

STATE OF ALASKA

MAR 9 1998

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October 25, 1996

Post-it* Fax Note	7671	Date	3/5	# of pages	14
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Mr. Mark Blakeslee
Clean Lakes for Kodiak
Post Office Box 3696
Kodiak, AK 99516

Dear Mr. Blakeslee:

Re: Kodiak Urban Lakes Project - Draft Technical Report, and Draft Assessment of the Character and Health of Kodiak's Urban Watershed and Lakes

Per your request, the Alaska Department of Fish and Game (ADF&G) has completed a critical review of the first drafts of the subject reports. The Kodiak Clean Lakes Project appears to be a very ambitious and worthwhile effort to collect baseline data which may be useful in identifying problems and developing recommendations for solutions. Toward that end the following comments are provided for your consideration. Our comments are divided into two sections. First we address concerns about the technical report, then we present comments on the assessment document.

Technical Report

The following comments are presented sequentially by each major topic section of the report. As written and formatted, we found the technical report hard to use. Many of our comments deal with report organization and data presentation. Tidbits of methodology, results, analysis and discussion, and recommendations are scattered throughout the report making it difficult to determine what was being presented, why it was being presented in a particular part of the report, and what the basis for many statements was founded upon. In some instances we were left with the impression that decisions concerning a course of action have been already been made and that the report was being used to try to justify a position even though the data does not support it.

Executive Summary: Overall we note that several sections contain hypothetical predictions or subjective statements that are not yet substantiated by the data that has been collected. We recommend that prognostic statements be removed from the document and that only objective information be presented until such time as reliable data has been gathered and reported. If predictions are to be made, separate sections should be added to the report. These sections should contain discussion and analysis of data and recommendations or predictions based upon that analysis.

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Section III. ASSESSMENT WORK - We suggest that this methods summary be relocated to become a separate part of the text that follows the executive summary but precedes the results sections. Also expand the methods section to explain the scientific design used for the sampling protocols and how the resulting raw data will be statistically tested to determine levels of significance. We note that much of the information contained in Section 4.0 (Results by Task) includes a presentation on the methods used. The present format makes presentation of the results confusing and review of the results is extremely cumbersome. Many questions arose simply because the definition, procedure, or explanation is housed in an obscure part of Section 4 of the report. Therefore, we recommend that all methods-related information be removed from the Results Sections 3.0 and 4.0 and that a separate Methods Section be added to the report.

The report uses many undefined or inappropriate terms. Examples include the word "weed" (as found in section III 5 b, IV 3, IV 3 b, c, h, VI 5 d, Tables 3-1A-I, as well as other locations) which has a negative connotation. The terms plant, aquatic plant, vegetation, or macrophyte are more neutral and objectively portray the facts. The term basically "healthy" is used in sections IV 1 and 2 but it is not defined. What condition factors or criteria were examined to determine health? Is healthy as used in this context a range or percentage and in comparison to what control? We note that the assessment document contained a glossary of terms that could be expanded to include additional relevant vocabulary for this report. Enclosure 1 is an alphabetized and expanded glossary that would be useful in presenting more unbiased baseline information. We also suggest including a short table of conversions for the benefit of the reader because some results are expressed in metric figures while others are not. For example conversions of meters to feet, acres to square meters, acre-feet to cubic meters, milligrams per liter = parts per million, micrograms per liter = parts per billion. Such a table could follow or be incorporated in the glossary.

Section IV-1 (Island Lake System) - Please clarify that this system flows into the ocean at Mill Bay.

- a. **STOCKED SILVER SALMON:** The assessment of silver salmon in this system appears to be subjective. Data are not provided in the report to substantiate the statement that stocks are abundant and healthy, nor that the growth rate is slower in some lakes due to lower productivity. Sampling may have been biased and limited. What unit of measure is used to determine abundance? Traps were fished for various periods of time and no data are presented which expands the catch into consistent, comparable time periods or which allows for trap saturation. Estimates of returning adult salmon is not presented nor is data about other species of fish trapped. Statistics are not presented to indicate that populations are different.
- b. **SILTATION:** We note that the siltation has likely already affected salmon production.

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- g. **AESTHETIC CONDITIONS:** To whom is the lake visually unappealing and what does lake depth have to do with it? Although accelerated by development in the area of Upper Horseshoe Lake the filling of a lake is a natural process.
- h. **OTHER:** What is the biomass of the freshwater clams in Beaver, Dark, and Island lakes? What is their water filtering ability and capacity?

Section IV-2 (Potato Patch Lake fed by Lily lake) - We suggest that the Lily Lake and Potato Patch Lake section be separated. The lakes have distinctly different fish species compositions, bathymetric features, and water quality characteristics.

- a. **STOCKED SILVER SALMON:** The assessment of silver salmon in this system appears to be subjective. Data are not provided in the report to substantiate the statement that stocks are abundant and healthy, nor that the growth rate is slower in some lakes due to lower productivity. Sampling may have been biased and limited. Traps were fished for various periods of time and no data are presented which expands the catch into consistent, comparable time periods or which allows for trap saturation. Estimates of returning adult salmon is not presented nor is data about other species of fish trapped. Statistics are not presented to indicate that populations are different.
- f. **OTHER POLLUTANTS:** Fuel from float plane operations on Lily Lake may also contribute to some of the problem in Potato patch Lake.

Section IV-3 (Mission Lake) - In the Status summary the statement concerning nutrients and potential oxygen depletion during the summer months appears to apply to Potato Patch Lake, however, no mention of that possibility is mentioned. Also, what recreational uses are impacted by aquatic plants in Mission Lake?

- a. 1) **SILVER SALMON:** The assessment of silver salmon in this system appears to be subjective. Data are not provided in the report to substantiate the statement that stocks are abundant and healthy, nor that the growth rate is slower in some lakes due to lower productivity. Sampling may have been biased and limited. Traps were fished for various periods of time and no data are presented which expands the catch into consistent, comparable time periods or which allows for trap saturation. Estimates of returning adult salmon is not presented nor is data about other species of fish trapped. Statistics are not presented to indicate that populations are different.
- a. 2) **SILVER SALMON:** What was the sample size used to determine the average weight?
- c. **OXYGEN LEVELS:** During what time period was the oxygen level near saturation? What surface area of the lake was sampled on October 17, 1995, when lethal oxygen level were detected? Also, what was the oxygen level in the upper 1 meter of the water column on that date?

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- f. 1) OTHER POLLUTANTS: Based upon what factual data is it possible to state that the raw sewage "over fertilized" the lake?
- h. OTHER: Please identify which recreational uses are being hindered by aquatic plants.

Section V. PLANNED TECHNICAL WORK FOR 1996 - Which project goal(s) will be addressed by item 5 (development of a landscaping plan for the southwest corner of Potato Patch Lake)? We suggest that the plan clearly identify which objectives will be addressed and how they will lead toward attainment of the project's goals.

SUGGESTED REMEDIAL ACTIONS - This should be numbered Section VI rather than V.

Section VI.2 Upper Horseshoe Lake - Please be aware that impounding the waterbody to improve aesthetic values must be weighed against any impacts to fish habitat and fish movement. We also suggest that affected land owners be aware of and support the plan.

Section VI.4.a. Potato Patch Lake - In addition to assessing the feasibility of diverting the Baranov Park flow, the consequences of such an action must be assessed.

Section VI.4.e. Potato Patch Lake - Other remedial actions that might be considered could include (1) working with the City to relocate the snow dump, and (2) involve students and land owners in a program of enhancing the shoreline and riparian zone by planting both herbaceous plant species and woody stemmed vegetation such as willow and alder in bare areas.

Section VI.5.d. Mission Lake - Weed Removal Proposal - Nothing presented in the document indicates that aquatic plants have increased to such a point that biological concerns exist. A discussion based upon factual data must be presented which links the project goals to the proposed action. In addition to fishery concerns, any assessment of plant removal should also address impacts to avian species.

1.0 Introduction: Please clarify the basis for the statement made by the last sentence of the first paragraph in the Background discussion. We believe it is extremely biased and not true.

3.0 Results by Lake: The Background section explains the presentation of the data included in the remainder of the report. This information should be moved to Section 1.0, Introduction. We also recommend that a distinct Methods Section be added to the report and that it precede Sections

3.0 and 4.0. As a general comment, most of the text of Section 3.0 could be included in a glossary of terms and definitions. Data of particular concern for a given lake could be summarized in text with reference to the appropriate table. This would serve to highlight issues of concern and allow readers to more easily find data of concern to them.

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Paragraph 2 - Change the word "weeds" to plants, aquatic plants, or macrophytes. Also note that the next to last sentence of this paragraph is misleading. Aquatic plants do not always grow in shallow lakes. Shallow lakes have the potential for significant macrophyte growth because of good light conditions and nutrient rich organic sediments.

Paragraph 4, Trophic Indicators - Because many of the lakes are turbid (i.e., greater than 5 NTU), the trophic state indicators of total phosphorous (TP), chlorophyll, and Secchi transparency need to be interpreted with caution. Although a TP value may indicate mesotrophy or eutrophy, a high concentration may indicate the presence of large amounts of suspended inorganic material or color rather than greater algal biomass. That is, inorganic turbidity severely lowers Secchi disk transparency and reduces the amount of chlorophyll expressed per unit phosphorous. For example, in Lower Horseshoe Lake the TP value of 55 implies eutrophy, but chlorophyll levels are very low. In this case the TP values are biased high due to lots of inorganic turbidity rather than greater algal biomass. Thus, both TP and Secchi disk transparency are not reliable indicators of the trophic status in lakes with appreciable non-algal light attenuation. In contrast, a lake with extensive macrophyte growth can have low TP values and chlorophyll concentrations (i.e., within the oligotrophic category), but the lake would still be considered eutrophic given that it is choked with lily pads.

Paragraph 5, phosphorous - A lake with high phosphorous does not necessarily have high chlorophyll levels. In lakes with high amounts of suspended inorganic particles such as silt or suspended sediment, total phosphorous will be high; however, the presence of silt from runoff or suspended sediments from stirred up bottom sediments cause turbidity which acts to reduce light penetration and lower primary productivity (chlorophyll).

Paragraphs 6 and 7, eutrophic, - From the information presented here we were left with the impression that murky lakes are automatically classified as eutrophic by this study. Such is not the case. We also note that during certain periods of high primary production lakes become naturally stained, but they are far from eutrophic. The discussion concerning lakes becoming anoxic after microalgae blooms should mention that this condition is usually confined to shallow lakes and is not a common occurrence. Finally, although eutrophic lakes can have a "vigorous food chain", there is generally a reduction in both plant and animal diversity in such waters.

Paragraph 9 and Tables 3-1 A to I, Detention Time - The hydraulic residence time is usually referred to in limnological texts as the Retention (rather than the Detention) Time.

Tables 3-1A thru I - We recommend against the use of the term "fertilized" when, in fact, fish productivity is really being described. The Kodiak Regional Aquaculture Association has lake fertilization programs that are intended to artificially increase primary production which in turn increases secondary production to benefit sockeye salmon fry. The untreated lakes in this study should not be confused with active fertilization projects.

Tables 3-1A thru I, Fish Catch Rate and Condition - What species of fish is represented? We suggest that all species captured be represented because fish can be used an indicator of overall lake health (e.g., water quality, physical characteristics, biotic community, etc.). In addition, we have serious reservations about the validity of the information presented. Please see our comments for Executive Summary sections IV-1a, IV-2a, IV-3a.1 and a.2, as well as for section 4.4 below.

Table 3-1A: Upper Horseshoe Lake - What unit of measure is used to determine "abundance" of juvenile silver salmon and against what baseline is the comparison made? Also what condition factors are used to determine that the fish were "healthy"? If the water depth is increased by manipulating the elevation of the road culvert, you are reminded that unrestricted, bi-directional fish movement through the culvert must be maintained.

Table 3-1B: Lower Horseshoe Lake - An assumption is made that is probably incorrect (data were not provided in the report to substantiate the statement about zooplankton). Generally, shallow lakes do not have well defined and viable zooplankton populations for a host of reasons, therefore the lake likely has few zooplankters to begin with; however, to say that they are washed out of the system is both unlikely and unsubstantiated. Although paving Selief Lane will likely reduce the amount of sediment introduced into the lake what affect will it have on the potential for "flash floods" type events to more rapidly flush the system?

Table 3-1C: Beaver Lake - Concerning zooplankton, we have the same comment as above under table 3-1B . We question whether freshwater mussels will have any affect on turbidity. Please provide a reference to substantiate your statement or remove it from text.

Table 3-1F: Lily Lake - We note that the zooplankton abundance in low. For other lakes with low zooplankton abundance this reports attributes it to low water retention time (i.e., Lower Horseshoe Lake and Beaver Lake). However, with a retention time of 75 days, Lily Lake has the greatest retention time for all lakes except the control lake. To what do you attribute the low zooplankton levels in Lily Lake?

Table 3-1G: Potato Patch Lake - The report states that , "Zooplankton biomass is very small, but fish trapping results indicated high relative abundance and good growth of stocked silver salmon in comparison with Mission Lake." We caution that this and other comparisons made throughout the reports do not appear to be based on sound science. From the description of the sampling method in section 4.4 we do not belief that the a statistically relevant set of numbers were obtained to be able to make such comparisons between lakes. What is the significance of catch per trap as related to abundance? Are the catch per trap numbers statistically comparable? What is the statistical significance of 98mm versus 91mm? Also, in the above example, we note that the condition factor for the fish is the same (i.e., 1.10), thereby leading us to question whether zooplankton biomass is a pertinent growth factor indicator for rearing silver salmon in the Kodiak lakes being studied. What other food sources are being utilized and what water quality or other man cause environmental perturbations affect them?

Table 3-1H: Mission Lake - The use of the term "good" to describe the number of out-migrating smolt is very subjective. We suggest that actual numbers be used to describe what was observed.

4.0 Results by Task:

As a general comment, much of this section should be moved to a methods section within the report. Also, many topics are discussed rather than simply presenting the results. Analysis and discussion of the results and any resultant recommendations should be separated and contained in distinctly different sections of the report. The information in section 4.8 presents the type of information normally included in an analysis and discussion section.

4.1.3 Bathymetry - For purposes of stocking rainbow trout and coho salmon the Sport Fish Division bases stocking density on surface acreage. A carrying capacity as outlined in the report has not been made.

4.2.1 Test Parameters and Significance, Total Fecal Coliforms- This topic seems to be a very important aspect of the clean lakes project but there is little explanation of what it means. What is the acceptable level from a human health standpoint and what are the regulatorily required levels? How do the Kodiak study lakes compare to non-urban waters on Kodiak?

4.3.1 - As an editorial comment we suggest that the name Alaska Department of Fish and Game be spelled once, followed by (ADF&G), then use ADF&G during the remainder of the text. We note that the ADF&G also provided literature concerning minnow trapping juvenile salmonids.

4.3.2 Last paragraph, last sentence - Please clarify to what "teeny carcasses" this statement refers.

4.4 Fish Trapping - Given the use of the data associated with the fish trapping effort, the ADF&G is very much concerned that the sample method employed cannot be used to make the characterizations, inferences, or conclusions that are presented in the report. The statement is made that, "The purpose of the minnow trapping surveys was to get a representative sample of fish from each lake in order to compare their average size, condition factor, and relative abundance." Such was not achieved. From the data presented, there are no clear indications of how salmon are fairing in the lakes. We have several comments concerning this portion of the study as follow:

- (1) The trapping was biased toward capture of small fish (i.e., the report states that Dolly Varden longer than 130 millimeters had trouble entering the traps and that silver salmon, presumably 1+ year old fry, were too large to enter the trap). A representative sample cannot be made using only one gear type, therefore the sample is biased and it tells very little about the population of fish other than those that were susceptible to trapping. This type of sample provides only a vague idea of what species are present and then only of small fish.

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- (2) This sample does not provide data concerning abundance unless it is combined and analyzed with fry stocking information and unless the sampling protocol is developed to yield statistically valid samples. Setting traps once during the spring and once in the fall for 18 to 24 hours soaks, yields only catch per unit of time. It does not provide a measure of relative abundance and comparisons between lakes are meaningless and inappropriate!
- (3) The report states that 2+ year old silver salmon were too large to fit in the traps. By what method were the fish aged?
- (4) Please provide information on all fish species captured.
- (5) Please provide clarification or list criteria used to define "fishy looking spots" where traps were set.
- (6) Paragraph 5 describes condition factor as a measure of how "chubby" a fish is. We suggest that the definition be reworded to state that it is a measure of a fishes well-being relative to its length-weight proportions.
- (7) Paragraph 7 says to take the relative abundance figures with a grain of salt because of a multitude of uncontrolled variables, then a short discussion makes several assumptions leading to the conclusion that perhaps the low catch rates indicate a water quality problem or that fish are harder to catch from shore. This is pointless rhetoric and should be deleted or moved to a discussions (rather than a results) section of the report.
- (8) Paragraph 8 says that a "uniform" population of silver salmon was used to stock road system lakes. What does this mean? Same parent stock or same length and weight? If the latter, what was the average length or weight and what was the range for these factors? At what life stage were the fish stocked, fry, presmolt, smolt? On what date were the lakes stocked and on what dates were the samples taken? The comparison of Island Lake to Potato Patch lake growth rates does not discuss that about 6 times more fish were put in Island Lake and how this might affect growth. In addition, scientific-educational permits for various educational class room incubators allow for stocking Potato Patch Lake with several hundred silver salmon fry. In the next paragraph the report conjectures that mortality explains the difference between the size of fish and catch rates between the lakes; however, there is no data to support this conclusion. Another explanation of why smaller silver salmon fry were caught in Island Lake could be that they were not the same fish that were stocked. There is no information presented countering the possibility that they might have been wild rearing fry. This plausible explanation should be investigated and then the hypothesis either confirmed or rejected.

- (9) Table 4.7 does not identify fish species captured. All species should be reported. Also, what is the catch rate per trap per lake? Fish trapping results are usually expanded to a unit Catch per Trap per Day or some other period of time. Because trapping times varied in this study, the results must be standardized and trap saturation must be addressed. Otherwise the information is nearly useless.

4.5 Macrophyte (Freshwater Aquatic Weed) Survey - Again, please change the word "weed" to plant. The statements about the need to control aquatic plants appear to be based largely on aesthetics and not on the reality of freshwater systems. Green plants photosynthesize thereby utilizing carbon dioxide and producing oxygen; and, they typically provide refuge and feeding areas for fish. Prior to determining that plant control methods are required an assessment must be made to weigh the goals of the project against objective data for each location. Regarding Mission Lake, it seems presumptive that the need for aquatic plant control is even being considered, given the lack of information currently available. If, as stated in 4.8.11, fish production is a high priority then many factors must be evaluated before moving ahead with an analysis of various plant control techniques. If the lake is to be managed for fish production, and if studies show that such is adequately being accomplished in its present state, the need to "control" aquatic plants may prove to be unnecessary. Further, please be aware that the discussion about a biological control (e.g., grass carp) must include the need for Board of Fish approval prior to introducing an exotic species to the state.

4.6 Freshwater Mussels - The second paragraph in this discussion makes some rather strong statements favoring the use of freshwater mussels to enhance water quality. We recommend that prior to making these statements information be provided to three questions. (1) Do the naturally occurring mussels in the Kodiak lakes actually function as is purported in the report? If so please provide documentation; (2) What are the effective population sizes in these lakes? (3) Given the low water retention times for water in these lakes, how much water can these populations actually filter?

In addition, please be aware that transplanting aquatic organisms such as freshwater mussels from one waterbody to another will require one or more permits from the ADF&G before proceeding with the proposal.

4.8.3 Siltation - Last paragraph, Why is Lily Lake not included in the summary?

4.8.5 Nutrients - The last paragraph of this section reports that fish growth is depressed in Gertrude Lake. If Gertrude Lake is the control water for this study, how can fish growth within it be defined as being depressed?

4.8.10 Seawater Intrusion - Why should adult salmon be allowed to enter these waters? Has spawning habitat been identified that would assist in fish production? Both Potato Patch and Mission lakes are stocked with silver salmon to provide an adult fish recreational fishery along Mission Beach. The goal is 100% harvest of the adult fish. If the Clean Lakes Project would like to develop a self sustaining salmon run in these two lakes, additional

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habitat enhancement work will be required as would a change in the current fishery management strategy for these waters. Fish passage is more easily justified, and in fact it is required, based upon state law which calls for the maintenance of unobstructed fish passage in fish bearing waters (i.e., access to, from, and within fresh waters frequented by any species of fish).

4.8.11 Fish Production - Contrary to conclusions made in paragraph 1 of this section, the data gathered and presented in this report shows little, other than the size characteristics of minnow trap-susceptible fish that were sampled during the spring and the fall. Therefore, for the reasons detailed above under section 4.4, comparisons of fish growth rates between Island Lake and Potato Patch Lake or Mission Lake cannot be made at this time. The data does not show that growth has occurred because the population sample is biased and it is not known that the fish caught in the spring are the same as those caught in the fall (i.e., no marking took place). It is assumed that all of the fish had spent one year in freshwater before leaving for the ocean, however, no age sampling occurred. In the Kodiak area the majority of wild coho salmon spend 2 years in freshwater. An assumption is made that Island Lake has a slower growth rate based on several hypotheses, however, none are substantiated by data collected during this study. Is it possible that the coho salmon from the Island Lake system smolt after 2 years? Many assumptions are made but nothing has proven.

Paragraph 2 of this section implies that some sort of enumeration of returning adult silver salmon to the Mission Beach area could be used to validate or refute "hopes and believes" that Mission Lake is producing silver salmon smolts. We caution that such an effort would be useless since any adult fish caught in the salt water could have been produced by either Potato Patch Lake, Mission Lake, or any number of other nearby salmon producing systems. Unless fish are tagged prior to emigration there is no way upon their return as adults to guarantee where they were produced.

5.1 Planning/Priority Setting - We suggest that as a part of the probable benefits estimate, every potential action include an assessment and allowance for the risk associated with each action.

6.0 Recommended Mid to Long Term Actions - We suggest that two additional actions be included on the list. (1) Test Lily Lake fish for levels of contaminants that might be of concern for human or animal consumption. (2) Determine feasibility of directing runoff water from the Buggy Banya, Safeway store and other commercial and industrial areas into a treatment facility rather than allowing it to flow directly into a lake.

Assessment Document

Based upon the comments provided on the technical report, we recommend that extensive revisions to the text of this document be made, particularly as regards the conclusions drawn from the fish sampling studies.

Mission Statement - As used in the mission statement, what is the definition of scenic beauty?

Geography - The first sentence of the fifth paragraph does not make sense and the remainder of the paragraph appears to be incomplete.

Socio-Economic Conditions - Paragraph one, second sentence, The fish fleet has not been ranked as the #1 port. The amount of fish landed led to that rating for the port. Also, for clarification, we suggest you include the years that the rating was attained.

Goals and Objectives of Clean Lakes for Kodiak - As presented, it is impossible to tell what is the goal and what is the objective.

Goal #1 - In addition to salmon, other species of fish are also produced in these waters which are important for sport and subsistence uses.

Goal #2 - As worded, this is a philosophical goal that cannot be obtained by the identified actions (objectives?). As stated only baseline data would be collected, because only monitoring and analysis to detect change are called for. Monitoring will not maintain or improve water quality, it will only increase our knowledge of the water quality. We suggest the goal be reworded to include some action mechanism that would be implemented if perturbations are detected.

Goal #3 - Although public education is an admirable goal, understanding alone will not necessarily mean that people will change their actions, their inherent biases, or convert them to being altruistic. Incentives through some sort of reward system might be considered in the long term to assist in reducing local water pollution.

Goal #4 - This goal is extremely confusing and we are not sure what is being said. Please reword the goal so that it can be understood.

Goal #5 - We recommend that the goal be reworded to allow for other appropriate technologies which could also be used to improve water quality. A goal should not have undue constraints placed upon it.

Goal #6 - Contrary to the first statement in the explanatory section, all restoration is not expensive. For example, many beneficial projects using low cost revegetative techniques can reduce erosion rates, improves natural water treatment systems, and improve water quality.

Recommended Actions - As a general comment, much of this section is poorly worded and the message is garbled by incomplete thoughts and unclear intent. We recommend the recommendation statements be structured as action oriented sentences. In addition, as a matter of information presentation, we suggest that the Recommended Actions Section be relocated to follow the Descriptions Section. By so doing, the reader will have had a chance

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to become somewhat familiar with the overall situation before reading the key ingredients of the document. The reader can then better understand why a recommendation is being made.

I. Community-Wide Recommendations - What does item 1 mean? Develop a drainage plan that shows where tributaries flow through private land and then restrict or limited development along the water course? Under item 3 we question how evaluation of impacts during planning will help water quality. Perhaps the intent is that a water quality impact assessment mechanism be incorporated as an integral part of the planning process for public works projects and also during the review of subdivision platting process.

II. Watershed Specific Recommendations -

A.3 - Aesthetics are not addressed in any of the project goals.

A.4 - Water flows quite well in the Selief Lane drainage ditch. Please restate this recommendation to address the problem that is to be resolved.

A.6 - We suggest that another action which could be taken within the Island Lake system to improve the local fishery is the installation/repair of the fish passage structure located between Island Lake and Mill Bay. A natural partial barrier about midway between the lake and the ocean hinders fish movements in the system. This recommendation is supported by Goal 1.

B.2 - Determine the importance of what?

B.4 - Landscaping is not identified as one of the goals of this project nor as a tool to be used to improve water quality.

C.3 - Please change the word weed to plant, aquatic plant, or macrophyte. We also suggest that the recommendation to implement an aquatic plant control program be modified by adding the word "if proven to be biologically necessary" to the end of the sentence. As an advisory, Mission Lake has been specified as being important for the spawning, rearing, or migration of anadromous fishes pursuant to AS 16.05.870(a). Prior to any disruptive inwater or other fish habitat manipulation work in the lake a Fish Habitat Permit must issued by the ADF&G.

Description of Kodiak's Lakes and Watersheds - Something is missing from the second paragraph of the introductory section. As written the paragraph does not make sense. In addition a map or aerial photo which identifies the watershed and the study lakes would enhance the presentation, particularly for readers who are not familiar with the area. Further a map depicting land ownership (i.e., state, federal, borough, and private) would be useful in developing various strategies for protection of specific land parcels.

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A. Island Lake System Watershed

1. Upper Watershed - The discussion terminates abruptly. Apparently we are missing a page of text.
- 2a. Upper Horseshoe Lake - We note that sedimentation of the lake from nearby development may have accelerated the lake's natural basin filling process; but, it is not the sole contributor.
3. Selief Lane Drainage - We note that the Recommendation Section identified the need to pave Selief Lane. In the context of this assessment document what affect will such an action have on the magnitude and duration of future flood events, the amount of sediment introduced into Beaver Lake, and the zooplankton flushing rate of the lake?
4. Beaver Lake - Are land developers and home owners advised or aware of the fact that they are building within the lake's normal flood plain?
5. Dark Lake - This discussion is confusing. Please clarify which lake is being addressed. The statement that "impacts to Beaver Lake are localized by residential development immediately adjacent to the lake" makes no sense. What is being said? That beavers only affect Beaver Lake? That only local residential development is causing impacts? Given that water flows down hill, why are water quality perturbations not present in Dark Lake? To what does the phrase "these impacts are minimal" refer? Does it mean flooding is minimal because fewer homes are impacted or does it refer to water quality parameters?
6. Island Lake - The text of this description is poorly worded and contains many assumptions (presented as declarative statements) that are not substantiated by information in the technical report. A portion of the text appears to have been lost as evidenced by the unfinished sentence which begins the third paragraph.
7. Island Lake Creek - Midway through the first paragraph a statement is made that "impacts here occur due to adjacent development". To what does the "here" refer? The pond like structure or the creek as a whole? In addition to timber blowdown, we suggest that sedimentation from the fill pads has cause impacts to this part of the Island Lake system.

B. Lily Lake/Potato Patch Lake Watershed

Why is there no discussion under the topic heading for Lily Lake? We note that the Impacts Summary found two pages later in the report lists sewage from Lily Lake condos as an impact. This might be worth mentioning in the lake description section too.

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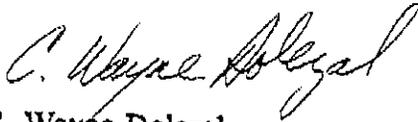
Potato Patch Lake - Paragraph 3, Please clarify that the location of the outlet of the lake was changed to a different location, channelized, and placed into a culvert. Paragraph 4, Please change the sentence to state that the terminal fishery is a terminal, saltwater fishery at Mission Beach.

C. Mission Lake Watershed - Paragraph 4, Last sentence, Please clarify what is seen , hockey goals or hockey games? Paragraph 5, How much sewage was allowed to enter the lake?

Glossary - The inclusion of a glossary is a good idea, however, to be most useful it should be arranged in alphabetical order. As mentioned in our comments for the technical report, we suggest that the glossary of terms could also be expanded to include additional relevant vocabulary germane to this report. Enclosure 1 is an alphabetized and expanded glossary that would be useful in more accurately and succinctly presenting information.

We appreciate the opportunity comment on these draft reports.

Sincerely,



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Enclosure: Suggested Glossary of Terms

cc: B. Cassidy, KIB
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