Draft Shellfish Ocean Plan White Paper

Background

The State Water Resources Control Board (State Board) is currently developing beneficial use alternatives to address differences in the SHELL beneficial use definition across Regional Boards, as well as the inherent difficulties in achieving the existing bacterial water quality standards at all locations where shellfish habitat exists. The amendment is planned to address natural sources of bacteria and alignment of Ocean Plan and Basin Plan beneficial uses related to shellfish. Under consideration is the separation of commercial harvesting and recreational harvesting into separate SHELL uses with different water quality objectives, and utilizing a reference system or natural source exclusion approach for recreational shellfish use.

Chapter II of the 2009 California Ocean Plan contains bacterial water quality standards for areas where the designated beneficial uses of water include contact recreational water and shellfish harvesting. Currently there is no fecal coliform standard for areas where mariculture is a designated beneficial use and shellfish are harvested for human consumption.

In 1992, the Department of Health Services (now the Department of Public Health) (DPH) suggested that the California Ocean Plan be amended to add a fecal coliform standard of 14 organisms per 100 ml for waters in all areas where shellfish may be harvested for human consumption. The addition of a fecal coliform standard would make the California Ocean Plan consistent with the National Shellfish Sanitation Program (NSSP) guidelines for commercial shellfish growing areas. Although the NSSP allows the regulating agency to use either total coliform or fecal coliform to regulate commercial shellfish growing areas, adding fecal coliform would make the California Ocean Plan consistent with recreational and/or commercial shellfish growing water requirements of other coastal states, and consistent with California's regulations for commercial shellfish growing waters.

Scoping Meeting

Project Goals

The Shellfish project was initiated to accomplish two goals: 1) create consistency between Ocean Plan amendments and Basin Plan revisions related to shellfish, and 2) address the overlap in activities contained within Shellfish Harvesting (SHELL), Aquaculture/Mariculture (AQUA/MAR), and Commercial Fishing (COMM) beneficial use definitions that lead to confusion in the enforcement of water quality standards. To accomplish these goals, five major issues need to be addressed for amending the Ocean Plan and Basin Plans.

The Five Issues:

- **Issue 1**. Improve definition of what constitutes "shellfish".
- **Issue 2**. Separate areas of recreational harvesting from commercial shellfish harvesting beneficial uses.
- **Issue 3.** Better define the geographic extent of the recreational shellfish harvesting beneficial use
- **Issue 4.** Add Fecal Coliform Shellfish standard to Ocean Plan
- **Issue 5.** Address the problem of natural sources of bacteria by allowing the implementation of the Fecal Coliform water quality objectives using either the **reference system with antidegradation** or the **natural sources exclusion approach.**

Issue Discussion

An initial review of coastal Regional Boards' Basin Plans show that vast sections of the near coastal ocean waters are designated as shellfish growing areas. Areas are often listed both for shellfish harvesting and for water contact recreation. In these situations, the more stringent shellfish bacterial standard would supersede the water contact recreation standard and could potentially result in an increase in 303(d) listings. Commercial areas have an increased level of monitoring. Staff is also mindful of the recreational harvest of shellfish in state marine waters. Ocean waters must be fishable and therefore the recreational shellfish beneficial use must be protected.

Issue 1

Improve definition of what constitutes "shellfish". This change was proposed for two reasons. First, because the various Regional Boards have an inconsistent definition of "shellfish" in their Basin Plans, which currently include bivalves (clams, oysters and mussels), crustaceans (lobster and crab), sea urchins, and abalone. The second reason was because there is no definition of shellfish in the commercial fishing beneficial use (COMM).

Issue 1 Analysis

- **Alternative 1**: No Action. Do not change the existing Ocean Plan definition of what constitutes "shellfish. This alternative would keep the Ocean Plan as it currently exists. This option does not clarify the overlap and among the Ocean Plan and Basin Plans with respect to Shellfish.
- **Alternative 2**: Amend the Ocean Plan and Basin Plans by adding improved definitions. To address these gaps, the proposed solutions are for Basin Plans to use the definition of shellfish specified in the Ocean Plan for SHELL (which restricts shellfish to bivalve mollusks), and for the definition of shellfish in COMM to specify that bivalves are not included in this beneficial use.

- **PRELIMINARY RECOMMENDATION**
  Alternative 2 Amend the Ocean Plan and Basin Plans by adding improved definitions.

Issue 2

Separate areas of recreational harvest from commercial shellfish harvesting beneficial uses. This change was proposed because of the overlap in definitions of the SHELL and AQUA/MAR beneficial uses. In addition, address the overlap in activities contained within shellfish harvesting (SHELL), mariculture/aquaculture (MAR/AQUA), and commercial fishing (COMM) beneficial use definitions, that lead to confusion in the enforcement of water quality standards

Issue 2 Analysis

- **Alternative 1**: No Action. Do not change the existing Ocean Plan beneficial use definitions. This alternative would keep the Ocean Plan as it currently exists. This option does not clarify the overlap and among the Ocean Plan and Basin Plans with respect to beneficial use definitions regarding shellfish harvesting.
- **Alternative 2**: Amend the Ocean Plan and Basin Plans by adding improved beneficial use definitions with regard to shellfish harvesting. The proposed change would be to remove commercial harvesting from SHELL, leaving this beneficial use to focus on recreational harvesting, but continue to include commercial shellfish harvesting operations in the AQUA/MAR beneficial use. Remove reference to shellfish harvesting from COMM as necessary.
- **PRELIMINARY RECOMMENDATION**
  Alternative 2 Amend the Ocean Plan and Basin Plans by adding improved Ocean Plan beneficial use definitions with regard to shellfish harvesting.

Issue 3

Better define the geographic extent of the recreational shellfish harvesting beneficial use. This change was proposed because the current designation of “Ocean Waters” for shellfish harvesting areas in the current definition is broad and applies in all of the State’s near-coastal ocean waters out to three nautical miles from shore regardless of whether shellfish is actually harvested or not.

Issue 3 Analysis

- **Alternative 1**: No Action. Do not change the existing Ocean Plan definition of "Ocean Waters" for shellfish harvesting areas. This alternative would keep the Ocean Plan as it currently exists and continue to rely on each Regional Board determining their geographic extent separately. This option does not clarify the geographic disparity among the Ocean Plan and Basin Plans with respect to Shellfish harvesting areas along the California coast.
- **Alternative 2**: Change the Ocean Plan to define recreational shellfish harvesting areas to the nearshore zone, applied to all intertidal areas in the state and seaward restricted to 30 feet deep or 1000 feet from shore, whichever is furthest from the shoreline.
- **PRELIMINARY RECOMMENDATION**
  Alternative 2 Amend the Ocean Plan by adding improved geographic definitions.

Issue 4

Add Fecal Coliform Shellfish standard to Ocean and Basin Plans.

- Add a fecal coliform standard for shellfish of 14 organisms per 100 ml of water with not more than 10% of samples exceeding 43 organisms per 100 ml.

This will create consistent statewide water quality standards for areas of shellfish harvesting. This change was proposed to address the gap between the water quality standards that appear in the Ocean Plan and those enforced by the California Department of Public Health. The proposed change was to add measures of fecal coliforms to the Ocean Plan to make the two programs comparable.

In addition, adding a fecal coliform of 14 organisms per 100 ml would make the California Ocean Plan consistent with recreational and/or commercial shellfish growing water requirements of other coastal states. The addition of a fecal coliform standard will make the California Ocean Plan consistent with the National Shellfish Sanitation Program (NSSP) guidelines for commercial shellfish growing areas

However, the existing Total Coliform standard and the proposed Fecal Coliform standard for protecting beneficial uses of shellfish are very stringent compared with normal bacteria standards applied to protect recreational uses. This is necessary to protect public consumption of filter feeding bivalves (mussels, clams, oysters and scallops) as they bioaccumulate bacteria and pathogens.

Issue 4 Analysis

- **Alternative 1**: No Action. Do not change the existing Ocean Plan standard for bacteria. This alternative would keep the Ocean Plan as it currently exists. This option provides inadequate protection to area where shellfish may be harvested for human consumption.
- **Alternative 2**: Amend the Ocean Plan by adding the fecal coliform standard of 14 organisms per 100 ml for waters where shellfish may be harvested for human consumption, and amend the Ocean Plan to address non-human sources of indicator bacteria for non-commercial areas**.** This change would make the Ocean Plan consistent with recreational and/or commercial shellfish growing water requirements of other coastal states, and consistent with California's regulations for commercial shellfish growing waters. The new fecal coliform standard would apply both in commercial shellfish growing waters and in those areas where recreational shellfish harvesting takes place. The standard would not be applicable where shellfish are not harvested for recreational or commercial purposes.

  However, this alternative would increase the need to address the natural background in areas recreational shellfish harvesting take place **(Issue 5)**. This would assist when the indicator bacteria is determined to be non-human and the indicator densities do not indicate a human health risk; therefore, the State would not consider those non-human sources of fecal contaminants in determining whether the standard is being attained.
- **Alternative 3**: Add the fecal coliform standard of 14 organisms per 100 ml in all areas. This alternative would use the fecal coliform standard of 14 organisms per 100 ml. However, this alternative would apply the new standard in all of the State's near-coastal ocean waters out to three nautical miles from shore regardless of whether shellfish is actually harvested or not. (Note Issue 2 can address this part of the problem) Furthermore non-human source of indicator bacteria (natural background) would not be considered in determining if standards are attained. The more stringent shellfish bacterial standard would effectively supersede the water contact recreation standard, and could potentially result in an increase in 303(d) listings without consideration of source of bacteria or the threat posed.
- **Alternative 4**: Add the fecal coliform standard of 14 organisms per 100 ml only in areas of commercial shellfish harvesting as designated by Aqua/Mar beneficial use as clarified in Issue 2. The addition of a fecal coliform standard to only commercial areas will make the California Ocean Plan consistent with the National Shellfish Sanitation Program (NSSP) guidelines for commercial shellfish growing areas.

- **PRELIMINARY RECOMMENDATION**

Alternative 2: Amend the Ocean Plan by adding the fecal coliform standard of 14 organisms per 100 ml for waters where shellfish may be harvested for human consumption, but only if we are able to amend the Ocean Plan to successfully address non-human sources of indicator bacteria for all recreational shellfish use.

Issue 5

Address the problem of natural sources of bacteria by allowing the implementation of indicator bacteria water quality objectives using either the **natural sources exclusion approach or reference system with anti-degradation approach.** Note that this should apply to contact recreational standards as well.

Natural Sources of Bacteria

Natural sources of bacteria may cause or contribute to exceedances of water quality objectives for indicator bacteria and will impact implementation of Fecal Coliform standard. It is not the intent of the State or Regional Board to require treatment or diversion of natural water bodies or to require treatment of natural sources of bacteria. Such requirements, if imposed by the State or Regional Board, could adversely affect valuable aquatic life and wildlife beneficial uses supported by water bodies in the state.

Furthermore, non-anthropogenic source of indicator bacteria (natural background) should not be considered in determining if standards are attained. The more stringent shellfish fecal coliform bacterial standard would effectively supersede the water contact recreation standard, and could potentially result in an increase in 303(d) listings without consideration of source of bacteria or the threat posed. Utilizing the latest approaches in source tracking and identification should help in identifying areas and amounts of natural background.

Under the **Natural Sources Exclusion Approach (NSEA)**, dischargers must demonstrate they have implemented all appropriate best management practices to control all anthropogenic sources of indicator bacteria to the target water body such that they do not cause or contribute to exceedances of the indicator bacteria water quality objectives. The requirement to control all sources of anthropogenic indicator bacteria does not mean the complete elimination of all anthropogenic sources of bacteria as this is both impractical as well as impossible. Dischargers must also demonstrate that the residual indicator bacteria densities are not indicative of a human health risk. After all anthropogenic sources of indicator bacteria have been controlled such that they do not cause exceedances of the indicator bacteria water quality objectives, and natural sources have been identified and quantified, exceedances of the indicator bacteria water quality objectives may be allowed based on the residual exceedances in the target water body. The residual exceedances shall define the background level of exceedance due to natural sources.

We may need additional flexibility in how the shellfish standards for recreational beneficial use are implemented. This change was proposed to address the difficulty in enforcing water quality standards due to natural sources of bacteria. The proposed solution was to investigate the use of a Reference System and Antidegradation Approach. This approach establishes an allowable exceedance frequency that is equal to or less than the frequency within a reference system, where a reference system is defined as an area minimally impacted by anthropogenic activity.

Implementation of indicator bacteria water quality objectives using the **Reference System and Antidegradation (RSA)** approach requires control of indicator bacteria from anthropogenic sources so that bacteriological water quality in the targeted waterbody is consistent with that of a reference system. The RSA approach also requires that no degradation of existing bacteriological water quality in the targeted water body occurs when the existing bacteriological water quality is better than that of a water body in a reference system. A reference system is a watershed and the beach to which the watershed discharges that is minimally impacted by anthropogenic activities that can affect bacterial densities in the water body.

Under the RSA approach, a certain frequency of exceedances of the indicator bacteria water quality objectives is allowed. The allowed frequencies of exceedances are either the observed frequency of exceedances in the selected reference system or the targeted water body, whichever is less.

Analysis of Reference System Approaches

The basic data used for the analysis of the impacts of the current total coliform standards and the addition of fecal coliform standards for shellfish was shoreline bacteria data collected at least weekly for beach recreational water quality monitoring program.

- Used California shoreline beach monitoring data from 2000 – 2009
  - 645 monitoring stations throughout California
  - 33,325 station/months of data
- Applied total and fecal coliforms Shell standards
  - Total coliforms median ≤ 70 MPN/ 100 ml (and 10% > 230)
  - Fecal coliforms median ≤ 14 MPN/ 100 ml (and 10% > 43)
- **Reference watershed defined as ≤7% developed**
- Determined how often the standards were exceeded under various scenarios

The data from the beach monitoring sites are an important part of the proposed reference system approach, which may be used to determine an allowable rate of exceedance to the shellfish standards due most likely to natural sources in these undeveloped watersheds. Data from the non-reference locations are also useful, as measurement of the existing frequencies of exceedance. In looking at all shoreline bacteria data it was determined that the median water quality standards would be

exceeded about 40% of the time for each total and fecal coliforms and over 65% of the time when any of the four standards were exceeded.

Undeveloped Reference Watershed

This is based on previous work at SCCWRP and regional boards establishing what would be considered some of the most natural watershed condition with limited anthropogenic influence. The standard examined for this study was a statewide value for watershed that were equal to or less than 7% development. While this is a logical and normal approach in determining reference watersheds, when analyzing total and fecal shellfish standards that are often very close to the laboratory detections limits, we found this approach to be of surprisingly limited value.

Analysis found that there was no correlation between percent development and percent of time the coliform standards were exceeded. Both the fecal and total coliform standards exhibited similar lack of relationships. This can be seen the marginal difference in exceedance rates for all four standards in all areas and in what the reference areas show (62% Undeveloped vs 65% for all sites). (See figure 1 below).

We do not feel that percent development will make an appropriate choice for use as a reference area standard.

ASBS Reference Watersheds

Areas of Special Biological Significance are areas along the coast of California that have legally limited anthropogenic discharges to protect water quality. While ideally these should provide excellent reference watershed when combined with low development in their source watersheds, these are a very limited set of beach shoreline monitoring stations. While coliform exceedance levels were measurably lower than that of other statewide reference areas, the lack of samples meant this data was based on very low data robustness. (See figure 1 below)

The very limited distribution of sample locations (8 sites out of 645 total) and analyses that are both undeveloped (<7%) and in an ASBS makes this an impractical method for a statewide reference system approach to natural sources of bacteria.

Reference Based on distance from POTW/303d listed waters

A promising approach is to use for reference sites only for those stations that are some distance (>1000 feet or a mile) from any existing POTW outfall or a 303d listed waterbody (i.e. the bacteria impaired steams and beach areas in the state of California). This analysis 1) Only uses bacteria as the criteria for the 303(d) listing (sites in the total coliform beach monitoring dataset were assessed for proximity to both the total coliform and indicator bacteria 303d listings, while the fecal coliform sites were assessed relative to the fecal coliform and indicator bacteria 303d listings), and 2) excluding 21 sites (out of 645) that do not have lat/long information, and therefore could not be assessed to proximity to 303d/POTWs. This gives an exceedance frequency for all 4 standards of

52% for reference sites >1000' of a 303d/POTW, and 51% for reference sites >1 mile of a 303d/POTW.

It seems like there is a better case for using reference sites that are located at least 1000 feet away from any 303(d) listed waterbody or POTW outfall. There are almost four times as many station-months of data located in this category (n=803, 36 stations) as in the ASBS Reference (n=230, 8 stations).

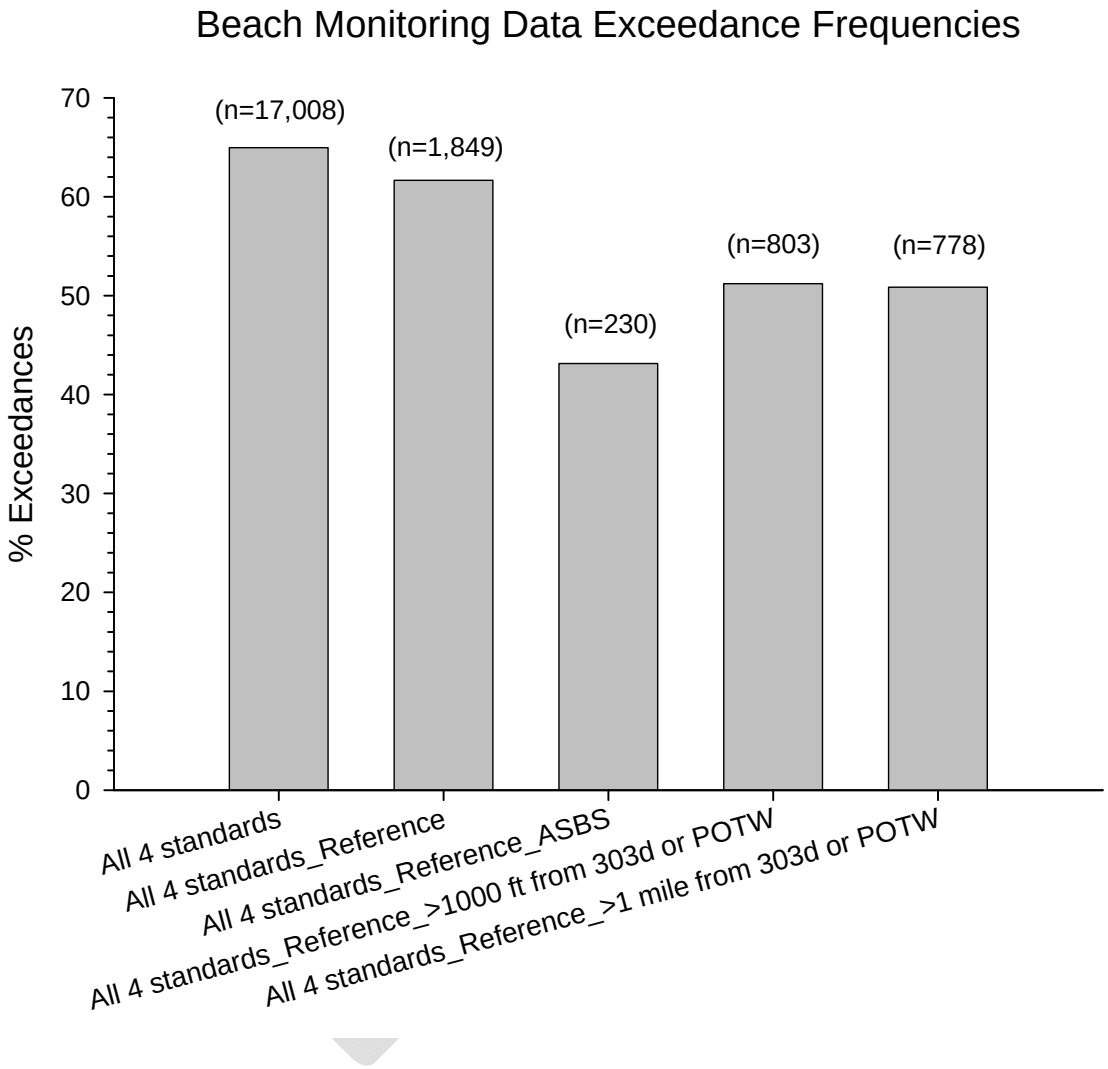

Figure 1. Beach monitoring data exceedance frequencies under different scenarios. Statewide station/month monitoring data from 1/2000 – 5/2009 were used for the analyses. The four standards included: total coliforms median >70 mpn/100 ml, total coliforms >10% >230 mpn/100 ml, fecal coliform median >14 mpn/100 ml, fecal coliform >10% >43 mpn/100 ml. "All 4 standards" indicates circumstances when any one standard was exceeded, and all four standards could be assessed. Reference sites are those within watersheds with ≤7% development. ASBS = Areas of Special Biological Significance. (n = number of station months with requisite data).

Inshore vs Offshore data (This is important for commercial offshore vs shoreline recreational shellfish)

Examination of bacteria data supplied by Los Angeles County Sanitation Districts (LACSD) indicates a much lower incidence of water quality exceedances in the offshore samples (surface samples = 1.1% exceedance, bottom samples = 0.4% exceedance, considering all 4 standards), compared with the shoreline samples (24% exceedance, considering all 4 standards). However, LACSD shoreline data had a lower exceedance frequency than the data from other Region 4 sites (76% exceedance frequency, shoreline data only, excluding LACSD, considering all 4 standards). Because of this difference, the exceedance frequency at inshore locations in other parts of Region 4 may be greater than what has been observed for LACSD.

Issue 5

Address the problem of natural sources of bacteria by allowing the implementation of the Fecal Coliform water quality objectives using either the **reference system with antidegradation** or the **natural sources exclusion approach**

Issue 5 Analysis

- **Alternative 1**: No Action. Do not change the existing Ocean Plan bacteria standard for shellfish. This alternative would keep the Ocean Plan as it currently exists. This option provides inadequate protection to area where shellfish may be harvested for human consumption.
- **Alternative 2:** Add a fecal coliform standard of 14 organisms per 100 ml in all areas without adding exclusion for natural sources or amending the existing language. This alternative will use the NSSP fecal coliform standard of 14 organisms per 100 ml. However, this alternative would apply the new standard in all of the State's ocean waters regardless of whether shellfish is actually harvested or not. The more stringent shellfish fecal coliform bacterial standard would effectively supersede the water contact recreation standard, and could potentially result in an increase in 303(d) listings without consideration of source of bacteria or the threat posed along major stretches of the California shoreline.
- **Alternative 3**: Add a fecal coliform standard of 14 organisms per 100 ml for shellfish. Add a definition for commercial and recreational shellfish. Separate areas of recreational from commercial shellfish harvesting beneficial uses. Add an allowance for using either the reference system or natural source exclusion approaches that will only apply to recreational shellfish harvesting and contact recreation.

  This approach would use for reference sites only those stations that are >1000 feet from any existing POTW outfall or a 303d listed waterbody. This gives an exceedance frequency for all 4 standards of 57% for reference sites >1000' of a 303d/POTW.

- **PLELIMINARY RECOMMENDATION**
  Alternative 3: Establish a fecal coliform standard of 14 organism per 100 ml for shellfish and add a natural source exclusion approach that will only apply to recreational shellfish and contact recreational areas. This would require amending the existing language of the Ocean Plan and separating the definition of recreational and commercial shellfish harvesting so that the RSA and NSEA could be applied only to recreational shellfish harvesting and contact recreation.