

**FINDINGS, CONCLUSIONS AND DECISION
OF THE HEARING EXAMINER FOR
THURSTON COUNTY**

CASE NO: 961372 (Application by Taylor Shellfish Company for a shoreline substantial development permit to construct and operate mussel rafts in Totten Inlet)

APPLICANT: Taylor Shellfish Company

SUMMARY OF REQUEST:

The Applicant requests a substantial development permit under the state Shoreline Management Act to construct and operate a mussel facility consisting of 58 rafts anchored off-shore along the eastern shoreline of north Totten Inlet. The proposal is described in detail in the Findings, below.

LOCATION OF PROPOSAL:

A portion of the south half of Section 5, T19N, R2W, W.M., which is approximately 600 feet waterward of the mean lower low water mark of the western shore of the Steamboat Island Peninsula, between approximately 85th Avenue NW and 90th Avenue NW.

SUMMARY OF DECISION:

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See Part III, Decision, below.

HEARING AND RECORD:

The hearing on this request was held before the undersigned Hearing Examiner on February 13 and 17, 2012. The record was held open until April 9, 2012 for submission of post-hearing briefing by the parties. Due to the amount of evidence and the nature of the issues, the Hearing Examiner requested a number of extensions in the time for decision. The final extension, to which the Applicant agreed, was until July 19, 2012.

The following exhibits are admitted as part of the record:

Exhibit 1. Nov. 3, 2011 Email from Tom Bjorgen to Parties.

Exhibit 2. Nov. 27, 2011 Email from Samuel Plauche to Tom Bjorgen.

Exhibit 3. Dec. 2, 2011 Email from Tom Bjorgen to Parties.

Exhibit 4. Jan. 30, 2012 Email from Tom Bjorgen to Parties.

Exhibit 5. Feb. 6, 2012 Email from Tom Bjorgen to Parties.

Exhibit 6. May 2010 Draft Environmental Impact Statement (DEIS).

Exhibit 7. Final Technical Reports.

Exhibit 8. Nov. 2011 Final Environmental Impact Statement (FEIS).

Exhibit 8a. CD containing the DEIS, the FEIS and the Technical Reports.

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Exhibit 9. 1996 - 2005 Comment Letters with Index.

Exhibit 10. Hearing Examiner Decision in No. AAPL 98-089, dated June 18, 1999.

Exhibit 11. Visual Impact Analysis and Navigation Concerns Assessment, prepared by APHETI, May 22, 1998.

Exhibit 12. Visual Impact and Ecological Concerns Assessment for the Totten Inlet Mussel Rafts Project, prepared by EDAW, Inc., January 1998.

Exhibit 13. Aquaculture Siting Study, prepared by EDAW Inc. and CH2M/HILL, October 1986.

Exhibit 14. Staff Report by Thurston County Resource Stewardship Department for Project No. 961372, prepared by Robert Smith and dated February 13, 2012. This exhibit includes the 12-page Staff Report and attachments a through l, listed on p. 12 of the Report.

Exhibit 15. Feb. 13, 2012 Written Public Comments.

Exhibit 16. Photo of Public Hearing Notice Posting.

Exhibit 17. Curriculum Vitae of Mark G. Pedersen, Ralph A. Elston, Roger I. E. Newell, Mitsuhiro Kawase, Jan Newton, J.E. (Jack) Rensel.

Exhibit 18. CD Containing Technical Reports, dated 1999 – 2008.

Exhibit 19. Letter from Brian Kinzett, Center for Shellfish Research, Feb. 9, 2012.

Exhibit 20. Taylor Shellfish, Feb. 13, 2012, Analysis of Project Consistency with SMA and SMPTR, including attachments.

Exhibit 21. Video Clip taken within Deepwater Point Farm, by Pacific Shellfish Institute, 2004.

Exhibit 22. Letter from Laura Hendricks, Sierra Club, Feb. 12, 2012, with attachments.

Exhibit 23. Plastic Disk of the type used in mussel facilities.

Exhibit 24. Excerpts from book titled "Plastic Ocean", by Capt. Charles Moore, 2011, but excluding web link to Jan. 2012 presentation by author.

Exhibit 25. Letter from Brendan W. Donckers, Gendler & Mann LLP, Feb. 12, 2012.

Exhibit 26. Documents submitted by Daniel E. Penttila, labeled Penttila Exhibits 1 through 15.

Exhibit 27. Decision in Association to Protect Hammersley, Eld and Totten Inlets v. Taylor Resources, Inc., Case No. 00-35667, (Aug. 6, 2002, 9th Circuit).

Exhibit 28. Written testimony from Mary Troy, including attachments, Feb. 13, 2012.

Exhibit 29. Written testimony of Cathy Wolfe, including attachments, undated.

Exhibit 30. Written statement of Julia C. and Francis J. Walker, including attachments, Feb. 16, 2012.

Exhibit 31. Written testimony of Lee Ruddy, including attachments, Feb. 13, 2012.

Exhibit 32. Comment Letters from Lance Winecka, Feb. 9, 2012, Mary DiMatteo, Feb. 13, 2012 and Susie Richards, Feb. 13, 2012.

Exhibit 33. Written testimony of Preston Troy, including attachments, Feb. 13, 2012.

Exhibit 34. Comment email from Carrie Toebbe, Feb. 17, 2012.

Exhibit 35. Puget Sound Action Team Statement, submitted by John Lentz.

Exhibit 36. Enlarged Aerial of Totten Inlet.

Exhibit 37. Surf Smelt, Sand Lance, Rock Sole and Herring Map, Washington Department of Fish and Wildlife, Mar. 10, 2009.

Exhibit 38. Transcript of Proceedings on Mar. 15, 2011 of public hearing by the Pierce County Hearing Examiner in administrative appeal No. AE1-10 and shoreline permit application No. SD22-06.

Exhibit 39. "Goeduck Aquaculture Harvest Impacts" presentation, 65th Annual Shellfish Conference and Tradeshow, Sept. 20, 2011.

Exhibit 40. Consultations under Section 7 of the Endangered Species Act and the Magnuson-Stevens Act for Nationwide Permit 48 activities in Washington State, US Dept. of Commerce, National Marine Fisheries Service, April 28, 2009.

Exhibit 41. Comment Letter from Jeff Dickison, Squaxin Island Tribe, Feb. 10, 2012.

Exhibit 42. Excerpts from Final Notice by the Army Corps of Engineers on reissuance of Nationwide Permit 48, effective March 19, 2012.

Exhibit 43. Chapter 8 of Shellfish Aquaculture and the Environment by Odd Lindahl, 2011.

Exhibit 44. Illustration titled "Shellfish present in system, Shellfish absent from system".

Exhibit 45. Enlarged Color Map of Project Location.

Exhibit 46. Solar LED Navigation Light.

Exhibit 47. Dive Survey Report by Ken Dean, Dec. 11, 2006.

Exhibit 48. Comment letter from Rosalind A. Schoof, dated February 16, 2012, with attachment.

Exhibit 49. Calculations by Dr. Jack Rensel.

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Exhibit 50. Email sent February 22, 2012 from Thomas Bjorgen to the parties, with issues for post-hearing briefing.

Exhibit 51. Emails from Jules Michel to Thomas Bjorgen sent March 11, 2012 at 11:49 and 11:56 a.m. inquiring into party status.

Exhibit 52. Email sent March 12, 2012 from Thomas Bjorgen to the parties and staff regarding inquiry from Jules Michel on party status.

Exhibit 53. APHETI's Closing Argument, dated April 9, 2012.

Exhibit 54. Taylor Shellfish's Post-Hearing Brief, dated April 9, 2012.

Exhibit 55. Emails between the Hearing Examiner and the Applicant, concerning extension of the deadline for the decision.

At the hearing, the following individuals testified under oath:

Robert Smith, Senior Planner
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Vickie Morris, EIS Consultant
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Diane Cooper, Director of Regulatory Affairs
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Gordon King, Mussel Department Manager
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Olympia, WA

Laura Hendricks

Washington State Chapter, Sierra Club

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Seattle, WA

Jim Gibbons

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Dr. Laura Hoberecht

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Susan Macomson

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Greg Reuv
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Bill Dewey
Public Policy and Communications Director
Taylor Shellfish Company
704 E. Hiawatha Boulevard
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Bill Taylor
Taylor Shellfish Company
130 SE Lynch Road
Shelton, WA

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Billy Plauche and Laura Kisielius, Plauche & Stock, appeared on behalf of Applicant Taylor Shellfish Company; Brendan Donckers, Gendler Mann, appeared on behalf of the Association to Protect Hammersley, Eld and Totten Inlets; Jeff Fancher, Deputy Prosecuting Attorney, appeared on behalf of Thurston County.

After consideration of the testimony and exhibits described above, the Hearing Examiner makes the following findings of fact, conclusions of law, and decision.

I. FINDINGS OF FACT

A. General description of proposed facility and Totten Inlet.

1. The Applicant, Taylor Shellfish Company, requests a substantial development permit under the Shoreline Management Act, Chap. 90.58 RCW, to install and operate a mussel raising facility in northern Totten Inlet.

2. The mussel species to be cultivated is *Mytilus edulis galloprovincialis*, popularly referred to as Gallo mussels. The Applicant has cultivated Gallo mussels at its Gallagher Cove mussel raft facility just to the southwest of the proposed site since 1992 and at its Deepwater Point mussel raft facility further south in Totten Inlet since 1994. The Gallagher Cove and Deepwater Point sites are shown on Figure 1-3 of the Final Environmental Impact Statement (FEIS) p. 1-1, at Ex. 8.

3. The facility would consist of 58 separate rafts anchored to the sea floor. Each raft would be 30 by 34 feet in size. The rafts would be attached end to end, with two feet in between, in two lines of eight rafts each and six lines of seven rafts each. Each line of eight rafts would 256 feet long. Each line of seven rafts would be 224 feet long. These groups of rafts

would be aligned with their long axis parallel to the shore in the general configuration shown at Exhibit (Ex.) 1, Attachment (Att.) e.

4. Each line of rafts would be secured in place at both ends with nylon lines and concrete wedge anchors. The rafts would be placed in water depths of 15 to 70 feet mean lower low water. Ex. 7, NewFields Report.

5. The Applicant proposes to lease 11.25 acres of aquatic lands from the state Department of Natural Resources. The landward edge of the lease area would be about 550 to 600 feet waterward of the mean lower low water tidal elevation line, and the lease area would extend about 700 feet further out into Totten Inlet from that landward edge. The length of the lease area parallel to the shore would be approximately 700 feet. The tidelands adjacent to the lease area are owned by the Applicant and are approximately mid-way in a 1.6 mile length of tidelands it owns. FEIS, p. 1-1, at Ex. 8.

6. According to Ex. 14 at p. 2, the mussel facility itself would occupy about 1.36 acres within this lease area. The Visual Impact Assessment at Ex. 12 states that the 58 proposed rafts themselves would cover 63,100 square feet or 1.45 acres of surface area. A comment letter at Ex. 15 characterized this as similar in size to a housing subdivision, since each of the rafts at 34 by 30 feet, would be similar in size to a house. The approximate location of the proposed raft facility is superimposed on an aerial photograph of the vicinity at Ex. 7, NewFields Report, Figure 2.

7. The approximate location of the proposed mussel raft facility, known as the North Totten Inlet (NTI) site, is shown on Figure 1-2 of the FEIS.

8. The raft components would be constructed at the Applicant's Lynch Road plant in Mason County, and the rafts would be assembled at low tide on the beach at the Applicant's Old

Plant site in Thurston County, the location of which is shown at FEIS Figure 1-2 and 1-3. After assembly, the rafts would be towed to the site of the proposed facility.

9. The rafts will be constructed of untreated lumber (Douglas fir), welded aluminum cross beams, and 55-gallon recycled food product barrels (for floatation devices). Synthetic “socks” made of a polypropylene or polyethylene mesh will be suspended from the raft structure, as shown in Ex. 1, Att. g. Each raft will have approximately 720, 16-foot long lines of socks suspended from it. The distance from the bottom of the lines to the sea bed will range from approximately three feet to forty eight feet. The socks will be seeded with immature mussels at a density of approximately 150 mussels per foot. The mussels will require approximately 14 to 18 months to reach harvestable size. Predator nets will enclose the underwater features of the rafts to exclude fish, marine birds, and marine mammals until the mussels are large enough to no longer be vulnerable to predation. See test. of King, FEIS at Ex. 8, and Staff Report at p. 2.

10. The operation will not involve any dredge harvesting, tilling or harrowing of bottom sediments. At harvest, a submersible platform would be moved under a raft and the lines with socks would be cut and would drop onto the platform. The platform would be brought to the surface and mussels would be stripped by hand from the socks. The socking material would be reused.

11. In general, there will be workers on some of the mussel rafts 5 or 6 days per week year-around between approximately 8:00 AM and 3:00 PM. During the summer months, work hours may be earlier. During winter months, work hours may be less due to very cold temperatures. At times, there may be no workers on the rafts for several days at a time. FEIS p. 1-11.

12. The facility would be subject to requirements of the U.S. Coast Guard for private aids to navigation. Ms. Cooper testified that the Applicant would install navigation lights with the lowest

brightness that complies with Coast Guard standards in order to reduce visibility from shoreline residences. A comment letter at Ex. 15 states that the Applicant has not installed navigational aids at its Gallagher Cove facility, that those rafts are virtually invisible in the dark and that boats have run into them.

13. With all 58 rafts in operation, an average of 877,963 pounds (whole body, wet weight) of mussels would be produced for sale each year.

14. Full development of the North Totten Inlet mussel farm will occur over a period of approximately five years or less. According to the Applicant, the first phase will likely consist of 12 to 24 rafts, depending on the availability of mussel "seed" to start the first crop, market demand, and the availability of financial resources to construct and initiate the farm. Subsequent phases would likely consist of 12 to 20 rafts per year up to the 58-raft total. Staff Report at p. 2.

15. Mr. Troy states at Ex. 33 that the mussel rafts at the Applicant's Gallagher Cove facility have been in the same positions for over 20 years.

16. The Applicant's Gallagher Cove and Deepwater mussel facilities in Totten Inlet are the first third-party certified sustainable mussel farms. Test. of Hopper.

17. Totten Inlet is one of the five long, narrow inlets that make up the southern basin of Puget Sound. Totten Inlet is primarily oriented in a southwest to northeast direction, and is divided into a main basin and two distinct inlets, Inner Totten Inlet (Oyster Bay) and Little Skookum Inlet in the south. The main basin is further divided between the deeper northern portion and a shallower southern portion. The northern portion, between the mouth of the Inlet and Windy Point, averages about 59 feet in depth, with a linear distance of approximately 2.2 miles and width of 0.7 mile. The southern portion extends from Windy Point south toward the entrances of Skookum Inlet and Inner Totten Inlet, and averages 26 feet deep with a linear distance of approximately 1.7

miles and an average width of 1.4 miles. Little Skookum Inlet and Inner Totten Inlet are generally very shallow with less than ten feet of water depth, and are approximately 3.5 miles in length. Totten Inlet receives its primary direct freshwater input from the Kennedy Creek, Skookum Creek, and Schneider Creek watersheds.

18. Totten Inlet is classified by the state Department of Ecology as Extraordinary, Class AA waters. Newfields Study, Ex. 7, Tab 9 at p. 1. However, The Department of Ecology has also placed Totten Inlet in the moderate concern category for water quality. NewFields, Ex. 7, Tab 9 at p. 26. It has the water quality necessary for shellfish growing. Test. of King.

19. The DEIS at Ex. 6, Sec. 3.1.1 contains a detailed analysis of the patterns of water circulation in Totten Inlet. The analysis concluded that tidal flushing occurs at the project site through consistent, low velocity water movement during flood and ebb cycles. Water at the site is constantly moving during the tidal cycle, without stopping or stagnating.

20. The analysis at Ex. 6, Sec. 3.1.1 of the DEIS noted also that “water mass residence time” refers to the amount of time it takes for a volume of water within a basin to be replaced with water from outside the system. These measurements represent the degree of water mixing, with systems that have short residence times being the most connected to adjacent water bodies. Several studies have estimated water residence time in Totten Inlet. After discussing several studies, the analysis in the DEIS concluded that water mass residence time in Totten Inlet is relatively brief, with the most accurate model pointing to about four days and other more simple models indicating up to 11 days. The flushing rate is much faster in the northern end of the inlet, where this project is proposed, compared to the southern end of the Inlet. The analysis concluded that the proposed mussel facility site is well flushed and that water passing through the site can, within a few tidal cycles at most, be transported to the mouth of the Inlet.

21. Ms. Hendricks testified that Totten Inlet is not a high flushing area. Dr. Rensel testified that it is fast flushing. On the basis of Dr. Rensel's expertise and the evidence cited above, the Inlet must be characterized as fast flushing.

22. In addition, the analysis at Ex. 6, Sec. 3.1.1 of the DEIS concluded that with the proposed raft array, current velocity inside the raft perimeter would be reduced by 60% to 79% and could be doubled on each side of the strings of rafts. Water currents would be expected to be affected up to 755 feet down current of the rafts. Because the differences in velocity are low and because a small percentage of the Inlet's water is affected, the analysis concluded these are not likely to cause a significant, adverse impact on the environment.

23. The July 8, 2010 letter from the Sierra Club at Sec. 2.2 of the FEIS at Ex. 8 states that "currently, 91% of the shoreline and intertidal areas of Totten Inlet have already been converted over to commercial aquaculture, with most of this expansion occurring just in the last 10 to 15 years." However, the response at p. 2-29 of the FEIS states that all but 4.9 miles of the 33 miles of shoreline in Totten Inlet are under commercial aquaculture lease, but that not all land under lease is under cultivation.

24. According to p. 1-24 of the FEIS, Table 1.7-1 of the FEIS lists the general level of shellfish aquaculture in Totten Inlet, but the Table itself only gives the acreage in geoduck cultivation, a total of 18.54 acres. Table 1.7-2 shows that since 2003 almost as many acres were taken out of geoduck production in Totten Inlet (14.5 acres), as were put into geoduck production (15.4 acres). However, the Endangered Species Act consultation document at Ex. 40, p. 32 states that as of 2009, there were approximately 2150 acres of shellfish farms in Totten Inlet. Mr. Daley testified that aquaculture in Totten Inlet well exceeds the natural level and that the density of mussel production at the proposed facility is many times greater than the natural density.

25. To summarize, the evidence shows that the statement that 91% of Totten Inlet shorelines have been converted to commercial aquaculture is incorrect. Instead, roughly 85% of Totten shorelines are under commercial aquaculture lease, and approximate 2150 acres are in shellfish farms. Since 2003 there has been a net gain of .9 acres in geoduck production in the Inlet. There are no pending applications for floating aquaculture facilities in Thurston Mason or Pierce counties. Test. of Smith.

26. The proposed mussel farm is located in the Conservancy environment under the Thurston Region Shoreline Master Program (SMP). Adjacent upland areas of the County are zoned Rural Residential Resource – One Dwelling Unit Per Five Acres (RRR 1/5).

27. Adjacent upland uses consist of single-family residences located on lots of various sizes. The Capital Land Trust recently purchased a 34-acre tract of land on the east side of Totten Inlet on Adams Cove, directly onshore from the location of the proposed mussel facility. The property contains a small pocket estuary with critical salmon habitat, an intertidal salt marsh, mudflats, a subtidal kelp bed, 1400 feet of waterfront, and several small streams flowing through a mature forest that covers most of the property. DEIS, Ex. 6 at p. 2-164. The property contains habitat for coho salmon, winter steelhead, chinook salmon, chum salmon and coastal sea-run cutthroat and a beach used for spawning by forage fish. Ex. 33.

B. History of the review of this proposal,

28. Taylor Shellfish Company (formerly Taylor Resources, Inc.) submitted an application for a Shoreline Substantial Development Permit accompanied by an Environmental Checklist to Thurston County Development Services on November 13, 1996. That application proposed to expand their existing mussel farm in Gallagher Cove (approximately one mile southwest of the

proposed North Totten Inlet site) from 21 rafts to 42 rafts and to develop a new mussel growing site (the North Totten Inlet site) for 108 rafts.

29. After initial County review, including several public meetings where a number of nearby property owners and other interested people expressed concern and opposition to the project, the Applicant revised its proposal. The revised proposal eliminated the proposed expansion at the existing Gallagher Cove facility and reduced the scope of the North Totten Inlet facility. That facility was reconfigured from 108 rafts to 58 rafts and aligned in a single row extending waterward from a shoreline location southerly of the original proposed location. That is the proposal now before the Hearing Examiner.

30. During continued review of the revised proposal, the County determined that no definitive local information was available to determine the capacity of Totten Inlet to support additional Gallo mussel production and the effects on water quality and bottom dwelling organisms that would result from the proposed expansion of mussel farming in the Inlet. Therefore, Thurston County issued a Determination of Significance (DS) under the State Environmental Policy Act (SEPA) on September 14, 1998, requiring preparation of a limited-scope Environmental Impact Statement (EIS) to address the following five issues:

Impacts to bottom-dwelling organisms (benthic community);

Impacts to the surrounding water column;

Impacts to the phytoplankton resource, and the effects this could have on other aquaculture and aquatic life in Totten Inlet;

Impacts that could be caused by the escapement and propagation of mussels; and

Impacts to marine navigation: lighting, and vessel navigation around the proposed mussel rafts.

31. The Applicant appealed the County's issuance of the DS. After holding a public hearing, the Thurston County Hearing Examiner issued a decision on June 18, 1999 that upheld the DS and required preparation of an EIS. The Applicant and the County have spent the intervening years gathering scientific information on the identified environmental issues and preparing an EIS.

32. As part of that process, Thurston County, after an extensive search and with input from the Applicant and from the Association to Protect Hammersley, Eld and Totten Inlets (APHETI), selected an Independent Technical Review Committee (ITRC) to review and comment on all technical documents and reports prepared by consultants to the Applicant. The members of the ITRC are J.E. (Jack) Rensel, Ph.D., Mitsuhiro Kawase, Ph.D, Jan Newton, Ph.D., Ralph Elston, Ph.D., and Roger Newell, Ph.D., each of whom are recognized experts in their respective fields. Those fields are set out in the FEIS, Ex. 8 at p. 1-6.

33. The ITRC operated separately from and independently of the Applicant. It identified topics for scientific review, reviewed the Applicant's technical reports and, according to Mr. Smith, did not accept a significant portion of the Applicant's consultants' work. The responses to comments in the FEIS are by the ITRC. The work of the ITRC extended from 2001 to 2009. Its purpose was to assure that best available science was used in the EIS. See FEIS at p. 1-6 and test. of Smith. Dr. Rensel of the ITRC testified at the hearing on this matter.

34. This is one of the most thoroughly reviewed proposals that has been presented to Thurston County. The presence of an expert and independent technical review panel is unique in this Hearing Examiner's experience.

C. The visual impact of the proposal.

35. As found, the 58 proposed rafts would be aligned in eight rows of either seven or eight rafts, beginning about 550 to 600 feet waterward of the mean lower low water tidal elevation line and extending about 700 feet further out into Totten Inlet. Each raft would be 34 feet by 30 feet in size. The 58 rafts themselves would cover 63,100 square feet or 1.45 acres of surface area. Since the rows of rafts are spread out somewhat as shown at Ex. 1, Att. e, the area occupied by the facility as a whole would be greater. The approximate size and location of the proposed raft facility is superimposed on an aerial photograph of the vicinity at Ex. 7, Tab 9, NewFields Report, Figure 2.

36. The rafts would rise between one and two feet above the water surface. However, the comment letters at Ex. 15 contain pictures showing mussel rafts in the area with unsightly collections of largely unidentifiable equipment and other objects stored on them. Some of the objects appear three to four times as high above the water line as the raft itself. Ms. Troy testified that the existing mussel rafts are piled high with equipment and are cleaned only when complaints are made. Ms. Eggleston stated at Ex. 15 that the existing rafts are used to store equipment in a messy, unsightly way. The photographs at Ex. 33 confirm these observations. The Department proposes a condition requiring that the rafts be kept neat and orderly and that materials which are not part of the rafts not be stored on them. Ex. 14, p. 11. The Applicant states it will comply with that condition. Test. of Cooper.

37. The Applicant's Visual Impact Assessment by EDAW, Inc. at Ex. 12 states that from 10 to 15 residences would have sustained views of the raft array. The Visual Impact Analysis by APHETI at Ex. 11 states that views from at least 25 to 30 residences would be impacted by the proposed rafts. According to Ex. 11, these effects would be sustained.

38. The EDAW Visual Impact Assessment states that the rafts would be in the right to the far right side of the majority of views from these residences. APHETI's Visual Impact Analysis states that the proposed facility would be directly in line with typical viewing corridors and would negatively impact the aesthetic appeal of the viewing experience.

39. The Visual Impact Assessment by EDAW states that the homes adjacent to the raft site range from 15 to 40 feet above the shoreline or base of the bulkhead. APHETI's Visual Impact Analysis states that homes adjacent to the raft site range from 15 to 70 feet above the shoreline or base of the bulkhead. APHETI's analysis states that with the rafts beginning approximately 600 feet from the shoreline, residences within 1000 feet of the facility would have views from 15 to 50 feet above the shoreline, while those from 1000 to 2000 feet of the site would have views from 60 to 70 feet above the shoreline. In general, the higher the residence, the more obvious the view of the rafts.

40. Each assessment describes the nature of the present view from these homes. The Applicant's characterizes the view as one of "open waters that are generally unobstructed by permanent, man-made water features", while APHETI's assessment is lyrical in its description of the light, color and power of the waters of the Inlet. The comments at Ex. 15 from nearby residents tend to agreement with the lyrical description.

41. Each assessment evaluated visual impact using the same ten criteria. From these, EDAW concluded that the proposal would have a moderate to high visual impact. However, on the basis of the computer generated photographs of views with and without the proposal at Ex. 12, EDAW concluded that

"the siting and design of the facility in the context of its landscape setting and low number of viewers would allow the mussel rafts to remain subordinate to the Project setting as a whole. Therefore . . . the Project would likely have a moderate visual impact on the area's visual resources."

42. From the same ten criteria, APHETI's analysis concluded that the proposal would have a high visual impact. APHETI argued that EDAW's reduction of the impact to moderate was flawed, because it relied on the low number of viewers and the number was low because only one view was analysed. In fairness, though, it is not at all clear that EDAW reduced the impact to moderate on the basis of computer generated photos from one location. Instead, the assessment appears to rely on its initial characterization at Ex. 12, p. 21 that with 10 to 15 residences, the number of viewers is "very low". As noted, APHETI disagrees, stating that views from at least 25 to 30 residences would be affected by the proposed rafts.

D. Nutrients.

43. Dr. Rensel testified that the principal threat to the waters of southern Puget Sound is eutrophication. "Eutrophic" is defined by the glossary in the DEIS as

" . . . nutrient over-enrichment, generally caused by excessive nitrogen in marine waters and phosphorus in freshwater. Coastal eutrophication results [from] principally human activities such as sewage disposal, fertilizer use, and atmospheric inputs. The addition of nitrogen to coastal waters stimulates algal blooms and growth of bacteria, and can cause broad shifts in ecological communities present and contribute to anoxic events and fish kills."

The evidence was consistent with the last sentence in this definition, confirming that the death of large quantities of algae from blooms stimulated by excess nitrogen will deplete oxygen levels in the water and lead to fish kills. Mr. Dewey added that debris from dead algae blooms also kills eel grass and other sea plants by blocking sunlight.

44. The evidence discussed three types of nutrients: nitrogen, silicates, and phosphorus. The reports concluded that the latter two types would not be appreciably affected by this proposal. See DEIS, Ex. 6 at p. 3-20, and Ex. 7, Tab 9, NewFields Report at p. 48. The Findings below discuss nitrogen.

45. The evidence focused on three forms of nitrogen: ammonium (NH₄), nitrate (NO₃) and nitrite (NO₂). These are collectively referred to as dissolved inorganic nitrogen or DIN.

46. Mussels both consume and release nitrogen. They consume nitrogen by filtering and consuming phytoplankton, microzooplankton and organic particles suspended in the water. Undesirable or excess filtered material is discarded into the water as pseudofeces. Wastes are excreted as feces.

47. No feed would be introduced to the mussels grown as part of this proposal. Test. of Dewey.

48. The NewFields Study at Ex. 7 projects that approximately 5817 kilograms of nitrogen per year would be released by the mussels in this project. Nitrogen from feces and pseudofeces that is deposited in sediments is metabolized by certain organisms and released to the water in the form of ammonium, nitrate and nitrite. However, not all of the feces and pseudofeces have an available form of nitrogen. The unavailable forms settle into the sediments and are broken down. Ex. 7, p. 45. According to the DEIS Glossary, remineralization refers to the breakdown of complex structures like plant life into simpler substances. According to the DEIS text at p. 3-21, remineralization is the process of transforming organic to inorganic nitrogen. The discussion at p. 45 of the NewFields Study at Ex. 7 states that remineralization in Totten Inlet is difficult to predict. Indications are that it could be either a source of DIN or a process reducing it. Id. Whatever its effect, the DIN generated or released through these processes does not represent new or

additional nitrogen introduced to the Inlet. Rather, it is a recycling of nitrogen which is more intense under the mussel rafts. DEIS, p. 3-21.

49. For these reasons, operation of mussel culture results in elevated levels of DIN, primarily ammonium, beneath and downcurrent from the rafts. The NewFields Study at Ex. 7, Tab 9, p. 40 projected that at a current speed of 10 cm per second, the concentration of ammonium under the rafts would reach a high of 5 micromoles in May (see DEIS glossary) and would be well under that in other months. At 25 cm per second, the levels would be lower. However, the NewFields Study at the same page stated that

"the proposed mussel rafts would not be expected to increase water column ammonium concentrations exceeding 5 [micromoles], except in the late spring and early summer."

Five micromoles is the Department of Ecology criterion for a high concentration of ammonium. NewFields, p. 40 at Ex. 7. This ammonium increase is localized and would not be expected to trigger eutrophic conditions in Totten Inlet. *Id.* DIN returns to ambient levels approximately 230 feet downcurrent from the raft arrays. DEIS, p. 3-20.

50. The harvesting of mussels from the proposed rafts is projected to remove 4549 kilograms of nitrogen per year. Removal of the fouling community, which are organisms like barnacles, sea anemones and algae that live on hard surfaces, would remove 1044 kilograms of nitrogen per year. Gamete production is projected to remove 1023 kilograms per year. NewFields, p. 49, Ex. 7. The NewFields Study also states that 5614 kilograms per year would be removed through "reintroduction as excretion" or "excretion to the water column as ammonia" and 5817 kilograms per year would be removed as feces or pseudo feces productions. However, it is not explained how excretion of the 5614 kilograms to the water column represents a decrease in nitrogen in the system. Further, the evidence discussed above shows that it is uncertain how

much of the 5817 kilograms per year as feces or pseudo feces would actually be removed from the system.

51. For these reasons, it does not seem accurate to claim, as Newfields does, that 18,047 kilograms per year will be removed from the system, and not just unavailable until recycled back in. Conservatively, though, the proposed mussel production would remove the 4549 kilograms of nitrogen per year through mussel harvest, 1044 kilograms through removal of the fouling community, and 1023 kilograms through gamete production. It is uncertain from this evidence how much of the 5817 kilograms of nitrogen per year from feces or pseudo feces would be permanently removed from the Inlet. Without counting any of the latter figure, adding these this numbers indicates that this project would permanently remove 6616 kilograms nitrogen per year. That sum would be increased by however much of the 5817 kilogram figure would be permanently removed. The sum would be decreased if not all of the assumed fouling community were removed.

52. More precise evidence was presented through the testimony of Dr. Rensel. He testified that the nearly 5000 kilograms of nitrogen which this proposal would remove per year represented 9.6% of the 47,000 kilograms of nitrogen deposited in Totten Inlet each year from stream and watershed run off. This reduction, Dr. Rensel testified, is of measurable and significant benefit.

53. The evidence showed that aquaculture is an increasingly recognized way of removing excess nitrogen from water bodies, thus helping to prevent eutrophication and depletion of oxygen that it leads to.

54. Mr. Cheney referred to a 2010 Study by the National Research Council, listing the ecological benefits from bivalves. He testified that bivalves are more effective in providing these benefits in areas like Totten Inlet.

55. Nitrogen in Puget Sound is primarily from human generated sources, including agricultural run-off into rivers and streams, sewage entering either from sewage treatment facilities or leaching into ground water from septic systems, and atmospheric deposition from burning fossil fuels. There are also modest influxes from adjacent marine systems. Recent work on productivity and nutrient sources in Totten Inlet has suggested a high level of nitrogen coming from human-generated sources, with concentrations increasing with distance further inside Totten Inlet from its mouth. See DEIS, Ex. 6, p. 3-19.

56. The Department of Ecology placed Totten Inlet in the moderate concern category for water quality. NewFields, p. 26, Ex. 7. Mr. Lentz testified that Totten Inlet has experienced algae blooms, and that in parts of Hood Canal eutrophication has led to the death of all sea life needing oxygen.

57. Concerning another benefit from aquaculture, Mr. Reuv testified that cultivated clams and oysters on the Pacific coast sequester 3500 metric tons of carbon each year.

58. The FEIS concluded that there would no significant, unavoidable adverse impacts to silicate, phosphorus or DIN as the result of the proposed project.

E. Dissolved oxygen.

59. The NewFields study at Ex. 7, Tab 9, p. 18 discusses the current levels of dissolved oxygen (DO) at the project site. An examination of DO at a depth of 1.5 meters at the site disclosed levels ranging from 9.6 to 14.5 mg/L throughout the year. Another study examined DO at different depths during different tides in September and October. One examination showed DO concentrations at all depths ranging from 7.5 to over 10 mg/L. Another showed concentrations at different depths ranging from 6.8 to 7.2 mg/L during flood tide and 6.7 to 6.8 mg/L during slack

tide. Another examination found that DO near the bottom near the project site remained above 7 mg/L. Ex. 7, NewFields, p. 18.

60. In general, the higher the water temperature, the lower the DO level. Test. of Pedersen.

61. DO decreases as water moves on the tide beneath mussel raft arrays. Ex. 7, NewFields, p. 21. This is caused by respiration by mussels and associated epifauna. Id. The lowest concentrations occur beneath the center of the raft array. Once water passes the raft array, it will likely recover to ambient DO concentrations within 230 to 656 feet. These distances may be "somewhat longer" with the proposed Alternative 1. DEIS, Ex. 6 at p. 3-15. Mr. Pedersen testified that lower concentrations would persist past these distances only if the ambient DO was depressed.

62. The level of 5 mg/L DO is a "biological stress concentration benchmark", depending on temperature and salinity. DEIS, Ex. 6 at p. 3-14, fn. 2. Mr. Pedersen testified that this level is recognized as the minimum for maintaining life without stress, according the state Department of Ecology and the U.S. Environmental Protection Agency. As levels drop below this point, "an organism becomes increasingly more stressed, more susceptible to disease, or potentially at low values even dies from suffocation if it cannot move away to better conditions." DEIS, Ex. 6 at p. 3-14, fn. 2. Mr. Pedersen's testimony was consistent with these characterizations, although he clarified that effects would depend on the species.

63. Table 2, Figures 15 and 16, and the text on pp. 21 and 23 of the NewFields Study at Ex. 7 provide key evidence about the likely effect of the proposed facility on DO. These data are from the Deepwater Point mussel raft facility further up Totten Inlet. NewFields at p. 23 states that because the proposed raft configuration is very similar to that at Deepwater, these data may be used to predict the effects of this project. Mr. Gardner and Dr. Rensel testified, though, that

ambient DO is higher at the proposed site, so its DO will be somewhat higher than the corresponding figures from Deepwater. Mr. Gardiner testified that ambient DO at the project site is not below 5 mg/L.

64. Table 2 of the NewFields Study at Ex. 7 shows the minimum and maximum ambient or background levels of DO approaching the facility at different months and at different tides. Table 2 also gives the percent change in ambient DO levels caused by the facility at Deepwater Point. Consistently with Mr. Pedersen's testimony about temperature, the lowest ambient levels and the greatest percentage reductions are in the summer months.

65. For most of the year, Table 2 indicates that DO would remain above the stress benchmark of 5 mg/L, although at some times it would fall below that level. To take the worst case, Table 2 shows that in August ambient, incoming water at flood tide would have an average DO ranging from 9.5 to over 10 mg/L, with a minimum level of 4.5. Table 2 shows that at the center of the raft array at flood tide, there would be an average decrease of 44% and a maximum decrease of 70%.

66. Both Mr. Pedersen and Dr. Rensel testified that the maximum 70% reduction should not be applied to the minimum 4.5 mg/L level for August flood tides. Dr. Rensel testified that this would result in large scale fish mortality, which has not happened, and that DO levels under 3 mg/L do not occur. However, Mr. Pedersen testified that fish could swim away from DO levels down to 2 mg/L at slack tide, which suggests that the absence of widespread mortality may not preclude DO at this level. Dr. Rensel pointed out also that Figure 16 of NewFields does show that if the incoming DO is at 4.5, it could be lowered by 70% as the worst case, although, as noted, Dr. Rensel testified that this has not occurred. Thirty percent of 4.5 is 1.35. Application of the average reduction of 44% to the minimum incoming DO of 4.5 results in a level of 2.52.

67. As another example of low DO, Table 2 shows a minimum incoming DO of 4.6 in October at flood tide and a maximum decrease of 15%. If that reduction were applied to the 4.6

minimum, a level of 3.9 would result. If it were applied to the low end of the average range for incoming water on the flood tide, a level of 4.8 would result.

68. The level resulting from applying the worst case reduction percentage to the worst case incoming minimum level, 1.35 mg/L, is one that the NewFields report at Table 2 and Figure 16 indicates could occur, but which expert testimony at the hearing indicated has not occurred. Further, as noted, the ambient DO at the project site is somewhat higher than that at Deepwater. Nevertheless, the data above does show that at least in August and October, this proposal would cause DO levels to fall below 5 mg/L. The same data indicate that these levels could be well below 5, even discarding the outlier figure of 1.35. As noted, DO of 2.52 results from applying the average reduction to the minimum incoming DO level at Deepwater. That figure would be an undetermined amount higher due to the higher ambient DO at the project site.

69. Dr. Rensel testified that the duration of the worst case would depend on water movement. At slack tide, it could last an hour or two. If a current is present, it may only last a matter of minutes. Test. of Rensel. However, Mr. Pedersen testified that the low DO levels may only last for a tidal cycle, which would be approximately six hours.

70. Mr. Pedersen testified that the areas of depressed DO are very localized and that even if it were 2 mg/L at slack tide, fish could swim away. He testified it would stress the fish, but that they could recover. Dr. Rensel testified that salmonids would not be present in Totten Inlet in August and that cutthroat trout should not be present. They would seek out cooler water and would swim away from areas of low DO.

71. Mr. Daley testified that the stream flowing out of the adjacent conservation area supports sea-run cutthroat trout and that generally all Puget Sound shorelines are utilized by Chinook salmon and steelhead. He testified also that DO is below 5 mg/L can have a chronic adverse impact on fish.

72. The FEIS concluded that there would no significant, unavoidable adverse impacts to DO as the result of the proposed project.

F. Phytoplankton, zooplankton, macroalgae and the food web.

73. Phytoplankton are microscopic plants and unicellular protists (organisms not well classified to other kingdoms) that form the foundation of the marine food web. See DEIS at Ex. 6, pp. 3-24.

74. The composition and growth cycles of phytoplankton in Totten Inlet are described in the Newfields Report at Ex. 7 and in the DEIS at Ex. 6, pp. 3-24 and 3-25. In summary, phytoplankton in Totten Inlet is characterized by relatively low abundance in late fall and winter, a large diatom bloom in early spring, more modest abundance from late May through July, followed by a second bloom in August. This second bloom was less pronounced but longer lasting than the spring bloom.

75. Mussels ingest phytoplankton up to 25 micrometers in diameter. Test. of Pedersen.

76. The presence of chlorophyll *a* (chl *a*) is a measurement of phytoplankton abundance. Measurements at Deepwater Point showed that chl *a* concentrations are significantly reduced within the raft array, by up to 90% of the concentrations in incoming water. NewFields, Ex. 7 at p. 67.

77. At a current velocity of 5 cm/sec, chl *a* concentrations are predicted to return to background levels by 293 meters downcurrent from the rafts. At a current velocity of 15 cm/sec, chl *a* concentrations are predicted to return to background levels within 90 meters downcurrent from the rafts, and at a velocity of 25 cm/sec, those concentrations would return to ambient conditions within 30 meters downcurrent. NewFields, Ex. 7, Tab 9 at p. 68. These velocities, 5, 15 and 25 cm/sec, represent the typical depth-averaged current speeds at the project site.

NewFields, Ex. 7, Tab 9 at p. 68. Peak currents at the site range from 25 to 50 cm/sec. At the Deepwater mussel raft facility, chl *a* concentrations returned to background levels from three to 70 meters downcurrent from the rafts. NewFields, Ex. 7, Tab 9 at pp. 62 and 67.

78. If there is decreased phytoplankton abundance past this zone of mixing, it would return to ambient conditions in about one day based on cell division rates of about one division per day. DEIS, Ex. 6 at p. 3-25.

79. In spring and summer the mussel facility here proposed may remove from .3 to .9 percent of the primary phytoplankton production over 50% of the area of Totten Inlet, representing the Northern Totten Inlet basin. In fall and winter, the proposed facility may remove from .5 to 1.4 percent of the primary phytoplankton production in the same area. DEIS, Ex. 6 at p. 3-25. In spring and summer the proposed facility is predicted to remove from 1.4 to 4.6 percent of the seasonal phytoplankton production relative to 10% of Totten Inlet, representing the area immediately surrounding the site. In fall and winter, the proposed facility is predicted to remove from 1.2 to 7.7 percent of the seasonal phytoplankton production in the same area. NewFields, Ex. 7 at Tab 9, p viii.

80. Dr. Rensel testified that there are approximately 40 million kilograms of phytoplankton in Totten Inlet in spring and summer. He characterized excess phytoplankton production as that beyond what the food web requires and testified that the amount of phytoplankton removed by this proposal would represent 1.1% of the excess phytoplankton production in Totten Inlet.

81. Zooplankton are small organisms that live in the water column. The two important categories of them are microzooplankton and gelatinous zooplankton. Zooplankton provide a critical link between the photosynthetic phytoplankton and fish and shellfish. Microzooplankton are a critical link between phytoplankton and bivalves. DEIS, Ex. 6 at p. 3-30.

82. Mussels ingest some zooplankton. Test. of Daley and Rensel. Mr. Pentilla agreed and testified that mussels may also ingest forage fish larvae. Mr. Pedersen testified that in his 40 years of work, he has never heard of mussels ingesting larvae of forage fish. Mr. Pedersen testified that he consulted with Dr. Newell, a member of the Independent Technical Review Committee on this, and Dr. Newell stated that Gallo mussels would not be able to capture or ingest larval herring. Mr. Pedersen testified that mussels sometimes capture adult copepods, small crustaceans such as water fleas, but that they do not ingest herring eggs. The preponderance of the evidence is that mussels will ingest phytoplankton less than 25 micrometers in diameter, some zooplankton and copepods, but not forage fish larvae or herring eggs.

83. Based on the food web analysis described below, the DEIS concluded that concerning zooplankton this proposal

"would be unlikely to create irreversible impacts to the hydrologic or biological health of this subbasin of Puget Sound due to characteristics of the proposed site and regional-specific physical and biological factors discussed in NewFields (2009)"

and that this proposal would not have any significant unavoidable adverse effects on zooplankton. DEIS, Ex. 6 at pp. 3-31 and 3-32.

84. Portions of the sea immediately beneath the proposed mussel raft array contain macroalgae known as sea lettuce and brown kelp. DEIS, Ex. 6 at p. 3-26. These plants, which are attached, not drifting, were only present under the approximately 7 percent of the raft area shown in green on Fig. 3-11 of the DEIS. Within this area, the bottom coverage of fixed macroalgae was very sparse, mostly ten percent or less. DEIS, Ex. 6 at p. 3-26.

85. The two shoreward rafts will likely shade unspecified portions of the area of macroalgae beneath the raft array. Because the rafts ride at anchor, their shadows will move,

allowing light to reach the bottom around the periphery of each unit. The rafts are not completely covered, so some light will penetrate through them. DEIS, Ex. 6 at p. 3-29.

86. Fig. 3-11 of the DEIS shows drift algae under the remaining 93% of the proposed raft array.

87. To evaluate the long-term effects of the proposed rafts on organisms in the water column, NewFields developed a carbon flow model for the Totten Inlet food web. The model considered the effect of phytoplankton, zooplankton in general, microzooplankton, gelatinous zooplankton, bivalves, herring, other forage fish, salmonids and the proposed mussel raft array on carbon flow in Totten Inlet and the Totten Inlet food web. The methods, mechanisms and results of the model are described at Newfields, Ex. 7, Tab 9 at pp. vii and viii and pp. 69 through 88. The model did not consider the direct consumption of zooplankton by mussels, but did consider the consumption of phytoplankton by zooplankton. See Newfields, Ex. 7, Tab 9 at p. vii and p. 83.

88. Mr. Eggleston testified that the United States produced 1.5 billion metric tons of carbon in 2010. Because phytoplankton and zooplankton sequester carbon, he testified that their loss must be considered in the carbon balance. This point is well taken. However, it appears that the carbon flow model in the NewFields report did consider that sequestration in its analysis of the proposal's effect on the food web. The report did not consider the effect of the proposal on the balance of carbon in a more general sense.

89. On the basis of the model, the NewFields report predicts that the proposed mussel facility would not change carbon flow in the water column food web in either the spring/summer or the fall/winter periods. Newfields, Ex. 7, Tab 9 at p. 88.

90. The FEIS concluded that there would no significant, unavoidable adverse impacts to phytoplankton, zooplankton or macroalgae as the result of the proposed project.

G. Benthos.

91. Benthos are creatures dwelling on the sea bottom. Ex. 6, DEIS Glossary. The DEIS at Ex. 6, p. 3-32, et seq., describes the benthic community beneath the mussel raft facility here proposed. At pp. 3-34 and 3-35 the DEIS describes the 2005 study by Brooks on the effects of the Deepwater Point mussel raft facility in Totten Inlet on the benthic community and concludes that the effects of the current proposal will be similar. This study by Dr. Brooks is found at Ex. 8, Tab 3. Those conclusions are that there will be "subtle infaunal community effects" extending to a distance from 148 to 246 feet downcurrent from the facility, but not beyond. The area of these effects would be between .92 and 1.54 acres for each of the eight rows of rafts proposed. DEIS, Ex. 6 at p. 3-35.

92. Neither the DEIS nor the FEIS describes these effects or states whether they are adverse or beneficial. The study by Dr. Brooks at Tab 4 of Ex. 7 at p. 9 describes these "subtle" effects as "nonsignificant".

93. In response to a question as to what the benthic "infaunal effects" were, Dr. Rensel testified that mussels deposit organic material which uses oxygen and which can extirpate benthos. Dr. Rensel, however, did not disagree with Dr. Brooks' conclusions.

94. The principal evidence indicating potential harm to benthos is the November 2006 dive under the Applicant's mussel rafts at Gallagher Cove. A number of individuals stated that this dive disclosed a white bacterial mat of Beggiatoa under the rafts, which was characterized as feeding on hydrogen sulfide which develops in anoxic environments. See Ruddy comment at FEIS, Ex. 8 at p. 2-143; Mary Troy comment at FEIS, Ex. 8 at p. 2-167; Francis Walker comment at FEIS, Ex. 8 at p. 2-179; and Anita Woodnutt comment at FEIS, Ex. 8 at p. 2-188. The comments raise concerns about the effect this growth may have on the benthic community.

95. The results of the 2006 dive are described in the December 1, 2006 letter from David S. Mann to Doug Sutherland, former Commissioner of Public Lands, at Ex. 33. In addition to the Beggatoa, the dive showed a three-inch layer of "sludge" covering the sea bed beneath the rafts, mussel shell debris covering the sea bed beneath the rafts, other debris such as sheet metal and PVC, and three large clumps of a colonial tunicate. No evidence of algae or other plant life was observed beneath the rafts and the benthic area under and around the rafts was described as "significantly compromised and indeed like a 'dead-zone'." Ex. 33.

96. Mr. King responded to the Mann letter at Ex. 33 by stating, among other matters, that Beggatoa has been observed when the rafts carry a full crop of mussels and heavy algae blooms are taking place. Mr. King stated at Ex. 33 that the Beggatoa disperses after harvest. He stated also that concentrated feeding by adult mussels during algae blooms "will result in a high concentration of organic waste ending up on the benthos." Ex. 33.

97. The FEIS responds at Ex. 8 at p. 2-148 to the SEPA comments by stating that the project site has better circulation than Gallagher Cove and

"is better suited for mussel farming due primarily to better circulation that allows for the distribution of wastes in a manner to optimize aerobic assimilation into the existing food web instead of anaerobic decomposition that would, at higher levels, result in die-off of benthic infauna."

The FEIS at p. 2-148 also states that while "there are statistical differences in organic enrichment effects on the benthos under the existing rafts compared to control sites", there are "very localized and temporary, citing the report at Tab 3 of Ex. 7, entitled Benthic Response at Deepwater Point, by Dr. Brooks, 2005b.

98. The anodyne phrase, "statistical differences in organic enrichment . . .", must mean that there is more enrichment under the rafts than at similar locations without mussel rafts. Even so, the FEIS's response does show agreement by the ITRC with Dr. Brooks that the effect is very localized and temporary and with Dr. Brooks' conclusion at Tab 4 of Ex. 7 at p. 9 that the effects on benthos would be "subtle" or "nonsignificant".

99. The response of the FEIS at p. 2-148 and 2-149 also pointed out that dive surveys performed by Brooks under the Deepwater Point rafts showed a healthy megafauna under the rafts, including a large number of crabs and starfish, while the megafaunal community at the reference location was "nearly depauperate".

100. In contrast to megafauna, the Brooks Report at Tab 3 of Ex. 7 states at p. 39 that macrofauna under the Deepwater Point rafts was significantly less than at the reference location. However, this was caused more by the coarse sediment grain size than by the high sulfide concentrations observed in the summer of 2002 just before harvest. Ex. 7, Tab 3, p. 39. Those concentrations were 12,800 to 15,300 micromoles, which was "sufficiently high to exclude most infaunal organisms." Ex. 7, Tab 3, p. 38. These effects under the farm's footprint were characterized as "significant". *Id.* These sulfide levels declined exponentially with distance to the north and reached background levels in 60 meters. Ex. 7, Tab 4, p. 8. Even higher sulfide concentration were apparently recorded in November 2002. See Ex. 7, Tab 3, p. 40.

101. The Brooks Study states that

"if sediments under the rafts had contained higher concentrations of fine material (silts and clays), the moderately high sulfide concentrations observed in July would have excluded sensitive infauna and the very high sulfide concentrations observed in November 2002 would have excluded all but a few opportunistic annelids."

Ex. 7, Tab 3, p. 40.

102. The Brooks Study at Ex. 7, Tab 4, p. 1 states that except for a deep channel, subtidal areas in Totten Inlet north of Little Skookum Inlet, including most of the project site, "were generally characterized as a muddy bowl." This strongly suggests that the sea bed beneath the project site has higher concentrations of silts and clays than does the coarse sediment grain beneath Deepwater. This suggests that, consistently with the excerpts from Ex. 7, Tab 3, pp. 38 and 40, above, the sulfide concentration observed in 2002 would likely have excluded most infaunal organisms if they occurred at the project site. The evidence did not indicate that the project site would be less susceptible to the high sulfide concentrations than would Deepwater. However, the Brooks Study at Ex. 7, Tab 3, p. 24 states that a sampling at Gallagher Cove about a month before harvest in 2002 showed sulfide at 414 micromoles under the downcurrent raft and 252 micromoles at 45 meters downcurrent from it. These are far below the high sulfide readings at Deepwater noted above.

103. The DEIS at Ex. 6, p. 3-35 states that the effect on benthos from each row of rafts at the proposed site would be between .92 and 1.54 acres in size. Dr. Brooks states that, assuming a three month fallow period from harvest to reseeded, at Deepwater the chemical characteristics of the sediment would be remediated in a "few months" and biological characteristics would be remediated within about seven months. See Ex. 7, Tab 3, p. 39. (The seven months is derived from the description of the period from harvest at the end of August 2001 to the reading of low sediment sulfides on March 22, 2002 at Ex. 7, Tab 3, p. 39.)

104. The only treatments of *Beggiatoa* which I found in the Brooks studies were at Ex. 7, Tab 4, pp. 4 and 38. The former reference describes *Beggiatoa* and gives some examples of how it appears; the latter reference states that *Pandalus platyceros* (a type of shrimp) and *Cancer magister* (Dungeness crab) have been seen foraging on mats of *Beggiatoa*.

105. In its survey of environmental impacts, the FEIS concluded there would be no significant unavoidable adverse impacts in all areas but one. In its discussion of macroinvertebrates – benthos, the FEIS states there would be no permanent significant unavoidable adverse impacts to macroinvertebrates (benthic organisms). Ex. 8, p. 1-19. The contrast in phrasing implies the presence of significant unavoidable adverse impacts which are not permanent on benthic organisms.

H. Forage fish.

106. Forage fish are small, schooling fish that provide a critical link in the marine food web. They eat zooplankton and are preyed upon by larger fish, birds and marine mammals. See Ex. 26, Subexhibit #2, and DEIS, Ex. 6 at p. 3-39. Key forage fish species in Puget Sound include Pacific herring, surf smelt, Pacific sand lance, northern anchovy, and longfin smelt. Pacific herring, surf smelt and sand lance are the most common in Puget Sound. Id. Habitat for Pacific herring, surf smelt, Pacific sand lance, and longfin smelt is considered priority habitat by the state Department of Fish and Wildlife (DFW). Id.

107. Pacific herring, surf smelt and sand lance spawn in the nearshore area, occupying many intertidal and shallow subtidal areas. Ex. 26, Subexhibit #2. Sand lances spawn between November and February in the intertidal area and deposit eggs in the top 3 cm of beach material. Ex. 26, Subexhibits #2 and #6. Surf smelt also deposit eggs in the intertidal area up to extreme high water. Ex. 26, Subexhibit #8. Spawning is widely variable and may occur year-round. Ex. 26, Subexhibit #2. Pacific herring spawn between early January and mid-June by depositing eggs mainly on marine vegetation in the intertidal and shallow subtidal zone. However, Squaxin Pass herring, those spawning in Totten Inlet, often deposit eggs on rocks and gravel, occasionally quite deep. Ex. 26, Subexhibit #10, and DEIS, Ex. 6 at p. 3-39. The state

Department of Fish and Wildlife map at Ex. 37 notes that the typical depths for herring spawning are +3 feet to -20 feet (mean lower low water).

108. Pacific herring, surf smelt and sand lance congregate in large numbers during spawning and are particularly vulnerable to shoreline activities during this stage. Ex. 26, Subexhibit #2.

109. The state Department of Fish and Wildlife map at Ex. 37 shows certain spawning areas in outer Totten Inlet. A comparison of Ex. 37 with the FEIS Location Map at Ex. 8, Fig. 1-2 shows that the beaches adjacent to the proposed facility are documented sand lance and surf smelt spawning areas. The proposed facility is not in a documented herring spawning area. Mr. Penttila, however, states that the area of the proposed facility was probably not adequately surveyed for herring spawn and advises that the rafts be moved further off-shore to avoid shading vegetation landward of the -30 foot contour. Mr. Pedersen testified that herring in South Puget Sound evolved so as not to depend on macroalgae for depositing eggs.

110. A comparison of Ex. 37 with the FEIS Location Map at Ex. 8, Fig. 1-2 shows also that the Old Plant beach, where raft assembly would take place, is a documented herring spawning area, but not a documented sand lance or surf smelt spawning area. As noted, typical depths for herring spawning are up to three feet above mean lower low water. The report by Margenex International at Ex. 7, Part 9 states that raft assembly will take place between the +9.5-foot and +1.0-foot elevations, mean lower low water. Thus, the area of raft assembly will overlap herring spawning area.

111. Mr. Penttila states at Ex. 26, Subexhibit #15 that based on photographs from the Margenex report, the upper intertidal zone of the beach at the Old Plant site shows clear potential for surf smelt and sand lance spawning, based on the substrate. Mr. Penttila states that he believes it was not included on DFW Salmonscape maps as a potential area, because he did not

position a sample site there during past surveys. Mr. Penttila worked for DFW for 39 years and participated in extensive surveys of forage fish spawning areas in Totten Inlet and south Puget Sound. Test. of Penttila and Ex. 26, Subexhibit #15. Mr. Pedersen testified that Mr. Penttila did not go on the Old Plant beach, but that he did. Mr. Pedersen testified that this beach at Old Plant has oyster shell hash, which is not good for surf smelt spawning. However, the Margenex Report at Ex. 7, Part 8 states that the heavy oyster hash is in the upper intertidal area. As noted raft assembly will take place down to one foot above mean lower low water, which would not be the upper intertidal area. Mr. Pedersen testified that although he felt there was no significant impact, increased assembly of rafts on the beach could have some impact and that a forage fish survey was appropriate. Mr. Penttila also recommended that a forage fish spawning survey be carried out at the Old Plant site.

112. Surf smelt eggs would be damaged by individuals walking on them or by raft assembly. Ex. 26, Subexhibit #4. The evidence did not specifically address the issue, but it seems likely that herring eggs deposited on rocks and gravel in the intertidal area would also be damaged by those actions.

113. The waterward limit of the nearshore area is the maximum depth where sunlight can support plant growth, which can reach depths of 30 meters. Ex. 26, Subexhibit #2.

114. The evidence conflicted as to whether mussels would ingest larval fish. Mr. Penttila indicated that forage fish larvae range from 4.5 to 6 mm in length and that mussels have been observed consuming amphipods, a species between 5 and 6 mm in length. Mr. Pedersen indicated that he has never heard of mussels ingesting forage fish larvae. Mr. Pedersen consulted with Dr. Newell of the ITRC, who stated that Gallo mussels will not be able to ingest larval herring. Dr. Newell stated also that mussels sometimes capture adult copepods, which are small crustaceans such as water fleas and are much smaller than fish larvae. The preponderance of the evidence offered is that mussels would not ingest larval fish.

I. Fish other than forage fish.

115. Chum salmon are common in Totten Inlet, with Kennedy Creek at its head one of the most productive Chum streams in Puget Sound. DEIS, Ex. 6 at p. 3-40. Chinook and coho salmon, winter steelhead and sea-run cutthroat trout also likely occur in the Inlet, but do not have significant spawning in its tributaries. Id.

116. Adult chum and coho salmon return to Totten Inlet to spawn in fall and early winter. Juvenile chum and coho are present in Totten Inlet from early spring to summer. Winter steelhead and coastal cutthroat are present in spring through late summer. NewFields, Ex. 7, Part 9, p. 73.

117. Effects on salmonids from this proposal would stem from its effect on their prey and on the phytoplankton and zooplankton that feed their prey. FEIS, Ex. 8, p. 1-19. Puget Sound Chinook salmon is listed as a threatened species under the federal Endangered Species Act (ESA). There are no runs of Puget Sound chinook to the tributaries of Totten Inlet, and the DEIS, Ex. 6 at p. 3-51 concludes their occurrence in the Inlet would be rare. Puget Sound steelhead is listed as a threatened species, but critical habitat has not yet been designated. Test. of Daley. Similarly, there are no runs of steelhead to the tributaries of Totten Inlet and their occurrence in the Inlet would be rare. DEIS, Ex. 6 at p. 3-52. The National Marine Fisheries Service will review this proposal under the ESA. Test. of Hoberecht.

118. Mr. Pedersen testified that the proposed rafts would not block any migratory routes for salmonids and that they should have no effect on the nearby Capital Land Trust property at Adams Cove.

119. Mr. Daley testified that salmonid stocks in the region have deteriorated since 1992. For example, in 1992 ten salmon or steelhead stocks were listed as healthy and four were listed as critical. In 2002 four stocks were considered healthy and five were critical.

120. It is unlikely that bull trout occurs in Totten Inlet. DEIS, Ex. 6, pp. 3-48 to 3-50.

121. The U.S. Corps of Engineers issued Nationwide Permit (NWP) No. 48 for existing commercial shellfish activities in 2007. The permit was subject to consultation under the ESA and the Magnuson-Stevens Act, the results of which are at Ex. 40. Because the permit under consideration is not for an "on-going, existing operation", see Ex. 40, p. 2-3, it does not fall under the umbrella of NWP 48.

122. Ms. Cooper testified that the federal permit needed under Section 10 of the Rivers and Harbors Act is on hold at the Corps of Engineers, while a biological assessment is being conducted. That federal permit will be subject to consultation requirements under the ESA.

123. The DEIS concludes at Ex. 6, p.3-42 that the proposal is unlikely to have any significant adverse impact on fish or their prey organisms.

J. Whales.

124. Southern resident killer whales (orcas) in Puget Sound are listed as endangered under the ESA. The site of the proposed mussel facility is within designated critical habitat for the orca. Since 1990, fewer than ten sightings of orcas have been reported in Totten Inlet. This rate of occurrence is very low compared to most other areas of Puget Sound. Their presence would tend to coincide with the late fall chum salmon run into Kennedy Creek. DEIS, Ex. 6 at p. 3-53.

125. The DEIS at pp. 3-53 and 3-54 states that whales would be likely to travel in the deeper parts of the Inlet away from the rafts and that they would echo-locate and tend to move away from the rafts. The DEIS states that mussel rafts and fish farms have been present in the marine waters of western Washington for up to 40 years without a single adverse interaction between a whale and the facilities. Id. No evidence to the contrary was offered. For these reasons and due to their rare presence, the DEIS concludes that the proposal would have "little or no significant effect on Southern Resident killer whales". Id. at 3-53. Evidence to the contrary was not presented.

K. Tunicates.

126. Tunicates are defined by dictionary.com as "marine chordate animals of the subphylum Tunicata, having a rounded or cylindrical body that is enclosed in a tough outer covering", such as sea squirts.

127. A colonial or invasive species of tunicates known as *Didemnum vexillum*, likely originating in Japan, was first discovered in Puget Sound in 1998 (FEIS p. 2-47) or 2004 (DEIS, p.3-33). It now grows in several Puget Sound areas and has been observed on Taylor shellfish mussel lines in Totten Inlet. FEIS, Ex. 8, p. 2-47. It can grow on hulls, ropes, docks and other structures and can form extensive encrusting mats over gravelly bottoms, smothering other marine organisms. DEIS, Ex. 6, p. 3-33. Mr. Penttila testified that tunicates can also grow on fallen shells.

128. The communication from Mary Carmen from the Woods Hole Oceanographic Institution, attached to the comment from Jules Michel at Ex. 15, cites an article by Bullard and Lambert in the Journal of Experimental Marine Biology and Ecology that *D. vexillum* has potential to cause great ecological and economic damage. The article cites the Applicant's Gallagher Cove mussel facility as a heavily fouled mussel culture facility. Unfortunately, this citation does not say whether the Bullard it cites is the same as the authority on whom the FEIS relies on p. 2-47, but it likely is the same. The DEIS at p. 3-33 cites D'Amore 2006 that *D. vexillum* is considered a serious threat in Puget Sound, because it disperses so easily and overgrows surfaces so rapidly.

129. *D. vexillum* can spread in several ways: by dispersing motile larvae, by overgrowing surrounding areas, or when fragments break off an existing colony and drift to new locations. DEIS, Ex. 6, p. 3-33; and FEIS, Ex. 8, p. 2-47. The FEIS states that fragments may only be able to reattach within six hours and have to come in contact with hard substrate. FEIS, Ex. 8, p. 2-47, citing Bullard et al. 2007. However, the communication from Mary Carmen at Ex. 15, states that she received an e-mail from Dr. Bullard, who stated that this assertion appears to be "somewhat incorrect". Dr. Bullard clarified that around 10% of the fragments could attach in as little as six hours, but that approximately 75% attached after 30 hours. Ms. Carmen also cites a response from "co-author" Dr. Reinhardt, whom I assume is Dr. Bullard's co-author. This response states that fragments of *D. vexillum* have been known to survive more than four weeks. Dr. Reinhardt also states that 75% to 80% of fragments reattach in 30 hours, which is inconsistent to some degree with Dr. Bullard's reported statement above that around 75% attach *after* 30 hours.

130. Technical evidence which is not subjected to cross-examination may not be developed to optimum precision. Nevertheless, the weight of the evidence just noted is that *D. vexillum* fragments are able to attach well after six hours, with most attaching by around 30 hours. Some fragments survive for more than four days.

131. Seabed composed of fine silty mud or shifting sands, which is the case in the vicinity of the project site, does not support *D. vexillum*. They will attach only to a hard substrate. FEIS, Ex. 8, p. 2-47. Ms. Carmen states that the proposed 58 rafts will result in an additional 24 acres of surface area below water and would create another vector for the spread of *D. vexillum*. The FEIS notes that pleasure boats spread *D. vexillum* in Puget Sound far from any shellfish operation and that it is common at many marinas.

132. The FEIS concludes that on p. 2-47 that the proposed facility could be a substrate for this organism, but that given its life history and all the current natural and human-made structures in Totten Inlet, "the problem can be expected to remain at about the same level with or without the project." The evidence does not show whether the apparent mistaken assumption that the species may not reattach after six hours is part of the "life history" on which this conclusion rests or whether the conclusion would be modified by the evidence that 75% to 80% would reattach by 30 hours. Nevertheless, the preponderance of the evidence is that with the extensive other hard surfaces in Totten Inlet and Puget Sound, both natural and man-made, the addition of this facility will not perceptibly worsen this problem.

L. Gallo mussels.

133. The native mussel in Puget Sound is *Mytilus edulis trossulus* (*M. e. trossulus*). DEIS, Ex. 6, p. 3-36. The most commonly cultured mussel in Washington is *Mytilus edulis galloprovincialis*, referred to as the Gallo or Mediterranean mussel. North Totten Inlet is one of the few places in Puget Sound where Gallo mussels grow particularly well. DEIS, Ex. 6, p. 3-36. As noted, the Applicant proposes to raise Gallo mussels at the proposed facility.

134. After reviewing scientific literature, the DEIS at p. 3-36 and 3-37 concluded that the origin of Gallo mussels such as those cultured in Washington is unknown and that Gallo mussels were resident in Puget Sound prior to their culture here.

135. *M. e. trossulus*, the native mussel, is adapted to cold water with reduced salinity, while the Gallo is adapted to warmer water with fairly high and constant salinity. DEIS, Ex. 6, p. 3-37. The waters of Puget Sound are relatively cold and experience large reductions in salinity during the winter peak spawning period of Gallos. This, according to the DEIS p. 3-37 and the study by Kenneth Brooks at Ex. 7, p. 11, would likely inhibit, but not extinguish successful recruitment of this species. Mr. Pedersen testified that Gallo mussels have superior growth, but only under the conditions to which they're adapted. The evidence did not examine whether general atmospheric warming would allow Gallos to spread more rapidly due to warming of Puget Sound.

136. The Brooks study at Ex. 7, Tab 5 drew on random samples of mussels taken in Puget Sound in areas of intensive mussel culture, including Totten Inlet. The 2002 survey in Totten Inlet was a random sampling of non-cultured, naturally occurring mussels. Of those taken from Totten Inlet in 2002, up to 3% were Gallos and 3% to 10% hybrids of Gallos and *M. e. trossulus* mussels. See Brooks, Ex. 7, p. 9 and DEIS, Ex. 6, p. 3-37. The DEIS concludes from this on p. 3-37 that in Totten Inlet, where intensive culture of Gallo mussels has been practiced for 20 years, that *M. e. trossulus* is still the dominant species in the naturally recruiting population and that there is little evidence that this natural mussel population may contain Gallo genes.

137. The Brooks study at Ex. 7, Tab 5 also describes some nonrandom mussel samples, which disclosed a higher percentage of hybrids. For example, in a sampling of mussels which resembled Gallos from Dyes Inlet in Puget Sound, 67% were found to be hybrids. Of nine mussels from Sequim Bay identified as Gallos from shell characteristics, 100% were hybrids. Of 53 mussels from Holmes Harbor resembling Gallos, 26 were Gallos, 26 were hybrids and one was *M. e. trossulus*. The Brooks study also explains that these samples came from areas with temperature, salinity or nearby traffic that could favor the spread of Gallos. See Ex. 7, Tab 5.

138. The Brooks study states at Ex. 7, Tab 5, p. 11 that nonrandom sampling is appropriate for determining the presence or absence of Gallo mussels, but that random sampling must be used to estimate population parameters.

139. The photographs at Ex. 30 by the Walkers show mussels colonizing on logs, rocks, ropes and chains on their beach in the vicinity of the Applicant's existing Gallagher Cove mussel raft facility.

140. The FEIS comment by Mr. Morrison at Ex. 8, p. 2-126 cites a letter from the U.S. Fish and Wildlife Service (U.S.F.W.S.) to the Corps of Engineers which he states concerns the Applicant's intent to grow Gallo mussels on rafts in Totten Inlet. The letter states in part:

We do oppose the use of the non-indigenous mussel, *M. galloprovincialis*, because of the risk to the native mussel (*M. trossulus*) and the wildlife species that feed on it . . .

If Taylor United, Inc. is wrong in its assessment, it is doubtful that any corrective measure would be effective in the eradication or control of the spread of this non-native mussel to other areas of Puget Sound."

Ex. 8, p. 2-126.

141. The FEIS responds to this comment by noting that no date is given for the letter cited by Mr. Morrison and stating that the Applicant's Director of Regulatory Affairs believes it was prepared in response to a proposed mussel facility on Whidbey Island over 15 years ago and is outdated. The comment also states that more recent review by the U.S.F.W.S. is in the Biological Opinion prepared for NWP 48 in 2009 and that the Biological Opinion did not recommend any conservation measures relative to cultivating Gallo mussels. Mr. Pedersen testified that the

Biological Opinion for NWP 48 would have examined invasiveness of Gallo mussels. As found above, NWP 48 covers existing shellfish operations, not the present proposal for a future facility.

142. Mr. Morrison's comment at Ex. 8, pp. 2-127 and 2-128 also cites a 2002 letter from Peter Wimberger, Associate Professor of Biology at the University of Puget Sound, with reasons why he believes that genetic sampling method used by Dr. Brooks is inadequate.

143. The FEIS responds at p. 2-129 by stating that Dr. Elston, the member of the Independent Technical Review Committee (ITRC) with expertise on mussel genetics, escapement and competition, reviewed Mr. Wimberger's comments and made recommendations to Dr. Brooks on his methodology. Dr. Brooks incorporated Dr. Elston's recommendations and used some of the methods proposed by Mr. Wimberger. The methodology used by Dr. Brooks was accepted by the ITRC.

144. Mr. Troy testified that a study by the University of Puget Sound found a higher percentage of Gallo mussels over time. He testified that where Dr. Brooks found up to 10% hybrids, U.P.S. found from 10% to 19%. In his FEIS comment at Ex. 8, p. 2-171, Mr. Troy cited the November 2008 issue of the Ecological Society Review which described the Gallo as "an invasive specie with the highest ecological impact score of 4, stating: Disrupts entire ecosystem processes with wider abiotic influences." Mr. Troy stated also that a 2009 sampling by APHETI found that 40% of the mussels in Gallagher Cove were Gallos. No evidence about the expertise of those carrying out the APHETI sampling was offered.

145. The County's response to Mr. Troy's comments noted that the study discussed in the Ecological Society Review assigned the ecological impact score globally and that it reflects the most damaging documented impacts. FEIS, Ex. 8 at p. 2-173. The response also cites experiments carried out by Dr. Rensel showing that Gallos grow and survive better than M. e.

trossulus, but that neither species was having a strong competitive effect on the survival or growth of the other. Ex. 8, p. 2-173 and 2-174.

146. Mr. Stevens testified that he has been growing Gallo mussels since 1985 or 86 and that a neighboring grower concerned about escapement filed a complaint against him. Mr. Stevens testified that the state Department of Fisheries subsequently determined that escapement was not a significant impact and allowed the cultivation of Gallos to continue.

147. Based on the studies it examines, the DEIS concludes at p. 3-38 that the risk of Gallo mussels displacing or genetically polluting *M. e. trossulus* is low and that it is unlikely the project would have a significant adverse effect of this nature. The DEIS, however, does not list the U.P.S studies as those it considered. The FEIS concludes at Ex. 8, p. 1-19 that there would be no significant unavoidable adverse impacts to the genetic make-up of native mussel populations in North Totten Inlet as the result of this proposal. The FEIS did consider the comments based on Professor Wimberger's analysis at U.P.S. As just noted, Dr. Elston of the ITRC reviewed Professor Wimberger's comments and made recommendations to Dr. Brooks on his methodology. Dr. Brooks incorporated Dr. Elston's recommendations and used some of the methods proposed by Mr. Wimberger. The methodology used by Dr. Brooks was accepted by the ITRC.

M. Miscellaneous effects.

148. A number of nearby residents commented or testified that mussel rafts and their predator nets create a stench; see, e.g., Eggleston comment at Ex. 15, test. of Kirsop, test. of Hickel, and comments at Part 2.3 of the FEIS. Mr. Hickel stated in his FEIS comment that a strong odor emanates from seals and sea lions that use the rafts as a rookery. Ms. Troy commented in the FEIS that there is often a strong stench of decaying, putrid material from the Applicant's rafts at Gallagher Cove.

149. Ms. Cooper testified that nets smell when stored on the beach and that the Applicant will no longer store them there. Mr. Kirsop testified that Taylor has responded to the problem of odor from the nets.

150. In the FEIS and in testimony, members of the public stated that the Applicant does not exercise oversight over its geoduck crews, which are loud and use foul language, that noise from current aquaculture operations has awakened residents in the middle of the night, that noise from the operation will resonate over the inlet on calm days which are most suited to work on the facility, and that lights from the operation will shine through windows of residences.

151. Conflicting evidence was submitted on plastic debris from mussel aquaculture washing up on beaches. Ms. Hendricks testified to reports of mussel disks being found in marine waters in Thurston and Pierce counties and that from six to eight washed up on her beach in one month earlier this year. An example of such a disk is at Ex. 23. Ms. Macomson, who lives at 6110 88th Avenue, testified that she finds mussel disks weekly and has removed "truckloads" of plastic from the beach. She testified that some consists of bags with the Taylor label.

152. Ms. Hendricks testified that plastic debris can be toxic and can show up in fish. She stated at Ex. 22 that studies have shown that plastic pollution harms aquatic life and that plastics are being found in fish, birds and mammals. The excerpts from Plastic Ocean at Ex. 24 state that in a 2008 fish study, 35% of the fish had ingested plastic. The excerpts state that plastic in the sea does not dissipate, that it breaks down into smaller, more ingestible pieces, that polyethylene and polypropylene contain BPA at levels causing adverse health effects. The excerpts at Ex. 24 state also that sessile or attached organisms can be carried long distances by plastic flotsam. Ms. Hendricks stated at Ex. 24 that plastic disks from mussel rafts in Totten Inlet have been found at Johnson Point and Henderson Bay.

153. Ms. Eggleston's commented at Ex. 15 that they often pick up pieces of plastic, rubber bands, zip ties, torn netting, floating tubes and mussel raft disks on walks along Totten Inlet. Steve and Julie Kirkwood commented at Ex. 15 that when they walk on the beaches downwind of the existing mussel rafts, it is rare that they don't find plastic containers that have blown from the rafts. Ms. Peterson testified that she regularly walks the beaches of Totten Inlet and Hope Island and "constantly" picks up plastic trash such as geoduck tubes, tube nets and oyster bags from the Applicant's operations in Totten Inlet.

154. Ms. Wilson, however, testified that she has lived on Puget Sound for 25 years, where Totten and Hammersley inlets join. She testified that her house is bordered by a lagoon that tends to collect debris and that she has only found two or three of the mussel disks in a six month period.

155. Mr. King testified that the Applicant has stored disks on scows and that from now on they will be stored on land. Mr. King testified also that retaining nets around the rafts will generally catch any disks that fall off. Ms. Cooper testified that the condition proposed by the Staff concerning storage on the rafts should eliminate plastic materials falling off a raft. That condition prohibits storing anything on a raft which is not part of the raft itself. Ex. 14, p. 11. Ms. Cooper also testified that microplastics are caused by long UV exposure and that the Applicant does not allow that to occur.

156. Rosalind Schoof, a toxicologist with expertise in assessing toxicological risks from exposure to chemical substances, stated that not storing extra equipment on the rafts and removing plastic items upon evidence they are becoming brittle or subject to degradation "is anticipated to reduce or eliminate the risk that the aquaculture gear will release microplastics. Ex. 48. Ms. Schoof also stated that the polyethylene or polypropylene used in the mussel "socks" has been shown to be safe for direct, prolonged contact with food due to the negligible transfer of chemicals. Ex. 48.

157. Conflicting evidence was also submitted about the general state of wildlife at Totten Inlet. Ms. Eggleston stated at Ex. 15 that a former abundance of diving ducks is now down to an occasional visitor and that they see fewer seals and eagles now. Fritz and Barb Mondau stated at Ex. 15 that they no longer see flounders, dogfish or schools of small "feeder fish" anymore and that sand dollar beds have been buried in silt. They described the method of harvesting geoducks as one generating much sediment in the water. Ms. Eggleston stated at Ex. 15 that before the present level of aquaculture, there was abundant life in Totten Inlet and its water looked clear. She described the water now as looking dead. Mr. Troy testified that sea smelt and herring have virtually disappeared from Totten Inlet. Ms. Coontz testified that she has noticed in Totten Inlet the loss of species such as sand dollars and changes in tidal currents. She believes the loss of species is due to oyster cultivation.

158. Mr. Schaffel disagreed with these characterizations, testifying that farmed beaches in the Inlet are still loaded with sand dollars, crabs and other wildlife and that the mussel rafts are loaded with birds. Ms. Wilson testified that she has farmed shellfish for 12 years near where Totten and Hammersley inlets merge and that the beaches they work on and around are full of life, with fish in the water. Mr. Steele testified that the decline in wildlife and habitat in Puget Sound has many causes and cannot be ascribed to shellfish farming.

159. The mussel rafts will be equipped with all private aids to navigation required by the U.S. Coast Guard under 33 CFR Parts 62 and 66. The edge of the facility will be marked by marine marker lights on buoys and/or lights on the end of each raft. When the rafts are first floated into place, the Applicant will install two solar powered navigation lights to identify the width of the rafts. FEIS, Ex. 8 at p. 1-22.

N. Cumulative impacts.

160. The Conclusions below discuss the proper standard for analyses of cumulative impacts under the SMA and conclude that the proper test uses the definition of cumulative impacts in the National Environmental Policy Act (NEPA) and the criteria used by the Shorelines Hearings Board in Fladseth v. Mason County, SHB No. 05-026 (2007). The Findings below discuss the extent to which cumulative effects were analysed consistently with those standards.

161. The FEIS at Ex. 8, p. 1-24 states that the carrying capacity analysis performed for the project, together with its water column analysis, analyzes cumulative impacts under the broad NEPA definition. The principal study dealing with water column impacts and the carrying capacity of Totten Inlet is the 2009 NewFields Assessment at Ex. 7, Tab 9, although other studies in Ex. 7 may also bear on the question. The FEIS states at p. 1-24 that the results of the water column effects investigations were peer reviewed by the ITRC and are reported in the DEIS at Ex. 6, pp. 3-2 through 3-24.

162. The FEIS updated prior information on the extent of shellfish production in Totten Inlet and concluded at p. 1-24 that there would be no significant, adverse environmental impacts to the carrying capacity of Totten Inlet with this proposed new mussel facility.

163. The 2009 NewFields Assessment states that its purpose is to

"1) evaluate the probable effects of the proposed mussel rafts on the surrounding water column, and 2) evaluate impacts to the phytoplankton resource, including the effects this could have on other aquaculture and aquatic life in Totten Inlet."

Ex. 7, Tab 9 at p. 3. The report discusses water column effects in five areas: currents and flow, dissolved oxygen, nutrients, phytoplankton, and phytoplankton based carbon flow. Ex. 7, Tab 9 at p. 3.

164. The Findings in Part F, above summarize the effect of the proposal on phytoplankton, zooplankton, macroalgae and the food web. The food web analysis rested on the carbon flow model set out at pp. 76, et seq. of the NewFields Assessment at Ex. 7.

165. As found above, Dr. Rensel characterized excess phytoplankton production as that beyond what the food web requires and testified that the amount of phytoplankton removed by this proposal would represent 1.1% of the excess phytoplankton production in Totten Inlet. Calculating the amount of phytoplankton required by the food web in Totten Inlet requires consideration of other consumers of phytoplankton, not just this proposal. Calculating the amount of phytoplankton actually present in Totten Inlet also requires consideration of other consumers of phytoplankton, not just this proposal. As found, there are no pending applications for floating aquaculture facilities in Thurston, Mason or Pierce counties. Thus, the analysis of phytoplankton and the food web in NewFields at Ex. 7, as reviewed by the ITRC, did take into account other producers and consumers of phytoplankton in the Inlet and did not view this proposal in isolation. It properly considered cumulative effects as applicable to this application.

166. As found above, the evidence shows that mussels will ingest some zooplankton and copepods, but not forage fish larvae or herring eggs. As also noted above, the NewFields Assessment discusses water column effects in five areas: currents and flow, dissolved oxygen, nutrients, phytoplankton, and phytoplankton based carbon flow. Ex. 7, Tab 9 at p. 3. As noted above, the water column analysis did consider the consumption of phytoplankton by zooplankton, but not the direct consumption of zooplankton by mussels. See Newfields, Ex. 7 at Tab 9, p. vii p. 83. The statement of impacts to zooplankton at p. 3-31 of the DEIS focuses on the direct and indirect effects of this proposal alone on zooplankton.

167. However, the FEIS states at p. 1-29 that

"with such a small percentage of the total phytoplankton used by these bivalves, the risk that there would be a significant effect on zooplankton abundance (a forage fish prey species), and hence that forage fish would be affected, is discountable"

This statement shows that the principal effect of mussels on zooplankton is through their consumption of phytoplankton and that that effect is minimal. As found above, the evidence does consider the cumulative effect on phytoplankton. Thus, it also considers the cumulative effects on zooplankton through the consumption of phytoplankton.

168. Turning to nutrients, the evidence, as summarized in the Findings above, shows that this project would remove substantial amounts of excess nitrogen from Totten Inlet, thus helping to prevent eutrophication and the depletion of oxygen that it leads to. The effect of this project on nitrogen levels and eutrophication will be beneficial. When a proposal reduces a potential adverse impact of other activities, there is no adverse cumulative impact of the project to examine in that area.

169. The effect of this proposal on dissolved oxygen (DO) is discussed in detail in the Findings above. In summary, the evidence shows that in August and October, this proposal would cause DO levels to fall below the stress level of 5 mg/L. The data indicates that these levels could be well below 5. For example, applying the average reduction caused by the Deepwater facility to the minimum incoming DO level at the Deepwater site in August results in a DO level of 2.52. However, as also found, this number would be an undetermined amount higher with this project, since ambient DO is higher. As discussed in Finding 69, the duration of low DO would depend on water movement, lasting from a matter of minutes to six hours.

170. As found, the food web model and analysis in the NewFields report and the relevant discussions in the DEIS and FEIS show that this proposal will not have any adverse cumulative impact on phytoplankton or on any other species through reduction of the phytoplankton on which

the food web rests. Thus, it must also be concluded that this proposal's reduction of DO will not have any adverse cumulative impact on phytoplankton or on any other species through reduction of the phytoplankton.

171. However, neither NewFields, the DEIS nor the FEIS discuss the direct effect on sea life of the seasonal areas of deficient DO projected from this proposal, considered together with potential low DO created by other activities in Totten Inlet. Instead, the direct effects of low DO from this project are considered in isolation. For example, it may well be that fish could easily avoid the areas of low DO caused by this proposal. However, the evidence does not show whether the other aquaculture facilities in Totten Inlet also cause areas of deficient DO, how large those areas are, what levels of DO they may have, or how long they may persist. Without that evidence, it is impossible to know the effect of this proposal on fish and other sea life, when added to the effect of other operations.

172. This point is especially relevant to forage fish. As found, the beaches adjacent to the proposed facility are documented sand lance and surf smelt spawning areas. The Gallagher Cove mussel facility is in or very near a documented herring spawning area and not far from documented sand lance and surf smelt spawning areas. Cf. map at FEIS , Fig. 1-2 and map at Ex. 37. The evidence does not disclose whether the Deepwater facility is near any of these spawning areas. The evidence not discuss whether this proposal, considered with other aquaculture operations in the Inlet, may harm forage fish by creating areas of low DO so close to spawning areas. The statement above that this proposal would have a discountable effect on zooplankton and forage fish was based on an analysis of phytoplankton abundance and the food web. It did not consider the direct effects of low DO.

173. Each project, considered alone, could be benign in its reductions of DO. At some point, though, the accumulation of pockets of low DO in the Inlet, although transient, may do harm.

The evidence is silent as to how close or far this proposal may be from that point. The evidence does not consider the cumulative impacts of this proposal through its effects on DO.

174. Turning to effects on the benthic community, the study by Dr. Brooks at Ex. 7, Tab 4 was designed to assess the carrying capacity of Totten Inlet with respect to the effects of the proposed mussel facility on certain elements of the environment. See Ex. 7, Tab 4, p. 1. The report concluded that

"Totten Inlet will be at approximately ten percent of its *carrying capacity* when the North Totten Inlet mussel farm reaches full production. These results indicate that any negative benthic effects in the immediate vicinity of the proposed mussel farm will be minor and ephemeral. It is quite possible that biodeposits from the farm will actually increase the abundance, diversity and biomass of the macrobenthic community near the farm."

Ex. 7, Tab 4, p. 11.

175. As discussed above, "carrying capacity" in the NewFields Report focuses largely on phytoplankton production and its effect on the food web. However, the Brooks Study reviewed "benthic environments in Totten Inlet and their response to the intensive cultivation of mussels on rafts." Ex. 7, Tab 4, p. 11. Immediately after the reference to "carrying capacity" in the excerpt above, the report stated that "[t]hese results indicate that any negative benthic effects in the immediate vicinity of the proposed mussel farm will be minor and ephemeral." This study concludes that this proposal's effect on benthos will approach only about ten percent of the carrying capacity of the Inlet. Although not stated expressly, this characterization implies that its conclusion takes into account the cumulative effect of at least mussel production in Totten Inlet.

176. However, neither the Brooks' studies nor the DEIS or FEIS discussed the extent of *Beggiatoa* under these or other raft facilities or their effect on benthos. It is also not clear whether

the high sulfide readings under the Deepwater rafts, which the evidence showed were sufficient nearly to extirpate benthic life for a period of months, are expected to be exceeded over the finer sediment at the project site or are found under other mussel raft facilities in the Inlet. Until adequate evidence is presented on each of these points, it cannot be found that cumulative effects on benthic life have been covered.

177. Next, the evidence summarized in the Findings above makes clear that the tunicate *D. vexillum* is spreading in Puget Sound areas and has the potential to cause substantial ecological damage. The evidence also shows that it can grow on hard surfaces such as hulls, ropes, docks and structures and can form extensive encrusting mats over gravelly bottoms. It has been observed on Taylor shellfish mussel lines in Totten Inlet and one communication in the evidence described the Gallagher Cove mussel facility as a heavily fouled with it.

178. The FEIS acknowledges on p. 2-47 that the proposed mussel facility could be a substrate for this organism. The evidence set out in the Findings shows that it almost certainly would be. However, the FEIS also concludes that given its life history and all the current natural and human-made structures in Totten Inlet, "the problem can be expected to remain at about the same level with or without the project." Even with the uncertainty about times of reattachment described above, the large number of docks, boats, ropes, and various natural hard surfaces in the Inlet support this conclusion. The evidence does adequately discuss cumulative effects concerning tunicates.

179. In deciding whether cumulative effects were properly weighed in considering potential spread of Gallo mussels, a number of facts from the Findings above are important. First, because the waters of Puget Sound are relatively cold and experience large reductions in salinity during the winter peak spawning period of Gallos, successful recruitment of this species would likely be inhibited, but not extinguished. However, Gallo mussels have superior growth under the conditions to which they're adapted. North Totten Inlet is one of the few places in Puget Sound where Gallo

mussels grow particularly well. The Findings also discuss the results of the random sampling of non-cultured, naturally occurring mussels in Totten Inlet and random samplings showing much higher percentages of Gallos and hybrids. As also found, the ITRC reviewed Professor Wimberger's challenges to Dr. Brooks' genetic sampling method and made recommendations to Dr. Brooks on his methodology. Dr. Brooks incorporated the ITRC's recommendations and used some of the methods proposed by Mr. Wimberger, a methodology accepted by the ITRC. The DEIS concluded that in Totten Inlet *M. e. trossulus* is still the dominant species in the naturally recruiting population and that there is little evidence that this natural mussel population may contain Gallo genes. The FEIS was consistent with this.

180. Apart from the U.S Fish and Wildlife letter on Gallos, which is discussed above and in the Conclusions, this evidence shows by a preponderance that this proposal, considered by itself, would not cause any significant spreading of or genetic pollution by Gallo mussels. The evidence shows the same about the mussel facilities existing in 2002 in Totten Inlet. What the evidence does not show is the combined effect when all mussel facilities in Totten Inlet are considered, including that proposed. This proposal would have 58 rafts. The Deepwater facility is described by NewFields at Ex. 7, Tab 9, p. 23 as very similar to this proposal. The Gallagher Cove facility has 21 rafts. FEIS, Ex. 8 at p. 1-1. If Deepwater and Gallagher together resulted in up to 3% Gallos and 10% hybrids in 2002, as the Brooks Study states, would the addition of the 58 rafts of this proposal increase those percentages proportionately? If so, what effect would that increase have? Or, would the addition of the 58 rafts accelerate the spread of Gallos so that these percentages would increase more than the proportionate increase in Gallo culture in Totten Inlet represented by this proposal? The evidence does not address these questions. It shows only that the status quo in 2002 was not troublesome.

181. These questions are not addressed by NWP 48. As Mr. Pedersen testified, the Biological Opinion prepared for NWP 48 in 2009 by the U.S.F.W.S. would have examined the invasiveness of Gallo mussels and did not recommend any conservation measures concerning their

cultivation. NWP 48, however, covers existing shellfish operations, not future facilities such as that here proposed. Thus, it does not address the combined effect of this and existing mussel cultivation in the Inlet.

II. CONCLUSIONS OF LAW

A. The legal standards governing the requested shoreline substantial development permit.

1. With exceptions not pertinent to this proposal, the state Shoreline Management Act (SMA), Chap. 90.58 RCW, defines shorelines of the state to include "all of the water areas of the state, including reservoirs, and their associated shorelands, together with the lands underlying them . . ." RCW 90.58.030 (2) (d). Shorelands, in turn, are defined as "those lands extending landward for two hundred feet . . . from the ordinary high water mark . . ." RCW 90.58.030 (2) (f). The SMA requires a substantial development permit for any "substantial development" on the shorelines of the state. RCW 90.58.140 (2). "Substantial development" is defined to include any development "of which the total cost or fair market value exceeds five thousand dollars . . ." RCW 90.58.030 (3) (e). By operation of statute, that threshold is now \$5718. The proposal here at issue is in the shorelines of the state, and its fair market value exceeds that amount. Therefore, the proposal may be carried out only if a substantial development permit is issued.

2. A substantial development permit (SDP) may be granted only if the proposal is consistent with the SMA and the local shoreline master program (SMP). RCW 90.58.140 (2) (b). The SMP for Thurston County is the Thurston Region Shoreline Master Program, as amended by Thurston County Code (TCC) 19.01.010.

3. The proposed mussel facility is deemed aquaculture under the definition in SMP Section 3, II, A. That definition also includes the "processing of aquatic plants and animals, and the maintenance and construction of necessary equipment, buildings and growing areas . . ." Under this definition, the actions proposed for the Old Plant site described in the Findings also count as aquaculture.

4. Industrial development is defined by SMP Section 3, VIII, A as

". . . the fabrication, assembly, manufacturing, processing or storage of goods. This category also includes the facilities for the transfer of cargo and/or passengers from water-borne craft."

Commercial aquaculture such as that proposed may accurately be called industrial under ordinary English usage. However, the specific references in this definition to fabrication, assembly, manufacture, processing and storage of goods and the transfer of cargo and passengers strongly suggest that it is restricted to this type of activity and does not capture agriculture, aquaculture or other commercial activities that may be deemed an industry. This conclusion is reinforced by the specific policies and regulations in the SMP. Legislative intent is plain that aquaculture is governed by the provisions governing aquaculture, not by provisions applying to these other industrial activities.

5. Under SMP, Section 3, II, D. all types of aquaculture are allowed in the Conservancy environment, "provided the operation is consistent with the policies and regulations of this program and chapter."

6. The policies of the SMP governing aquaculture are set out in Section 3, II, B, which states:

- "1. The Region should strengthen and diversify the local economy by encouraging aquacultural uses.
2. Aquacultural use of areas with high aquacultural potential should be encouraged.
3. Flexibility to experiment with new aquaculture techniques should be allowed.
4. Aquacultural enterprises should be operated in a manner that allows navigational access of shoreline owners and commercial traffic.
5. Aquacultural development should consider and minimize the detrimental impact it might have on views from upland property.
6. Proposed surface installations should be reviewed for conflicts with other uses in areas that are utilized for moorage, recreational boating, sport fishing, commercial fishing or commercial navigation. Such surface installations should incorporate features to reduce use conflicts. Unlimited recreational boating should not be construed as normal public use.
7. Areas with high potential for aquacultural activities should be protected from degradation by other types of uses which may locate on the adjacent upland.
8. Proposed aquacultural activities should be reviewed for impacts on the existing plants, animals and physical characteristics of the shorelines.
9. Proposed uses located adjacent to existing aquaculture areas which are found to be incompatible should not be allowed."

7. The general regulations of the SMP governing aquaculture are set out in Section 3, II, B, which states:

1. Aquaculture development shall not cause extensive erosion or accretion along adjacent shorelines.
2. Aquacultural structures and activities that are not shoreline dependent (e.g., warehouses for storage of products, parking lots) shall be located to minimize the detrimental impact to the shoreline.
3. Proposed aquaculture processing plants shall provide adequate buffers to screen operations from adjacent residential uses.
4. Proposed residential and other developments in the vicinity of aquaculture operations shall install drainage and waste water treatment facilities to prevent any adverse water quality impacts to aquaculture operations.
5. Land clearing in the vicinity of aquaculture operations shall not result in offsite erosion, siltation or other reductions in water quality.
6. For nonaquacultural development or uses proposed within or adjacent to an Aquacultural District, or which may be adversely affected by the aquaculture operation, restrictive covenants shall be filed which will inform prospective buyers of the proximity of the Aquacultural District."¹

¹ Paragraph 7 contains regulations concerning aquaculture districts and is not relevant to this matter.

8. Apart from the more specific policies and regulations discussed above, Section 2 V of the SMP sets out a number of Regional Criteria which also apply to this proposal. That provision states in relevant part:

"All development within the jurisdiction of this Master Program shall demonstrate compliance with the following policies:

. . .

B. Protection of water quality and aquatic habitat is recognized as a primary goal. All applications for development of shorelines and use of public waters shall be closely analyzed for their effect on the aquatic environment. Of particular concern will be the preservation of the larger ecological system when a change is proposed to a lesser part of the system, like a marshland or tideland.

. . .

F. Applicants for permits shall have the burden of proving that a proposed substantial development is consistent with the criteria which must be met before a permit is granted. In any review of the granting or denial of an application for a permit as provided in RCW 90.58.18.180 (1), the person requesting the review shall have the burden of proof.

G. Shorelines of this Region which are notable for their aesthetic, scenic, historic or ecological qualities shall be preserved. Any private or public development which would degrade such shoreline qualities shall be discouraged. Inappropriate shoreline uses and poor quality shoreline conditions shall be eliminated when a new shoreline development or activity is authorized.

H. Protection of public health is recognized as a primary goal. All applications for development or use of shorelines shall be closely analyzed for their effect on the public health."

9. The parties sharply disagree whether the state Water Pollution Control Act, Chap. 90.48, and its implementing rules must be met to obtain this shoreline substantial development permit. Given the conclusions below, it is not necessary to decide this issue.

10. This proceeding does not involve any challenge to a threshold determination or to the adequacy of an EIS under the State Environmental Policy Act (SEPA), Chap. 43.21C RCW. This decision does not exercise substantive SEPA authority under RCW 43.21C.060.

B. Analysis of specific legal issues.

11. This analysis turns first to a discussion of the principle legal issues raised in this proceeding and then to a discussion of compliance with governing standards, given the resolution of the principle issues.

1. Cumulative impacts.

12. The notion of cumulative impacts arises often in land use law. At its core is the consideration of a project's effects together with the effects of other activities. Disputes tend to crop up in two areas: whether cumulative effects should be considered in a specific case, and, if so, what other uses or proposals should be considered. This case is no exception.

13. These issues are nicely illustrated by the contrasting approach of two statutes which do not directly apply to this proceeding. First, certain actions under SEPA require the consideration of cumulative impacts. In cases dealing with challenges to an EIS, the courts have held that

"[a]dditional projects do not require review in an EIS for cumulative impacts if they are either substantially independent from the proposed action or are not necessary to meet the project's purpose and need. *Cheney*, 87 Wn.2d at 345 (explaining dependent actions); *SEAPC v. Cammack II Orchards*, [49 Wn. App. 609](#), 614, 744 P.2d 1101 (1987) . . ."

Gebbers v. Okanogan PUD No. 1, 144 Wn.2d 371, 380 (2008). *Accord*, WAC 197-11-060 (3).

14. In a case involving a challenge to a mitigated determination of nonsignificance under SEPA, the court held that

". . . as a general proposition, the nature of cumulative impacts is prospective and not retrospective. A cumulative impact analysis need only occur when there is some evidence that the project under review will facilitate future action that will result in additional impacts. *Tucker v. Columbia River Gorge Comm'n*, [73 Wn. App. 74](#), 81-83, 867 P.2d 686 (1994) . . .

We also hold that the cumulative impact argument must fail unless the Boehms can demonstrate that the project is dependent on subsequent proposed development . . .

Boehm v. City of Vancouver, 111 Wn. App. 711, 720 (2002). Thus, in challenges to EISs or threshold determinations, SEPA takes a narrow view of cumulative impacts.

15. In contrast, cumulative impacts are defined under the National Environmental Policy Act (NEPA) as

"[t]he impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor, but collectively significant actions taking place over a period of time."

Although NEPA may apply to federal approvals needed for this project, it does not apply to the SDP here at issue.

16. The SMA, which does apply to this proceeding, recognizes that

"coordinated planning is necessary in order to protect the public interest associated with the shorelines of the state while, at the same time, recognizing and protecting private property rights consistent with the public interest. There is, therefore, a clear and urgent demand for a planned, rational, and concerted effort, jointly performed by federal, state, and local governments, to prevent the inherent harm in an uncoordinated and piecemeal development of the state's shorelines."

RCW 90.58.020. In Hayes v. Yount, 87 Wn.2d 280, 288 (1976), the Supreme Court held that with this language,

"the legislature and people of this state recognized the necessity of controlling the cumulative adverse effect of "piece-meal development of the state's shorelines" through "coordinated planning" of all development, not only "substantial development."

The Court held further that

"[t]he fact that respondent himself cannot control future filling in the Snohomish River estuary does not, in itself, render arbitrary and capricious the board's concern over the

ultimate impact of such development in light of its statutory duties. See RCW [90.58.140](#); [90.58.020](#)."

Hayes, 87 Wn.2d at 288.

17. In Skagit County v. Department of Ecology, 93 Wn.2d 742, 750 (1980), the Court cited its observation in Hayes that

"[l]ogic and common sense suggest that numerous projects, each having no significant effect individually, may well have very significant effects when taken together"

and concluded that

"[t]he SMA recognizes the necessity for controlling the cumulative detrimental impact of piecemeal development through coordinated planning of all development. RCW [90.58.020](#)."

The Court also held there was nothing inconsistent "in the board's decision to vacate a permit allowing fill and in its finding the fill would not significantly affect the total estuary." Skagit County, 93 Wn.2d at 750.

18. Our court's recognition that individually insignificant projects may do significant harm taken together, its condemnation of uncoordinated and piecemeal development of the shorelines, and its concern with cumulative impacts viewed prospectively and retrospectively, announces a cumulative impacts policy for our shorelines indistinguishable from that followed by NEPA.

19. A number of decisions of the Shorelines Hearings Board (SHB) also deal with cumulative impacts. In Fladseth v. Mason County, SHB No. 05-026 (2007), the County had

denied an SDP for a residential pier, ramp and float on the north shore of the southern hook of Hood Canal. In upholding the denial, the SHB held that

"consideration of potential cumulative effects and precedential effects is warranted in any case where there is proof of impacts that risk harm to habitat, loss of community use, or a significant degradation of views and aesthetic values. In such cases, a balancing of the interests of project proponents, adjacent shoreline property owners, and those of the public is necessary."

20. The Board applied the Fladseth rule in Overaa v. Bauer, et al., SHB No. 10-015, a case also involving a residential pier, ramp and float on Hood Canal, but on the more developed western shore near Hoodspout. The County had granted the permit subject to a condition requiring a study comparing impacts to epibenthic prey resources at the site and at a nearby existing pier. Overaa, at Finding 17. The condition was adopted to consider cumulative impacts. Overaa, at Finding 11.

21. The Board upheld the permit and required the condition to be stricken or modified. It held that the circumstances of this location did not warrant a cumulative effects study, because the project is consistent with nearby uses and development, will not significantly change the character of the shoreline or the nearshore environment and will not adversely affect fish or their habitat. Overaa, at Findings 13 and 14.

22. The Board held also that

"[t]he general policies of RCW 90.58.020 present no bar to this type of project situated in an area where docks are allowed by the local Master Program and where harm to the nearshore environment and migrating salmon has not been demonstrated."

Overaa, at Finding 14. If this is intended to hold that RCW 90.58.020 and the SMA only require an examination of cumulative impacts when it is demonstrated that the project at issue alone will harm the environment, it is contrary to Hayes and cannot be followed. However, the Board's citation of Fladseth indicates that it is following that test in Overaa. Thus, reading this statement consistently with the Fladseth test is consistent with the Board's intention and avoids a conflict with Hayes.²

23. In summary, the characterization of cumulative impacts in the NEPA test above is most consistent with Hayes and Skagit County and will be followed. The Fladseth test will also be followed, requiring examination of cumulative impacts, "where there is proof of impacts that risk harm to habitat". (Emph. added.)

24. The Findings in Part N, above, make factual determinations of the extent of potential cumulative impacts and the extent to which they were analysed by the evidence. Before deciding whether these analyses of specific cumulative impacts meet the legal standards just discussed, two general points may be made. The discussion above shows that cumulative impacts can stem from both other existing uses and from potential future uses. As found, the uncontroverted evidence is that there are no pending applications for floating aquaculture facilities in Thurston, Mason or Pierce counties. No evidence of any plans for such facilities was offered. Given this, it would be wholly speculative and largely unproductive to require the applicant to analyse the effects of this proposal combined with those of potential unknown, unplanned future uses. More importantly, as long as the approach to cumulative impacts of this decision is followed, any new aquaculture facility would be reviewed for the cumulative impact of its own effects together with the effects of existing facilities. Done properly, this should avoid piecemeal consideration and ensure that the

² Overaa did not hold, as the Applicant states at Ex. 54, p. 24, that claims of cumulative effects are speculative and must be rejected, "unless there is proof that additional, similar projects will be proposed and approved under applicable regulatory criteria near the subject proposal".

"tipping point" to which some testified is not approached. For these reasons, the effects of this proposal should be examined together with those of existing and proposed uses. It is not necessary otherwise to attempt to project possible future uses in the area.

25. The second general point is that under RCW 90.58.030 this facility is proposed in a shoreline of statewide significance, since it is seaward of the line of extreme low tide. RCW 90.58.020 states that "the interest of all of the people shall be paramount in the management of shorelines of statewide significance" and imposes a mandatory preference of uses on those shorelines. The most highly preferred uses are those which

"(1) Recognize and protect the statewide interest over local interest;

(2) Preserve the natural character of the shoreline; [and]

(3) Result in long term over short term benefit . . ."

The more comprehensive view of cumulative impacts followed by this decision is more consistent with these policies than is the more restrictive SEPA version. It is also more consistent with the recognition in Fladseth, at Conclusion 15 that it is less likely that cumulative effects will need to be considered on a shoreline that is not a shoreline of statewide significance.

26. Turning now to specific areas, the Findings above show that the analysis of phytoplankton and the food web did take into account other producers and consumers of phytoplankton in the Inlet and did not view this proposal in isolation. It properly considered cumulative effects under the applicable standards. The Findings also show that the principal effect of mussels on zooplankton is through their consumption of phytoplankton and that that effect is minimal. Because the evidence does consider the cumulative effect on phytoplankton, it also

considers the cumulative effects on zooplankton through the consumption of phytoplankton. The cumulative effects on zooplankton are also properly considered.

27. Next, the Findings show that this project would remove substantial amounts of excess nitrogen from Totten Inlet, thus helping to prevent eutrophication and the depletion of oxygen that it leads to. The effect of this project on nitrogen levels and eutrophication will be beneficial. When a proposal reduces a potential adverse impact of other activities, there is no adverse cumulative impact of the project to examine in that area.

28. The Findings concerning dissolved oxygen (DO), though, showed that even though fish may be able to avoid the areas of low DO caused by this proposal, the evidence does not show whether the other aquaculture facilities in Totten Inlet also cause areas of deficient DO, how large those areas are, approximately what levels of DO they may have, or about how long they may persist. Instead, the direct effects of low DO from this project are considered in isolation, and we do not know their consequences when added to the effect of other operations. For the reasons set out in the Findings, this point is especially relevant to forage fish, given their nearby spawning areas.

29. This project, considered alone, could be benign in its reductions of DO, although it plainly poses a "risk" of harm under Fladseth. At some point, though, the accumulation of pockets of low DO in the Inlet, although transient, may do harm. The evidence is silent as to whether this proposal is approaching or crossing that point. Under RCW 90.58.020, Hayes, Skagit County and Fladseth, this does not properly consider cumulative impacts on DO or the cumulative impacts of low DO on aquatic life and habitat.

30. Next, the Findings show that the study by Dr. Brooks at Ex. 7, Tab 4 takes into account the cumulative effect of mussel production in Totten Inlet on benthic life. However, the evidence, as found, did not discuss the extent of *Beggiatoa* under the rafts or its effect on benthic life. Nor does the evidence make clear whether the high sulfide readings under the Deepwater

rafts, which the evidence showed were sufficient nearly to exclude or extirpate benthic life for a period of months, are expected to be exceeded over the finer sediments at the project site. Without evidence on the cumulative effects of *Beggiatoa* and sulfide levels beneath this proposal and other existing mussel facilities in the Inlet, cumulative effects on benthic life have not been covered under the standards above.

31. For the reasons set out in the Findings, the evidence adequately discusses cumulative effects concerning tunicates.

32. The Findings in Part N, above, discuss whether cumulative effects were properly weighed in considering potential spread of Gallo mussels or its hybrids. The Findings also note the concerns in an undated letter from the U.S Fish and Wildlife Service, which is set out in the FEIS comments.

33. Apart from the U.S.F.W.S. letter, the Findings determined that the evidence shows by a preponderance that this proposal, considered by itself, would not cause any significant spreading of or genetic pollution by Gallo mussels. The evidence also shows the same about the mussel facilities existing in 2002 in Totten Inlet, those at Deepwater and Gallagher Cove. The evidence does not show, however, the combined effect of potential Gallo dissemination when all mussel facilities in Totten Inlet are considered, including this proposal. As the Findings noted, if Deepwater and Gallagher together resulted in up to 3% Gallos and 10% hybrids in 2002, as the Brooks Study states, would the addition of the 58 rafts of this proposal increase those percentages proportionately? If so, what effect would that increase have? Or, would the addition of the 58 rafts of this proposal accelerate the spread of Gallos beyond a simple proportionate increase?

34. The evidence does not address the combined effect of this proposal and existing mussel cultivation in the Inlet on the spread of Gallos and hybrids. Without that, cumulative effects are not adequately addressed under the standards above.

35. Aside from the deficient areas identified above, the evidence shows that cumulative effects were adequately examined under the applicable standards.

2. The effect on views.

36. RCW 90.58.020 states that in the implementation of SMA policies,

"the public's opportunity to enjoy the physical and aesthetic qualities of natural shorelines of the state shall be preserved to the greatest extent feasible consistent with the overall best interest of the state and the people generally."

37. As relevant to views and aesthetics, the SMP implements these policies through a number of provisions. First, the SMP allows aquaculture in Conservancy shorelines such as this, "provided the operation is consistent with the policies and regulations of this program and chapter." SMP, Section 3, II, D. This is a legislative determination that even with their inherent effect on views, facilities such as this are allowed in the proposed location, as long as consistent with the SMP's policies and regulations. The validity of this legislative determination is not here at issue. Therefore, it must be accepted.

38. The SMP policies and regulations listed above specifically governing aquaculture contain only one provision dealing with views, the policy at Section 3, II, B, 5 that "[a]quacultural development should consider and minimize the detrimental impact it might have on views from upland property." Also applicable is the Regional Criterion at SMP Section 2, V, G, which states:

"Shorelines of this Region which are notable for their aesthetic, scenic, historic or ecological qualities shall be preserved. Any private or public development which would degrade such shoreline qualities shall be discouraged . . ."

39. One of the conditions of approval proposed by the Staff Report requires that

"The mussel rafts shall be kept in a neat and orderly manner. Materials that are not part of the rafts shall not be stored on the rafts."

40. The dueling visual analyses described in the Findings disagree in many ways. The Applicant's analysis states that from 10 to 15 residences would have sustained views of the raft array, but that the rafts would not be in the center of the view of the majority of those residences. APHETI's analysis states that at least 25 to 30 residences would have sustained views and that the facility would be directly in line with typical viewing corridors. The analyses disagree about the elevation of affected residences and the severity of the effect on views. The Applicant's analysis concluded it would have a moderate visual impact, while APHETI's analysis concluded the visual impact would be high.

41. What can be distilled from this is that from 10 to 30 residences will have views of this large raft array not far from the shore where now lies open water. The evidence also shows through testimony and photographs that other mussel rafts operated by the Applicant in the area have been piled with unsightly collections of equipment and other objects, some of which appear three to four times as high above the water line as the raft itself. The testimony indicated that the rafts are cleaned only when complaints are made. None of this evidence was rebutted. See Findings 36, et seq.

42. The first policy dealing with views is that aquaculture should "consider and minimize" any detrimental impact on views from upland properties. On pp. 20 and 21 of its post-hearing brief at Ex. 54, the Applicant lists a number of ways in which it has minimized visual impact. The first two of these note that the Applicant reduced the size of the current proposal by over 55% and dropped its proposal to expand the nearby Gallagher Cove raft array. Abandoning plans to expand

the Gallagher Cove facility, though, does nothing to reduce the effect on views of the proposed facility. More importantly, allowing reductions in scope alone to satisfy the minimization policy would create an incentive to initially propose larger projects than are likely needed and then to reduce them to the planned size. There is no evidence that the Applicant here engaged in such a strategy. However, this possibility in other cases counsels against allowing reductions in project scope alone to meet this policy.

43. Other points listed by the Applicant, though, do constitute legitimate minimization: measures affecting alignment, spacing, profile, materials and colors of the raft facility. Most important, though, is the un rebutted evidence that other raft arrays have contained large collections of prominent and unsightly materials. Without effectively preventing that in this proposal, it cannot be said that visual impact has been effectively minimized. The proposed condition would require the rafts to be kept "in a neat and orderly manner", without storage of materials that are not part of the rafts. The Applicant has represented under oath that it will comply with this condition. However, the past unsightly storage and the reduced scope of the County's ability to monitor and enforce due to severe budget cuts call into question the practical enforceability of this condition. It is neither fair nor efficient to require nearby residents to fund enforcement of this condition by hiring their own lawyers.

44. There are other enforcement mechanisms, though, which should be effective in enforcing this condition. RCW 90.58.210 (2) states that any person who fails to conform to the terms of a shoreline permit

"shall also be subject to a civil penalty not to exceed one thousand dollars for each violation. Each permit violation or each day of continued development without a required permit shall constitute a separate violation."

Both Thurston County and the Department of Ecology have the authority to impose these civil penalties under RCW 90.58.210.

45. In addition, RCW 90.58.210 states that the attorney general and the County prosecutor

"shall bring such injunctive, declaratory, or other actions as are necessary to ensure that no uses are made of the shorelines of the state in conflict with the provisions and programs of this chapter, and to otherwise enforce the provisions of this chapter."

Further, under RCW 90.58.220 violations of the SMA or an SMP are punishable as gross misdemeanors.

46. With these enforcement mechanisms, the following additional conditions will help assure the enforcement of the condition concerning storage on the rafts:

The condition concerning storage on the rafts shall be strictly interpreted and implemented;

The Applicant shall provide to any nearby upland property owner who requests an updated telephone number and e-mail address through which complaints may be lodged with the Applicant about the upkeep and condition of the rafts and compliance with this condition;

The Applicant shall promptly respond to any such complaints and take all measures needed to comply with the condition concerning storage on the rafts;

If any person believes the Applicant is not complying with this condition, he or she may request the County or the Department of Ecology to assess daily civil penalties under the authority above.

These conditions will be included in any approval of this permit.

47. The second policy noted above is the Regional Criterion at SMP Section 2, V, G, which states:

"Shorelines of this Region which are notable for their aesthetic, scenic, historic or ecological qualities shall be preserved. Any private or public development which would degrade such shoreline qualities shall be discouraged . . ."

48. As described in the Findings, Totten Inlet is not pristine and undisturbed, but remains a place of natural beauty. Although a somewhat subjective judgment, the evidence described in the Findings, especially the descriptions in some of the comments in Ex. 15, show that this part of Totten Inlet is notable for its aesthetic and scenic qualities. Thus, SMP Section 2, V, G requires that these shorelines be "preserved" and that development which would degrade those qualities be "discouraged".

49. The Regional Criteria begin with the statement that "[a]ll development within the jurisdiction of this Master Program shall demonstrate compliance" with them. By their nature, the proposed mussel rafts would degrade the aesthetic and scenic qualities of these shorelines and thus would not preserve those qualities as they now are. Thus, this Regional Criterion indicates that the proposal should be denied.

50. However, denying this proposal on this basis would effectively prohibit mussel rafts in Totten Inlet. Virtually no matter where located in the Inlet, a mussel raft facility would be visible from some upland properties and by users of the Inlet. No matter how neatly kept or well camouflaged, mussel rafts would inherently have the characteristics which are inconsistent with this Regional Criterion. As noted, all types of aquaculture are allowed in the Conservancy environment,

"provided the operation is consistent with the policies and regulations of this program and chapter." SMP, Section 3, II, D. Almost the entire Thurston County shoreline of Totten Inlet is designated Conservancy. To read this Regional Criterion effectively to prohibit mussel rafts, a type of aquaculture, in Totten Inlet would conflict with the provision expressly allowing it in the Conservancy environment. It would also conflict with the policies in SMP Section 3, II, B, which expressly encourage aquacultural uses in this shoreline environment.

51. A standard rule of statutory construction is that all of the provisions of an act must be considered in relation to one another and, if possible, harmonized to insure the proper construction of each. Willis v. Simpson Investment Co., 79 Wn. App. 405, 411 (1995). When the SMP expressly allows and encourages aquaculture, including mussel rafts, in the Conservancy environment, it does not constitute harmonization to read the Regional Criterion to prohibit mussel rafts in the Conservancy environment due to their effect on views. Stated another way, the SMP contains a legislative determination that mussel rafts are an allowed use in the Conservancy environment and are not prohibited by the ineluctable, inherent appearance of such rafts. The Regional Criterion at issue can require modifications to the size, array, color, construction, and upkeep of the rafts. However, since these facilities are permitted, it cannot be read to prohibit them due to an inescapable characteristic of their appearance.

52. Subject to the conditions below, this proposal complies with the standards and policies of the SMP concerning views and aesthetics.

3. The meaning of the term "significant".

53. Beginning on p. 1-15, the FEIS discusses a list of potential environmental effects and concludes for each that this proposal will have no significant unavoidable adverse impacts. The FEIS also lists mitigation measures that will avoid, minimize or compensate for potential adverse effects of the proposal. See Ex. 8, pp. 1-15 and following.

54. In ordinary English, to say that an impact is insignificant suggests that it is minimal, even trivial; and that no further attention need be paid to it. With this sense of the word, the conclusions of the FEIS imply that the environmental effects of the project are not cause for further concern.

55. "Significant" is defined under SEPA by WAC 197-11-794 and Norway Hill v. King County, 87 Wn.2d 267, 278 (1976), as a reasonable likelihood of more than a moderate adverse impact on environmental quality. The determination of significance includes

"the examination of at least two relevant factors: (1) the extent to which the action will cause adverse environmental effects in excess of those created by existing uses in the area, and (2) the absolute quantitative adverse environmental effects of the action itself, including the cumulative harm that results from its contribution to existing adverse conditions or uses in the affected area."

Norway Hill v. King County, 87 Wn.2d at 277.

56. Perhaps of most guidance is the fact that the presence of probable, significant adverse effects under SEPA is the litmus for requiring an EIS. See WAC 197-11-310 and following. Only when an impact is severe enough to warrant an EIS, an unusual event, can it be significant under SEPA. Thus, if "significance" is given the more common meaning noted above, impacts would warrant conditioning or denial under the underlying permit standards only if an EIS were prepared. SEPA, however, plainly preserves the authority to condition or deny permits through the underlying standards, even when an EIS is not required (as long as substantive SEPA is not used for denial). Therefore, the more ordinary meaning of "significant" noted above cannot be used in interpreting the statements in the FEIS that there are no significant unavoidable adverse impacts. As Mr. Pedersen testified and the Applicant pointed out at Ex. 54, p. 28, the inquiry into

significance under SEPA is certainly relevant in determining whether a proposal meets applicable standards. However, the finding of no significant impact does not necessary mean that all standards relating to that impact are met.

C. Summary of areas of compliance and noncompliance with the governing standards.

57. The following Conclusions describe compliance with the governing standards by examining the principal impacts of the proposal.

58. As far as the effect on nutrients and DIN is concerned, the proposal complies with the standards noted above. The evidence properly considers cumulative impacts in this area and no further analysis of cumulative impacts is required.

59. As far as the effect on phytoplankton, zooplankton, macroalgae and the food web is concerned, the proposal complies with the standards noted above. The evidence properly considers cumulative impacts in this area and no further analysis of cumulative impacts is required.

60. As far as the effect on views and aesthetics is concerned, the proposal complies with the standards noted above. The evidence properly considers cumulative impacts in this area and no further analysis of cumulative impacts is required.

61. As held above, under RCW 90.58.020, Hayes, Skagit County and Fladseth, the evidence submitted does not properly consider cumulative impacts of this project on dissolved oxygen (DO). In the absence of an adequate cumulative effects analysis, it cannot be concluded that this proposal complies with governing standards as far as its effect on DO is concerned.

62. The need for a cumulative analysis of the effects on DO is especially relevant to forage fish, given their nearby spawning areas and the widespread spawning areas for surf smelt

and sand lance in Totten Inlet, as shown on Ex. 37. The evidence discussed in the Findings also establishes the need for a forage fish spawning survey at the Old Plant site and conditions requiring that all raft assembly activities, including associated walking and transport, be kept off the documented herring spawning area and any other forage fish spawning area disclosed by the survey at the Old Plant site.

63. Turning to the benthic community, the analysis of compliance is more involved. As set out above in Part B, 1 of the Conclusions, the study at Ex. 7, Tab 4 does discuss the cumulative effect of mussel production in Totten Inlet on benthic life. However, the evidence did not examine the extent of *Beggiatoa* under these or other raft facilities or its effect on benthos. It is also not clear whether the high sulfide readings under the Deepwater rafts, which the evidence showed were sufficient nearly to exclude or extirpate benthic life for a period of months, are expected to be exceeded over the finer sediment at the project site or are found under other mussel raft facilities in the Inlet. The cumulative effects on benthic life of *Beggiatoa* and sulfide levels beneath this proposal and other existing mussel facilities in the Inlet have not been covered under the standards above.

64. Apart from the question of cumulative impacts, the evidence showed high sulfide concentrations under the Deepwater rafts in the summer of 2002 just before harvest from 12,800 to 15,300 micromoles, as found above. This was deemed "significant" and "sufficiently high to exclude most infaunal organisms", as also found. Even higher sulfide concentrations were apparently recorded in November 2002. The Brooks Study at Ex. 7, Tab 3, p. 40 states that

"if sediments under the rafts had contained higher concentrations of fine material (silts and clays), the moderately high sulfide concentrations observed in July would have excluded sensitive infauna and the very high sulfide concentrations observed in November 2002 would have excluded all but a few opportunistic annelids."

As also found, the evidence suggests that the sea bed beneath the project site has higher concentrations of silts and clays than does the coarse sediment grain beneath Deepwater. This suggests that, consistently with the excerpts from Ex. 7, Tab 3, pp. 38 and 40, above, the sulfide concentrations observed in 2002 would likely have excluded most infaunal organisms if they occurred at the project site.

65. Even though temporary and limited in area, the apparent likely near extirpation of benthic life under the rafts is troubling, and it is not certain whether that consequence was specifically examined by the ITRC. Further, the evidence discussed at Finding 95 disclosed a three-inch layer of "sludge" covering the sea bed beneath the rafts at Gallagher Cove, to which the FEIS responded that the project site

"is better suited for mussel farming due primarily to better circulation that allows for the distribution of wastes in a manner to optimize aerobic assimilation into the existing food web instead of anaerobic decomposition that would, at higher levels, result in die-off of benthic infauna."

See Finding 97. In addition, Dr. Brooks concluded that biological characteristics under the rafts would be remediated within about seven months. Finding 103. Finally, as discussed in the Findings, there is very little evidence about the extent or effect of the *Beggiatoa* that may be caused by this proposal.

66. To determine compliance with the requirements to protect habitat found in Section B of the Regional Criteria of the SMP, additional information on the effect on benthic life is needed on at least the following points:

- a. Approximately how long will the high sulfide concentrations described in Finding 100 typically persist in a mussel raft growth cycle?

- b. Approximately how long will these levels exclude or extirpate benthic infauna as described in the materials cited in Findings 100 through 102?

- c. Finding 103 cites evidence that it will take about seven months for the benthic infauna to recover from the effects of the high sulfide levels. Given the length of the growth cycle, does this comply with the Regional Criteria?

- d. What effect will the deposition of organic material, as described in Findings 94 through 97, have on benthic life at this site?

- e. Finding 104 points out the absence of technical analysis of the extent or effect of *Beggiatoa*. Approximately how long will *Beggiatoa* typically persist under the rafts in each growth cycle and what effect does that have on benthic organisms?

- f. Are the high sulfide levels, deposition of organic material, and generation of *Beggiatoa*, and the resulting effect on benthos, an inherent or inevitable aspect of mussel raft culture in Totten Inlet? Can these effects be reduced or avoided through changes in location of the facility or in its method of operation?

67. As far as the effect on salmonids and whales is concerned, the proposal complies with the standards noted above. The evidence properly considers cumulative impacts in this area and no further analysis of cumulative impacts is required.

68. As far as the effect on the spread of tunicates is concerned, the proposal complies with the standards noted above. The evidence properly considers cumulative impacts in this area and no further analysis of cumulative impacts is required.

69. Turning to the potential spread or hybridization of Gallo mussels, two points are important. First, the Findings note a letter at Ex. 8, p. 2-126 from the U.S. Fish and Wildlife Service to the Corps of Engineers which opposes growing Gallo mussels on rafts in Totten Inlet, because of the risk to the native mussel and the wildlife species that feed on it. The only responses to this letter are the statements in the FEIS that no date is given for the letter and that the Applicant's Director of Regulatory Affairs believes it was prepared in response to a proposed mussel facility on Whidbey Island over 15 years ago and is outdated. The FEIS also states that more recent review by the U.S.F.W.S. is in the Biological Opinion prepared for NWP 48 in 2009, which did not recommend any conservation measures relative to cultivating Gallo mussels. However, as found, NWP 48 covers existing shellfish operations, not proposals for future facilities such as this.

70. Speculation that the U.S.F.W.S. letter is old or applies to something else is not a sufficient response to its opposition to growing Gallo mussels on rafts in Totten Inlet. Without evidence as to the date and purpose of the letter, or a superseding statement from U.S.F.W.S., or other relevant response, it is questionable whether this proposal is consistent with SMP Section 2 V B, above, or the policies of RCW 90.58.020 expressing concern about the "utilization, protection, restoration, and preservation" of the shorelines" and expressing "a clear and urgent demand for a planned, rational, and concerted effort . . . to prevent the inherent harm in an uncoordinated and piecemeal development of the state's shorelines."

71. Second, as concluded above, the evidence shows by a preponderance that this proposal, considered by itself, would not cause any significant spreading of or genetic pollution by Gallo mussels. The evidence also shows the same about the mussel facilities existing in 2002 in Totten Inlet, those at Deepwater and Gallagher Cove. The evidence does not show, however, the combined effect of potential Gallo dissemination when all mussel facilities in Totten Inlet are considered, including this proposal. For that reason, the evidence does not properly consider the cumulative effects of this proposal on the spreading of or genetic pollution by Gallo mussels.

72. As found, evidence was submitted that a strong unpleasant odor is created by mussel rafts, their predator nets, and seals and sea lions using the rafts as a rookery. The Applicant testified that nets smell when stored on the beach and that the Applicant will no longer store them there. Odors are not covered by the SMP's aquaculture policies or regulations or by its Regional Criteria. However, the policies of RCW 90.58.020 recognize and protect private property rights consistent with the public interest, and SMP Section Two, III states that permitted uses shall be conducted in a manner to minimize, to the extent feasible, any resultant damage to the ecology and environment of the shoreline area and any interference with the public's use of the water.

73. Since aquaculture is expressly allowed by the SMP in this area, it is clear that the SMP does not prohibit aquaculture due to odors which are inherent and inevitable in its nature. The policies above are equally clear that proposals should be conditioned to minimize offensive odors. Therefore, the Applicant should be required to not store nets on the beach or the rafts and to take measures needed to prevent seals and sea lion from using the rafts as a rookery. The Applicant should also be required to keep the rafts clean, especially of odor causing substances. These measures, together with the condition governing storage on the rafts, should reduce odors to the extent practicable.

74. On the question of plastics, the evidence showed that aquacultural activities in Totten Inlet generate plastic debris that drifts on the water and washes up on shore. The preponderance of the evidence is that this debris poses a danger to fish and other sea life. The principal plastic debris the evidence attributed to mussel rafts were plastic disks of the type found at Ex. 23. The Applicant testified that it has stored disks on scows and that from now on they will be stored on land, that retaining nets around the rafts will generally catch any disks that fall off, and that the condition proposed by the Staff concerning storage on the rafts should eliminate plastic materials falling off a raft. Ms. Schoof, a toxicologist, stated that not storing extra equipment on the rafts

and removing plastic items upon evidence they are becoming brittle or subject to degradation "is anticipated to reduce or eliminate the risk that the aquaculture gear will release microplastics.

75. On this evidence, any approval of this proposal should be conditioned on requiring the Applicant to store all plastic disks on land, not on scows or on other water craft or on the rafts; to install and maintain retaining nets around the rafts which will catch any disks that fall off; to comply with the condition proposed by the Staff concerning storage on the rafts; and to remove plastic items upon evidence they are becoming brittle or subject to degradation.

76. As far as all other impacts and issues are concerned, the proposal complies with the standards noted above.

77. The remaining question is the proper response to the deficiencies described above. The law requires an adequate analysis of cumulative impacts before an SDP may be issued. As shown, that was not carried out for this proposal in three areas, dissolved oxygen, the effect on the benthic community, and the spreading of or genetic pollution by Gallo mussels. Therefore, the application could be denied at this stage on that basis. As also shown, however, this proposal has undergone an extraordinary amount of review, including an evaluation of the Applicant's technical reports by an independent panel of high qualifications. The deficiencies in the review of cumulative impacts are ones of process, not substance; that is, until this review is carried out, we do not know whether the cumulative impacts in fact will allow approval or require denial. Under these circumstances, it would serve neither fairness nor efficiency to deny the entire project and require the Applicant to appeal to obtain the right to carry out the required cumulative impacts analysis.

78. Therefore, this decision will give the Applicant a choice. It may inform the Hearing Examiner that it wishes to challenge the determination that the present analysis of cumulative impacts is deficient and the requirement to perform an additional analysis under the standards above. In that case, I will issue a supplemental decision denying the application on that basis,

and the Applicant may appeal. Alternatively, the Applicant may inform the Examiner that it wishes to carry out the analysis of cumulative effects required by this decision. In that case, the Examiner and the parties will confer about the timing and nature of that analysis.

79. In addition, the discussion above discloses two areas apart from cumulative effects where the preponderance of the evidence is insufficient to show compliance with the governing standards. First, whether the apparent near exclusion or extirpation of benthic life under the rafts, although temporary and limited in area, is consistent with the governing standards, and second, whether the position stated in the letter from the U.S.F.W.S. on the spread or hybridization of Gallo mussels is applicable to this proposal.

80. If the Applicant chooses to undertake further examination of cumulative impacts, then it is fairest and most efficient to allow it and other parties to submit supplemental evidence and argument on these two issues. If the Applicant chooses not to do so, then I would make a decision on these two issues on the basis of the evidence already submitted.

III. DECISION

An adequate analysis of cumulative impacts was not carried out as required by governing standards in three areas, dissolved oxygen, the effect on the benthic community, and the potential spreading of or genetic pollution by Gallo mussels. For this reason, the application does not comply with the standards governing issuance of the SDP. An adequate examination of cumulative impacts does not necessarily require examining other aquaculture facilities to the same degree this proposal was examined. It does, however, require an examination consistent with the Conclusions, above.

Apart from cumulative impacts, additional evidence is needed in two other areas. First, as discussed in Conclusions 64 through 66, additional information is needed to determine whether the

proposal's effect on benthic life is consistent with the governing standards. Specifically, additional information would be helpful on at least the following points:

- a. Approximately how long will the high sulfide concentrations described in Finding 100 typically persist in a mussel raft growth cycle?
- b. Approximately how long will these levels exclude or extirpate benthic infauna as described in the materials cited in Findings 100 through 102?
- c. Finding 103 cites evidence that it will take about seven months for the benthic infauna to recover from the effects of the high sulfide levels. Given the length of the growth cycle, does this comply with the Regional Criteria?
- d. What effect will the deposition of organic material, as described in Findings 94 through 97, have on benthic life at this site? Does that effect comply with the Regional Criteria?
- e. Finding 104 points out the absence of technical analysis of the extent or effect of Beggiatoa. Approximately how long will Beggiatoa typically persist under the rafts in each growth cycle and what effect does that have on benthic organisms?
- f. Are the high sulfide levels, deposition of organic material, and generation of Beggiatoa, and the resulting effect on benthos, an inherent or inevitable aspect of mussel raft culture in Totten Inlet? Can these effects be reduced or avoided through changes in location of the facility or in its method of operation?

Second, on the issue of possible spreading and/or hybridization of Gallo mussels, evidence is needed whether the position stated in the letter from the U.S.F.W.S. in Finding 140 concerning the

spread of Gallo mussels applies to this proposal and, if so, whether it affects the determination of compliance with the Regional Criteria.

In all other areas, the proposal complies with the standards noted above. The evidence properly considers cumulative impacts in these other areas and no further analysis of cumulative impacts is required for them.

For the reasons set out in Conclusions 77 through 80, above, the Applicant is given two options for proceeding. First, it may inform the Hearing Examiner that it wishes to challenge the determination that the present analysis of cumulative impacts is deficient and the requirement to perform an additional cumulative analysis. In that case, I will issue a supplemental decision denying the application on that basis, and the Applicant may appeal. Alternatively, the Applicant may inform the Examiner that it wishes to carry out the analysis of cumulative effects required by this decision. In that case, the Examiner and the parties will confer about the timing and nature of that analysis.

If the Applicant chooses to undertake further examination of cumulative impacts, then it and other parties may submit supplemental evidence and argument on the two other issues just noted: that relating to benthic life and that relating to the effect of the U.S.F.W.S. letter. If the Applicant chooses not to undertake the additional cumulative impacts analysis, then I would make a decision on these two issues on the basis of the evidence already submitted.

Due to the length of this decision and the detailed nature of the issues, the Applicant will have 30 days from the date of this decision to decide which of the two options it desires. If the Applicant desires more time, that will be allowed.

The following conditions do not relate to the issues above on which further proceedings may be held, and they will be imposed on any project approval:

HEARING EXAMINER DECISION IN NO. 961372

PAGE 91

A. Conditions 1 through 4 on Page 11 of the Staff Report at Ex. 14 are incorporated by reference.

B. One off these incorporated conditions requires that

"The mussel rafts shall be kept in a neat and orderly manner. Materials that are not part of the rafts shall not be stored on the rafts."

For the reasons discussed in Conclusions 43 through 46, the following additional conditions are imposed to implement this condition:

1. This condition shall be strictly interpreted and implemented;
2. The Applicant shall provide to any nearby upland property owner who requests an updated telephone number and e-mail address through which complaints may be lodged with the Applicant about the upkeep and condition of the rafts and compliance with this condition;
3. The Applicant shall promptly respond to any such complaints and take all measures needed to comply with this condition;
4. If any person believes the Applicant is not complying with this condition, he or she may request the County or the Department of Ecology to assess daily civil penalties under RCW 90.58.210 (2).

C. The Applicant shall conduct a forage fish spawning survey at the Old Plant site, consistently with accepted scientific standards. The Applicant shall inform Mr. Penttila of the date of any site visit associated with the survey and allow him to be present. The Applicant shall submit the

results of this survey to Mr. Pentilla, Mr. Donckers, Mr. Smith and to any other party to this proceeding who requests.

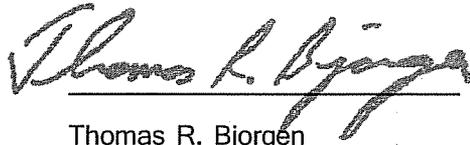
D. All raft assembly activities, including associated walking and transport, shall be kept off the documented herring spawning area at the Old Plant site and any other forage fish spawning area disclosed by the survey at the Old Plant site.

E. The Applicant is required to store all plastic disks on land, not on scows or on other water craft or on the rafts; to install and maintain retaining nets around the rafts which will catch any disks that fall off; to comply with Condition B noted above concerning storage on the rafts; and to remove plastic items upon evidence they are becoming brittle or subject to degradation.

F. The Applicant shall not store nets on the beach or on the rafts and shall take measures needed to prevent seals and sea lions from using the rafts as a rookery. The Applicant shall keep the rafts clean, especially of odor causing substances.

G. References to the Applicant in these conditions apply also to any person acting on behalf of the Applicant and to any successor.

Dated this 19th day of July, 2012.

A handwritten signature in black ink, appearing to read "Thomas R. Bjorgen", written over a horizontal line.

Thomas R. Bjorgen

Thurston County Hearing Examiner



Project No. 961372 SSDP
 Appeal Sequence No.: _____

Check here for: **RECONSIDERATION OF HEARING EXAMINER DECISION**

THE APPELLANT, after review of the terms and conditions of the Hearing Examiner's decision hereby requests that the Hearing Examiner take the following information into consideration and further review under the provisions of Chapter 2.06.060 of the Thurston County Code:

(If more space is required, please attach additional sheet.)

Check here for: **APPEAL OF HEARING EXAMINER DECISION**

TO THE BOARD OF THURSTON COUNTY COMMISSIONERS COMES NOW _____
 on this _____ day of _____, 20____, as an APPELLANT in the matter of a Hearing Examiner's decision rendered on _____, 20____, by _____ relating to _____

THE APPELLANT, after review and consideration of the reasons given by the Hearing Examiner for his decision, does now, under the provisions of Chapter 2.06.070 of the Thurston County Code, give written notice of APPEAL to the Board of Thurston County Commissioners of said decision and alleges the following errors in said Hearing Examiner decision:

Specific section, paragraph and page of regulation allegedly interpreted erroneously by Hearing Examiner:

1. Zoning Ordinance _____
2. Platting and Subdivision Ordinance _____
3. Comprehensive Plan _____
4. Critical Areas Ordinance _____
5. Shoreline Master Program _____
6. Other: _____

(If more space is required, please attach additional sheet.)

AND FURTHERMORE, requests that the Board of Thurston County Commissioners, having responsibility for final review of such decisions will upon review of the record of the matters and the allegations contained in this appeal, find in favor of the appellant and reverse the Hearing Examiner decision.

STANDING

On a separate sheet, explain why the appellant should be considered an aggrieved party and why standing should be granted to the appellant. This is required for both Reconsiderations and Appeals.

Signature required for both Reconsideration and Appeal Requests

 APPELLANT NAME PRINTED

 SIGNATURE OF APPELLANT

 Address

 Phone

Please do not write below - for Staff Use Only:

Fee of \$595.00 for Reconsideration or \$820.00 for Appeal. Received (check box): Initial _____ Receipt No. _____
 Filed with the Resource Stewardship Department this _____ day of _____, 20____.

THURSTON COUNTY
PROCEDURE FOR RECONSIDERATION AND APPEAL
OF HEARING EXAMINER DECISION TO THE BOARD

NOTE: THERE MAY BE NO EX PARTE (ONE-SIDED) CONTACT OUTSIDE A PUBLIC HEARING WITH EITHER THE HEARING EXAMINER OR WITH THE BOARD OF THURSTON COUNTY COMMISSIONERS ON APPEALS (Thurston County Code, Section 2.06.030).

If you do not agree with the decision of the Hearing Examiner, there are two (2) ways to seek review of the decision. They are described in A and B below. Unless reconsidered or appealed, decisions of the Hearing Examiner become final on the 15th day after the date of the decision.* The Hearing Examiner renders decisions within five (5) working days following a Request for Reconsideration unless a longer period is mutually agreed to by the Hearing Examiner, applicant, and requester.

The decision of the Hearing Examiner on an appeal of a SEPA threshold determination for a project action is final. The Hearing Examiner shall not entertain motions for reconsideration for such decisions. The decision of the Hearing Examiner regarding a SEPA threshold determination may only be appealed to Superior Court in conjunction with an appeal of the underlying action in accordance with RCW 3.21C.075 and TCC 17.09.160. TCC 17.09.160(K).

A. RECONSIDERATION BY THE HEARING EXAMINER (Not permitted for a decision on a SEPA threshold determination)

1. Any aggrieved person or agency that disagrees with the decision of the Examiner may request Reconsideration. All Reconsideration requests must include a legal citation and reason for the request. The Examiner shall have the discretion to either deny the motion without comment or to provide additional Findings and Conclusions based on the record.
2. Written Request for Reconsideration and the appropriate fee must be filed with the Resource Stewardship Department **within ten (10) days of the written decision**. The form is provided for this purpose on the opposite side of this notification.

B. APPEAL TO THE BOARD OF THURSTON COUNTY COMMISSIONERS (Not permitted for a decision on a SEPA threshold determination for a project action)

1. Appeals may be filed by any aggrieved person or agency directly affected by the Examiner's decision. The form is provided for this purpose on the opposite side of this notification.
2. Written notice of Appeal and the appropriate fee must be filed with the Resource Stewardship Department **within fourteen (14) days of the date of the Examiner's written decision**. The form is provided for this purpose on the opposite side of this notification.
3. An Appeal filed within the specified time period will stay the effective date of the Examiner's decision until it is adjudicated by the Board of Thurston County Commissioners or is withdrawn.
4. The notice of Appeal shall concisely specify the error or issue which the Board is asked to consider on Appeal, and shall cite by reference to section, paragraph and page, the provisions of law which are alleged to have been violated. The Board need not consider issues, which are not so identified. A written memorandum that the appellant may wish considered by the Board may accompany the notice. The memorandum shall not include the presentation of new evidence and shall be based only upon facts presented to the Examiner.
5. Notices of the Appeal hearing will be mailed to all parties of record who legibly provided a mailing address. This would include all persons who (a) gave oral or written comments to the Examiner or (b) listed their name as a person wishing to receive a copy of the decision on a sign-up sheet made available during the Examiner's hearing.
6. Unless all parties of record are given notice of a trip by the Board of Thurston County Commissioners to view the subject site, no one other than County staff may accompany the Board members during the site visit.

C. STANDING All Reconsideration and Appeal requests must clearly state why the appellant is an "aggrieved" party and demonstrate that standing in the Reconsideration or Appeal should be granted.

D. FILING FEES AND DEADLINE If you wish to file a Request for Reconsideration or Appeal of this determination, please do so in writing on the back of this form, accompanied by a nonrefundable fee of **\$595.00** for a Request for Reconsideration or **\$820.00** an Appeal. Any Request for Reconsideration or Appeal must be **received** in the Permit Assistance Center on the second floor of Building #1 in the Thurston County Courthouse complex no later than 4:00 p.m. per the requirements specified in A2 and B2 above. **Postmarks are not acceptable.** If your application fee and completed application form is not timely filed, you will be unable to request Reconsideration or Appeal this determination. The deadline will not be extended.

* Shoreline Permit decisions are not final until a 21-day appeal period to the state has elapsed following the date the County decision becomes final.