur, would affect the long-term success of the fish population. To best determine when the ELS absent provision should be applied, all readily available information regarding the fish species distributions, spawning periods, nursery periods and the duration of early life stages found in the water body would be considered. Expert opinions from fisheries biologists and other scientists would be considered, and where it could be obtained, the consensus opinion from a diverse body of experts would be heavily relied upon.

Pros:
This would be simple to implement once the appropriate time frame was selected.

Cons:
It is hard, if not impossible, to define a general start and end date for Early Life Stages of all species in all water bodies. Fish reproduce at all different times of the year (e.g. winter, summer, year round). It would be an over simplification to select a time of year when there is no reproduction of any fish in all water bodies. A more accurate approach would be to look at which fish are present in each of the water bodies, what the spawning period is for the fish present and apply time frames for the ELS absent or present objectives on a water body-specific basis.

d) Seasonal Approach for Some Water Bodies and ELS Present At All Times For All Other Water Bodies

Under this alternative, Regional Board staff would determine the species currently present, or present during any period since November 1975, and what their reproductive periods are for the water bodies to which Publicly Owned Treatment Works (POTWs) discharge. The rationale for this approach is that at this time POTWs are developing the means to meet water quality objectives for ammonia making it important for the Regional Board to set these objectives as precisely as possible for this subset of water bodies. If winter spawning fish exist in a particular water body, then the ELS absent provision would not be applied. If there were no winter

spawning fish in a particular water body, the ELS absent provision could be applied during that winter period. For the rest of the water bodies, ELS fish would be assumed present at all times.

Pros:
This would focus staff efforts on assessing the water bodies in the region where the ELS absent provision can provide regulatory relief where and when it is environmentally appropriate to apply the ELS absent provision.

Cons:
A detailed analysis of the fish species and their spawning periods would not be conducted for a large number of water bodies, i.e. those to which large POTWs do not discharge. If in the future there is an interest in determining if the ELS absent condition could be applied to one of these water bodies, site-specific analyses would need to be conducted.

It may be difficult to define region-wide ELS present and absent periods for all of those water bodies with winter spawning fish (to which large POTWs discharge). The season would need to be conservatively defined to protect all winter spawning fish, which could be overly protective of some water bodies that may only have spawning during one month of the winter spawning period.

e) ELS Present In All Water Bodies At All Times

This option would assume that ELS are present in all water bodies at all times. To invoke the ELS absent condition, adequate data would need to be collected to justify such a change to the implementation provisions for the 30-day average ammonia objective. Invoking the ELS absent condition for a specific water body would require that the request be reviewed and approved through the Basin Plan Amendment process. To best determine when the ELS absent condition should be allowed, data regarding fish species distributions, spawning periods, nursery periods and the duration of sensitive life stages found in the water body would need to be presented. Expert opinions from fisheries biologists and other scientists must be considered, and where it can be obtained, the consensus opinion from a diverse body of experts should be heavily relied upon. The determination of the time frame during the year when early life stages are most likely not to be present in numbers that, if chronic toxicity did occur, would affect the long-term success of the fish populations, would need to include a record of information adequate to withstand public scrutiny.

Pros:
This would be very protective because the more stringent standard (ELS present condition) would be applied to all water bodies at all times (except where a water body-specific exemption was made).

Cons:
This would not give flexibility to dischargers where and when it may be environmentally appropriate, unless the dischargers are prepared to pursue a site-specific study to revise the ELS implementation provision for specific water bodies.

f) Evaluation using Temperature Data

This alternative is based on the assumption that there are many water bodies in our region where water temperature does not drop below 15 degrees C. If the assumption about temperatures in regional waters is valid, we could then eliminate certain water bodies from consideration of the

ELS present designation, since it is only at temperatures below 15 degrees C that the objective can be more stringent.

A variation on this approach would be to evaluate whether temperatures in engineered water bodies rarely fell below 15 degrees C. If this proved to be true, we could categorically exclude these water bodies from the ELS present category on the basis of temperature.

We would need to test our assumptions by examining adequate/representative temperature data for all of our major water bodies. We would want multiple years of data (to capture cooler conditions in some years), adequate intra-annual data to capture seasonal conditions, and sufficient spatial representation within the water bodies (data for each reach).

Pros:
If our assumptions turned out to be valid (and the temperature data was adequate to support these assumptions), this would be a simple approach to determining where the ELS present provision was not applicable (where waterbodies did not have temperatures below 15 degrees C).

Cons:
This approach (with two variations) depends on an assumption turning out to be true, that 1) temperatures rarely fall below 15 degrees C in many waterbodies or 2) that engineered channels of a certain type rarely contain water at temperatures below 15 degrees C. Analysis of the available data did not support these two assumptions we thought might be true regarding temperature data.

This approach also requires that adequate/representative temperature data be available. While we were able to make some conclusions about temperature data, we did not feel the data we had was sufficient.

g) Survey method to identify water bodies where fish reproduce at temperatures below 15 degrees C.

This method examines through the use of expert opinion and a review of readily available existing data and information which fish reproduce at temperatures < 15 degrees C and where they are located in the Los Angeles Region. This approach is premised on the fact that there are a limited number of fish species that reproduce in significant numbers below 15 degrees C. It is only below 15 degrees C that the regional 30-day average objective varies based upon the presence or absence of ELS fish. If fish that reproduce below 15 degrees C are present in the water body, then ELS are considered present. If there are no fish that reproduce below 15 degrees C, then staff concludes that it is not necessary to apply the "ELS present" objective, since it is only at the lower temperatures that the 30-day average objective is dependent upon the presence of ELS.

Pros:
The survey method is based upon expert opinion and published data where available. Where these are of high confidence and quality, this is a thorough and environmentally protective method.

Cons:
Again, the survey method is based upon expert opinion and published data where available. Where these are of lower confidence or quality, the outcome could be over- or under-

protective results. In addition, site-specific objectives (SSOs) would have to be handled separately because site-specific objectives may change the temperature threshold at which fish and ELS of fish become more sensitive than invertebrates to ammonia toxicity.

h) ELS Present In All Water Bodies At All Times, except in engineered channels that do not allow for vegetation to grow or natural substrate to settle.

This option assumes that ELS are present in all water bodies at all times. The exception to this would be in river reaches that have bottoms (and sides) that are engineered with concrete lining, or otherwise engineered to limit or preclude in-stream vegetation or natural substrate (like rocks) to settle. These engineered channels do not provide suitable habitat for fish reproduction. Fish require in-stream cover and appropriate substrate for reproduction and the nuturing and protection of early life stages.

Fish need unpolluted water and abundant food in a habitat that provides spawning areas, shelter and freedom of movement. The bed and soil of a natural river and the associated aquatic and riparian vegetation combine to provide the food chain upon which fish depend. A natural river channel is characterized by the morphological features that are vital for the life cycle of fish: gravel shoals or reed beds for spawning, pools and riffles where fish rest and feed, and turbulent reaches which enhance oxygenation. Removal of bed material causes loss of instream vegetation and food. It may destroy spawning or nursery habitats.[1]

One of the factors used to conduct habitat assessment is to identify and categorize the presence of rock strata in the riverbank (from silt to sand to gravel to cobble to boulder to bedrock). Another factor considered in habitat assessment is to characterize the amount of cover provided by vegetation and rocks under which fish can find habitat. The degree of pooling in rivers/creeks is also noted. Concrete-lined channels provide few of these conditions.[2]

One technique of fish habitat restoration is to increase the gravel substrate along the creek or river bottom to increase spawning areas. Fish require either rocks or vegetation to provide spawning habitat.[3] Lack of spawning gravel may limit production within watersheds.[4]

Engineered channels, as described above, will not allow successful fish reproduction and early development in significant numbers due to the limited to non-existent aquatic habitat necessary for reproduction and early development.

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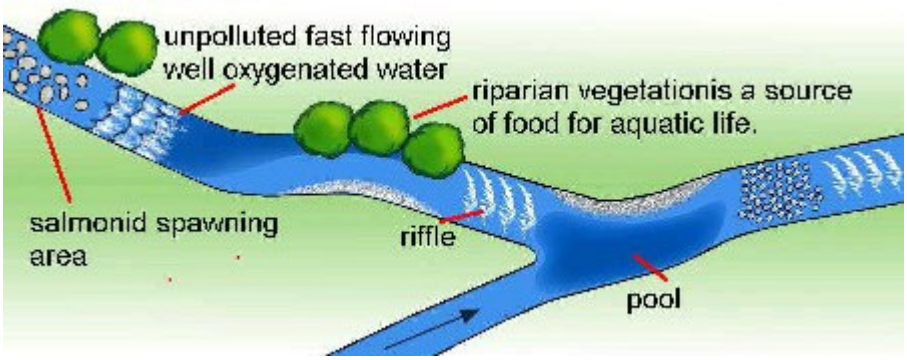
[1] Eastern Regional Fisheries Board. Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites. 15A Main Street, Blackrock, Co. Dublin. Phone 01-2787022, Fax 01-2787025. info@fishingireland.net. www.fishingireland.net

[2] California Salmonid Stream Habitat Restoration Manual. State of California Resources Agency, Department of Fish and Game. 3rd Edition. January 1998.

[3] Spawning Habitat, for Selected Ontario Fish Species.

[4] Fish and Fish Habitat, Island County Creek Restoration Planning, WashingtonTrout.org

Figure 1. Diagram of a healthy water body.



Pros:
This method relies on understanding the basic habitat requirements for fish reproduction and early development. Given these simple conditions, it is easy to determine which channels are suitable for early life stage development. It addresses all water bodies in the region.

Cons:
There could be some deposition of natural substrate material, on an interim basis, in a concrete lined channel that could provide limited habitat for reproduction and early development. Additionally, free floating larval stages considered a part of the early development stages could float into concrete lined channels from more natural upstream reaches. Therefore, this implementation approach could be under-protective in some instances.

i) Apply "ELS absent" objectives in major water bodies that do not have fish species that reproduce below 15 degrees C or where physical conditions preclude reproduction and early development in significant numbers even where fish species that reproduce below 15 degrees Celsius are present. Apply "ELS present" objectives in all other water bodies.

This option is a combination of alternative (g) and alternative (h) described above. First, it utilizes the survey method described in alternative (g) to determine if fish that reproduce below 15 degrees C are present in the water body. If they are present, then ELS are considered present. If there are no fish that reproduce below 15 degrees C, then staff assumes that the "ELS absent" objective can be applied, since it is only at temperatures below 15 degrees Celsius that the objective varies on the basis of the presence or absence of ELS. Second, it also integrates the concept in alternative (h) that even if fish species that reproduce at temperatures below 15 degrees Celsius are present, certain physical conditions in the channel may preclude significant reproduction and early development of these fish species. Therefore, engineered channels that do not allow for vegetation to establish or natural substrate to settle and that are not immediately downstream of natural water bodies are not considered "ELS present" even if adult fish are present. See Section III PROPOSED ACTION for further specificity regarding this option.