From: CYRIL Alex
To: MOYNAHAN Kevin; Mike.Tehan@noaa.gov; Evans, Lawrence C NWP; Kemper_McMaster@fws.gov
Cc: MORALES Michael; LOBDELL Bob; METZ Eric; PUENT Sally
Subject: RE: Next Steps on Chetco Gravel mining
Date: Wednesday, March 07, 2007 1:34:14 PM

I am available on the 21st or 23rd.
--Alex

-----Original Message-----
From: MOYNAHAN Kevin
Sent: Wednesday, March 07, 2007 11:52 AM
To: Mike.Tehan@noaa.gov; Lawrence.C.Evans@nwp01.usace.army.mil; Kemper_McMaster@fws.gov
Cc: MORALES Michael; LOBDELL Bob; METZ Eric; CYRIL Alex
Subject: Re: Next Steps on Chetco Gravel mining

Michael - March 23rd in the morning works for me - meeting is a good idea at this point.

Alex Cyril from ODEQ is working on the 401 cert.

DSL supports getting the operators back in the river - even on a limited scale - while studies are being done - if that can be worked out in light of resource/fishery concern.

Regards, Kevin

Kevin Moynahan Assistant Director Wetland/Waterway Conservation Division
Department State Lands
503 378-3805 x259
kevin.moynahan@state.or.us

----- Original Message -----
From: Mike Tehan <Mike.Tehan@noaa.gov>
To: MOYNAHAN Kevin <Kevin.Moynahan@state.or.us>; Evans, Lawrence C NWP <Lawrence.C.Evans@nwp01.usace.army.mil>; Kemper_McMaster@fws.gov <Kemper_McMaster@fws.gov>; BOWLES Ed
Cc: Ken Phippen <Ken.Phippen@noaa.gov>; Chuck Wheeler <Chuck.Wheeler@noaa.gov>; Janine_M_Castro@fws.gov <Janine_M_Castro@fws.gov>
Sent: Wed Mar 07 10:21:35 2007
Subject: Next Steps on Chetco Gravel mining

Greetings,

As you may know by now, NMFS sent a written response to Freeman Rock responding to the Chetco River gravel study proposal (see attached). I know we had asked our staff on the gravel tech. team to review the proposal and come up with a joint response, however, Bob Lohn had committed to a 3-week turnaround, and so we could not wait for the group product. I know that Chuck Wheeler of my Roseburg staff touched bases with many of the tech. team members, but time did not allow more thorough coordination...sorry about that.

Basically, we suggested a long-term approach that involves a sediment

supply study of the whole watershed similar to that done recently for the Smith River. Since this will take up to a couple of years, we suggested that if any permits are issued before this study is completed, it would be helpful if the Corps and DSL would limit the scope of the permits to a year at a time. And to inform these annual permit decisions, we recommended that a short-term gravel study focus on first determining whether the river bed was aggrading or degrading, by examining existing data, to see whether interim gravel mining was even appropriate. If evidence shows that the river is aggrading and therefore gravel mining might be appropriate, we recommended that the Oregon Sediment Removal Guidelines be used as BMPs to guide that extraction.

Bill Freeman called me today in response to the NMFS letter. We is asking his consultant to prepare an implementation plan in response to our recommendations. He wanted to understand who the gravel technical team was, and how he could engage their collective review of this and future products. I explained that the tech. team was an ad hoc team of technical staff, but suggested that he focus his communication through Larry and Kevin, as the "permitting officials", since much of this hinges around the permit processes.

I think it would be helpful if the permitting and reg. agencies got together to discuss next steps, so that we can communicate with the gravel folks in a coordinated and expeditious fashion.

Larry, Kevin, Kemper,

Are you available on March 21 or 23?

Ed,

I don't have any of your staff's e-mail addresses...I know that Patty Snow is the gravel tech team person, but that Russ S. and Todd C. have been involved locally. Do you have a preference for whom we coordinate with on this issue?

Also, I assume we should start including ODEQ as they hold the 401 card, but not sure of the proper contact.

Sorry for the rambling message, but I wanted to try and get the ball rolling.

Thanks, michael

From:	Monical, Teena G NWP
To:	Linton, Judy L NWP
Subject:	FW: March 15th meeting
Date:	Thursday, March 15, 2007 9:18:01 AM
Attachments:	Draft scope of work 011207.pdf chetco study letter.pdf

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Teena Monical

Telephone (541) 465-6877
FAX (541) 465-6888

-----Original Message-----
From: Chuck Wheeler [mailto:Chuck.Wheeler@noaa.gov]
Sent: Tuesday, March 13, 2007 4:41 PM
To: Janine_M_Castro@fws.gov
Cc: Anne.Mullan@noaa.gov; Chuck Wheeler; Joe_Zisa@fws.gov; Marc.Liverman@noaa.gov; Patty.Snow@state.or.us; Rob_Burns@fws.gov; jim.d.brick@state.or.us; Hanson, Michele E NWP; robert.c.anderson@noaa.gov; Craig_Tuss@fws.gov; Monty_Knudsen@fws.gov; Monical, Teena G NWP; Eric.Metz@dsl.state.or.us; michael.morales@dsl.state.or.us; CYRIL alex; Grudzinski, Lisa A NWP; Dorsey, Garrett L NWP; Greg_M_Smith@fws.gov; Harris, Kathryn L NWP; john_l_marshall@fws.gov
Subject: March 15th meeting

Everyone,

Below is a message from NMFS State Director Michael Tehan. It is an update to what is going on for the Chetco River gravel projects. Attached to this message is the letter that NMFS responded with to the Chetco operators in response to their "draft scope of work proposal", which is also attached.

I put together the Chetco Study response trying to fully represent the recommendations within the Oregon Sediment removal Considerations. We are basically requesting the companies to follow those recommendations.

Time did not permit NMFS to get approval from the Gravel Tech Team before sending this to the operators, but it has always been our hope that this will be reviewed by the tech team and a combined response from all the agencies sent.

I am hoping that we can discuss this at the meeting Thursday. See you there!

Chuck

-------- Original Message --------
Subject: Next Steps on Chetco Gravel mining
Date: Wed, 07 Mar 2007 10:21:35 -0800
From: Mike Tehan <Mike.Tehan@noaa.gov> <mailto:Mike.Tehan@noaa.gov>
To: MOYNAHAN Kevin <Kevin.Moynahan@state.or.us> <mailto:Kevin.Moynahan@state.or.us> , "Evans, Lawrence C NWP" <Lawrence.C.Evans@nwp01.usace.army.mil> <mailto:Lawrence.C.Evans@nwp01.usace.army.mil> , Kemper_McMaster@fws.gov, BOWLES Ed <Ed.Bowles@state.or.us> <mailto:Ed.Bowles@state.or.us>
CC: Ken Phippen <Ken.Phippen@noaa.gov> <mailto:Ken.Phippen@noaa.gov> , Chuck Wheeler <Chuck.Wheeler@noaa.gov> <mailto:Chuck.Wheeler@noaa.gov> , Janine_M_Castro@fws.gov

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Thanks, michael

McBain & Trush
FISHERIES
HYDROLOGY
RIPARIAN ECOLOGY
STREAM RESTORATION
FLUVIAL GEOMORPHOLOGY
P.O. Box 663, Arcata, CA 95518 • 980 7th Street, Arcata, CA 95521
Phone: (707)826-7794 • Fax: (707)826-7795

January 12, 2007

Mr. Bill Yocum
Freeman Rock Inc.
99031 South Bank Chetco River Rd
Brookings, OR 97415

RE: Proposed Scope of Work for Chetco River Gravel Extraction

Bill:

Based on our conversations January 9, 2006, the National Marine Fisheries Service (NMFS) has recently recommended to the Oregon Division of State Lands (DSL) to suspend all present gravel mining operations on the lower Chetco River. From the limited information you provided (fax copy of letter from NMFS to DSL dated August 29, 2006), the primary reason cited by NMFS for why a gravel mining permit should not be issued was that historic permitted extraction volumes exceeded natural supply, which has deepened the estuary and degraded salmonid habitat. NMFS suggested that, based on a regional sediment yield calculated for the Rogue River, the annual gravel supplied to the Chetco River averages 13,000 cubic yards (cy).

During our discussion, you had proposed a plan for reinstating gravel mining on the Chetco River, first by establishing an interim extraction guideline and then following up with a long-term gravel mining plan. To do this, we envision the following steps:

1. Conduct a reconnaissance-level sediment yield analysis for the Chetco River and compare with the NMFS sediment yield estimate;
2. Assess present sediment dynamics, geomorphology, and historic gravel extraction with respect to salmonid habitat in the lower Chetco River;
3. Recommend temporary / interim gravel extraction volumes for 2007 based on the results of #1 and #2;
4. Develop a long-term extraction plan based on more rigorous and watershed-specific sediment yields and hydrology (e.g., by water year type).

From our discussions and the NMFS letter, the primary issue for suspending gravel mining is low natural sediment supply and related long-term effects of past extraction on channel morphology and fish habitat. Based on your objectives and the above steps, we are proposing a two-phase scope of work, with Phase I addressing Steps #1, 2, and 3 (with the objective of recommending an allowable extraction volume for 2007) and Phase 2 addressing Step #4. Step 4 will provide more rigorous quantitative analyses to develop a long-term gravel extraction plan, including refined sediment budget estimates.

The scope of work we are proposing is for Phase 1 only. In addition to our company staff, we are including Randy Klein as a subcontractor to provide technical review.

Please let me know if this scope meets your expectations, and feel free to contact me if there are any particular details you'd like to discuss.

Sincerely,

Geoffrey M. Hales, R.G.
Oregon Registered Geologist #G2075

PHASE 1 SCOPE OF WORK

Objective: Establish an interim extraction guideline by (1) conducting a reconnaissance-level sediment yield analysis for the Chetco River and comparing results with the NMFS sediment yield estimate; (2) assessing present sediment dynamics, geomorphology, and historic gravel extraction with respect to salmonid habitat in the lower Chetco River, and (3) recommending temporary / interim gravel extraction volumes for 2007 based on the results of (1) and (2). To do this, we are proposing the following tasks:

Task 1. Background information gathering and field reconnaissance

Gather background information and data to estimate annual Chetco River sediment supply and compare with NMFS estimate; make one (1) one-day field trip to observe river conditions in gravel mining reaches (for both Tidewater Contractors and Freeman Rock). Information sources include: aerial photographs, historic topographic surveys (cross sections and/or longitudinal profiles), historic gravel extraction records, historic photographs, and pertinent literature, reports, and maps (e.g., unit sediment yields from other rivers, other reports that evaluate the ecological impacts of gravel mining).

Task 1 approximate cost: $6,900

Task 2. Data analysis (estimate sediment supply, assess potential effects on salmonid habitat)

Provide reconnaissance-level sediment yield and sediment supply estimates based on: (1) studies by others, (2) field observations, and (3) other data gathered in Task 1 (e.g., survey data); provide reconnaissance-level salmonid habitat evaluation and evaluate linkages to gravel mining.

Task 2 approximate cost: $5,200

Task 3. Prepare technical memorandum, present results

Summarize analysis results in a short technical memorandum, with interim extraction volume recommendations. Present results at a meeting in Brookings, assumed to be attended by landowners / operators, regulatory agencies, and stakeholders.

Task 3 approximate cost: $7,500

TOTAL PHASE 1 APPROXIMATE COST: $19,600

Note: The above costs are approximations pending final internal budget review and confirming subcontractor rates (presently estimated).

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northwest Region
7600 Sand Point Way N.E.. Bldg. 1
Seattle, WA 98115

March 2,2007

Bill Yocum
Freeman Rock Inc.
P.O. Box 1218
Brookings, Oregon 97415

Dear Mr. Yocum:

Thank you for the opportunity to meet on February 1,2007, with all three of the Chetco River gravel operators. It was very helpful to see the river and to discuss the issues with everyone in the same room at the same time. The idea developed at the January 4,2007, meeting in Coquille of having a unified approach for the entire Chetco River watershed will be a great help when addressing gravel mining and permitting issues in this area. It is also helpful that you proactively solicited a proposal for studying sediment supply within the entire Chetco River. For these reasons, the following comments apply not only to Freeman Rock's operation, but to Tidewater Contractors' and South Coast Lumber Company's as well. The National Marine Fisheries Service (NMFS) believes this watershed approach is integral to understanding sediment related issues in the Chetco River.

The NMFS' trust resources present in the area are Southern Oregon/Northern California (SONC) coho salmon (Oncorhynchus *kisutch*) which are listed as threatened under the Endangered Species Act (ESA) (70 FR 37160), SONC coho salmon critical habitat (64 FR 24049), and Pacific salmon (Chinook salmon and coho salmon) essential fish habitat (EFH) designated under the Magnuson-Stevens Fishery Conservation and Management Act (MSA). As you are aware, our regulatory role is to consult on Federal permit actions when requested by the Corps of Engineers pursuant to the ESA and MSA, and to provide advisory comments and conservation recommendations to State permitting agencies pursuant to the Fish and Wildlife Coordination Act (16 USC 661 et seq.) and MSA.

Our review of the proposed actions suggests that there both short-term and long term issues to be addressed. Let me begin by taking up the long-term issues first.

We have reviewed McBain and Trush's (M&T) January 12,2007, proposed scope of work for Chetco River gravel extraction in Curry County, Oregon. This scope of work was prepared in response to your solicitation of a plan to gain regulatory approval and allow gravel removal operations on the Chetco River to continue. What follows, in the "Comments on the Proposed Scope of Work" section of this letter, are our initial comments on this study proposal.

Printed on Recycled Paper

During our February site visit, we committed to responding to your study proposal within three weeks. While these comments have been delayed a week due mainly to unexpected interruptions in my own schedule, these comments reflect our initial thoughts on the proposal. However, I would not recommend that you or your contractor undertake work based on them until the other agencies which are also involved in approving or reviewing applicable permits have also completed their reviews.

When we committed to make a timely review of the proposal, we had hoped that other agencies would also be able to complete their review within the same time period. All of them have begun the review; your study proposal is currently under review by the interagency Oregon Gravel Technical Team, which includes representatives from NMFS, U.S. Fish and Wildlife Service, Corps of Engineers, Oregon Department of State Lands, Oregon Department of Fish and Wildlife, and Oregon Department of Environmental Quality.

Because each of these agencies have roles in the permitting process of gravel extraction operations on the Chetco River and are charged with management of the natural resources in this area, we believe that it will be important to you, and, in a practical sense, less costly and ultimately less time-consuming for you, if the proposed study does not go forward until you have in hand a combined, coordinated, and consistent response. This will assure that the study design can respond filly to the regulatory requirements and concerns of the agencies as fully as possible, and that the resulting study can be a good basis for decision for all of the parties. Since we, also, will learn from the comments and thoughts of the other agencies reviewing the proposed study, the comments contained in this letter should be considered preliminary, firnished in the spirit of continuing a constructive and open dialogue. We may need to supplement these preliminary comments based on the interagency review.

Comments on Proposed Scope of Work

Only the first phase of the scope of work is proposed at this time, so comments will be limited to Tasks #1 through #3 as follows: (1) Data and information collection, (2) data analysis, and (3) preparation of recommendations and result presentation. Because this is a preliminary proposal and many of the details have not been finalized and explained, it is not possible at this time to approve of the specific approach and analysis. Before a study plan could be approved, several additional pieces of information would be needed. For instance, in Task #2 there is no mention of what protocol would be used to estimate reconnaissance-level sediment yield and sediment supply, nor a description of how the data and information would be analyzed.

Development of a sediment budget is a complex undertaking that requires an evaluation of the entire watershed, including sediment sources (land slides, debris flows, bank erosion, bed erosion, *etc.*), transport reaches, and depositional areas (bars, floodplains, road crossings, etc.), and incorporates the hydrologic history. The full sediment budget analysis is included in Task #4 (not within Phase 1), so we are unclear what type of analysis would be included at the reconnaissance level.

Similarly, Task #3 does not indicate how extraction volume recommendations will be made. Would they be a percentage of the estimated sediment supply, and if so, how would this percentage be established? Sediment budgets average the natural variability of fluvial processes over many years to yield a calculated average sediment production value per year.

This 'average' value is very misleading and cannot be considered the harvestable amount, because sediment is not transported during yearly average flows per se, but rather is storm event driven, and downstream reaches require sediment load to make up for natural exports. Furthermore, there is little science available on 'safe' harvest ratios.

Lastly, there is no mention of site-specific design criteria to protect stream geomorphology. The geomorphic approach to gravel extraction includes the retention of a specific bar outline and elevation attributes with the intent to maintain channel forming processes, so that habitat is protected and maintained. It relies on site-specific considerations, such as the location and depth of the channel thalweg, and the adjacent bar forms. Development of a geomorphic approach requires careful surveying of the stream channel and adjacent floodplain, upstream, downstream, and at the proposed mining site, along with an analysis of the channel hydraulics and stream hydrology.

Notwithstanding the need for more specific details, we believe that most of Tasks #1 and #2 would be valuable, and would help to address the current lack of information on the physical processes of the Chetco River. However, in order to analyze whether, and how much, gravel removal is appropriate from the Chetco River, we suggest altering the approach with the recommendations described below.

Recommended Approach

Based on prior experience with the Smith River, and other areas, we believe it could take from one to two years to complete an appropriate study and develop an acceptable long-term strategy for sustainable gravel mining in the Chetco River basin, including a sediment supply estimate, analysis of effects to Federal and State trust resources, mitigation measures, and issuance of multi-year Federal and State permits. As we mentioned above, we believe it is critical to work collaboratively with all the resource and regulatory agencies to avoid conflicts and ensure that all can support the ultimate solution that is developed.

In the meantime, we understand the desire to continue gravel extraction to support the local economy. Accordingly, we are proposing the following recommendations that address both the potential for continued short-term gravel mining during the interim one to two year period, as well as a long-term (beyond **2** years), sustainable solution.
We have drawn heavily from the document ***Sediment** Removal from **Active Stream Channels in Oregon*** (Federal Interagency Working Group 2006). In general, NMFS believes that the focus for the short term should be on ensuring protection of the geomorphology of the river and associated habitat, and that a sediment supply estimate is better suited for longer-term planning, management, and restoration of physical stream attributes.

Short-term recommendations. Our suggestion to the Corps and DSL would be to consider issuing annual permits for the next one to two years while a long-term solution is developed. Accordingly, the purpose of these short-term recommendations is to quickly develop information to support an ESA and MSA consultation for these interim permits. The first recommendation focuses on developing information on the current conditions of the Chetco River and determining whether it is appropriate to remove gravel at this time.

If this initial assessment concludes that interim gravel removal is possible, then the second recommendation focuses on best management practices to protect essential habitat features during the short-term mining operations.

The first step is to assess the vertical stability of the Chetco River bed; i.e., whether it is in equilibrium, degrading, or aggrading. Gravel extraction is not appropriate in degrading and incised channels. Extraction in these systems exacerbates the negative impacts of incision on stream geomorphology and fish habitat. Gravel extraction is also not appropriate in a channel that is at equilibrium with its sediment supply because any extraction will result in a deficit situation. With minor changes in Tasks #1 and #2, the proposed scope of work could identify the vertical trend of the channel bed. Instead of putting focus on estimating sediment supply through a reconnaissance level approach, the focus would be on comparing the trend of cross-sections and longitudinal profiles from the mouth of the Chetco River up to river mile 11. Data from the last several years should be compared with historical information, such as the 1939 Corps of Engineers bathyrnetric map and gravel extraction surveys at least a decade old. All surveys need to be tied to established benchmarks or a standard geodetic datum to be useful. Additional sources of information are stream gauge records, bridge scour surveys, bridge maintenance records, water intakes, pipeline crossings, any static structures placed within the streambed, and aerial photography. The NMFS expects such an effort would entail a thorough examination of the available historical and modern data and would result in a report that presents all the data used at deriving the conclusion. We would expect this analysis would likely take the contractor approximately two to four weeks.

If the Chetco River is aggrading, gravel extraction using best management practices may be possible without significant long-term effects to our trust resources. The second step would be to select an extraction design which conserves the physical processes that create and maintain stream habitat. The methods of aggregate extraction should be designed to enhance topographic complexity and encourage natural restoration of self-sustaining geomorphic features and associated aquatic and riparian habitats (Federal Interagency Working Group 2006). To accomplish this, aggregate removal cannot alter bar form in its natural configuration and size for elevations related to a design discharge (see, section 4.5.1 in Federal Interagency Working Group 2006 for a discussion of design discharge). Geomorphic functions and habitats will be least adversely affected by retaining the edges of bars and mining from the downstream interior portion (Federal Interagency Working Group 2006).
The Bar Form method as described in section 4.5.2 of ***Sediment Removal from Active Stream Channels in Oregon*** details the general design considerations that would be appropriate for implementation on the Freeman Rock site, the South Coast Lumber site and the Tidewater Contractors river mile 10.2 site. Because the Chetco River is temperature limited in the areas of the extraction, no part of the excavated backwater should be excavated below the ordinary low water level.
The Tidewater Contractors gravel bar at river mile 2 is tidally influenced. Additional analysis and design are needed to understand the dynamics of a gravel bar that is inundated at high tide. The expertise needed to design an appropriate harvest method for this site was not available within the time lines established for the completion of this letter.

Long-term recommendations. The purpose of the long term recommendations is to provide information that feeds an effective and efficient permitting process, as well as focuses planning and management strategies.

The NMFS believes a long-term study of sediment supply, movement, distribution and deposition is critical to management of the Chetco River resources. A recent assessment of the lower Smith River sediment dynamics (MFG ***et*** al. 2006) might serve as an applicable template. Before undertaking such a project, all of the agencies need to be involved in the designing phase.

While there are other means of inferring the sediment supply (as in Tasks #1 and #2), ground truthing has to be incorporated for accuracy and for calibration of the chosen model. A rigorous study of sediment dynamics will take multiple years of data collection to use in modeling sediment transport. A study comparable to the Smith River assessment could be completed in one to two years. Continued sampling after this initial report would be required for a better understanding of how storm events move sediment into the stream channel and how these pulses of sediment are manipulated and moved through the channel. This may take 10 years or longer due to significant annual variability in streamflow and even more variability in gravel delivery. This kind of information will be beneficial in the long term to focus planning and management strategies, and potentially altering the design of extraction.

Thank you for the opportunity to comment on this proposal. We look forward to continuing to work with you on this effort.

Sincerely,

D. Robert Lohn
Regional Administrator

cc: Larry Evans, Corps
Teena Monical, Corps
Kemper McMaster, FWS
Craig Tuss, FWS
Janine Castro, FWS
Louise Solliday, DSL
Kevin Moynahan, DSL
Bob Lobdell, DSL
Patty Snow, ODFW
Russ Stauff, ODFW
Todd Confer, ODFW
Tom Melville, ODEQ
Alex Cyril, ODEQ
Robert Elayer, Tidewater Contractors
Virgil Frazer, South Coast Lumber Company

LITERATURE CITED

Federal Interagency Working Group*. 2006. Sediment Removal from Active Stream Channels in Oregon: Considerations for Federal Agencies for the Evaluation of Sediment Removal Actions from Oregon Streams. USFWS Oregon Fish and Wildlife Office, Portland, Oregon, 85p. Available on-line at: www.fws.gov/oregonfwo/News/GravelMining.asp. *U.S. Fish and Wildlife Service, National Marine Fisheries Service, US Army Corps of Engineers, and the Environmental Protection Agency.

MFG, Inc.Graham Matthews & Associates, and Alice Berg & Associates. 2006. Assessment of the Lower Smith River. MFG project no. 240022. Arcata, CA. 41 pp.

From: CYRIL Alex
To: Linton, Judy L NWP
Cc: PUENT Sally
Subject: RE: Gravel meeting follow up
Date: Monday, March 26, 2007 12:33:09 PM

Hiya Judy.
Thanks for the quick response to the meeting. I am not available the week of Apr16th, but have wide open availability the weeks or Apr 23rd or 30th... I believe we discussed this meeting including the applicants, and if this is the case, I would like to re-iterate my request for a pre-meeting conference call between the agencies to discuss the NMFS letter and what our individual agency interpretations and our unified positions will be. Thanks, Judy. See you soon!
--Alex

-----Original Message-----
From: Linton, Judy L NWP [mailto:Judy.L.Linton@nwp01.usace.army.mil]
Sent: Monday, March 26, 2007 11:46 AM
To: kevin.moynahan@dsl.state.or.us; Yvonne Vallette; CYRIL Alex; mike.tehan@noaa.gov; kemper_mcmaster@fws.gov; Patty Snow; CHARLAND Jay
Cc: Evans, Lawrence C NWP
Subject: Gravel meeting follow up

Good Morning: as a follow up to the Chetco River Gravel Removal Strategy meeting held last Friday (3/23), I have been asked to schedule a second meeting for the mid to late April timeframe. One purpose of this meeting will be to determine if gravel removal operations within the Chetco River can occur during this coming work season (July – September) and if so, under what circumstances. A second purpose will be to discuss long term gravel removal (how this is to be evaluated, what information is needed, who are the players, what is their purpose, etc).

Please provide me with dates and times that will work for you primarily between the period of April 16 through April 27. If others within your organization would also be attending please provide me their names so I can also coordinate with them (or if possible provide available dates for them in your response).

Thank you for your assistance in this effort. If you have any questions, give me a call at 503-808-4382. Judy

From:	Patty Snow
To:	Linton, Judy L NWP
Cc:	Todd Confer
Subject:	RE: Gravel meeting follow up
Date:	Monday, March 26, 2007 11:58:09 AM

Hi Judy, Todd Confer in our Gold Beach office also needs to be involved. I'm not sure what dates he is available but I am copying him on this response. For me, any days from April 16 -April 27 work with the exception of April 20 AM. Thanks, Patty

Patty Snow

Land and Water Use Coordinator

Wildlife Division

(503) 947-6089

From: Linton, Judy L NWP [mailto:Judy.L.Linton@nwp01.usace.army.mil]
Sent: Monday, March 26, 2007 11:46 AM
To: MOYNAHAN Kevin; Yvonne Vallette; CYRIL Alex; mike.tehan@noaa.gov; kemper_mcmaster@fws.gov; Patty Snow; CHARLAND Jay
Cc: Evans, Lawrence C NWP
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Thank you for your assistance in this effort. If you have any questions, give me a call at 503-808-4382. Judy

From:	Janine_M_Castro@fws.gov
To:	Anne.Mullan@noaa.gov; Chuck Wheeler; Janine_M_Castro@fws.gov; Joe_Zisa@fws.gov; marc.liverman@noaa.gov; Patty.Snow@state.or.us; Rob_Burns@fws.gov; jim.d.brick@state.or.us; robert.c.anderson@noaa.gov; Craig_Tuss@fws.gov; Monty_Knudsen@fws.gov; Eric.Metz@dsl.state.or.us; michael.morales@dsl.state.or.us; CYRIL alex; Greg_M_Smith@fws.gov; john_l_marshall@fws.gov; Linton, Judy L NWP; Bob.Lobdell@state.or.us
Subject:	March 15th Tech Team meeting minutes (1 attachment)
Date:	Friday, March 30, 2007 12:37:23 PM
Attachments:	Sediment Budgets and Geomorphic Approach.doc

** NEXT MEETING MAY 22nd @ 10:00 -- ARE YOU AVAILABLE??**

PLEASE NOTE NEW E-MAIL DISTRIBUTION LIST IN THE "To:" LINE

March 15, 2007
Gravel Mining Technical Team Meeting
Portland, Oregon

Participants:

Anne Mullan, NMFS (phone)
Bob Lobdell, DSL
Patty Snow, ODFW
Jim Brick, ODFW (phone)
Judy Linton, COE (phone)
Chuck Wheeler, NMFS (phone)
Rob Burns, FWS (phone)
Eric Metz, DSL
Greg Smith, FWS
Janine Castro, FWS

IMST Review:

Based on feedback from the Management Team, Janine Castro will make editorial updates and minor changes to the Sediment document. More substantial changes will be indexed and delivered to the Management Team for further evaluation before the changes are implemented.

Chetco:

Chuck Wheeler and Janine Castro gave an overview of what has transpired with Freeman Rock regarding the Scope of Work letter that was sent by McBain and Trush. NMFS responded to this SOW listing out specific concerns regarding the approach and defined the temporal and spatial differences between a geomorphic mining approach (short-term, local), and a sediment budget approach (long-term, watershed scale) (see attachment for draft language regarding these two approaches). NMFS would like to receive feedback from the Tech Team regarding their analysis of the situation, but since the Tech Team has historically been an ad hoc group, there is uncertainty how this might occur. PLEASE review the sediment budget/geomorphic approach paper and provide Janine with any feedback prior to our May meeting.

DSL will send a notice to the Tech Team when the Chetco project is out on Public Notice to solicit specific feedback. DSL also indicated they have copies of the navigability files on the Chetco.

Upcoming Meetings:

March 21st -- Dredging Meeting sponsored by the COE (Greg Smith attended)

March 23rd -- Chetco Meeting with state directors (COE, FWS, NMFS, DEQ, DSL, ODFW). Also to discuss future function of the Tech Team.

Project Updates:

Umpqua Basin:
Possible fish habitat projects.

Willamette Valley:
No updates

Lower Columbia River:
NW Aggregates -- 200,000 cy/yr & deeper than nav channel
Columbia River -- 400,000 cy/yr.
Morse Bros.
Morse Bros. Sump
Pacific Rock/Rinker Materials

Coastal:
Chetco R. -- see above.
Rogue R. -- DEQ sponsored public meeting in January.
Hunter Ck. (3) -- Worked on 2 out of 4 bars using the geomorphic approach.
Illinois R. -- Kirbyville -- incomplete application.
Sixes R. -- Curry County Roads -- in consult with NMFS

Please let me know if I've made any errors or omissions.

J.

(See attached file: Sediment Budgets and Geomorphic Approach.doc)

Janine M. Castro, PhD, RG
Geomorphologist

US Fish and Wildlife Service
2600 SE 98th Ave., Suite 100
Portland, OR 97266
503.231.6179

Sediment Budgets and the Geomorphic Approach:

Data needs for instream and stream related aggregate mining vary depending upon the temporal and spatial scales considered. Two approaches are used to define limits on aggregate harvesting; sediment budgets and local geomorphology. Sediment budgets, appealing because of their numerical nature, are inherently vague in spatial and temporal scale as well as inaccurate because of large variation in sediment production and transport processes. Consequently there are significant shortcomings to the approach, particularly if applied singularly. Similarly, the geomorphic approach is very useful at a local scale for quantifying annual harvest volumes and protecting habitat, but does not necessarily provide data for large scale or long range stream management.

Interpretation of sediment budget results is difficult and controversial, for several reasons. First, the coarse portion of the sediment that moves as part of a stream's bedload does not usually move every year. Significant bedload transport may occur only once every few decades in coastal Oregon streams. Sediment budgets average over many years the natural variability of fluvial processes to give a calculated average sediment production value per year. This "average" value is often considered the harvestable amount, which is generally not the case because downstream reaches require sediment load to make up for natural exports. Furthermore, there is little science available on what are 'safe' harvest ratios.

Sediment budgets are a tool best used for long-range planning for stream management and restoration. A sediment budget in conjunction with historic extraction rates can tell us if harvest rates have exceeded recruitment, thus potentially resulting in channel degradation. Similarly, historic extraction rates combined with repeated cross sections can tell us if harvesting has exceeded the sediment budget. In its best form, a sediment budget can predict if the channel is tending to aggrade or degrade over time, although river responses may be delayed by bed armor processes. Therefore, a sediment budget analysis can help define reaches of river where aggregate harvest may be least harmful to habitat. Development of a sediment budget is a complex undertaking that requires an evaluation of the entire watershed, includes sediment sources (land slides, debris flows, bank erosion, bed erosion, etc.), transport reaches, and depositional areas (bars, floodplains, road crossings, etc.), and incorporates the hydrologic history. To be predictive, a sediment budget should also project future changes in hydrology and watershed sediment production.

The geomorphic approach retains specific bar outline and elevation attributes with the intent to maintain channel forming processes, so that habitat is protected and maintained. It relies on site-specific considerations, such as the location and depth of the channel thalweg, and the adjacent bar forms. Development of a geomorphic approach requires careful surveying of the stream channel and adjacent floodplain, upstream, downstream, and at the proposed mining site, along with an analysis of the channel hydraulics and stream hydrology. These data are usually developed in conjunction with permit requirements and monitoring for aggregate harvesting.

A sediment budget is not necessarily required to utilize the geomorphic approach, but if mining is occurring along a significant length of the channel, then it is important for the evaluation of cumulative effects.

In summary, a sediment budget can be informative for long range planning and for estimating the change trajectory for a reach of river (ie. identify at what rate harvesting is low risk). Local management of aggregate harvest utilizing retention of geomorphic features and processes can protect existing, or restore, local habitat. Combining the two approaches is complimentary, allowing for management of local habitat and for large scale long range river management.

From:	Linton, Judy L NWP
To:	kemper_mcmaster@fws.gov; mike.tehan@noaa.gov; Evans, Lawrence C NWP; "Monty_Knudsen@fws.gov"; MOYNAHAN Kevin; METZ Eric; "LOBDELL Robert"; "CYRIL Alex"; Patty Snow; CONFER Todd A; CHARLAND Jay
Cc:	Linton, Judy L NWP
Subject:	April Gravel meeting
Date:	Friday, March 30, 2007 2:00:03 PM

Good afternoon –

I want to pass along that April 25th will be the date for the meeting to further discuss Chetco River gravel removal operations. As indicated previously, the three gravel operators on the Chetco will be invited to participate. A final meeting location has not been determined yet, but I will be shooting for a Salem location to accommodate those traveling from the southern part of the state. Please set aside time from 10:00 to 1:00 for the meeting; although I will be working to define the agenda which will hopefully have us done sooner.

Thank you all for responding so quickly to my request for meeting dates...all agencies will be represented on the 25th. Let me know if questions or comments.

Judy (503-808-4382)

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, PORTLAND DISTRICT
P.O. BOX 2946
PORTLAND, OREGON 97208-2946

April 6, 2007

REPLY TO
ATTENTION OF:
Operations Division
Regulatory Branch

Mr. Ted Freeman, Jr.
Freeman Rock, Inc.
P.O. Box 1218
Brookings, Oregon 97105

Dear Mr. Freeman:

The U.S. Army Corps of Engineers, Portland District (Corps), and the Oregon Department of State Lands (DSL) invite you to participate in a meeting on April 25, 2007, to discuss permitting issues related to gravel mining on the Chetco River. In addition to the Corps and DSL, representatives from the U.S. Fish and Wildlife, National Marine Fisheries Service, Oregon Department of Fish and Wildlife, Oregon Department of Environmental Quality, and Oregon Department of Land Conservation and Development will be in attendance. The meeting will be held at the DSL offices on 775 Summer Street NE, Suite 100, in Salem beginning at 10:00 a.m.

The purpose of the meeting is to evaluate both short-term and long-term issues related to your recent state and Federal permit applications for continued gravel extraction on the Chetco River. Short-term solutions could include continued operations within the Chetco River over the next one or two years, if it is determined such operations can be done without adversely affecting aquatic resources.

Our intent is that this session will be an open and substantive discussion between the regulatory agencies, governed by both state and federal statutory and regulatory framework, and informed by the best available science. We will be interested in hearing your detailed knowledge of the river and the mining technology you propose to employ. Please bring your consultants and/or other technical experts to explore what studies might yield answers for either short or long-term solutions potentially allowing continued gravel extraction in the river.

If you have any questions please contact Mr. Lawrence Evans at (503) 808-4370 or Mr. Kevin Moynahan at (503) 378-3805 extension 259. A copy of this letter is being sent to Mr. Bill Yocum at the Oregon Department of State Lands.

Sincerely,

Lawrence C. Evans
Chief, Regulatory Branch
U.S. Army Corps of Engineers

Kevin Moynahan
Assistant Director, Wetlands and
Waterways Conservation Division
Oregon Department of State Lands

From:	CYRIL Alex
To:	Linton, Judy L NWP; mike.tehan@noaa.gov; MOYNAHAN Kevin; Patty Snow; Monty_Knudsen@fws.gov; CHARLAND Jay; vallette.yvonne@epa.gov
Cc:	Evans, Lawrence C NWP; kemper_mcmaster@fws.gov
Subject:	April Gravel pre-meeting check-in
Date:	Monday, April 16, 2007 1:05:32 PM
Importance:	High

Hello All:
I have heard back from a few on when a conference call may happen, but am anxious about insuring the key permitting agencies (DSL and the Corps) be available as we all agreed at our last meeting that the permits will be crucial vehicles for our interagency decisions. Although I believe the intention of the group is to get the surveying done prior to the in-water window so that permitting extraction may go forward given the finding of the river aggrading, my decision document (and the Corps and DSL permits, too) will need to address the questions below. Although we want to avoid making decisions prior to or at the upcoming meeting, I believe we are all still desirous of having unity in our approach and that some clear decision points need to be outlined, as well as other options and fallback positions. Please take a moment to let me know your availability for a call or respond in an email/call describing your agency position on the questions below, as well as adding questions or info you feel is pertinent. Thanks for you attention to this in order to better coordinate on these issues.
--Alex

-----Original Message-----
From: CYRIL Alex
Sent: Monday, April 09, 2007 1:25 PM
To: 'Linton, Judy L NWP'; kemper_mcmaster@fws.gov; Monty_Knudsen@fws.gov; MOYNAHAN Kevin; LOBDELL Bob; mike.tehan@noaa.gov; Patty Snow; CHARLAND Jay; Yvonne Vallette
Cc: Evans, Lawrence C NWP
Subject: RE: April Gravel meeting

Greetings all.
As we discussed at our last meeting, I would like to propose a meeting of the minds on NMFS letter to Freeman/Tidewater/South Coast prior to the meeting Judy has arranged. Although we seemed to agree that we were on the same page, I think it would be wise to have some understanding from one another as to our specific agency positions relative to permittable activities, excavation limits, survey/study expectations, etc. Potential questions we should know our united answers to are:

* Is the action we will put forward on the Chetco an immediate short-term study and a long term study?
* Is the short term study to determine if the river is aggrading, degrading, or in equilibrium?
* If so, are we agreeing to no extraction during the study AND in the future if it the study determines the river NOT to be aggrading?
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* How will we deal with the applications on the Rogue?
* Other questions?

I know schedules are tight, and if we have to, a conference call could be on the morning of the 25th prior to our set meeting, but perhaps a few days before would be better. I could make time on 18th, 19th, 20th, 23rd, or 24th. Alternatively, we could try to do this by email, though others may have different questions and interpretation of subtle details over email is sometimes challenging... Please let me know your preference and availability. I will compile response I get and rebroadcast to everyone. Thanks for you coordination and consideration on this.

--Alex

-----Original Message-----
From: Linton, Judy L NWP [mailto:Judy.L.Linton@nwp01.usace.army.mil]
Sent: Wednesday, April 04, 2007 9:36 AM
To: kemper_mcmaster@fws.gov; Monty_Knudsen@fws.gov; MOYNAHAN Kevin; METZ Eric; LOBDELL Bob; mike.tehan@noaa.gov; CYRIL Alex; Patty Snow; CONFER Todd A; CHARLAND Jay; Yvonne Vallette
Cc: Evans, Lawrence C NWP; Linton, Judy L NWP
Subject: April Gravel meeting

Subject: Interagency Gravel Removal Strategy Mtg

Date: April 25

Location: Department of State Lands office, Salem, Mill Creek Room

Time: 10-12:30

I have spoken with Bill Yocum (Freeman Rock) and have provided him with this information. Formal invitations to participate in this meeting will be sent to Freeman Rock, Tidewater, and South Coast by week's end. Judy (503) 808-4382

From:	MOYNAHAN Kevin
To:	CYRIL Alex
Cc:	Evans, Lawrence C NWP
Subject:	RE: April Gravel pre-meeting check-in
Date:	Monday, April 16, 2007 1:10:11 PM

Hi Alex - the only time I have available of those you set forth is April 24th in the morning. Hope that works.

Regards, Kevin

From: CYRIL Alex [mailto:Alex.Cyril@state.or.us]
Sent: Monday, April 16, 2007 1:05 PM
To: Linton, Judy L NWP; mike.tehan@noaa.gov; MOYNAHAN Kevin; SNOW Patty; Monty_Knudsen@fws.gov; CHARLAND Jay; vallette.yvonne@epa.gov
Cc: Evans, Lawrence C NWP; kemper_mcmaster@fws.gov
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Importance: High

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Cc: Evans, Lawrence C NWP; Linton, Judy L NWP
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From:	Mike Tehan
To:	CYRIL Alex
Cc:	Linton, Judy L NWP; MOYNAHAN Kevin; Patty Snow; Monty_Knudsen@fws.gov; CHARLAND Jay; vallette.yvonne@epa.gov; Evans, Lawrence C NWP; kemper_mcmaster@fws.gov
Subject:	Re: April Gravel pre-meeting check-in
Date:	Monday, April 16, 2007 3:15:47 PM

Alex,

Ken, Chuck and I are available the morning of the 24th, but I am booked up completely before that. I understand the you and Chuck worked through these questions so you know what we are thinking...

thanks, michael

CYRIL Alex wrote:

Hello All:
I have heard back from a few on when a conference call may happen, but am anxious about insuring the key permitting agencies (DSL and the Corps) be available as we all agreed at our last meeting that the permits will be crucial vehicles for our interagency decisions. Although I believe the intention of the group is to get the surveying done prior to the in-water window so that permitting extraction may go forward given the finding of the river aggrading, my decision document (and the Corps and DSL permits, too) will need to address the questions below. Although we want to avoid making decisions prior to or at the upcoming meeting, I believe we are all still desirous of having unity in our approach and that some clear decision points need to be outlined, as well as other options and fallback positions. Please take a moment to let me know your availability for a call or respond in an email/call describing your agency position on the questions below, as well as adding questions or info you feel is pertinent. Thanks for you attention to this in order to better coordinate on these issues.
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To:	CYRIL Alex
Cc:	CHARLAND Jay; Linton, Judy L NWP; kemper_mcmaster@fws.gov; MOYNAHAN Kevin; Evans, Lawrence C NWP; mike.tehan@noaa.gov; Patty Snow; vallette.yvonne@epa.gov; Joe_Zisa@fws.gov; Craig_Tuss@fws.gov
Subject:	Re: April Gravel pre-meeting check-in
Date:	Tuesday, April 17, 2007 10:59:57 AM

Alex, the best days for us are the 23rd or 24th, but I am also available the afternoon of the 18th and anytime on the 19th, and 20th. Janine Castro will be available for the 23rd and the 24th.

It is our understanding that we would be proposing a short term evaluation (estimated at 2 to 3 months) of the condition of the Chetco system to determine whether it is aggrading, degrading or in equilibrium. Janine has identified a number of methods to do the evaluation in a period of several months that we could discuss at the pre-meeting conference call.

If the stream is aggrading or in dynamic equilibrium, we would recommend a further evaluation (that may occur concurrently?) of what might be the extractable excess for an aggrading condition. For the dynamic equilibrium condition, a sediment budget evaluation would determine whether there is an likely an extractable excess or not and, if so, what it may be. The degrading condition begs the question whether there should be any extraction until the system actually recovers.

Interim extraction (while the study is occurring) is something that we should discuss as a group since there are many issues to consider. Similarly, in the long term, for the degrading and equilibrium conditions we need a good discussion of the pertinent considerations to arrive at a definitive answer.

I would also hope that the Federal considerations paper would play an important role in all of these discussions.

I hope this helps.

Monty Knudsen
Assistant Project Leader
Oregon Fish & Wildlife Office
2600 S.E. 98th Avenue
Portland, OR 97266-1398
503.231.6179

From: Monical, Teena G NWP
To: Linton, Judy L NWP
Subject: FW: Feb. 1 meeting notes
Date: Monday, April 23, 2007 1:12:02 PM
Attachments: notes.doc

Teena Monical

Telephone (541) 465-6877
FAX (541) 465-6888

-----Original Message-----
From: BILL YOCUM [mailto:billy@freemanrock.com]
Sent: Tuesday, February 06, 2007 8:37 AM
To: Chuck Wheeler; bob.lohn@noaa.gov; Monical, Teena G NWP; Grudzinski, Lisa A NWP; Molly (Wyden) McCarthy; Ron Kreskey; Dave Scott; Bob Lobdell; SOLLIDAY Louise * Governor's Office; Todd Confer; Jim Waldvogel; Robert Elayer; Jon Barton; Terri Moffett; Karmen
Subject: Feb. 1 meeting notes

Here are the notes documenting our Feb. 1st. meeting on the Chetco. If you have any questions or correction, please let me know. Thanks for your input in balancing the ecology and economy of the Chetco River and the local communities.

Bill

Feb. 1, 2007 Field Trip Notes

Attendees: Ted Freeman Jr., Bob Lohn (NW Regional Director for NOAA), Chuck Wheeler (NMFS), Teena Monical (COE), Terri Moffett (Sen. G. Smith Rep.), Molly McCarthy (Sen. R. Wyden Rep.), Ron Kreskey (Rep. P. DeFazio Rep.), Dave Scott (Port of Brookings Harbor), Bob Lobdell (DSL), Todd Confer (ODFW), Russell Stauft (ODFW), Jim Waldvogle (Sea Grant), Captain Gary Klien, Captain Val Early, Captain Gary Early, Virgil Frasier (So. Coast Lbr.), Scott Darger (Tidewater Contractors), Robert Elayer (Tidewater Contractors), and Bill Yocum (Freeman Rock).

Objective: To observe the current condition of the Chetco River, to discuss the NMFS concerns with gravel removal, to agree on a short-term (2007) and long-term solution for gravel removal on the Chetco that will supply the Federal, State, and local aggregate needs.

1:30 pm to 4:30 pm. Met at the Brookings Harbor Port and departed to 2nd Bridge (River Mile 11) on the Chetco River for a float trip. Following is who went in what drift boat.

Captain Val Early passengers included Ted Freeman Jr., Bob Lohn, Jim Waldvogel, Todd Confer, and Chuck Wheeler.

Captain Gary Early passengers included Terri Moffett, Molly McCarthy, Bob Lobdell, Russell Stauft, Scott Darger.

Captain Gary Kline passengers included Teena Monical, Ron Kreskey, and Dave Scott.

All river goers were handed the following list of things that they should look for. It was explained that these questions came from concerns expressed by the NMFS. It was mentioned that with one trip the attendees probably not be able to answer the questions but they should focus on these questions while going down the Chetco.

- Has gravel removal caused any significant impacts on aquatic habitat (salmon or steelhead fisheries)?
- Has gravel removal reduced stream complexity, pool quality, channel stability and/or migration barriers to fish?
- Has gravel removal changed the river channel from alternating gravel bars to one simplified channel with a loss of gravel bars?
- Has gravel removal occurred at a rate greater than natural recruitment and the base elevation of the river has decreased?
- Has gravel removal decreased the Chinook Spawning Habitat?
- Has gravel removal decreased the number of pool and riffles that reduced fish habitat?
- Has gravel removal eliminated the establishment of riparian vegetation? Does Freeman Bar have less vegetation than other similar areas on the Chetco?
- Has gravel removal deepened the Chetco River estuary?

- Is the Chetco a gravel deficient River?

4:30 pm to 6:00 pm. After the float trip we convened in the Conference Room at the Port of Brookings Harbor. We did introductions and went through the above questions.

Bill then proceeded to go through the NMFS concerns that were expressed about the Chetco. In addition Bill also mentioned that an inter-agency formal response should not cite draft documents that have not been finalized by the issuing agency. NMFS cited a draft BO in their comments to DSL. We discussed the NMFS belief that that gravel removal results in a "take" to the SONC Coho. NMFS also believes that gravel removal will adversely affect designated EFH for groundfish and coastal pelagics in the estuary and the Chetco River.

Gary Klien mentioned that the fishermen have harvested thousands of fish from the Chetco through the years and there have only been rumors of Coho being caught. Gary stated that a limited amount of Coho will use the estuary as a feeding station when the bait fish is in the estuary.

Bob Lohn gave a simplified version of the T&E Act and stated that the Chetco is within the designated ESU and the habitat needs to be looked at for any federal project. Even if there is not an established Coho run there was an historic run and an analysis needs to take place. Bill mentioned that the definition for historic is written history. If there is no written documentation then it becomes pre-historic in which artifacts, computer modeling, and other tools are used to put the pieces together to document what was there prior to written history. The only written history about Coho on the Chetco are the ODFW surveys that for 14 years showed one to 36 Coho during seven years and zero Coho for seven years. Russ and Todd mentioned that the SONC Coho Recovery Plan will provide sound direction for activities on the Chetco and will be a major component for the long-term solution. Virgil mentioned the similarities between the Spotted Owl and the SONC coho. He suggested that we learn from the positive aspects of that process to avoid the legal traps that came out of the Spotted Owl process. It became apparent that the lack of data on the amount of gravel that is available in the Chetco is the main issue.

Bob Lohn then discussed the NMFS role with EFH and the Corps. He stated that unlike the ESA, NMFS would make recommendations to the Corps that are not legally binding. If the Corps thinks that the EFH impacts are minor and the social impacts are larger, then the Corps can choose not to follow the EFH recommendations. This is a Corps decision.

Virgil stated that South Coast Lumber removed Chetco aggregate for there own use. Bill stated that Tidewater Contractors removes aggregates for local asphalt and concrete sales and Freeman Rock removes aggregate for sand, gravel and concrete sales. If Tidewater Contractors and/or Freeman Rock does not have a supply and goes out of business then the local Northern California and Southern Oregon coastal communities will be impacted economically and there will be a major cost increase and a loss of family wage jobs.

Bill stated that the industry has an immediate need to know if there is going to be a 2007 removal season. For if there is then the pre-removal survey needs to be ordered, if there is not going to be a 2007 removal then a downsizing plan needs to be implemented. Bill then suggested a solution as outlined by McBain & Trush Consultants that submitted a proposal to Freeman Rock in January of 2007. This proposal suggested a short-term solution with interim gravel removal volumes for 2007 and the need for a long-term removal plan based on sediment yields and hydrology. The short-term solution has a price tag of $20,000. Jim brought copies of the recent "Assessment of the Lower Smith River" that was prepared for Del Norte County in January of 2007. Jim stated that this assessment had a high price tag that the County paid and that NMFS did not agree with the calculations. He warned that any report needs to be team effort between the agencies and the operators before there could be solution. Bill wanted concurrence from the agencies that this was a prudent approach before any dollars was spent. Teena stated that the Corps was not very optimistic about a removal permit for 2007. Bob Lohn stated that he sees the urgency for a short-term and long-term solution. He did agree with the approach that was suggested by McBain and Trush but wanted to discuss this with his staff. Bob said that he would get back to us in three weeks on a process that he hopes will work for the short and long-term solution.

Bill thanked Terri, Dave, the river Captains, the Congressional Reps., the Agencies and others for their input and interest in working towards the balance of ecology and economy and the meeting was then over.

From:	CYRIL Alex
To:	CYRIL Alex; Evans, Lawrence C NWP; Linton, Judy L NWP; Monical, Teena G NWP; mike.tehan@noaa.gov; chuck.wheeler@noaa.gov; Ken.Phippen@noaa.gov; Monty_Knudsen@fws.gov; craig_tuss@fws.gov; Janine_M_Castro@fws.gov; CHARLAND Jay; MOYNAHAN Kevin; Patty Snow; Yvonne Vallette
Subject:	Updated "Agenda" for Apr 25th Chetco meeting
Date:	Tuesday, April 24, 2007 4:39:14 PM
Attachments:	Apr 25 BACKGROUND INFO AND AGENDA.doc

All:
Here is the latest with comments I received incorporated... See you tomorrow!
--Alex <<Apr 25 BACKGROUND INFO AND AGENDA.doc>>

-----Original Message-----
From: CYRIL Alex
Sent: Tuesday, April 24, 2007 1:42 PM
To: Evans, Lawrence C NWP; 'Linton, Judy L NWP'; 'teena.g.monical@nwp01.usace.army.mil'; mike.tehan@noaa.gov; 'chuck.wheeler@noaa.gov'; 'Ken.Phippen@noaa.gov'; Monty_Knudsen@fws.gov; 'craig_tuss@fws.gov'; 'Janine_M_Castro@fws.gov'; CHARLAND Jay; MOYNAHAN Kevin; 'Patty Snow'; Yvonne Vallette

Subject: "Agenda" for Apr 25th Chetco meeting

Hello All:
I think I got this to everyone from our phone call this morning plus Larry (Congratulations, Larry (and Kevin)! In your absence you and Kevin were elected Co-Chairs!). I am happy to help facilitate by keeping the meeting on point. To that end I am providing an outline for the discussion with some limited background info based on our discussion this morning. I think it is pretty clear, but if anyone has strong feelings about clarifying anything, adding anything or is uncomfortable with providing this at the meeting, please let me know BEFORE CLOSE OF BUSINESS TODAY. Thanks again for your excellent coordination and commitment to working together to resolve this. I am confident that our hard work on this will result in useful approaches to these types of issues in the future and throughout the state. See you tomorrow!

<< File: Apr 25 BACKGROUND INFO AND AGENDA.doc >>

L. Alexandra Cyril
401 Water Quality Certification Coordinator
Department of Environmental Quality
Northwest Region
2020 SW 4th Avenue, Suite 100
Portland, OR 97201

503 229-6030
503 229-6957 (fax)

cyril.alex@deq.state.or.us

Aggregate Mining Permit Applications on the Chetco River
April 25, 2007
DSL – Mill Creek Room 10am-12pm

APPLICANTS:
Freeman Rock
Tidewater Contractors, Inc.
South Coast Lumber

AGENCY REPRESENTATIVES:
USACE – 404/Sec 10 Permit: Larry Evans, (Co-Chair); Judy Linton; Teena Monical
DSL – Removal/Fill Permit: Kevin Moynahan, (Co-Chair); Bob Lobdell; Mike Morales
DEQ – 401 Water Quality Certification: Alex Cyril
DLCD – Coastal Zone Consistency Certification: Jay Charland
NMFS – Biological Opinion: Mike Tehan; Ken Phippen; Chuck Wheeler
USFWS –Coordination Act Consultation: Monty Knudsen; Janine Castro
ODFW: Patty Snow, Todd Confer
EPA: Yvonne Vallette

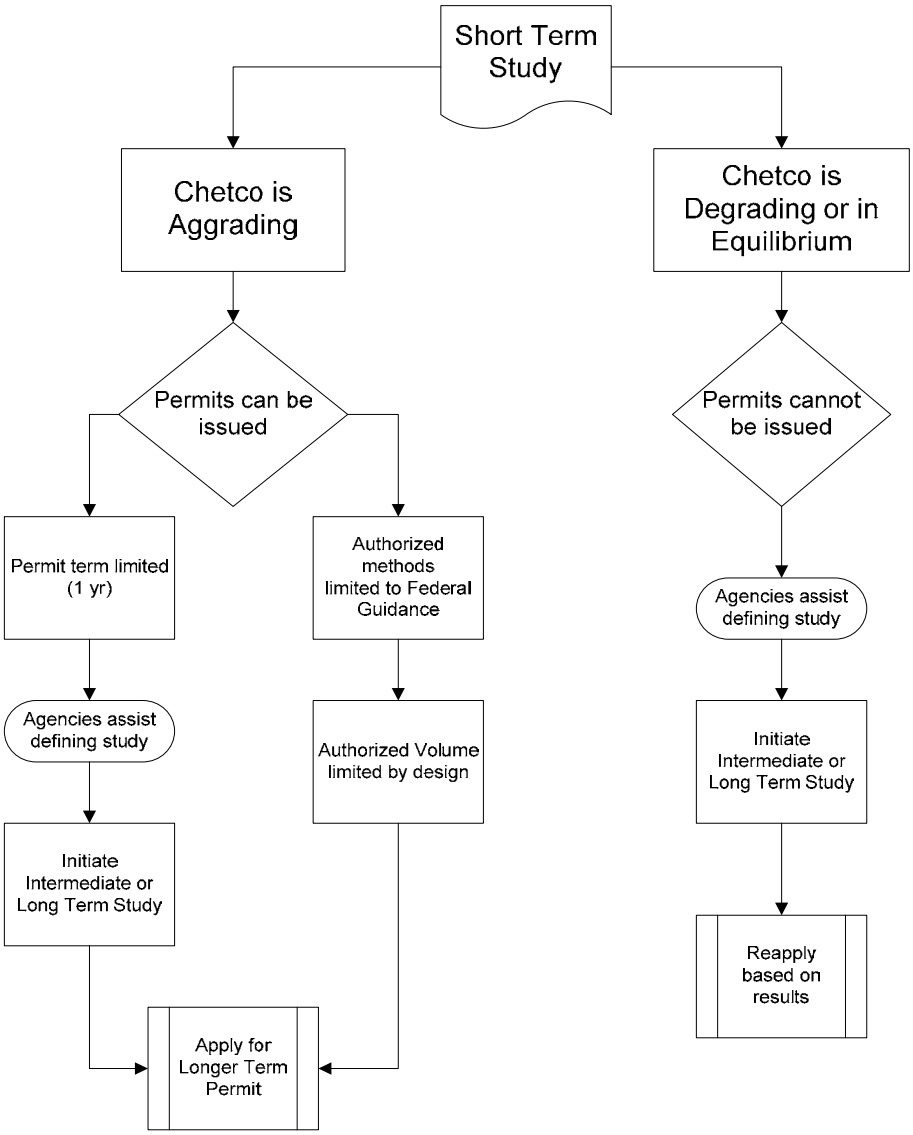
BACKGROUND:
Permit applications have been submitted and are currently under review for authorization of aggregate removal from various locations in the Chetco River, Curry County, OR. Public comments have been received and a public meeting in Gold Beach has been held by the agencies. Additionally, the applicants have held a meeting in Coquille at which USACE and DSL agreed to work together and with the industry to pursue a regional/watershed approach for aggregate mining in the Chetco River and potentially other basins in the future. The above agencies have agreed to coordinate efforts and work with the applicants to arrive at a near-term solution for acquiring information as to the state of aggregate abundance in the Chetco system, so that these applications can be evaluated in keeping with varying agency responsibilities and requirements. Our meeting today is to discuss the path forward for these permit applications and provide a forum to discuss the steps involved.

DISCUSSION POINTS:

- Sediment Yield Analysis proposal and agency response
    - Proposal submitted by Freeman – does this represent Tidewater and South Coast as well?
    - Short Term Recommendations and Long Term Recommendations
        - Tidewater site in estuary will require a different extraction design and has different in-water work window restrictions
        - Define study areas – reach scale

- Permit decision timeline – based on results of Short Term study
    - Batched approach to current non-estuary applications
    - Short term study complete and submitted before June 1 in order to process all agency documents by middle (mid- Aug?) of in-water work window (July 15-Sep 30)

- <u>Decision options</u>



- <u>Permit limitations and info needs for future permits</u>
    - Design based on Federal Guidelines recommendations – alcove shape, depth limits, setbacks, etc.
    - Volume allowable determined by design configuration – will likely be reduced from previous years dependant on amounts that recruit annually
    - Intermediate or Long Term study – agencies will assist in determining a cost effective study design
        - Perhaps an intermediate option is to set up repeatable cross-sections and surveys to better understand current dynamics
        - Full scale sediment budget analysis
        - Predictive information relating to varying sizes of events which may allow for different levels of extraction
        - Integration of efforts statewide – gravel tech team, CHERT process as a model, etc.

- Summary of group understanding and next steps
    - Applicants acting together on sediment analyses and batched permit decisions?
    - Tidewater estuary location application processed separately?
    - Concurrence on Short Term/Long Term approach to sediment yield analysis?
    - Concurrence on Short Term Recommendations and defined study areas?
    - Applicants able to complete and submit Short Term study before June 1 (the earlier the better) as it is based on existing info?
    - Agencies agree to strive to deliver decision documents by mid-Aug?
    - Applicants understand likely permit limits (1 year, Federal Guidelines for design, limited volume, Long Term study needed…) or permit denials if degrading or in equilibrium until Long Term study complete?
    - Agencies agree to provide finalized info request (if necessary) immediately?
    - Discussion of next steps and time frame for them…
    - Other questions or issues not addressed (time permitting)…

From:	CYRIL Alex
To:	Evans, Lawrence C NWP; Linton, Judy L NWP; Monical, Teena G NWP; mike.tehan@noaa.gov; chuck.wheeler@noaa.gov; Ken.Phippen@noaa.gov; Monty_Knudsen@fws.gov; craig_tuss@fws.gov; Janine_M_Castro@fws.gov; CHARLAND Jay; MOYNAHAN Kevin; Patty Snow; Yvonne Vallette
Subject:	"Agenda" for Apr 25th Chetco meeting
Date:	Tuesday, April 24, 2007 1:42:04 PM
Attachments:	Apr 25 BACKGROUND INFO AND AGENDA.doc

Hello All:
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L. Alexandra Cyril
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Tidewater Contractors, Inc.
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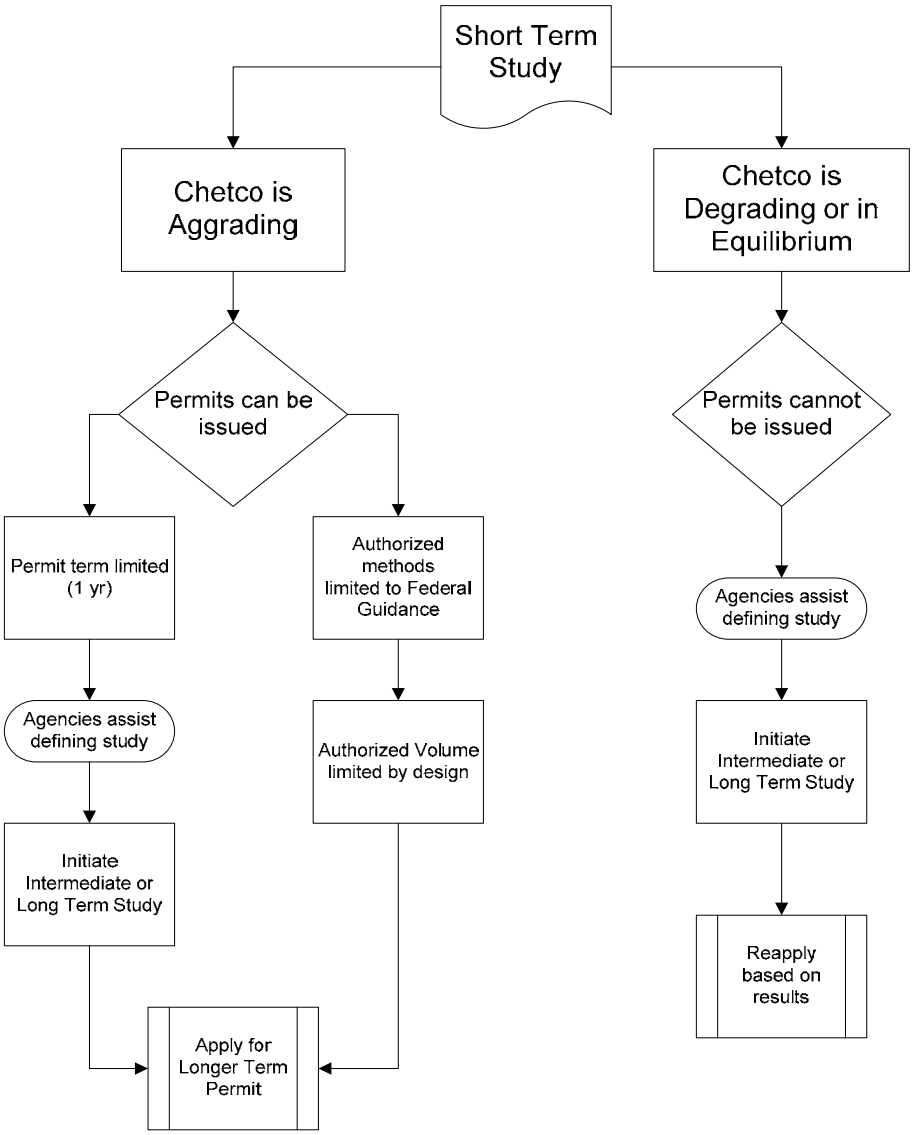
- <u>Decision options</u>



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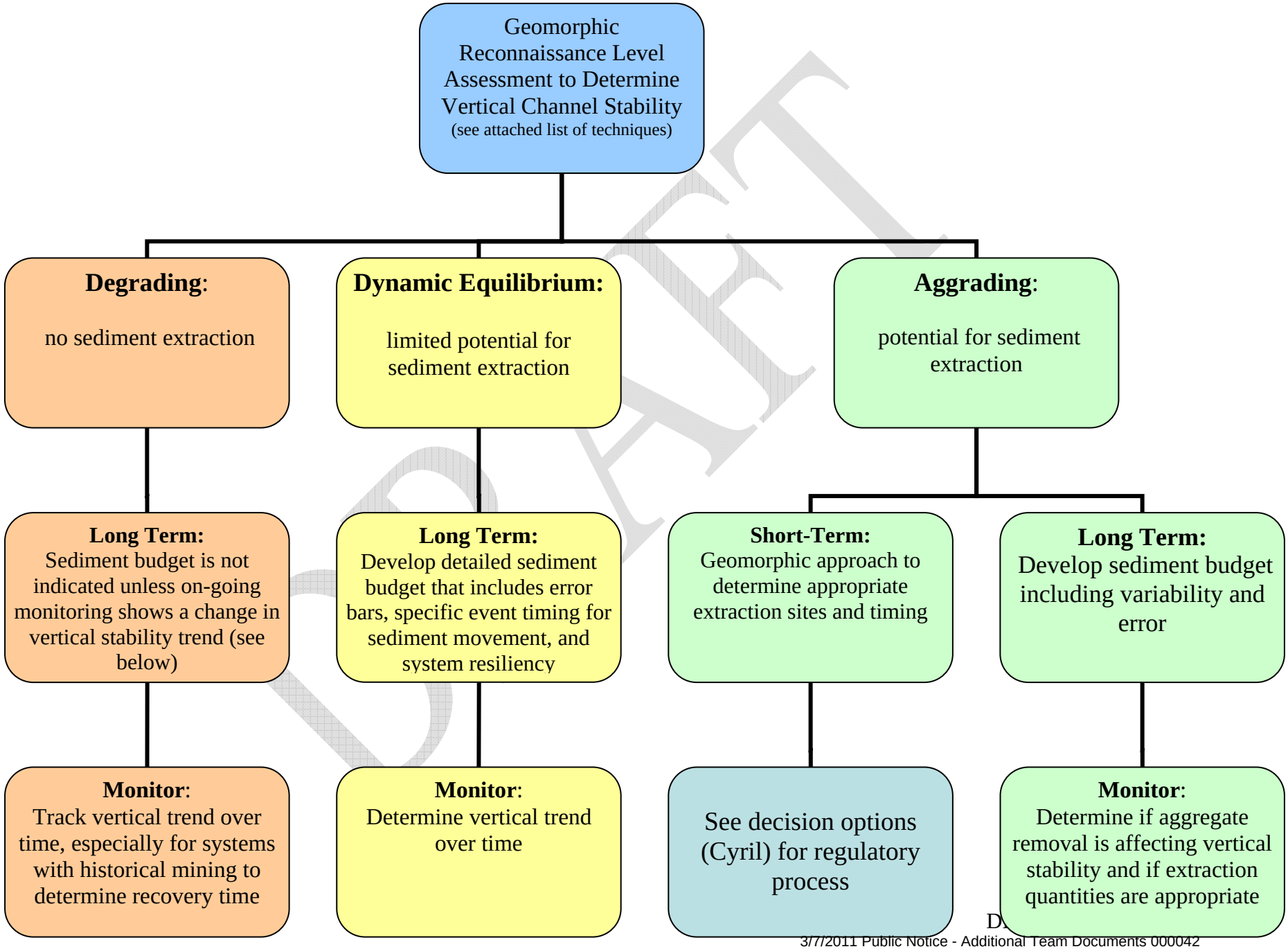
From:	Monty_Knudsen@fws.gov
To:	Kevin.Moynahan@state.or.us; Evans, Lawrence C NWP; Kemper_McMaster@fws.gov; Ed.Bowles@state.or.us; Janine_M_Castro@fws.gov; puent.Sally@deq.state.or.us; Cyril.Alex@deq.state.or.us; Eric.METZ@state.or.us; Linton, Judy L NWP; Monty_Knudsen@fws.gov; Patty.Snow@state.or.us; Jay.Charland@state.or.us; vallette.yvonne@epamail.epa.gov; craig_tuss@fws.gov; Monical, Teena G NWP; chuck.wheeler@noaa.gov; ken.phippen@noaa.gov
Subject:	Janine"s gravel mining flow chart
Date:	Tuesday, April 24, 2007 3:09:34 PM
Attachments:	Gravel mining flow chart.doc

Here is the chart that Janine developed for us.

(See attached file: Gravel mining flow chart.doc)

Monty Knudsen
Assistant Project Leader
Oregon Fish & Wildlife Office
2600 S.E. 98th Avenue
Portland, OR 97266-1398
503.231.6179


Geomorphic Reconnaissance Level Assessment to Determine Vertical Channel Stability
(see attached list of techniques)
Degrading:
no sediment extraction
Dynamic Equilibrium:
limited potential for sediment extraction
Aggrading:
potential for sediment extraction
Long Term:
Sediment budget is not indicated unless on-going monitoring shows a change in vertical stability trend (see below)
Long Term:
Develop detailed sediment budget that includes error bars, specific event timing for sediment movement, and system resiliency
Short-Term:
Geomorphic approach to determine appropriate extraction sites and timing
Long Term:
Develop sediment budget including variability and error
Monitor:
Track vertical trend over time, especially for systems with historical mining to determine recovery time
Monitor:
Determine vertical trend over time
See decision options (Cyril) for regulatory process
Monitor:
Determine if aggregate removal is affecting vertical stability and if extraction quantities are appropriate

DRAFT

Following is a list of reconnaissance level techniques (from most rapid and least expensive, to more intensive) that will help to answer the broad question of aggradation or degradation. The maximum number of techniques listed should be employed depending on feasibility and appropriateness to a given site. This is a weight of evidence argument, so conclusions should not be drawn from a single approach.

- Analysis of stream gauge records, especially long-term comparison of individual flow measurements and rating curve shifts (the number of rating tables will give an indication of channel cross-sectional stability and a trend of aggradation and degradation).
- Analysis of bathymetry from bridge scour evaluations and/or analysis of bridge as-built conditions with current conditions.
- Review of bridge maintenance records, specifically additional scour protection or dredging.
- Examination of in-channel or channel-adjacent cultural features for evidence of scour or deposition (i.e. rip rap, irrigation diversions, boat launches, exposed pipelines).
- Analysis of peak flow hydrology, including shifts in magnitude of index floods or flood patterns (extensive gravel exposure after flooding is often interpreted as aggradation, when in actuality it may just reflect a redistribution of the sediment).
- Evidence for cross-sectional change in shape and area, especially widening and shallowing of the cross-section, which can be evaluated even where cross-sections cannot be precisely re-located.
- Examination of streambank heights and relationship with geomorphic bankfull (the elevation of the depositional surface corresponding with the currently active floodplain, which may not be the same as the historic floodplain).
- Examination of floodplain and bank areas to determine if there is a buried soil horizon.
- Review of aerial photos with ground truthing to determine if riparian vegetation has been lost due to prolonged saturation, or if there has been a shift from drought tolerant to saturation tolerant species (or vice versa).
- Semi-quantitative field examination of streambed sediment patterns, including:
    - pavement to sub-pavement size relationships (lack of a coarsened surface layer may indicate heavy sediment load and inability to transport this load),
    - matrix supported sub-pavement (i.e. the coarse grains do not touch each other, which may indicate a heavy sediment load),
    - evidence for pool infilling (bars encroaching on pools, or buried pavement in pools),
    - bar patterns, such as population of medial bars and bars located at the outside of meander bends,
    - buried pavement layers,
    - bi-modal pavement layers,
    - bimodal sediment distributions (i.e. peak in both the sand and gravel fractions, which can be an indication of heavy local sources such as eroding banks, as opposed to distal watershed sources).

None of these study elements alone is sufficient to conclude that a stream is aggrading or degrading, but taken together, they provide a strong basis for determining the trend in vertical stability.

DRAFT

From:	Linton, Judy L NWP
To:	kemper_mcmaster@fws.gov; "Monty_Knudsen@fws.gov"; "Janine_M_Castro@fws.gov"; mike.tehan@noaa.gov; "MOYNAHAN Kevin"; "METZ Eric"; "LOBDELL Robert"; "CYRIL Alex"; Patty Snow; CONFER Todd A; "Jay Charland"; vallette.yvonne@epa.gov
Cc:	Monical, Teena G NWP; ken.phippen@noaa.gov; Chuck Wheeler; "Craig_Tuss@fws.gov"
Subject:	Operators short-term study proposal
Date:	Tuesday, April 24, 2007 12:05:50 PM
Attachments:	chetco_gravel_removal_eval.pdf

This is the info I received from Bill Yocum in response to the study recommendation in the March 2 letter from NMFS.

Chetco River Evaulation in Support of a Short-Term Permit for Gravel Removal Operations

Robert Elayer, Tidewater Contractors, Inc.
Bill Yocum, Freeman Rock, Inc.
Virgil Frazier, South Coast Lbr. Co. (March 12, 2007)

Background

This evaluation plan is presented in response to a recommendation by Mr. Robert Lohn, Regional Administrator, National Marine Fisheries Service in a letter dated March 2, 2007 to Bill Yocum, Freeman Rock, Inc. Mr. Lohn proposed a two-phased approach that would provide gravel to support the local economy for the present time as well as a long-term sustainable solution. Phase I would address an interim permitting period of the next one or two years, while Phase II would address permitting beyond that period. The purpose of Phase I is to quickly develop information to support an ESA and MSA consultation for interim removal/fill permits. Phase I would first develop information on the current conditions of the Chetco River and determine whether it is appropriate to remove gravel at this time. If gravel removal is possible, the best management practices to protect essential habitat features during the short-term mining operations would then be developed. The data developed in support of this initial phase and data developed during and as a result of the permitted interim mining would provide input to the Phase II long term permitting process.

This evaluation plan will provide support upon which the interim permits will be based on. All the gravel mining operations on the Chetco River will be evaluated together so that the total impact can be assessed and gravel allotment fairly distributed among the operators. The gravel operations include the Tidewater site located at the upper end of the estuary at river mile 2.2; the Freeman Rock site located at river mile 4.5 to 5.5; the South Coast Lumber site located at river mile 7.0; and the Upper Tidewater site at river mile 10.2.

River Characterization

The initial step in Phase I is to determine if the Chetco River is in equilibrium, degrading, or aggrading. Gravel mining will be allowed only if the river is aggrading. Rather than focusing on determining sediment supply and replenishment rates, this river characterization study will focus on comparing current river conditions such as longitudinal and transverse profiles with historical records. Available historical records may be available from, for example, aerial photography, hydrographic surveys, mining records, harbor dredging records, gaging station records, bridge scour surveys, bridge maintenance records, water intakes, pipeline crossings, and any public structures placed within the streambed. Current conditions will be determined by aerial photography studies, local ground surveys, local hydrographic surveys, and other local examinations. This step of the phase should take no more than about one month to complete. The database resulting from this river characterization step will provide us with a well-defined base case upon which future mining can be compared for evaluation.

Determine Best Management Practices

If the river is determined to be aggrading and suitable for gravel mining, then the second step of Phase I will be to determine the best management practices to use in harvesting the gravel. The principal methods employed historically on the Chetco River include bar lowering/shaping, bar trenching, and pit excavation within the estuary. These methods will be evaluated along with other possible methods to determine the best method to be employed that will result provide the best protection of essential habitat features.

From: McCarthy, Molly (Wyden)
To: Linton, Judy L NWP
Subject: RE: April 25th interagency meeting re: Chetco gravel removal
Date: Tuesday, April 24, 2007 2:11:35 PM

Hi Judy - I wanted to let you know that I can't make the drive up tomorrow, but my counterpart from our Salem office, Fritz Graham, will be attending the meeting for me. Thanks again for telling me about the meeting and please keep me in the loop.

-Molly

****
Molly McCarthy Skundrick
Office of US Senator Ron Wyden
541-858-5122

-----Original Message-----
From: Linton, Judy L NWP [mailto:Judy.L.Linton@nwp01.usace.army.mil]
Sent: Monday, April 23, 2007 2:23 PM
To: McCarthy, Molly (Wyden)
Subject: RE: April 25th interagency meeting re: Chetco gravel removal

Molly: That would be great if you could come. We are trying to make sure
all key players keep informed as we work through this issue. From the Congressional end, I know that Senator Smith's office will be represented and
believe we will also have someone from Representative Defazio's office as
well.

I look forward to meeting you on Wednesday.

-----Original Message-----
From: McCarthy, Molly (Wyden) [mailto:molly_skundrick@wyden.senate.gov]
Sent: Monday, April 23, 2007 2:06 PM
To: Linton, Judy L NWP
Subject: RE: April 25th interagency meeting re: Chetco gravel removal

Thank you Judy, I was not aware of the meeting. I'd like to attend if possible.

****
Molly McCarthy Skundrick
Office of US Senator Ron Wyden
541-858-5122

-----Original Message-----
From: Linton, Judy L NWP [mailto:Judy.L.Linton@nwp01.usace.army.mil]
Sent: Monday, April 23, 2007 1:44 PM
To: McCarthy, Molly (Wyden)
Subject: April 25th interagency meeting re: Chetco gravel removal

Molly: I want to make sure you are aware of the interagency meeting that is
being held at the Department of State Lands offices in Salem to discuss

Chetco River gravel removal. The meeting will be from 10 - 12 in the Mill
Creek Room at DSL, 775 Summer Street. Purpose is to discuss current proposals for gravel removal, potentials for short-term and long-term studies
to look at impacts of gravel removal, and the process for further evaluation
of gravel issues. Federal and state resource agencies will be present as
well as representatives from the gravel industry.
Please let me know if you have questions.
Judy Linton
Policy Specialist
Corps of Engineers, Regulatory Branch, Portland District
(503) 808-4382

From:	Chuck Wheeler
To:	MOYNAHAN Kevin; Evans, Lawrence C NWP; Kemper_McMaster@fws.gov; BOWLES Ed; Janine_M_Castro@fws.gov; PUENT Sally; CYRIL Alex; METZ Eric; Linton, Judy L NWP; Monty_Knudsen@fws.gov; Patty.Snow@state.or.us; Jay.Charland@state.or.us; vallette.yvonne@epamail.epa.gov; Craig Tuss; Monical, Teena G NWP
Cc:	Ken Phippen
Subject:	FW: "Chert" concept for Chetco Gravel Oversight...
Date:	Tuesday, April 24, 2007 11:14:50 AM

This was the message I got out of the blue about stakeholders wanting to look into the CHERT process.

Chuck

------ Original Message -------
From : Catherine Wiley[mailto:cwileywoods@hotmail.com]
Sent : 4/20/2007 2:27:49 PM
To : wheeler@mcsi.net
Cc :
Subject : FW: "Chert" concept for Chetco Gravel Oversight...

Chuck; I wanted to advise you that we are commencing a cooperative effort to deal with the issues of gravel removal on the Chetco. I coordinated a Land Use Conference here in Brookings last Saturday. One of the speakers was Randy Klein, Hydrologist & Sediment & Erosion Specialist (plus degrees & credentials) out of Arcata. He is a member of the "Chert' team which cooperatively provides scientific oversight with the gravel industry on the Mad & Eel rivers. The team down there includes hydrologists, biologists, etc., etc.So far, up here, Bill Yocum (Freeman Rock) is on-board, as are Harry Hoogesteger (South Coast Watershed Coordinator),Pat Russell, (League of Women Voters), Val Early, (Fishing Guide [I'll add pre-eminent]), and
Richard Heap (Biologist, former Fish & Wildlife in Nevada & current representative [suported by all] to the salmon fishing season negotiations in California & Salem). The concept is to objectively & scientifically establish parameters for gravel extraction, as well as on-going monitoring (by the team) of compliance & impacts.
It seems to me that this model could save us all (including the fish) a great deal of hardship & angst.I believe it would encourage cooperative, rather than contentious involvement, & possibly become a model for our State. Oregon Shores is on board with this as well. I'd like to know your thoughts. Thanks! Catherine Wiley

From:	Patty Snow
To:	Evans, Lawrence C NWP; Linton, Judy L NWP
Cc:	Ronald Anglin
Subject:	Chetco River Team Members
Date:	Thursday, April 26, 2007 3:26:16 PM

Hello Larry and Judy, good to see you yesterday! I am responding to your request for ODFW membership on the two advisory groups for Chetco River gravel removal. Please add my name to the technical team and Ron Anglin to the executive team list. I will also make sure to work closely with Todd Confer our district fish biologist for the area. Thank you, Patty

Patty Snow

Land and Water Use Coordinator

Wildlife Division

(503) 947-6089

From: Evans, Lawrence C NWP
To: "BILL YOCUM"; Linton, Judy L NWP
Cc: Bob Lobdell; Janine Castro; Robert Elayer; TED FREEMAN, JR; Jon Barton; Joy Smith; Virgil
Subject: RE: Chetco - General Permit
Date: Tuesday, May 01, 2007 7:58:45 AM

Good morning Bill -

Judy Linton is the Corps' representative on the technical team and I will represent the agency on the executive team. I will ask Judy to be sure to keep her finger on the pulse of the action and to keep me informed of the group's progress. I am also confident Janine Castro will do an excellent job assessing the information you will provide so a determination on whether the Chetco River is aggrading, or not, can be made.

Larry

-----Original Message-----
From: BILL YOCUM [mailto:billy@wave.net]
Sent: Tuesday, May 01, 2007 8:33 AM
To: Evans, Lawrence C NWP
Cc: Bob Lobdell; Janine Castro; Robert Elayer; TED FREEMAN, JR; Jon Barton; Joy Smith; Virgil
Subject: Chetco - General Permit

Larry,

The mini-team that was appointed at the Salem meeting on the 25th does not have a representative from the Corps. It seems logical that the Corps needs to be informed on the progress of this committee since they are one of the permitting agencies that will be making a decision for the 2007 removal season. Also, this committee will probably need some existing information that the Corps maintains in their files.

Please let us know who the Corps contact will be for this mini-team.
Thanks.

Bill

From: BILL YOCUM
To: Linton, Judy L NWP
Subject: Fw: Chetco River list
Date: Tuesday, May 01, 2007 8:08:05 AM

----- Original Message -----
From: "Robert Elayer" <relayer@twcontractors.com>
To: "'Chuck Wheeler'" <Chuck.Wheeler@noaa.gov>; "'Janine Castro'" <Janine_M_Castro@fws.gov>
Cc: "'Bob Lobdell'" <robert.lobdell@dsl.state.or.us>; "'Virgil'" <virgilf@socomi.com>; "'Joy Smith'" <Joy@umpquasand.com>; "'TED FREEMAN, JR'" <tedf@wave.net>; "'Jon Barton'" <jabar@millenicom.com>; "'BILL YOCUM'" <billy@wave.net>
Sent: Tuesday, May 01, 2007 7:50 AM
Subject: RE: Chetco River list

> Janine and Chuck,
> We do not have any additional aerial photography other than what Chuck gave
> me some time ago for the RM 2.0 Tidewater property. I have done some
> searches on the internet but have not found anything else (but that is not
> so say that there isn't more out there). All this was flown at
> 1:12,000-scale and we don't have any corresponding records for the river
> flows, tide levels, etc, although it could probably be figured out based on
> the date and time the photography was taken. I don't have that information.
> I had proposed some time ago that we fly 1:6,000-scale aerial photography
> which can be used to identify vegetation type and river features better than
> the 1:12,000-scale photos. The ideal time to fly this is in the fall or
> summer during low river flows and low tide.
>
> Chuck, you mentioned that you thought we had cross sections at Tidewater Bar
> in the estuary. I have never found any in our records and do not believe
> they exist. The only ones I am aware of are the 1939 Corps map and the 1976
> OSU sections that are hard to read. I am working on these to try and
> decipher the depths. We also have the cross sections through almost 40 years
> at the 2nd bridge gauging station on the Chetco. This is near our RM 10.2
> property.
>
> Robert
>
> -----Original Message-----
> From: Chuck Wheeler [mailto:Chuck.Wheeler@noaa.gov]
> Sent: Monday, April 30, 2007 3:41 PM
> To: BILL YOCUM
> Cc: Janine Castro; Bob Lobdell; Virgil; Joy Smith; TED FREEMAN, JR; Jon
> Barton; Robert Elayer
> Subject: Re: Chetco River list
>
> Bill,
>

> I only got a few minutes to look at this right now. Off the top of my
> head I only see two other sources not listed. One is aerial photos,
> (The corps usually houses a lot of these in Portland, the BLM does as
> well. I have a disk of BLM ones if you need it). The second is cross
> sections at Tidewater in the estuary, I thought Robert and I had a
> conversation where he told me Tidewater had been taking cross-sections
> all the way across the river and benchmarking them for a few years.
>
> I will have more time tomorrow to look at this, if I notice anything
> else I will respond again.
>
> Chuck
>
> BILL YOCUM wrote:
> > Here is the list that we (Robert & Bill) put together of reconnaissance
> > level data groups that we think might be relevant for an aggradation
> > analysis of the Chetco.
> >
> > Chuck and Bob, do you see any obvious omissions or do you have any info
to
> > add?
> >
> > Janine, let me know what titles you are interested in. Also, if you
see
> > any data collection that might be relevant please let us know. The
latest
> > upstream disturbance to the watershed that added aggregate pulses into
the
> > system would be the Biscuit Fire and the rain on snow event of 97.
> >
> > Bill
> >
>

From: BILL YOCUM
To: Linton, Judy L NWP
Subject: Fw: Chetco River list
Date: Tuesday, May 01, 2007 8:08:46 AM

----- Original Message -----
From: <Janine_M_Castro@fws.gov>
To: "Chuck Wheeler" <Chuck.Wheeler@noaa.gov>
Cc: "BILL YOCUM" <billy@wave.net>; "Jon Barton" <jabar@millenicom.com>; "Joy Smith" <Joy@umpquasand.com>; "Robert Elayer" <relayer@twcontractors.com>; "Bob Lobdell" <robert.lobdell@dsl.state.or.us>; "TED FREEMAN, JR" <tedf@wave.net>; "Virgil" <virgilf@socomi.com>
Sent: Monday, April 30, 2007 4:39 PM
Subject: Re: Chetco River list

>
> Hi Bill,
>
> I will echo what Chuck has said -- any aerial photos would be very, very
> useful, especially if the vegetation type can be discerned. A decadal
> interval of photos is preferable, along with photos that are taken at
> approximately the same time of year.
>
> Chuck and I will be meeting tomorrow afternoon to review the list and
> existing data that Chuck has on file. as I mentioned in my voice mail,
> there is a potential for a field visit the week of May 21st -- will keep
> you posted.
>
> Thanks,
> Janine
>
> Janine M. Castro, PhD, RG
> Geomorphologist
>
> "There's no more to-day than
> there was a thousand years ago --
> You can't wear water out."
> D.H. Lawrence
>
> US Fish and Wildlife Service
> 2600 SE 98th Ave., Suite 100
> Portland, OR 97266
> 503.231.6179
>
>
>
> Chuck Wheeler
> <Chuck.Wheeler@no
> aa.gov> To
> BILL YOCUM <billy@wave.net>
> 04/30/2007 04:40 cc
> PM Janine Castro
> <Janine_M_Castro@fws.gov>, Bob
> Lobdell
> <robert.lobdell@dsl.state.or.us>,
> Virgil <virgilf@socomi.com>, Joy

> Smith <Joy@umpquasand.com>, "TED
> FREEMAN, JR" <tedf@wave.net>, Jon
> Barton <jabar@millenicom.com>,
> Robert Elayer
> <relayer@twcontractors.com>
> Subject
> Re: Chetco River list
>
>
>
>
>
>
>
>
>
>
> Bill,
>
> I only got a few minutes to look at this right now. Off the top of my
> head I only see two other sources not listed. One is aerial photos,
> (The corps usually houses a lot of these in Portland, the BLM does as
> well. I have a disk of BLM ones if you need it). The second is cross
> sections at Tidewater in the estuary, I thought Robert and I had a
> conversation where he told me Tidewater had been taking cross-sections
> all the way across the river and benchmarking them for a few years.
>
> I will have more time tomorrow to look at this, if I notice anything
> else I will respond again.
>
> Chuck
>
> BILL YOCUM wrote:
> > Here is the list that we (Robert & Bill) put together of reconnaissance
> > level data groups that we think might be relevant for an aggradation
> > analysis of the Chetco.
> >
> > Chuck and Bob, do you see any obvious omissions or do you have any info
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> > add?
> >
> > Janine, let me know what titles you are interested in. Also, if you
see
> > any data collection that might be relevant please let us know. The
> latest
> > upstream disturbance to the watershed that added aggregate pulses into
> the
> > system would be the Biscuit Fire and the rain on snow event of 97.
> >
> > Bill
> >
>
>
>

From: BILL YOCUM
To: Linton, Judy L NWP
Subject: Fw: Chetco River list
Date: Tuesday, May 01, 2007 8:11:27 AM
Attachments: SUMMARY OF DATA TO SUPPORT AGGREGATE MINING.doc

----- Original Message -----
From: "BILL YOCUM" <billy@wave.net>
To: "Janine Castro" <Janine_M_Castro@fws.gov>; "Bob Lobdell" <robert.lobdell@dsl.state.or.us>; "Chuck Wheeler" <Chuck.Wheeler@NOAA.gov>; "Virgil" <virgilf@socomi.com>
Cc: "Joy Smith" <Joy@umpquasand.com>; "TED FREEMAN, JR" <tedf@wave.net>; "Jon Barton" <jabar@millenicom.com>; "Robert Elayer" <relayer@twcontractors.com>
Sent: Friday, April 27, 2007 4:19 PM
Subject: Chetco River list

> Here is the list that we (Robert & Bill) put together of reconnaissance
> level data groups that we think might be relevant for an aggradation
> analysis of the Chetco.
>
> Chuck and Bob, do you see any obvious omissions or do you have any info to
> add?
>
> Janine, let me know what titles you are interested in. Also, if you see
> any data collection that might be relevant please let us know. The latest
> upstream disturbance to the watershed that added aggregate pulses into the
> system would be the Biscuit Fire and the rain on snow event of 97.
>
> Bill
>

SUMMARY OF DATA TO SUPPORT AGGREGATE MINING PERMIT APPLICATIONS ON THE CHETCO RIVER

Robert Elayer, April 26, 2007
Bill Yocum, April 27, 2007

STREAM GAUGE RECORDS

- Gauging station 14400000 (Chetco River near Brookings, OR)
  - Provisional copy of rating table for the Chetco gauging station (1970).
  - Flow records are available from October 1969 to current (RE has file of data)
  - Rating curve shifts (not checked but thought to be none)
  - Flow field data (RE has copies of field data sheets for all except 1980's)

BRIDGE AS-BUILT, SCOUR, AND MAINTENANCE RECORDS

- "Doc" Martin Bridge (Hwy 101 at about RM 0.5)
  - ODOT Data
- 2nd Bridge (North Bank Chetco River Road at about RM 10)
  - Searched for data from Forest Service but found nothing
- North Fork Bridge data. This bridge is just above the confluence of the North Fk. and the main stem of the Chetco. We think the County might have some pre-construction elevation information that might be relevant.

IN-CHANNEL AND CHANNEL-ADJACENT FEATURES

- River float trip?

PEAK FLOW HYDROLOGY ANALYSIS

- No known data

CROSS-SECTIONAL CHANGE IN SHAPE

- 1939 bathymetric survey
  - U.S. Engineer Office, 1939, *Chetco River, Oregon, Entrance to Tide Rock, June 20 – July 14, 1939*: U.S. Engineer Office, Portland, Oregon District (CW has copy)
- 1976 bathymetric survey
  - Slotta, L.S. and Tang, S., 1976, *Chetco River Tidal Hydrodynamics Assiciated with Marina Flushing*: Oregon State University, Ocean Engineering Programs (JC has a copy)
- Cross sectional data at 2nd Bridge (USGS gauging station 14400000)
  - USGS Gaging station field flow record data
  - 24 sections from 12/21/1969 through 3/13/2006 (1980's data missing)
  - Summarized and adjusted for elevation using bench mark on bridge deck (RE developed and is presented in Excel file)
- Transect surveys on Freeman Bar from 1997 to 2006.

NATURAL RESOURCES OF THE CHETCO

- *Estuary Inventory Report*, ODFW & OLCDC, 1979.
- Friends of Cal-Ore Fish, Steelhead Derby Fish Counts from 1983 to 2007.
- SMMS Metadata Report, *Base Shoreline for Chetco Estuary Plan*, Identification Information, Data Quality Information, Spacial Data Organization Information, Spatial Reference Information, Distribution Information, Metadata Reference Information, (www.inforain.org/mapsatwork/oregonestuary, 1987).

STREAM BANK HEIGHTS AND GEOMORPHOLOGY

- River float trip?

FLOODPLAIN AND BANKS

- River float trip?

RIPARIAN VEGETATION CHANGES

- River float trip?

STREAMBED SEDIMENT PATTERNS

- River float trip?

WATER SUPPLY SYTEMS

- City of Brookings and Harbor Water intake information. (construction data and well logs).

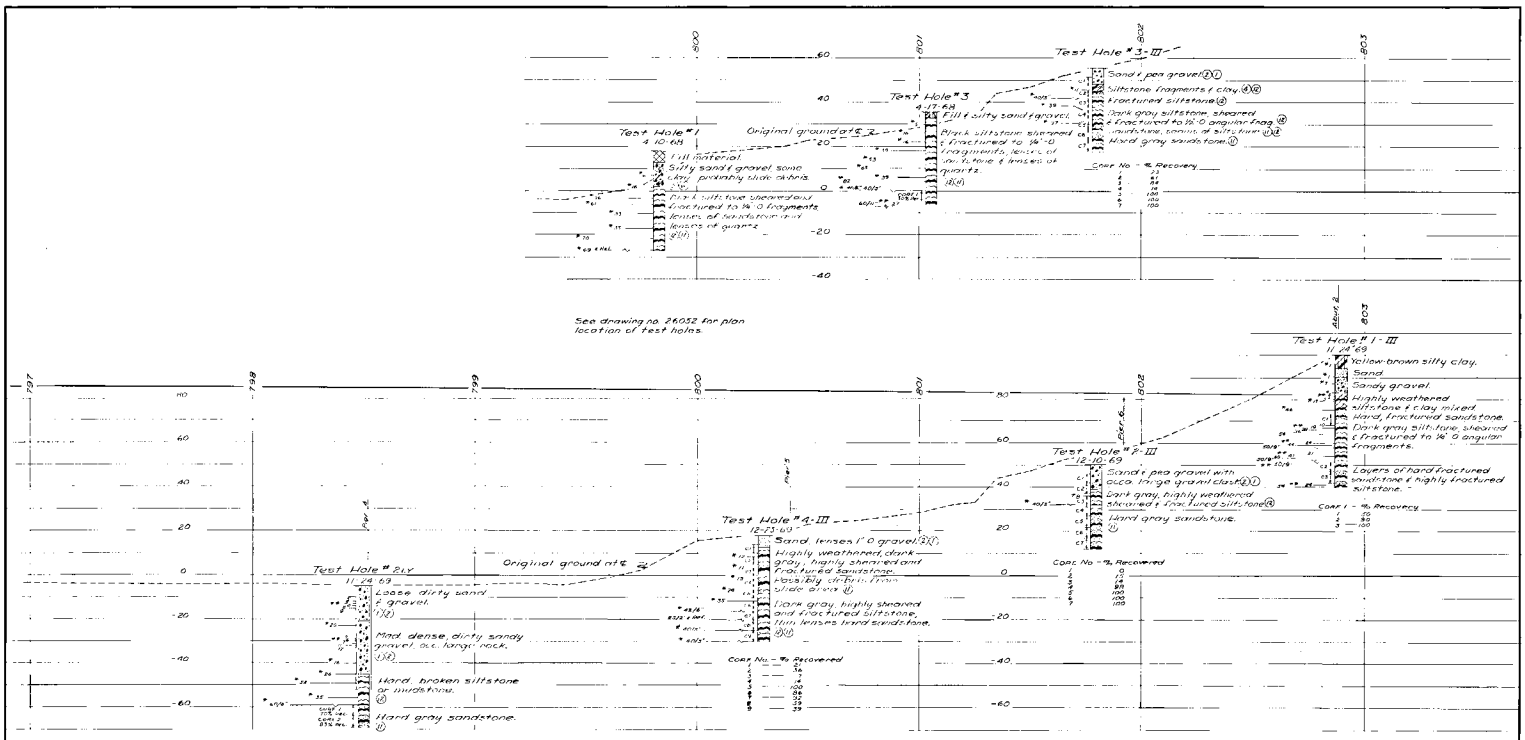
From:	BILL YOCUM
To:	Linton, Judy L NWP
Subject:	Fw: Hwy 101 Chetco River Bridge
Date:	Tuesday, May 01, 2007 8:20:41 AM
Attachments:	01143D_Foundation_2.pdf 01143D_Foundation_1.pdf 01143D_Vicinity.pdf 01143D_Elevation.pdf UW01143D.xls 01143D_Insp_SIA.pdf

---

----- Original Message -----
From: "BILL YOCUM" <billy@wave.net>
To: "Chuck Wheeler" <Chuck.Wheeler@NOAA.gov>; "Janine Castro" <Janine_M_Castro@fws.gov>; "Bob Lobdell" <robert.lobdell@dsl.state.or.us>
Cc: "Robert Elayer" <relayer@twcontractors.com>; "Joy Smith" <Joy@umpquasand.com>; "TED FREEMAN, JR" <tedf@wave.net>; "Jon Barton" <jabar@millenicom.com>
Sent: Monday, April 30, 2007 7:27 AM
Subject: Fw: Hwy 101 Chetco River Bridge

> I am also keeping a hard file of this info.
>
> Bill
>
> ----- Original Message -----
> From: HARTMAN Bert H
> To: BILL YOCUM
> Sent: Friday, April 27, 2007 3:08 PM
> Subject: RE: Hwy 101 Chetco River Bridge
>
>
> Bill
>
>
>
> I do not have any maintenance file that would show dredging. I can give you
> the original drawings and the current underwater inspection report.
>
>
>
> The dive report does have a measurement from a ladder rung to the water
> surface. There is the 2006 dive report, and also an earlier one to compare
> with.
>
>
>
> Perhaps this is not enough information, but this is all that I can think of
> that would help you. The only project I see after 1972 had to do with guard
> rails, expansion joints, and lighting. I do not see any scour
> countermeasures. The inspection report shows there is little risk of scour.
>

>
>
> Bert Hartman, P.E.
> Bridge Program Unit Manager
> 503-986-3395
>
>
> ----------
--
> ----
>
> From: BILL YOCUM [mailto:billy@wave.net]
> Sent: Thursday, April 26, 2007 1:44 PM
> To: HARTMAN Bert H
> Subject: Hwy 101 Chetco River Bridge
>
>
>
> Hello Bert,
>
>
>
> I am getting some information for a interagency team made of Dr. Janine
> Castro (USF&WS), Chuck Wheeler (NMFS), and Bob Lodell (DSL). The purpose
of
> this information is for an aggradation analysis that will be the basis for
> determining if there is a 2007 aggregate removal season on the Chetco
River.
>
>
>
> Some information that is needed for this analysis includes bathymetric
data
> from bridge scour and/or comparison of bridge as-built condition to
current
> condition. Additional information is bridge maintenance records,
> specifically additional scour protection or dredging. Can you steer me in
> the direction where we might get a copy of any relevant data that can help
> with the aggradation analysis? Thanks.
>
>
>
> Bill Yocum
>
> 541-469-2444
>



Foundation data shown on this drawing, in some instances, is a compilation of and a revision in terminology from the original test-hole logs.

* Standard 2" ∅ Split Tube Test.
** Oregon Miniature Pile Test.

LEGEND OF MATERIALS

1. Gravels, cobbles and boulders.
2. Sand.
3. Silts.
4. Clays.
5. Silty gravels, gravel-silt mixture.
6. Silty sand, sand-silt mixture.
7. Clayey gravel, gravel-clay mixture.
8. Clayey sand, sand-clay mixture.
9. Silty clay.
10. Sand-silt-clay mixture, near equal proportions.
11. Sandstone
12. Shale.
13. Basalt rock, broken, solid, weathered, lava.
14.

DATE	REVISION

APPROVED

BRIDGE ENGINEER

DESIGNED | CHECKED

DRAWN JLD | CALC. BOOK

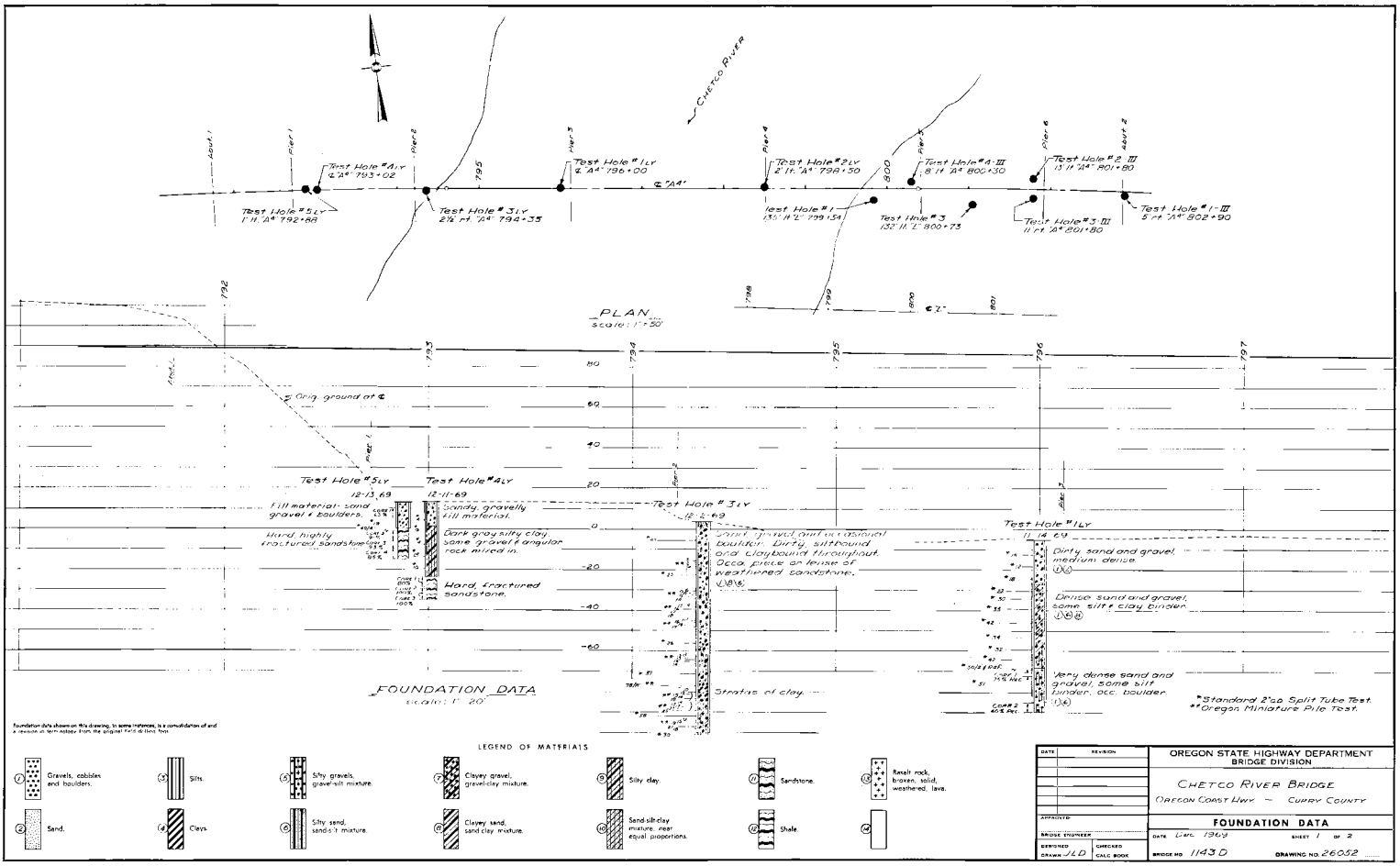
OREGON STATE HIGHWAY DEPARTMENT
BRIDGE DIVISION

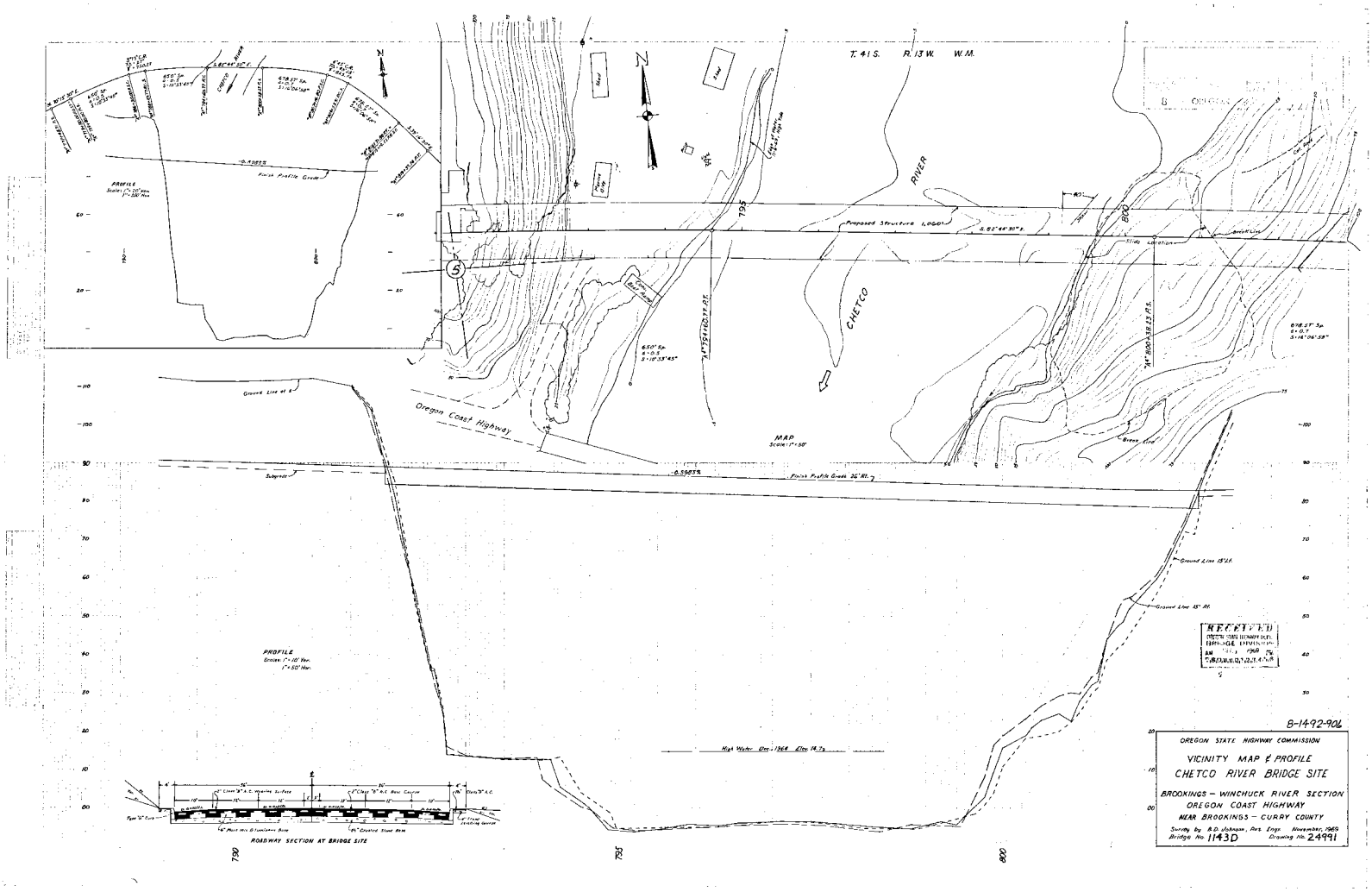
CHETCO RIVER BRIDGE
OREGON COAST HWY. - CURRY COUNTY

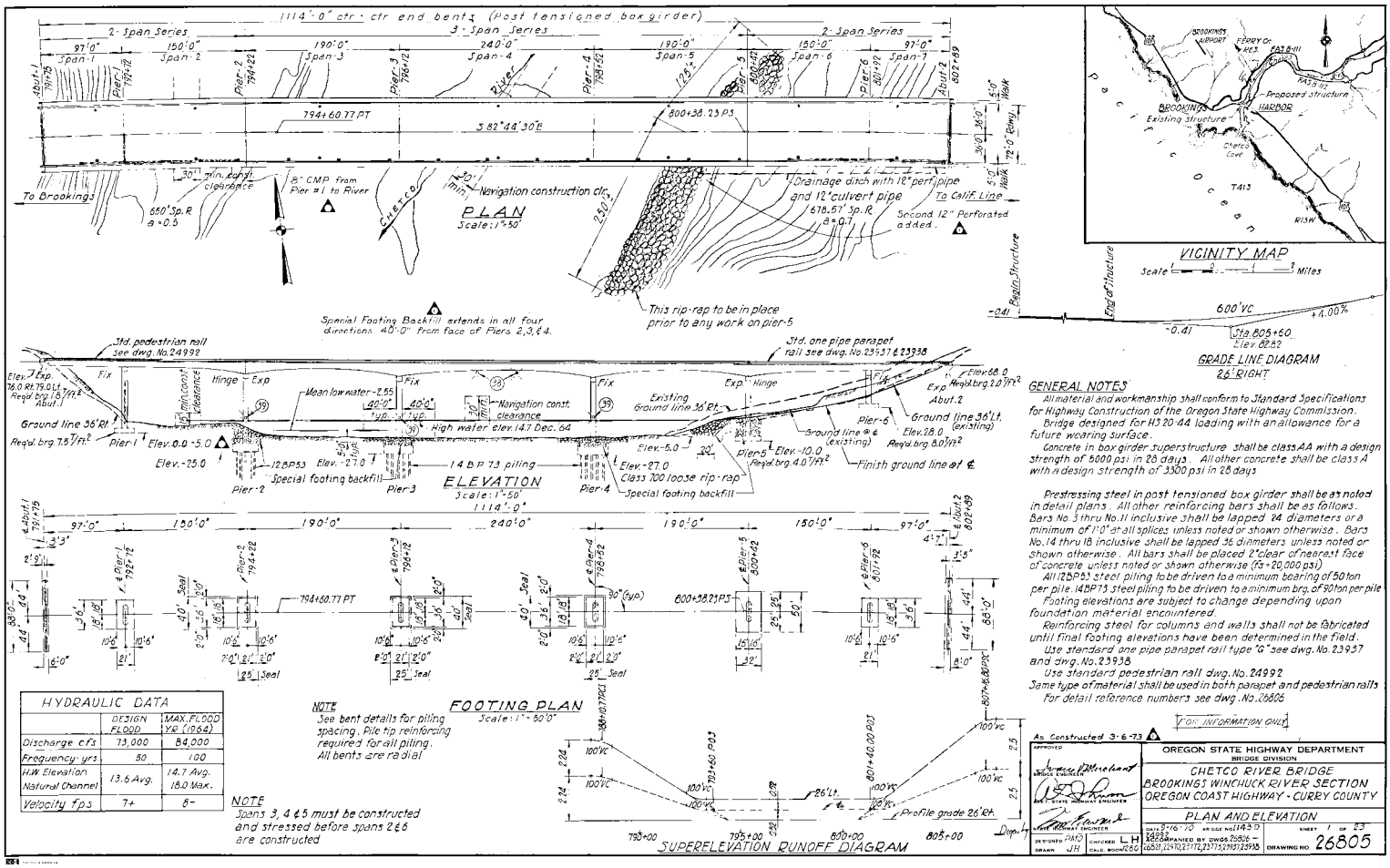
FOUNDATION DATA

DATE Dec. 1969 SHEET 2 OF 2

BRIDGE NO. 1143D DRAWING NO. 26053


CHETCO RIVER
Test Hole #4LY
4' "A" 793+02
Test Hole #5LY
1' lt. "A" 792+88
Test Hole #3LY
2½' rt. "A" 794+35
Test Hole #1LY
4' "A" 796+00
Test Hole #2LY
2' lt. "A" 798+50
Test Hole #4-III
8' lt. "A" 800+30
Test Hole #2-III
13' lt "A" 801+80
Test Hole #1
135' lt "L" 799+54
Test Hole #3
132' lt. "L" 800+73
Test Hole #3-III
11' rt. "A" 801+80
Test Hole #1-III
5' rt. "A" 802+90
PLAN
scale: 1" = 50'
Orig. ground at ℄
Test Hole #5LY
12-13-69
Fill material- sand gravel & boulders.
Hard, highly fractured sandstone
Test Hole #4LY
12-11-69
Sandy, gravelly fill material.
Dark gray silty clay, some gravel & angular rock mixed in.
Hard, fractured sandstone.
Test Hole #3LY
12-2-69
Dark gray, and sub-rounded boulder. Dirty, siltbound and claybound throughout. Occ. piece or lense of weathered sandstone.
Stratum of clay.
Test Hole #1LY
11-14-69
Dirty, sand and gravel, medium dense
Dense sand and gravel, some silt & clay binder
Very dense sand and gravel, some silt binder, occ. boulder.
*Standard 2" o.d. Split Tube Test.
**Oregon Miniature Pile Test.
FOUNDATION DATA
scale: 1" = 20'
Foundation data shown on this drawing, in some instances, is a consolidation of and a revision in form taken from the original field drilling logs.
LEGEND OF MATERIALS
1 Gravels, cobbles and boulders.
2 Sand.
3 Silts.
4 Clays.
5 Silty gravels, gravel-silt mixture.
6 Silty sand, sand-silt mixture.
7 Clayey gravel, gravel-clay mixture.
8 Clayey sand, sand clay mixture.
9 Silty clay.
10 Sand-silt-clay mixture, near equal proportions.
11 Sandstone.
12 Shale.
13 Basalt rock, broken, solid, weathered, lava.
DATE REVISION
OREGON STATE HIGHWAY DEPARTMENT
BRIDGE DIVISION
CHETCO RIVER BRIDGE
OREGON COAST HWY. ~ CURRY COUNTY
FOUNDATION DATA
BRIDGE ENGINEER
DESIGNED
DRAWN JLD
CHECKED
CALC. BOOK
DATE Dec. 1969
SHEET 1 OF 2
BRIDGE NO. 1143D
DRAWING NO. 26052


T. 41 S. R. 13 W. W.M.
CHETCO
RIVER
Oregon Coast Highway
MAP
SCALE 1" = 50'
PROFILE
Finish Profile Grade
Proposed Structure L.0.60'
Ground Line 15' Rt.
Ground Line 15' Lt.
High Water Dec. 1964 Elev. 14.7'
ROADWAY SECTION AT BRIDGE SITE
RECEIVED
8-1492-906
OREGON STATE HIGHWAY COMMISSION
VICINITY MAP & PROFILE
CHETCO RIVER BRIDGE SITE
BROOKINGS – WINCHUCK RIVER SECTION
OREGON COAST HIGHWAY
NEAR BROOKINGS – CURRY COUNTY
Bridge No. 1143D
Drawing No. 24991



HYDRAULIC DATA	DESIGN FLOOD	MAX. FLOOD YR (1964)
Discharge cfs	73,000	84,000
Frequency-yrs.	50	100
H.W. Elevation Natural Channel	13.6 Avg.	14.7 Avg. 18.0 Max.
Velocity fps	7+	8-

NOTE
See bent details for piling spacing. Pile tip reinforcing required for all piling. All bents are radial

NOTE
Spans 3, 4 & 5 must be constructed and stressed before spans 2 & 6 are constructed

GENERAL NOTES

All material and workmanship shall conform to Standard Specifications for Highway Construction of the Oregon State Highway Commission.

Bridge designed for H3 20-44 loading with an allowance for a future wearing surface.

Concrete in box girder superstructure shall be class AA with a design strength of 5000 psi in 28 days. All other concrete shall be class A with a design strength of 3300 psi in 28 days

Prestressing steel in post tensioned box girder shall be as noted in detail plans. All other reinforcing bars shall be as follows. Bars No. 3 thru No. 11 inclusive shall be lapped 24 diameters or a minimum of 1'-0" at all splices unless noted or shown otherwise. Bars No. 14 thru 18 inclusive shall be lapped 36 dinmeters unless noted or shown otherwise. All bars shall be placed 2" clear of nearest face of concrete unless noted or shown otherwise (f'_c = 20,000 psi)

All 12BP53 steel piling to be driven to a minimum bearing of 50 ton per pile. 14BP73 steel piling to be driven to a minimum brg. of 90 ton per pile

Footing elevations are subject to change depending upon foundation material encountered.

Reinforcing steel for columns and walls shall not be fabricated until final footing elevations have been determined in the field.

Use standard one pipe parapet rail type "G" see dwg. No. 23937 and dwg. No. 23938

Use standard pedestrian rail dwg. No. 24992

Same type of material shall be used in both parapet and pedestrian rails for detail reference numbers see dwg. No. 20805

FOR INFORMATION ONLY

As Constructed 3-6-73

APPROVED BRIDGE ENGINEER	OREGON STATE HIGHWAY DEPARTMENT BRIDGE DIVISION
ASST. STATE HIGHWAY ENGINEER	CHETCO RIVER BRIDGE BROOKINGS WINCHUCK RIVER SECTION OREGON COAST HIGHWAY - CURRY COUNTY
STATE HIGHWAY ENGINEER	PLAN AND ELEVATION
DESIGNED RMS CHECKED LH DRAWN JH CALC. BOOK 260	DATE 8-16-70 BRIDGE NO. 1143-D SHEET 1 OF 23 SUPERSEDES DWGS. 26806 - 26501, 22470, 23172, 23175, 23951, 22955 DRAWING NO. 26805

UNDERWATER INSPECTION REPORT

BRIDGE NAME:	Chetco River Bridge			**REGION:**	3	**BRIDGE NUMBER:**	01143D
RIVER NAME:	Chetco River	**OWNER:**	State	**DISTRICT:**	7	**INSPECTION DATE:**	9/19/2006
STATE HWY #:	9	**ROUTE NUMBER:**	US 101	**MILE POINT:**	357.98	**CURRENT:**	Incoming Tide
COUNTY:	Curry	**ROAD NAME:**				**VISIBILITY (Ft.):**	6
FOUNDATION TYPE:	Steel H-Pile			**ACCESS:**	4	**WATER TEMP:**	55
DIVERS:	Shorb, James, Vann, Rosenblad			**INS. INTERVAL:**	4	**MAXIMUM DEPTH:**	9-ft.
Water Elevation	Pier #4 downstream end from top ladder bracket down 14.6-ft.					**Constructed In**	1972

UNDERWATER ELEMENT CONDITION STATES:					**CONDITION STATES**					
Elem.	*Description:*	*Environment*	*Qty*	*Units*	*1*	*2*	*3*	*4*	*5*	*Temp*
205	Concrete Column/Pile Extn.	Severe	2	each	0	2	0	0	0	N

NBI Ratings

Item	*Description:*	*Condition Rating*
60	Substructure Condition Assessment	7
61	Channel and Channel Protection Condition Assessment	8
113	Scour	T

GENERAL NOTES:

ELEMENT REMARKS:

Elem. *Description:*

205 **Pier 3 (Brookings End):** No footings are exposed at this pier. There is a scattered blanket of riprap all around the column that is partially covered with sand and gravel. Several falsework pile extend up from the streambed a maximum of 1.5'. There is no drift at this pier.

205 **Pier 4:** No footings are exposed at this pier. Several falsework pile are exposed at the corners of the pier. They extend a maximum of 1' above the streambed. The riprap forms a uniform blanket around the column. It is partially covered with sand and gravel.

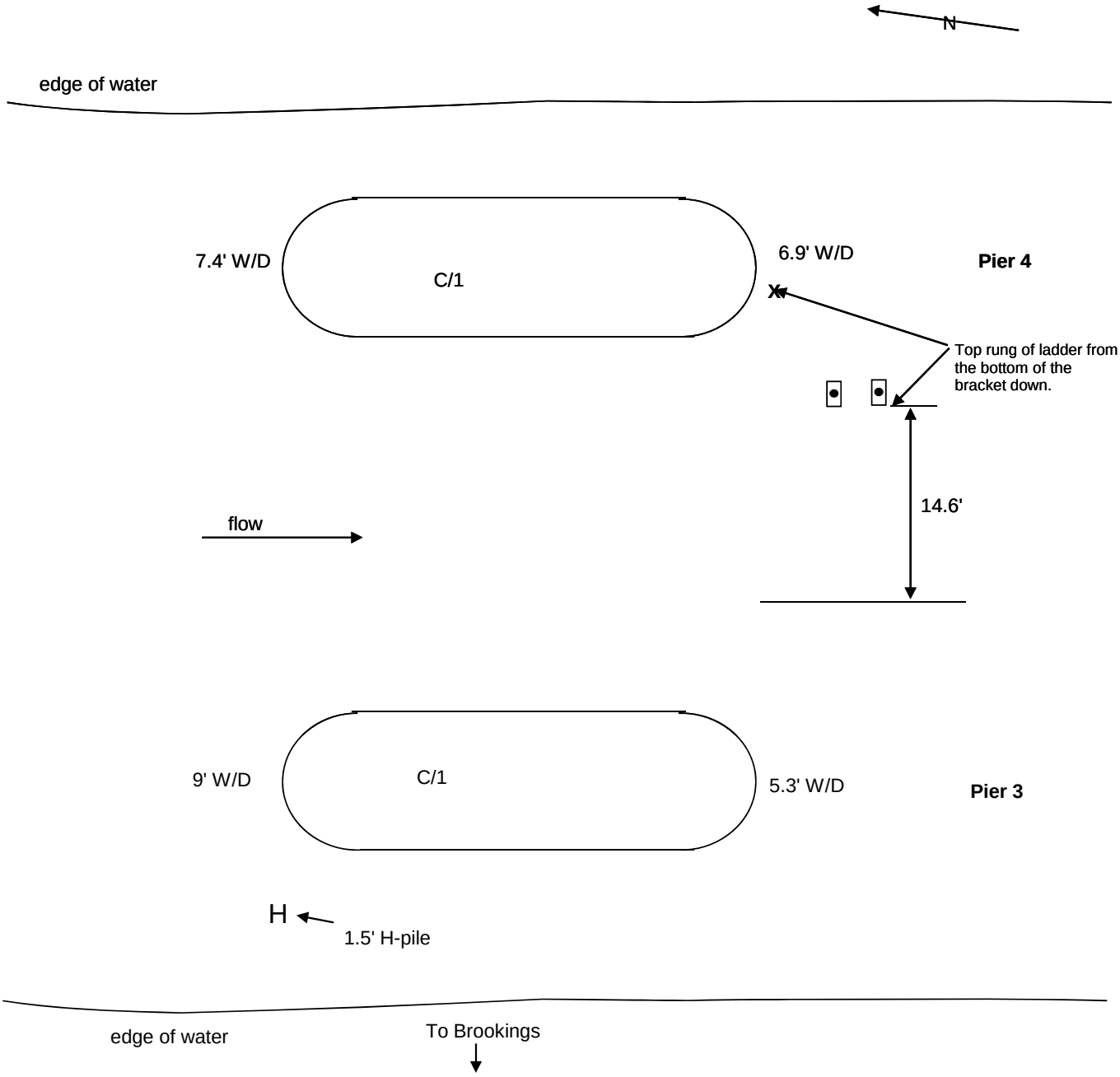
Maintenance Recommendations:

Elem. *Description:*

No underwater maintenance work is recommended at this time.

Rick Shorb, P.E.
Underwater Operations Engineer
(503) 986-2979

cc: District 7W Bridge Crew Coordinator
Region 3 Bridge Inspector
Bridge Operations


N
edge of water
7.4' W/D
C/1
6.9' W/D
Pier 4
X
Top rung of ladder from the bottom of the bracket down.
14.6'
flow
9' W/D
C/1
5.3' W/D
Pier 3
H
1.5' H-pile
edge of water
To Brookings

UNDERWATER INSPECTION REPORT

BRIDGE NAME:	Chetco River Bridge			**REGION:**	3	**BRIDGE NUMBER:**	01143D
RIVER NAME:	Chetco River	**OWNER:**	State	**DISTRICT:**	7	**INSPECTION DATE:**	6/26/2002
STATE HWY #:	9	**ROUTE NUMBER:**	US 101	**MILE POINT:**	357.98	**CURRENT:**	High Tide
COUNTY:	Curry	**ROAD NAME:**				**VISIBILITY (Ft.):**	6
FOUNDATION TYPE:	Steel H-Pile			**ACCESS:**	4	**WATER TEMP:**	50
DIVERS:	Shorb, James, Schmid, Ottosen	**INS. INTERVAL:**	4	**U/W RATING:**	7	**MAXIMUM DEPTH:**	9-ft.

UNDERWATER ELEMENT CONDITION STATES:					**CONDITION STATES**					
Elem.	*Description:*	*Environment*	*Qty*	*Units*	*1*	*2*	*3*	*4*	*5*	*Temp*
205	Concrete Column/Pile Extn.	Severe	2	each	0	2	0	0	0	N

GENERAL NOTES:

ELEMENT REMARKS:

Elem. *Description:*

205 **Pier 3 (Brookings End):** No footings are exposed at this pier. There is a scattered blanket of riprap all around the column that is partially covered with sand and gravel. Several falsework pile extend up from the streambed a maximum of 1.5'. There is no drift at this pier.

205 **Pier 4:** No footings are exposed at this pier. Several falsework pile are exposed at the corners of the pier. They extend a maximum of 1' above the streambed. The riprap forms a uniform blanket around the column. It is partially covered with sand and gravel.

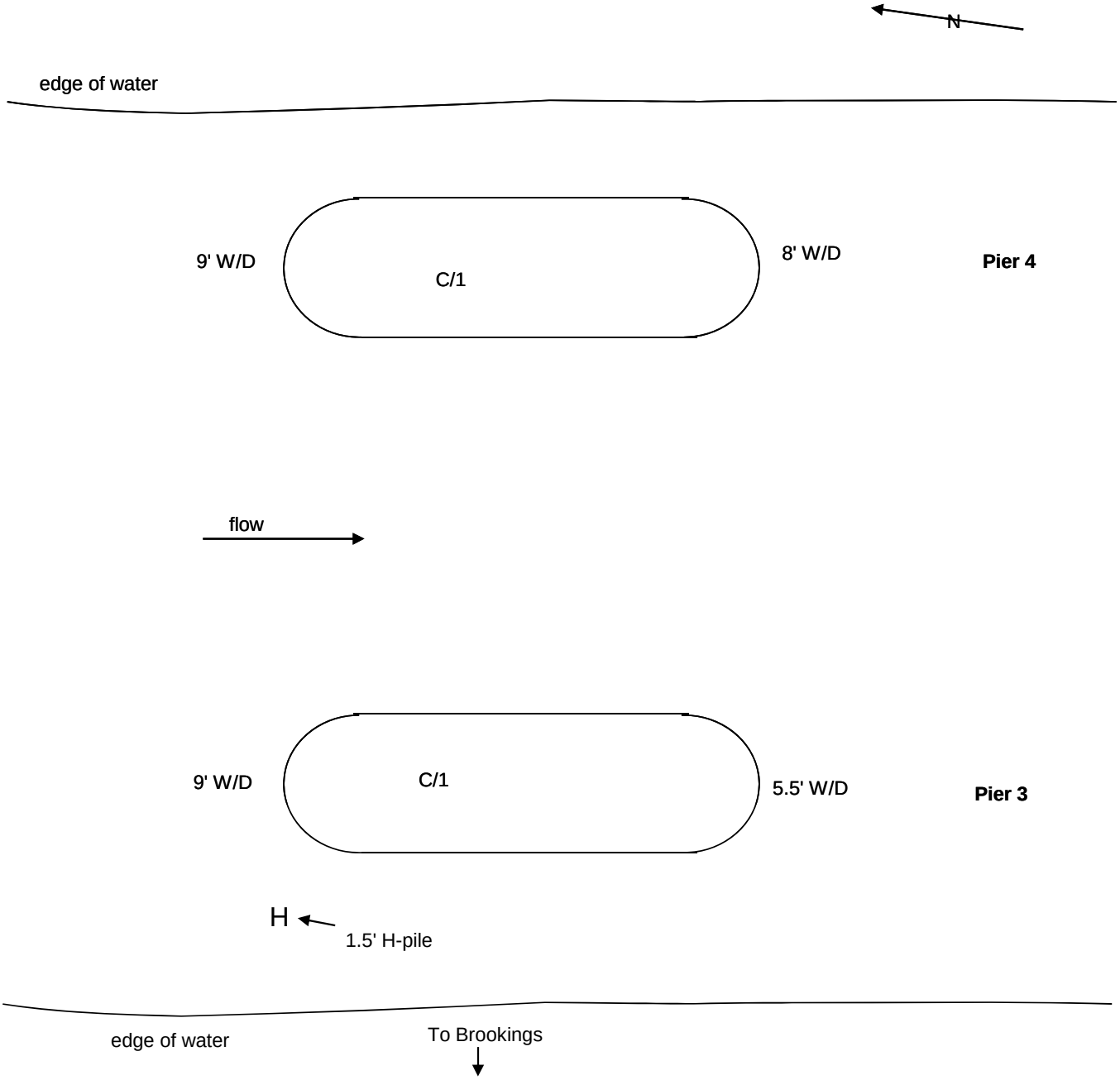
Maintenance Recommendations:

Elem. *Description:*

No underwater maintenance work is recommended at this time.

Rick Shorb, P.E.
Underwater Operations Engineer
(503) 986-2979

cc: District 7 Bridge Crew Coordinator
Region 3 Bridge Inspector
Bridge Operations


N
edge of water
9' W/D
C/1
8' W/D
Pier 4
flow
9' W/D
C/1
5.5' W/D
Pier 3
H
1.5' H-pile
edge of water
To Brookings

Oregon Department of Transportation
Bridge Inspection Report

District	07	**Structure**	Chetco River, Hwy 9	**Bridge ID**	**01143D**
Fac Crossed	CHETCO RIVER	**Owner**	State Highway Agency	**Fac Carried**	**US101(HWY009) SB**
Suff Rating	76.0	**County**	Curry	**Mile Point**	**357.98mi**
AC Depth	0.00	**Record Type**	1	**Insp Date**	04/12/2005
Bridge Length	1114.00ft	**Insp Freq**	24	**Inspector 1**	**Robert Bowne (02002)**
		Bridge Width	87.10ft	**Inspector 2**	

Signature:_____

Element Condition States

Elem	Description	Env	Qty	Units	1	2	3	4	5	status
12	Concrete Deck - Bare	Sev.	97100.00sqft	(SF)	0%	100%	0%	0%	0%	
104	P/S Conc Closed Web/Box Girder	Sev.	7798.00ft	(LF)	90%	10%	0%	0%	0%	
205	Reinforced Conc Column or Pile Extension	Sev.	6	(EA)	67%	33%	0%	0%	0%	
215	Reinforced Conc Abutment	Sev.	2	(EA)	100%	0%	0%	0%	0%	
234	Reinforced Conc Cap	Sev.	6	(EA)	100%	0%	0%	0%	0%	
300	Strip Seal Expansion Joint	Sev.	180.00ft	(LF)	50%	50%	0%	0%	0%	
305	Polychlorophrene Joint	Sev.	180.00ft	(LF)	40%	40%	20%	0%	0%	
309	Other Joint	Mod.	180.00ft	(LF)	70%	30%	0%	0%	0%	
310	Elastomeric Bearing	Sev.	48	(EA)	100%	0%	0%	0%	0%	
321	Reinforced Conc Approach Slab w/ or w/o AC Ovly	Sev.	2	(EA)	95%	5%	0%	0%	0%	
325	Traffic Impact Condition	Ben.	1	(EA)	0%	100%	0%	0%	0%	
326	Deck Wearing Surface	Ben.	1	(EA)	100%	0%	0%	0%	0%	
330	Metal Bridge Railing - Uncoated	Sev.	2242.00ft	(LF)	100%	0%	0%	0%	0%	
331	Reinforced Conc Bridge Railing	Sev.	2242.00ft	(LF)	95%	5%	0%	0%	0%	
358	Deck Cracking	Sev.	1	(EA)	80%	20%	0%	0%	0%	

Appraisal

Appraisal	NBI #	Rating
Scour	113	T Tidal, Low Risk
Bridge Rail	36A	1 Meets Standards
Transitions	36B	1 Meets Standards
Approach Rail	36C	1 Meets Standards
Rail Ends	36D	0 Substandard
Structural	67	7 Above Min Criteria

NBI Category

Category	NBI #	Rating
Deck Condition	58	6 Satisfactory
Superstructure	59	7 Good
Substructure	60	7 Good
Channel	61	8 Protected
Culvert/Retaining Walls	62	N N/A (NBI)

Deck	68	9 Above Desirable Crit
Clearance	69	3 Intolerable - Correct
Waterway	71	9 Above Desirable
Approach Alignment	72	8 Equal Desirable Crit

Remarks

Bare Concrete Deck (12)
LOTS OF WOODWASTE, SMALL PATCHES, SPALLS

P/S Conc Box Girder (104)
Inspected the inside of the box during a QA review 8/11/04

Conc Bridge Railing (331)
DIP IN RAIL SPAN 1 LEFT ????

Maintenance Recommendations

Region	District	Highway	Mile Point	Bridge ID	Name	County	Custodian
3	*07*	*009*	*357.98mi*	*01143D*	*Chetco River, Hwy 9*	*Curry*	*State Highway Agency*

Priority	Crew	Element	notes	Est. Cost	Status	action	Re Da
Routine/Schedule	Not Assigned	(12) Bare Concrete Deck	Seal the deck Generated by hwye04b on 04/25/2005	20000	Approved	Ovly Deck	4/12

**Completed items not included on default search*

Load Rating

Rating Date		**Posting Req**	5 At/Above Legal Loads
Design Load	5 MS 18 (HS 20)	**Posting Status.**	A Open, no restriction
Operating Load	60.00ton	**OR Method**	5 No rating
Inventory Rating	36.00ton	**IR Method**	5 No rating

truck	Rating Factor	%Below	Posting Required	Controlling Member	Actual Posting	Posting Date
Type 3						
Type 3S-2						
Type 3-3						

Load Rating Condition Comparison Chart

Category	NBI#	Rating Condition	Current Condition
Traffic Impact	308		
Deck Wearing Surface	310		
Deck Condition	58		6
Superstructure	59		7
Substructure	60		7
Temporary Repairs	103		_
Wearing Surface Thickness	293		0.00

Inspection Schedule

Activity	Conducted On	Frequency	Next Inspection
Routine Inspection	04/12/2005	24	04/01/2007
Underwater	09/19/2006	48	09/19/2010

76.0 **Suff Rating**
Structurally Deficient

Oregon Department of Transportation

Structure and Inventory Appraisal Report

Bridge NO: 01143D
InspDate: 8/11/04

(122) Highway/CO RD	009
(2) Highway District	District 7
(3) County	Curry
(4) City	08650
(5) Inventory Route	121001010
(6) Feature INT	CHETCO RIVER
(7) Facility Carried	US101(HWY009) SB
(8) Structure Number	01143D009 35798
(9) Location	05.1 MI N OR - CALIF S L
(10) Vert Clearance	99.99ft
(11) Mile Post	357.98mi
(16) Latitude	420317.82
(17) Longitude	1241608.76
(19) Bypass Detour	123.65mi
(20) TOLL	3 On free road
(21) Custodian	State Highway Agency
(22) Owner	State Highway Agency
(26) Func Class	02 Rural Other Princ
(27) Year Built	1972
(28) Lanes	on: 4 / under: 3
(29) Average Daily Traffic	25200
(30) Year of ADT	2004
(31) Design Load	5 MS 18 (HS 20)
(32) Approach Roadway	72.00ft
(33) Bridge Median	1 Open median
(34) Skew	0º
(35) Structure Flared	0 No flare
(36) Traffic Safety Feature	1110
(37) Historical Significance	5
(38) Navigation Control	1
(39) Navigation Vert Clear	48.00ft
(40) Navigation Horz Clear	160.00ft
(41) Open Status	A
(42) Type Service On	1
(42) Type Service Under	6
(12) Base Highway	1

(43) Struct Main	6 P/S Conc Continuous 05 Multiple Box Beam
(44) Struct Appr	0 Not Applicable 00 Not Applicable
(45) Number Main Spans	7
(46) Number Appr Spans	0
(47) Horizontal Clearance	72.00ft
(48) Maximum Span Length	240.00ft
(49) Structure Length	1114.00ft
(50) Sidewalk Width LT	5.00ft
(50) Sidewalk Width RT	5.00ft
(51) Bridge Roadway Width	72.00ft
(52) Deck Width	87.10ft
(53) Vert Clear Over Deck	99.99ft
(54) Vert Clear Under Deck	25.00ft
(55) Min Lat Underclear CD	H 0.00ft
(56) Min Lat Underclear	L 0.00ft

***** CONDITION *****

(58) Deck	6
(59) SuperStructure	8
(60) SubStructure	7
(61) Channel	8
(62) Culvert	N
(64) Operating Rating	60.00ton
(66) Inventory Rating	36.00ton

*****APPRAISAL*****

(67) Structure Condition	7
(68) Deck Geometry	9
(69) Underclearance	3
(70) Posting	5
(71) Waterway Adequacy	9
(72) APPR RDWY Alignment	8
(75) Type of Work	8

(65) Inv Rating Method	5
(92) Critical Feat Insp	(93) Date
(A)Fracture Crit	N 0 _
(B)Underwater Insp	Y 48 Jun 26 2002 12:
(94) Cost of Improvement	3567139
(95) Roadway Improvement	356714
(96) Project Improvement	5707422
(97) Year of Improvement	2006
(98) Border BRST-Code	
(100) Defense Highway	2
(101) Parallel Structure	N
(102) Direction of Traffic	2
(103) Temporary Structure	_
(104) Highway System	1
(106) Year Reconstructed	
(107) Deck Structure	1
(108) Wearing Surface	100
(109) Truck ADT	5
(110) Designated National Network	0
(111) Pier Protection	1
(112) NBIS Bridge Length	Y
(113) Scour Critical Bridge	T
(114) Future ADT	39600
(115) Year of Future ADT	2024
(116) Vert-Lift Clearance	

*****State Information*****

(117) Est Maint Cost	
(118) Culvert Length	
(119) Culvert Inside Height	
(120) Inspector	Robert Bowne (02002)

Network		(76) Improvement Length	1115.49ft
(13) LRS Inventory Route	000900100S00	(90) Inspection Date	08/11/2004
(105) Federal Lands HWY	0	(90) Inspection Frequency	24
		(63) Oper Rating Method	5

Documents for Bridge # 01143D

Bridge Clearance documents: Unavailable
Bridge Images: IM01143DA0.JPG, IM01143DA1.JPG,
Concrete Shear Cracks Documents: Unavailable
Cross Channel documents: Unavailable
Deck Survey documents: Unavailable
Fracture Critical Inspection documents: Unavailable
Fatigue Prone Detail documents: Unavailable
Sign Structures documents: Unavailable
Timber Boring documents: Unavailable
Underwater documents: UW01143D.PDF,

From:	Chuck Wheeler
To:	BILL YOCUM
Cc:	Janine_M_Castro@fws.gov; Bob Lobdell; Linton, Judy L NWP; Robert Elayer; TED FREEMAN, JR; Jon Barton; Joy Smith
Subject:	Re: Chetco
Date:	Wednesday, May 02, 2007 11:12:50 AM

Bill,

I know we said at the meeting we would rely on currently available data, but in our discussions yesterday Janine and I identified a real opportunity to advance everyone's understanding by doing a couple cross-sections. I am glad to hear it looks like you and Robert will be able to accomplish this. It looked to us that there were two great places for this.

1. Above the 101 bridge. Upstream far enough to be out of the influence of the bridge. Probably near the upstream portion of the bar on the southeastern bank. We presume it can easily be tied into a permanent benchmark on the bridge and can be related to MSL.
2. The Tidewater, Inc. bar. Near the downstream end out of the influence of Joe Hall Creek and it's associated bar. We presume it can easily be tied into a permanent benchmark that Tidewater has been using and can be related to MSL.

NMFS and Tidewater did not agree on interpretation of bed elevation information for the estuary in last year's Biological Opinion. These surveys could go a long way to bringing us to consensus. Thanks for acting on this opportunity to resolve these issues.

Chuck

BILL YOCUM wrote:

> Hi Janine,
>
> Below is a response to your last e-mail.
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> > 1. If there is any possible way to get a couple of cross-sections in the next month, that would be very useful. It wouldn't be useful in areas where we have no historic data, but if we could get one just upstream of the Highway 101 bridge (above the influence of the bridge) plus one in the Tidewater area, that would be great. I would then like to visit those sites during the float trip and see what they look like on the ground with relation to bar height, bank condition, and floodplain connectivity.
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> Response:
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> I think that we can accomplish this task in the near future. I know that Rober Eayler has been working on this. When it is accomplished, we will get the info to you.

2. Extent of riprap and other bank protection methods along the lower channel, especially upstream of head of tide. We can look at this in the field as well, but I would like to develop a prioritized list before the trip.

Response:

I'll check with the Corps (Judy Linton) on what they have on their files and we'll try to field verify what is on the ground.

3. Bridge maintenance records -- I remember that there was some discussion about this already, but I thought I would ask again just in case.

Response:

I sent the team an e-mail on 4/30/07 with the Hwy 101 bridge data that ODOT has on file. I have re-attached the information.

.

I have contacted the USGS and am tracking down the old rating tables as well as other available information -- they have been very helpful.

Response:

I I have a 1970 provisional copy of the USGS rating table for the gaging station on the Chetco River (mile 10.8). The copy is not the best of quality. It's about 90% readable.

Thanks for helping with this process.

Bill

Hi Bill,

Please forward this to the appropriate parties (esp. Bob Lobdell and Judy Linton) -- I am working remotely from Roseburg and do not have access to my electronic address book (I took a guess at Chuck's e-mail address, so you might check that as well).

Chuck and I met today and reviewed the materials that we had available. It sounds like Virgil has compiled a bunch more aerial photography and will be shipping a CD to me soon, which will be great.

After reviewing maps and photos, and speaking with Pete Klingeman, we decided that the primary area of study should be from just upstream of the USGS gauging station down to the mouth. We may break that into two distinct reaches, but we will need data for both. I would also like to do a lower resolution evaluation of the area upstream of the gauge just to get a sense of the stream dynamics and changes with flow events -- so any aerial photography for RM 10 to RM 20 would be great as well.

Following is a list of items that I was hoping you might be able to help with:

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That is it for now. Will be in touch soon.

Janine

From:	BILL YOCUM
To:	Janine_M_Castro@fws.gov
Cc:	Bob Lobdell; Chuck Wheeler; Linton, Judy L NWP; Robert Elayer; TED FREEMAN, JR; Jon Barton; Joy Smith
Subject:	Re: Chetco
Date:	Wednesday, May 02, 2007 9:23:22 AM
Attachments:	01143D_Elevation.pdf 01143D_Foundation_1.pdf 01143D_Foundation_2.pdf 01143D_Insp_SIA.pdf 01143D_Vicinity.pdf UW01143D.xls

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From:	Chuck Wheeler
To:	Robert Elayer
Cc:	Janine_M_Castro; Bob Lobdell; Linton, Judy L NWP; jabar@millenicom.com; BILL YOCUM; tedf@freemanrock.com; Joy@umpquasand.com; virgilf@socomi.com
Subject:	Re: River float trip
Date:	Thursday, May 03, 2007 9:33:44 AM

Robert, I would like to go. We also have a gravel extraction expert from California we believe will be able to join us. I also would like Bill to be there. Is anyone else from the mailing list interested? Is there any hope of securing a second boat? Bill?

I got your fax on the cross-sections. As best as I can tell it looks like #9&10 would be best for above the bridge and #13&14 for the Tidewater area. You may have figured that out already though as I see 9&10 are circled. If we could overlay cross-sections from 1939, 1976 and present, our knowledge base will be significantly enhanced. Thank you.

Chuck

Robert Elayer wrote:

Janine,

I understand from the emails that you are available May 21, 22, or 23 for a river float trip. I have arranged for one of our project managers to take us down in his boat. It will be an all day affair and we will go from above our 2nd bridge site at RM 10 to the estuary. I am sure you will want to stop frequently and get out to look at the river features close up. Our schedule is best on May 21 or 22, but we could rearrange some things for the 23rd if that is the only day you can go. His boat can hold 4 people max so with the pilot (Scott Darger), you, and hopefully myself, that would leave room for one more person. Would Chuck like to go?

We are also going to try and get those new bathymetric cross sections where you wanted them. Did you see the 1939 and 1976 cross sections I sent to Chuck? I would like to try and duplicate some of them and will also get one above the highway 101 bridge. Right now it is pretty stormy here but will try and get these done soon.

Robert Elayer

Tidewater Contractors, Inc.

From: Janine_M_Castro@fws.gov
To: Anne.Mullan@noaa.gov; Chuck Wheeler; Janine_M_Castro@fws.gov; Joe_Zisa@fws.gov; marc.liverman@noaa.gov; Patty.Snow@state.or.us; Rob_Burns@fws.gov; jim.d.brick@state.or.us; robert.c.anderson@noaa.gov; Craig_Tuss@fws.gov; Monty_Knudsen@fws.gov; Eric.Metz@dsl.state.or.us; michael.morales@dsl.state.or.us; CYRIL alex; Greg_M_Smith@fws.gov; john_l_marshall@fws.gov; Linton, Judy L NWP; Bob.Lobdell@state.or.us
Subject: Gravel Tech Team Meeting Cancelled
Date: Monday, May 14, 2007 3:35:09 PM

Good afternoon,

The gravel mining management/executive team is currently evaluating the function and focus of the gravel tech team. In the meantime, I have been asked to postpone future meetings until we hear back from the managers, so there will be no meeting on May 22nd.

On a related note, I will be travelling down to Brookings to evaluate the lower Chetco for determination of vertical stability (aggrading, degrading, or dynamic equilibrium) next week. I will have a summary of my findings completed by the end of the month.

Please let me know if you have any questions.

Thanks,
Janine

Janine M. Castro, PhD, RG
Geomorphologist

"There's no more to-day than
there was a thousand years ago --
You can't wear water out."
D.H. Lawrence

US Fish and Wildlife Service
2600 SE 98th Ave., Suite 100
Portland, OR 97266
503.231.6179

From: Linton, Judy L NWP
To: Chuck Wheeler; "LOBDELL Robert"
Subject: FW: Chetco
Date: Tuesday, May 15, 2007 10:06:18 AM
Attachments: chetco_bank_stab_belowrm10.pdf

Forwarding info I sent to Bill Yocum and Janine regarding permits issued by the Corps for bank stabilization on the Chetco River.

-----Original Message-----
From: Linton, Judy L NWP
Sent: Monday, May 14, 2007 2:19 PM
To: 'BILL YOCUM'
Cc: 'Janine_M_Castro@fws.gov'
Subject: RE: Chetco

Bill: attached is the result of my query for bank stabilization projects on the Chetco. Let me know if you have problems opening and I'll break it down. There are 16 projects most below rm 5 with a few others scattered above. I just included location info, a brief description of what the work was, plus a drawing or two to show what the work was to look like. Following the group's float trip I can provide more details if necessary but this should provide at least the baseline info. Judy

-----Original Message-----
From: BILL YOCUM [mailto:billy@wave.net]
Sent: Wednesday, May 02, 2007 10:15 AM
To: Janine_M_Castro@fws.gov
Cc: Bob Lobdell; Chuck Wheeler; Linton, Judy L NWP; Robert Elayer; TED FREEMAN, JR; Jon Barton; Joy Smith
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Response:

I I have a 1970 provisional copy of the USGS rating table for the gaging station on the Chetco River (mile 10.8). The copy is not the best of quality. It's about 90% readable.

Thanks for helping with this process.

Bill

Hi Bill,

Please forward this to the appropriate parties (esp. Bob Lobdell and Judy Linton) -- I am working remotely from Roseburg and do not have access to my electronic address book (I took a guess at Chuck's e-mail address, so you might check that as well).

Chuck and I met today and reviewed the materials that we had available. It sounds like Virgil has compiled a bunch more aerial photography and will be shipping a CD to me soon, which will be great.

After reviewing maps and photos, and speaking with Pete Klingeman, we decided that the primary area of study should be from just upstream of the USGS gauging station down to the mouth. We may break that into two distinct reaches, but we will need data for both. I would also like to do a lower resolution evaluation of the area upstream of the gauge just to get a sense of the stream dynamics and changes with flow events -- so any aerial photography for RM 10 to RM 20 would be great as well.

Following is a list of items that I was hoping you might be able to help

with:

1. If there is any possible way to get a couple of cross-sections in the next month, that would be very useful. It wouldn't be useful in areas where we have no historic data, but if we could get one just upstream of the Highway 101 bridge (above the influence of the bridge) plus one in the Tidewater area, that would be great. I would then like to visit those sites during the float trip and see what they look like on the ground with relation to bar height, bank condition, and floodplain connectivity.

2. Extent of riprap and other bank protection methods along the lower channel, especially upstream of head of tide. We can look at this in the field as well, but I would like to develop a prioritized list before the trip.

3. Bridge maintenance records -- I remember that there was some discussion about this already, but I thought I would ask again just in case.

I have contacted the USGS and am tracking down the old rating tables as well as other available information -- they have been very helpful.

I'm in the field all day tomorrow and will not be back in the office until Friday, but I think we have a good start on the analysis. My plan is to create a table with a description of the available data (along with its reliability) and an indication of what it is telling us about the vertical stability of the stream. The final piece will be the float trip where I will look at field indicators. I'll try to get a list together of where I may want to look at the floodplain so we can be sure that access is not an issue.

That is it for now. Will be in touch soon.

Janine

(1)

DEPARTMENT OF THE ARMY
PORTLAND DISTRICT, CORPS OF ENGINEERS
P.O. BOX 2946
PORTLAND, OREGON 97208-2946

BC	
SC Ron	11/19
PM	
TL	
PM Ron	11/19
TECH	
TYP	

Reply to
Attention of:

November 19, 1999

Operations Division

SUBJECT: Nationwide Permit Verification
Case No: 99-1381

Elizabeth R. Clark
99856 S Bank Chetco Road
Brookings, Oregon 97415

Dear Ms. Clark:

This is your Department of Army authorization to install approximately 150 cubic yards of riprap along 50 linear feet of the left bank of the Chetco River, River Mile 6.0, near Harbor, Curry County, Oregon (Section 25, T40S/R13W). The Chetco River is water quality limited for temperature, therefore turbidity monitoring reports shall be submitted to Oregon Department of Environmental Quality (See Implementation Conditions #12 and #13, Enclosure 4).

This letter verifies that your proposed activities as presented in your application (Enclosure 1) are authorized under the terms and limitations of Nationwide Permit Number 13, as described in Enclosure 2. Your activities must be conducted in accordance with the conditions presented in Enclosures 3 and 4. Failure to comply with any of the listed conditions will render your authorization invalid and could result in the assessment of civil penalties. Permits, where required, under Oregon's Removal/Fill Law, as well as other appropriate local authorizations, must also be obtained or your authorization will not be valid.

This verification is valid until November 17, 2001, unless the nationwide permit expires, is modified, reissued, or revoked prior to that date. All the nationwide permits, except Nationwide Permit 26, are scheduled to be modified, reissued or revoked in February 2002. Nationwide Permit 26 will expire on December 31, 1999. If you commence or are under contract to commence this activity before the date the nationwide permit expires, is modified or revoked, you will have twelve months from the date of the modification or revocation to complete the activity under the present terms and conditions of the current nationwide permit.

If you have any questions regarding our nationwide permit authority, please contact Jan Stuart at the above address or telephone (503) 808-4381.

Sincerely,

Ronald E. Marg
Regulatory Project Manager
Regulatory Branch

Enclosures

Copies Furnished:

ODEQ (Melville)
ODSL (McCabe - DSL No: GA-18842)
DLCD
CO-GP (Craig) w/Application

④ **PROPOSED PROJECT PURPOSE & DESCRIPTION**

Project Purpose and Need:

PLACE RIPRAP ALONG RIVER BANK TO STOP EARTH SLUMP

Project Description:

ESTABLISH A TOE TO PLACE CLASS 5 RIPRAP ALONG FACE OF EXISTING SLUMP TO HELP STOP THE RIVER FROM CONTINUING TO CUT BACK AND UNDERMINE EXISTING YARD AND WELL. SEE DETAILS.

How many project drawing sheets are included with this application? 2

NOTE: A complete application must include drawings and a location map submitted on separate 8½ X 11 sheets.

Will any material, construction debris, runoff, etc. enter a wetland or waterway? ○ Yes ☒ No

If yes, describe the type of discharge (above) and show the discharge location on the site plan.

Estimated Start Date ASAP Estimated Completion Date 15 DAYS

⑤ **PROJECT IMPACTS AND ALTERNATIVES**

Describe alternative sites and project designs that were considered to avoid impacts to the waterway or wetland.

Describe what measures you will use (before and after construction) to minimize impacts to the waterway or wetland.

TO LEAVE A 4' BUFFER OF EXISTING MATERIAL FROM TRENCH TO EXISTING WATER LEVEL TO MIN. SILTATION OF RIVER.
USE EXCAVATOR TO REMOVE AND REPLACE MATERIAL FROM UPLAND SIDE OF PROJECT.

NOTE: If necessary, use additional sheets.

⑥ **ADDITIONAL INFORMATION**

Adjoining Property Owners and Their Addresses and Phone Numbers

T.L. 200 WILLIAM SCHNACKEL, P.O. BOX 2659, HARBOR, OR 97415
(541) 469-2564

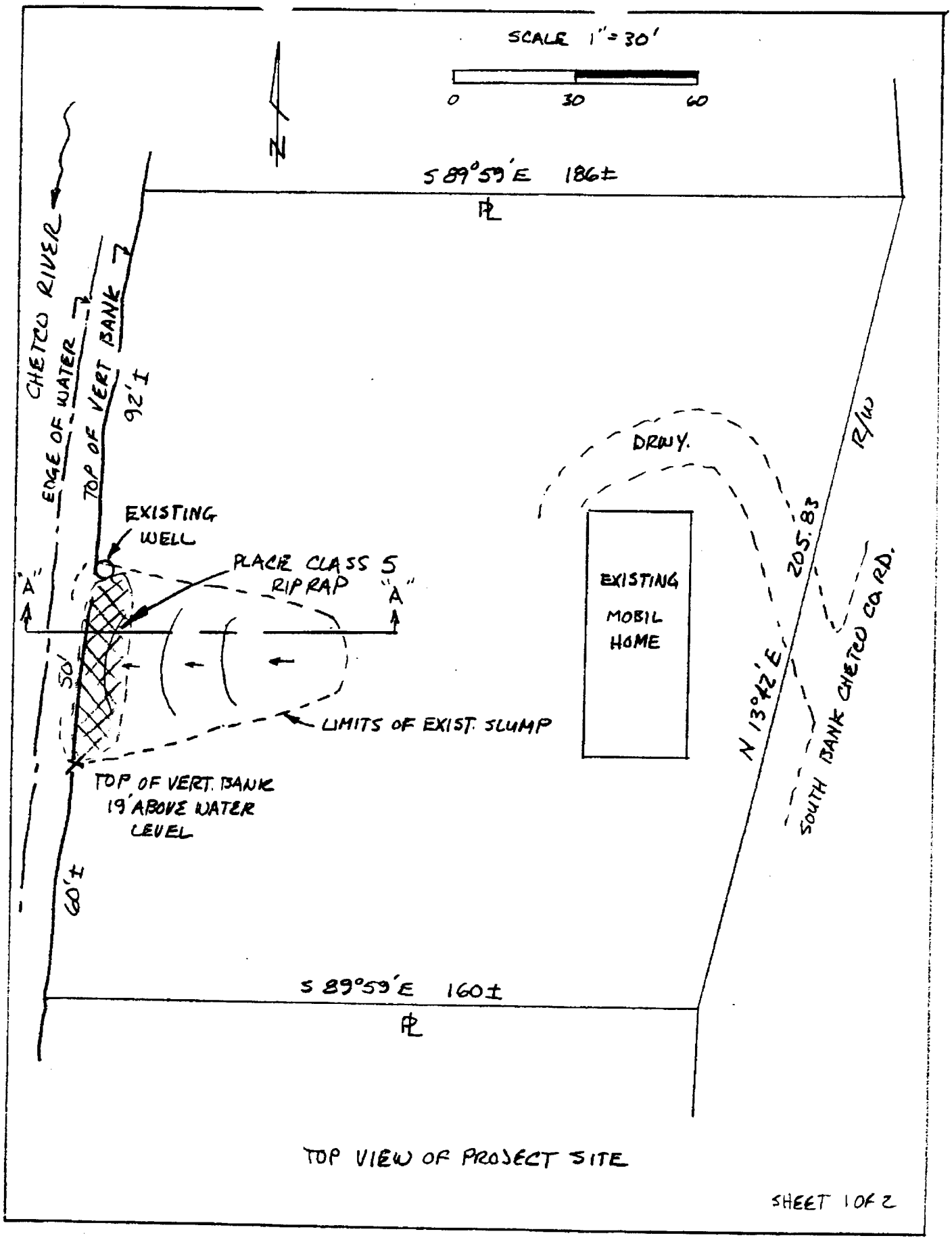
T.L. 400 STANDLEY W. MORRIS, 97885 SO. BANK CHETCO RD. BROOKINGS OR. 97415
(541) 888-8600

Has the proposed activity or any related activity received the attention of the Corps of Engineers or the State of Oregon in the past, e.g., wetland delineation, violation, permit, lease request, etc.? ○ YES ○ NO

If yes, what identification number(s) were assigned by the respective agencies:

Corps # _____

State of Oregon# _____



TOP VIEW OF PROJECT SITE

SHEET 1 OF 2

(2)

DEPARTMENT OF THE ARMY
PORTLAND DISTRICT, CORPS OF ENGINEERS
P.O. BOX 2946
PORTLAND, OREGON 97208-2946

January 25, 2000

Reply to
Attention of:
Operations Division

SUBJECT: Nationwide Permit Verification
Case No: 99-1280

Bob McKinney
98440 North Bank
Brookings, Oregon 97415

Dear Mr. McKinney:

The U.S. Army Corps of Engineers has reviewed your application (Enclosure 1) for Department of the Army authorization to stabilize 100 feet of bankline, River Mile 2.4 of the Chetco River near Brookings, Curry County, Oregon, by placing 5 cubic yards of material below the ordinary high water line. Please take special note of Implementation Condition #9.

This letter verifies that your proposed activities as presented in your application are authorized under the terms and limitations of Nationwide Permit Number 13, as described in Enclosure 2. Your activities must be conducted in accordance with the conditions presented in Enclosures 3 and 4. Failure to comply with any of the listed conditions will render your authorization invalid and could result in the assessment of civil penalties. You are also responsible for obtaining any permits, where required, under Oregon's Removal/Fill Law, as well as other appropriate local authorizations

This verification is valid until February 11, 2001. If you commence or are under contract to commence this activity before the date the nationwide permit expires, you will have twelve months from the expiration date to complete the activity under the present terms and conditions of the current nationwide permit.

If you have any questions regarding our nationwide permit authority, please contact Chris Thoms at the above address or telephone (503) 808-4385.

Sincerely,

Lawrence C. Evans
Chief, Regulatory Branch

Enclosures

Copy Furnished:

Oregon Division of State Lands (McCabe - DSL NO: GA-18738)
Department of Land Conservation and Development (Valentine)
CO-GP(Craig)

BC
SC
PM
TL
PM
TECH
TYP

④

PROPOSED PROJECT PURPOSE & DESCRIPTION

Project Purpose and Need: TO MAINTAIN BANK AND STOP EROSION CAUSED BY EXTREME HIGH FLOOD LEVEL WATER FROM THE PAST TWO WINTERS, WASHING AWAY EXISTING BANK AND PLACING MY HOUSE, DECK AND PROPERTY IN JEOPARDY

Project Description: REPLACE ROCK/RIP-RAP ALONG A 150' REACH OF THE CHEHCO RIVER AT MILE 2.4 TO MAINTAIN EXISTING BANK.

THIS WILL BE ACCOMPLISHED BY PLACING LARGE ROCKS ALONG THE SHORELINE.

THE SOURCE OF ROCK MATERIAL WILL BE FROM LOCAL ROCK QUARRIES WITHIN A TWO MILE RADIUS OF PROJECT SITE.

THE MAJORITY OF ROCK WILL BE PLACED ABOVE THE HIGH TIDE LINE TO HELP WITH EROSION, ALTHOUGH SOME ROCK WILL ENTER THE WATER. LITTLE VEGETATION WILL BE DISRUPTED AS THE EXISTING SHORELINE (NEXT TO THE WATER) IS BARE

DUE TO THE EXPENSE OF THIS PROJECT, IT WILL NEED TO BE DONE OVER TIME (IN PHASES) AS PERMIT AND MONIES ALLOW.

How many project drawing sheets are included with this application? 4

NOTE: A complete application must include drawings and a location map submitted on separate $8^1/_2$ X 11 sheets.

Will any material, construction debris, runoff, etc. enter a wetland or waterway? ⊗ Yes ○ No SMALL AMOUNT OF ROCK

If yes, describe the type of discharge (above) and show the discharge location on the site plan.

Estimated Start Date 10/1/99 Estimated Completion Date _____

⑤

PROJECT IMPACTS AND ALTERNATIVES

Describe alternative sites and project designs that were considered to avoid impacts to the waterway or wetland.

PLANTING VEGETATION WAS CONSIDERED - BUT VEGETATION WILL NOT HOLD BACK SANDY BANK

Describe what measures you will use (before and after construction) to minimize impacts to the waterway or wetland.

BALES OF HAY WILL BE PLACED ALONG WATERS EDGE TO PREVENT ROCKS FROM EMERGING WATER.

NOTE: If necessary, use additional sheets.

⑥

ADDITIONAL INFORMATION

Adjoining Property Owners and Their Addresses and Phone Numbers

BURGER 98430 4690526 NORTH BANK RD

McCOURT 98450 4696400 NORTH BANK RD

Has the proposed activity or any related activity received the attention of the Corps of Engineers or the State of Oregon in the past, e.g., wetland delineation, violation, permit, lease request, etc.? ○ YES ⊗ NO UNKNOWN

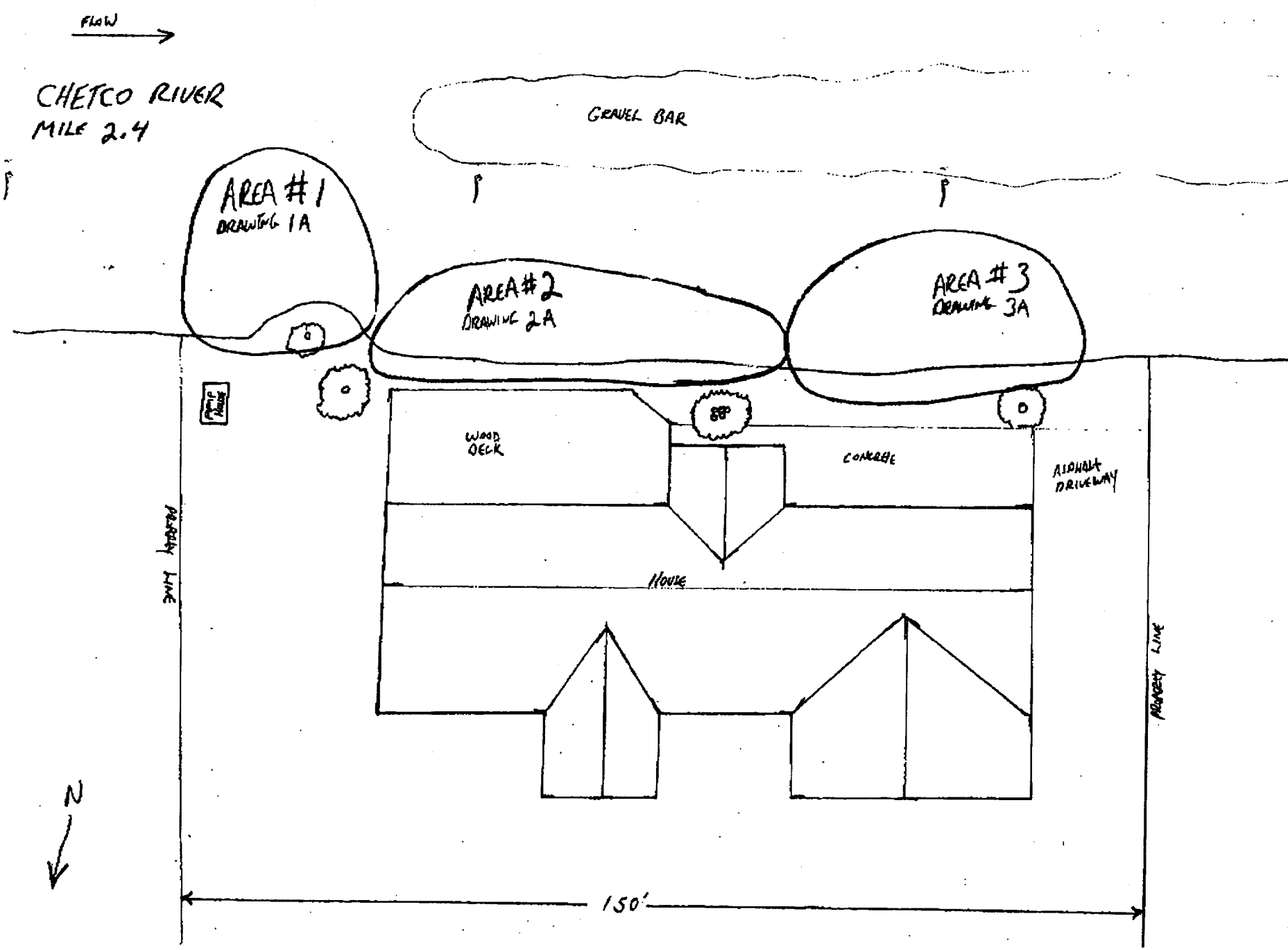
If yes, what identification number(s) were assigned by the respective agencies:

Corps # _____

State of Oregon# _____

3/7/2011 Public Notice - Additional Team Documents 000091

McKinney BANK MAINTENANCE. PROJECT 98440 N BANK RD



(3)

CO-G
CO-GP
PM
Tech
Typist

DEPARTMENT OF THE ARMY
PORTLAND DISTRICT, CORPS OF ENGINEERS
P.O. BOX 2946
PORTLAND, OREGON 97208-2946

REPLY TO
ATTENTION OF:

March 17, 1997

Operations, Construction,
and Readiness Division

SUBJECT: Nationwide Permit Authorization ID No: 97-198

Oregon State Parks & Recreation Department
Attn: Don Higginson
1655 Highway 101 S.
Brookings, Oregon 97415

Dear Mr. Higginson:

This is your Department of the Army authorization to place 500 cubic yards of rock riprap along 150 linear feet of bankline in the Chetco River at River Mile 10, in Curry County, near Brookings, Oregon.

This letter verifies that your proposed activity as presented in your application (Enclosure 1), is authorized under the terms and limitations of Nationwide Permit Number 13, as described in Enclosure 2. Your activities must be conducted in accordance with the conditions presented in Enclosure 3. Failure to comply with any of the listed conditions will render your authorization invalid and could result in the assessment of civil penalties. Permits, where required, under Oregon's Removal/Fill Law, as well as other appropriate local authorizations, must also be obtained or your authorization will not be valid.

This verification is valid until March 12, 1999, unless the nationwide permit expires, is modified, reissued, or revoked prior to that date. All the nationwide permits, except Nationwide Permit 26, are scheduled to be modified, reissued or revoked in February, 2002. If you commence or are under contract to commence this activity before the date the nationwide permit expires, is modified or revoked, you will have twelve months from the date of the modification or revocation to complete the activity under the present terms and conditions of the current nationwide permit.

④ **PROPOSED PROJECT PURPOSE & DESCRIPTION**

Project Purpose and Need:
- Reclaim eroded river bank
- Restore soil around exposed root systems (Myrtlewood & Tanoak)
- Bring campsite to proper elevation and reclaim lost site area

Project Description:

Install a 13' high and 150' long riprap structure using 2'X3' quarried rock. As rocks are placed, the void behind the rock (8' average) and under the root systems will be filled with river loam. Rock placement and back filling will continue until the desired length and height is reached. Existing vegetation will not be removed. Tidewater Contractors will provide the shot quarry rock, river loam back fill, and equipment consisting of dump truck and excavator.

How many project drawing sheets are included with this application? 1 drawing; 2 aerial photos; 1 loc. map

NOTE: A complete application must include drawings and a location map submitted on separate $8^1/_2$X 11 sheets.

Will any material, construction debris, runoff, etc. enter a wetland or waterway? ○ Yes ⊗ No

If yes, describe the type of discharge (above) and show the discharge location on the site plan.

Estimated Start Date March 26, 1997 Estimated Completion Date March 27, 1997.

⑤ **PROJECT IMPACTS AND ALTERNATIVES**

Describe alternative sites and project designs that were considered to avoid impacts to the waterway or wetland.

The project is "site specific" because the eroded bank to be reclaimed and the exposed root systems to be covered are in this project area.

Describe what measures you will use (before and after construction) to minimize impacts to the waterway or wetland.

Disturbance to areas outside of the project area will be confined to vehicle access. The best site access with the least amount of vegetation damage is from the gravel bar side of the project. Since the excavator will leave tracks after construction, the disturbed area on the river side of the riprap will be leveled to the natural contours and restored as much as possible to pre-project conditions.

(98% of outside project access will be on existing use areas)

NOTE: If necessary, use additional sheets.

⑥ **ADDITIONAL INFORMATION**

Adjoining Property Owners and Their Addresses and Phone Numbers

US For est Service 541-469-2196
555 5th St., Brookings, OR 97415

South Coast Lumber 541-469-2136
Hwy 101, Brookings, OR 97415

Has the proposed activity or any related activity received the attention of the Corps of Engineers or the State of Oregon in the past, *e.g.*, wetland delineation, violation, permit, lease request, etc.? ○ YES ⊗ NO

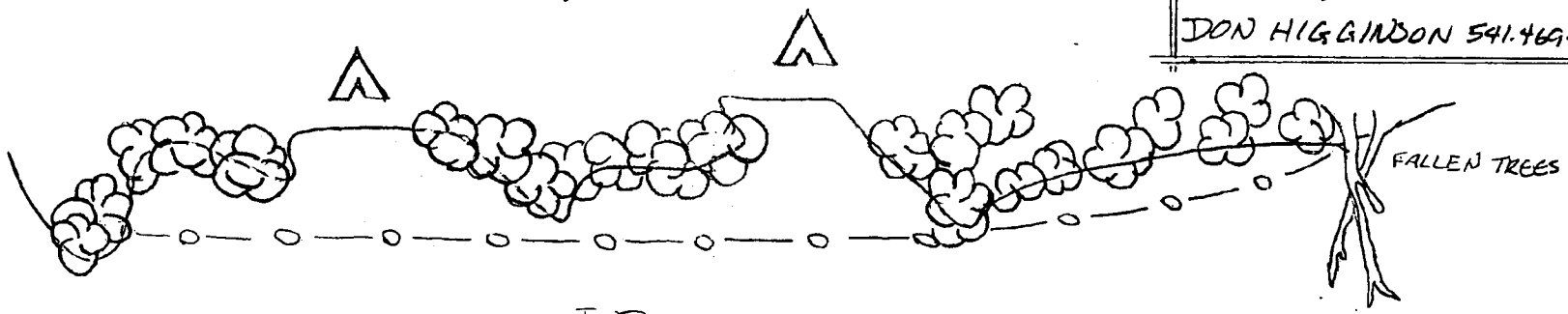
If yes, what identification number(s) were assigned by the respective agencies:

Corps # _____ — _____

State of Oregon# _____

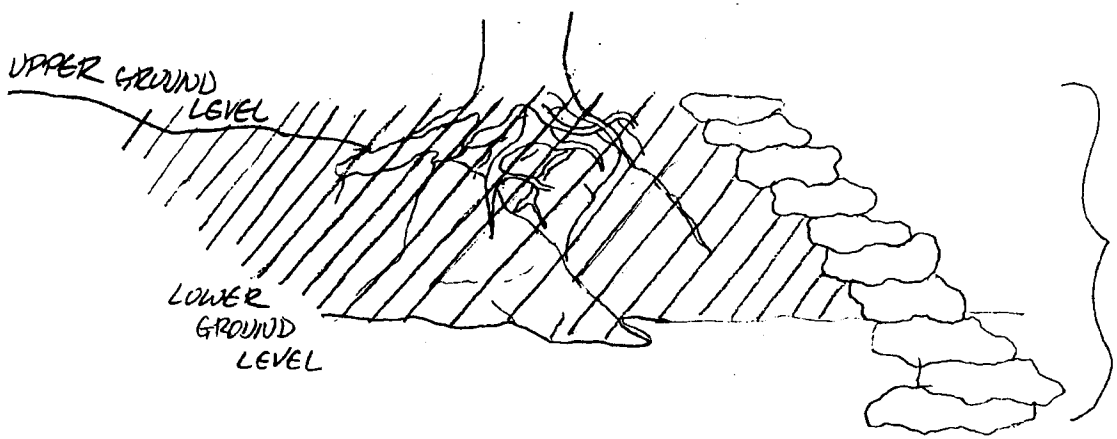
LOEB STATE PARK
RIPRAP PROJECT
(SITES 42 & 43)

OREGON STATE PARKS & REC.
1655 Hwy 101
Brookings, OR 97415
DON HIGGINSON 541.469-0224



TOP VIEW

Project is reclaiming and protecting soil lost around root systems from Nov. '96 flood and is not exceeding original bank line.



SIDE VIEW

GOAL
- Reclaim eroded river bank
- Restore soil around exposed root systems
- Bring camp site to proper elev.

SOLUTION
- Install 400 CF riprap
- Back fill with soil

LEGEND
- Campsite
- Trees
- Existing bank
- Proposed riprap (150')
- Riprap rock (3' size)
- Soil back fill

NOT TO SCALE
2-3-97

(4)

CO-G
~~CO-GP~~
PM Ron 9/27
Tech
Typist

Let – Long –

DEPARTMENT OF THE ARMY
PORTLAND DISTRICT, CORPS OF ENGINEERS
P.O. BOX 2946
PORTLAND, OREGON 97208-2946

September 26, 1996

REPLY TO
ATTENTION OF:

Operations, Construction,
and Readiness Division

SUBJECT: Permit Application No: 96-1513; Provisional Nationwide Permit

Don Derricott
97666 N. Bank Chetco River Road
Brookings, Oregon 97415

Dear Mr. & Mrs. Derricott:

We have received your application (Enclosure 1) for Department of the Army authorization to palace approximately 150 cubic yards of riprap along 109 linear feet of bankline of the Chetco River, at River Mile 1.1, in Curry County, near Brookings, Oregon.

Based on the information included in your application, the proposed work would be authorized under the terms of the nationwide permit described below subject to the conditions found at Enclosure 2. However, Oregon Coastal Zone Management (CZM) consistency concurrence from Oregon Department of Land Conservation and Development (DLCD) has not been issued for this nationwide permit. Therefore, according to Federal law, the proposed work is not authorized until you secure CZM concurrence from DLCD.

CZM concurrence for your proposed work will be considered by Oregon Department of Land Conservation and Development, Ms. Christine Valentine, telephone (503) 373-0093. By copy of this letter, we are notifying DLCD of your proposed work. If CZM concurrence is issued, any imposed conditions will become a requirement of your authorization.

Nationwide permit 33 CFR 330, Appendix A, Section B, 13, authorizes bank stabilization activities necessary for erosion prevention provided:

a. No material is placed in excess of the minimum needed for erosion protection;

b. The bank stabilization activity is less than 500 feet in length;

c. The activity will not exceed an average of one cubic yard per running foot placed along the bank below the plane of the ordinary high water mark or the high tide line;

d. No material is placed in any special aquatic site, including wetlands;

e. No material is of the type or is placed in any location or in any manner so as to impair surface water flow into or out of any wetland area;

f. No material is placed in a manner that will be eroded by normal or expected high flows (properly anchored trees and treetops may be used in low energy areas); and,

Don & Carolyn Derricott/Riverside RV
97666 N. B k Chetco River Road
~~Brookings,~~ 4

④

PROPOSED PROJECT PURPOSE & DESCRIPTION

Project Purpose and Need: Immediate attention is needed to stop bank erosion. River current has created a crescent shaped cut into the bank. The properties north and south of this area have been stabilized similar to this proposal. We could lose another 4 to 10 ft of bank this winter of 1996-97.

Project Description:

A toe trench of sufficient size and depth will be dug at the base of the proposed riprap. Tests have shown this area to be of aproximately 2½- in. gravel. All work can be done from the above bank. Large stones (3-4 ft) can be laid over a membrain layer of Marifi (1400 or the equivalent) and backfilled so as to separate the rock & backfill. By backfilling and rolling the membrain over said backfill, the outer large rocks can be placed on the river side of membrain. There is approximately 17 vertical feet to come up to the existing bank grade that is 14 ft above sea level.

The timing of this project is critical because of the following factors: 1) The Weather, 2) For the next 4-6 weeks materials and machinery are available, and permission has been granted to use adjoining property for transporting materials to the site without damaging paved roads, ie, North Bank Chetco River Rd., and 3) Less silt dispersion and easier installation are accomplished during minus tides (Sept. 27-30 and Oct. 14-16)

How many project drawing sheets are included with this application? 13

NOTE: A complete application must include drawings and a location map submitted on separate 8½ X 11 sheets.

Will any material, construction debris, runoff, etc. enter a wetland or waterway? ○ Yes ⊗ No

If yes, describe the type of discharge (above) and show the discharge location on the site plan.

Estimated Start Date Before Oct. 96 Estimated Completion Date 2 - 3 weeks.

⑤

PROJECT IMPACTS AND ALTERNATIVES

Describe alternative sites and project designs that were considered to avoid impacts to the waterway or wetland.

Because of the time-factor, the availability of rock and its proximaty to the job site, and the amount of bank loss per year, no other type of stabilization seems to be adequate, and in the past has proven to be successful on various State and County projects.

Describe what measures you will use (before and after construction) to minimize impacts to the waterway or wetland.

Very little, if any, impact will occur during the construction period except for some minor silt disturbance. After project is completed the loss of soil and downstream silt will be stopped, therefore keeping the river channel cleaner from this property's bank erosion.

NOTE: If necessary, use additional sheets.

⑥

ADDITIONAL INFORMATION

Adjoining Property Owners and Their Addresses and Phone Numbers

Eric B. Larsen (South neighbor)
Ardencraig Niell Rd.
Grants, Pass, OR 97527
541-476-3010

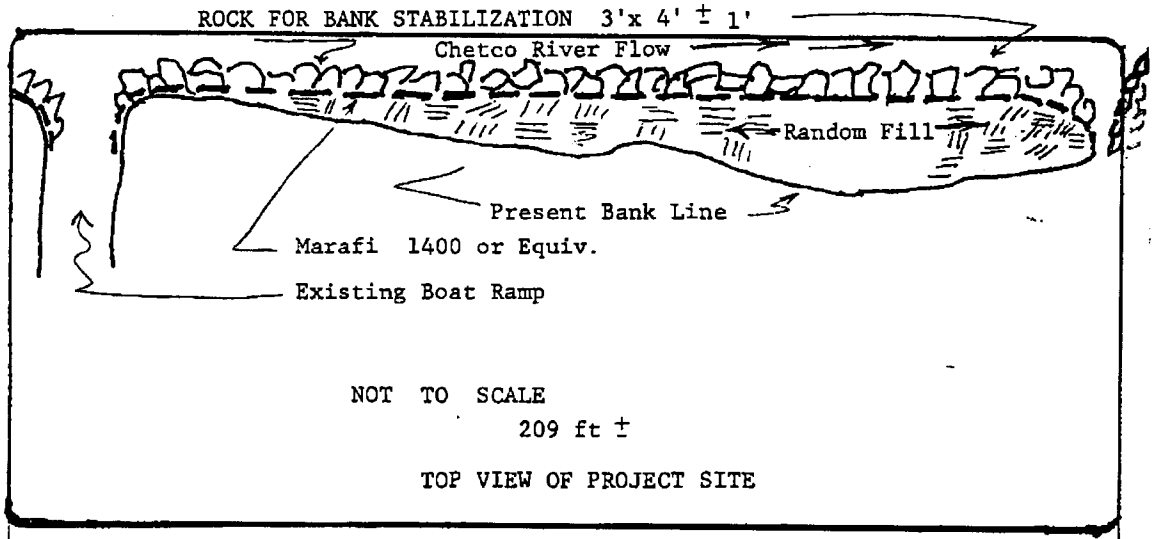
Roger Hollibaugh (North neighbor)
97748 N. Bank Chetco River Road
Brookings, OR 97415
541-469-4599

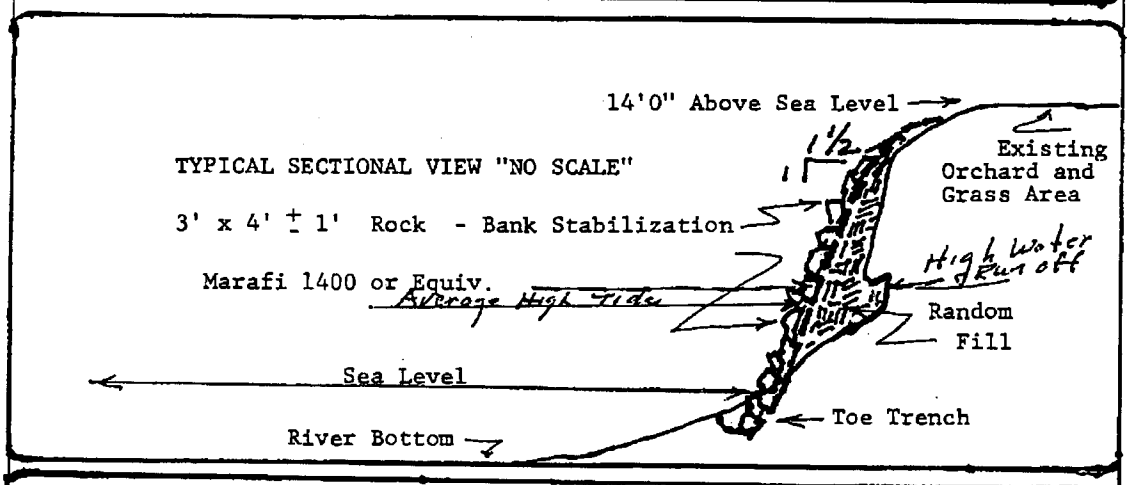
Has the proposed activity or any related activity received the attention of the Corps of Engineers or the State of Oregon in the past, e.g., wetland delineation, violation, permit, lease request, etc.? ○ YES ⊗ NO

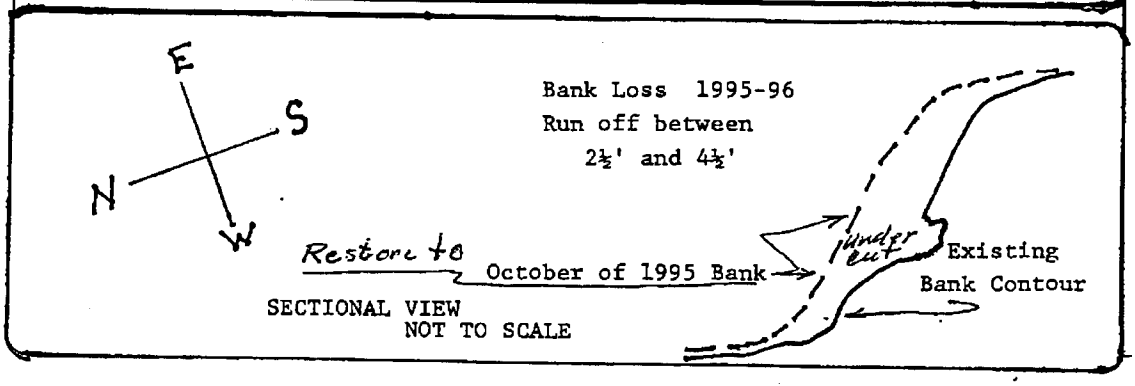
If yes, what identification number(s) were assigned by the respective agencies:

Corps # _____

State of Oregon# _____







PROPOSED BANK PROTECTION

In Chetco River

At River Mile 1.1

County of Curry **State** Oregon

Application by Don & Carolyn Derricott

Date September 1996 **Sheet** 2 **Of** 2

3/7/2011 Public Notice - Additional Team Documents 000097

(5)

DEPARTMENT OF THE ARMY
PORTLAND DISTRICT, CORPS OF ENGINEERS
P.O. BOX 2946
PORTLAND, OREGON 97208-2946

November 7, 1996

CO-G
CO-GP
PM
Tech
Typist CP

REPLY TO
ATTENTION OF:

Operations, Construction,
and Readiness Division

SUBJECT: Permit Application No: 96-1403; Provisional Nationwide Permit

Ted Freeman
P.O. Box 1218
Brookings, Oregon 97415

Dear Mr. Freeman:

We have reviewed your application (Enclosure 1) for Department of the Army authorization to excavate approximately 266 cubic yards of material for a toe trench and sloping of bankline. Install five (5) barbs along 600 linear feet of bankline and place rock riprap between the barbs. Approximately 489 cubic yards of rock shall be used at River Mile 4.9 of the Chetco River, in Curry County, near Brookings, Oregon.

Based on the information included in your application, the proposed work would be authorized under the terms of the nationwide permit described below subject to the conditions found at Enclosure 2. However, Oregon Coastal Zone Management (CZM) consistency concurrence from Oregon Department of Land Conservation and Development (DLCD) has not been issued for this nationwide permit. Therefore, according to Federal law, the proposed work is not authorized until you secure CZM concurrence from DLCD.

CZM concurrence for your proposed work will be considered by Oregon Department of Land Conservation and Development, Ms. Christine Valentine, telephone (503) 373-0093. By copy of this letter, we are notifying DLCD of your proposed work. If CZM concurrence is issued, any imposed conditions will become a requirement of your authorization.

Nationwide permit 33 CFR 330, Appendix A, Section B, 13, authorizes bank stabilization activities necessary for erosion prevention provided:

a. No material is placed in excess of the minimum needed for erosion protection;

b. The bank stabilization activity is less than 500 feet in length;

c. The activity will not exceed an average of one cubic yard per running foot placed along the bank below the plane of the ordinary high water mark or the high tide line;

d. No material is placed in any special aquatic site, including wetlands;

④ PROPOSED PROJECT PURPOSE & DESCRIPTION

Project Purpose and Need:

1) Reduce sedimentation caused by erosion;
2) To protect high value pasture from continuing erosion of the Chetco River;
3) Improve fish habitat through rock structures & re-vegitating with Willows.

Project Description:

1) To rip rap approximately 600' of bank using large, clean, approved quarry rock;
2) A toe trench will be excavated and larger boulders will be placed with an excavator to create 5 rock ~~banks~~ barbs to enhance fish habitat. The deflectors will extend approximately 15 feet into channel;
3) Material at top of bank will be pulled back to create a 2 to 1 slope;
4) Rip rap will be placed between ~~banks~~ barbs to stabilize erosion prone stream bank.

How many project drawing sheets are included with this application? 4

NOTE: A complete application must include drawings and a location map submitted on separate 8½ X 11 sheets.

Will any material, construction debris, runoff, etc. enter a wetland or waterway? ○ Yes ⊗ No

If yes, describe the type of discharge (above) and show the discharge location on the site plan.

Estimated Start Date Sept. 30,1996 Estimated Completion Date Oct. 2, 1996

⑤ PROJECT IMPACTS AND ALTERNATIVES

Describe alternative sites and project designs that were considered to avoid impacts to the waterway or wetland.

The combination of ~~banks~~ barbs, bank rip rap and Willow planting will improve fish rearing habitat, repairing health and decreasing erosion.

Describe what measures you will use (before and after construction) to minimize impacts to the waterway or wetland.

Area of the proposed project is approximately 3 feet above median low water at this present time. Project will be completed before winter floods begin. Project area will not be affected until high flooding. The project will be conducted with assistance and technical advice from Derek Godwin, OSU Extension Service, Tom Pervis, NRCS, and Todd Confer, ODFW.

NOTE: If necessary, use additional sheets.

⑥ ADDITIONAL INFORMATION

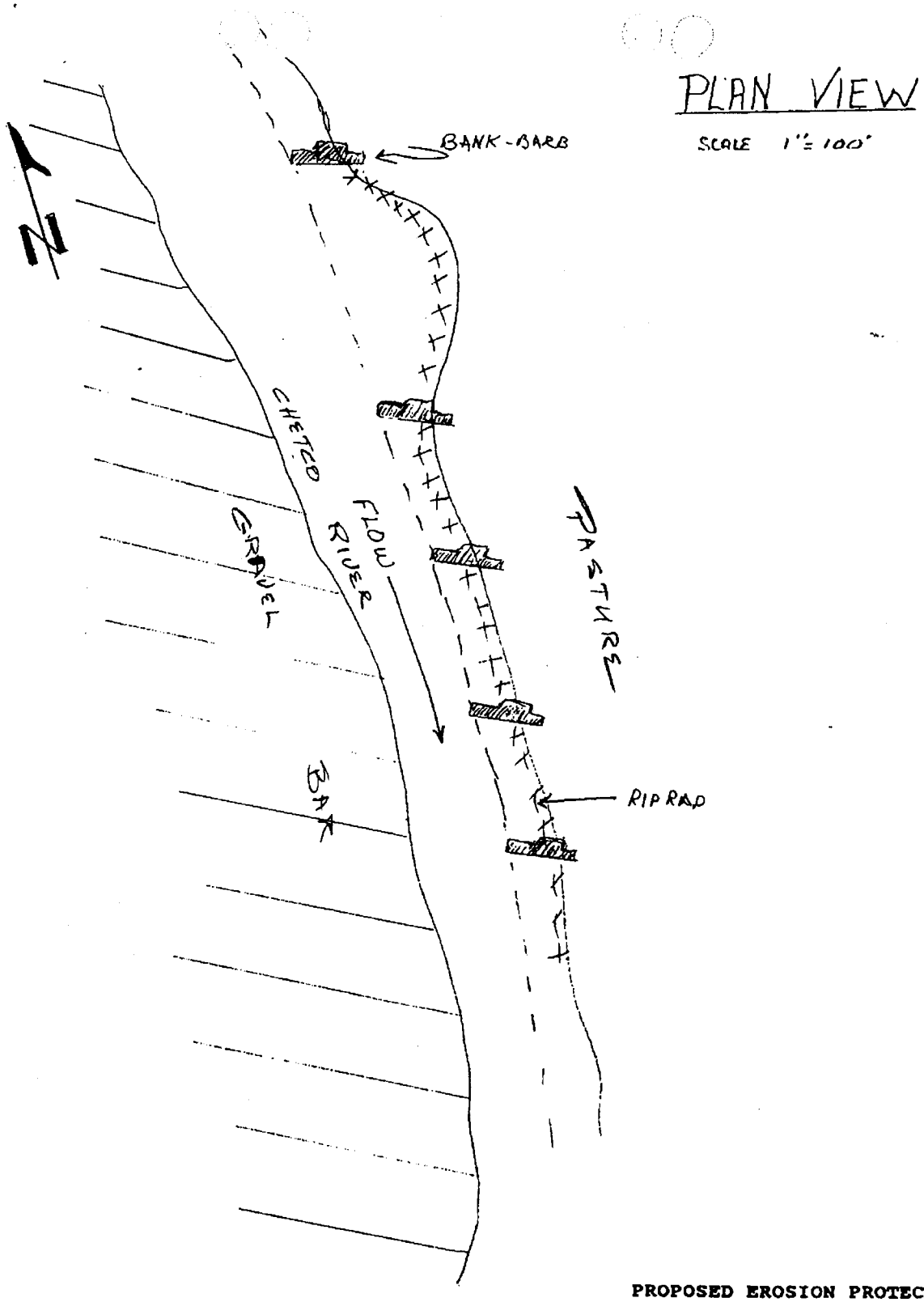
Adjoining Property Owners and Their Addresses and Phone Numbers

KEITH SMITH - 98153 N. Bank Chetco, Brookings OR 97415
NORMA WAGGONOR - PO Box 664, Klamath Falls, OR 97601
CITY OF BROOKINGS - 898 Elk Dr., Brookings OR 97415
DR. T. ALEX - 99480 S. Bank Chetco, Brookings OR 97415
CHUCK HARLESS - 96382 S. Bank Chetco, Brookings OR 97415

Has the proposed activity or any related activity received the attention of the Corps of Engineers or the State of Oregon in the past, e.g., wetland delineation, violation, permit, lease request, etc.? ○ YES ○ NO

If yes, what identification number(s) were assigned by the respective agencies:

Corps # _____



PROPOSED EROSION PROTECTION

In Chetco River

At River Mile 4.9

County of Curry State Oregon

Application by Ted Freeman

Date Aug. 1996 Sheet 2 of 3

(6)

CO-G
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Tech
Typist

DEPARTMENT OF THE ARMY
PORTLAND DISTRICT, CORPS OF ENGINEERS
P.O. BOX 2946
PORTLAND, OREGON 97208-2946

August 22, 1996

REPLY TO
ATTENTION OF:

Operations, Construction,
and Readiness Division

SUBJECT: Permit Application No: 96-1011; Provisional Nationwide Permit

Peter D. Celli
P.O. Box 2033
Harbor, Oregon 97415

Dear Mr. Celli:

We have received your application (Enclosure 1) for Department of the Army authorization to repair an existing revetment that was authorized under Department of the Army permit No. 071-OYA-2-004977. The project site is located at Mile 7.0 of the Chetco River, in Curry County, near Brookings, Oregon.

Based on the information included in your application, the proposed work would be authorized under the terms of the nationwide permit described below subject to the conditions found at Enclosure 2. However, Oregon Coastal Zone Management (CZM) consistency concurrence from Oregon Department of Land Conservation and Development (DLCD) has not been issued for this nationwide permit. Therefore, according to Federal law, the proposed work is not authorized until you secure CZM concurrence from DLCD.

CZM concurrence for your proposed work will be considered by Oregon Department of Land Conservation and Development, Ms. Christine Valentine, telephone (503) 373-0093. By copy of this letter, we are notifying DLCD of your proposed work. If CZM concurrence is issued, any imposed conditions will become a requirement of your authorization.

Nationwide permit 33 CFR 330, Appendix A, Section B, 3, authorizes the repair, rehabilitation, or replacement of any previously authorized, currently serviceable, structure or fill, or of any currently serviceable structure or fill authorized by 33 CFR 330.3, provided that the structure or fill is not to be put to uses differing from those uses specified or contemplated for it in the original permit or the most recently authorized modification. Minor deviations in the structure's configuration or filled area including those due to changes in materials, construction techniques, or current construction codes or safety standards which are necessary to make repair, rehabilitation, or replacement are permitted, provided the environmental impacts resulting from such repair, rehabilitation, or replacement are minimal. Currently serviceable means useable as is or with some maintenance, but not so degraded as to essentially require reconstruction. This nationwide permit authorizes the repair, rehabilitation, or replacement of those structures destroyed by storms, floods, fire or other discrete events, provided the repair, rehabilitation, or replacement is commenced or under contract to commence within two years of the date of their destruction or damage. In cases of catastrophic events, such as hurricanes or tornadoes, this two-year limit may be waived by

④ **PROPOSED PROJECT PURPOSE & DESCRIPTION**

Project Purpose and Need: Purpose is to protect property from further erosion needed to protect adjacent dwelling

Project Description: Riprap will be placed at toe of slope below existing riprap.

How many project drawing sheets are included with this application? 2

NOTE: A complete application must include drawings and a location map submitted on separate 8½ X 11 sheets.

⑤ **PROJECT IMPACTS AND ALTERNATIVES**

Describe alternative sites and project designs that were considered to avoid impacts to the waterway or wetland.

Velocity of water to great to use vegetative measures.

Describe what measures you will use (before and after construction) to minimize impacts to the waterway or wetland.

care will be taken to keep loose material from falling into river.

NOTE: If necessary, use additional sheets.

⑥ **ADDITIONAL INFORMATION**

Adjoining Property Owners and Their Addresses and Phone Numbers

NORMA WAGNER 469-4905

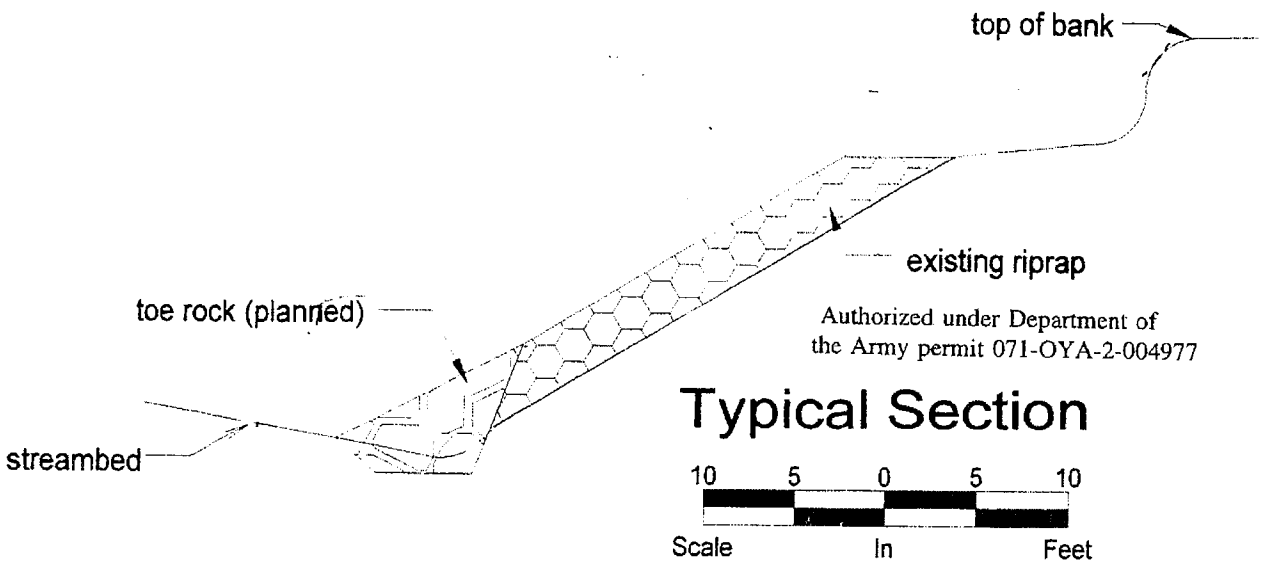
John HERALD 469-3983

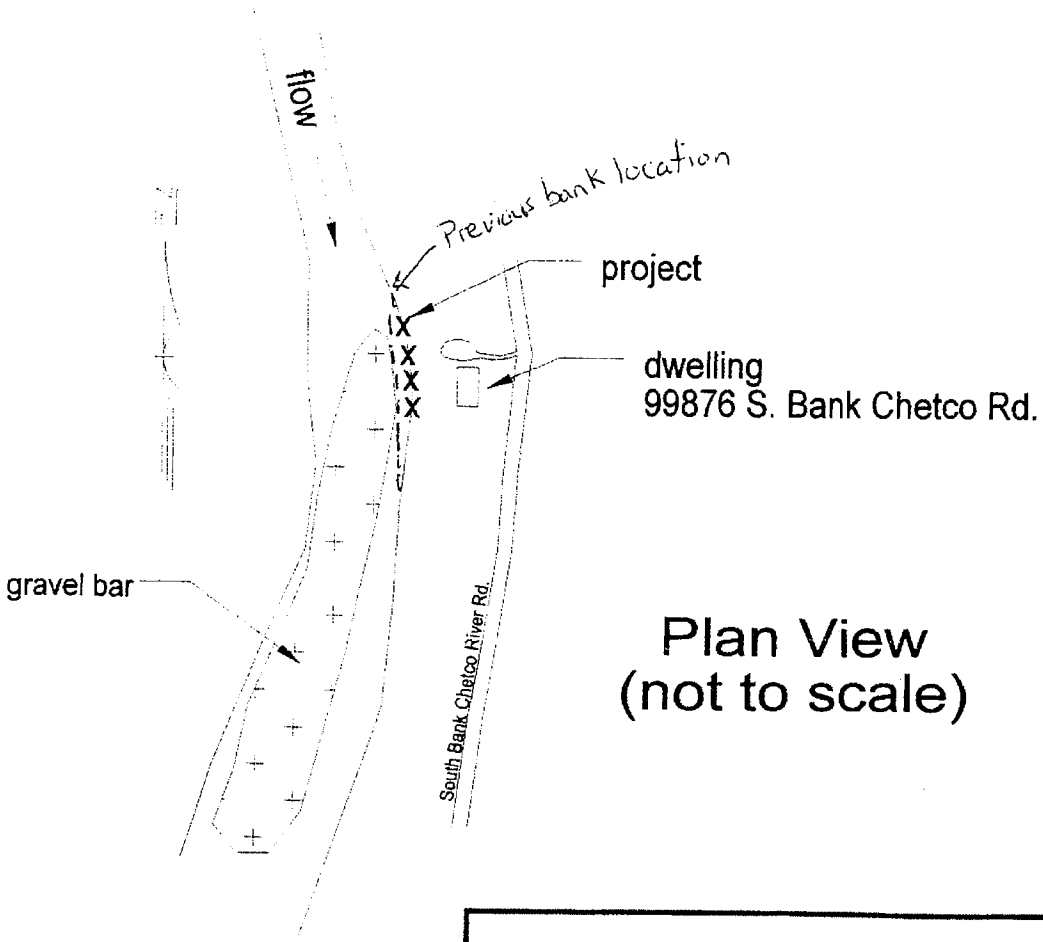
Has the proposed activity or any related activity received the attention of the Corps of Engineers or the State of Oregon in the past, e.g., wetland delineation, violation, permit, lease request, etc.? ☒ YES ○ NO

If yes, what identification number(s) were assigned by the respective agencies:

Corps # 2129 done under: John C & Louise Schutt

State of Oregon# 21 9





PROPOSED STREAMBANK PROTECTION
CHETCO RIVER NEAR MILE 7
CURRY COUNTY -- OREGON
BY: PETER D. CELLI
JULY 12, 1996 SHEET 2 OF 2

(7)

RECEIVED
NOV 1 2 1996
REG & ENV RES BR

DEPARTMENT OF THE ARMY PERMIT

Permittee: PORT OF BROOKINGS HARBOR

Permit No: 96-00970

Issuing Office: U.S. ARMY CORPS OF ENGINEERS, PORTLAND DISTRICT

NOTE: The term "you" and its derivatives, as used in this permit, means the permittee or any future transferee. The term "this office" refers to the appropriate district or division office of the Corps of Engineers having jurisdiction over the permitted activity or the appropriate official of that office acting under the authority of the commanding officer.

You are authorized to perform work in accordance with the terms and conditions specified below.

Project Description: Construct a 4 foot high retaining wall, slope the bankline, and place 550 cubic yards of riprap on the sloped bankline. Approximately 625 cubic yards of material (existing riprap & soils from the sloping of the bankline) shall be removed and trucked to an upland site for disposal.

Purpose: To stabilize the bankline from further sloughing into the boat basin.

Drawings: Four drawings marked 96-970 (Chetco River - Bank Stabilization).

Project Location: River Mile 1.0 of the Chetco River, in Curry County, at Brookings, Oregon.

General Conditions:

1. The time limit for completing the work authorized ends on November 30, 1999. If you find that you need more time to complete the authorized activity, submit your request for a time extension to this office for consideration at least one month before the above date is reached.

2. You must maintain the activity authorized by this permit in good condition and in conformance with the terms and conditions of this permit. You are not relieved of this requirement if you abandon the permitted activity, although you may make a good faith transfer to a third party in compliance with General Condition 4 below. Should you wish to cease to maintain the authorized activity or should you desire to abandon it without a good faith transfer, you must obtain a modification of this permit from this office, which may require restoration of the area.

3. If you discover any previously unknown historic or archeological remains while accomplishing the activity authorized by this permit, you must immediately notify this office of what you have found. We will initiate the Federal and state coordination required to determine if the remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

ENG FORM 1721, Nov 86

(33 CFR 325(Appendix A))

Permittee: PORT OF BROOKINGS 1 BOR

Permit No: 96-00970

4. If you sell the property associated with this permit, you must obtain the signature of the new owner in the space provided and forward a copy of the permit to this office to validate the transfer of this authorization.

5. If a conditioned water quality certification has been issued for your project, you must comply with the conditions specified in the certification as special conditions to this permit. For your convenience, a copy of the certification is attached if it contains such conditions.

6. You must allow representatives from this office to inspect the authorized activity at any time deemed necessary to ensure that it is being or has been accomplished in accordance with the terms and conditions of your permit.

Special Conditions a. through g.:

a. All construction debris shall be disposed of in such a manner that it cannot enter the waterway.

b. All piling and lumber treated with protective material shall be completely dry before use in or near the waterway.

c. Care shall be taken to prevent any petroleum products, chemicals, or other deleterious materials from entering the water.

d. Only clean, durable riprap shall be used.

e. Work in the waterway shall be done so as to minimize turbidity increases in the water that tend to degrade water quality and damage aquatic life.

f. When the District Engineer has been notified by a fishery agency that a filling activity is adversely affecting fish or wildlife resources or the harvest thereof, and when the District Engineer subsequently directs remedial measures, the permittee shall comply with such directions as may be received to suspend or modify the activity, to the extent required to mitigate or eliminate the adverse effect.

g. All in-water work, including temporary fills, shall occur within the Oregon Department of Fish and Wildlife preferred work period, which is between October 31 and May 31 in the Chetco River Estuary. If the permittee has justified need to perform work outside of the established window, he shall consult with the ODFW district biologist at (541) 247-7605. Any deviation from the established preferred in-water period shall be documented and accepted by the ODFW district biologist and submitted to the Corps and DSL for final approval and inclusion into the permit file.

Further Information:

1. Congressional Authorities: You have been authorized to undertake the activity described above pursuant to:

(X) Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403).
(X) Section 404 of the Clean Water Act (33 U.S.C. 1344).
( ) Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 (33 U.S.C. 1413).

2. Limits of this authorization.

a. This permit does not obviate the need to obtain other Federal, state, or local authorizations required by law.

b. This permit does not grant any property rights or exclusive privileges.

c. This permit does not authorize any injury to the property or rights of others.

d. This permit does not authorize interference with any existing or proposed Federal project.

3. Limits of Federal Liability. In issuing this permit, the Federal Government does not assume any liability for the following:

a. Damages to the permitted project or uses thereof as a result of other permitted or unpermitted activities or from natural causes.

b. Damages to the permitted project or uses thereof as a result of current or future activities undertaken by or on behalf of the United States in the public interest.

Permittee: PORT OF BROOKINGS F]OR

Permit No: 96-00970

c. Damages to persons, property, or to other permitted or unpermitted activities or structures caused by the activity authorized by this permit.

d. Design or construction deficiencies associated with the permitted work.

e. Damage claims associated with any future modification, suspension, or revocation of this permit.

4. Reliance on Applicant's Data: The determination of this office that issuance of this permit is not contrary to the public interest was made in reliance on the information you provided.

5. Reevaluation of Permit Decision. This office may reevaluate its decision on this permit at any time the circumstances warrant. Circumstances that could require a reevaluation include, but are not limited to, the following:

a. You fail to comply with the terms and conditions of this permit.

b. The information provided by you in support of your permit application proves to have been false, incomplete, or inaccurate (See 4 above).

c. Significant new information surfaces which this office did not consider in reaching the original public interest decision.

Such a reevaluation may result in a determination that it is appropriate to use the suspension, modification, and revocation procedures contained in 33 CFR 325.7 or enforcement procedures such as those contained in 33 CFR 326.4 and 326.5. The referenced enforcement procedures provide for the issuance of an administrative order requiring you to comply with the terms and conditions of your permit and for the initiation of legal action where appropriate. You will be required to pay for any corrective measures ordered by this office, and if you fail to comply with such directive, this office may in certain situations (such as those specified in 33 CFR 209.170) accomplish the corrective measures by contract or otherwise and bill you for the cost.

6. Extensions. General condition 1 establishes a time limit for the completion of the activity authorized by this permit. Unless there are circumstances requiring either a prompt completion of the authorized activity or a reevaluation of the public interest decision, the Corps will normally give favorable consideration to a request for an extension of this time limit.

Your signature below, as permittee, indicates that you accept and agree to comply with the terms and conditions of this permit.

Russ Crabtree
(PERMITTEE SIGNATURE)

Nov 6, 1996
(DATE)

RUSS CRABTREE
(PRINTED NAME)

Port Mgr
(TITLE)

This permit becomes effective when the Federal official, designated to act for the Secretary of the Army, has signed below.

W. B. Payne
(DISTRICT ENGINEER)
for Byron K. Blankenship
FOR
Robert T. Slusar
Colonel, U.S. Army
Commanding

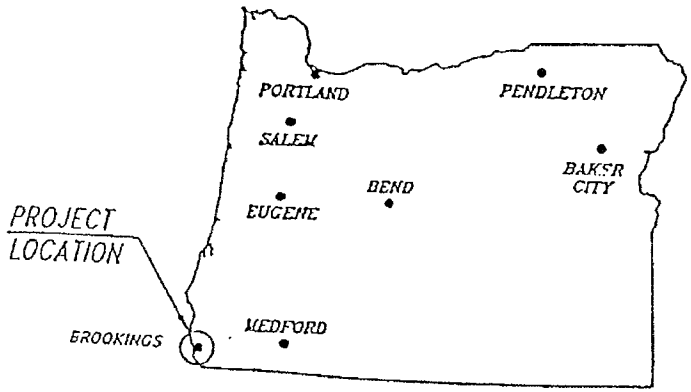
20 Nov 1996
(DATE)

When the structures or work authorized by this permit are still in existence at the time the property is transferred, the terms and conditions of this permit will continue to be binding on the new owner(s) of the property. To validate the transfer of this permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below.

(TRANSFEREE)

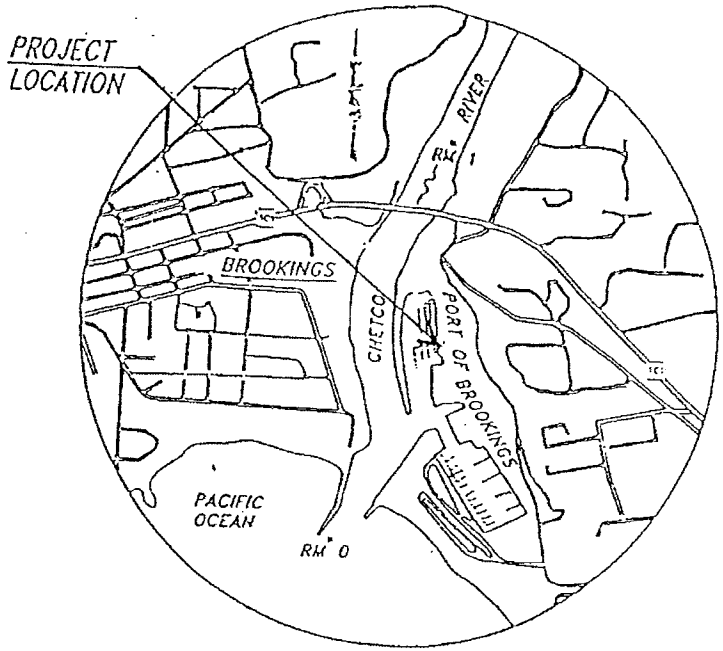
(DATE)

3/7/2011 Public Notice - Additional Team Documents 000106



LOCATION MAP

NOT TO SCALE



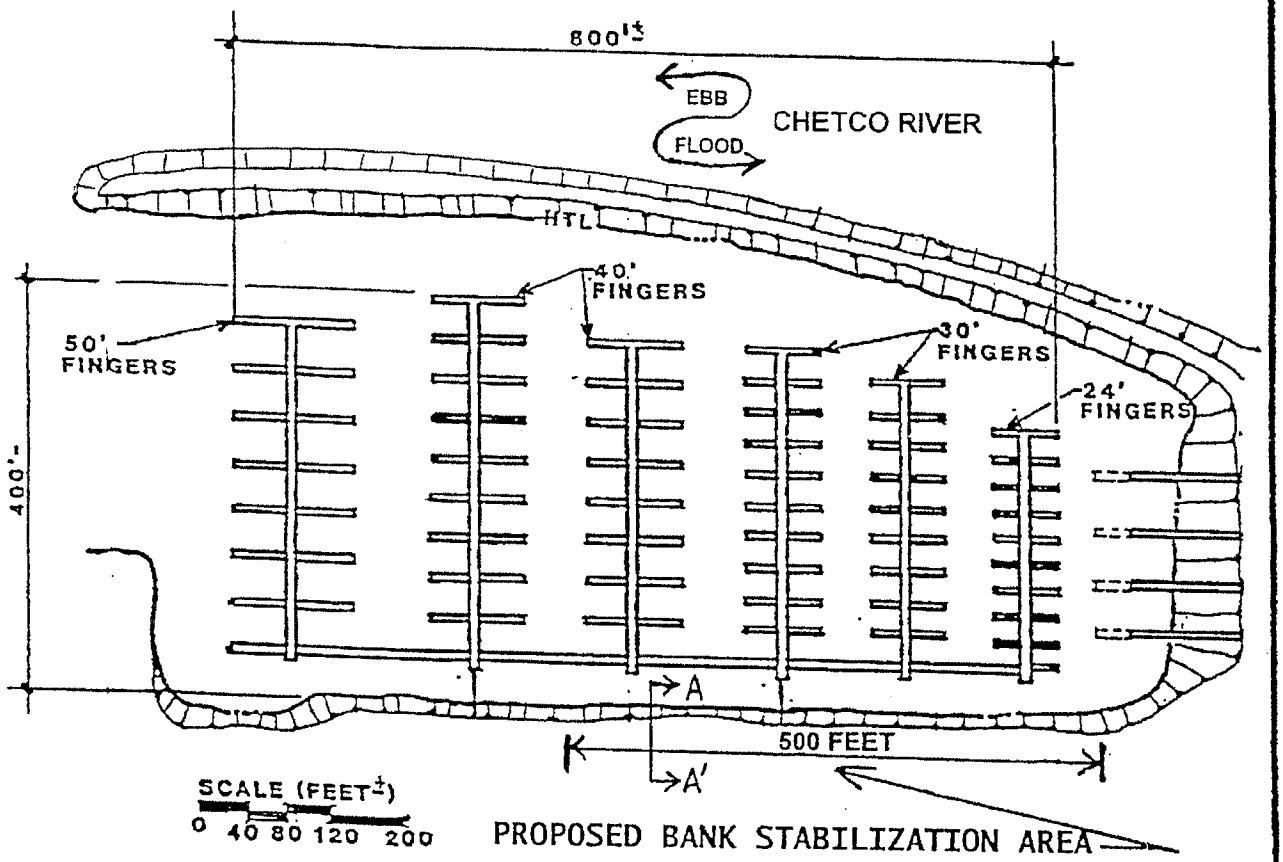
VICINITY MAP

0 1/4 1/2

SCALE IN MILES

96-970 (Chetco River - Bank Stabilization)

SHEET 1



96-970 (Chetco River - Bank Stabilization)

PURPOSE: BANK STABILIZATION TIDAL DATUM: MLLW= 0.0' ADJACENT PROPERTY OWNERS: C.O.E. (DIKE)	**BASIN 1 IMPROVEMENTS PLAN** PORT OF BROOKINGS BROOKINGS, OREGON	BANK STABILIZATION NEAR: CHETCO RIVER MOUTH APPLICATION BY: PORT OF BROOKINGS 2

(8)

DEPARTMENT OF THE ARMY
PORTLAND DISTRICT, CORPS OF ENGINEERS
P.O. BOX 2946
PORTLAND, OREGON 97208-2946

August 20, 1996

C G
CO-GP
PM RSA 8/20
Tech
Typist MS

REPLY TO
ATTENTION OF:
Operations, Construction,
and Readiness Division

SUBJECT: Permit Application No: 96-847; Provisional Nationwide Permit

Chetco Watershed Council
C/O Derek Godwin, Curry County Extension
P.O. Box 488
Gold Beach, Oregon 97444

Dear Mr. Godwin:

We have received your application (Enclosure 1) for Department of the Army authorization to install five rock barbs at site 1, four rock barbs at site 2, and four rock barbs at site 3, for a total of thirteen rock barbs. The project shall require the removal of 725 cubic yards of material for site preparation and the placement of 240 cubic yards of rock. The project is located at Mile 4.5 of the Chetco River, in Curry County, near Brookings, Oregon.

Based on the information included in your application, the proposed work would be authorized under the terms of the nationwide permit described below subject to the conditions found at Enclosure 2. However, Oregon Coastal Zone Management (CZM) consistency concurrence from Oregon Department of Land Conservation and Development (DLCD) has not been issued for this nationwide permit. Therefore, according to Federal law, the proposed work is not authorized until you secure CZM concurrence from DLCD.

CZM concurrence for your proposed work will be considered by Oregon Department of Land Conservation and Development, Ms. Christine Valentine, telephone (503) 373-0093. By copy of this letter, we are notifying DLCD of your proposed work. If CZM concurrence is issued, any imposed conditions will become a requirement of your authorization.

Nationwide permit 33 CFR 330, Appendix A, Section B, 13, authorizes bank stabilization activities necessary for erosion prevention provided:

a. No material is placed in excess of the minimum needed for erosion protection;

b. The bank stabilization activity is less than 500 feet in length;

c. The activity will not exceed an average of one cubic yard per running foot placed along the bank below the plane of the ordinary high water mark or the high tide line;

d. No material is placed in any special aquatic site, including wetlands;

e. No material is of the type or is placed in any location or in any manner so as to impair surface water flow into or out of any wetland area;

f. No material is placed in a manner that will be eroded by normal or expected high flows (properly anchored trees and treetops may be used in low energy areas); and,

④ PROPOSED PROJECT PURPOSE & DESCRIPTION

Project Purpose and Need: 1) Improve fish habitat by preserving [illegible]ble high value fish habitat in secondary channel, enhancing a critical backwater area and reducing sedimentation caused by erosion. This project is done in concert with other restoration measures as part of a larger fish habitat restoration project on city property on lower Jack Creek. 2) Reduce streambank erosion of high value farmland.

Project Description:

* Excavate toe trench, place large boulders in the trench with a hydraulic excavator to create rock barbs. Rock barbs will be lined with filter fabric. A total of 13 rock barbs will be placed. ~~at three of the four sites outlined in this project~~. Deflectors will extend 10 to 20 feet into channel. They will be spaced 50 to 75 feet apart.
* Pull back material creating existing eroding bankline. Smooth and shape bank to an evenly graded two to one slope.
* Stabilize erosion prone stream banks using variety of bio-engineering methods including willow revetment, willow steaks and bundles.

How many project drawing sheets are included with this application? 4

NOTE: A complete application must include drawings and a location map submitted on separate $8^1/_2$ X 11 sheets.

⑤ PROJECT IMPACTS AND ALTERNATIVES

Describe alternative sites and project designs that were considered to avoid impacts to the waterway or wetland.

Lining the streambank with large boulder rip rap was considered, but it was thought to be less desirable than a combination of rock barbs and vegetative planting. Installation of large rock rip rap is a more drastic alteration to the waterway. The rock barbs and vegetative planting were thought to be more beneficial to fish by providing superior cover and shade which more closely mimics the natural features of the stream.

While armoring the streambank with rock may solve the immediate erosion at the three sites, it could also defer the problem to other areas downstream by deflecting the streams energy. In contract, rock barbs encourage the natural process of localized deposition and scour to reduce erosion and absorb the streams energy.

Describe what measures you will use (before and after construction) to minimize impacts to the waterway or wetland.

Work will be done in accord with ODFW's in-water timing restrictions. The preferred work period is July 1 to October 1. Stream banks will be vegetated with native grasses, shrubs and trees.

This project will be conducted with assistance and technical advise of Clayton Barber, ODFW STEP Biologist, Derek Godwin, OSU Watershed Restoration Extension Agent, and Tom Purvis, Natural Resource Conservation Service.

NOTE: If necessary, use additional sheets.

⑥ ADDITIONAL INFORMATION

Adjoining Property Owners and Their Addresses and Phone Numbers

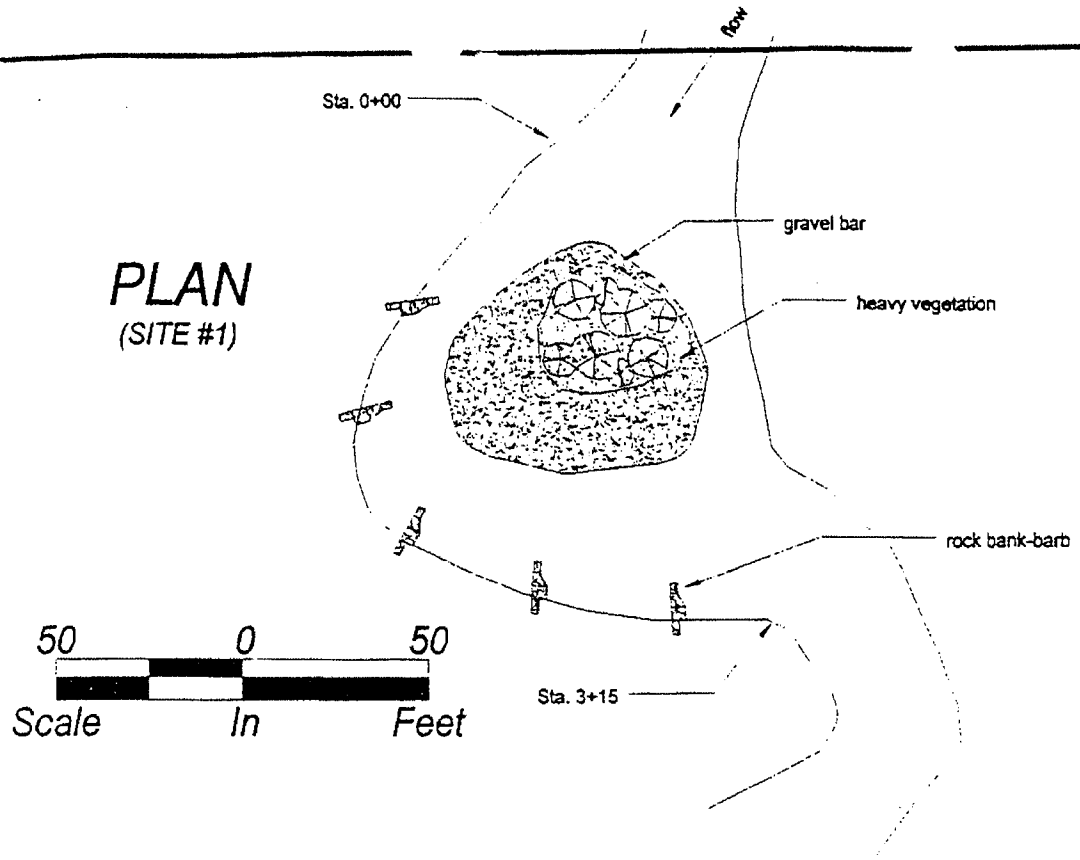
South Coast Lumber Co. PO Box 670, Brookings, OR 97415
Contact Fred Arnold, Timberland Manager, Phone 541-469-3898
Freeman, Ted L and Doris L (trustees) PO Box 1218, Brookings, OR 97415, Phone 541-469-2444
King, George J and Robyn D, PO Box 2995, Harbor, OR 97415
Gibbs, Vern F, PO Box 3022, Harbor, OR 97415, Phone 541-469-4425

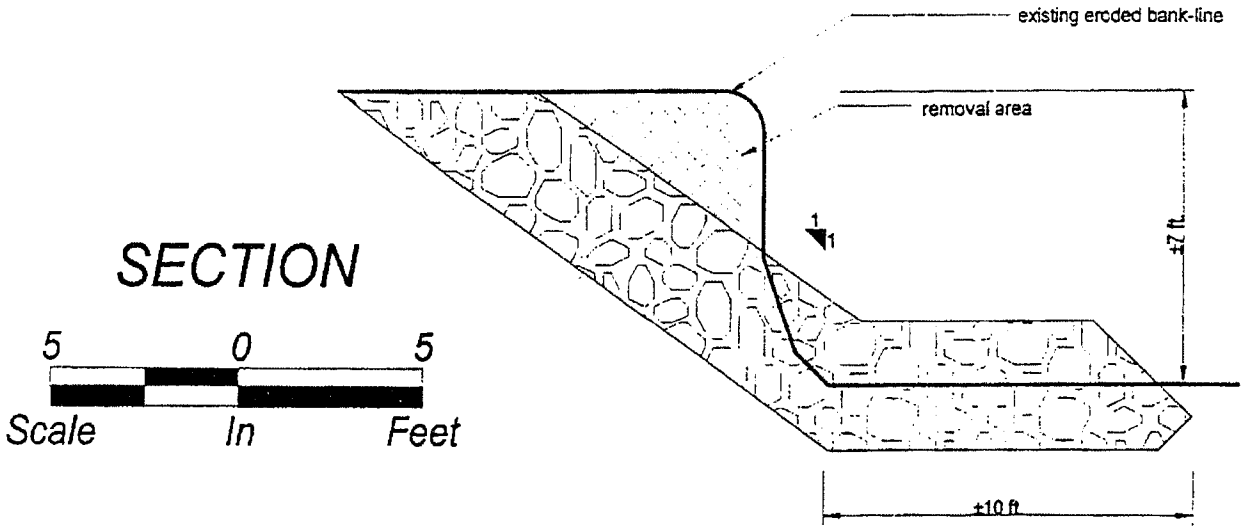
Has the proposed activity or any related activity received the attention of the Corps of Engineers or the State of Oregon in the past, *e.g.*, wetland delineation, violation, permit, lease request, etc.? ○ YES ⊗ NO

If yes, what identification number(s) were assigned by the respective agencies:

Corps # _____

State of Oregon# _____





PROPOSED STREAM HABITAT RESTORATION
JACK'S CREEK – CURRY COUNTY – OREGON
BY: CHETCO WATERSHED ASSOCIATION
APRIL 30, 1996 SHEET 2 OF 4

(9)

DEPARTMENT OF THE ARMY
PORTLAND DISTRICT, CORPS OF ENGINEERS
P.O. BOX 2946
PORTLAND, OREGON 97208-2946

November 7, 1996

CO-G
CO-GP
PM
Tech
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REPLY TO
ATTENTION OF:

Operations, Construction,
and Readiness Division

SUBJECT: Permit Application No: 96-1403; Provisional Nationwide Permit

Ted Freeman
P.O. Box 1218
Brookings, Oregon 97415

Dear Mr. Freeman:

We have reviewed your application (Enclosure 1) for Department of the Army authorization to excavate approximately 266 cubic yards of material for a toe trench and sloping of bankline. Install five (5) barbs along 600 linear feet of bankline and place rock riprap between the barbs. Approximately 489 cubic yards of rock shall be used at River Mile 4.9 of the Chetco River, in Curry County, near Brookings, Oregon.

Based on the information included in your application, the proposed work would be authorized under the terms of the nationwide permit described below subject to the conditions found at Enclosure 2. However, Oregon Coastal Zone Management (CZM) consistency concurrence from Oregon Department of Land Conservation and Development (DLCD) has not been issued for this nationwide permit. Therefore, according to Federal law, the proposed work is not authorized until you secure CZM concurrence from DLCD.

CZM concurrence for your proposed work will be considered by Oregon Department of Land Conservation and Development, Ms. Christine Valentine, telephone (503) 373-0093. By copy of this letter, we are notifying DLCD of your proposed work. If CZM concurrence is issued, any imposed conditions will become a requirement of your authorization.

Nationwide permit 33 CFR 330, Appendix A, Section B, 13, authorizes bank stabilization activities necessary for erosion prevention provided:

a. No material is placed in excess of the minimum needed for erosion protection;

b. The bank stabilization activity is less than 500 feet in length;

c. The activity will not exceed an average of one cubic yard per running foot placed along the bank below the plane of the ordinary high water mark or the high tide line;

d. No material is placed in any special aquatic site, including wetlands;

④ PROPOSED PROJECT PURPOSE & DESCRIPTION

Project Purpose and Need:
1) Reduce sedimentation caused by erosion;
2) To protect high value pasture from continuing erosion of the Chetco River;
3) Improve fish habitat through rock structures & re-vegitating with Willows.

Project Description:
1) To rip rap approximately 600' of bank using large, clean, approved quarry rock;
2) A toe trench will be excavated and larger boulders will be placed with an excavator to create 5 rock ~~banks~~ barbs to enhance fish habitat. The deflectors will extend approximately 15 feet into channel;
3) Material at top of bank will be pulled back to create a 2 to 1 slope;
4) Rip rap will be placed between ~~banks~~ barbs to stabilize erosion prone stream bank.

How many project drawing sheets are included with this application? 4

NOTE: A complete application must include drawings and a location map submitted on separate 8½ X 11 sheets.

Will any material, construction debris, runoff, etc. enter a wetland or waterway? ○ Yes ⊗ No

If yes, describe the type of discharge (above) and show the discharge location on the site plan.

Estimated Start Date Sept. 30,1996 Estimated Completion Date Oct. 2, 1996.

PROJECT IMPACTS AND ALTERNATIVES

Describe alternative sites and project designs that were considered to avoid impacts to the waterway or wetland.

The combination of ~~banks~~ barbs, bank rip rap and Willow planting will improve fish rearing habitat, repairing health and decreasing erosion.

Describe what measures you will use (before and after construction) to minimize impacts to the waterway or wetland.

Area of the proposed project is approximately 3 feet above median low water at this present time. Project will be completed before winter floods begin. Project area will not be affected until high flooding. The project will be conducted with assistance and technical advice from Derek Godwin, OSU Extension Service, Tom Pervis, NRCS, and Todd Confer, ODFW.

NOTE: If necessary, use additional sheets.

⑤ ADDITIONAL INFORMATION

Adjoining Property Owners and Their Addresses and Phone Numbers

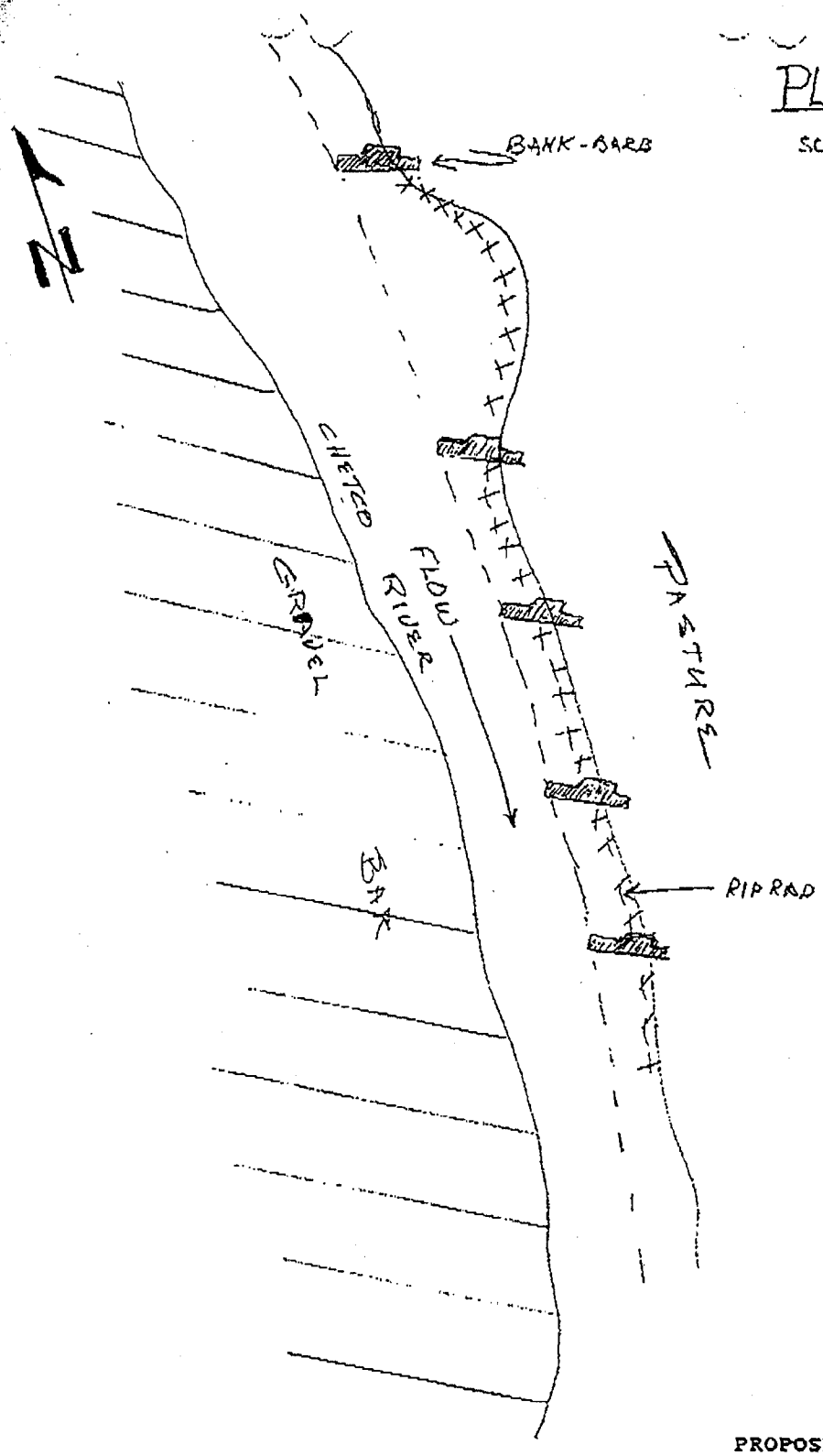
KEITH SMITH - 98153 N. Bank Chetco, Brookings OR 97415
NORMA WAGGONOR - PO Box 664, Klamath Falls, OR 97601
CITY OF BROOKINGS - 898 Elk Dr., Brookings OR 97415
DR. T. ALEX - 99480 S. Bank Chetco, Brookings OR 97415
CHUCK HARLESS - 96382 S. Bank Chetco, Brookings OR 97415

Has the proposed activity or any related activity received the attention of the Corps of Engineers or the State of Oregon in the past, e.g., wetland delineation, violation, permit, lease request, etc.? ○ YES ○ NO

If yes, what identification number(s) were assigned by the respective agencies:

Corps # _____

State of Oregon



PROPOSED EROSION PROTECTION

In Chetco River

At River Mile 4.9

County of Curry State Oregon

Application by Ted Freeman

Date Aug. 1996 Sheet 2 of 3

(10)

DEPARTMENT OF THE ARMY
PORTLAND DISTRICT, CORPS OF ENGINEERS
P. O. BOX 2946
PORTLAND, OREGON 97208-2946

Reply to
Attention of:

January 31, 1996

Operations Division

SUBJECT: Permit Application No: 95-1008

Tidewater Contractors Incorporated
Attn: David Baldwin
P. O. Box 1956
Brookings, Oregon 97415

Dear Mr. Baldwin:

We received your application requesting a Department of the Army Permit to repair 800 feet of bankline along the Chetco River. Your bank stabilization project was first authorized on April 2, 1985, under the name of Eagle Cap Rentals, permit number 071-OYA-2-005490. The original project was completed in the fall of 1985.

We have determined that the proposed work would be authorized under the terms of the nationwide permit described below, subject to the conditions (Enclosure 1), and provided you receive permits, where required, under Oregon's Removal/Fill Law and appropriate local authorizations.

Nationwide permit 33 CFR 330, Appendix A, Section B, 3, authorizes the repair, rehabilitation, or replacement of any previously authorized, currently serviceable, structure or fill, or of any currently serviceable structure or fill authorized by 33 CFR 330.3, provided that the structure or fill is not to be put to uses differing from those uses specified or contemplated for it in the original permit or the most recently authorized modification. Minor deviations in the structure's configuration or filled area including those due to changes in materials, construction techniques, or current construction codes or safety standards which are necessary to make repair, rehabilitation, or replacement are permitted, provided the environmental impacts resulting from such repair, rehabilitation, or replacement are minimal. Currently serviceable means useable as is or with some maintenance, but not so degraded as to essentially require reconstruction. This nationwide permit authorizes the repair, rehabilitation, or replacement of those structures destroyed by storms, floods, fire or other discrete events, provided the repair, rehabilitation, or replacement is commenced or under contract to commence within two years of the date of their destruction or damage. In cases of catastrophic events, such as hurricanes or tornadoes, this two-year limit may be waived by the District Engineer, provided the permittee can demonstrate funding, contract, or other similar delays. Maintenance dredging and beach restoration are not authorized by this nationwide permit.

US Army Corps of Engineers
Portland District

JOINT PERMIT APPLICATION FORM

THIS APPLICATION WILL MEET THE REQUIREMENTS OF BOTH AGENCIES

STATE OF OREGON 1859

AGENCIES WILL ASSIGN NUMBERS

Corps Action ID Number 95 1008 Oregon Division of State Lands Number SP-2314

SEND ONE SIGNED COPY OF YOUR APPLICATION TO EACH AGENCY

District Engineer
ATTN: CENPP-PE-RP
P O Box 2946
Portland, OR 97208-2946
503/326-7730

RECEIVED
OCT 10 1995
REG & ENV RES BR

State of Oregon
Division of State Lands
775 Summer Street NE
Salem OR 97310
503/378-3805

① Applicant Name and Address: TIDEWATER CONTRACTORS, INC.
P. O. Box 1956
Brookings, OR 97415
business phone # 503-469-5341
home phone #
FAX # 503-469-5543

O Co-Applicant
O Authorized Agent
O Contractor
Name and Address
business phone #
home phone #
FAX #

Property Owner (if different than applicant) Name and Address: EAGLE CAP RENTALS
P. O. Box 1956
Brookings, OR 97415
business phone # 503-469-5341
home phone #
FAX # 503-469-5543

② **PROJECT LOCATION**

Street, Road or other descriptive location		Legal Description			
		Quarter	Section	Township	Range
97906 South Bank Chetco River Road		NW & SW	33	40	13
In or Near (City or Town)	County	Tax Map #		Tax Lot #	
Brookings	Curry	40-13-33		510 and 503	
Waterway	River Mile	Latitude		Longitude	
Chetco River	2.3				

Is consent to enter property granted to the Corps and the Division of State Lands? O Yes O No

③ **PROPOSED PROJECT INFORMATION**

Activity Type: ⊗ Fill O Excavation (removal) O In-Water Structure O Maintain/Repair an Existing Structure

Brief Description: _____

Fill will involve 890 cubic yards annually and/or _____ cubic yards for the total project

_____ cubic yards in a wetland or below the ordinary high water or high tide line

Fill will be ⊗ Riprap ⊗ Rock O Gravel O Sand O Silt O Clay O Organics O Other

Fill Impact Area is N/A Acres; +- 800' length; N/A width; as necessary depth

Removal will involve _____ cubic yards annually and/or _____ cubic yards for the total project

_____ cubic yards below the ordinary high water or high tide line

Removal will be O Riprap O Rock O Gravel O Sand O Silt O Clay O Organics O Other _____

Removal Impact Area is _____ Acres; _____ length; _____ width; _____ depth

Estimated Start Date On-Going Estimated Completion Date On-Going

Will any material, construction debris, runoff, etc. enter a wetland or waterway? O Yes ⊗ No

If yes, describe the type of discharge and show the discharge location on the site plan.

Marcy

④ **PROPOSED PROJECT PURPOSE & DESCRIPTION**

Project Purpose and Need:

Project Description:

The purpose of this activity is to protect and stabilize the existing streambank at this particular location from future flood erosion hazards. The entire length of this erosion prone area (+- 8,001') will be surfaced with quarry rock rip-rap in accordance with Oregon Division of State Land regulations.

How many project drawing sheets are included with this application? One

NOTE: A complete application must include drawings and a location map submitted on separate $8^1/_2$ X 11 sheets.

⑤ **PROJECT IMPACTS AND ALTERNATIVES**

Describe alternative sites and project designs that were considered to avoid impacts to the waterway or wetland.

N/A

Describe what measures you will use (before and after construction) to minimize impacts to the waterway or wetland.

Place any necessary rip rap with caution to minimize impact to waterway.

NOTE: If necessary, use additional sheets.

⑥ **ADDITIONAL INFORMATION**

Adjoining Property Owners and Their Addresses and Phone Numbers

Thomas McKenzie, POB 1235, Brookings, OR 97415
William Cunningham, POB 607, Brookings, OR 97415
Robert Allsup, POB 2053, Brookings, OR 97415

Has the proposed activity or any related activity received the attention of the Corps of Engineers or the State of Oregon in the past, *e.g.*, wetland delineation, violation, permit, lease request, etc.? ☒ YES ○ NO

If yes, what identification number(s) were assigned by the respective agencies:

Corps # 071-OYA-1-004395

State of Oregon# DSL Removal #42, DSL Erosion Control #SP2314

DEPARTMENT OF THE ARMY
PORTLAND DISTRICT, CORPS OF ENGINEERS
P. O. BOX 2946
PORTLAND, OREGON 97208-2946

(11)

R
RE
RR
Orig. RR of
Typist

Reply to
Attention of:

January 9, 1990

Planning Division

SUBJECT: Application 9523; North Fork Chetco River

Curry County Road Department
ATTN Daniel P. Crumley, Roadmaster
P.O. Box 746
Gold Beach, Oregon 97444

Dear Mr. Crumley:

We have reviewed your application (Enclosure 1) for erosion control work on the North Fork of the Chetco River, at the Don Cameron Bridge, near Brookings, Curry County, Oregon.

Your project will qualify for authorization under General Permit No. 071-OYA-4-004388 (Enclosure 2), subject to the terms and conditions, providing you secure a State Fill Permit from the Oregon Division of State Lands (ODSL), and providing no objections are received from Federal resource agencies. If your project fails to be permitted by ODSL, or if a Federal resource agency objects to authorization under the General Permit, processing of an individual permit application will be required if you wish to pursue authorization.

Please be aware that other authorizations from Federal, state, or local governments may be required by law.

To ensure the success of your erosion control efforts, we suggest that you maintain a buffer strip of vegetation, woody vegetation if possible, along the top of the riverbank. We further recommend that you lay cuttings of alder, willow and/or similar sprouting-type vegetation under the top layer of the riprap to accelerate revegetation. The riverside vegetation will enhance fish habitat, while the trees root systems will stabilize the riprap. Cuttings may be taken from vegetation on-site and may vary from 1 to 4 feet in length and 1/2 to 4 inches to diameter. They should be placed approximately 2 to 6 feet apart. Cuttings placed along the toe should be laid in a horizontal position. Cuttings should also be placed vertically into the fill above the riprapped area.

Has any agency denied approval for the activity described herein or for any other activity directly related to it?

☐ Yes ☒ No If yes, please explain in Remarks.

ADJOINING PROPERTY ON THE WATERWAY: Give names, addresses, and phone numbers of owners and/or occupants.

John & Mary Whittaker
97925 Payne Road
Brookings, Oregon 97415
469-2909

The Badger Family Trust
99299 North Bank Chetco River Road
Brookings, Oregon 97415
469-3883

PLEASE EXPLAIN IN DETAIL your plans to restore the area to its natural condition.

Disturbed areas will be contoured and reseeded following construction as necessary.

INFORMATION FOR FILL OR REMOVAL:

FILL WILL INVOLVE _____ cubic yards annually, and 200 cubic yards for the total project.

☒ Riprap ☐ Rock ☐ Gravel ☐ Sand ☐ Silt ☐ Clay ☐ Organic

REMOVAL WILL INVOLVE _____ cubic yards annually, and _____ cubic yards for the total project.

☐ Rock ☐ Gravel ☐ Sand ☐ Silt ☐ Clay

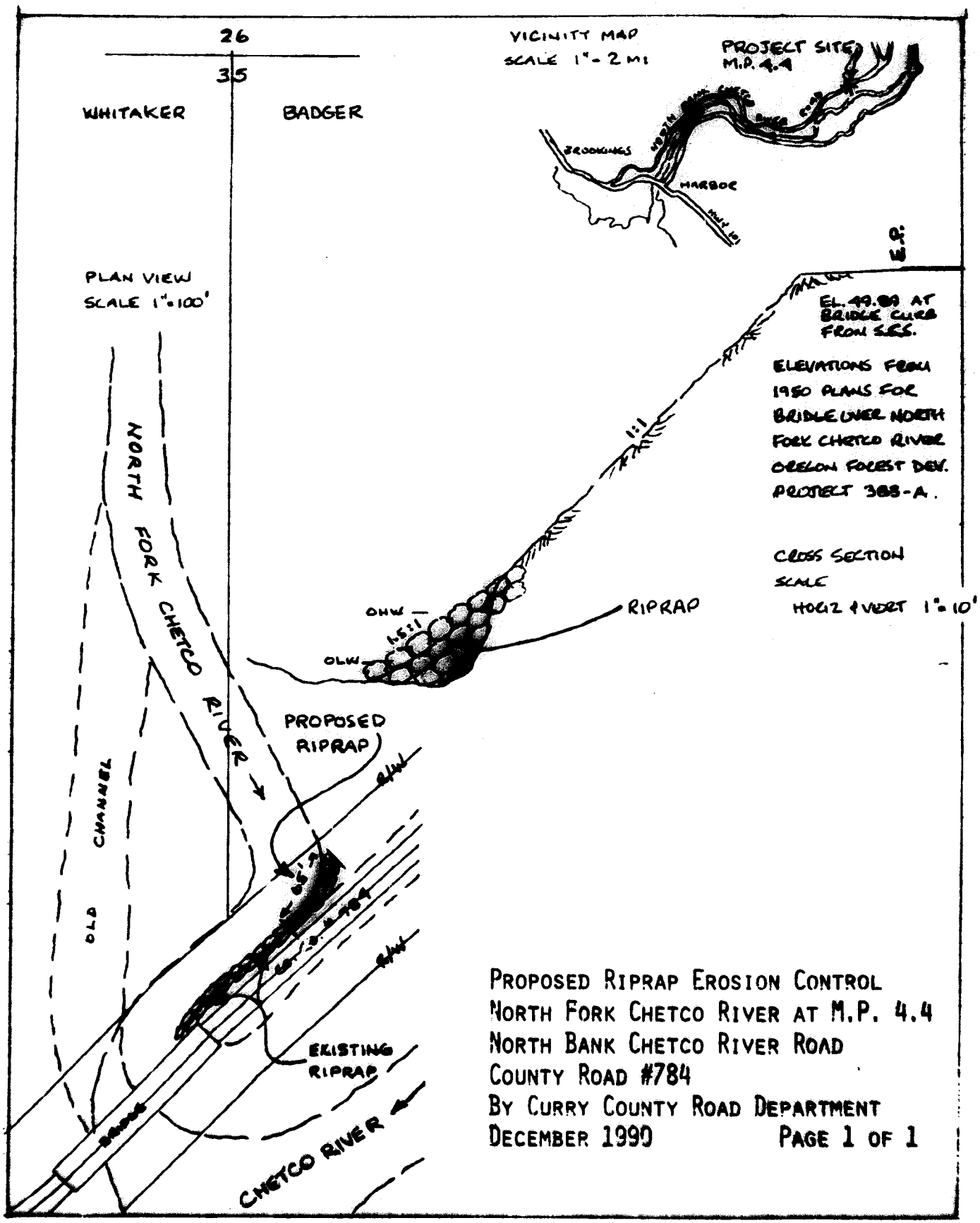
DESCRIBE IN DETAIL THE PROPOSED ACTIVITY---its primary purpose and secondary purpose, if any,---intended use (privat public, commercial)---type of structures and use---type of vessels using facility---facilities for handling wastes--- type of conveyance and manner of extraction of any fill or removal---the quantity and composition of, and the source and disposal sites for any fill or removal. (If additional space is needed, use plain sheet of paper.)

Place 200 ± cubic yards riprap in a 3 ± foot deep blanket along 65 lineal feet of North Fork Chetco River bank line to protect the North Bank Chetco River County Road. This is not currently an emergency situation, but if the river would rise significantly, it may develope into an emergency which would require immediate action to save the road.

Application is hereby made for a permit or permits to authorize the activities described herein. I certify that I familiar with the information contained in this application, and that, to the best of my knowledge and belief, such information is true, complete, and accurate. I further certify that I possess the authority to undertake the propo activities.

John B. Mather, for
Daniel P. Crowley, Landowner
Signature of Applicant or Authorized Agent

18 USC 1001 provides in part: "Whoever, in any manner within the jurisdiction of any department . . . of the United States knowingly and willfully falsifies . . . a material fact or makes any false . . . statement or . . . u any false . . . document . . . shall be fined not more than $10,000 or imprisoned not more than five years, or both.



PROPOSED RIPRAP EROSION CONTROL
NORTH FORK CHETCO RIVER AT M.P. 4.4
NORTH BANK CHETCO RIVER ROAD
COUNTY ROAD #784
BY CURRY COUNTY ROAD DEPARTMENT
DECEMBER 1990

(12)

DEPARTMENT OF THE ARMY
PORTLAND DISTRICT, CORPS OF ENGINEERS
P. O. BOX 2946
PORTLAND, OREGON 97208-2946

Reply to
Attention of:

September 19, 1990

Planning Division

SUBJECT: Permit 009334

Orig.
Typist

Constance McKenzie Law
ATTN: James Martin
98203 South Bank Chetco Rd.
Brookings, Oregon 97415

Dear Mr. Martin:

We have received your application (Enclosure 1) for a Department of the Army Permit to replace approximately 280 lineal feet of riprap on the south bank of the Chetco River, river mile 2.3, near Brookings, Curry County, Oregon.

Your proposed work is authorized if you comply with the nationwide permit described below, subject to the Conditions and Management Practices (Enclosure 2), and provided you adhere to the following Regional Condition:

That these activities shall receive permits, where required, under Oregon's Removal/Fill Law and appropriate local authorizations.

Nationwide permit 33 CFR 330.5(a)(3) authorizes the repair, rehabilitation, or replacement of any previously authorized, currently serviceable, structure or fill, or of any currently serviceable structure or fill constructed prior to the requirement for authorization, provided such repair, rehabilitation, or replacement does not result in a deviation from the plans of the original structure or fill, and further provided that the structure or fill has not been put to uses differing from uses specified for it in any permit authorizing its original construction. Minor deviations due to changes in materials or construction techniques and which are necessary to make repair, rehabilitation, or replacement are permitted. Maintenance dredging and beach restoration are not authorized by this nationwide permit.

This verification will be valid until the nationwide permit is modified, reissued, or revoked. All the nationwide permits are scheduled to be modified, reissued or revoked prior to 13 January 1992. It is incumbent upon you to remain informed of changes to the nationwide permits. We will issue a public notice announcing the changes when they occur. Furthermore, if you commence or are under contract to commence this activity before the date the nationwide permit is modified or revoked, you will have twelve months from the date of the modification or revocation to complete the activity under the present terms and conditions of this nationwide permit.

Has any agency denied approval for the activity described herein or for any other activity directly related to it?

☐ Yes ☒ No If yes, please explain in Remarks.

ADJOINING PROPERTY ON THE WATERWAY: Give names, addresses, and phone numbers of owners and/or occupants.

East Property Owner: Curry County

West Property Owner: Tidewater Construction Co. 16156 Hwy 101 S Brookings, Oregon 97415

PLEASE EXPLAIN IN DETAIL your plans to restore the area to its natural condition.

The riprap site will be 200-288 feet long and composed of approx. 1500 cu yds. of 12-24 inch clean, durable rock placed along original line of bank. The riprap slope will be less than 1.5 feet horizontal to 1 foot vertical. A 12 inch mat of sand/gravel will serve as bedding for the riprap. Natural vegetation of reed grass and willows will be planted on ground above riprap upon completion of project to prevent subsequent erosion.

INFORMATION FOR FILL OR REMOVAL:

FILL WILL INVOLVE _____ cubic yards annually, and 1500 cubic yards for the total project.

☒ Riprap ☐ Rock ☒ Gravel ☐ Sand ☐ Silt ☐ Clay ☐ Organic

REMOVAL WILL INVOLVE _____ cubic yards annually, and _____ cubic yards for the total project.

☐ Rock ☐ Gravel ☐ Sand ☐ Silt ☐ Clay

DESCRIBE IN DETAIL THE PROPOSED ACTIVITY---its primary purpose and secondary purpose, if any,---intended use (private, public, commercial)---type of structures and use---type of vessels using facility---facilities for handling wastes---type of conveyance and manner of extraction of any fill or removal---the quantity and composition of, and the source and disposal sites for any fill or removal. (If additional space is needed, use plain sheet of paper.)

The primary purpose of the riprap is to restore original riverbank and protect existing area inhabited by tenants of River Bend Park, a privately owned mobile home/rv park. Manufactured homes are currently within 15 feet of the danger area. All riprap and fill will be locally obtained and construction will be under the direct supervision of an experienced contractor. Extreme care shall be taken to prevent any pollutants from entering the water and to minimize disturbance of aquatic life and surrounding environmental resources.

Application is hereby made for a permit or permits to authorize the activities described herein. I certify that I am familiar with the information contained in this application, and that, to the best of my knowledge and belief, such information is true, complete, and accurate. I further certify that I possess the authority to undertake the proposed activities.

Constance McKenzie Law 17Aug90

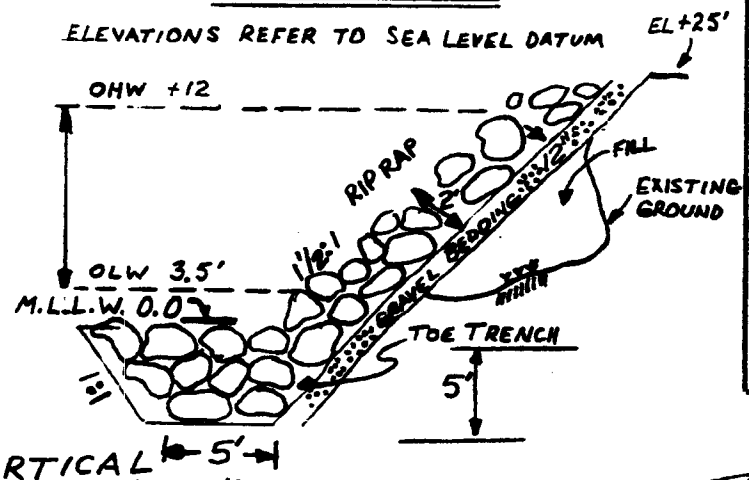
Signature of Applicant or Authorized Agent

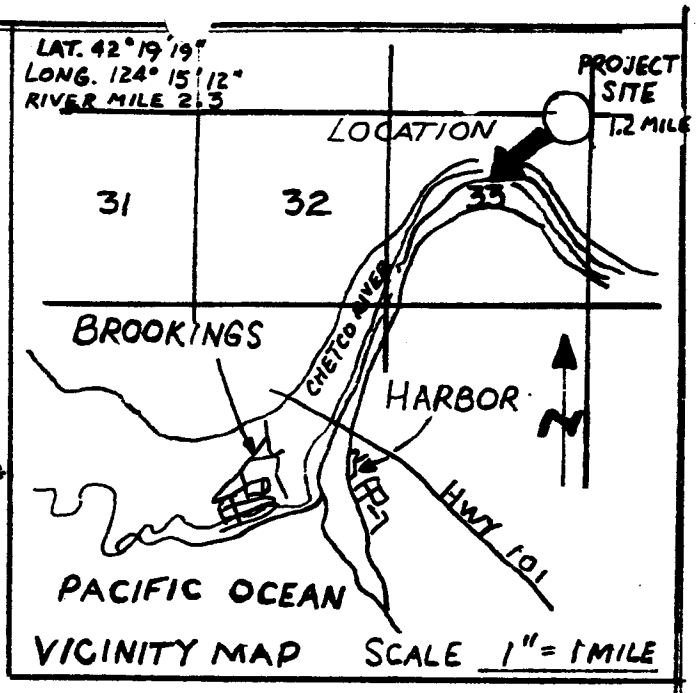
18 USC 1001 provides in part: "Whoever, in any manner within the jurisdiction of any department . . . of the United States knowingly and willfully falsifies . . . a material fact or makes any false . . . statement or . . . uses any false . . . document . . . shall be fined not more than $10,000 or imprisoned not more than five years, or both."

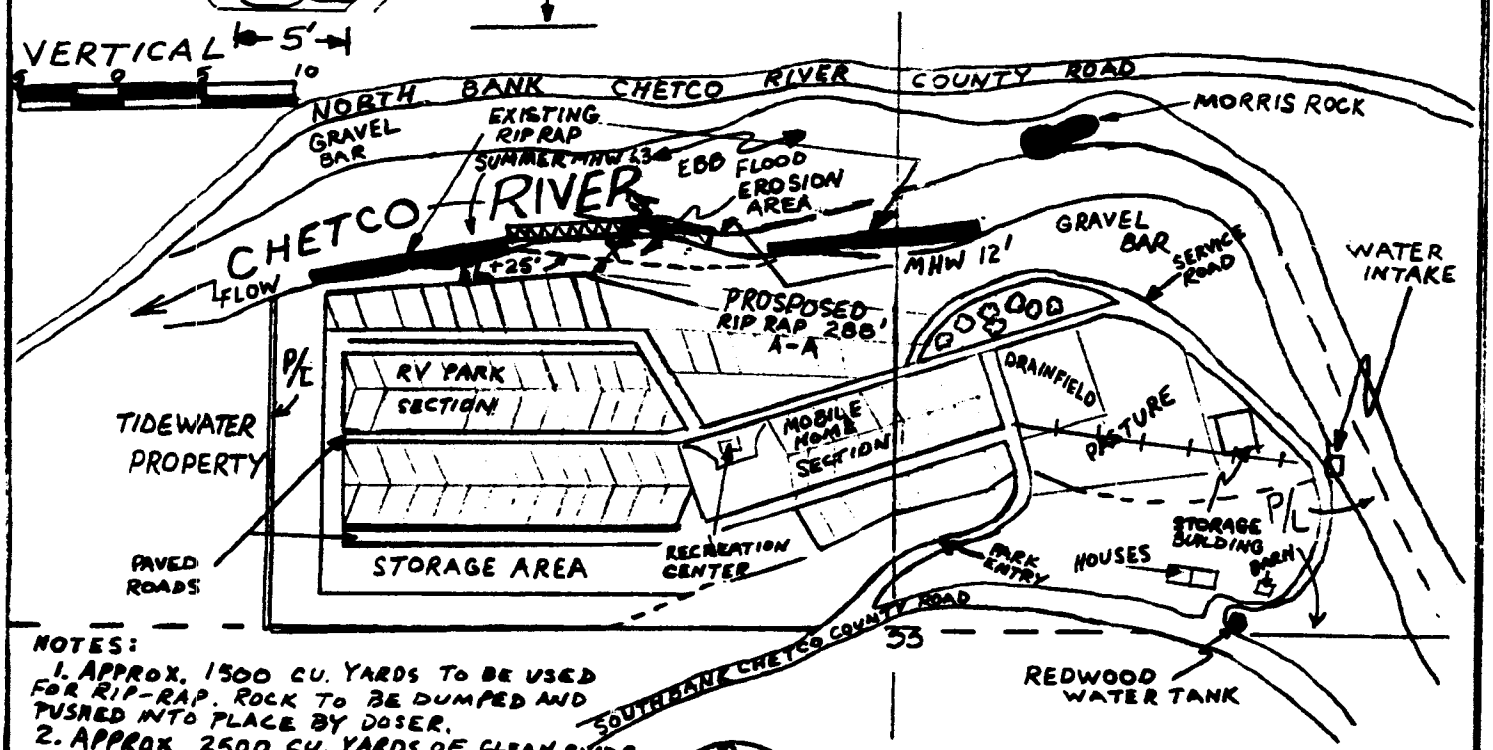
TYPICAL CROSS SECTION

LINE A-A

ELEVATIONS REFER TO SEA LEVEL DATUM







NOTES:
1. APPROX. 1500 CU. YARDS TO BE USED FOR RIP-RAP. ROCK TO BE DUMPED AND PUSHED INTO PLACE BY DOZER.
2. APPROX. 2500 CU. YARDS OF CLEAN RIVER GRAVEL TO FILL BEHIND RIP-RAP
3. NO ADJACENT STRUCTURES

PLAN VIEW

SCALE IN FEET
100 0 200 400

N

RIVER MILE 2.3

PURPOSE: RIP-RAP FOR BANK PROTECTION FOR PRIVATE RV & MOBILE HOME PARK

DATUM: MEAN LOWER LOW WATER (M.L.L.W)

ADJACENT PROPERTY OWNERS
1. TIDEWATER CONTRACTORS, INC.
2. CURRY COUNTY

RIVERBEND RV PARK
SEC 33, TWP 40S, R13W, W.M.
CURRY COUNTY, OREGON
APPLICANT: CONSTANCE LAW
DATE: 17 AUGUST 1990
RIVERBEND CORPORATION

(13)

DEPARTMENT OF THE ARMY PERMIT

Permittee: RON FALLERT

Permit No: 071-9YA-4-009220

Issuing Office: U.S. ARMY CORPS OF ENGINEERS, PORTLAND DISTRICT

NOTE: The term "you" and its derivatives, as used in this permit, means the permittee or any future transferee. The term "this office" refers to the appropriate district or division office of the Corps of Engineers having jurisdiction over the permitted activity or the appropriate official of that office acting under the authority of the commanding officer.

You are authorized to perform work in accordance with the terms and conditions specified below.

Project Description: Placement of approximately 1400 cubic yards of riprap and bedding for bank protection, as shown on the accompanying drawings.

Purpose: Bank Protection.

Drawings: Three sheets labeled 009220 (Chetco River - Bank Protection).

Project Location: South (east) bank of the Chetco River, River Mile 7.0, near Brookings, Curry County, Oregon.

Permit Conditions:

General Conditions:

1. The time limit for completing the work authorized ends on March 31, 1994. If you find that you need more time to complete the authorized activity, submit your request for a time extension to this office for consideration at least one month before the above date is reached.

2. You must maintain the activity authorized by this permit in good condition and in conformance with the terms and conditions of this permit. You are not relieved of this required if you abandon the permitted activity, although you may make a good faith transfer to a third party in compliance with General Condition 4 below. Should you wish to cease to maintain the authorized activity or should you desire to abandon it without a good faith transfer, you must obtain a modification of this permit from this office, which may require restoration of the area.

3. If you discover any previously unknown historic or archeological remains while accomplishing the activity authorized by this permit, you must immediately notify this office of what you have found. We will initiate the Federal and state coordination required to determine if the remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

ENG FORM 1721, Nov 86

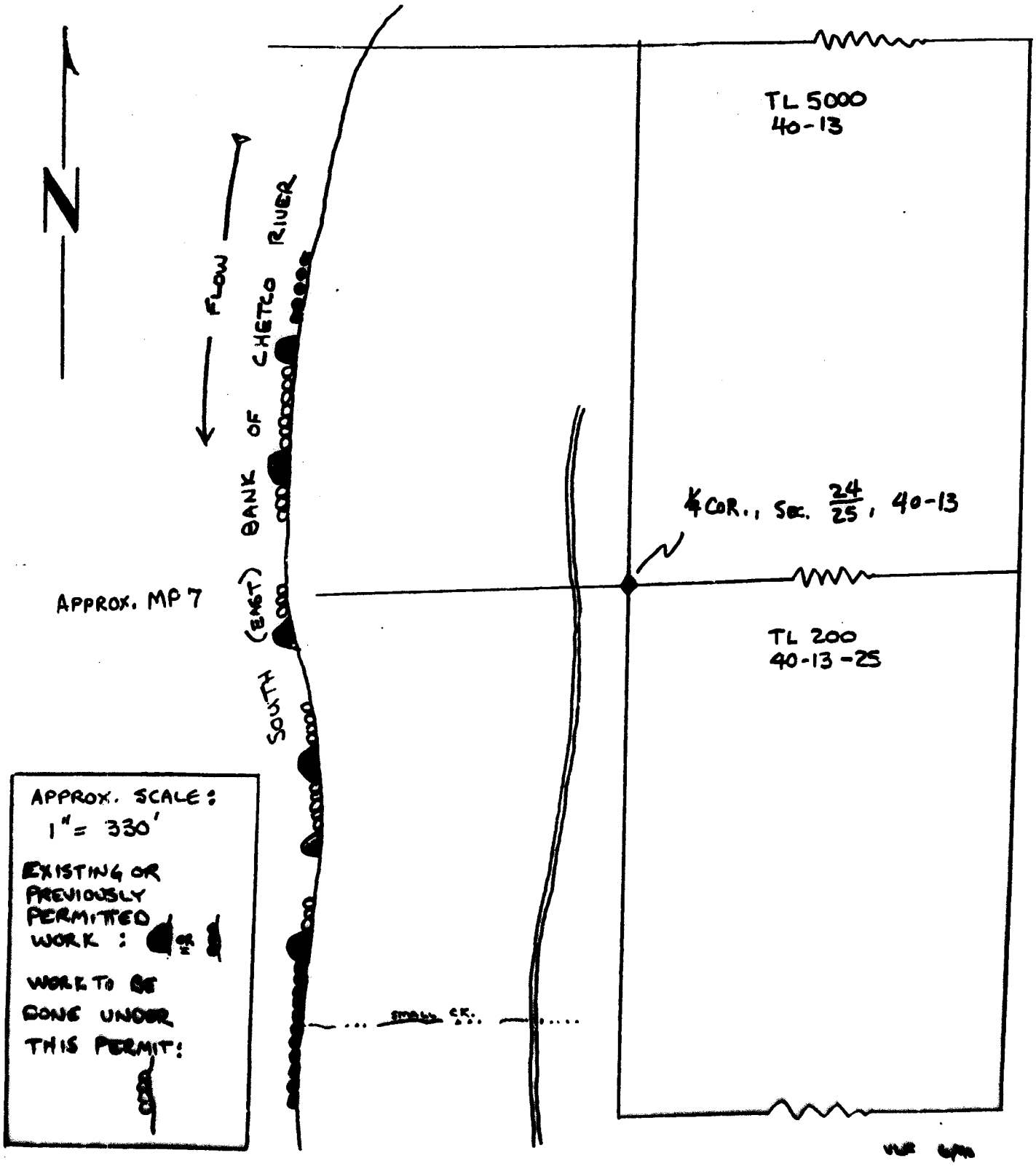
(33 CFR 325(Appendix A))

3/7/2011 Public Notice - Additional Team Documents 000124

ADDITIONAL EROSION CONTROL WORK TO BE DONE ON PROPERTY BELONGING TO:

RON FALLERT

JUNE 1990



(14)

DEPARTMENT OF THE ARMY PERMIT

Permittee: STEEVENS BROTHERS, INC.

Permit No: 071-0YA-4-008859

Issuing Office: U.S. ARMY CORPS OF ENGINEERS, PORTLAND DISTRICT

NOTE: The term "you" and its derivatives, as used in this permit, means the permittee or any future transferee. The term "this office" refers to the appropriate district or division office of the Corps of Engineers having jurisdiction over the permitted activity or the appropriate official of that office acting under the authority of the commanding officer.

You are authorized to perform work in accordance with the terms and conditions specified below.

Project Description: Place up to approximately 670 cubic yards of riprap and approximately 100 cubic yards of river gravel bedding along 600 lineal feet of bankline. The material will be end dumped with a frontloader.

Purpose: Erosion Protection

Drawings: Two sheets labeled 008859 (Chetco River - Bank Protection).

Project Location: Chetco River, river mile 4.0, near Brookings, Curry County, Oregon.

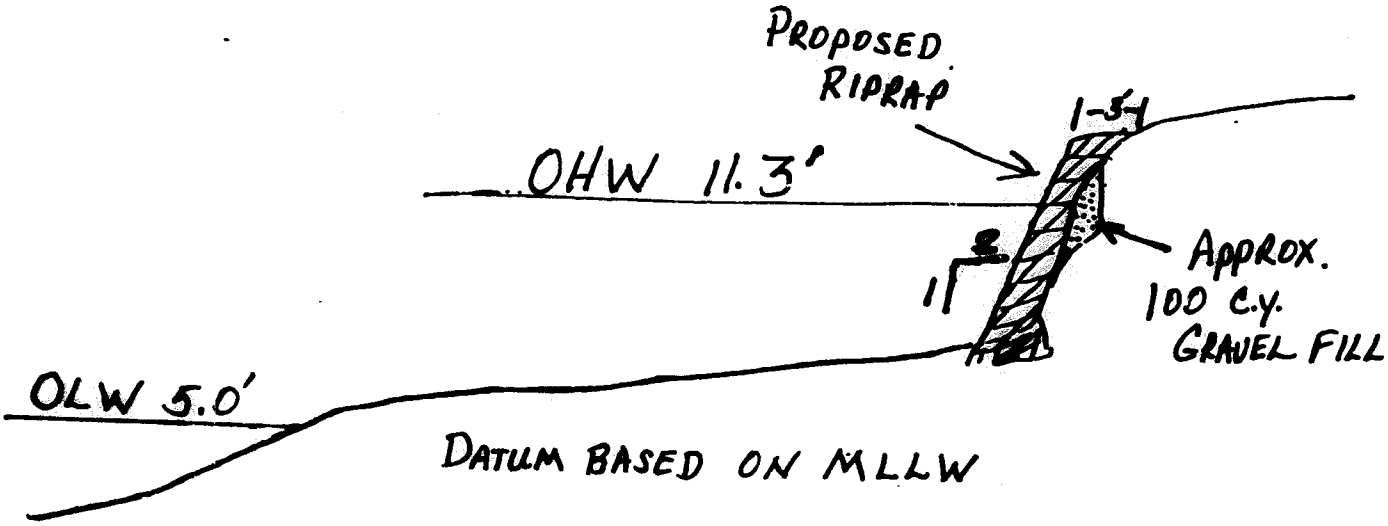
Permit Conditions:

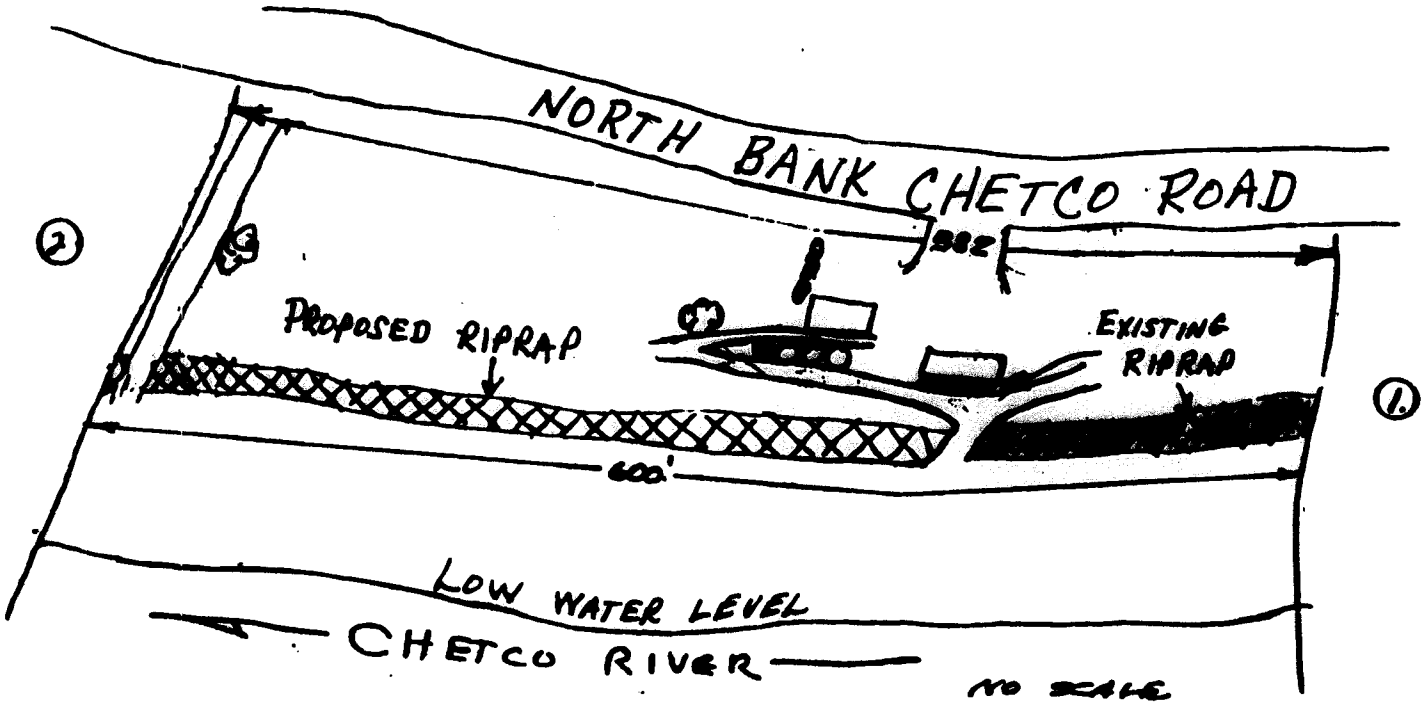
General Conditions:

1. The time limit for completing the work authorized ends on January 31, 1994. If you find that you need more time to complete the authorized activity, submit your request for a time extension to this office for consideration at least one month before the above date is reached.

2. You must maintain the activity authorized by this permit in good condition and in conformance with the terms and conditions of this permit. You are not relieved of this required if you abandon the permitted activity, although you may make a good faith transfer to a third party in compliance with General Condition 4 below. Should you wish to cease to maintain the authorized activity or should you desire to abandon it without a good faith transfer, you must obtain a modification of this permit from this office, which may require restoration of the area.

3. If you discover any previously unknown historic or archeological remains while accomplishing the activity authorized by this permit, you must immediately notify this office of what you have found. We will initiate the Federal and state coordination required to determine if the remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.





ADJACENT PROPERTY OWNERS
1. CITY OF BROOKINGS
2. CLAIR & BEULAH JACKSON

DATE DEC. 10, 1989
STEEVENS BROS INC., MIKE STEEVENS, AGENT
CHETCO RIVER RIVER MILE 4.:
CURRY COUNTY OREGON
SHEET 2 OF 2

(15)

DEPARTMENT OF THE ARMY
PORTLAND DISTRICT, CORPS OF ENGINEERS
P. O. BOX 2946
PORTLAND, OREGON 97208-2946

Reply to
Attention of:

October 5, 1988

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50.1 Fr 8137

Planning Division (CENPP-PL-R)

Subject: 071-OYA-4-008137 (Chetco River - Erosion Protection)

Ms. Bernice E. Abbott
Post Office Box 1575
Brookings, Oregon 97415

Dear Ms. Abbott

We have received your application (Enclosure 1) for a Department of the Army Permit to take 300 cubic yards of gravel from a gravel bar above the current water level and push it up onto the bank to provide erosion protection on the Chetco River, Mile 3.0, near Brookings, Curry County, Oregon.

Your proposed work is authorized if you comply with the nationwide permit described below, subject to the Conditions and Management Practices (Enclosure 2), and provided you obtain permits, where required, under Oregon's Removal/Fill Law and appropriate local authorizations.

Nationwide permit 33 CFR 330.5(a)(13) authorizes bank stabilization activities provided:

a. The bank stabilization activity is less than 500 feet in length;

b. The activity is necessary for erosion prevention;

c. The activity is limited to less than an average of one cubic yard per running foot placed along the bank within waters of the United States:

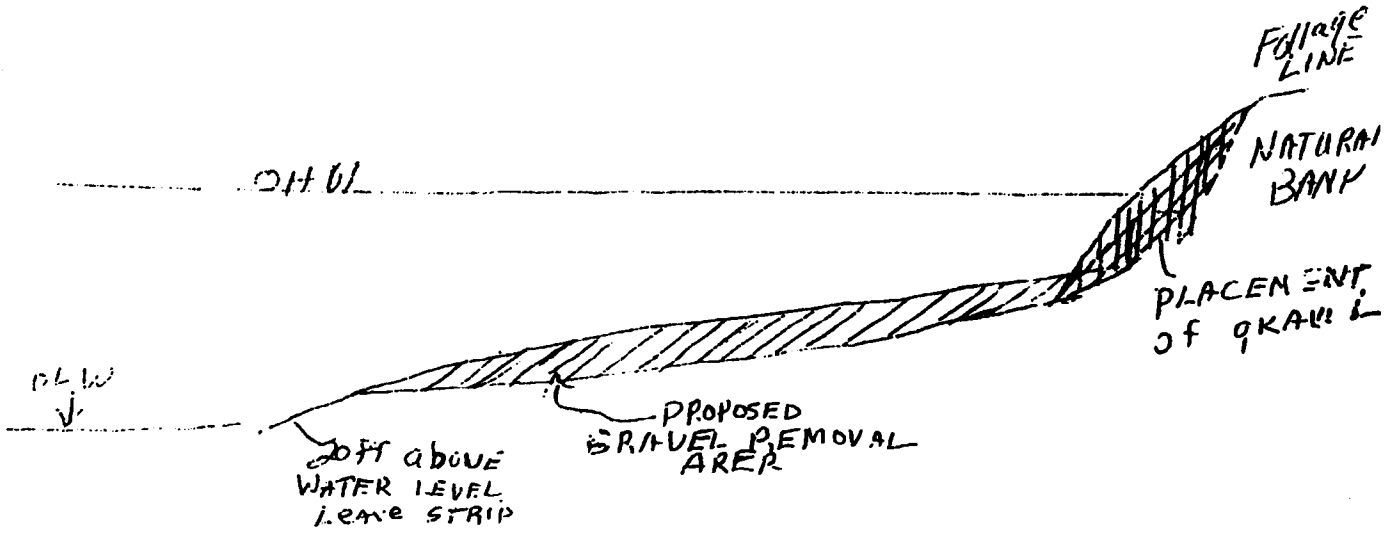
d. No material is placed in excess of the minimum needed for erosion protection;

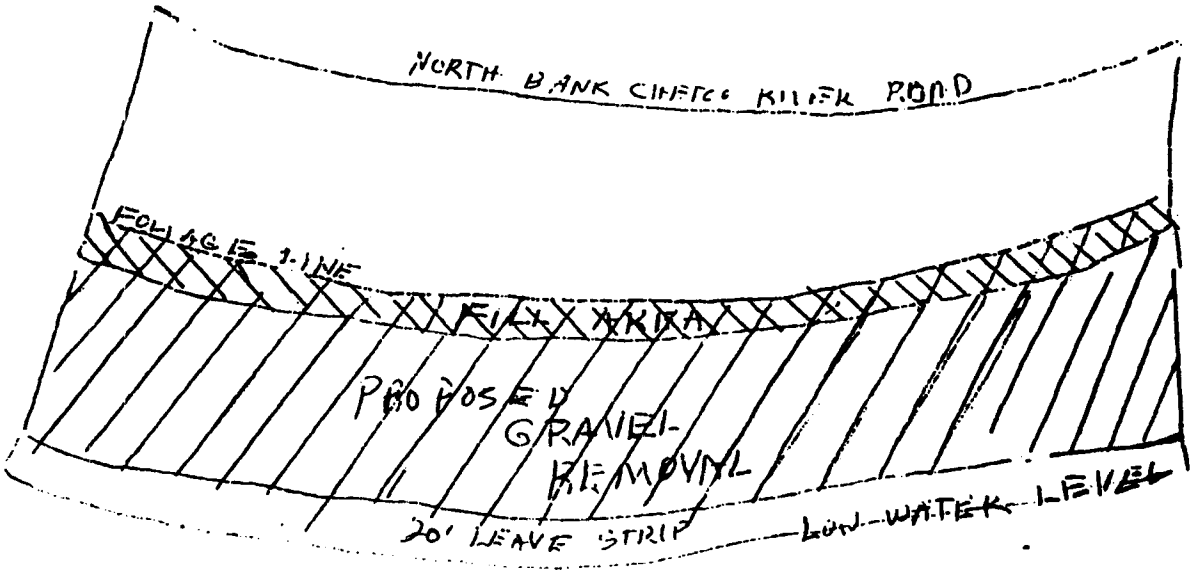
e. No material is placed in any wetland area;

f. No material is placed in any location or in any manner so as to impair surface water flow into or out of any wetland area;

g. Only clean material free of waste metal products, organic materials, unsightly debris, etc. is used; and

h. The activity is a single and complete project.





CHETCO RIVER -

ADJACENT PROPERTY OWNERS
1. CITY OF BROOKINGS
2. LAURIE & WES Hendrick

JULY 25, 1988
PROPOSED GRAVEL REMOVAL
GAS FILL
CHETCO RIVER MILE 3
NEAR: BROOKINGS
COUNTY CURRY OREGON
APPLICANT: BERNICE ABBOTT

2 of 2

3/7/2011 Public Notice - Additional Team Documents 000129

(16)

June 27, 1985

Operations Division (NPPOP-R-1)

Subject: 071-OYA-4-005858 (Chetco River - Bank Protection)

Ron Fallert
Box 670
Brookings, Oregon 97415

Dear Mr. Fallert:

We have reviewed your application for erosion control work on the Chetco River, Mile 7, in Curry County, near Brookings, Oregon, consisting of placing approximately 2,500 cubic yards of rock filter material and riprap along 1,300 linear feet of bankline. Approximately 2,350 cubic yards will be placed below the ordinary high water line.

Your project will qualify for authorization under the attached General Permit No. 071-OYA-4-004388, subject to the terms and conditions, providing you secure a State Fill Permit from the Oregon Division of State Lands (ODSL), and providing no objections are received from Federal resource agencies. If your project fails to be permitted by ODSL, or if a Federal resource agency objects to authorization under the General Permit, processing of an individual permit application will be required if you wish to pursue authorization.

If you have any questions regarding the authorization of your project or the terms and conditions of the attached General Permit, please contact Roy Loghry at the above address or telephone (503) 221-6995.

Sincerely,

R-2

G. A. Newgard
Chief, Regulatory Branch

Attachment

CF: ODSL

Loghry/6995/bc
27 Jun 85

3/7/2011 Public Notice - Additional Team Documents 000130

Application No. 071-OYA-2-004611

Name of Applicant A. S. & J. B. QUINN

Effective Date 4 February 1983

Expiration Date (If applicable) 28 February 1986

DEPARTMENT OF THE ARMY
PERMIT

Referring to written request dated 4 August 1982 for a permit to:

( ) Perform work in or affecting navigable waters of the United States, upon the recommendation of the Chief of Engineers, pursuant to Section 10 of the Rivers and Harbors Act of March 3, 1899 (33 U.S.C. 403);

(X) Discharge dredged or fill material into waters of the United States upon the issuance of a permit from the Secretary of the Army acting through the Chief of Engineers pursuant to Section 404 of the Federal Water Pollution Control Act (86 Stat. 816, P.L. 92-500);

( ) Transport dredged material for the purpose of dumping it into ocean waters upon the issuance of a permit from the Secretary of the Army acting through the Chief of Engineers pursuant to Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 (86 Stat. 1052; P.L. 92-532);

A. S. & J. B. Quinn
98422 N. Bank Chetco
Brookings, Oregon 97415

is hereby authorized by the Secretary of the Army:

to place 500 cubic yards of riprap along 55 feet of the bank of the Chetco River.

in The Chetco River, Mile 2.0, in Curry County

at near Brookings, Oregon.

in accordance with the plans and drawings attached hereto which are incorporated in and made a part of this permit (on drawings: give file number or other definite identification marks.)

004611 (Chetco River - Bank Protection)

subject to the following conditions:

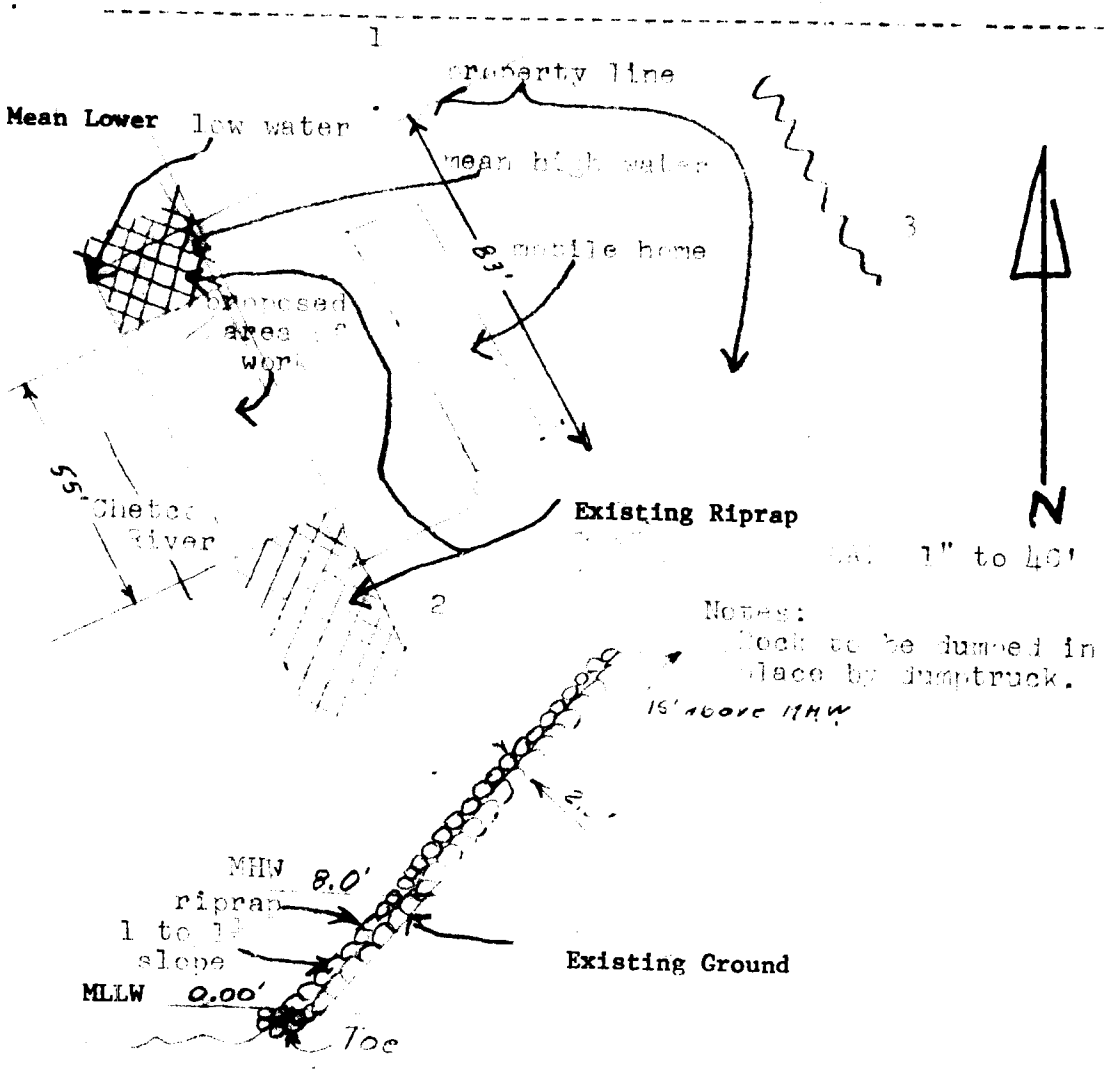
I. General Conditions:

a. That all activities identified and authorized herein shall be consistent with the terms and conditions of this permit; and that any activities not specifically identified and authorized herein shall constitute a violation of the terms and conditions of this permit which may result in the modification, suspension or revocation of this permit, in whole or in part, as set forth more specifically in General Conditions j or k hereto, and in the institution of such legal proceedings as the United States Government may consider appropriate, whether or not this permit has been previously modified, suspended or revoked in whole or in part.

ENG FORM 1721 1 JUL 77 EDITION OF 1 APR 74 IS OBSOLETE. (ER 1145-2-303)

3/7/2011 Public Notice - Additional Team Documents 000131

004611 (Chetco River - Bank Protection)



PROPOSED: Riprap to protect river bank

ADJACENT PROPERTY OWNERS:

1. Charles Saylor
2. Margaret Ramsay
3. Floyd Stone

PROPOSED RIPRAP

ON: Chetco RIVER MILE 2

NEAR: Brookings

COUNTY Curry STATE Oregon

APPLICANT: A.E.&J.B. Quinn

DATE: July 26, 1982

SHEETS: 1 of 2

From: Janine_M_Castro@fws.gov
To: Linton, Judy L NWP
Cc: kemper_mcmaster@fws.gov; joe_zisa@fws.gov
Subject: Re: Chetco river: aggrading/degrading
Date: Thursday, May 31, 2007 4:15:24 PM

Hi Judy,

I sent my determination off to Kemper and Joe this morning and they will be sharing the information with the larger group soon. I probably have not addressed all of the questions raised, but I would be more than happy to help initiate the longer term study to ensure that the process continues to move forward.

I am in Mississippi this week, but I will be returning to the office on Monday.

Thanks,
Janine

Janine M. Castro, PhD, RG
Geomorphologist

"There's no more to-day than
there was a thousand years ago --
You can't wear water out."
D.H. Lawrence

US Fish and Wildlife Service
2600 SE 98th Ave., Suite 100
Portland, OR 97266
503.231.6179

To   <Janine_M_Castro@fws.gov>
cc
bcc
Subject   Chetco river: aggrading/degrading
"Linton, Judy L NWP" <Judy.L.Linton@nwp01.usace.army.mil>

05/31/2007 02:32 PM MST

Greetings, Janine: I wanted to touch base with you and see how things were progressing toward the determination as to whether the lower Chetco River system is aggrading or degrading. As you know this information is a key piece in the Corps (and other regulatory agencies) permit decision for several applications in this system. Do you think you will have a recommendation by the end of this week (June 1)?

In speaking with Bill Yocum and Teena Monical this morning regarding this short-term call, both have special requests about what your report might include....I don't know if you will be able to accommodate them but I want to pass this information along. I believe Bill has spoken to you directly about his request, but he would like to see a link between the short-term recommendation and the long-term process. How will or should the study team move from one to the other? In short, I believe he just wants to make sure the momentum keeps rolling along and that the study team members don't see the long-term process as just that – "long-term" – and put it on the back burner behind other important issues. (I know this is Larry's goal as well so I will be asked to keep it moving too!)

Teena's request is related to this short-term recommendation. If it is determined the system is degrading, can you make some estimate as to the years before the system may return to aggrading? That information would play into our alternatives analysis. I think also if the system is aggrading, can we make a call as to how long it might stay that way given certain factors (i.e. limited mining, etc)?

Thanks for all your efforts, Janine. Please let me know if I can be of assistance in any way. Judy (503-808-4382)

From: Linton, Judy L NWP
To: "Janine_M_Castro@fws.gov"
Subject: Chetco river: aggrading/degrading
Date: Thursday, May 31, 2007 2:32:41 PM

Greetings, Janine: I wanted to touch base with you and see how things were progressing toward the determination as to whether the lower Chetco River system is aggrading or degrading. As you know this information is a key piece in the Corps (and other regulatory agencies) permit decision for several applications in this system. Do you think you will have a recommendation by the end of this week (June 1)?

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Thanks for all your efforts, Janine. Please let me know if I can be of assistance in any way. Judy (503-808-4382)

From: Monty_Knudsen@fws.gov
To: Linton, Judy L NWP; Evans, Lawrence C NWP
Subject: Fw: Chetco River Vertical Stability Determination
Date: Monday, June 04, 2007 4:05:23 PM
Attachments: Chetco River Issue Statement.doc
Chetco River Determination Table.doc
Chetco River Source Data.doc

Sorry, I used a wrong email address the first time out. This one should work.

Monty Knudsen, Assistant Project Leader
Oregon Fish & Wildlife Office
2600 S.E. 98th Avenue
Portland, OR 97266-1398
503.231.6179
Visit our Website at: http://www.fws.gov/oregonfwo/
----- Forwarded by Monty Knudsen/OSO/R1/FWS/DOI on 06/04/2007 04:03 PM -----

Monty Knudsen/OSO/R1/FWS/DOI
06/04/2007 01:32 PM

To
judy.linton@usace.army.mil, larry.c.evans@usace.army.mil, cyril.alex@deq.state.or.us, louise.c.soliday@state.or.us, kevin.moynahan@dsl.state.or.us, mike.tehan@noaa.gov, vallette.yvonne@epa.gov, patty.snow@state.or.us, ron.anglin@state.or.us

cc
Kemper McMaster/OSO/R1/FWS/DOI@FWS, Joe Zisa/OSO/R1/FWS/DOI@FWS, Janine M Castro/OSO/R1/FWS/DOI@FWS, Craig Tuss/SWO/R1/FWS/DOI@FWS

Subject
Chetco River Vertical Stability Determination

Attached below are documents pertaining to the Chetco River Vertical Stability Determination for your consideration. As indicated in the documents, the river segment examined appears to be in a dynamic equilibrium status if viewed as a whole. However, it varies from stream reach to stream reach; mostly indicating equilibrium, a few sites aggrading and several degrading. This then begs the question of what, if anything, could be done this year with regard to permitting some level of gravel mining, and if so, where and, how much. I suggest we schedule a meeting/conference call asap to discuss the next

steps & options.

Joe Zisa is our point of contact regarding setting up such a meeting/conference call so please provide Joe your availability for the next few days and into early next.

Thanks

(See attached file: Chetco River Issue Statement.doc) (See attached file: Chetco River Determination Table.doc) (See attached file: Chetco River Source Data.doc)

Monty Knudsen, Assistant Project Leader
Oregon Fish & Wildlife Office
2600 S.E. 98th Avenue
Portland, OR 97266-1398
503.231.6179
Visit our Website at: http://www.fws.gov/oregonfwo/

OREGON FISH AND WILDLIFE OFFICE
ISSUE STATEMENT

DATE: May 31, 2007

PURPOSE: Determination of the vertical stability of the lower Chetco River

Concern over the impact of instream gravel mining on the lower Chetco River in Southwestern Oregon has precipitated a reconnaissance level investigation of the vertical stability of the channel from river mile (RM) 11.0 downstream to the mouth. This issue statement summarizes the findings of a brief analysis based on existing data (see attachment) and a one day field investigation on May 23, 2007. Agency staff assigned to this task include: Dr. Janine Castro, USFWS, Chuck Wheeler, NMFS, and Bob Lobdell, DSL. A brief peer review was provided by Dr. Peter C. Klingeman, Professor Emeritus, OSU, Corvallis, OR, Dr. Andrew Simon, Research Geologist, USDA—ARS, National Sedimentation Laboratory, Oxford, MS, Dr. Colin Thorne, Professor of Physical Geography, University of Nottingham, UK, Dr. Brian Cluer, Geomorphologist, NMFS, Santa Rosa, CA, and Rob Sampson, State Conservation Engineer, USDA—NRCS, Boise, ID.

A matrix including the analysis method used, data available, and indication of vertical trend is attached, along with a list of all source data consulted during this analysis.

RECONNAISSANCE ACTIVITIES:

The following analyses were completed during the month of May, 2007, to determine the vertical stability of the Chetco River.

- Specific-gauge analysis, including rating table shifts, completed by Dr. Peter Klingeman, May 9, 2007.
- Analysis of bathymetry from 1939 and 1976 maps, along with recent surveys in 2007 by Tidewater Contractors, completed by Robert Elayer, Tidewater Contractors.
- Planform analysis of the upper Tidewater Contractors site and Emily Creek reach, completed by Castro and Cluer, 2007.
- Highway 101 bridge-scour reports from 2005 and 2006, which includes an underwater investigation, completed by ODOT.
- Evaluation of existing bank-stabilization measures from 1983 to the present, based upon Corps of Engineers permit records and field investigation, completed by Janine Castro.
- Evaluation of municipal water-supply intakes on the Chetco River, including the City of Brookings and Harbor Rural Water District, completed by Chuck Wheeler via personal communication with the City of Brookings.
- Review of time series cross-sections including SCS Flood Study (1977), Marquess and Associates (1980), and Oregon Department of State Lands (1981), completed by DSL.
- Field investigation of bar height relative to floodplain height, completed by Janine Castro and Brian Cluer, 2007.

- Field examination of floodplain and bank areas to identify buried soil horizons, completed by Janine Castro, 2007.
- Riparian vegetation changes from aerial photos and ground surveys, completed by Janine Castro, 2007.
- Field examination of streambed sediment patterns, including armoring, particle imbrication, and particle-size distributions (visual), completed by Janine Castro and Brian Cluer, 2007.

VERTICAL STABILITY DETERMINATION:

Based on the available data at the time of this investigation, the current overall vertical trend of the Chetco River is dynamic equilibrium. This conclusion is further refined into three specific channel reaches.

RM 11.0 to RM 7.0

The positioning of gravel bars in the river from RM 11.0 downstream to RM 7.0 has been stable for many years as indicated by consistent bar form, bar size and degree of confinement of the low water channel width over several decades. The specific-gauge analysis shows short periods with water levels rising and falling for a specified discharge. This can be interpreted to indicate phases of aggradation and degradation at the gauging station, with the most recent phase being degradational. This typifies a stream with significant bedload transport during high flow years, rather than constant bedload transport every year. Based on a regression analysis, the trend for the last 36 years is degradational, but the overall magnitude of change is small (approximately 1 foot for moderate to high flows). Reduced sediment input from the catchment due to changes in land use management may be in part responsible for this trend. The history of gravel extraction both upstream and downstream of the gauge may also have affected the stage/discharge relationship.

RM 7.0 to RM 2.0

Below RM 7.0 downstream to head of tide the channel has been, and continues to be, highly dynamic. For example, the thalweg has shifted laterally, gravel bars have changed location and there is wider variation in bar heights than in the reaches up and downstream. Most of the bank stabilization work performed during the past 25 years has occurred in this reach in response to channel migration and bar formation. Field investigation suggests that failures of bank stabilization works are primarily due to inadequate design and/or implementation rather than system-wide degradation. The low flow channel is much wider and shallower than in the upstream reach, as clearly shown on the aerial photos, with the widest, shallowest section occurring in the region of RM 6.0 to RM 4.0. Lateral instability in this reach is exacerbated by anthropogenic, instream activity. Experience shows that actions that disturb the gravel armor and lower bar elevations may result in accelerated sedimentation and reductions in pool depths. Within this context, recent gravel deposition is evident from a buried soil surface on Freeman Bar at RM 6.0. However, despite the high level of lateral shifting and bar change, the presence

of intact remnant bridge piers at RM 6.5 indicate that adjustments to the bed elevation around this location have been minimal. This interpretation is based on the assumption that the bridge was not a major stream crossing, but rather was used to access the gravel bar on the north side of the river during low flows. Since the bridge was probably constructed for limited access, it is inferred that the bridge piers were not driven to great depths in the channel bed. Additionally, remnant bridge decking was apparent only a few feet above the water surface elevation.

It may be concluded that channel adjustments in this reach during the past 40 years have been predominantly in the lateral rather than vertical dimension.

RM 2.0 to RM 0

The tidal reach of the Chetco River appears to have deepened slightly over the past 20 years based on review of current and historical aerial photos that reveal a decrease in the elevation of intertidal bar forms. The probable cause of channel deepening is a combination of navigational dredging, interruption of littoral-derived sediments, and gravel extraction. This interpretation is corroborated by five cross-sections surveyed by the COE, DSL, and Tidewater Contractors for 1939, 1976, and 2007, respectively.

SUMMARY:

Based on the available data and field reconnaissance, the fluvial course between RM 11.0 and RM 2.0 of the Chetco River appears to be in dynamic equilibrium, while the tidal reach downstream of RM 2.0 has deepened in response to sediment removal. Depending upon the stream reach and the time period considered, there are indications of both slight aggradation and degradation in the fluvial reaches. Much of the channel adjustment that occurs in the lower Chetco River appears to be in the lateral dimension, as indicated by shifting bar forms and bank erosion. Annual disturbance of the bed and bar material due to gravel extraction is exacerbating the lateral instability of the channel between RM 7.0 and RM 2.0. This is because bedload in the Chetco River is transported in significant quantities during major flood events, with reworking of the deposited sediments during intervening years.

CONTACT: Janine Castro, Geomorphologist, Oregon Fish and Wildlife Office at 503-231-6179.

Chetco River: Summary of data analyses and field reconnaissance to support vertical stability determination

By: Janine Castro, Geomorphologist, USFWS, Portland, Oregon

May 25, 2007

Method Used	**Available Data**	**Notes**	**Trend**
Specific Gauge Analysis	1970 through 2007 USGS rating tables for gauge #14400000. Specific gauge analysis completed by Pete Klingeman, May 9, 2007.	Missing rating tables 28, 29, 30. Rating table adjustments show aggradation starting in 1972 continuing until a degradational phase in 1985. The channel started aggrading again in 1989 before significant degradation in 1996 with slight aggradation following, but not recovering to pre-1996 elevations. Regression through stage/discharge relationship shows degradational trend.	DE, D-
Cross-section comparison from bathymetric surveys	1939, COE; 1976, L.S. Slotta; 2007, Tidewater Contractors. All cross-sections below head of tide.	Comparison made by Robert Elayer, Tidewater. Cross-section numbers 7, 9, 10, 13, and 14 resurveyed. Elayer indicates that the 2007 cross-sections should be considered preliminary. Of the five cross-sections resurveyed, only cross-section 10 seems to have aggraded, while cross-section 9 is in equilibrium, leaving stations 7, 13, and 14 showing slight degradation. Cross-section 14 is the closest spatially to cross-section #56 listed below. Both cross-sections show slight degradation and are within an actively mined site.	DE, D-
Cross-section comparison from SCS Flood Study, Marquess & Assoc., and DSL	SCS, DSL, & MA reports 1977, 1981, 1982, 1989	Three cross-sections were resurveyed after the initial SCS survey in 1978 by Marquess & Assoc. in 1980 and then DSL (1981??). Cross-section #14 is located just downstream of the North Bank Road Bridge (RM 10.5); cross-section #48 is located just downstream of the confluence with the North Fork; and cross-section #56 is located just upstream of Morris Rock (RM 2.5). Only cross-section #56 shows signs of degradation. Lumley asserts that many of the other SCS cross-sections are not comparable due to control point issues, and further asserts that the cross-section	DE, D-

		comparison is not appropriate for determination of vertical stability.	
Cross-section comparison from South Coast mining site	South Coast Lumber 2003, 2004, and 2005. Cross-sections of the mined bar pre- and post-mining; does not include the active channel.	Post-mining recovery to same elevation 2003 through 2005 for cross-sections 0+00, 1+00, 2+00, 3+00, 4+00, 5+00, 6+00, 7+00, 8+00, 9+00, 10+00, and12+00. Cross-section 11+00 did not recover to 2003 levels in either 2004 or 2005 – it is approximately 1-foot lower in elevation.	N/A
Planform analysis at upper Tidewater site near USGS gauge	Aerial photos 1976, 1978 (IR), 1979, 1986, 1991, 1994.	The four bars downstream of the bridge show minimal change. The mined bar upstream of the bridge shows a change in the cross-over position. Bars upstream from the mined bar show no change. All bars are boundary forced due to the narrow valley width and probably have a backwater effect on the USGS gauge due to a downstream constriction (per Pete Klingeman).	DE
Planform analysis near Emily Creek	Aerial photos 1939, 1982, 1986, 1990, and 1994.	Bar form seems to be stable since the 1964 flood. Emily Creek confluence is perched and disconnected from main stem in all years.	DE
Bank stabilization	Permit requests from COE back to 1983, field investigation	16 COE permitted projects, 9 of which occur between RM 2.0 and 4.9. Field evidence of numerous unpermitted projects, but total length of stabilization has not been quantified. Much of the rock placement appears to be related to stabilization and protection of North Bank Road. Extensive riprap and groins along the lower Chetco. Most rock was end dumped and not keyed in to bed. Failures appear to result from revetment design and installation, not undermining of the structure. Bank instability is due primarily to lateral channel migration.	N/A
Riparian vegetation	Aerial photos various years, field investigation	No trend detectable. The constrained valley form results in frequent disturbance to vegetation establishment on depositional bars.	N/A

Streambed sediment patterns / depositional bars	Aerial photos 1940 to 2002, field investigation, Klingeman 2002, Lumley.	From RM 11.0 down to RM 7.0, the channel has been very stable with gravel bars in approximately the same location with channel width is maintained over time. This is supported by the Lumley and Klingeman reports. RM 7.0 downstream to RM 2.5 is dynamic and much wider and shallower than upstream. Much bank stabilization has occurred in this reach. From head of tide downstream, there appears to be a decrease in at least one substantial bar.	A-, DE
Water supply systems	Lumley report, DSL 1982 Letter, Wheeler pers. comm. 2007	City of Brookings water intake moved 2 miles upstream. This apparently was due to drought conditions and an increase in withdrawals causing brackish water to enter the system. Harbor Rural Water District concerned about decreased water level in their well.	N/A
Bridge Repair/Maintenance	Inspection records 2005 & 2006	In 2005 structure was listed as in "acceptable condition". In 2006 the underwater inspection found no piers exposed and no maintenance required. Maximum depth = 9 feet	DE
Bridge Piers	Field investigation	Bridge piers located at RM 6.5, approximately 2 to 3-feet exposed above water surface at 650 cfs. Some decking still in place	DE
Bedload Transport vs. Extraction	Ogden Beeman Report, 1981, & Lumley Report	Bedload transport calculation using the Einstein equation resulted in a theoretical potential of 372,000 cy/yr average transport (this assumes no limit of source material). The highest estimate is 840,000 cy for 1974, and the low estimate is 22,000 cy for 1977. Permitted extraction as of 2005 was 235,000 cy/yr. Permitted extraction from 1976 to 1980 exceeded 3.5 million cy/yr, although DSL reports only 240,000 cy were actually removed in 1980.	D or A, depending on year

Changes in navigability	Klingeman reports – affidavit and hydrologic/hydraulic/morphologic analyses, 1993	According to Pete Klingeman, "it is my opinion that the Chetco River could have supported the same uses in 1859 as it is capable of supporting today."	DE
Floodplain elevation & bar elevation	Field investigation estimating bar height relative to water surface elevation	Bar heights ranged from 5 to 12 feet in elevation above the water surface (all bar heights relative to the water surface elevation during the field investigation). Bar height is directly related to floodplain extent and channel constriction. Constrained reaches, such as RM 11.0 to RM 7.0, have relatively high bars (10 to 12 feet), while unconstrained reaches downstream of RM 7.0 generally have lower bars (5 to 8 feet). The lowest bars encountered were located at Freeman Bar and measured approximately 4 to 5 feet in height. Several comparisons of bar height to floodplain height showed coupling of these elevations with the floodplain being only one to two feet above fully developed bar formations.	DE
Buried soil horizons	Field investigation	A soil horizon buried by a reent deposit of gravel and sand was observed at Freeman Bar on the left bank.	A-, DE
Tributary junctions with the mainstem Chetco	Field investigation	During the field investigation, tributary junctions were inspected for evidence of incision or aggradation. All tributaries encountered (Emily Creek, Dry Creek, Mill Creek, North Fork Jack's Creek, and Joe Hall Creek, plus several smaller tributaries) had moderate to abundant sediment deposited as fans into the main channel. The larger tributary fans (Emily and North Fork) projected into the main channel and affected the thalweg location, while the smaller fans were scoured to a steep face in alignment with the main channel. No headcuts were evident in the tributaries.	A

Bed material sorting and armoring	Field investigation	Most depositional bars were slightly armored but showed no signs of significant imbrication. Sediment size was heterogeneous from sand to cobble. The channel bed where visible was a mix of sizes with limited patchiness, and with sand over gravel in many locations.	DE, A-

* A = aggrading, D = degrading, DE = dynamic equilibrium (-/+ indicate limited (-) or excessive (+))

CHETCO RIVER SOURCE DATA:

REVIEWED FOR DETERMINATION OF VERTICAL STABILITY

Janine Castro, Geomorphologist, US Fish and Wildlife Service, May 31, 2007

CORRESPONDANCE

From: DSL – Stanley Hamilton
To: Curry County Board of Commissioners
Date: February 5, 1982
Subject: Chetco River Resource Management (note in pencil indicates that this letter was never sent)

From: City of Brookings – Richard Ullian
To: DSL – Bill Parks
Date: February 16, 1988
Subject: Revised application for gravel removal on Chetco River – Permit Nos. RP 4077 and RP 3375

From: Tidewater Contractors – Robert Elayer
To: Corps of Engineers – Lisa Grudzinski
Date: June 26, 2006
Subject: pictures of sediment from Yaquina Dredge

From: Corps of Engineers – Sheryl Carrubba (e-mail)
To: NMFS – Chuck Wheeler
Date: July 21 and July 24, 2006
Subject: Clarification and response to Tidewater pictures form Yaquina dredging operation

From: FWS
To: Corps of Engineers
Date: November 20, 2006
Subject: Freeman Rock Cease and Desist Order

From: McBain and Trush
To: Freeman Rock – Bill Yokum
Date: January 12, 2007

From: NMFS – Bob Lohn
To: Freeman Rock Inc. – Bill Yokum
Date: March 2, 2007
Subject: Sediment study scope of work

From: NMFS
To: Corps of Engineers
Date: March 7, 2006
Subject: Draft Biological Opinion, Tidewater

From: Freeman Rock – Ted Freeman
To: Corps of Engineers
Date: April 10, 2007
Subject: Response to Corps add info letter

From: Tidewater Contractors, Inc. – Robert Elayer
To: NMFS – Chuck Wheeler
Date: May 3, 2006

Subject: Aggrading/degrading interpretation in the BO

From: Tidewater Contractors, Inc. – Robert Elayer
To: NMFS – Chuck Wheeler
Date: May 25, 2006
Subject: Aggrading/degrading interpretation in the BO

From: NMFS – Chuck Wheeler
To: Brian Cluer, NMFS, & Janine Castro, FWS
Date: May/June, 2006
Subject: Chetco River data including aerial photos and draft BO

FIELD INVESTIGATION

May 23, 2007. Field investigation with Chuck Wheeler, NMFS, Brian Cluer, NMFS, Kevin Moynahan, DSL, Bob Lobdell, DSL, Robert Elayer, Tidewater Contractors, and wrap-up with Bill Yokum, Freeman Rock. Field investigation started at the Upper Tidewater site (RM 10.7) and continued downstream to the boat harbor.

MAPS, SURVEYS, & PHOTOS

BLM aerial photos, 1940, 1955, 1976, 1986, 1992, 1997, 2002 (various scales)

South Coast Lumber Company gravel bar surveys completed for 2003, 2004, and 2005 (12 cross-sections each year tied to a permanent vertical datum). River Mile 7.0. Surveyor – Raymond Schlack.

South Coast Lumber supplied aerial photos: 1940, 1962, 1972, 1976, 1981, 1985, 1990, 1994, 1998, 2000, 2002, 2004, 2006

Tidewater ground photos, May 3, 2006.

Tidewater photos of YAQUINA dredge material, June 2006.

Chuck Wheeler ground photos, October, 2005.

Chuck Wheeler ground photos, July 25, 2006.

Chuck Wheeler ground photos, February 1, 2007.

PERMITS

Bank stabilization permits issued from the US Army Corps of Engineers from 1983 through 2000, RM 1.0 to RM 10.0. Permit letters provided by COE, 2007.

Chetco River commercial gravel removal state permits, September 1, 2005. Total permitted extraction 235,000 cy/yr between RM 1.0 and RM 10.0.

REPORTS & DOCUMENTS

Affidavit of Dr. Peter Klingeman. 1993. Plantiff vs. Tindewater Contractors, et al. Chetco Navigability.

Chetco River Bridge Inspection Reports, 2005 and 2006 (underwater)

Hamilton, S.F. 1972. An Inventory of Filled Lands in the Chetco River. Prepared for the Advisory Committee to the State Land Board of Oregon by the Advisory Committee's Engineering Staff.

Klingeman, P.C. 1993. Chetco River field reconnaissance with Oregon Department of Justice.

Klingeman, P.C. 1993. Chetco River, Oregon: hydrologic/hydraulic/morphologic analyses of navigability. Report to Oregon Department of Justice.

Klingeman, P.C. 2002. DRAFT Willow bar reconnaissance and evaluation, Chetco River, based on field visit on Thursday, July 25, 2002, and prior site visits.

Lumley, P.E. No date. Chetco River: problematical analysis of the gravel resource. Report to DSL, Waterways Section.

Marquess and Associates, Inc. 1980. Report to Harbor Rural Water District, Harbor, Oregon.

Ogden Beeman & Associates. 1981. River Engineering Analysis Chetco River.

Soil Conservation Service. 1979. Flood hazard study, Chetco River, Curry County, Oregon. Prepared by the USDA soil Conservation Service in cooperation with Curry County, Curry County Soil and Water Conservation District, and the State Water Resources Department.

From: BILL YOCUM
To: Linton, Judy L NWP
Subject: Fw: Chetco River Aggregate
Date: Tuesday, June 05, 2007 1:17:31 PM

----- Original Message -----
From: "BILL YOCUM" <billy@wave.net>
To: "Dave Pratt" <prattd@co.curry.or.us>; "Val Early" <Val@earlyfishing.com>; "Tom Hoshall" <tomhoshall@stuntzner.com>; "Todd Confer" <Todd.A.Confer@state.or.us>; "Ron Kreskey" <ron.kreskey@mail.house.gov>; "Rich Angstrom" <rich@ocapa.net>; "Marlyn Schafer" <SchaferM@co.curry.or.us>; "Kevin Richardson" <kevinrichard@comcast.net>; "Kevin Moynahan" <kevin.moynahan@dsl.state.or.us>; "Joy Smith" <Joy@umpquasand.com>; "Jodi Ferrin" <Ferrinj@co.curry.or.us>; <Alex.Cyril@state.or.us>; <Russell.P.Stauff@state.or.us>; <Tom.Melville@state.or.us>; "Virgil" <virgilf@socomi.com>; "Robert Elayer" <relayer@twcontractors.com>; "Jon Barton" <jabar@millenicom.com>; "Karmen" <karmen.fore@mail.house.gov>; "Terri Moffett" <Terri_moffett@gsmith.senate.gov>; "TED FREEMAN, JR" <tedf@wave.net>; "Cornelia de Bruin" <cdebruin@triplicate.com>; "Joel Summer" <joel@currycountyreporter.com>; "Curry Coastal Pilot newsroom" <news@currypilot.com>; <bob.lohn@noaa.gov>; "Dave Scott" <dscott@port-brookings-harbor.org>; "Dave Perry" <Dave.Perry@State.or.us>; "Patty Snow" <Patty.Snow@state.or.us>; "Yvonne Vallette" <Vallette.Yvonne@epa.gov>; "Molly (Wyden) McCarthy" <Molly_McCarthy@wyden.senate.gov>; "Teena Monical" <Teena.G.Monical@usace.army.mil>; "SOLLIDAY Louise * Governor's Office" <Louise.Solliday@state.or.us>; "Larry Evans" <Lawrence.C.Evans@nwp01.usace.army.mil>
Cc: "Janine Castro" <Janine_M_Castro@fws.gov>; "Chuck Wheeler" <Chuck.Wheeler@NOAA.gov>; "Judy Linton" <judy.l.linton@usace.army.mil>; "Bob Lobdell" <robert.lobdell@dsl.state.or.us>
Sent: Tuesday, June 05, 2007 11:11 AM
Subject: Chetco River Aggregate

> I received a call yesterday afternoon from Dr. Janine Castro (USFWS
> Geomorphologist) and she told me that she has turned her "Short Term Chetco
> River Aggregate Report" into the Corps. I asked her what were her findings
> and she explained that it is a little more complicated than giving a short
> summary but here it is:
>
> The lower Chetco River (from 2nd bridge) is 11 river miles (RM) long out of
> a 55 mile long river. The lower river was again segmented in three
> additional groups; from RM 11 to RM 7, RM 7 to tidewater, and from
> tidewater to the ocean.
>
> From RM 11 to RM 7 the river has been bouncing between aggrading and
> degrading. This year the river is on the degrading side of the line.
>
> From RM 7 to tidewater the river is in equilibrium (neither aggrading nor
> degrading). Please note that Freeman Rock removed a little over 100,000
> cubic yards and river is in equilibrium.
>

> From tidewater to the Pacific Ocean Janine did not classify the river as
> aggrading/equilibrium/degrading. She classified this section as estuary
> deepening. She indicated that the deepening is a result of the cumulative
> actions of jetty construction, navigational dredging, and commercial
> aggregate removal.
>
> She is recommending a meeting of the agencies representatives to happen
> either this week or next to discuss possible short-term permits based on
her
> analysis and conclusions. So I guess the process is moving and we will
know
> more about the potential 2007 removal season by June 15, 2007.
>
> If I made any incorrect interpretations of my phone call, then please let
me
> know. When I hear any additional information I will forward this to you.
I
> hope to get a copy of the "Short Term Study" this week. If anyone would
> like me to send them a copy please let me know.
>
> Again, let me thank everyone for their efforts in getting us this far. I
> really like the active link between the River, the Communities, the
> Agencies, and the Congressional Delegation. Thanks for your interest in
the
> ecology and economy of southern Oregon and northern California.
>
> Bill Yocum
> Freeman Rock Inc.
> 541-469-2444
>

From: Joe_Zisa@fws.gov
To: Linton, Judy L NWP
Subject: Fw: Chetco River Vertical Stability Determination Conference call
Date: Tuesday, June 12, 2007 1:15:03 PM

----- Forwarded by Joe Zisa/OSO/R1/FWS/DOI on 06/12/2007 01:13 PM -----

Joe Zisa/OSO/R1/FWS/DOI

06/12/2007 10:00 AM To
Mike Tehan <Mike.Tehan@noaa.gov>, Chuck Wheeler <Chuck.Wheeler@noaa.gov>, Craig_Tuss@fws.gov, cyril.alex@deq.state.or.us, Janine_M_Castro@fws.gov, judy.linton@usace.army.mil, Kemper_McMaster@fws.gov, ken Phippen <Ken.Phippen@noaa.gov>, kevin.moynahan@dsl.state.or.us, larry.c.evans@usace.army.mil, louise.c.soliday@state.or.us, Monty_Knudsen@fws.gov, patty.snow@state.or.us, ron.anglin@state.or.us, vallette.yvonne@epa.gov
cc
Subject
Chetco River Vertical Stability Determination Conference callLink
<Notes:///88256958006E54C7/DABA975B9FB113EB852564B5001283EA/808DDE41608164E2872572F00072F07E>

A conference call to discuss Chetco River Vertical Stability Determination has been scheduled for Wednesday, 13 June, 1300-1400hrs. Phone-in number is 877.934.2812, participant code: 294348.

Monty Knudsen will facilitate discussion.

Monty_Knudsen@fws.gov wrote:
> Attached below are documents pertaining to the Chetco River Vertical
> Stability Determination for your consideration. As indicated in the
> documents, the river segment examined appears to be in a dynamic
> equilibrium status if viewed as a whole. However, it varies from stream
> reach to stream reach; mostly indicating
> equilibrium, a few sites aggrading and several degrading. This then begs
> the question of what, if anything, could be done this year with regard to
> permitting some level of gravel mining, and if so, where and, how much. I
> suggest we schedule a meeting/conference call asap to discuss the next
> steps & options.
>
> Joe Zisa is our point of contact regarding setting up such a
> meeting/conference call so please provide Joe your availability for the
> next few days and into early next.
>
> Thanks
>
>
> (See attached file: Chetco River Issue Statement.doc) (See
> attached file: Chetco River Determination Table.doc) (See
> attached file: Chetco River Source Data.doc)
>
>
> Monty Knudsen, Assistant Project Leader
> Oregon Fish & Wildlife Office
> 2600 S.E. 98th Avenue

> Portland, OR 97266-1398
> 503.231.6179
> Visit our Website at: http://www.fws.gov/oregonfwo/

From:	Janine_M_Castro@fws.gov
To:	cpruss@verizon.net
Cc:	Linton, Judy L NWP; Bob.Lobdell@state.or.us; Monty_Knudsen@fws.gov
Subject:	Chetco River Documents
Date:	Tuesday, August 07, 2007 10:36:12 AM
Attachments:	Chetco River Issue Statement.pdf Chetco River Determination Table.pdf Chetco River Source Data.pdf

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Dear Pat,

Attached are the three documents that you requested in your letter dated July, 10, 2007. This includes the issue statement, source data, and determination matrix.

Please direct any permit related questions to DSL (Bob Lobdell) and the Corps of Engineers (Judy Linton).

Regards,
Janine

(See attached file: Chetco River Issue Statement.pdf)(See attached file: Chetco River Determination Table.pdf)(See attached file: Chetco River Source Data.pdf)

Janine M. Castro, PhD, RG
Geomorphologist

"There's no more to-day than
there was a thousand years ago --
You can't wear water out."
D.H. Lawrence

US Fish and Wildlife Service
2600 SE 98th Ave., Suite 100
Portland, OR 97266
503.231.6179

OREGON FISH AND WILDLIFE OFFICE
ISSUE STATEMENT

DATE: May 31, 2007

PURPOSE: Determination of the vertical stability of the lower Chetco River

Concern over the impact of instream gravel mining on the lower Chetco River in Southwestern Oregon has precipitated a reconnaissance level investigation of the vertical stability of the channel from river mile (RM) 11.0 downstream to the mouth. This issue statement summarizes the findings of a brief analysis based on existing data (see attachment) and a one day field investigation on May 23, 2007. Agency staff assigned to this task include: Dr. Janine Castro, USFWS, Chuck Wheeler, NMFS, and Bob Lobdell, DSL. A brief peer review was provided by Dr. Peter C. Klingeman, Professor Emeritus, OSU, Corvallis, OR, Dr. Andrew Simon, Research Geologist, USDA—ARS, National Sedimentation Laboratory, Oxford, MS, Dr. Colin Thorne, Professor of Physical Geography, University of Nottingham, UK, Dr. Brian Cluer, Geomorphologist, NMFS, Santa Rosa, CA, and Rob Sampson, State Conservation Engineer, USDA—NRCS, Boise, ID.

A matrix including the analysis method used, data available, and indication of vertical trend is attached, along with a list of all source data consulted during this analysis.

RECONNAISSANCE ACTIVITIES:

The following analyses were completed during the month of May, 2007, to determine the vertical stability of the Chetco River.

- Specific-gauge analysis, including rating table shifts, completed by Dr. Peter Klingeman, May 9, 2007.
- Analysis of bathymetry from 1939 and 1976 maps, along with recent surveys in 2007 by Tidewater Contractors, completed by Robert Elayer, Tidewater Contractors.
- Planform analysis of the upper Tidewater Contractors site and Emily Creek reach, completed by Castro and Cluer, 2007.
- Highway 101 bridge-scour reports from 2005 and 2006, which includes an underwater investigation, completed by ODOT.
- Evaluation of existing bank-stabilization measures from 1983 to the present, based upon Corps of Engineers permit records and field investigation, completed by Janine Castro.
- Evaluation of municipal water-supply intakes on the Chetco River, including the City of Brookings and Harbor Rural Water District, completed by Chuck Wheeler via personal communication with the City of Brookings.
- Review of time series cross-sections including SCS Flood Study (1977), Marquess and Associates (1980), and Oregon Department of State Lands (1981), completed by DSL.
- Field investigation of bar height relative to floodplain height, completed by Janine Castro and Brian Cluer, 2007.

- Field examination of floodplain and bank areas to identify buried soil horizons, completed by Janine Castro, 2007.
- Riparian vegetation changes from aerial photos and ground surveys, completed by Janine Castro, 2007.
- Field examination of streambed sediment patterns, including armoring, particle imbrication, and particle-size distributions (visual), completed by Janine Castro and Brian Cluer, 2007.

VERTICAL STABILITY DETERMINATION:

Based on the available data at the time of this investigation, the current overall vertical trend of the Chetco River is dynamic equilibrium. This conclusion is further refined into three specific channel reaches.

RM 11.0 to RM 7.0

The positioning of gravel bars in the river from RM 11.0 downstream to RM 7.0 has been stable for many years as indicated by consistent bar form, bar size and degree of confinement of the low water channel width over several decades. The specific-gauge analysis shows short periods with water levels rising and falling for a specified discharge. This can be interpreted to indicate phases of aggradation and degradation at the gauging station, with the most recent phase being degradational. This typifies a stream with significant bedload transport during high flow years, rather than constant bedload transport every year. Based on a regression analysis, the trend for the last 36 years is degradational, but the overall magnitude of change is small (approximately 1 foot for moderate to high flows). Reduced sediment input from the catchment due to changes in land use management may be in part responsible for this trend. The history of gravel extraction both upstream and downstream of the gauge may also have affected the stage/discharge relationship.

RM 7.0 to RM 2.0

Below RM 7.0 downstream to head of tide the channel has been, and continues to be, highly dynamic. For example, the thalweg has shifted laterally, gravel bars have changed location and there is wider variation in bar heights than in the reaches up and downstream. Most of the bank stabilization work performed during the past 25 years has occurred in this reach in response to channel migration and bar formation. Field investigation suggests that failures of bank stabilization works are primarily due to inadequate design and/or implementation rather than system-wide degradation. The low flow channel is much wider and shallower than in the upstream reach, as clearly shown on the aerial photos, with the widest, shallowest section occurring in the region of RM 6.0 to RM 4.0. Lateral instability in this reach is exacerbated by anthropogenic, instream activity. Experience shows that actions that disturb the gravel armor and lower bar elevations may result in accelerated sedimentation and reductions in pool depths. Within this context, recent gravel deposition is evident from a buried soil surface on Freeman Bar at RM 6.0. However, despite the high level of lateral shifting and bar change, the presence

of intact remnant bridge piers at RM 6.5 indicate that adjustments to the bed elevation around this location have been minimal. This interpretation is based on the assumption that the bridge was not a major stream crossing, but rather was used to access the gravel bar on the north side of the river during low flows. Since the bridge was probably constructed for limited access, it is inferred that the bridge piers were not driven to great depths in the channel bed. Additionally, remnant bridge decking was apparent only a few feet above the water surface elevation.

It may be concluded that channel adjustments in this reach during the past 40 years have been predominantly in the lateral rather than vertical dimension.

RM 2.0 to RM 0

The tidal reach of the Chetco River appears to have deepened slightly over the past 20 years based on review of current and historical aerial photos that reveal a decrease in the elevation of intertidal bar forms. The probable cause of channel deepening is a combination of navigational dredging, interruption of littoral-derived sediments, and gravel extraction. This interpretation is corroborated by five cross-sections surveyed by the COE, DSL, and Tidewater Contractors for 1939, 1976, and 2007, respectively.

SUMMARY:

Based on the available data and field reconnaissance, the fluvial course between RM 11.0 and RM 2.0 of the Chetco River appears to be in dynamic equilibrium, while the tidal reach downstream of RM 2.0 has deepened in response to sediment removal. Depending upon the stream reach and the time period considered, there are indications of both slight aggradation and degradation in the fluvial reaches. Much of the channel adjustment that occurs in the lower Chetco River appears to be in the lateral dimension, as indicated by shifting bar forms and bank erosion. Annual disturbance of the bed and bar material due to gravel extraction is exacerbating the lateral instability of the channel between RM 7.0 and RM 2.0. This is because bedload in the Chetco River is transported in significant quantities during major flood events, with reworking of the deposited sediments during intervening years.

CONTACT: Janine Castro, Geomorphologist, Oregon Fish and Wildlife Office at 503-231-6179.

Chetco River: Summary of data analyses and field reconnaissance to support vertical stability determination

By: Janine Castro, Geomorphologist, USFWS, Portland, Oregon

May 25, 2007

Method Used	**Available Data**	**Notes**	**Trend**
Specific Gauge Analysis	1970 through 2007 USGS rating tables for gauge #14400000. Specific gauge analysis completed by Pete Klingeman, May 9, 2007.	Missing rating tables 28, 29, 30. Rating table adjustments show aggradation starting in 1972 continuing until a degradational phase in 1985. The channel started aggrading again in 1989 before significant degradation in 1996 with slight aggradation following, but not recovering to pre-1996 elevations. Regression through stage/discharge relationship shows degradational trend.	DE, D-
Cross-section comparison from bathymetric surveys	1939, COE; 1976, L.S. Slotta; 2007, Tidewater Contractors. All cross-sections below head of tide.	Comparison made by Robert Elayer, Tidewater. Cross-section numbers 7, 9, 10, 13, and 14 resurveyed. Elayer indicates that the 2007 cross-sections should be considered preliminary. Of the five cross-sections resurveyed, only cross-section 10 seems to have aggraded, while cross-section 9 is in equilibrium, leaving stations 7, 13, and 14 showing slight degradation. Cross-section 14 is the closest spatially to cross-section #56 listed below. Both cross-sections show slight degradation and are within an actively mined site.	DE, D-
Cross-section comparison from SCS Flood Study, Marquess & Assoc., and DSL	SCS, DSL, & MA reports 1977, 1981, 1982, 1989	Three cross-sections were resurveyed after the initial SCS survey in 1978 by Marquess & Assoc. in 1980 and then DSL (1981??). Cross-section #14 is located just downstream of the North Bank Road Bridge (RM 10.5); cross-section #48 is located just downstream of the confluence with the North Fork; and cross-section #56 is located just upstream of Morris Rock (RM 2.5). Only cross-section #56 shows signs of degradation. Lumley asserts that many of the other SCS cross-sections are not comparable due to control point issues, and further asserts that the cross-section	DE, D-

		comparison is not appropriate for determination of vertical stability.	
Cross-section comparison from South Coast mining site	South Coast Lumber 2003, 2004, and 2005. Cross-sections of the mined bar pre- and post-mining; does not include the active channel.	Post-mining recovery to same elevation 2003 through 2005 for cross-sections 0+00, 1+00, 2+00, 3+00, 4+00, 5+00, 6+00, 7+00, 8+00, 9+00, 10+00, and12+00. Cross-section 11+00 did not recover to 2003 levels in either 2004 or 2005 – it is approximately 1-foot lower in elevation.	N/A
Planform analysis at upper Tidewater site near USGS gauge	Aerial photos 1976, 1978 (IR), 1979, 1986, 1991, 1994.	The four bars downstream of the bridge show minimal change. The mined bar upstream of the bridge shows a change in the cross-over position. Bars upstream from the mined bar show no change. All bars are boundary forced due to the narrow valley width and probably have a backwater effect on the USGS gauge due to a downstream constriction (per Pete Klingeman).	DE
Planform analysis near Emily Creek	Aerial photos 1939, 1982, 1986, 1990, and 1994.	Bar form seems to be stable since the 1964 flood. Emily Creek confluence is perched and disconnected from main stem in all years.	DE
Bank stabilization	Permit requests from COE back to 1983, field investigation	16 COE permitted projects, 9 of which occur between RM 2.0 and 4.9. Field evidence of numerous unpermitted projects, but total length of stabilization has not been quantified. Much of the rock placement appears to be related to stabilization and protection of North Bank Road. Extensive riprap and groins along the lower Chetco. Most rock was end dumped and not keyed in to bed. Failures appear to result from revetment design and installation, not undermining of the structure. Bank instability is due primarily to lateral channel migration.	N/A
Riparian vegetation	Aerial photos various years, field investigation	No trend detectable. The constrained valley form results in frequent disturbance to vegetation establishment on depositional bars.	N/A

Streambed sediment patterns / depositional bars	Aerial photos 1940 to 2002, field investigation, Klingeman 2002, Lumley.	From RM 11.0 down to RM 7.0, the channel has been very stable with gravel bars in approximately the same location with channel width is maintained over time. This is supported by the Lumley and Klingeman reports. RM 7.0 downstream to RM 2.5 is dynamic and much wider and shallower than upstream. Much bank stabilization has occurred in this reach. From head of tide downstream, there appears to be a decrease in at least one substantial bar.	A-, DE
Water supply systems	Lumley report, DSL 1982 Letter, Wheeler pers. comm. 2007	City of Brookings water intake moved 2 miles upstream. This apparently was due to drought conditions and an increase in withdrawals causing brackish water to enter the system. Harbor Rural Water District concerned about decreased water level in their well.	N/A
Bridge Repair/Maintenance	Inspection records 2005 & 2006	In 2005 structure was listed as in "acceptable condition". In 2006 the underwater inspection found no piers exposed and no maintenance required. Maximum depth = 9 feet	DE
Bridge Piers	Field investigation	Bridge piers located at RM 6.5, approximately 2 to 3-feet exposed above water surface at 650 cfs. Some decking still in place	DE
Bedload Transport vs. Extraction	Ogden Beeman Report, 1981, & Lumley Report	Bedload transport calculation using the Einstein equation resulted in a theoretical potential of 372,000 cy/yr average transport (this assumes no limit of source material). The highest estimate is 840,000 cy for 1974, and the low estimate is 22,000 cy for 1977. Permitted extraction as of 2005 was 235,000 cy/yr. Permitted extraction from 1976 to 1980 exceeded 3.5 million cy/yr, although DSL reports only 240,000 cy were actually removed in 1980.	D or A, depending on year

Changes in navigability	Klingeman reports – affidavit and hydrologic/hydraulic/morphologic analyses, 1993	According to Pete Klingeman, "it is my opinion that the Chetco River could have supported the same uses in 1859 as it is capable of supporting today."	DE
Floodplain elevation & bar elevation	Field investigation estimating bar height relative to water surface elevation	Bar heights ranged from 5 to 12 feet in elevation above the water surface (all bar heights relative to the water surface elevation during the field investigation). Bar height is directly related to floodplain extent and channel constriction. Constrained reaches, such as RM 11.0 to RM 7.0, have relatively high bars (10 to 12 feet), while unconstrained reaches downstream of RM 7.0 generally have lower bars (5 to 8 feet). The lowest bars encountered were located at Freeman Bar and measured approximately 4 to 5 feet in height. Several comparisons of bar height to floodplain height showed coupling of these elevations with the floodplain being only one to two feet above fully developed bar formations.	DE
Buried soil horizons	Field investigation	A soil horizon buried by a reent deposit of gravel and sand was observed at Freeman Bar on the left bank.	A-, DE
Tributary junctions with the mainstem Chetco	Field investigation	During the field investigation, tributary junctions were inspected for evidence of incision or aggradation. All tributaries encountered (Emily Creek, Dry Creek, Mill Creek, North Fork Jack's Creek, and Joe Hall Creek, plus several smaller tributaries) had moderate to abundant sediment deposited as fans into the main channel. The larger tributary fans (Emily and North Fork) projected into the main channel and affected the thalweg location, while the smaller fans were scoured to a steep face in alignment with the main channel. No headcuts were evident in the tributaries.	A

Bed material sorting and armoring	Field investigation	Most depositional bars were slightly armored but showed no signs of significant imbrication. Sediment size was heterogeneous from sand to cobble. The channel bed where visible was a mix of sizes with limited patchiness, and with sand over gravel in many locations.	DE, A-

* A = aggrading, D = degrading, DE = dynamic equilibrium (-/+ indicate limited (-) or excessive (+))

CHETCO RIVER SOURCE DATA:

REVIEWED FOR DETERMINATION OF VERTICAL STABILITY

Janine Castro, Geomorphologist, US Fish and Wildlife Service, May 31, 2007

CORRESPONDANCE

From: DSL – Stanley Hamilton
To: Curry County Board of Commissioners
Date: February 5, 1982
Subject: Chetco River Resource Management (note in pencil indicates that this letter was never sent)

From: City of Brookings – Richard Ullian
To: DSL – Bill Parks
Date: February 16, 1988
Subject: Revised application for gravel removal on Chetco River – Permit Nos. RP 4077 and RP 3375

From: Tidewater Contractors – Robert Elayer
To: Corps of Engineers – Lisa Grudzinski
Date: June 26, 2006
Subject: pictures of sediment from Yaquina Dredge

From: Corps of Engineers – Sheryl Carrubba (e-mail)
To: NMFS – Chuck Wheeler
Date: July 21 and July 24, 2006
Subject: Clarification and response to Tidewater pictures form Yaquina dredging operation

From: FWS
To: Corps of Engineers
Date: November 20, 2006
Subject: Freeman Rock Cease and Desist Order

From: McBain and Trush
To: Freeman Rock – Bill Yokum
Date: January 12, 2007

From: NMFS – Bob Lohn
To: Freeman Rock Inc. – Bill Yokum
Date: March 2, 2007
Subject: Sediment study scope of work

From: NMFS
To: Corps of Engineers
Date: March 7, 2006
Subject: Draft Biological Opinion, Tidewater

From: Freeman Rock – Ted Freeman
To: Corps of Engineers
Date: April 10, 2007
Subject: Response to Corps add info letter

From: Tidewater Contractors, Inc. – Robert Elayer
To: NMFS – Chuck Wheeler
Date: May 3, 2006

Subject: Aggrading/degrading interpretation in the BO

From: Tidewater Contractors, Inc. – Robert Elayer
To: NMFS – Chuck Wheeler
Date: May 25, 2006
Subject: Aggrading/degrading interpretation in the BO

From: NMFS – Chuck Wheeler
To: Brian Cluer, NMFS, & Janine Castro, FWS
Date: May/June, 2006
Subject: Chetco River data including aerial photos and draft BO

FIELD INVESTIGATION

May 23, 2007. Field investigation with Chuck Wheeler, NMFS, Brian Cluer, NMFS, Kevin Moynahan, DSL, Bob Lobdell, DSL, Robert Elayer, Tidewater Contractors, and wrap-up with Bill Yokum, Freeman Rock. Field investigation started at the Upper Tidewater site (RM 10.7) and continued downstream to the boat harbor.

MAPS, SURVEYS, & PHOTOS

BLM aerial photos, 1940, 1955, 1976, 1986, 1992, 1997, 2002 (various scales)

South Coast Lumber Company gravel bar surveys completed for 2003, 2004, and 2005 (12 cross-sections each year tied to a permanent vertical datum). River Mile 7.0. Surveyor – Raymond Schlack.

South Coast Lumber supplied aerial photos: 1940, 1962, 1972, 1976, 1981, 1985, 1990, 1994, 1998, 2000, 2002, 2004, 2006

Tidewater ground photos, May 3, 2006.

Tidewater photos of YAQUINA dredge material, June 2006.

Chuck Wheeler ground photos, October, 2005.

Chuck Wheeler ground photos, July 25, 2006.

Chuck Wheeler ground photos, February 1, 2007.

PERMITS

Bank stabilization permits issued from the US Army Corps of Engineers from 1983 through 2000, RM 1.0 to RM 10.0. Permit letters provided by COE, 2007.

Chetco River commercial gravel removal state permits, September 1, 2005. Total permitted extraction 235,000 cy/yr between RM 1.0 and RM 10.0.

REPORTS & DOCUMENTS

Affidavit of Dr. Peter Klingeman. 1993. Plantiff vs. Tindewater Contractors, et al. Chetco Navigability.

Chetco River Bridge Inspection Reports, 2005 and 2006 (underwater)

Hamilton, S.F. 1972. An Inventory of Filled Lands in the Chetco River. Prepared for the Advisory Committee to the State Land Board of Oregon by the Advisory Committee's Engineering Staff.

Klingeman, P.C. 1993. Chetco River field reconnaissance with Oregon Department of Justice.

Klingeman, P.C. 1993. Chetco River, Oregon: hydrologic/hydraulic/morphologic analyses of navigability. Report to Oregon Department of Justice.

Klingeman, P.C. 2002. DRAFT Willow bar reconnaissance and evaluation, Chetco River, based on field visit on Thursday, July 25, 2002, and prior site visits.

Lumley, P.E. No date. Chetco River: problematical analysis of the gravel resource. Report to DSL, Waterways Section.

Marquess and Associates, Inc. 1980. Report to Harbor Rural Water District, Harbor, Oregon.

Ogden Beeman & Associates. 1981. River Engineering Analysis Chetco River.

Soil Conservation Service. 1979. Flood hazard study, Chetco River, Curry County, Oregon. Prepared by the USDA soil Conservation Service in cooperation with Curry County, Curry County Soil and Water Conservation District, and the State Water Resources Department.

From: Chuck Wheeler
To: Linton, Judy L NWP
Subject: Re: Chetco Gravel Initiative - Phase 2
Date: Friday, August 24, 2007 8:13:07 AM

I am available the Sep 11-14 and 18-21.

I think it would be wise to queue up a discussion with the USGS ASAP. If there is any data gathering they would want to do, they will have to get out there this winter.

Chuck

Linton, Judy L NWP wrote:

Greetings to all:

When we all met back on April 25th we discussed a two-phase approach for evaluating gravel mining within the Chetco River. The first phase was using existing information to determine whether mining could occur during the 2007/08 work periods. This work is soon to be completed. Phase 2 involves looking at the broader issues surrounding gravel mining in the Chetco River system to determine whether mining can continue on a longer term basis.

The Corps of Engineers would like to set up a meeting of the Executive and Technical Team members to kick-off the Phase 2 effort. Purpose would be to talk generally about timeframes, how we will identify needs, and make sure we are all on the same page about what would be achieved by this effort (what question are we trying to answer). The specific details will be worked out at later sessions by the folks on the Tech Team.

We would like to have the meeting by mid-October. Please respond with dates that will work for you during the following periods: week of Sep 10, week of Sep 17, week of Oct 8, week of Oct 15. I'll coordinate with DSL to see if the Land Board Room is available again as that seemed to work well for our last gathering. I'll also see if teleconferencing is an option for those that may not be able to attend in person. Thanks for your assistance in this effort.

Thanks - Judy

503-808-4382

From: Linton, Judy L NWP
To: "karmen.fore@mail.house.gov"
Subject: FW: Chetco Gravel Initiative - Phase 2
Date: Tuesday, August 28, 2007 3:55:01 PM

Forwarding for your information.

-----Original Message-----
From: Linton, Judy L NWP
Sent: Tuesday, August 28, 2007 3:50 PM
To: Linton, Judy L NWP; 'Monty_Knudsen@fws.gov'; 'Janine_M_Castro@fws.gov'; 'mike.tehan@noaa.gov'; 'ken.phippen@noaa.gov'; 'Chuck Wheeler'; 'vallette.yvonne@epa.gov'; 'MOYNAHAN Kevin'; 'LOBDELL Robert'; 'CYRIL Alex'; 'Patty Snow'; 'Ronald.E.Anglin@state.or.us'; 'Jay Charland'; 'Bill Yocum'; 'tedf@wave.net'; 'relayer@twcontractors.com'; 'virgilf@socomi.com'; 'rich@ocapa.net'
Cc: Evans, Lawrence C NWP; 'PrattD@co.curry.or.us'
Subject: RE: Chetco Gravel Initiative - Phase 2

Good afternoon:

Please set aside Wednesday October 17 from 1:00 to 2:30 for our Phase 2 kick-off meeting. We will be meeting in the Land Board Room in the Department of State Lands Building, 775 Summer Street NE, Salem.

For those not able to attend the meeting in person, a teleconference line will be available. I will provide call-in details as we get closer to the meeting date.

Thanks to all for providing such quick responses to my request for dates.
Judy Linton
503-808-4382

-----Original Message-----
From: Linton, Judy L NWP
Sent: Thursday, August 23, 2007 4:21 PM
To: 'Monty_Knudsen@fws.gov'; 'Janine_M_Castro@fws.gov'; mike.tehan@noaa.gov; ken.phippen@noaa.gov; Chuck Wheeler; vallette.yvonne@epa.gov; 'MOYNAHAN Kevin'; 'LOBDELL Robert'; 'CYRIL Alex'; 'Patty Snow'; 'Ronald.E.Anglin@state.or.us'; 'Jay Charland'; 'Bill Yocum'; 'tedf@wave.net'; 'relayer@twcontractors.com'; 'virgilf@socomi.com'; 'rich@ocapa.net'
Cc: Evans, Lawrence C NWP; Linton, Judy L NWP
Subject: Chetco Gravel Initiative - Phase 2

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Thanks - Judy
503-808-4382

From:	Linton, Judy L NWP
To:	Linton, Judy L NWP; "Monty_Knudsen@fws.gov"; "Janine_M_Castro@fws.gov"; "mike.tehan@noaa.gov"; "ken.phippen@noaa.gov"; "Chuck Wheeler"; "vallette.yvonne@epa.gov"; "MOYNAHAN Kevin"; "LOBDELL Robert"; "CYRIL Alex"; "Patty Snow"; "Ronald.E.Anglin@state.or.us"; "Jay Charland"; "Bill Yocum"; "tedf@wave.net"; "relayer@twcontractors.com"; "virgilf@socomi.com"; "rich@ocapa.net"
Cc:	Evans, Lawrence C NWP; "PrattD@co.curry.or.us"
Subject:	RE: Chetco Gravel Initiative - Phase 2
Date:	Tuesday, August 28, 2007 3:50:23 PM

Good afternoon:

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503-808-4382

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From: Linton, Judy L NWP
Sent: Thursday, August 23, 2007 4:21 PM
To: 'Monty_Knudsen@fws.gov'; 'Janine_M_Castro@fws.gov'; mike.tehan@noaa.gov; ken.phippen@noaa.gov; Chuck Wheeler; vallette.yvonne@epa.gov; 'MOYNAHAN Kevin'; 'LOBDELL Robert'; 'CYRIL Alex'; 'Patty Snow'; 'Ronald.E.Anglin@state.or.us'; 'Jay Charland'; 'Bill Yocum'; 'tedf@wave.net'; 'relayer@twcontractors.com'; 'virgilf@socomi.com'; 'rich@ocapa.net'
Cc: Evans, Lawrence C NWP; Linton, Judy L NWP
Subject: Chetco Gravel Initiative - Phase 2

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Thanks - Judy
503-808-4382

From: Linton, Judy L NWP
To: "Terri_moffett@gsmith.senate.gov"
Subject: FW: Chetco Gravel Initiative - Phase 2
Date: Tuesday, August 28, 2007 3:54:10 PM

Forwarding for your information.

-----Original Message-----
From: Linton, Judy L NWP
Sent: Tuesday, August 28, 2007 3:50 PM
To: Linton, Judy L NWP; 'Monty_Knudsen@fws.gov'; 'Janine_M_Castro@fws.gov'; 'mike.tehan@noaa.gov'; 'ken.phippen@noaa.gov'; 'Chuck Wheeler'; 'vallette.yvonne@epa.gov'; 'MOYNAHAN Kevin'; 'LOBDELL Robert'; 'CYRIL Alex'; 'Patty Snow'; 'Ronald.E.Anglin@state.or.us'; 'Jay Charland'; 'Bill Yocum'; 'tedf@wave.net'; 'relayer@twcontractors.com'; 'virgilf@socomi.com'; 'rich@ocapa.net'
Cc: Evans, Lawrence C NWP; 'PrattD@co.curry.or.us'
Subject: RE: Chetco Gravel Initiative - Phase 2

Good afternoon:

Please set aside Wednesday October 17 from 1:00 to 2:30 for our Phase 2 kick-off meeting. We will be meeting in the Land Board Room in the Department of State Lands Building, 775 Summer Street NE, Salem.

For those not able to attend the meeting in person, a teleconference line will be available. I will provide call-in details as we get closer to the meeting date.

Thanks to all for providing such quick responses to my request for dates.
Judy Linton
503-808-4382

-----Original Message-----
From: Linton, Judy L NWP
Sent: Thursday, August 23, 2007 4:21 PM
To: 'Monty_Knudsen@fws.gov'; 'Janine_M_Castro@fws.gov'; mike.tehan@noaa.gov; ken.phippen@noaa.gov; Chuck Wheeler; vallette.yvonne@epa.gov; 'MOYNAHAN Kevin'; 'LOBDELL Robert'; 'CYRIL Alex'; 'Patty Snow'; 'Ronald.E.Anglin@state.or.us'; 'Jay Charland'; 'Bill Yocum'; 'tedf@wave.net'; 'relayer@twcontractors.com'; 'virgilf@socomi.com'; 'rich@ocapa.net'
Cc: Evans, Lawrence C NWP; Linton, Judy L NWP
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Thanks - Judy
503-808-4382

From: McCarthy, Molly (Wyden)
To: Linton, Judy L NWP
Subject: RE: Chetco Gravel Initiative - Phase 2
Date: Wednesday, August 29, 2007 1:31:23 PM

Great - thank you Judy. I'll need to conf. call into the meeting.

Talk with you soon. -Molly

****

-----Original Message-----
From: Linton, Judy L NWP [mailto:Judy.L.Linton@usace.army.mil]
Sent: Tuesday, August 28, 2007 3:54 PM
To: McCarthy, Molly (Wyden)
Subject: FW: Chetco Gravel Initiative - Phase 2

Forwarding for your information.

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From: Linton, Judy L NWP
Sent: Tuesday, August 28, 2007 3:50 PM
To: Linton, Judy L NWP; 'Monty_Knudsen@fws.gov';
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Thanks - Judy
503-808-4382

From: Linton, Judy L NWP
To: "e.frank.schnitzer@mlrr.oregongeology.com"
Subject: Chetco River gravel mining
Date: Thursday, September 20, 2007 1:49:34 PM

Good afternoon, Frank. This is a follow-up to my voice mail message regarding gravel mining, specifically the Chetco River at this point. A group of made up of the state and federal agencies and gravel industry has been working since April 2007 to determine if mining could occur in the Chetco River this year. That effort was completed with the issuance of state and federal permits in August as you may know. We are now moving forward with a longer term effort to determine if mining can continue beyond the scope of those permits. A meeting has been set up for October 17 as a kick-off for that study. I have included more of the specifics below. I would like to invite DOGAMI to participate in that meeting if possible. If not, there will be other opportunities to provide input.

I am in the office tomorrow (Friday 9/21) and Monday (9/24) in the morning but out the rest of the week of the 24th. I can be reached via this email or at 503-808-4382. I look forward to speaking with you. Judy

Meeting specifics: Wednesday October 17 from 1:00 to 2:30 in the Land Board Room, Department of State Lands Building, 775 Summer Street NE, Salem.
For those not able to attend the meeting in person, a teleconference line will be available. I will provide call-in details as we get closer to the meeting date.

Purpose of the meeting is to discuss Phase 2 study efforts. Phase 2 involves looking at the broader issues surrounding gravel mining in the Chetco River system to determine whether mining can continue on a longer term basis. We will talk generally about timeframes, how we will identify informational needs, and make sure we are all on the same page about what would be achieved by this effort (what question are we trying to answer). The specific details (i.e. exactly what information is needed beyond existing data) will be worked out at later sessions by the folks on the Tech Team.

From:	Linton, Judy L NWP
To:	"Monty_Knudsen@fws.gov"; "mike.tehan@noaa.gov"; Evans, Lawrence C NWP; Yvonne Vallette; "Jay Charland"; MOYNAHAN Kevin; PUENT Sally; "Ronald.E.Anglin@state.or.us"; "rich@ocapa.net"; "PrattD@co.curry.or.us"; "McCarthy, Molly (Wyden)"; "Terri_moffett@gsmith.senate.gov"; "karmen.fore@mail.house.gov"; "tedf@wave.net"; "Robert Elayer"; "virgilf@socomi.com"
Cc:	"Janine_M_Castro@fws.gov"; "Chuck Wheeler"; "ken.phippen@noaa.gov"; Linton, Judy L NWP; "LOBDELL Robert"; "MORALES Michael"; CYRIL Alex; Patty Snow; CONFER Todd A; "e.frank.schnitzer@mlrr.oregongeology.com"; "Jim O"Connor"; "Bill Yocum"
Subject:	Chetco Gravel Initiative - Phase 2 kick-off mtg Oct 17
Date:	Thursday, October 11, 2007 11:46:02 AM
Attachments:	Chetco River Phase 2 Study Meeting agenda17oct07.doc

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Greetings: this is a reminder of our meeting on October 17 at the Department of State Lands offices (775 Summer Street NE, Salem) in the Land Board Room to kick-off the Phase 2 study efforts for the Chetco River gravel initiative. Meeting time is 1:00 to 2:30. I am still tracking down the teleconference number and will send out a separate message once I have it.

Again, the purpose of the meeting is to talk generally about timeframes, how we will identify needs, and make sure we are all on the same page about what would be achieved by this effort (what question are we trying to answer). The specific details will be worked out at later sessions by the folks on the Tech Team. I have attached an agenda which identifies some discussion points. We can add to these points as time allows.

I look forward to seeing you on Wednesday. Judy Linton (503-808-4382)

Chetco River Phase 2 Study Meeting
October 17, 2007
DSL – Land Board Room, 1:00 - 2:30

INTRODUCTIONS AND OPENING REMARKS:

DISCUSSION POINTS:

- Phase 2 study question and follow-up action: Can mining continue in the Chetco River system beyond current permit authorizations?
    - If yes, work towards development of General Permits (COE/DSL) to include ESA coverage for minimal impact mining.
        - Proposals not within General Permit parameters would require individual review.
    - If no, prepare detailed issues paper outlining reasons for that determination.

- Informational needs:
    - What information do we need beyond existing data and how do we get it?
        - Sediment budget analysis
    - Data collection needs different for estuary segment?
    - Do the monitoring requirements of the current permits help get us what we need for area above estuary?

- Action Items and Proposed Timeline:
    - Complete information/data gathering and answer study question – August 2008.
    - If mining can proceed, develop and implement General permit – goal March 2009 (prior to 2009 work season).

- Next steps in Phase 2 study:
    - Schedule meeting of Technical Team.
    - Integration of efforts statewide – gravel tech team, CHERT process as model, etc.
    - Other items?

- Beyond the Chetco:
    - Where do we go from here?
    - Applying what we have learned in the Chetco system.

From:	McCarthy, Molly (Wyden)
To:	Linton, Judy L NWP; Monty_Knudsen@fws.gov; mike.tehan@noaa.gov; Evans, Lawrence C NWP; Yvonne Vallette; Jay Charland; MOYNAHAN Kevin; PUENT Sally; Ronald.E.Anglin@state.or.us; rich@ocapa.net; PrattD@co.curry.or.us; Moffett, Terri (Gordon Smith); karmen.fore@mail.house.gov; tedf@wave.net; virgilf@socomi.com
Cc:	Janine_M_Castro@fws.gov; Chuck Wheeler; ken.phippen@noaa.gov; Patty Snow; CONFER Todd A; LOBDELL Robert; CYRIL Alex; MORALES Michael; e.frank.schnitzer@mlrr.oregongeology.com; Jim O"Connor; Bill Yocum
Subject:	RE: Gravel meeting - teleconference line
Date:	Wednesday, October 17, 2007 2:52:02 PM

Hi all – after a morning of no power or phones, I was able to get into the call around 1:30. I heard that Terri from Sen. Smith's office was there, but I couldn't get my headset to work in time to let folks know we were listening also. Although it was tough to hear everyone, I was glad to be included. Please let me know what we can do to be helpful as you go forward in talking with the gravel tech team and setting up a policy meeting for November.

Thanks again! -Molly
****

Molly McCarthy Skundrick
Office of US Senator Ron Wyden
310 W 6th Street, Medford, Oregon
541-858-5122
molly_skundrick@wyden.senate.gov

-----Original Message-----
From: Linton, Judy L NWP [mailto:Judy.L.Linton@usace.army.mil]
Sent: Friday, October 12, 2007 8:49 AM
To: Monty_Knudsen@fws.gov; mike.tehan@noaa.gov; Evans, Lawrence C NWP; Yvonne Vallette; Jay Charland; MOYNAHAN Kevin; PUENT Sally; Ronald.E.Anglin@state.or.us; rich@ocapa.net; PrattD@co.curry.or.us; McCarthy, Molly (Wyden); Moffett, Terri (Gordon Smith); karmen.fore@mail.house.gov; tedf@wave.net; virgilf@socomi.com
Cc: Janine_M_Castro@fws.gov; Chuck Wheeler; ken.phippen@noaa.gov; Patty Snow; CONFER Todd A; LOBDELL Robert; CYRIL Alex; MORALES Michael; e.frank.schnitzer@mlrr.oregongeology.com; Jim O'Connor; Bill Yocum
Subject: Gravel meeting - teleconference line

The teleconference number for the October 17 gravel meeting is 503-945-8963. The conference line is currently set up to accept five people calling in. Right now I know of two that will be calling in (Larry Evans and Molly McCarthy). If you plan to call in please let me know so I can make sure we have enough coverage. Thanks - Judy

From: MOYNAHAN Kevin
To: Evans, Lawrence C NWP
Subject: RE: Contact info - USGS
Date: Monday, October 22, 2007 8:23:55 AM

Larry - concertinaing the exec team membership - how do you recall that shaking out? Myself, you, Kemper/Monte, Mike Tehan, DEQ, OCAPA, rep from Associated Oregon Counties???

-----Original Message-----
From: Evans, Lawrence C NWP [mailto:Lawrence.C.Evans@usace.army.mil]
Sent: Monday, October 22, 2007 7:44 AM
To: Monty_Knudsen@fws.gov; MOYNAHAN Kevin
Cc: Linton, Judy L NWP
Subject: RE: Contact info - USGS

Thank you Monty -

From where I sit I see a need to:

1) Confirm who the agency representatives are on the tech team. I understand there was a previous group of individuals who had done work earlier on gravel issues in Oregon rivers but it is my understanding this was more of an "ad hoc' group, and not a committee officially established by either State or Federal agencies. It is my hope we will only have the one "official" tech team with approved representation as we proceed with this strategic effort.

2) Confirm who each agency representative is for the Executive Committee. It is my jope/expectation that these individuals will have the authority to represent their agency missions and make decisions without a need to go back and get approval from higher up. I see one of the primary roles of this Executive Committee is to ensure actions being worked by the Tech Team move forward without delay. I also expect this Committee to step in when there may be disagreement among the members of the Tech Team, and action by agency leadership would be helpful.

Judy briefed me on last week's meeting, and I wanted to thank you again for the support you and Janine have provided. IT appears the effort to complete the Chetco River study will be critical, and I have tasked Judy with making sure we move forward without delay due to the congressional interest we continue to have with this action. Can you reply to this email and let me know who will be the USFWS POC for this effort? Will it be Janine as the tech committee rep?

Thanks again

Larry

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From: Monty_Knudsen@fws.gov [mailto:Monty_Knudsen@fws.gov]
Sent: Wednesday, October 17, 2007 3:58 PM
To: MOYNAHAN Kevin
Cc: Janine_M_Castro@fws.gov; Evans, Lawrence C NWP; Linton, Judy L NWP
Subject: Re: Contact info - USGS

Thanks Kevin. I have already sent Janine a note indicating that she should
convene the Tech Team ASAP and by copying her on this note she will get the
contact information for the USGS people. I also think she knows how to get
in touch with Rich Angstrom.

Also, I want to be sure that folks don't somehow get the idea that Janine
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too many other projects that she is needed on that are priorities for us
and most of them involve on-the ground restoration for fish and wildlife
habitats.

I hope you understand.

Cheers!

Monty Knudsen, Assistant Project Leader
Oregon Fish & Wildlife Office
2600 S.E. 98th Avenue
Portland, OR 97266-1398
503.231.6179
Website: http://www.fws.gov/oregonfwo/

"MOYNAHAN Kevin"

<Kevin.Moynahan@s

tate.or.us>

To

<Monty_Knudsen@fws.gov>

10/17/2007 03:19

cc

PM

Subject

Contact info - USGS

Monty - here are the two individuals at the meeting today:

Glen Hess gwhess@usgs.gov 503 251-3236; Jim O'Conner oconner@usgs.gov
503
251-3222

Sorry for the poor sound today!

Kevin

Kevin Moynahan
Assistant Director
Department of State Lands
Wetlands and Waterways Conservation Division
775 Summer St. NE, Suite 100
Salem, OR 97301
phone: 503-986-5259
fax: 503-378-4844
e-mail: kevin.moynahan@state.or.us

From: Monty_Knudsen@fws.gov
To: Evans, Lawrence C NWP
Cc: Linton, Judy L NWP; MOYNAHAN Kevin; Joe_Zisa@fws.gov; Janine_M_Castro@fws.gov; Kemper_McMaster@fws.gov
Subject: RE: Contact info - USGS
Date: Tuesday, October 23, 2007 11:29:48 AM

Thanks Larry, at this time I will be the Service Representative to the Executive team with Joe Zisa as my backup. Janine will be our person for the Technical Team. There is also a possibility that we may also have someone from our Vancouver Fisheries Resource Office attend the Technical Team with Janine since they have extensive fish habitat modeling capability with regard to things like gravel mining in streams and the effects on fish habitats. We are in discussions with them right now.

Monty Knudsen, Assistant Project Leader
Oregon Fish & Wildlife Office
2600 S.E. 98th Avenue
Portland, OR 97266-1398
503.231.6179
Website: http://www.fws.gov/oregonfwo/

"Evans, Lawrence C NWP" <Lawrence.C.Evans@usace.army.mil>
10/22/2007 07:44 AM

To
<Monty_Knudsen@fws.gov>, "MOYNAHAN Kevin" <Kevin.Moynahan@state.or.us>

cc
"Linton, Judy L NWP" <Judy.L.Linton@usace.army.mil>

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Salem, OR 97301
phone: 503-986-5259
fax: 503-378-4844
e-mail: kevin.moynahan@state.or.us

From:	Janine_M_Castro@fws.gov
To:	Anne.Mullan@noaa.gov; chuck.wheeler@noaa.gov; Janine_M_Castro@fws.gov; Joe_Zisa@fws.gov; marc.liverman@noaa.gov; Patty.Snow@state.or.us; Rob_Burns@fws.gov; jim.d.brick@state.or.us; robert.c.anderson@noaa.gov; Craig_Tuss@fws.gov; Monty_Knudsen@fws.gov; Eric.Metz@dsl.state.or.us; michael.morales@dsl.state.or.us; CYRIL alex; Greg_M_Smith@fws.gov; john_l_marshall@fws.gov; Linton, Judy L NWP; Bob.Lobdell@state.or.us
Subject:	Next Gravel Tech Team Meeting
Date:	Thursday, October 25, 2007 3:02:23 PM
Attachments:	CHETCO RIVER GRAVEL REMOVAL_Phase 2 mtg notes (ac).doc

---

Good afternoon,

The next (and last) meeting of the "historic" Gravel Technical Team will be held from 10:00 am until noon on Tuesday, November 20th, at the FWS office in Portland.

As many of you know, agency managers met last week to discuss the Phase II study efforts on the Chetco River (minutes attached). During this meeting they agreed that the Tech Team should continue with slightly different representation from the agencies, and that the team would also include representation from industry and the broader public.

Judy Linton is working on convening the first meeting of this modified Tech Team -- ideally, this meeting will be held on the afternoon of November 20th following our morning meeting. The other date under consideration is Thursday, November 29th.

The members of the new Technical Team are not completely confirmed, but we do know that the following individuals will be representing their respective agencies on the new team:

Chuck Wheeler, NMFS
Patty Snow, ODFW
Alex Cyril, DEQ
Judy Linton, COE
Bob Lobdell, DSL
Janine Castro, FWS

During the morning meeting my goal is to summarize updates to the sediment recommendations document based on recommendations from the IMST and address any unfinished business that has accumulated over the years.

Thank you to everyone who has been participating in this group for so many years.

I'll see you in November!

Janine

Janine M. Castro, PhD, RG
Geomorphologist

"There's no more to-day than
there was a thousand years ago --
You can't wear water out."
D.H. Lawrence

US Fish and Wildlife Service
2600 SE 98th Ave., Suite 100
Portland, OR 97266
(See attached file: CHETCO RIVER GRAVEL REMOVAL_Phase 2 mtg notes (ac).doc)

CHETCO RIVER GRAVEL REMOVAL
PHASE 2 KICK-OFF MEETING
DSL LAND BOARD ROOM
OCTOBER 17, 2007 (1:00 – 2:30)

ATTENDEES:
Monty Knudsen (by phone), U.S. Fish and Wildlife Service
Michael Tehan, NMFS – Portland Office
Ken Phippen, NMFS – Roseburg Office
Chuck Wheeler, NMFS – Roseburg Office
Larry Evans (by phone), Corps of Engineers, Portland
Judy Linton, Corps of Engineers, Portland
Teena Monical, Corps of Engineers, Eugene Field Office
Yvonne Vallette, Environmental Protection Agency
Jim O'Connor, USGS
Glenn Hess, USGS
Louise Solliday, Department of State Lands
Kevin Moynahan, Department of State Lands
Bob Lobdell, Department of State Lands
Sally Puent, Department of Environmental Quality
Alex Cyril, Department of Environmental Quality
Patty Snow (by phone), Department of Fish and Wildlife, Salem Hdqtrs
Todd Confer, Department of Fish and Wildlife, Gold Beach Field Office
Jay Charland, Department of Land Conservation and Development
Bill Yocum, Freeman Rock
Robert Elayer, Tidewater Contractors
Joy Smith, Umpqua Sand & Gravel
Kelly Guido, Umpqua Sand & Gravel
Chris Doane, LTM
Rich Angstrom, OCAPA
David Pratt, Curry County
Jodi Fritts, Curry County
Molly McCarthy (by phone), Senator Wyden's Office
Terri Moffett, Senator Smith's Office

INTRODUCTIONS AND OPENING REMARKS:

The meeting started off with introductions and opening remarks. Larry Evans indicated the Corps of Engineers is very committed to continuing the collaboration with all partners in the issues surrounding gravel removal, not only as they apply to the Chetco River but as the study moves to other watersheds. If studies determine mining can continue in the Chetco River, the Corps will work towards the development of a regional general permit which would be used as a template for other systems. Larry indicated the Corps would look to the gravel industry to identify the next river system to be studied.

Kevin Moynahan echoed Larry's comments and added that evaluating the gravel issue is especially important given that some permits authorized by DSL now require federal permits which in turn trigger other review requirements (such as the endangered species act and water quality certification).

Rich Angstrom spoke in support of continuing the executive and technical teams as was discussed in the April 25, 2007 meeting. Rich stated the gravel industry would like the Umpqua River system to be evaluated next.

DISCUSSION POINTS:

Judy Linton started the discussion by stating the question we are trying to answer is whether mining can continue in the Chetco River beyond current permit authorizations. The term "current permit authorizations" refers to the permits issued in August 2007, to Freeman Rock and Tidewater for mining above the estuary (DSL permits year to year, Corps permits and 401 certifications and BOs expire in 2009). If mining can continue beyond 2009, work will then focus on trying to develop a general permit. If it is determined mining cannot continue, the reasons for coming to that conclusion will need to be spelled out in detail as the Corps will use that information in making future decisions on requests for Department of the Army permits for gravel removal. Such decisions could include permit denials.

Robert Elayer asked if the study will include the estuary as Tidewater was not given a permit to mine their estuary site. It was concluded the study areas (RM 11 to the mouth within the estuary) used in evaluating the Chetco River permit requests will also apply to this Phase 2 effort as there are no operators above the upper Tidewater site. The NMFS representatives all agreed the entire system needs to be looked at as a whole (estuary and upper reaches). We need to take into account all dredging occurring in the watershed, including work being done by the Corps of Engineers and the Port and marinas. For Phase 2 it is important to get the study design and data collection started so we don't miss the 2007/08 winter season.

USGS is interested in participating to the extent possible, but will need to know what information is necessary before determining the agency resources (including time and cost) required. Joy Smith indicated Umpqua Sand and Gravel has gathered much information over the years they have been mining which might be useful to the gravel study efforts; other operators may also be in the same position. Kevin Moynahan offered DSL as a repository for this data. One of the charges to USGS will be to act as a neutral party to interpret existing industry and agency data usefulness and determine what other data will be necessary as well as how to use it all.

Much discussion followed on the make-up of the Executive/Policy and Technical Teams. Questions were raised about who will lead each group and what the charge of each group will be. There needs to be a purpose and need statement for each team as well as a process for communication between the teams. For the gravel industry, Rich Angstrom asked that he plus one industry representative (Joy Smith) be on the Executive Team. For the Technical Team, Rich asked to have Chris Lidstone (consultant contracted by OCAPA) plus one industry rep (Bill Yokum or Robert Elayer). One issue for the Executive Team to discuss will be potential funding for the data collection (USGS work, etc.) and possibly other portions of Phase 2. We talked about how to pull in the counties in response to Curry County's request to wrap their permit process into the state and federal processes– perhaps the Association of Oregon Counties should be at the table. A suggestion was also made that we rotate county representation on the teams depending on the river system being studied. The Technical Team will largely be composed of agency reps who have been working together to draft the Sediment Removal Recommendations paper and now are charged with integrating the IMST review recommendations. Funding and workload issues will need to be discussed for those agency reps to continue working and take on this new charge.

We had a brief discussion about floodplain mining and whether this should be included in the overall evaluation. DOGAMI would be a key player in that discussion. Kevin will contact Gary Lynch to discuss DOGAMI's participation in the Phase 2 effort.

Timelines: The timelines for the action items listed on the agenda are proposed, based on the need to have some decision and product prior to the expiration of authorizations issued to Freeman and Tidewater above the estuary. *Note: If it is determined mining can continue, the focus will be on having no lapse in authorizations to remove gravel; therefore, the end dates of the Corps/DSL permits, 401 certification, and ESA BiOp will drive the date the decision and final product is required.* DEQ and NMFS are concerned we will not have enough time and information from the required monitoring for the existing permits to allow us to make decisions according to the proposed timelines. USGS believes we will not be able to have much information beyond existing with only one season to collection data. Generally more than one season is needed. This enforces need for Technical Team to meet as soon as possible to determine what information needs to be collected.

We concluded by discussing the possibility of using other groups to assist in the study efforts:

- Oregon State University Gravel Symposium: Guillermo Giannico (Associate Professor in the Department of Fish and Wildlife) sent an email in early summer asking about interest in putting together another gravel symposium. It appears this may not be possible until March 2008 given other work.
- Oregon Solutions Group: they may be able to help most with facilitation of meetings and figuring out allocation among users. Corps and DSL need to determine if that is worthwhile.
- Portland State University Conflict Resolution Group: Mike Tehan was approached by this group. We may not be at a stage where we need there efforts now, but they may be beneficial in the future if decisions focus on how to allocate gravel resources.

FOLLOW-UP ACTION ITEMS:

1. Schedule meeting of gravel technical team: Monty Knudsen offered to have Janine Castro take the lead.
2. Schedule meeting of Executive Team: Kevin Moynahan will take the lead with the goal of having a meeting the first part of November.
3. Kevin Moynahan will contact Association of Oregon Counties and DOGAMI to inquire about a representative from each participating in teams.
4. Umpqua system data information: Joy Smith will provide a summary of existing information to Kevin Moynahan.
5. Rich Angstrom requested minutes to memorialize this and all subsequent meetings of both teams.

From:	Linton, Judy L NWP
To:	"Janine_M_Castro@fws.gov"; Monty_Knudsen@fws.gov
Cc:	Craig_Tuss@fws.gov; Joe_Zisa@fws.gov; kevin.moynahan@state.or.us; Evans, Lawrence C NWP; Mike Tehan; Rob_Burns@fws.gov
Subject:	RE: FW: Next Gravel Meeting
Date:	Thursday, October 25, 2007 8:13:34 AM

Janine and all: I am most happy to assist in this effort and will put together a list as suggested and send to Janine this morning (with copy to the Exec Team folks so you all can make immediate adjustments if necessary). Judy

-----Original Message-----
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Sent: Wednesday, October 24, 2007 4:23 PM
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I will also need some assistance on the agenda since I was not at the last gravel meeting and I am not completely clear on the meeting objectives.

Sorry for the confusion.

Janine

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bcc
Subject   Re: FW: Next Gravel Meeting
Monty Knudsen/OSO/R1/FWS/DOI

10/24/2007 03:55 PM

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Not sure why Janine included them except as FYI. As far as I know, these other FWS people have never been involved with the Tech Team, but never having been at one of the meetings I just don't know.

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503.231.6179
Website: http://www.fws.gov/oregonfwo/

"Evans, Lawrence C NWP" <Lawrence.C.Evans@usace.army.mil>
10/24/2007 02:39 PM

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cc
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Subject

FW: Next Gravel Meeting

Fellow executive committee members and esteemed colleagues:

After reading Judy's email I have some questions (or perhaps concerns). It was my understanding the technical team for the gravel study initiative would be comprised of 1 (maaaybe 2 but no more) representatives from each agency that is participating in this strategic effort. In addition, it was my understanding the technical team would include a representative from the gravel industry (and possibly local authorities and/or environmental interests). The purpose for including all interest groups was to ensure this process was transparent and to provide the industry the opportunity to participate and develop the study, not just have it presented to them after-the-fact. In addition, if I understand Judy's email correctly, the group initially identified may have multiple issues/tasks/interests in front of them. I thought we were going to have a team committed to advancing the gravel initiative, not a group that has multiple interests that may distract it.

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Thoughts?

Thank you for your immediate attention to this request.

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Subject: FW: Next Gravel Meeting

Larry: wanted to let you know the tech team meeting is being scheduled. As we discussed previously, this is largely the group that was meeting to discuss a range of issues. There are 7 USFWS representatives listed and 4 NOAA reps. Also of note is there are no gravel industry reps (unless I missed it). It may be good to have all these folks at the initial meeting (you will note one item to be discussed is the IMST changes to the Sediment Removal document), but as we continue down the Phase 2 path, many of these folks need to bow out. But I think that needs to come from agency leadership. Has Kevin M started to schedule the Executive team meeting?

On a related matter...I will have sitrep bullets later this afternoon.

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Subject: Next Gravel Meeting

Good morning,

I have been charged with setting up the next Gravel Tech Team meeting to discuss the Phase 2 study on the Chetco River and the IMST recommended changes to the Sediment Removal Recommendations document. We will also have a debrief regarding the Chetco meeting that occurred last week.

Please let me know if you are available for a 3 hour meeting in Portland on the following days (indicating am/pm if necessary):

November 16, 20, 27, 28, 29, 30

Thanks,
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Subject:	RE: FW: Next Gravel Meeting
Date:	Thursday, October 25, 2007 2:03:23 PM
Attachments:	Chetco River - Exec and Tech Team members.doc

Attached is the list of Executive and Technical Team members and contact information. I am still in the processing of confirming executive team members for EPA, DLCD and the county representation. In talking with Joy Smith and Bill Yocum, I understand the industry folks will be meeting in the next few weeks to discuss, among other things, who they want to have on the technical team. Both Joy and Bill suggested Robert Elayer as one member because of his technical background.

As a refresher, and to keep us on track, these are the follow-up action items from the October 17 meeting:

1. Schedule meeting of technical team: this is in progress.
2. Schedule meeting of executive team: Kevin Moynahan is lead.
3. Contact Association of Oregon Counties and DOGAMI to inquire about participation in Chetco effort: Kevin Moynahan is lead
4. Provide summary of existing data to DSL regarding the Umpqua system: Joy Smith is lead.

Let me know if questions or comments. Thanks - Judy

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October 2007

EXECUTIVE AND TECHNICAL TEAM MEMBERS
CHETCO RIVER PHASE 2 EFFORT

STATE AND FEDERAL AGENCIES

U.S. FISH AND WILDLIFE SERVICE:

- Monty Knudsen – **E** (Monty_Knudsen@fws.gov) 503-231-6179
- Joe Zisa – **E Alt** (Joe_Zisa@fws.gov)
- Janine Castro – **T** (Janine_M_Castro@fws.gov)

NATIONAL MARINE FISHERIES SERVICE:

- Michael Tehan – **E** (mike.tehan@noaa.gov) 503-231-2202
- Ken Phippen – **E Alt** (Ken.Phippen@noaa.gov) 541-957-3383
- Chuck Wheeler – **T** (Chuck.Wheeler@noaa.gov)

CORPS OF ENGINEERS:

- Larry Evans – **E** (lawrence.c.evans@usace.army.mil) 503-808-4370
- Judy Linton – **T** (judy.l.linton@usace.army.mil) 503-808-4382

ENVIRONMENTAL PROTECTION AGENCY:

-
- Yvonne Vallette – **T** (Vallette.Yvonne@epa.gov) 503-326-2716

U.S. GEOLOGICAL SURVEY

- Jim O'Connor (oconnor@usgs.gov) 503-231-3200

OREGON DEPARTMENT OF STATE LANDS:

- Kevin Moynahan – **E** (kevin.moynahan@state.or.us) 503-986-5259
- Bob Lobdell – **T** (bob.lobdell@state.or.us) 503-986-5282

OREGON DEPARTMENT OF ENVIRONMENTAL QUALITY:

- Sally Puent – **E** (PUENT.sally@deq.state.or.us) 503-229-5379
- Alex Cyril – **T** (Cyril.Alex@deq.state.or.us) 503-229-6030

OREGON DEPARTMENT OF FISH AND WILDLIFE:

- Ron Anglin - **E** (Ronald.E.Anglin@state.or.us)
- Patty Snow – **T** (Patty.Snow@state.or.us) 503-947-6089
- Todd Confer (Todd.A.Confer@state.or.us) 541-247-7605 Gold Beach Field Off

OREGON DEPARTMENT OF LAND CONSERVATION AND DEVELOPMENT:

- Bob Bailey – **E** (bob.bailey@state.or.us) 503-373-0050 x 281
- Jay Charland – **T** (jay.charland@state.or.us) 503-373-0050 x 253

OREGON DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES:

- Frank Schnitzer (e.frank.schnitzer@mlrr.oregongeology.com) 541-967-2066

GRAVEL INDUSTRY REPRESENTATIVES

- Rich Angstrom – **E** (rich@ocapa.net) 503-588-2430 ext 8
- Joy Smith – **E** (Joy@UmpquaSand.com) 541-673-1088
- Robert Elayer – **T** (relayer@twcontractors.com) 541-469-5341
- Bill Yocum – **T Alt** (byocum@hughes.net) 541-469-2444

LOCAL REPRESENTATIVES

CURRY COUNTY:

- David Pratt - **T** (PrattD@co.curry.or.us) 541-247-3284

From:	Mike Tehan
To:	Evans, Lawrence C NWP
Cc:	kevin.moynahan@state.or.us; Monty_Knudsen@fws.gov; Linton, Judy L NWP; Ken Phippen
Subject:	Re: FW: Next Gravel Meeting
Date:	Thursday, October 25, 2007 8:29:33 AM

Larry,

I agree with your summary of tasks/priorities. At the meeting we discussed the fact that the "Oregon Gravel Tech. Team" is a standing team that encompasses all of the state geographic branches with gravel issues. Depending on the issue and location, we may have folks from the Oregon Coast (Tillamook), SW Oregon (Rogue/Umpqua) or Willamette Basin participating. But there is very limited hydrogeomorphic expertise on the team (Janine) and she has helped all these folks.

So the task is for the members of the tech team associated directly in the Chetco (Chuck Wheeler for us) to focus on the tasks you laid out, and to set aside any other ongoing tasks they may have been working on in other basins, etc. Chuck is our guy for this immediate task. We may have others participate in other (now lower priority) tasks the tech team was working on.

At least that is my view..

thanks, michael

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> Please let me know if you are available for a 3 hour meeting in Portland on
> the following days (indicating am/pm if necessary):
>
> November 16, 20, 27, 28, 29, 30
>
> Thanks,
> Janine
>
> Janine M. Castro, PhD, RG
> Geomorphologist
>
> "There's no more to-day than
> there was a thousand years ago --
> You can't wear water out."
> D.H. Lawrence
>
> US Fish and Wildlife Service
> 2600 SE 98th Ave., Suite 100
> Portland, OR 97266
> 503.231.6179
>
>

From:	Bill Yocum
To:	Robert Elayer
Cc:	Crennen, Mike; chris.doan@ltminc.com; Joy Smith; TED FREEMAN, JR; Jon Barton; Linton, Judy L NWP; Janine Castro; Rich Angstrom; Jennifer Dunagan
Subject:	Fw: Conference Call with Rich
Date:	Thursday, October 25, 2007 9:44:25 AM

Hello Robert,

Like I mentioned on the phone today, I told Judy Linton (Corps) that you would be the Industry Rep. on the Chetco, Phase II Technical Team and that I would be your alternate. I also told her that the individual for the 2nd industry slot has not been confirmed and to leave it as a vacancy at this point of time. It looks like the conference call discussing the 2nd industry slot will take place on Oct. 31st. I will be heading down to Arizona this week-end and will be returning on the 12th of November. If you run into any problems, I can be reached at 541-661-4576.

Have a good day.

Bill

----- Original Message -----
From: Joy Smith <mailto:Joy@UmpquaSand.com>
To: mike.crennen@ltminc.com ; chris.doan@ltminc.com
Cc: byocum@hughes.net ; Ted Freeman, Jr. <mailto:tedf@wave.net> ; Kelly Guido <mailto:Kelly@UmpquaSand.com>
Sent: Wednesday, October 24, 2007 12:59 PM
Subject: Conference Call with Rich

Hello there,

I wanted to touch base with all of you and find out when would be a good time to talk about some of this. Mike I have left messages for you and Chris I understand you are out of the office this week.

Bill and I spoke about a couple of things that we would like to talk to Rich Angstrom regarding.

1. The issues that we are dealing with are not just effecting or concerning the "South Coast/Southern Oregon" areas, but rather have far larger implications and effect upland as well as gravel mining for the entire state.

2. Despite the knowledge Chris Lidstone has on the Umpqua Water Basin. He may not be the best person available for the technical team. He has a history with a lot of these folks that are on the technical team and while we want to be sure our interest is looked after we have to provide someone the group with deal with. Perhaps Bill Langer from USGS out of Colorado may be an alternative resource that we could hire for this position. OR...maybe there is someone else, regardless we need to think - New face...no prior history??

3. Furthermore, I feel that we would want to offer our "Scientist" as a review option for the Technical Team. Have him checking the data to make sure the best science available is being used and applied properly. But not have him out here doing the testing and studies. That would incur a lot of cost very quickly and none of us can really afford to offer up a lot of cash.

4. OCAPA paying for the scientist for the technical team…I'd like to think so…we need to talk to Rich about this. He would like to put the cost onto us (south coast and southern Oregon) but I do believe this is something the industry should be helping with. Also, I had gotten the Land of Umpqua Economic Development group to offer $5,000.00 for the White paper that we never had them put into the pot. Maybe we can pool some of these resources for this??

5. Winter Workshop (OCAPA) we would like to present some of this information to the core population of the OCAPA membership. This would be a place that we could let people know that the issues we have been dealing with are headed to the flood plain. (See my previous e-mail regarding Alex Cyril's comments and my conversation) Also to make people aware of the agencies want to see in the survey work we are all doing.

I don't know all the answers, but I know that together we can find them…what do you guys think? Should we get a call to Rich tomorrow? Or does one of us want to call him to talk about these items? Do you agree with some/all or disagree with the items above?? I'd like to get some feedback and know that we are working together to a collective goal.

Talk soon,
joy

Joy Smith

Umpqua Sand & Gravel

640 Shady Drive

Roseburg, OR 97470

Phone: 541-673-1088 Fax: 541-673-1620

Cell Phone: 541-817-7621

They may forget what you said, but they will never forget how you make them feel.

From: Linton, Judy L NWP
To: "Alex Cyril"; "Bob Lobdell"; "Chuck Wheeler"; "Frank Schnitzer"; "Janine Castro"; "Jay Charland"; "Jim O"Connor"; Linton, Judy L NWP; "Patty Snow"; "Robert Elayer"; "Yvonne Vallette"; Jodi Fritts; "Don_Anglin@fws.gov"; "gwhess@usgs.gov"; "Todd Confer"
Subject: FW: Chetco River Technical Team meeting
Date: Monday, October 29, 2007 4:21:59 PM

This is to confirm that the tech team meeting will be on November 20th from 1:00 to 3:00. The meeting will be held at the FWS office in Portland. Although it would be nice to see all of your smiling faces, some folks are a bit farther away than others...therefore a telephone line has been set up for those that need or would prefer to call in. The call in info is: Dial: 9-1-877-934-2812, Pass Code: 294348.

An agenda will be developed and sent out as we get closer to the meeting date. See you soon. Judy

-----Original Message-----
From: Linton, Judy L NWP
Sent: Friday, October 26, 2007 10:21 AM
To: 'Alex Cyril'; 'Bill Yocum'; 'Bob Lobdell'; 'Chuck Wheeler'; 'David Pratt'; 'Frank Schnitzer'; 'Janine Castro'; 'Jay Charland'; 'Jim O'Connor'; Linton, Judy L NWP; 'Patty Snow'; 'Robert Elayer'; 'Todd Confer'; 'Yvonne Vallette'; 'Don_Anglin@fws.gov'
Subject: Chetco River Technical Team meeting

Good morning:

I would like to get a date set for the first meeting of the Chetco River Technical Team and would like to propose we meet on the afternoon of Tuesday, November 20th (start time about 1:00) at the FWS office in Portland - many of you will already be attending a morning meeting at that location. If that does not work out, an alternate date would be Thursday, November 29th.

Please let me know your availability for these dates. Thanks – Judy (503)808-4382

From: David Pratt
To: Linton, Judy L NWP
Subject: RE: County reps for Executive and Technical Teams - Chetco River
Date: Tuesday, October 30, 2007 2:50:55 PM

Judy:

Thank you. It's very helpful. I will pass it on to the Board

Dave Pratt

David J. Pratt, AICP
Public Services/Planning Director
Curry County Public Services
PO Box 746
94235 Moore St
Gold Beach, OR 97444
P-541-247-3284
F-541-247-4579
prattd@co.curry.or.us

-----Original Message-----
From: Linton, Judy L NWP [mailto:Judy.L.Linton@usace.army.mil]
Sent: Tuesday, October 30, 2007 8:43 AM
To: David Pratt
Subject: FW: County reps for Executive and Technical Teams - Chetco River

David: thought I would reply to you directly and let you communicate with the board of commissioners...

Since we are just beginning this process it is hard to predict commitment for serving on these teams. However, my boss (Larry Evans) and I have discussed the concept of the Executive Team meeting quarterly with the primary purpose of getting progress updates from the tech team. Kevin Moynahan was taking the lead on setting up the first meeting of the Executive team to discuss some of the issues raised at the October 17 meeting. Frequency of meetings could be another topic.

The technical team will probably meet more frequently at least until we define a study and data collection needs. If the purpose of County planning involvement would be to ensure permit needs are considered, Jodi's participation in the technical teams could be on a "to be determined" basis and subject to agenda topics for that particular meeting. It will be good to have her at the first meeting though so we can all talk about expectations, etc. Also, we should have the ability to teleconference for most meetings so that will minimize time devoted to these meetings for those at your end of the state!

Hope that helps. Judy

-----Original Message-----
From: Georgia Nowlin [mailto:NowlinG@co.curry.or.us]
Sent: Monday, October 29, 2007 2:16 PM
To: David Pratt; Linton, Judy L NWP
Cc: !Commissioners

Subject: RE: County reps for Executive and Technical Teams - Chetco River

It is fine with me, but what is the time commitment?

Georgia

From: David Pratt
Sent: Monday, October 29, 2007 11:31 AM
To: Linton, Judy L NWP
Cc: !Commissioners
Subject: RE: County reps for Executive and Technical Teams - Chetco River

Judy:

I would like to serve on the Executive Committee and have Jodi serve on the Technical Committee, but I will have to check with my Board of Commissioners first.

Dave Pratt

From: Linton, Judy L NWP [mailto:Judy.L.Linton@usace.army.mil]
Sent: Thursday, October 25, 2007 10:05 AM
To: David Pratt
Subject: County reps for Executive and Technical Teams - Chetco River

Good morning, David: I am putting together a list of the Executive and Technical teams for the Phase 2 Chetco River effort. I know that Kevin Moynahan was going to contact the Association of Oregon Counties to see about their potential participation, but as expressed in last weeks meeting it is also important for county planning to be represented.

Do you see yourself as participating on the Executive Team with

perhaps Jodi Fritts on the Technical Team. Let me know as soon as you can.
We want to get a message sent out soon with possible dates for the tech team meeting. Thanks - Judy

--
This message has been scanned for viruses and
dangerous content by MailScanner <http://www.mailscanner.info/>
, and is
believed to be clean.

--
This message has been scanned for viruses and dangerous content by MailScanner, and is believed to be clean.

From:	Linton, Judy L NWP
To:	"Alex Cyril"; "Bill Yocum"; "Bob Lobdell"; "Chuck Wheeler"; "Frank Schnitzer"; "Janine Castro"; "Jay Charland"; "Jim O"Connor"; Linton, Judy L NWP; "Patty Snow"; "Robert Elayer"; "Todd Confer"; "Yvonne Vallette"; "Jodi Fritts"
Cc:	"Bob Bailey"; Evans, Lawrence C NWP; "Joe Zisa"; "Joy Smith"; "Ken Phippen"; "Kevin Moynahan"; "Mike Tehan"; "Monty Knudsen"; "Rich Angstrom"; "Ron Anglin"; "Sally Puent"; "David Pratt"
Subject:	November 15th meeting request
Date:	Friday, November 02, 2007 9:03:12 AM

Good morning all:

First I will apologize to Kevin Moynahan if I am overstepping my bounds by sending this message, but I know how busy Kevin is and I wanted to clarify a message you all received recently. The Land Board Room sent a message requesting your attendance at a meeting on November 15th in Salem from 1:30 to 3:30. This is intended to be a meeting of the Executive Team....so if you are part of that team (those of you in the cc list) please respond to the Land Board message.

For all my fellow Technical Team members, our party is set for November 20th at the U.S. Fish and Wildlife Service office in Portland (or by telephone) from 1:00 to 3:00.

Judy
(503) 808-4382

From:	Linton, Judy L NWP
To:	"Alex Cyril"; "Bill Yocum"; "Bob Lobdell"; "Chuck Wheeler"; "Frank Schnitzer"; "Janine Castro"; "Jay Charland"; "Jim O"Connor"; Linton, Judy L NWP; "Patty Snow"; "Robert Elayer"; "Todd Confer"; "Yvonne Vallette"; Jodi Fritts
Cc:	"Bob Bailey"; Evans, Lawrence C NWP; "Joe Zisa"; "Joy Smith"; "Ken Phippen"; "Kevin Moynahan"; "Mike Tehan"; "Monty Knudsen"; "Rich Angstrom"; "Ron Anglin"; "Sally Puent"; "David Pratt"
Subject:	Chetco River Technical Team meeting - Agenda
Date:	Monday, November 19, 2007 10:38:48 AM
Attachments:	Nov 20 Tech Team mtg agenda.doc

Good morning: attached is the agenda for the Chetco River Technical Team meeting scheduled for 1:00 to 3:00 at the U.S. Fish and Wildlife Service office at 2600 SE 98th Avenue in Portland. For those of you calling in the call number is: 1-877-934-2812, Pass Code: 294348.

Topics of the agenda were developed in part based on questions the Executive Team would like the Tech Team to answer and to report on at their next meeting scheduled for December 19. Other topics can be added as appropriate.

Talk with you all tomorrow. Judy

CHETCO RIVER GRAVEL REMOVAL
TECHNICAL TEAM MEETING
NOVEMBER 20, 2007

AGENDA ITEMS:

- Administrative Details
  - Tech Team organization
    - Structure
    - Membership (fluid based on watershed?)
  - Meeting frequency
  - Other

- Process and Data/Information Needs
  - Timelines
    - Limitations of Existing Authorizations (COE/DSL permits, WQ Certification, Biological Opinion)
    - Time to complete study
    - Develop and implement general permits (if study determines mining can continue)
  - Information Needs
  - Process to obtain information

- Next Steps
  - Brief Executive Team at December 19 meeting
  - Schedule next meeting of Tech Team

From:	Linton, Judy L NWP
To:	"Jim O"Connor"; "gwhess@usgs.gov"; "cdl@lidstone.com"
Subject:	Chetco River Phase 1 information
Date:	Wednesday, November 21, 2007 1:05:02 PM
Attachments:	Chetco River Issue Statement.doc Chetco River Source Data.doc Chetco River Determination Table.doc

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I thought I would go ahead and send this to you folks prior to getting the meeting notes out as I believe everyone else has the documents. I will confirm that theory when I send out the notes!

Thanks for participating in the meeting yesterday. Judy

OREGON FISH AND WILDLIFE OFFICE
ISSUE STATEMENT

DATE: May 31, 2007

PURPOSE: Determination of the vertical stability of the lower Chetco River

Concern over the impact of instream gravel mining on the lower Chetco River in Southwestern Oregon has precipitated a reconnaissance level investigation of the vertical stability of the channel from river mile (RM) 11.0 downstream to the mouth. This issue statement summarizes the findings of a brief analysis based on existing data (see attachment) and a one day field investigation on May 23, 2007. Agency staff assigned to this task include: Dr. Janine Castro, USFWS, Chuck Wheeler, NMFS, and Bob Lobdell, DSL. A brief peer review was provided by Dr. Peter C. Klingeman, Professor Emeritus, OSU, Corvallis, OR, Dr. Andrew Simon, Research Geologist, USDA—ARS, National Sedimentation Laboratory, Oxford, MS, Dr. Colin Thorne, Professor of Physical Geography, University of Nottingham, UK, Dr. Brian Cluer, Geomorphologist, NMFS, Santa Rosa, CA, and Rob Sampson, State Conservation Engineer, USDA—NRCS, Boise, ID.

A matrix including the analysis method used, data available, and indication of vertical trend is attached, along with a list of all source data consulted during this analysis.

RECONNAISSANCE ACTIVITIES:

The following analyses were completed during the month of May, 2007, to determine the vertical stability of the Chetco River.

- Specific-gauge analysis, including rating table shifts, completed by Dr. Peter Klingeman, May 9, 2007.
- Analysis of bathymetry from 1939 and 1976 maps, along with recent surveys in 2007 by Tidewater Contractors, completed by Robert Elayer, Tidewater Contractors.
- Planform analysis of the upper Tidewater Contractors site and Emily Creek reach, completed by Castro and Cluer, 2007.
- Highway 101 bridge-scour reports from 2005 and 2006, which includes an underwater investigation, completed by ODOT.
- Evaluation of existing bank-stabilization measures from 1983 to the present, based upon Corps of Engineers permit records and field investigation, completed by Janine Castro.
- Evaluation of municipal water-supply intakes on the Chetco River, including the City of Brookings and Harbor Rural Water District, completed by Chuck Wheeler via personal communication with the City of Brookings.
- Review of time series cross-sections including SCS Flood Study (1977), Marquess and Associates (1980), and Oregon Department of State Lands (1981), completed by DSL.
- Field investigation of bar height relative to floodplain height, completed by Janine Castro and Brian Cluer, 2007.

- Field examination of floodplain and bank areas to identify buried soil horizons, completed by Janine Castro, 2007.
- Riparian vegetation changes from aerial photos and ground surveys, completed by Janine Castro, 2007.
- Field examination of streambed sediment patterns, including armoring, particle imbrication, and particle-size distributions (visual), completed by Janine Castro and Brian Cluer, 2007.

VERTICAL STABILITY DETERMINATION:

Based on the available data at the time of this investigation, the current overall vertical trend of the Chetco River is dynamic equilibrium. This conclusion is further refined into three specific channel reaches.

RM 11.0 to RM 7.0

The positioning of gravel bars in the river from RM 11.0 downstream to RM 7.0 has been stable for many years as indicated by consistent bar form, bar size and degree of confinement of the low water channel width over several decades. The specific-gauge analysis shows short periods with water levels rising and falling for a specified discharge. This can be interpreted to indicate phases of aggradation and degradation at the gauging station, with the most recent phase being degradational. This typifies a stream with significant bedload transport during high flow years, rather than constant bedload transport every year. Based on a regression analysis, the trend for the last 36 years is degradational, but the overall magnitude of change is small (approximately 1 foot for moderate to high flows). Reduced sediment input from the catchment due to changes in land use management may be in part responsible for this trend. The history of gravel extraction both upstream and downstream of the gauge may also have affected the stage/discharge relationship.

RM 7.0 to RM 2.0

Below RM 7.0 downstream to head of tide the channel has been, and continues to be, highly dynamic. For example, the thalweg has shifted laterally, gravel bars have changed location and there is wider variation in bar heights than in the reaches up and downstream. Most of the bank stabilization work performed during the past 25 years has occurred in this reach in response to channel migration and bar formation. Field investigation suggests that failures of bank stabilization works are primarily due to inadequate design and/or implementation rather than system-wide degradation. The low flow channel is much wider and shallower than in the upstream reach, as clearly shown on the aerial photos, with the widest, shallowest section occurring in the region of RM 6.0 to RM 4.0. Lateral instability in this reach is exacerbated by anthropogenic, instream activity. Experience shows that actions that disturb the gravel armor and lower bar elevations may result in accelerated sedimentation and reductions in pool depths. Within this context, recent gravel deposition is evident from a buried soil surface on Freeman Bar at RM 6.0. However, despite the high level of lateral shifting and bar change, the presence

of intact remnant bridge piers at RM 6.5 indicate that adjustments to the bed elevation around this location have been minimal. This interpretation is based on the assumption that the bridge was not a major stream crossing, but rather was used to access the gravel bar on the north side of the river during low flows. Since the bridge was probably constructed for limited access, it is inferred that the bridge piers were not driven to great depths in the channel bed. Additionally, remnant bridge decking was apparent only a few feet above the water surface elevation.

It may be concluded that channel adjustments in this reach during the past 40 years have been predominantly in the lateral rather than vertical dimension.

RM 2.0 to RM 0

The tidal reach of the Chetco River appears to have deepened slightly over the past 20 years based on review of current and historical aerial photos that reveal a decrease in the elevation of intertidal bar forms. The probable cause of channel deepening is a combination of navigational dredging, interruption of littoral-derived sediments, and gravel extraction. This interpretation is corroborated by five cross-sections surveyed by the COE, DSL, and Tidewater Contractors for 1939, 1976, and 2007, respectively.

SUMMARY:

Based on the available data and field reconnaissance, the fluvial course between RM 11.0 and RM 2.0 of the Chetco River appears to be in dynamic equilibrium, while the tidal reach downstream of RM 2.0 has deepened in response to sediment removal. Depending upon the stream reach and the time period considered, there are indications of both slight aggradation and degradation in the fluvial reaches. Much of the channel adjustment that occurs in the lower Chetco River appears to be in the lateral dimension, as indicated by shifting bar forms and bank erosion. Annual disturbance of the bed and bar material due to gravel extraction is exacerbating the lateral instability of the channel between RM 7.0 and RM 2.0. This is because bedload in the Chetco River is transported in significant quantities during major flood events, with reworking of the deposited sediments during intervening years.

CONTACT: Janine Castro, Geomorphologist, Oregon Fish and Wildlife Office at 503-231-6179.

CHETCO RIVER SOURCE DATA:

REVIEWED FOR DETERMINATION OF VERTICAL STABILITY

Janine Castro, Geomorphologist, US Fish and Wildlife Service, May 31, 2007

CORRESPONDANCE

From: DSL – Stanley Hamilton
To: Curry County Board of Commissioners
Date: February 5, 1982
Subject: Chetco River Resource Management (note in pencil indicates that this letter was never sent)

From: City of Brookings – Richard Ullian
To: DSL – Bill Parks
Date: February 16, 1988
Subject: Revised application for gravel removal on Chetco River – Permit Nos. RP 4077 and RP 3375

From: Tidewater Contractors – Robert Elayer
To: Corps of Engineers – Lisa Grudzinski
Date: June 26, 2006
Subject: pictures of sediment from Yaquina Dredge

From: Corps of Engineers – Sheryl Carrubba (e-mail)
To: NMFS – Chuck Wheeler
Date: July 21 and July 24, 2006
Subject: Clarification and response to Tidewater pictures form Yaquina dredging operation

From: FWS
To: Corps of Engineers
Date: November 20, 2006
Subject: Freeman Rock Cease and Desist Order

From: McBain and Trush
To: Freeman Rock – Bill Yokum
Date: January 12, 2007

From: NMFS – Bob Lohn
To: Freeman Rock Inc. – Bill Yokum
Date: March 2, 2007
Subject: Sediment study scope of work

From: NMFS
To: Corps of Engineers
Date: March 7, 2006
Subject: Draft Biological Opinion, Tidewater

From: Freeman Rock – Ted Freeman
To: Corps of Engineers
Date: April 10, 2007
Subject: Response to Corps add info letter

From: Tidewater Contractors, Inc. – Robert Elayer
To: NMFS – Chuck Wheeler
Date: May 3, 2006

Subject: Aggrading/degrading interpretation in the BO

From: Tidewater Contractors, Inc. – Robert Elayer
To: NMFS – Chuck Wheeler
Date: May 25, 2006
Subject: Aggrading/degrading interpretation in the BO

From: NMFS – Chuck Wheeler
To: Brian Cluer, NMFS, & Janine Castro, FWS
Date: May/June, 2006
Subject: Chetco River data including aerial photos and draft BO

FIELD INVESTIGATION

May 23, 2007. Field investigation with Chuck Wheeler, NMFS, Brian Cluer, NMFS, Kevin Moynahan, DSL, Bob Lobdell, DSL, Robert Elayer, Tidewater Contractors, and wrap-up with Bill Yokum, Freeman Rock. Field investigation started at the Upper Tidewater site (RM 10.7) and continued downstream to the boat harbor.

MAPS, SURVEYS, & PHOTOS

BLM aerial photos, 1940, 1955, 1976, 1986, 1992, 1997, 2002 (various scales)

South Coast Lumber Company gravel bar surveys completed for 2003, 2004, and 2005 (12 cross-sections each year tied to a permanent vertical datum). River Mile 7.0. Surveyor – Raymond Schlack.

South Coast Lumber supplied aerial photos: 1940, 1962, 1972, 1976, 1981, 1985, 1990, 1994, 1998, 2000, 2002, 2004, 2006

Tidewater ground photos, May 3, 2006.

Tidewater photos of YAQUINA dredge material, June 2006.

Chuck Wheeler ground photos, October, 2005.

Chuck Wheeler ground photos, July 25, 2006.

Chuck Wheeler ground photos, February 1, 2007.

PERMITS

Bank stabilization permits issued from the US Army Corps of Engineers from 1983 through 2000, RM 1.0 to RM 10.0. Permit letters provided by COE, 2007.

Chetco River commercial gravel removal state permits, September 1, 2005. Total permitted extraction 235,000 cy/yr between RM 1.0 and RM 10.0.

REPORTS & DOCUMENTS

Affidavit of Dr. Peter Klingeman. 1993. Plantiff vs. Tindewater Contractors, et al. Chetco Navigability.

Chetco River Bridge Inspection Reports, 2005 and 2006 (underwater)

Hamilton, S.F. 1972. An Inventory of Filled Lands in the Chetco River. Prepared for the Advisory Committee to the State Land Board of Oregon by the Advisory Committee's Engineering Staff.

Klingeman, P.C. 1993. Chetco River field reconnaissance with Oregon Department of Justice.

Klingeman, P.C. 1993. Chetco River, Oregon: hydrologic/hydraulic/morphologic analyses of navigability. Report to Oregon Department of Justice.

Klingeman, P.C. 2002. DRAFT Willow bar reconnaissance and evaluation, Chetco River, based on field visit on Thursday, July 25, 2002, and prior site visits.

Lumley, P.E. No date. Chetco River: problematical analysis of the gravel resource. Report to DSL, Waterways Section.

Marquess and Associates, Inc. 1980. Report to Harbor Rural Water District, Harbor, Oregon.

Ogden Beeman & Associates. 1981. River Engineering Analysis Chetco River.

Soil Conservation Service. 1979. Flood hazard study, Chetco River, Curry County, Oregon. Prepared by the USDA soil Conservation Service in cooperation with Curry County, Curry County Soil and Water Conservation District, and the State Water Resources Department.

Chetco River: Summary of data analyses and field reconnaissance to support vertical stability determination

By: Janine Castro, Geomorphologist, USFWS, Portland, Oregon

May 25, 2007

Method Used	**Available Data**	**Notes**	**Trend**
Specific Gauge Analysis	1970 through 2007 USGS rating tables for gauge #14400000. Specific gauge analysis completed by Pete Klingeman, May 9, 2007.	Missing rating tables 28, 29, 30. Rating table adjustments show aggradation starting in 1972 continuing until a degradational phase in 1985. The channel started aggrading again in 1989 before significant degradation in 1996 with slight aggradation following, but not recovering to pre-1996 elevations. Regression through stage/discharge relationship shows degradational trend.	DE, D-
Cross-section comparison from bathymetric surveys	1939, COE; 1976, L.S. Slotta; 2007, Tidewater Contractors. All cross-sections below head of tide.	Comparison made by Robert Elayer, Tidewater. Cross-section numbers 7, 9, 10, 13, and 14 resurveyed. Elayer indicates that the 2007 cross-sections should be considered preliminary. Of the five cross-sections resurveyed, only cross-section 10 seems to have aggraded, while cross-section 9 is in equilibrium, leaving stations 7, 13, and 14 showing slight degradation. Cross-section 14 is the closest spatially to cross-section #56 listed below. Both cross-sections show slight degradation and are within an actively mined site.	DE, D-
Cross-section comparison from SCS Flood Study, Marquess & Assoc., and DSL	SCS, DSL, & MA reports 1977, 1981, 1982, 1989	Three cross-sections were resurveyed after the initial SCS survey in 1978 by Marquess & Assoc. in 1980 and then DSL (1981??). Cross-section #14 is located just downstream of the North Bank Road Bridge (RM 10.5); cross-section #48 is located just downstream of the confluence with the North Fork; and cross-section #56 is located just upstream of Morris Rock (RM 2.5). Only cross-section #56 shows signs of degradation. Lumley asserts that many of the other SCS cross-sections are not comparable due to control point issues, and further asserts that the cross-section	DE, D-

		comparison is not appropriate for determination of vertical stability.	
Cross-section comparison from South Coast mining site	South Coast Lumber 2003, 2004, and 2005. Cross-sections of the mined bar pre- and post-mining; does not include the active channel.	Post-mining recovery to same elevation 2003 through 2005 for cross-sections 0+00, 1+00, 2+00, 3+00, 4+00, 5+00, 6+00, 7+00, 8+00, 9+00, 10+00, and12+00. Cross-section 11+00 did not recover to 2003 levels in either 2004 or 2005 – it is approximately 1-foot lower in elevation.	N/A
Planform analysis at upper Tidewater site near USGS gauge	Aerial photos 1976, 1978 (IR), 1979, 1986, 1991, 1994.	The four bars downstream of the bridge show minimal change. The mined bar upstream of the bridge shows a change in the cross-over position. Bars upstream from the mined bar show no change. All bars are boundary forced due to the narrow valley width and probably have a backwater effect on the USGS gauge due to a downstream constriction (per Pete Klingeman).	DE
Planform analysis near Emily Creek	Aerial photos 1939, 1982, 1986, 1990, and 1994.	Bar form seems to be stable since the 1964 flood. Emily Creek confluence is perched and disconnected from main stem in all years.	DE
Bank stabilization	Permit requests from COE back to 1983, field investigation	16 COE permitted projects, 9 of which occur between RM 2.0 and 4.9. Field evidence of numerous unpermitted projects, but total length of stabilization has not been quantified. Much of the rock placement appears to be related to stabilization and protection of North Bank Road. Extensive riprap and groins along the lower Chetco. Most rock was end dumped and not keyed in to bed. Failures appear to result from revetment design and installation, not undermining of the structure. Bank instability is due primarily to lateral channel migration.	N/A
Riparian vegetation	Aerial photos various years, field investigation	No trend detectable. The constrained valley form results in frequent disturbance to vegetation establishment on depositional bars.	N/A

Streambed sediment patterns / depositional bars	Aerial photos 1940 to 2002, field investigation, Klingeman 2002, Lumley.	From RM 11.0 down to RM 7.0, the channel has been very stable with gravel bars in approximately the same location with channel width is maintained over time. This is supported by the Lumley and Klingeman reports. RM 7.0 downstream to RM 2.5 is dynamic and much wider and shallower than upstream. Much bank stabilization has occurred in this reach. From head of tide downstream, there appears to be a decrease in at least one substantial bar.	A-, DE
Water supply systems	Lumley report, DSL 1982 Letter, Wheeler pers. comm. 2007	City of Brookings water intake moved 2 miles upstream. This apparently was due to drought conditions and an increase in withdrawals causing brackish water to enter the system. Harbor Rural Water District concerned about decreased water level in their well.	N/A
Bridge Repair/Maintenance	Inspection records 2005 & 2006	In 2005 structure was listed as in “acceptable condition”. In 2006 the underwater inspection found no piers exposed and no maintenance required. Maximum depth = 9 feet	DE
Bridge Piers	Field investigation	Bridge piers located at RM 6.5, approximately 2 to 3-feet exposed above water surface at 650 cfs. Some decking still in place	DE
Bedload Transport vs. Extraction	Ogden Beeman Report, 1981, & Lumley Report	Bedload transport calculation using the Einstein equation resulted in a theoretical potential of 372,000 cy/yr average transport (this assumes no limit of source material). The highest estimate is 840,000 cy for 1974, and the low estimate is 22,000 cy for 1977. Permitted extraction as of 2005 was 235,000 cy/yr. Permitted extraction from 1976 to 1980 exceeded 3.5 million cy/yr, although DSL reports only 240,000 cy were actually removed in 1980.	D or A, depending on year

Changes in navigability	Klingeman reports – affidavit and hydrologic/hydraulic/morphologic analyses, 1993	According to Pete Klingeman, "it is my opinion that the Chetco River could have supported the same uses in 1859 as it is capable of supporting today."	DE
Floodplain elevation & bar elevation	Field investigation estimating bar height relative to water surface elevation	Bar heights ranged from 5 to 12 feet in elevation above the water surface (all bar heights relative to the water surface elevation during the field investigation). Bar height is directly related to floodplain extent and channel constriction. Constrained reaches, such as RM 11.0 to RM 7.0, have relatively high bars (10 to 12 feet), while unconstrained reaches downstream of RM 7.0 generally have lower bars (5 to 8 feet). The lowest bars encountered were located at Freeman Bar and measured approximately 4 to 5 feet in height. Several comparisons of bar height to floodplain height showed coupling of these elevations with the floodplain being only one to two feet above fully developed bar formations.	DE
Buried soil horizons	Field investigation	A soil horizon buried by a reent deposit of gravel and sand was observed at Freeman Bar on the left bank.	A-, DE
Tributary junctions with the mainstem Chetco	Field investigation	During the field investigation, tributary junctions were inspected for evidence of incision or aggradation. All tributaries encountered (Emily Creek, Dry Creek, Mill Creek, North Fork Jack's Creek, and Joe Hall Creek, plus several smaller tributaries) had moderate to abundant sediment deposited as fans into the main channel. The larger tributary fans (Emily and North Fork) projected into the main channel and affected the thalweg location, while the smaller fans were scoured to a steep face in alignment with the main channel. No headcuts were evident in the tributaries.	A

Bed material sorting and armoring	Field investigation	Most depositional bars were slightly armored but showed no signs of significant imbrication. Sediment size was heterogeneous from sand to cobble. The channel bed where visible was a mix of sizes with limited patchiness, and with sand over gravel in many locations.	DE, A-

* A = aggrading, D = degrading, DE = dynamic equilibrium (-/+ indicate limited (-) or excessive (+))

From:	Bill Yocum
To:	Linton, Judy L NWP; Evans, Lawrence C NWP; Bob Lobdell; Kevin Moynahan
Cc:	Rich Angstrom; Joy Smith; TED FREEMAN, JR; Jon Barton
Subject:	Chetco River draft notes
Date:	Monday, November 26, 2007 9:19:07 AM
Attachments:	Phase 2 notes 11_07.doc

Here is a summary of the notes from the meetings that I attended. Do they appear accurate to you? Did I miss any major items? Let me know. Thanks.

Bill Yocum
541-469-2444

Chetco Aggregate Supply
Phase II Study Update
11/26/07

Background: The Corps claimed jurisdiction on Chetco River sand and gravel removal operations based on fill greater than "incidental". From this jurisdictional shift, the NMFS issued a "take permit" in a Biological Opinion for the SONC Coho Salmon that is covered by the Endangered Species Act even though there are no documented independent runs of SONC Coho Salmon on the Chetco River.

The state and federal agencies agreed that there would be a two-phase study to determine if sand and gravel can continue to be removed from the Chetco. Phase I would use existing information to determine if the Chetco was in an aggrading, degrading, or equilibrium condition. It was determined in late spring of 07 that the lower Chetco was in dynamic equilibrium and that sand and gravel removal would be permitted for a two-year period while Phase II (sediment bed load study) was being completed.

Phase II includes an Executive Team and a Technical Team. The Executive Team is made up of managers while the Technical Team makeup include resource specialists. The Oregon Concrete Producers Association (OCAPA) is an umbrella organization of the aggregate industry. The Board of OCAPA met just prior the Executive and Technical Team meetings. Below is a summary of what took place during these three separate meetings.

November 14, 2007. OCAPA held a Board meeting and discussed the Chetco Phase II Study. Discussions focused around; a) the potential jurisdictional shift of in-water regulations moving to the adjacent 100-year flood plain, b) the use of the Chetco process to develop a standard for river systems to determine the issuance of no permits or general permits verses individual permits. It was agreed that these are statewide issues. The Board also agreed to fund $10,000 earmarked for Oregon Solutions and/or technical expertise dealing with the Phase II process.

November 15, 2007. The Executive Team met dealing with the development of policy and timelines for the Phase II update. The Chair for the Executive Team include Kevin Moynahan (DSL) and Larry Evans (Corps). Other members are managers from USFWS, NMFS, EPA, ODFW, DEQ, DLCD, OCAPA, Umpqua Sand & Gravel, and Freeman Rock. DOGAMI was invited but did not show up.

The Executive Team agreed to pursue Oregon Solutions for setting up, facilitating, and documenting future meetings. They also gave guidance to the Technical Team to have a draft Phase II report completed by spring of 08. This would give the Corps a year to put the project out for public review and to develop an inter-agency system for general permits verses the traditional individual permits.

The next Executive Team meeting was scheduled for December 19, 2007 from 12:00 to 2:00 pm.

November 20, 2007. The Technical Team met dealing with the development of the methodology for Phase II of the Chetco Study Plan. The Chair for the Technical Team is Judy

Linton (Corps) and Bob Lobdell (DSL). Other members include specialists from USFW, NMFS, USGS, EPA, ODFW, DEQ, DLCD, Lidstone & Assoc., Tidewater Contractors, and Freeman Rock. DOGAMI was invited but did not show up.

The outcome of Phase II should address the need of knowing if the river is aggrading or degrading and determining the amount of sediment budget. The USGS will review Phase I of the Chetco Study and make a recommendation for the Phase II portion of the study. This could include direct sediment measurement, use of LIDAR, modeling (sediments models are weak at best), geomorphic measurements (pre/post removal surveys), or a combination of thereof.

Some members did not agree that the time-line set by the Executive Team was realistic. Some members also wanted a budget for this process so they would know their priorities as this relates to other projects.

The Technical Team also felt that they need a statewide list of rivers affected by gravel removal permits so they could begin to prioritize for future studies.

The next Technical Team meeting will be scheduled around the third or fourth week in January of 2008.

From:	Linton, Judy L NWP
To:	"Alex Cyril"; "Bill Yocum"; "Bob Lobdell"; "Chuck Wheeler"; "Janine Castro"; "Jay Charland"; "Jim O"Connor"; "Patty Snow"; "Robert Elayer"; "Yvonne Vallette"; "gwhess@usgs.gov"; "cdl@lidstone.com"
Cc:	Linton, Judy L NWP
Subject:	Tech Team meeting notes, etc.
Date:	Tuesday, November 27, 2007 1:52:18 PM
Attachments:	20 Nov 2007 Tech Team mtg notes.doc Deschutes River Overview (2).pdf

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Greetings: attached are the draft meeting notes for the November 20 Tech Team meeting. Please review and let me know of corrections, etc. I have also attached the Deschutes River sediment paper that Jim O'Connor mentioned at the meeting. I previously sent the Chetco River Phase 1 work products to Jim O'Connor, Glen Hess, and Chris Lidstone and so have not attached it here as I assume the rest of you have it already. If you do not have it, let me know and I can send it to you.

Here is the link to the paper discussing sediment work done on the McKenzie River. This paper was prepared in cooperation with the Corps.

Influence of Cougar Reservoir Drawdown on Sediment and DDT Transport and Deposition in the McKenzie River Basin, Oregon, Water Years 2002–04 <http://pubs.usgs.gov/sir/2007/5164/>

Have I forgotten anything? Please provide comments on the meeting notes as soon as possible. I will then finalize. Thanks - Judy

MEETING NOTES
CHETCO RIVER GRAVEL REMOVAL
TECHNICAL TEAM MEETING
NOVEMBER 20, 2007
1:00 to 3:00

ATTENDEES:
Judy Linton, US Army Corps of Engineers
Janine Castro, US Fish and Wildlife Service
Chuck Wheeler, National Marine Fisheries Service
Yvonne Vallette, Environmental Protection Agency
Bob Lobdell, Oregon Department of State Lands
Alex Cyril, Oregon Department of Environmental Quality
Jay Charland, Oregon Department of Land Conservation and Development (phone)
Patty Snow, Oregon Department of Fish and Wildlife
Robert Elayer, Tidewater Contractors, Inc
Bill Yocum, Freeman Rock, Inc
Chris Lidstone, Lidstone and Associates, Inc (phone)
Jim O'Connor, US Geological Survey
Glen Hess, US Geological Survey

AGENDA ITEMS:

1) Administrative Details:

Mission: The focus of the Technical Team is evaluating specific watersheds to objectively determine whether gravel mining can occur on a short-term or long-term basis. Such evaluation will include looking at direct and indirect impacts to sediment movement. Meetings are not to evaluate or discuss specific permit actions which may be under review by either the Corps of Engineers (Corps) or Department of State Lands (DSL).

Organization: The Corps and DSL will act as co-chairs for the Technical Team and will be responsible for setting up meetings, taking notes and generally making sure there is follow through with identified action items. Draft meeting notes will be sent to meeting participants for review prior to becoming final.

The Team will attempt to reach agreement on future actions – any insurmountable disagreements will be raised to the Executive Team for resolution.

Membership: It was agreed the membership should be fluid based on the watershed being studied.

2) Process and Data/Information Needs:

Timelines: The timelines for existing Chetco River gravel mining authorizations for Freeman Rock and Tidewater were clarified. The Department of the Army permit expires September 2009; Water Quality Certification is valid until August 2009; DSL permits require annual renewal for work occurring beyond 2008; and the Biological Opinions provide endangered species coverage through the 2008 work season (which runs from July 15 through September 30 above the Chetco River estuary). Therefore, if it is determined further mining can occur in the Chetco River beyond the 2008 season, permits must be in place by spring of 2009. At the November 15 Executive Team meeting it was suggested that this Phase 2 study be completed by spring 2008 to allow one full year to complete the permit process should that be the direction taken.

Information Needs/Process to Obtain Information: Sediment budget information is crucial. Most of the winter high flows have already passed so we may not be able to collect any data this year. Jim O'Connor suggested there may be a way to estimate sediment budget information without doing actual measurements. He will have a better idea once he has a chance to review the Phase 1 work. USGS will also evaluate the Phase 1 work to determine if there is better way to structure the determination of whether a system is aggrading/degrading/equilibrium.

USGS could do sediment transport studies. They will need to know the specific questions to be answered (including timelines and spatial scope) and then can prepare a draft scope of work to include required funding (estimated). This scope of work would include 1) data collection that can be done within the immediate timelines and 2) data collection that can be done given a longer time period. It may make most sense to pick one river system that can represent all coastal systems rather than evaluate all systems. USGS estimated it will be the 1st or 2nd week of January 2008 before they are able to provide the draft scope of work. Technical Team needs to recommend to the Executive Team that funding for USGS work crucial.

Additional information that may be beneficial:
1) Cross-sectional information provided by the operators could potentially be used if combined with known water events. The evaluation would also need to include review of aerial photos at these same cross-sections.
2) Monitoring reports as required under existing mining permits. Freeman Rock has collected data and will have the reports out by December. Although Tidewater did not mine in 2007 they do have pre-mine surveys and will also be doing pre-mine surveys in 2008.
3) Pre-mine surveys at Tidewater Bar: This information has been collected for past two years.
4) Suggestion made that we should also look at site specific responses to gravel removal within watersheds.

Regarding evaluation of other watersheds, the group agreed we need direction from the Executive Team on prioritization beyond the Umpqua River system (which will be studied next). DSL has a list of active gravel operators; the Corps has a list of pending permit applications which needs to be updated to add the Coquille River and Hunter Creek. The mention of Hunter Creek raised the question of how we will deal with sub-basins. All agreed that we should recommend to the Executive Team that we start the Phase 1 study process for the Umpqua River. The Executive Team will need to decide who will pull together the final product for that effort, however, as Janine is pretty well tied up with other work well into next year.

3) Next Steps:

- Brief the Executive Team at their December 19 meeting on Technical Team organization details and information needed for Phase 2 study work. Execs also need to be briefed on work being done by USGS to assist the Technical Team in refining information needs and estimated timelines.
- The next meeting of the Technical Team will be scheduled around mid-January (exact date pending receipt of draft scope of work from USGS.

Overview of Geology, Hydrology, Geomorphology, and Sediment Budget of the Deschutes River Basin, Oregon

Jim E. O'Connor

U.S. Geological Survey, Portland, Oregon

Gordon E. Grant

U.S. Forest Service, Corvallis, Oregon

Tana L. Haluska

U.S. Geological Survey, Portland, Oregon

Within the Deschutes River basin of central Oregon, the geology, hydrology, and physiography influence geomorphic and ecologic processes at a variety of temporal and spatial scales. Hydrologic and physiographic characteristics of the basin are related to underlying geologic materials. In the southwestern part of the basin, Quaternary volcanism and tectonism has created basin fills and covered and deranged the surficial hydrologic system, resulting in a relatively low-relief lava-covered landscape with runoff emerging largely from extensive groundwater systems fed by Cascade Range precipitation. The remarkably steady flows of the entire Deschutes River, as depicted in annual and peak flow hydrographs, are due primarily to buffering by the extensive groundwater system of this part of the basin. The eastern part of the basin is primarily underlain by Tertiary volcanic, volcaniclastic, and sedimentary rocks that have weathered into dissected uplands with generally greater slopes and drainage densities than of that of the southwestern part of the basin. Surficial runoff is more seasonal and less voluminous from this more arid part of the basin. The northern part of the basin has been sharply etched by several hundred meters of late Cenozoic incision, resulting in the greatest relief and drainage density of anywhere in the basin. For large floods, such as those of December 1964 and February 1996, more than half of the peak flow at the mouth of the Deschutes River is derived from the northern part of the basin. Modern sediment yield for much of the Deschutes River basin, as determined from reservoir surveys, is exceptionally low and is related to regional slope and drainage properties. Broad-scale sediment budget calculations indicate that more than 50 percent of the sediment produced in the Deschutes River basin produced under modern, pre-impoundment, conditions is from the northern part of the basin. There is ample evidence, however, of much greater sediment yields and large pulses of downstream sediment delivery during Quaternary episodes of volcanism and glaciation.

INTRODUCTION

The Deschutes River is remarkable. Its uniform, spring-fed hydrologic regime has long impressed geographers and hydrologists [e.g., *Russell*, 1905; *Henshaw et al.*, 1914]. Partly in conjunction with the stable flow regime, modern sediment production is exceptionally low over much of the basin. These two factors have combined to create an unusually stable geomorphic system over human time scales. Consequently, as will be seen in following chapters, it is a river system in which impoundments have had few apparent geomorphic effects on the downstream channel and valley bottom of the Deschutes River system.

Geology and Geomorphology of the Deschutes River, Oregon
Water Science and Application 7
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10/1029/007WS03

3/7/2011 Public Notice - Additional Team Documents 000233

However, the Deschutes River basin has not been similarly quiescent over geologic time scales. Extensive volcanism, regional and local tectonism, landslides, and cataclysmic floods have all left their mark across the landscape. Moreover, as is the case for most large basins, the resulting geomorphic characteristics, such as topography, hydrology, and sediment yield, vary widely. The modern Deschutes River, with its stable hydrologic and geomorphic regime and rich aquatic ecosystems, is the combined result of (1) these past processes and events and (2) the present regime of sediment and water yield established by the regional geology. To understand the Deschutes River and its response to impoundment, it is necessary to understand this geologic and hydrologic context.

This paper provides an overview of the geologic, hydrologic, and geomorphic setting of the Deschutes River basin, with special emphasis on aspects that have influenced how the river has responded to impoundment by the Pelton-Round Butte dam complex. This overview sets the stage for companion studies of the valley bottom, channel, and fish ecology of the Deschutes River, which comprise the other papers in this volume.

GEOLOGY, TOPOGRAPHY, HYDROLOGY, AND SEDIMENT TRANSPORT OF THE DESCHUTES RIVER

The Deschutes River drains 26,860 km^2 of north-central Oregon[1], first flowing south from its Cascade Range headwaters, then northward for nearly 300 km along the eastern margin of the Cascade Range before joining the Columbia River 160 km east of Portland (Figure 1). Its principle tributaries, the Crooked and Metolius Rivers, join the Deschutes River at 185 and 180 km, respectively, from the Columbia River confluence. Portland General Electric and the Confederated Tribes of Warm Springs generate 427 megawatts of power from the Pelton-Round Butte dam complex, a set of three hydroelectric dams located 160 to 180 km upstream from the Columbia River confluence.

[1]The drainage area reported by *Hubbard et al.* [1998, p. 118] for the U.S. Geological Survey gage "Deschutes River at Moody, near Biggs, Oregon (station number 14103000)", 2.25 km upstream from the Deschutes River confluence with the Columbia River, is "10,500 mi^2, approximately". Our estimate of the drainage basin area, from a geographic information system analysis of the basin outline portrayed in Figure 1 (derived from a 30-meter resolution digital elevation model) is 26,860 km^2 (10,370 mi^2). We will use the 26,860 km^2 value for discussion and analysis.

Geologic Setting

The Deschutes River basin is formed in sedimentary, igneous, and metamorphic rocks, whose ages range from more than 250 million years old to as young as 1300 years old (Plate 1). The vast majority, however, are Cenozoic volcanic rocks (less than 65 million years old), and almost all of these rocks are lavas of various compositions or other eruptive products. In general, bedrock ages become progressively younger from east to west across the basin. Mesozoic (250 to 65 million years old) and Paleozoic (more than 250 million years old) sedimentary and volcanic rocks crop out in a small area at the eastern edge of the Deschutes River basin. Most of the Ochoco Mountains, a low mountain range forming much of the eastern flank of the basin, and the Mutton Mountains, which trend northwest across the north-central part of the basin, are underlain by weathered volcanic, volcaniclastic, and sedimentary rocks of the John Day and Clarno Formations. These rocks date from about 55 to 20 million years old and are remnants of ancient volcanic highlands and their eruptive products [*Robinson et al.*, 1984; *Walker and Robinson*, 1990; *Taylor*, 1990].

Much of the northern and eastern parts of the Deschutes River basin is underlain by the Columbia River Basalt Group (CRBG), a series of accordantly layered basalt flows erupted primarily between 17 and 14.5 million years ago and covering 165,000 km^2 of southern Washington, northern Oregon, and western Idaho [*Tolan et al.*, 1989]. The CRBG in the eastern part of the Deschutes River basin issued from vents in the John Day River basin, whereas CRBG in the northern Deschutes River basin originated as flows that came westward down the ancestral Columbia Plain from numerous vents in eastern Washington, eastern Oregon, and western Idaho, filling the Columbia Plain with up to 600 m of lava, locally separated by thin sedimentary interbeds [*Newcomb*, 1969; *Smith*, 1986; 1991]. The contemporaneous "Prineville chemical-type" basalt flows (mapped as part of the CRBG in Figure 2, although geographically and chemically distinct from the CRBG [*Goles*, 1986; *Reidel et al.*, 1989; *Hooper et al.*, 1993]) erupted near the location of Bowman Dam in the central part of the basin and flowed northward along an ancestral Crooked River to where they are interbedded with the CRBG that filled the Columbia Plain from the north. The distribution of the CRBG and contemporaneous basalt flows indicates that by 17 million years ago, the present overall geometry of the northern Deschutes River basin had been established with northward drainage through lowlands bounded by the Ochoco Mountains on the east and the ancestral Cascade Range on the west [*Smith*, 1986].

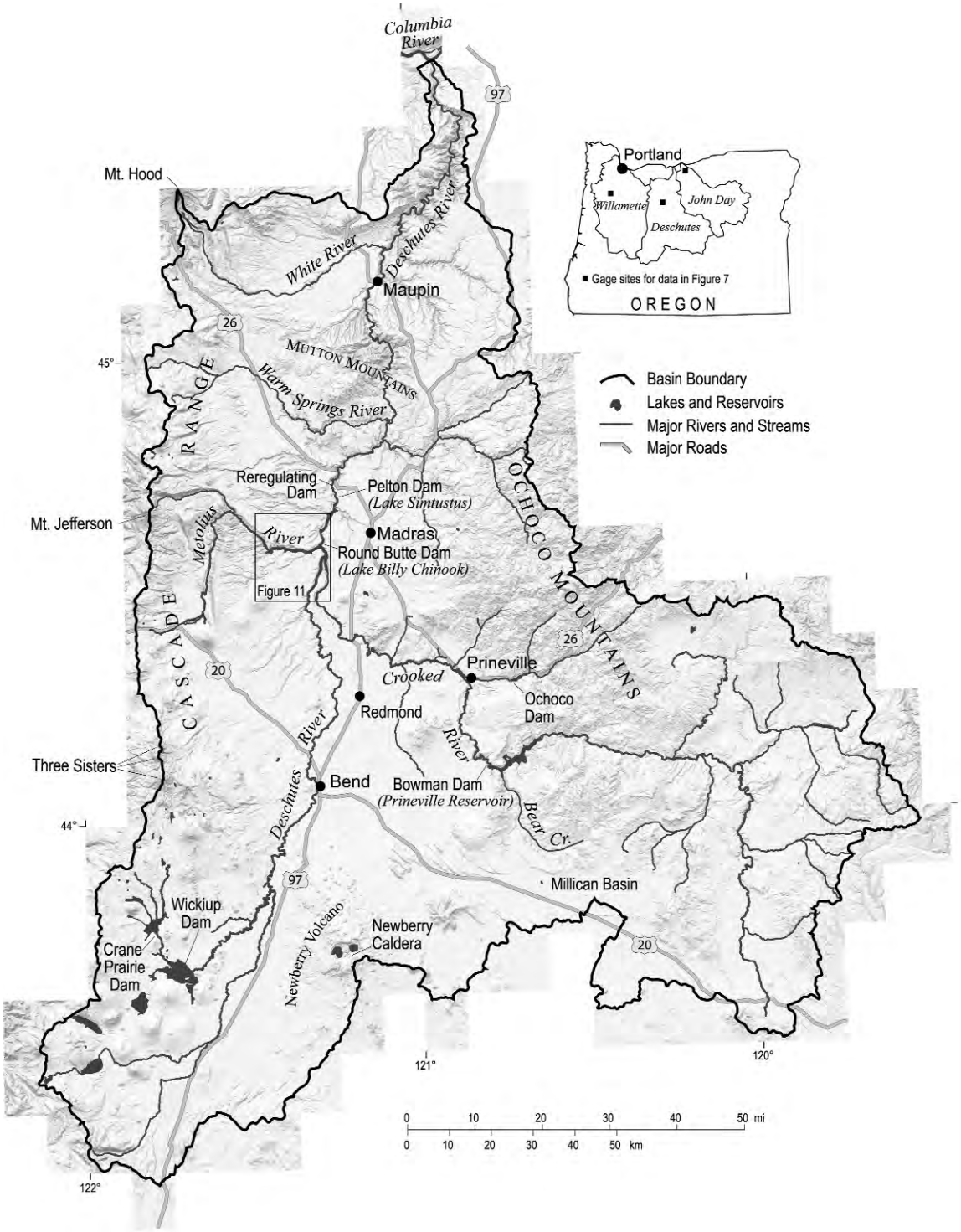

Figure 1. Location map showing major physiographic and cultural features of the Deschutes River basin. Hillshade topographic base derived from U.S. Geological Survey 30-m resolution digital elevation data.

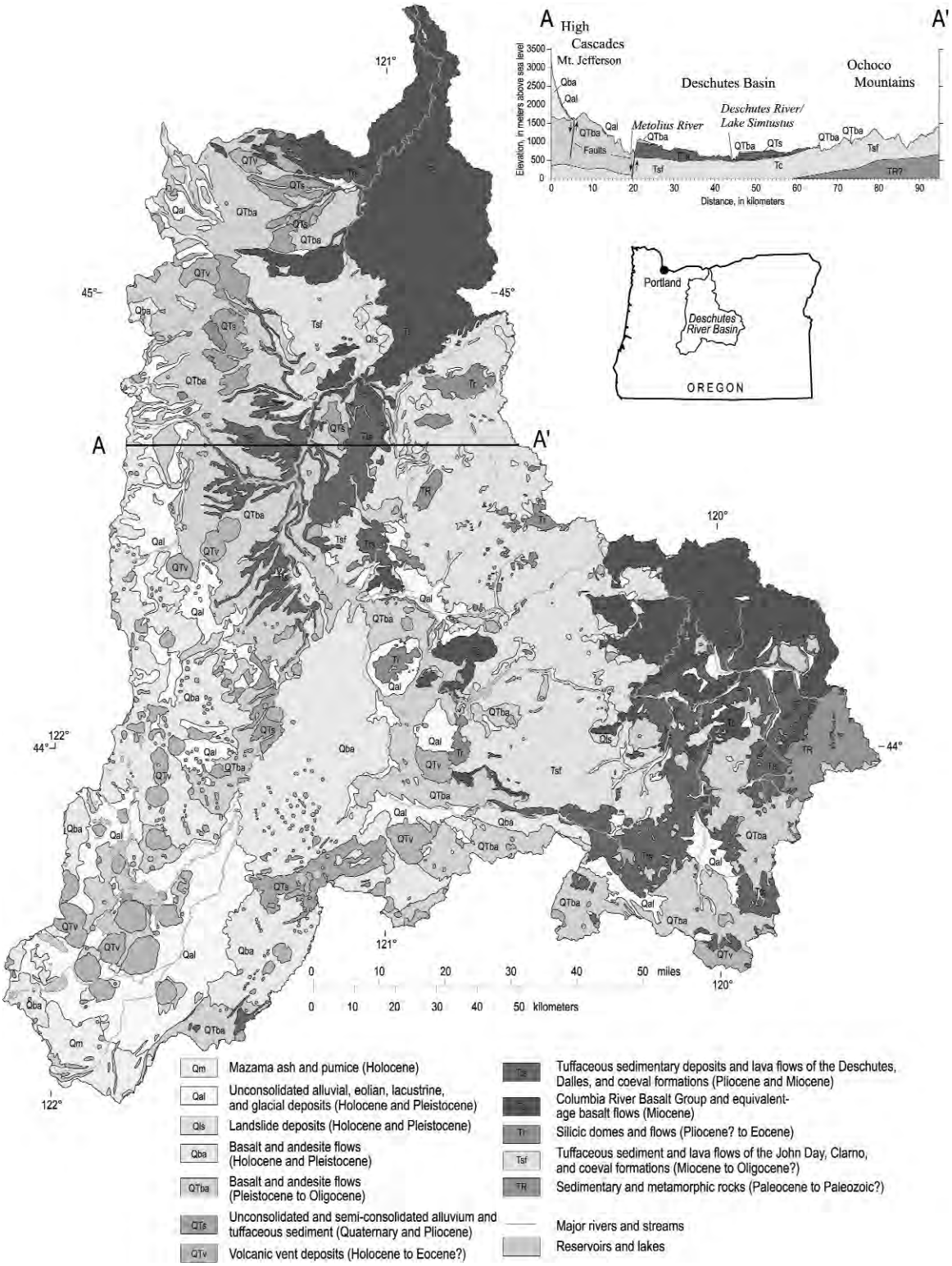

Plate 1. Geologic map of the Deschutes River basin, map units and descriptions generalized from *Walker and MacLeod* [1991]. Cross-section after *Smith* [1986].

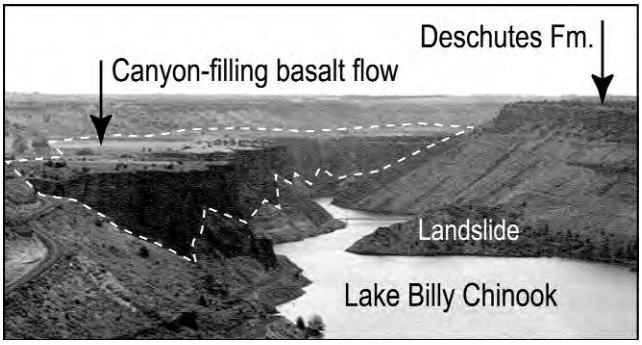

Figure 2. View south up the Crooked River arm of Lake Billy Chinook, impounded behind Round Butte Dam. A basalt flow, age 1.19±0.08 Ma [*Smith*, 1986], has partly filled the canyon previously incised into lava flows, pyroclastic deposits, and fluvial sand and gravel of the Deschutes Formation. The top of the intercanyon basalt flow is 140 m above lake; top of Deschutes Formation is 210 m above lake. Photograph by J.E. O'Connor, 1998.

Deformation during and after emplacement of the Columbia River Basalt Group resulted in isolated basins that accumulated sediment, ignimbrite, and airfall tuffs shed eastward from the emerging Cascade Range and from volcanic highlands in the eastern part of the Deschutes River basin [*Smith*, 1986; *Smith et al.*, 1989]. These deposits formed primarily between 15 and 4 million years ago and include the Simtustus, Deschutes, and Dalles Formations in the central and northern parts of the Deschutes River basin, and the Rattlesnake Ash Flow Tuff in the southeastern Deschutes River basin [*Smith*, 1986, 1991; *Smith et al.*, 1989]. Basalt flows and gravel deposits within the Deschutes Formation near Madras show that the course of the Deschutes River 7.4 to 4.0 million years ago was similar to the present course [*Smith*, 1986, 1987a].

Near the top or capping the Deschutes and Dalles Formations are widespread basalt flows, including the basalt of Juniper Flat near Maupin [2.77±0.36 Ma; R.M. Conrey, unpublished data, cited in *Sherrod and Scott*, 1995] and the Agency Plains basalt flow north of Madras [5.31±0.05 Ma; *Smith and Hayman*, 1987]. These Pliocene basalt flows cover vast surfaces on the uplands, indicating that the landscape at the time was incised little if at all, and that the Deschutes River and its tributaries were flowing at an elevation near the present canyon rims near Madras and Maupin. Specific evidence is found at Round Butte, near Round Butte Dam, where a 3.97±0.05-million-year-old basalt flow invaded Deschutes River gravel about 275 m above the present river level [*Smith*, 1986, 1987b].

The Deschutes and Dalles Formations grade westward into Miocene volcanic rocks of the Cascade Range [*Smith et al.*, 1989]. These rocks are in turn overlain by the active volcanic arc of the present Cascade Range that forms the western boundary of the Deschutes River basin. Volcanism along the crest of the range, as well as at numerous vents that pepper the eastern flank of the range, has resulted in a largely constructional topography of young volcanoes and lava flows that are mostly less than 2 million years old [Plate 1; *Taylor*, 1990; *Walker and MacLeod*, 1991].

Extensive lava flows from Newberry Volcano south of Bend flowed into and partly filled the Crooked and Deschutes River canyons between 1.2 and <0.4 million years ago [Figure 2; *Russell*, 1905; *Stearns*, 1931; *Smith*, 1986, 1991; *Bishop and Smith*, 1990; *Sherrod et al.*, in press]. Their distribution and thickness show that by 1.2 million years ago, the Deschutes River system had incised to near its present elevation near Round Butte Dam. Similarly, a 0.9±0.1 million year old basalt flow from Stacker Butte [*Shannon and Wilson Inc.*, 1973, cited in *Bela*, 1982], flowed down the north valley wall of the Columbia River to near present river level near the mouth of the Deschutes, indicating that local base level at the Columbia-Deschutes confluence has not changed substantially in the last million years. The 275 m of incision between about 4 and 1 million years ago indicates a period of regional incision and canyon formation affecting at least the north half of the Deschutes River basin, during which downcutting averaged nearly 0.1 mm/yr. Repeated episodes of incision through the subsequent canyon-filling lava flows (Figure 2) were at even more rapid rates.

Topography and Drainage Network

The overall topography and drainage network development within the Deschutes River basin is the result of this geologic history. To frame discussion of the overall geologic, topographic and hydrologic characteristics of the basin, we have subdivided the watershed into three terranes on the basis of general geologic and topographic characteristics (Figures 3 and 4).

Eastern Highlands Terrane. The Ochoco Mountains and high lava plains form the southeastern part of the Deschutes River basin. This region, largely drained by the Crooked River, is underlain by a variety of rocks, but the main Ochoco Mountains are formed primarily of the John Day and Clarno Formations (unit Tsf on Plate 1). These formations are mainly composed of weathered lava flows and poorly consolidated claystone, siltstone, and volcanic ash-flow tuff deposited between 55 and 20 million years ago. The John Day and Clarno Formations are susceptible to landsliding, and almost all of the landslides in the Deschutes

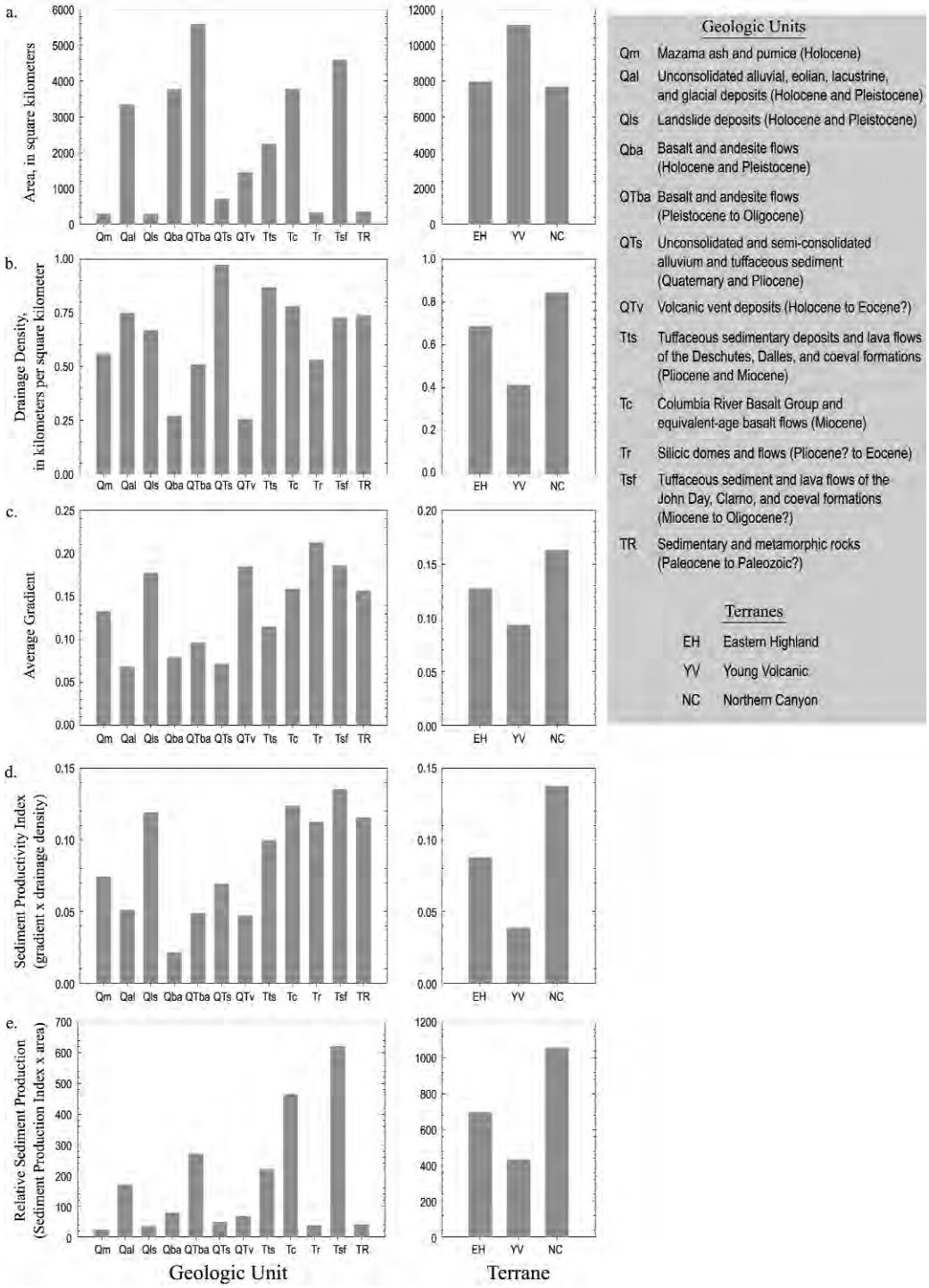

Figure 3. Geomorphic and physiographic attributes of each of the twelve major geologic units (Plate 1) and three terranes (Figure 4) within the Deschutes River basin. (a) Area of surface exposure. (b) Drainage density, from U.S. Geological Survey 1:100,000 digital hydrography. (c) Average hillslope gradient, calculated from U.S. Geological Survey 30-meter digital elevation data. (d) Sediment Production Index (SPI), calculated as the product of mean gradient and drainage density. (e) Relative potential for sediment production, calculated as the product of SPI and area.

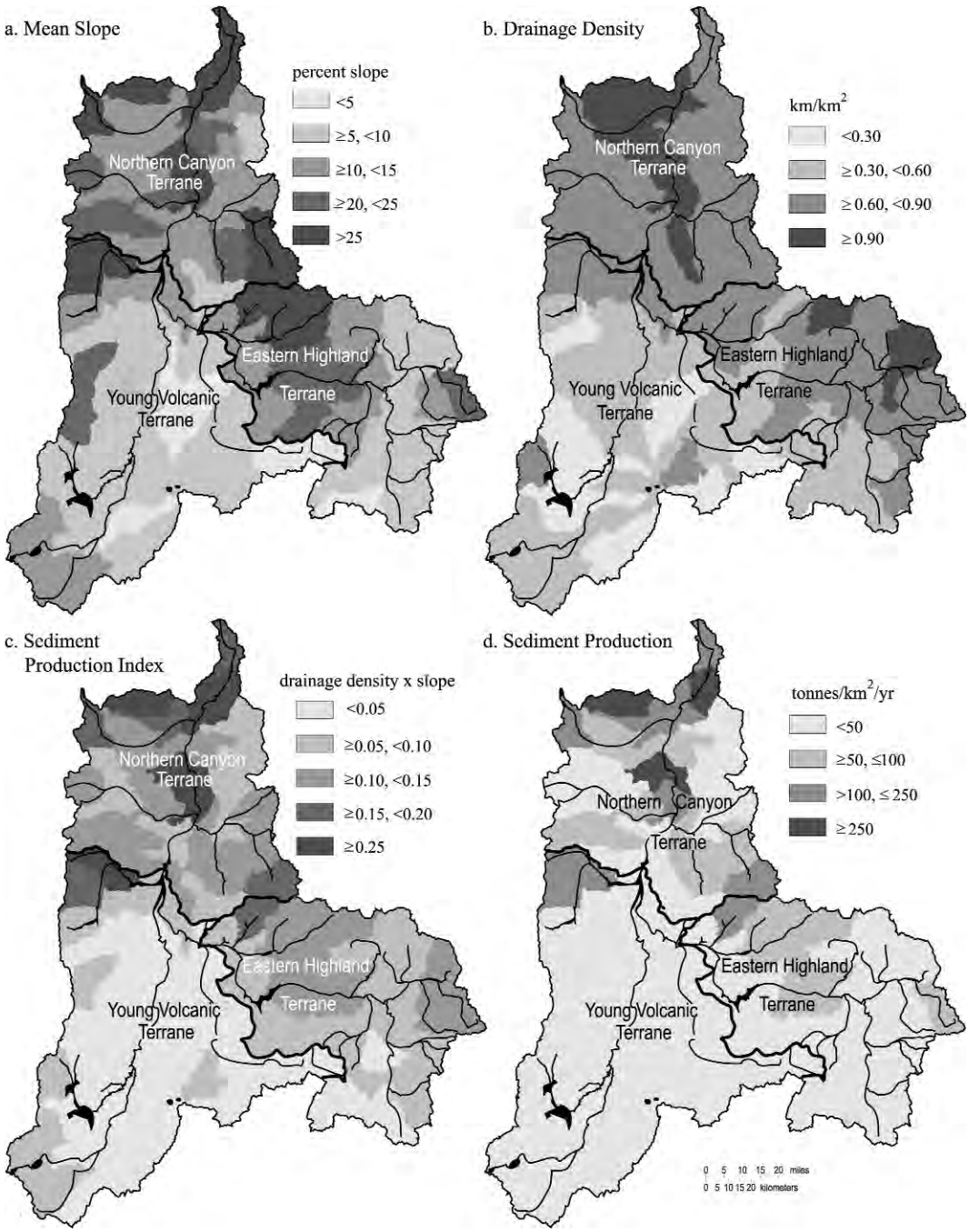

Figure 4. Distribution of geomorphic attributes and estimated sediment production for 100 approximately equal-sized subbasins of the Deschutes River basin. (a) Mean subbasin hillslope gradient, calculated from U.S. Geological Survey 30-meter digital elevation data (depicted in Figure 1). In many subbasins there are areas of significantly higher and lower slopes. (b) Subbasin drainage density, from mapped watercourses shown by U.S. Geological Survey 1:100,000 digital hydrography (shown on Figure 6). (c) Sediment Production Index (SPI), calculated as the product of mean gradient and drainage density as depicted (in a generalized fashion) in 4a and 4b (where slope is expressed as a fraction). (d) Calculated sediment yields, developed from empirical relation between SPI and surveyed accumulations in Deschutes River basin reservoirs (shown in Figure 14).

River basin are within these units (Plate 1). This landscape is one of the oldest in the Deschutes River basin, and more than 10 million years of weathering has produced a well-integrated hydrologic network in the erodible rocks of the region. The Ochoco Mountains have a high density of stream channels (Figure 4b) that connect steep hillslopes and source channels to trunk channels flowing within alluvial valleys.

Young Volcanic Terrane. The southern and southwestern part of the basin, drained by the Deschutes and Metolius Rivers upstream of the Pelton-Round Butte dam complex, is bounded by the high and rugged Cascade Range on the west, the western margin of Newberry volcano lava flows on the east, and indistinct low divides between the Klamath Basin and the Basin and Range Province to the south. The Young Volcanic terrane is underlain by young volcanic rocks (units QTba, Qba and QTv on Plate 1) and basin-filling deposits (unit Qal) that have accumulated behind drainage-blocking lava flows and fault scarps. Pleistocene glacial deposits and outwash locally mantle uplands along the east flank of the Cascade Range. Pumice from Mount Mazama (Crater Lake) forms a widespread surface layer in the southern part of the province (mapped as unit Qm on Plate 1 where it obscures the underlying bedrock). The largely constructional volcanic landscape coupled with Quaternary faulting and channel-damming lava flows has resulted in a sparse and locally disconnected surface channel network traversing low-relief alluvial and lacustrine basins (Figures 4a and 4b).

Northern Canyon Terrane. The northern part of the Deschutes River basin is composed of dissected tablelands formed along the eastern rampart of the Cascade Range and the western Columbia River Plain. The central axis of the basin consists of sharply etched canyons rimmed by young basalt flows and incised into basin-filling sediment and older volcanic and volcaniclastic rocks. From Lake Billy Chinook downstream, the Deschutes River is deeply incised within a canyon variously carved into the relatively soft John Day and Clarno Formations, cliff-forming CRBG basalts, and younger strata of the Simtustus, Deschutes, and Dalles Formations with their capping basalt flows. Large tributaries from the west drain the Cascade Range, whereas tributaries from the east drain tablelands of CRBG and landslide-dominated uplands of the John Day and Clarno Formations. This terrane has the highest average slope and drainage density of the entire basin (Figures 3 and 4).

Geology, Topography, and Drainage Pattern. Topographic and stream-network properties in the basin result from the strong correspondence of geomorphic properties, such as slope and drainage density, with geology. This correspondence gives each of the terranes its distinct topographic and hydrologic characteristics (Figures 3 and 4). The older rock units that underlie most of the uplands of the Eastern Highlands and Northern Canyons have the greatest average slope. Of the widely distributed units, the John Day and Clarno Formations (grouped on Plate 1 as unit Tsf) and the CRBG (unit Tc on Plate 1) have the greatest average hillslope gradients. Late Tertiary and Quaternary vent complexes (unit QTv) also have relatively high average gradients. The older high-relief uplands underlain by the John Day and Clarno Formations and the CRBG also have relatively high drainage densities (Figure 3). The greatest drainage densities in the Deschutes River basin have developed on the poorly consolidated and unconsolidated Tertiary and Quaternary sedimentary rocks. These units (Tts and QTs on Plate 1), which were deposited during times of basin filling, regional aggradation, and higher base levels, are now densely drained by closely spaced channels, especially in the Northern Canyons province. In contrast, the young volcanic rocks (units Qba, QTba, and QTv of Plate 1), which characterize the Young Volcanic terrane, have drainage densities typically less than half that of most other units in the basin (Figure 3).

Hydrology

The unique hydrologic characteristics of the Deschutes River basin are largely controlled by the geology, topography, and stream network [see also *Gannett et al.*, this volume]. Average annual runoff for the 26,860 km^2 basin is $5.2 \cdot 10^9$ m^3, which is equivalent to about 0.19 m over the entire drainage area. By far the largest portion of this water is derived from the high Cascade Range along the western part of the drainage basin, where high elevation and oceanward position promote greater precipitation and substantial winter snowpack (Figure 5). Farther east within the Cascade Range rain shadow, annual precipitation and runoff diminish rapidly, resulting in semi-arid rainfall and runoff conditions for much of the basin (Figures 5 and 6).

Near its confluence with the Columbia River, the Deschutes River has a mean monthly flow ranging from 124 m^3/s in August to 213 m^3/s in February (Figure 6, Deschutes River at Moody, 1965-1996). Prior to regulation, the highest monthly averages were in early spring and resulted primarily from snowmelt in the Cascade Range. Lowest flows are typically during the late summer months of July, August, and September. The relatively small range between low and high flows is unusual and was noted by *Russell* [1905], who wrote that:

> "The Deschutes is of especial interest to geographers, as it exhibits certain peculiarities not commonly met with.

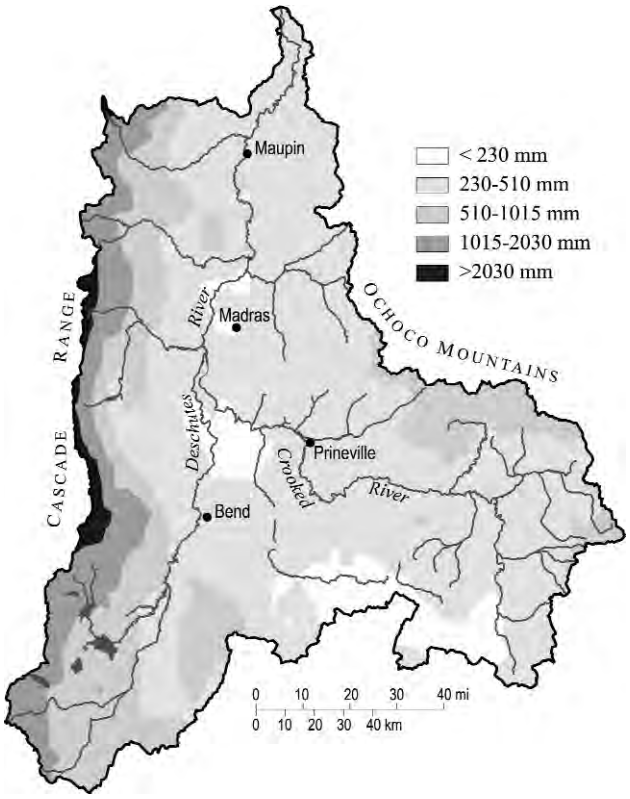

Figure 5. Mean annual precipitation in the Deschutes River basin for the period 1961-1990. From data provided by the Spatial Climate Analysis Service, Oregon State University. (http://www.ocs.orst.edu/prism/prism_new.html; August, 2001).

> Although flowing from high mountains on which precipitation varies conspicuously with seasonal changes and where snow melts rapidly as the heat of summer increases, its volume, throughout a large section of its course, is practically constant throughout the year."

and by *Henshaw et al.* [1914, p. 12] who more specifically observed:

> "The flow of the river is more remarkably uniform than that of any other river in the United States comparable with it in size, and its economic value is almost incalculable. At the mouth of the stream the maximum discharge is only six times the minimum. Ocular evidence of this uniformity of flow is presented by the low grass-grown banks between which the river flows for much of its course."

The steadiness of flow is illustrated by comparing the annual hydrographs and flood peak records of the Deschutes River basin with those of the adjacent and similar-sized basins to the west (Willamette Basin) and east (John Day Basin) (Figures 7 and 8). For the John Day River, the mean monthly discharge for April is more than thirty times that for September. Likewise for the Willamette River, the mean monthly discharge for January is about ten times that for August. In contrast, the Deschutes River varies only by a factor of 1.5 between the months of greatest and least flow. Just as the annual response to flow is tempered in the Deschutes River basin, so is the response to individual climatic events. The maximum meteorologic peak discharge for the Deschutes River just downstream from the Pelton-Round Butte dam complex was 540 m^3/s on February 8, 1996[2]—less than five times the mean flow of 125 m^3/s. In contrast, the largest flood discharges on both the Willamette and John Day Rivers have been more than twenty times the rivers' mean flows (Figure 8).

The uncommonly steady flow of the Deschutes River is due primarily to the poorly integrated surficial drainage system along the eastern flank of the Cascade Range in the southern and western parts of the Deschutes River basin. Much of the seasonal precipitation and snow melt infiltrates into extensive groundwater systems within the highly permeable young volcanic fields and basin fill deposits, emerging months to years later in large springs at the headwaters of the Metolius River, along the lower Crooked River, and between River Mile (RM) 100 and 120 on the Deschutes River[3] [*Russell*, 1905; *Henshaw et al.*, 1914; *Stearns*, 1931; *Manga*, 1996, 1997; *Gannett et al.*, 2001, *Gannett et al*., this volume]. Consequently, there is little monthly or seasonal variation in flow for many headwater drainages in the southern and western parts of the Deschutes River basin (Figure 6). As a result, the annual hydrograph of the Deschutes River shows minimal seasonal variation near the Pelton-Round Butte dam complex, where springs contribute the majority of the total flow volume [*Gannett et al.*, this volume]. In contrast, seasonal flow variations are much greater in the headwater basins of the older, steeper, and more dissected terrain in the eastern Deschutes River basin (Figure 6), but because the total volume of flow from these more arid drainages is small, they do not substantially affect the annual distribution of flow in the lower Deschutes River. Some additional flow regulation is provided by the abundant lakes and glaciers in Cascade Range headwaters, and also

[2]The February 8, 1996, flow was not substantially attenuated by the Pelton-Round Butte dam complex [*Fassnacht*, 1998]. A larger flow (640 m^3/s) on July 16, 1983, resulted from a short accidental release from the Pelton-Round Butte dam complex.

[3] Units given are metric except for locations, which are given as river miles (RM), or miles upstream from the river mouth as marked on USGS topographic maps. These values are close to, but not necessarily the same as, actual distances along the present channel. Fractional river miles given herein are based on interpolations between these published river miles.

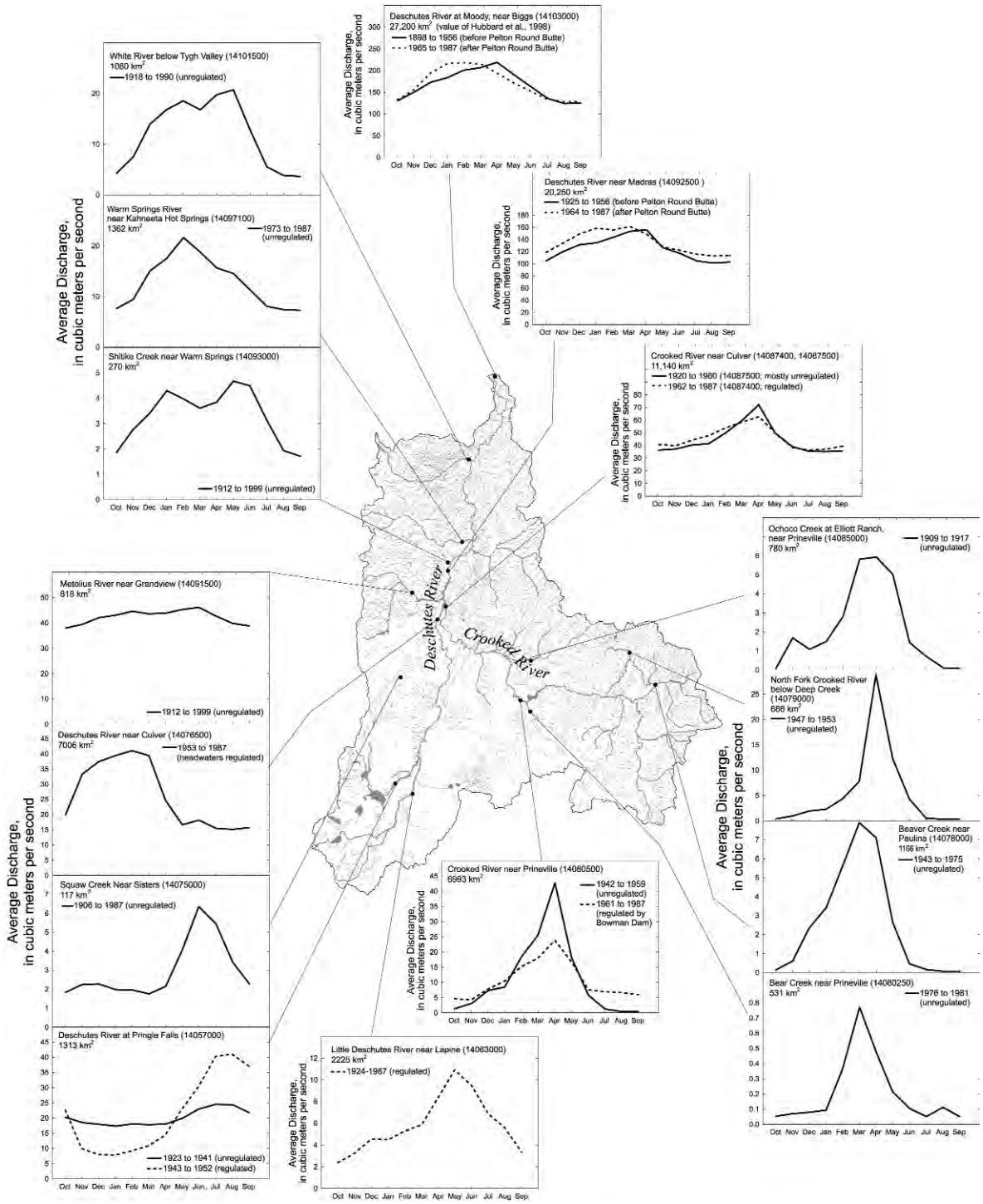

Figure 6. Hydrography and representative annual hydrographs for U.S. Geological Survey stream gaging stations in the Deschutes River basin. Data from *Moffatt et al.* [1990] and the U.S. Geological Survey National Water Information System (http://water.usgs.gov/nwis).

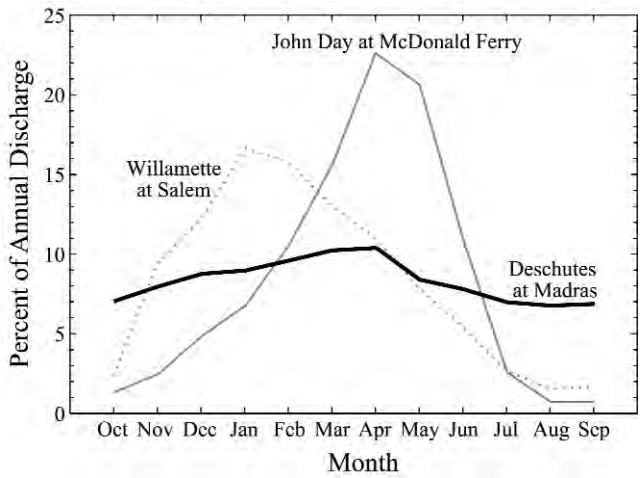

Figure 7. Mean monthly discharges for the John Day River at McDonald Ferry (station No. 14048000, period of record 1905-1987, drainage area 19,630 km^2), Deschutes River near Madras (14092500, 1925-1956, 20,250 km^2), and Willamette River at Salem (14191000, 1910-1941, 18,855 km^2). Discharges are expressed in terms of percent of annual flow to emphasize differences in seasonal distribution of runoff. Periods of record selected to minimize effects of upstream dams. Data from *Moffatt* et al. [1990]. Basin locations shown in Figure 1.

by two storage reservoirs in the Crooked River system and three reservoirs in the Deschutes River headwaters.

Steady discharge and muted response to individual meteorologic events are pronounced for flow entering Lake Billy Chinook at the Pelton-Round Butte dam complex, where the largest flows are less than five times the mean annual flow. However, flow response to individual runoff events becomes progressively greater downstream in the Northern Canyons terrane. For example, large inflows to the Deschutes River from Cascade Range tributaries (primarily Shitike Creek, Warm Springs River, and White River) during the February 1996 flood (the largest flood in nearly 100 years of record) increased the peak discharge from 540 m^3/s (Deschutes River near Madras) to 1990 m^3/s (Deschutes River at Moody), an increase of a factor of 3.7 despite only a 26 percent increase in drainage area. Similar increases occurred during the December 1964 flood, although more runoff was captured by storage reservoirs during this event [*Beebee and O'Connor*, this volume; *Hosman et al.*, this volume]. The large peak flows generated in the Northern Canyons terrane result from the steeper and more dissected tributary drainages and the absence of an extensive regional groundwater system such as found in the southern Deschutes River basin. This heightened storm response of the Northern Canyons tributaries is reflected in the early winter peaks and the greater month-to-month variation of the annual hydrographs for Shitike Creek, Warm Springs River, and White River compared to Cascade Range stations in the Deschutes River headwaters (Figure 6).

Regional Sediment Production and Transport

Together, the geology, geomorphology, and hydrology of the Deschutes River basin substantially influence the type and quantity of sediment delivered to the Deschutes River as well as the frequency of sediment movement. There are few data on actual sediment delivery in the Deschutes River basin, so the following discussion is largely qualitative and founded on consideration of the overall geologic history as well as current geomorphic and hydrologic characteristics. In a later section, we apply sparse sediment-transport measurements and the record of modern sediment delivery to Lake Billy Chinook, Prineville Reservoir, and Ochoco Reservoir to provide quantitative support for the inferences derived here from more general observations.

Within the Young Volcanic terrane of the southern and southwestern parts of the basin, the primarily basaltic and andesitic volcanic rocks are generally unweathered and do not produce large volumes of sediment. These lava flows typically break down to gravel (by physical weathering processes such as freeze-thaw) and clay (through chemical weathering). Modern processes produce very little sand. Reworked tephra, ash, and Mazama pumice also contribute in some degree to bedload. The low drainage density (Figure 4b) coupled with the small and steady surface flows in this part of the basin (Figure 6) result in only infrequent sediment transport in the river systems draining this terrane. In the southern part of the basin, much of the transported sediment is probably trapped in lakes and alluvial basins formed behind young lava flows and by basin-range faulting.

Nevertheless, large volumes of sediment have been produced episodically in the Young Volcanic terrane during periods of extensive glaciation and during large volcanic eruptions. Large glaciers and ice sheets covered much of the high Cascade Range during Pleistocene ice ages [*Crandell*, 1965; *Scott*, 1977]. These glaciers eroded and transported a substantial volume of gravel, sand, and silt derived from erodible Cascade Range stratovolcanoes and formed large moraines and outwash plains near their termini. These deposits compose much of the alluvium along the eastern flank of the Cascade Range (Plate 1, unit Qal). Sand and gravel outwash terraces can be traced from moraines down many of the tributaries to the Deschutes and Metolius Rivers [e.g. *Scott*, 1977; *Sherrod et al.*, in press], indicating that at times of peak sediment production there was abundant sand and gravel delivered continuously to the Metolius and Deschutes Rivers.

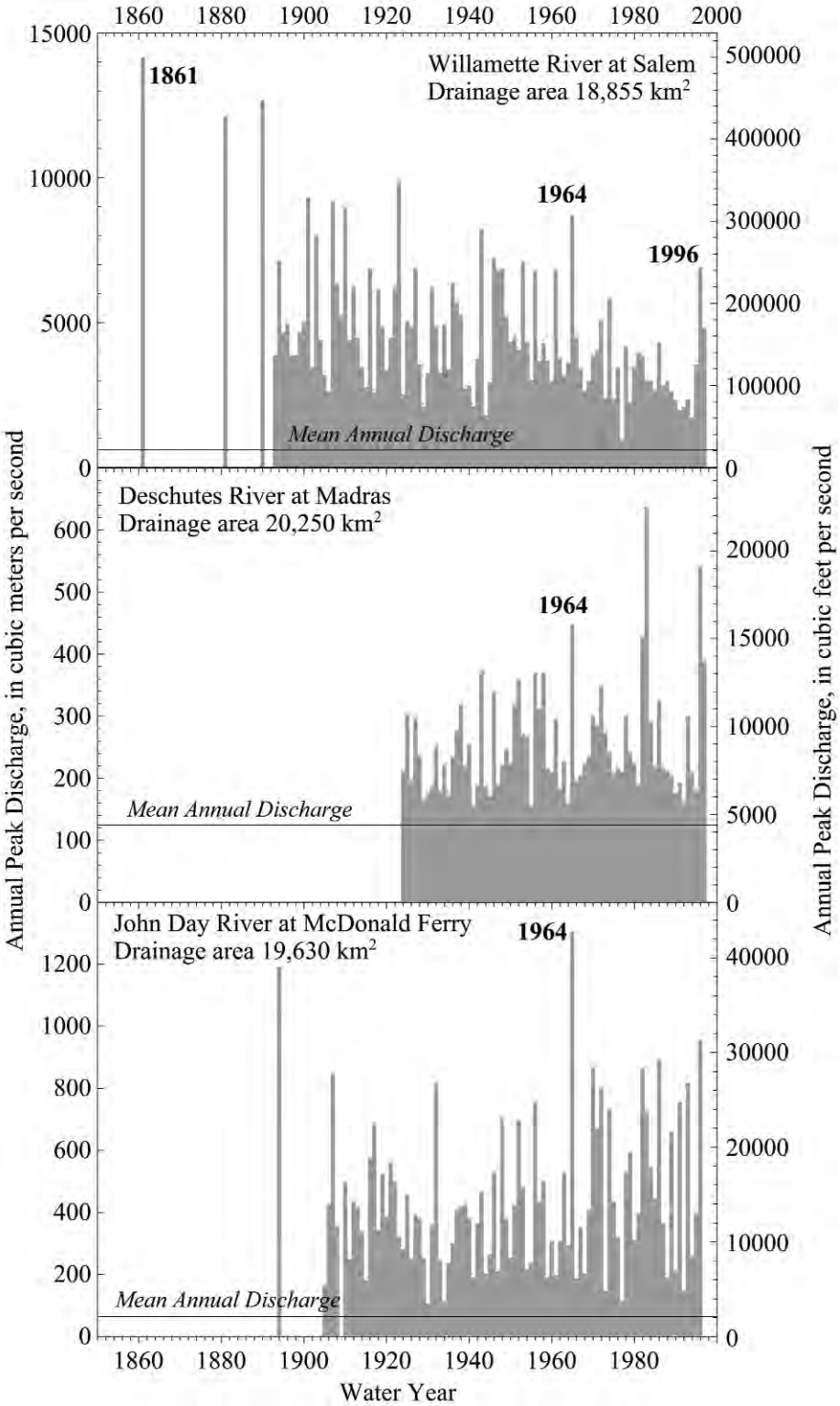

Figure 8. Annual peak discharges for the Willamette (station No. 14191000), Deschutes (14092500), and John Day (14048000) Rivers. Basin locations shown in Figure 1.

Most of the remaining glacial deposits, however, are perched on ridgetops, lava flows, and hillslopes away from active channels, so that little of this sediment now makes its way into modern channels.

Large volcanic eruptions have also episodically fed immense quantities of sediment to the Deschutes and Metolius Rivers. During the last 500,000 years, major eruptions from volcanic centers west of Bend [*Hill and Taylor*, 1989], Mount Jefferson [*Beget*, 1981; *Conrey*, 1991] and Mount Mazama [Crater Lake; *Sarna-Wojcicki and Davis*, 1991] have spread vast quantities of fallout ash and pumice over large parts of the Deschutes River basin, but the thickest accumulations have been along the eastern flank of the Cascade Range in the upper Deschutes and Metolius drainages. Several individual pumice and ash falls from the Tumalo volcanic center west of Bend are locally thicker than 10 m [*Hill and Taylor*, 1989]. The 7500-year-old Mazama pumice is sufficiently thick to obscure the underlying geology over more than 250 km^2 of the southern margin of the Deschutes River basin (unit Qm on Plate 1). Sand- and gravel-sized pumice is readily mobilized from hillslopes and transported downstream; consequently, during the decades following these major eruptions, there were likely periods of greatly enhanced sediment transport of silt-sized tephra and sand- and gravel-sized pumice grains, resulting in substantial channel aggradation. Pyroclastic flows (hot gas-rich flows of volcanic rock fragments) and lahars (volcanic debris flows) from Cascade Range eruptions have likely also episodically introduced large quantities of sand and gravel directly into the upper Deschutes and Metolius Rivers [e.g. *Smith*, 1986; *Hill and Taylor*, 1989]. Although there is sparse stratigraphic record of such events in Quaternary deposits above Lake Billy Chinook, deposits from a >75 ka[4] lahar from Mount Jefferson are preserved along the lower Deschutes River [*O'Connor et al.*, this volume].

Within the Eastern Highlands terrane, including the Ochoco Mountains and high lava plains of the southeastern part of the Deschutes River basin, the deeply weathered lava flows and poorly consolidated claystone, siltstone, and ashflow tuffs of the John Day and Clarno Formations are highly erodible, producing silt and clay from extensively dissected uplands. The fine-grained material produced in the uplands locally accumulates as valley fill along larger tributaries. Over geologic time scales, however, the dense stream network within this province efficiently conveys abundant fine-grained sediment from the eroding highlands into the Crooked and Deschutes Rivers.

The distinctly different hydrologic character of the Eastern Highland terrane of the Deschutes River basin likely amplifies sediment transport efficiency. The Crooked River has a more arid hydrologic regime with less total runoff but significantly greater month-to-month variation than does the upper Deschutes River (Figure 6). Prior to construction of Prineville Reservoir, the mean March flow of the Crooked River near Prineville was 100 times the mean August flow, whereas the variation for the Deschutes River near Culver is less than a factor of three [Figure 6; *Moffatt et al.*, 1990]. Because the ability to entrain and transport sediment increases exponentially with discharge, the flashier flows of the Crooked River probably expedited sediment delivery to the Deschutes River under pre-dam conditions.

As in the Young Volcanic terrane, there has probably been significant variation in the sediment delivery from the Ochoco Mountains over geologic and historic time scales. During the last 0.5 million years, the drainage area of the Crooked River has also been repeatedly blanketed by eastward drifting plumes of ash and pumice from Cascade Range eruptions. These deposits were probably eroded rapidly from steep hillslopes and moved into the channel system. There were no glaciers in the Ochoco Mountains during Pleistocene glacial periods, but the colder climates may have enhanced rates of weathering and hillslope sediment production. Pleistocene sand and gravel terraces 15 meters above the modern floodplain near Prineville reflect regional stream aggradation and increased sediment delivery that probably resulted from glacial climates.

Historic incision of fine-grained valley alluvium in the Crooked River basin has formed extensive gully networks [*Russell*, 1905; *Buckley*, 1992; *Welcher*, 1993] that continue to erode headward up the stream channel network (Figure 9). Incision has been widely attributed to overgrazing [e.g.

Figure 9. Bear Creek eroding fine-grained valley alluvium in the Crooked River drainage. Cut bank is about 3 m high. Photograph by J.E. O'Connor, 1998.

[4] "ka" = kilo-annum, or thousands of years before present.

Russell, 1905; *Buckley*, 1992]; however, in a study of Camp Creek in the upper Crooked River basin, *Welcher* [1993] identified several periods of prehistoric incision followed by aggradation that may have corresponded to subtle climate shifts. Regardless of their cause, periods of channel incision and gully formation would lead to substantially elevated rates of sediment transport downstream into the major watercourses.

Within the Northern Canyon terrane, a variety of sediment size and abundance is produced from the diverse rock types and environments. The John Day, Clarno, Simtustus, Deschutes, and Dalles Formations produce primarily silt and clay from fluvial erosion and mass movements of soft ashy beds. CRBG and younger basalts, as well as lava flows within the John Day, Clarno, and Deschutes Formations, physically weather into boulders and cobbles that enter the Deschutes River by tributary floods, debris flows, and canyon rockfalls. Chemical weathering of basalt typically generates clay minerals that are incorporated into overlying soils and can wash into the river system during periods of soil erosion.

With the Deschutes River flowing as much as 600 m below the adjacent uplands, many tributaries are short and steep. Larger tributaries such as the Warm Springs and White Rivers are incised into narrow valleys that lead directly from the Cascade Range. Consequently, the hydrologic response to both regional runoff events (such as December 1964 and February 1996 rain-on-snow events) and short-duration local events such as summer thunderstorms can be swift and intense. As described above, more than 70 percent of the February 8, 1996 peak discharge, was contributed by tributaries downstream of the Pelton-Round Butte dam complex. This integrated hydrologic network coupled with abundant sediment sources allows for efficient transport of relatively large quantities of sediment (compared to the areas of young lavas upstream) to the Deschutes River valley bottom during local and regional runoff events.

As with both the Young Volcanic and Eastern Highland terranes, Quaternary rates of sediment input to the Deschutes River system in the Northern Canyons have probably varied substantially. This section of the Deschutes River basin has also been episodically blanketed with ash and pumice falls, although not as thickly as have the southerly parts of the basin. Large glacial-age ice caps and glaciers formed around Mount Hood and the adjacent Cascade Range, resulting in outwash gravels that contributed significantly to the sediment load of the Deschutes River. Lahars and pyroclastic flows from Cascade Range eruptions have episodically delivered large quantities of gravel and sand to the Deschutes River. A recent example is a circa A.D. 1790 sandy lahar from Mount Hood (Jon Major, USGS, oral communication, 1998) that reached the Deschutes River via the White River. Large Quaternary landslides, primarily within the John Day and Clarno Formations have directly injected large volumes of sediment into the Deschutes River valley bottom [*O'Connor et al.*, this volume]. The northern part of this area has also been episodically mantled with windblown silt and fine sand derived from the Columbia Plain, and up to 10 m of silt and fine sand was deposited during backflooding 100 km up the lower Deschutes River valley during the late Pleistocene Missoula Floods [*O'Connor et al.*, this volume].

Deschutes River Basin Sediment Budget

These largely qualitative inferences on modern sediment supply are bolstered by limited data on sediment production and transport in the Deschutes River basin. Bathymetric surveys and bottom sampling of Lake Billy Chinook (the reservoir impounded by Round Butte Dam, Figure 1) undertaken as part of this study, as well as surveys of Prineville and Ochoco Reservoirs by the Bureau of Reclamation (Figure 1), furnish volume and size estimates for regional sediment production during the last 34-90 years. Suspended load measurements conducted by the U.S. Geological Survey for short periods at five gages provide sparse additional records of annual sediment production.

Reservoir Sedimentation Surveys. Surveys and sampling of sediment accumulated in Lake Billy Chinook provide estimates of the volume and type of sediment trapped by the Pelton-Round Butte Project operations and precluded from moving from the upper Deschutes, Crooked, and Metolius River basins to the lower Deschutes River. Each of the three arms of Lake Billy Chinook were surveyed by Portland General Electric crews during the summer and fall of 1998, allowing determination of the individual sediment contributions from the Deschutes, Crooked, and Metolius Rivers for the 34 years since closure of Round Butte Dam (Figure 10). Electronic total stations and satellite telemetry were used to gather positions of depths acquired by a vessel-mounted electronic depth finder. For each of the three arms of Lake Billy Chinook, 30 to 44 cross sections were measured from the point where the river entered the lake to approximately 3 km downstream (Figure 11). Resulting cross-sections were compared to cross-sections derived from 1.5-m (5-ft) contour maps surveyed by Portland General Electric prior to inundation. This analysis shows that deltas up to 15 m thick have formed where the Crooked and Deschutes Rivers enter Lake Billy Chinook. No detectable delta could be resolved by the repeat cross sections for the Metolius arm, although

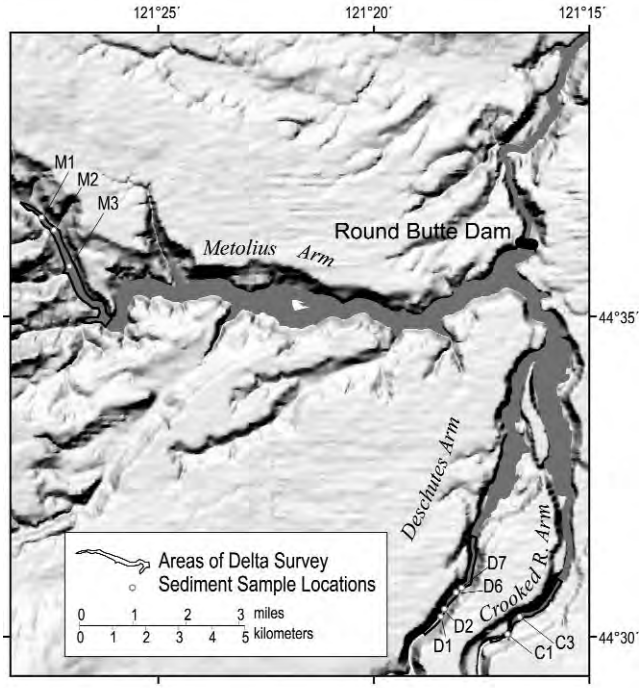

Figure 10. Location of delta surveys and sediment samples in Lake Billy Chinook. Survey and sample location data from Portland General Electric (Scott Lewis and Gary Reynolds, Portland General Electric, 1998 written communication). Hillshade topographic base from U.S. Geological Survey 30-m digital elevation data.

reconnaissance diving by Scott Lewis (Portland General Electric, oral communication, 1998) revealed local accumulation of silt, sand, and gravel up to 2 m thick, which is about the maximum uncertainty associated with comparing pre- and post-reservoir bathymetry.

The volumes of each of the Deschutes and Crooked River deltas were calculated by multiplying the average change in area for each pair of adjacent cross sections by the distance between each pair. Using this approach, the estimated volume of the delta where the Crooked River enters Lake Billy Chinook is about 627,000 m^3, and that for the Deschutes River is about 622,400 m^3 (Table 1). Composition of the deltas is not completely known, but reconnaissance augering and analysis of ten samples from the delta surfaces show that all three deltas are primarily composed of sand and gravel at their apices and become finer-grained farther and deeper into the reservoir (Figures 11 and 12). The Deschutes River delta is coarsest, having a pebbly delta apex that grades downstream to mostly sand. The Crooked River delta is distinctly finer than both the Deschutes and Metolius River deltas, with the upstream part of the delta formed primarily of sand, grading downstream to mostly silt and clay. These analyses support qualitative observations during reconnaissance diving and collection of the samples (Scott Lewis, written communication, 1998) that the Crooked River delta is primarily composed of silt, fine sand, and organic detritus; and the Deschutes River delta is composed of coarse sand with minor gravel at the delta apex grading to fine sand at the downstream crest of the delta.

Reservoir sediment volumes have also been measured by the Bureau of Reclamation for Prineville and Ochoco Reservoirs in the Crooked River drainage (Table 1; Ronald Ferrari, U.S. Bureau of Reclamation, written communication, 1999). In Prineville Reservoir, behind Bowman Dam on the Crooked River, a May 1998 survey indicated that about 5,657,400 m^3 had accumulated since the December 1960 closure of the dam. Ochoco Reservoir accumulated about 3,802,000 m^3 of sediment between January 1920 closure and a June 1990 survey. There are no available sediment-size data for these reservoirs.

These volume estimates were converted to masses by assuming *in situ* sediment densities of 1.3 to 1.5 tonnes/m^3 for sediment in Lake Billy Chinook and about 1.1 tonnes/m^3 for the presumably finer sediment in Ochoco and Prineville Reservoirs, for which large parts of their source areas are underlain by the John Day and Clarno Formations (Table 1). These sediment density values were based on empirical observations of reservoir sediment density presented in *Vanoni* [1975, pp. 38-44], which show that the density of reservoir deposits composed primarily of sand and gravel typically ranges between 1.3 and 1.5 tonnes/m^3. The 1.1 tonnes/m^3 density assumed for Ochoco and Prineville Reservoirs corresponds to an assumed sediment composition of silt and fine sand.

Sediment Yield. These measurements of reservoir sediment accumulation provide for independent decadal-scale estimates of modern sediment yield for parts of the basin (Table 1). The yield contributing to the Deschutes and Crooked River arms to Lake Billy Chinook for the 34-year period between 1964 and 1998 is remarkably low–on the order of 4 to 6 tonnes/km^2·yr. The yield from the Metolius arm is even lower. These low sediment yield values are all the more notable because the 34-year period that they encompass includes the two largest flow events in the last 140 years. Sediment yield in the upper Crooked River basin is substantially higher, ranging from 26 tonnes/km^2·yr in Prineville Reservoir (also including the sediment delivered by both the 1964 and 1996 floods) to 80 tonnes/km^2·yr for Ochoco Reservoir (only including the 1964 flood, but representing a much longer duration than the other reservoirs).

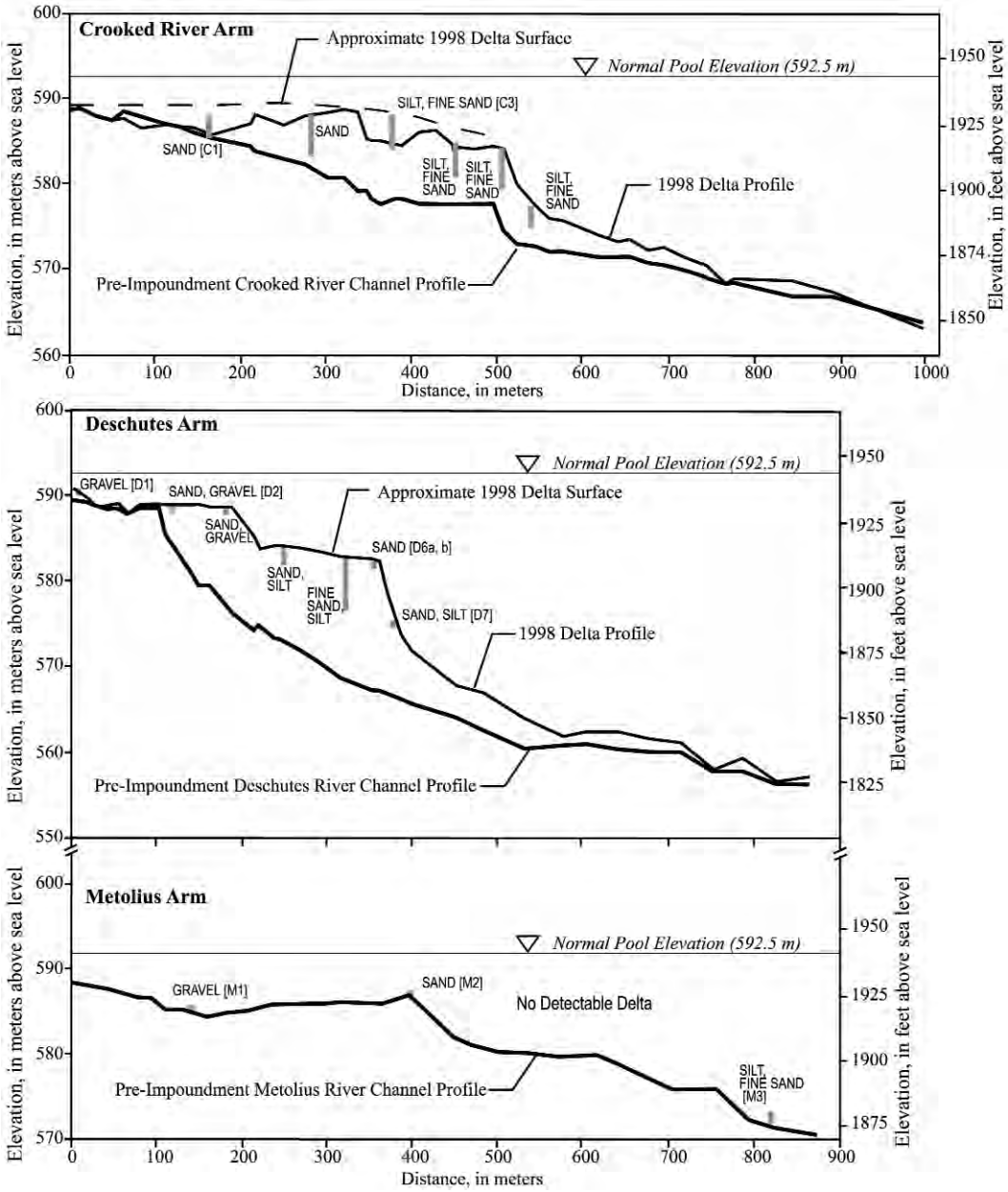

Figure 11. Upper 1 km of longitudinal profiles of the three arms of Lake Billy Chinook, showing pre-impoundment river profile, present delta profiles over the former channel thalwegs, and dominant substrate composition along each delta. Areas of surveys shown on Figure 10. There was no detectable difference between the present reservoir bottom and the former channel profile in the Metolius arm, although there has been up to 1.5 m of deposition locally (Scott Lewis, Portland General Electric, written communication, 1998). The approximate delta surface depicted for the Crooked Arm represents the overall uppermost elevation of delta deposits along the survey transects. In contrast, the surface of the Deschutes arm delta was more uniform across its breadth. Drawn from data from Portland General Electric (Gary Reynolds, 1998 written communication). Substrate descriptions from subsurface augering conducted by Scott Lewis (Portland General Electric, written communication, 1999; depth indicated by extent of vertical bars). Locations of analyzed samples (with sample designations) shown in Figure 10.

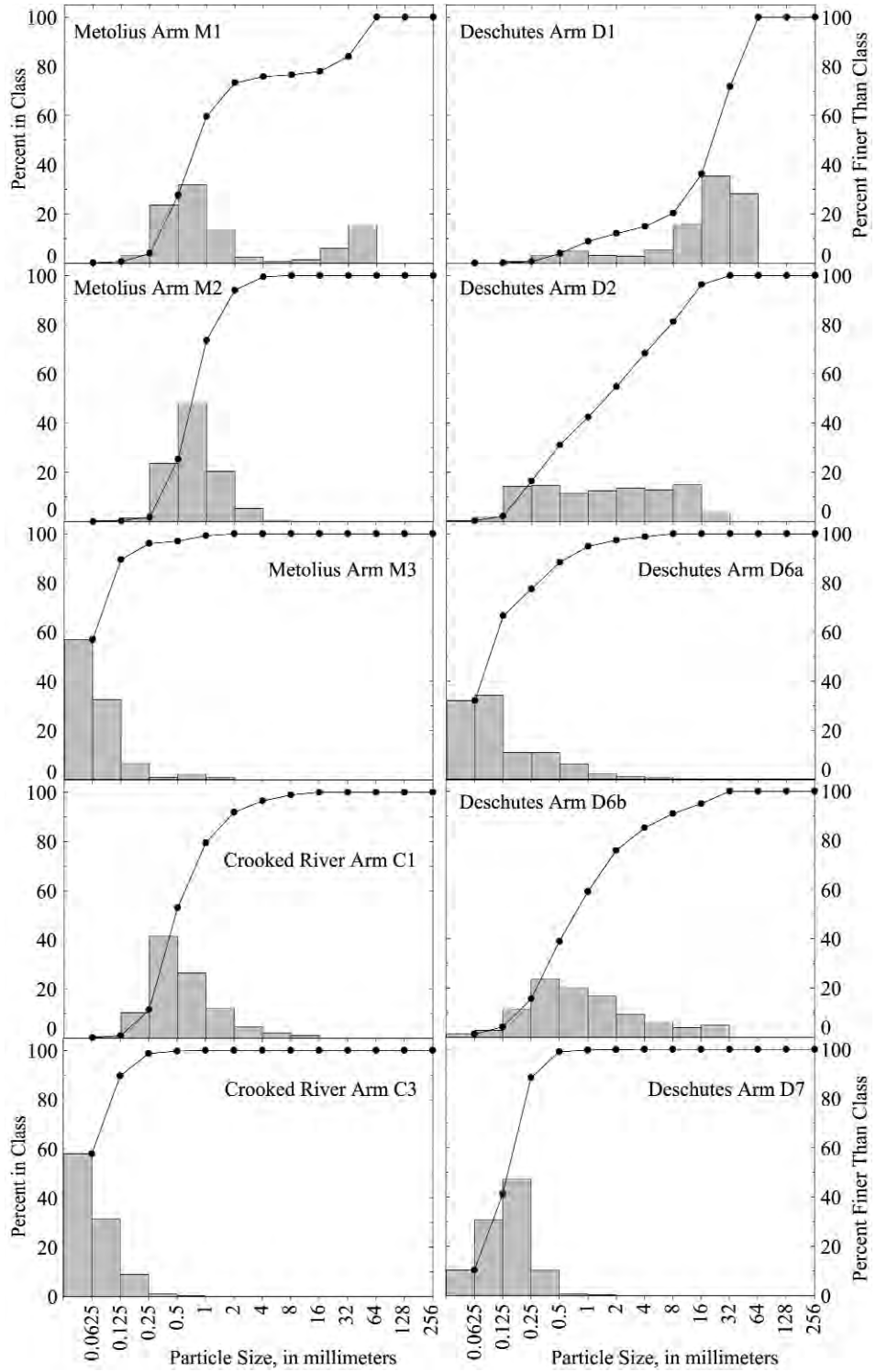

Figure 12. Grain size analyses showing percent in each size class (histogram) and cumulative weight percent (curve) for ten samples from Lake Billy Chinook. Sample locations shown in Figures 10 and 11. Samples collected by Scott Lewis, Portland General Electric. Analyses conducted by U.S. Geological Survey, Vancouver, Washington.

Table 1. Summary of sediment yield estimates determined from Deschutes River basin reservoir surveys.

Reservoir	Contributing Basin Area (km^2)	Closure and Survey Records	Surveyed Sediment Volume (m^3)	Assumed Sediment Density ($tonnes/m^3$)[1]	Sediment Mass (tonnes)	Sediment Yield ($tonnes/yr/km^2$)	Unit Area Sediment Production Index (km^{-3})
Deschutes Arm, Lake Billy Chinook	6000	Round Butte Dam closed Jan. 2, 1964; surveyed May 1998	622400	1.44	898700	4.4	0.032
Crooked River Arm, Lake Billy Chinook	3920	Round Butte Dam closed Jan. 2, 1964; surveyed May 1998	627000	1.25	803200	6.1	0.046
Prineville Reservoir	6346	Bowman Dam closed Dec., 1960; surveyed May, 1998[2]	5657400	1.12	6342000	26.0	0.078
Ochoco Reservoir	752	Ochoco Dam closed Jan., 1920; survey date June 1990[2]	3802000	1.12	4262100	80.4	0.136

[1]Estimated from measured and inferred delta composition and empirical observations of reservoir sediment density portrayed in *Vanoni* [1975, pp. 38-44].
[2]Sediment volumes, survey dates, and dam closure information provided by Ronald Ferrari, U.S. Bureau of Reclamation (written communication, 1999)

We have found no other measurements of regional sediment yield for equivalent contributing areas that are as low as the sediment yield of the areas contributing to the Crooked and Deschutes River arms of Lake Billy Chinook (Figure 13). These rates are generally two to seven times less than sediment yields reported by *Judson and Ritter* [1964] for the Columbia and Snake River basins, about seven to fifteen times less than reported for the Klamath River basin (as calculated from data attributed to Janda and Nolan in *Milliman and Syvitiski* [1992]), and more than two orders of magnitude smaller than those predicted by area-based regression equations developed by *Milliman and Syvitiski* [1992] for mountain drainage basins in temperate regions. These low overall rates of sediment yield from the areas contributing to Lake Billy Chinook reflect the predominance of young volcanic rocks (which produce little sediment), limited surficial hydrologic network in many of the sediment source areas, and the absence of modern processes that supply and deliver abundant sediment. The sediment yields of the areas contributing to Ochoco and Prineville Reservoir are more typical of other landscapes, but still lower than for most basins of similar size for which there are sediment yield measurements (Figure 13).

Sediment Budget. Sediment yield values from isolated parts of the basin document regional sediment contributions to the Deschutes River system, but do not fully portray basin-wide patterns of sediment yield. A basin-wide sediment budget is critical to fully evaluate the effects of impoundment on overall sediment flux. In this section we extrapolate the reservoir sediment yield data to the rest of the basin on the basis of basin physiography in order predict the spatial distribution of sediment input into the Deschutes River system and the effects of impoundment on overall sediment supply.

Our approach follows from the premise that in steady-state landscapes dominated by diffusive processes of surficial sediment mobilization (e.g. biogenic activity, rain-splash, soil creep, freeze-thaw action), sediment flux per unit stream length is proportional to the gradient of the flanking hillslope [*Culling*, 1960, 1963; *Hirano*, 1968], although this relation is not necessarily linear in steeper terrains [*Andrews and Buckman*, 1987; *Roering et al.*, 1999]. Consequently, the sediment yield per unit area will be proportional to the product of average slope gradient and drainage density, which we term *the sediment production index* (SPI). To apply this reasoning on a spatially explicit basis, we divided the Deschutes River basin into 100 approximately equal-sized and hydrographically defined subbasins for which area, drainage density, and average hillslope gradient were calculated from digital topographic and hydrographic data (Figure 4a, b). For each subbasin we then calculated the sediment production index as the product of subbasin drainage density and mean hillslope gradient (Figure 4c). Combining the areas now contributing sediment into the Crooked River and Deschutes arms of Lake Billy Chinook, and Prineville and Ochoco Reservoirs, and comparing the calculated sediment production index to actual sediment yields as recorded in the reservoirs yields the regression relation:

$$Q_s = 3.74\ (SPI)^{2.23} (r^2 = 0.98;\ P = 0.015),$$

where Q_S is sediment yield, in tonnes per square kilometer per year, and SPI is in units of km^{-1} (Figure 14).

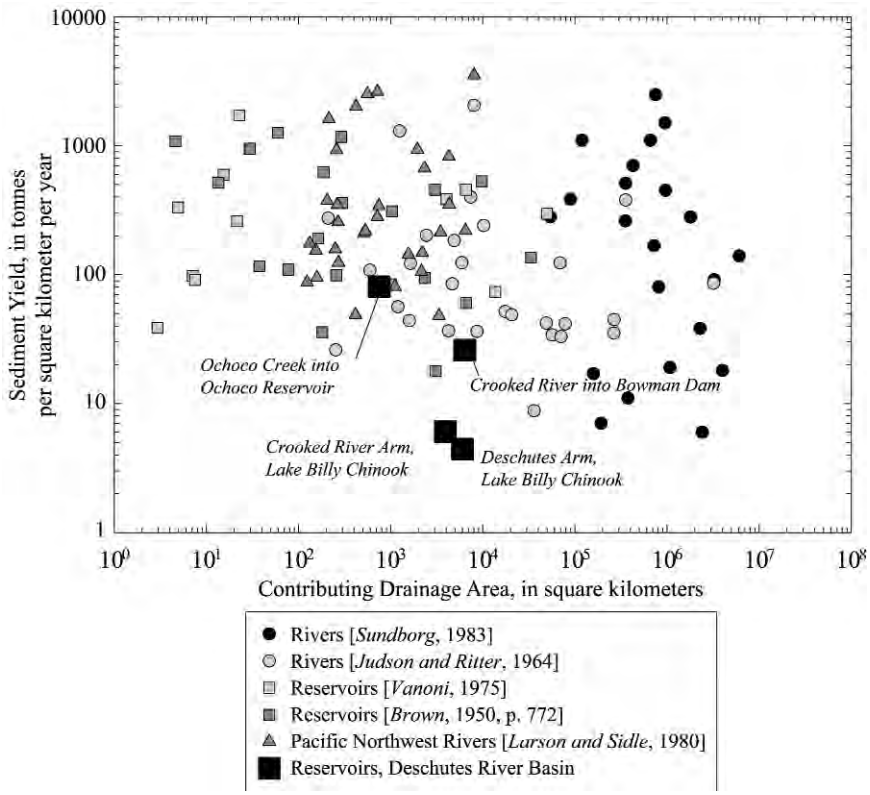

Figure 13. Compilation of sediment yield data from various sources, comparing sediment yield from parts of the Deschutes River basin to yields from other basins. Ochoco Creek and Crooked River sediment yields derived from surveyed sediment volumes behind Ochoco and Bowman Dams (Table 1; Ronald Ferrari, U.S. Bureau of Reclamation, 1999 written communication). Lake Billy Chinook (LBC) volumes measured by Portland General Electric survey crews in 1998 (Figures 10 and 11).

This result is only strictly applicable to transported bedload and suspended sand and silt (>0.004 mm) that drops out rapidly in these large reservoirs. Clay-sized particles probably stay in suspension long enough bypass the reservoirs. This result is also broadly consistent with the central tendencies (on a logarithmic plot) of the annual volumes of suspended load recorded at four U.S. Geological Survey gaging stations for short periods (Figure 14), although these gages also depict the substantial year-to-year variation in sediment transport. The results of a single year of suspended load measurements for White River, a large tributary draining the eastern Cascade Range and entering the Deschutes River downstream of the Pelton-Round Butte dam complex, are consistent with extrapolation of this relation to even higher values of SPI.

By applying this relation to the SPI calculated for each of the 100 subwatersheds (Figure 4d) and summing the resulting estimates of sediment yield downstream, we may estimate the overall downstream sediment flux and the incremental effects of impoundment in the Deschutes River basin (Figure 15). Under pre-impoundment conditions, modern sediment flux downstream of the confluence of the Deschutes, Crooked, and Metolius Rivers, 180 km upstream of the Columbia River confluence, is estimated to have been about 480,000 tonnes/yr. More than half of this volume was from the Crooked River basin. Downstream at the Columbia River confluence, the total annual sediment flux under pre-impoundment conditions is estimated to have been slightly more than 1,200,000 tonnes/yr, indicating that 60 percent of Deschutes River pre-impoundment sediment flux into the Columbia River is derived from below the Pelton-Round Butte dam complex. On the basis of this analysis, Trout Creek, Warm Springs River, and White River are likely to be major sources of sediment along the lower Deschutes River (Figure 15). In addition, the steep and dissected terrain formed where the Deschutes River has incised through the Mutton Mountains, between 120 and 90 km from the Columbia River confluence, (Figures 1 and 4) is also predicted to be an area of substantial sediment production and delivery. Consistent with this prediction is a concentration

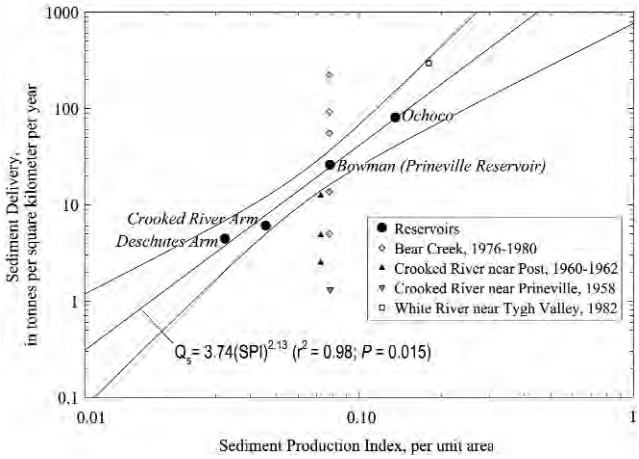

Figure 14. Regression and 95 percent confidence limits between unit Sediment Production Index values (SPI) and measured sediment yields (Table 1) for areas contributing to reservoirs in the Deschutes River basin. Shown for comparison are annual suspended load volumes measured at U.S. Geological Survey streamflow stations within the Deschutes River basin. Suspended load data from U.S. Geological Survey annual reports and water-supply papers.

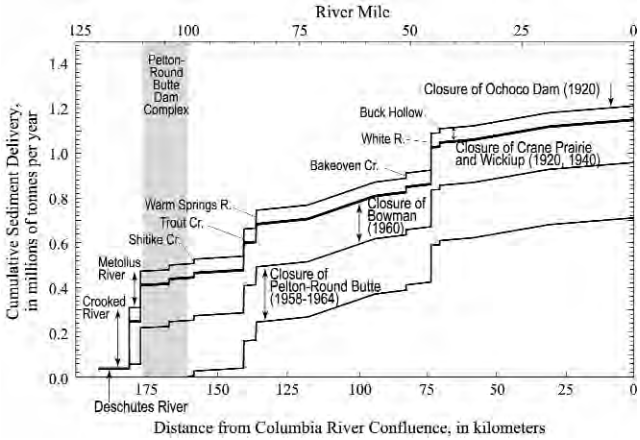

Figure 15. Calculated sediment budget for the lower 200 km of the Deschutes River showing spatial distribution of sediment input and the incremental effects of sediment trapping by upstream reservoirs. Sediment volumes determined on the basis of calculated SPI values (Figure 4) and the empirical relation between SPI and sediment yield shown in Figure 14. Uppermost curve shows calculated cumulative sediment delivery for preimpoundment Deschutes River upstream to Crooked River confluence, and lowest curve shows calculated cumulative sediment delivery after the stepwise reduction resulting from each of the major impoundments in the Deschutes River basin.

of tributary fan deposits along this section of Deschutes River [*Curran and O'Connor*, this volume), likely formed by floods and debris flows triggered by summer convective storms precipitating on the numerous short and steep tributaries.

These sediment yield and delivery estimates portrayed on figures 4c, 4d, 13, 14, and 15 represent modern pre- and post-impoundment conditions for the past 50 to 80 years, including the effects of two large regional floods. Nevertheless, the short time window of sedimentation recorded in Lake Billy Chinook and other basin reservoirs does not adequately reflect basin-wide sediment delivery over longer time scales that incorporate periods of volcanism, cataclysmic flooding, and glacial climates. Such events and processes that operate over longer time scales are important in controlling valley geomorphology and the transport of sediment into the Deschutes River system. Thus, a key to assessing the effects of Deschutes River basin dams on river, channel, and valley bottom conditions is the role of the modern sediment transport regime relative to sediment yield and delivery events that occur over geologic time scales. Several papers in this volume explore this matter in greater detail, but the remarkably low sediment transport rates of the modern (both pre- and post-impoundment) Deschutes River basin help tip the scales toward greater importance of rare high-magnitude events.

SUMMARY OF IMPORTANT BASIN-SCALE PROCESSES AND CONDITIONS

The cumulative result of the geologic history of the Deschutes River basin is that the basin has distinct geologic, hydrologic, and geomorphic attributes when compared to other western U.S. rivers. Of these attributes, the remarkably steady flows and low sediment flux are important factors for understanding the geomorphology of the Deschutes River below the Pelton-Round Butte dam complex. These modern processes and conditions, as well as the history of geologic events such as canyon cutting, volcanism, and glaciation, form the framework for the studies of valley geomorphology, channel processes, and fish ecology reported in accompanying papers. The most important aspects of this framework are:

1. The present stream network and valley morphology have resulted from tens of millions of years of tectonic, volcanic, and erosional processes. The overall northward course of the Deschutes River was established by about 12 million years ago. The present canyon of the lower Deschutes River was carved between 4 and 1 million years ago, but there have been subsequent episodes of partial

refilling and incision initiated by lava flows, volcaniclastic debris, and glacial outwash.

2. The vast extent of young and permeable volcanic rocks and the poorly developed surface channel network in the southern Deschutes River basin have resulted in a hydrologic system buffered by substantial groundwater flow. Consequently, flow entering the lower Deschutes River is unusually steady–the annual variation of flow is small and the response to regional climatic events is muted compared to other rivers of its size. More than 70 percent of the peak discharges of both the December 1964 and February 1996 flood flows in the lower Deschutes River entered downstream of the Pelton-Round Butte dam complex despite encompassing only 26 percent of the total drainage area.

3. The rock types in the southern and western parts of the Deschutes River basin, especially the Quaternary volcanic rocks, do not produce substantial sediment, and the sediment that has been produced is primarily gravel, silt, and clay deposited as glacial moraines and outwash now preserved on ridgetops and in disconnected alluvial basins. The older and more weathered volcanic rocks of the John Day and Clarno Formations that underlie the Ochoco Mountains are susceptible to landsliding and likely produce more sediment than any of the other broadly defined rock types in the basin. In the northern part of the basin, Tertiary lava flows of the CRBG are relatively resistant to erosion and produce mainly cobble- and gravel-sized material. Aside from the lahar-filled valley of the upper White River draining Mount Hood, there are few sources of sand readily accessible by the modern channel network anywhere in the Deschutes River Basin.

4. The steady stream flows coupled with low sediment supply have resulted in extremely low rates of sediment delivery to the Deschutes River. Sediment yield from the southern part of the Deschutes River basin, determined from reservoir surveys, is the smallest yet reported for basins of such size. The eastern part of the Deschutes River basin, underlain by the weathered and uplifted volcanic and volcaniclastic rocks of the John Day and Clarno Formations has greater sediment yield and is a major source of silt and clay, but most of the areas underlain by these formations are now upstream of reservoirs and do not contribute sediment to the lower Deschutes River. Extrapolation of sediment yield measurements from reservoir surveys on the basis of an empirical relation between sediment yield and physiography leads us to infer that more than 60 percent of the total Deschutes River sediment load was derived from downstream of the Pelton-Round Butte dam complex prior to impoundment in the basin. This also corresponds to the greater relative runoff volumes derived from the lower part of the basin. The Pelton-Round Butte dam complex now traps about 50 percent of the total, basin-wide, pre-impoundment sediment load entering the lower Deschutes River. But because of the large volume of sediment introduced from downstream, this equates to less than 25 percent of the total load at the Columbia River confluence (Figure 15).

5. Most sediment delivered to the Deschutes River over time periods of thousands to millions of years has probably been delivered in pulses by episodic events such as major pumice and ash falls, volcanic debris flows, landslides, or during periods of radically altered basin conditions such as extensive glaciation or short-lived rapid incision. The total volume of sediment, especially sand and gravel, delivered during these episodic events is probably orders of magnitude greater than the volume of sediment that enters the system during more quiescent times, such as those recorded by the 20th century reservoir surveys.

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MEETING NOTES
CHETCO RIVER GRAVEL REMOVAL
TECHNICAL TEAM MEETING
NOVEMBER 20, 2007
1:00 to 3:00

ATTENDEES:
Judy Linton, US Army Corps of Engineers
Janine Castro, US Fish and Wildlife Service
Chuck Wheeler, National Marine Fisheries Service
Yvonne Vallette, Environmental Protection Agency
Bob Lobdell, Oregon Department of State Lands
Alex Cyril, Oregon Department of Environmental Quality
Jay Charland, Oregon Department of Land Conservation and Development (phone)
Patty Snow, Oregon Department of Fish and Wildlife
Robert Elayer, Tidewater Contractors, Inc
Bill Yocum, Freeman Rock, Inc
Chris Lidstone, Lidstone and Associates, Inc (phone)
Jim O'Connor, US Geological Survey
Glen Hess, US Geological Survey

AGENDA ITEMS:

1) Administrative Details:

Mission: The focus of the Technical Team is evaluating specific watersheds to objectively determine whether gravel mining can occur on a short-term or long-term basis. Such evaluation will include looking at direct and indirect impacts to sediment movement. Meetings are not to evaluate or discuss specific permit actions which may be under review by either the Corps of Engineers (Corps) or Department of State Lands (DSL).

Organization: The Corps and DSL will act as co-chairs for the Technical Team and will be responsible for setting up meetings, taking notes and generally making sure there is follow through with identified action items. Draft meeting notes will be sent to meeting participants for review prior to becoming final.

The Team will attempt to reach agreement on future actions – any insurmountable disagreements will be raised to the Executive Team for resolution.

Membership: It was agreed the membership should be fluid based on the watershed being studied.

2) Process and Data/Information Needs:

Timelines: The timelines for existing Chetco River gravel mining authorizations for Freeman Rock and Tidewater were clarified. The Department of the Army permit expires September 2009; Water Quality Certification is valid until August 2009; DSL permits require annual renewal for work occurring beyond 2008; and the Biological Opinions provide endangered species coverage through the 2008 work season (which runs from July 15 through September 30 above the Chetco River estuary). Therefore, if it is determined further mining can occur in the Chetco River beyond the 2008 season, permits must be in place by spring of 2009. At the November 15 Executive Team meeting it was suggested that this Phase 2 study be completed by spring 2008 to allow one full year to complete the permit process should that be the direction taken.

Information Needs/Process to Obtain Information: Sediment budget information is crucial. Most of the winter high flows have already passed so we may not be able to collect any data this year. Jim O'Connor suggested there may be a way to estimate sediment budget information without doing actual measurements. He will have a better idea once he has a chance to review the Phase 1 work. USGS will also evaluate the Phase 1 work to determine if there is better way to structure the determination of whether a system is aggrading/degrading/equilibrium.

USGS could do sediment transport studies. They will need to know the specific questions to be answered (including timelines and spatial scope) and then can prepare a draft scope of work to include required funding (estimated). This scope of work would include 1) data collection that can be done within the immediate timelines and 2) data collection that can be done given a longer time period. It may make most sense to pick one river system that can represent all coastal systems rather than evaluate all systems. USGS estimated it will be the 1st or 2nd week of January 2008 before they are able to provide the draft scope of work. Technical Team needs to recommend to the Executive Team that funding for USGS work crucial.

Additional information that may be beneficial:
1) Cross-sectional information provided by the operators could potentially be used if combined with known water events. The evaluation would also need to include review of aerial photos at these same cross-sections.
2) Monitoring reports as required under existing mining permits. Freeman Rock has collected data and will have the reports out by December. Although Tidewater did not mine in 2007 they do have pre-mine surveys and will also be doing pre-mine surveys in 2008.
3) Pre-mine surveys at Tidewater Bar: This information has been collected for past two years.
4) Suggestion made that we should also look at site specific responses to gravel removal within watersheds.

Regarding evaluation of other watersheds, the group agreed we need direction from the Executive Team on prioritization beyond the Umpqua River system (which will be studied next). DSL has a list of active gravel operators; the Corps has a list of pending permit applications which needs to be updated to add the Coquille River and Hunter Creek. The mention of Hunter Creek raised the question of how we will deal with sub-basins. All agreed that we should recommend to the Executive Team that we start the Phase 1 study process for the Umpqua River. The Executive Team will need to decide who will pull together the final product for that effort, however, as Janine is pretty well tied up with other work well into next year.

3) Next Steps:

- Brief the Executive Team at their December 19 meeting on Technical Team organization details and information needed for Phase 2 study work. Execs also need to be briefed on work being done by USGS to assist the Technical Team in refining information needs and estimated timelines.
- The next meeting of the Technical Team will be scheduled around mid-January (exact date pending receipt of draft scope of work from USGS.

Overview of Geology, Hydrology, Geomorphology, and Sediment Budget of the Deschutes River Basin, Oregon

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Tana L. Haluska

U.S. Geological Survey, Portland, Oregon

Within the Deschutes River basin of central Oregon, the geology, hydrology, and physiography influence geomorphic and ecologic processes at a variety of temporal and spatial scales. Hydrologic and physiographic characteristics of the basin are related to underlying geologic materials. In the southwestern part of the basin, Quaternary volcanism and tectonism has created basin fills and covered and deranged the surficial hydrologic system, resulting in a relatively low-relief lava-covered landscape with runoff emerging largely from extensive groundwater systems fed by Cascade Range precipitation. The remarkably steady flows of the entire Deschutes River, as depicted in annual and peak flow hydrographs, are due primarily to buffering by the extensive groundwater system of this part of the basin. The eastern part of the basin is primarily underlain by Tertiary volcanic, volcaniclastic, and sedimentary rocks that have weathered into dissected uplands with generally greater slopes and drainage densities than of that of the southwestern part of the basin. Surficial runoff is more seasonal and less voluminous from this more arid part of the basin. The northern part of the basin has been sharply etched by several hundred meters of late Cenozoic incision, resulting in the greatest relief and drainage density of anywhere in the basin. For large floods, such as those of December 1964 and February 1996, more than half of the peak flow at the mouth of the Deschutes River is derived from the northern part of the basin. Modern sediment yield for much of the Deschutes River basin, as determined from reservoir surveys, is exceptionally low and is related to regional slope and drainage properties. Broad-scale sediment budget calculations indicate that more than 50 percent of the sediment produced in the Deschutes River basin produced under modern, pre-impoundment, conditions is from the northern part of the basin. There is ample evidence, however, of much greater sediment yields and large pulses of downstream sediment delivery during Quaternary episodes of volcanism and glaciation.

INTRODUCTION

The Deschutes River is remarkable. Its uniform, spring-fed hydrologic regime has long impressed geographers and hydrologists [e.g., *Russell*, 1905; *Henshaw et al.*, 1914]. Partly in conjunction with the stable flow regime, modern sediment production is exceptionally low over much of the basin. These two factors have combined to create an unusually stable geomorphic system over human time scales. Consequently, as will be seen in following chapters, it is a river system in which impoundments have had few apparent geomorphic effects on the downstream channel and valley bottom of the Deschutes River system.

Geology and Geomorphology of the Deschutes River, Oregon
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However, the Deschutes River basin has not been similarly quiescent over geologic time scales. Extensive volcanism, regional and local tectonism, landslides, and cataclysmic floods have all left their mark across the landscape. Moreover, as is the case for most large basins, the resulting geomorphic characteristics, such as topography, hydrology, and sediment yield, vary widely. The modern Deschutes River, with its stable hydrologic and geomorphic regime and rich aquatic ecosystems, is the combined result of (1) these past processes and events and (2) the present regime of sediment and water yield established by the regional geology. To understand the Deschutes River and its response to impoundment, it is necessary to understand this geologic and hydrologic context.

This paper provides an overview of the geologic, hydrologic, and geomorphic setting of the Deschutes River basin, with special emphasis on aspects that have influenced how the river has responded to impoundment by the Pelton-Round Butte dam complex. This overview sets the stage for companion studies of the valley bottom, channel, and fish ecology of the Deschutes River, which comprise the other papers in this volume.

GEOLOGY, TOPOGRAPHY, HYDROLOGY, AND SEDIMENT TRANSPORT OF THE DESCHUTES RIVER

The Deschutes River drains 26,860 km^2 of north-central Oregon[1], first flowing south from its Cascade Range headwaters, then northward for nearly 300 km along the eastern margin of the Cascade Range before joining the Columbia River 160 km east of Portland (Figure 1). Its principle tributaries, the Crooked and Metolius Rivers, join the Deschutes River at 185 and 180 km, respectively, from the Columbia River confluence. Portland General Electric and the Confederated Tribes of Warm Springs generate 427 megawatts of power from the Pelton-Round Butte dam complex, a set of three hydroelectric dams located 160 to 180 km upstream from the Columbia River confluence.

[1]The drainage area reported by *Hubbard et al.* [1998, p. 118] for the U.S. Geological Survey gage "Deschutes River at Moody, near Biggs, Oregon (station number 14103000)", 2.25 km upstream from the Deschutes River confluence with the Columbia River, is "10,500 mi^2, approximately". Our estimate of the drainage basin area, from a geographic information system analysis of the basin outline portrayed in Figure 1 (derived from a 30-meter resolution digital elevation model) is 26,860 km^2 (10,370 mi^2). We will use the 26,860 km^2 value for discussion and analysis.

Geologic Setting

The Deschutes River basin is formed in sedimentary, igneous, and metamorphic rocks, whose ages range from more than 250 million years old to as young as 1300 years old (Plate 1). The vast majority, however, are Cenozoic volcanic rocks (less than 65 million years old), and almost all of these rocks are lavas of various compositions or other eruptive products. In general, bedrock ages become progressively younger from east to west across the basin. Mesozoic (250 to 65 million years old) and Paleozoic (more than 250 million years old) sedimentary and volcanic rocks crop out in a small area at the eastern edge of the Deschutes River basin. Most of the Ochoco Mountains, a low mountain range forming much of the eastern flank of the basin, and the Mutton Mountains, which trend northwest across the north-central part of the basin, are underlain by weathered volcanic, volcaniclastic, and sedimentary rocks of the John Day and Clarno Formations. These rocks date from about 55 to 20 million years old and are remnants of ancient volcanic highlands and their eruptive products [*Robinson et al.*, 1984; *Walker and Robinson*, 1990; *Taylor*, 1990].

Much of the northern and eastern parts of the Deschutes River basin is underlain by the Columbia River Basalt Group (CRBG), a series of accordantly layered basalt flows erupted primarily between 17 and 14.5 million years ago and covering 165,000 km^2 of southern Washington, northern Oregon, and western Idaho [*Tolan et al.*, 1989]. The CRBG in the eastern part of the Deschutes River basin issued from vents in the John Day River basin, whereas CRBG in the northern Deschutes River basin originated as flows that came westward down the ancestral Columbia Plain from numerous vents in eastern Washington, eastern Oregon, and western Idaho, filling the Columbia Plain with up to 600 m of lava, locally separated by thin sedimentary interbeds [*Newcomb*, 1969; *Smith*, 1986; 1991]. The contemporaneous "Prineville chemical-type" basalt flows (mapped as part of the CRBG in Figure 2, although geographically and chemically distinct from the CRBG [*Goles*, 1986; *Reidel et al.*, 1989; *Hooper et al.*, 1993]) erupted near the location of Bowman Dam in the central part of the basin and flowed northward along an ancestral Crooked River to where they are interbedded with the CRBG that filled the Columbia Plain from the north. The distribution of the CRBG and contemporaneous basalt flows indicates that by 17 million years ago, the present overall geometry of the northern Deschutes River basin had been established with northward drainage through lowlands bounded by the Ochoco Mountains on the east and the ancestral Cascade Range on the west [*Smith*, 1986].

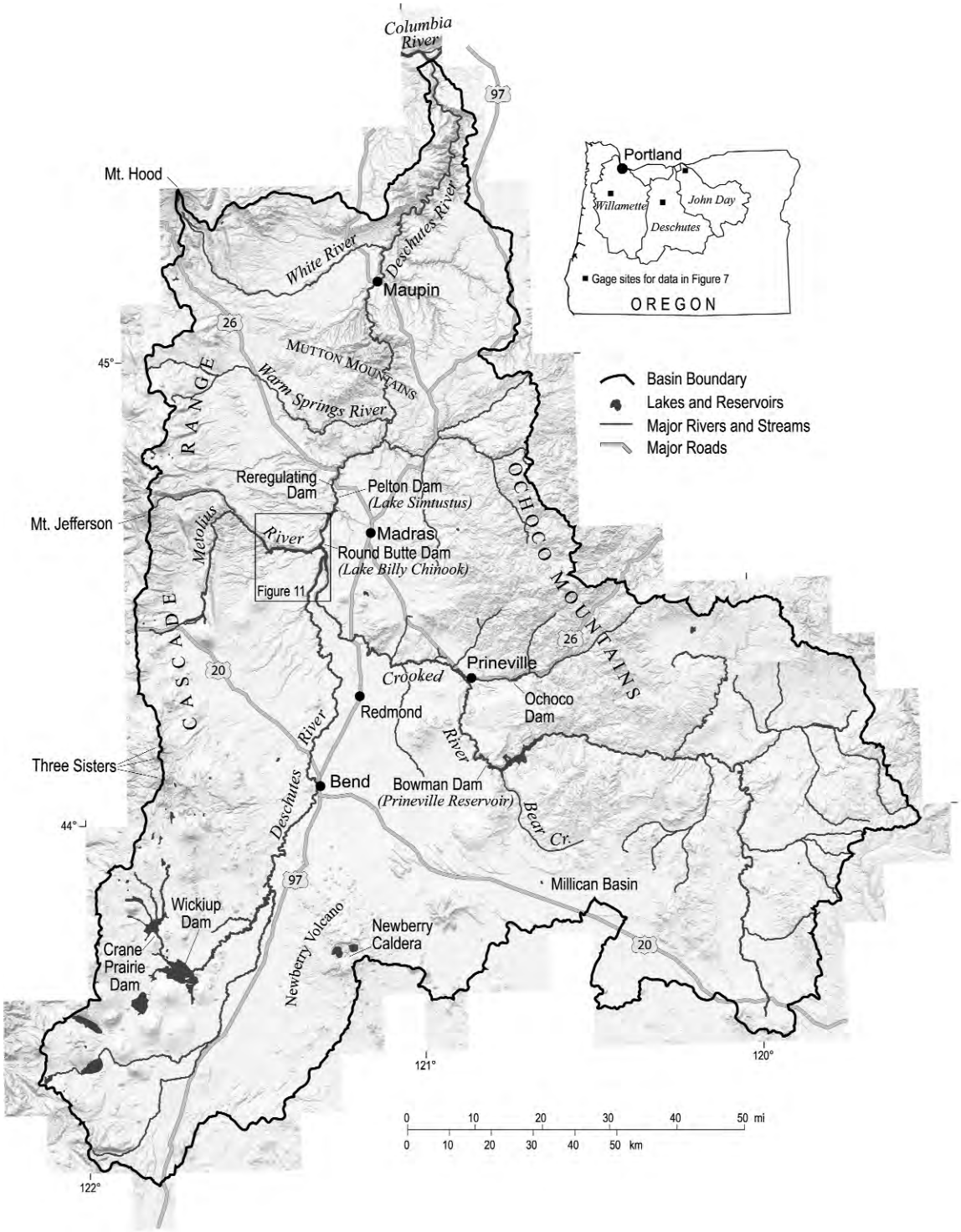

Figure 1. Location map showing major physiographic and cultural features of the Deschutes River basin. Hillshade topographic base derived from U.S. Geological Survey 30-m resolution digital elevation data.

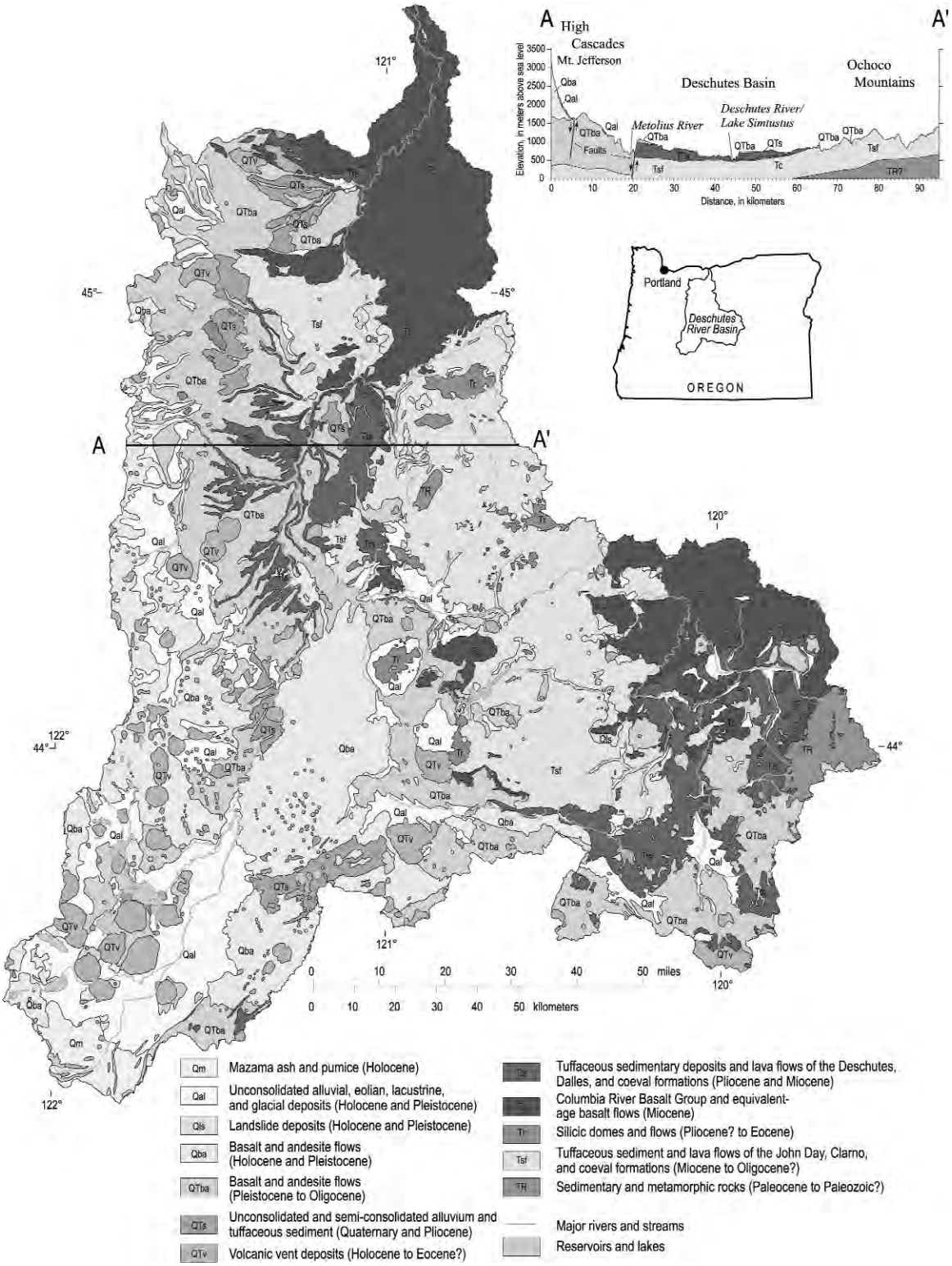

Plate 1. Geologic map of the Deschutes River basin, map units and descriptions generalized from *Walker and MacLeod* [1991]. Cross-section after *Smith* [1986].

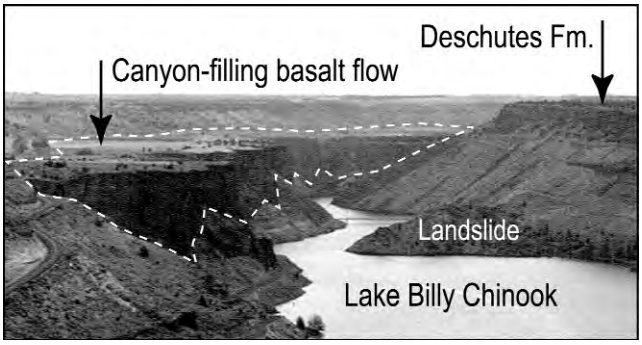

Figure 2. View south up the Crooked River arm of Lake Billy Chinook, impounded behind Round Butte Dam. A basalt flow, age 1.19±0.08 Ma [*Smith*, 1986], has partly filled the canyon previously incised into lava flows, pyroclastic deposits, and fluvial sand and gravel of the Deschutes Formation. The top of the intercanyon basalt flow is 140 m above lake; top of Deschutes Formation is 210 m above lake. Photograph by J.E. O'Connor, 1998.

Deformation during and after emplacement of the Columbia River Basalt Group resulted in isolated basins that accumulated sediment, ignimbrite, and airfall tuffs shed eastward from the emerging Cascade Range and from volcanic highlands in the eastern part of the Deschutes River basin [*Smith*, 1986; *Smith et al.*, 1989]. These deposits formed primarily between 15 and 4 million years ago and include the Simtustus, Deschutes, and Dalles Formations in the central and northern parts of the Deschutes River basin, and the Rattlesnake Ash Flow Tuff in the southeastern Deschutes River basin [*Smith*, 1986, 1991; *Smith et al.*, 1989]. Basalt flows and gravel deposits within the Deschutes Formation near Madras show that the course of the Deschutes River 7.4 to 4.0 million years ago was similar to the present course [*Smith*, 1986, 1987a].

Near the top or capping the Deschutes and Dalles Formations are widespread basalt flows, including the basalt of Juniper Flat near Maupin [2.77±0.36 Ma; R.M. Conrey, unpublished data, cited in *Sherrod and Scott*, 1995] and the Agency Plains basalt flow north of Madras [5.31±0.05 Ma; *Smith and Hayman*, 1987]. These Pliocene basalt flows cover vast surfaces on the uplands, indicating that the landscape at the time was incised little if at all, and that the Deschutes River and its tributaries were flowing at an elevation near the present canyon rims near Madras and Maupin. Specific evidence is found at Round Butte, near Round Butte Dam, where a 3.97±0.05-million-year-old basalt flow invaded Deschutes River gravel about 275 m above the present river level [*Smith*, 1986, 1987b].

The Deschutes and Dalles Formations grade westward into Miocene volcanic rocks of the Cascade Range [*Smith et al.*, 1989]. These rocks are in turn overlain by the active volcanic arc of the present Cascade Range that forms the western boundary of the Deschutes River basin. Volcanism along the crest of the range, as well as at numerous vents that pepper the eastern flank of the range, has resulted in a largely constructional topography of young volcanoes and lava flows that are mostly less than 2 million years old [Plate 1; *Taylor*, 1990; *Walker and MacLeod*, 1991].

Extensive lava flows from Newberry Volcano south of Bend flowed into and partly filled the Crooked and Deschutes River canyons between 1.2 and <0.4 million years ago [Figure 2; *Russell*, 1905; *Stearns*, 1931; *Smith*, 1986, 1991; *Bishop and Smith*, 1990; *Sherrod et al.*, in press]. Their distribution and thickness show that by 1.2 million years ago, the Deschutes River system had incised to near its present elevation near Round Butte Dam. Similarly, a 0.9±0.1 million year old basalt flow from Stacker Butte [*Shannon and Wilson Inc.*, 1973, cited in *Bela*, 1982], flowed down the north valley wall of the Columbia River to near present river level near the mouth of the Deschutes, indicating that local base level at the Columbia-Deschutes confluence has not changed substantially in the last million years. The 275 m of incision between about 4 and 1 million years ago indicates a period of regional incision and canyon formation affecting at least the north half of the Deschutes River basin, during which downcutting averaged nearly 0.1 mm/yr. Repeated episodes of incision through the subsequent canyon-filling lava flows (Figure 2) were at even more rapid rates.

Topography and Drainage Network

The overall topography and drainage network development within the Deschutes River basin is the result of this geologic history. To frame discussion of the overall geologic, topographic and hydrologic characteristics of the basin, we have subdivided the watershed into three terranes on the basis of general geologic and topographic characteristics (Figures 3 and 4).

Eastern Highlands Terrane. The Ochoco Mountains and high lava plains form the southeastern part of the Deschutes River basin. This region, largely drained by the Crooked River, is underlain by a variety of rocks, but the main Ochoco Mountains are formed primarily of the John Day and Clarno Formations (unit Tsf on Plate 1). These formations are mainly composed of weathered lava flows and poorly consolidated claystone, siltstone, and volcanic ash-flow tuff deposited between 55 and 20 million years ago. The John Day and Clarno Formations are susceptible to landsliding, and almost all of the landslides in the Deschutes

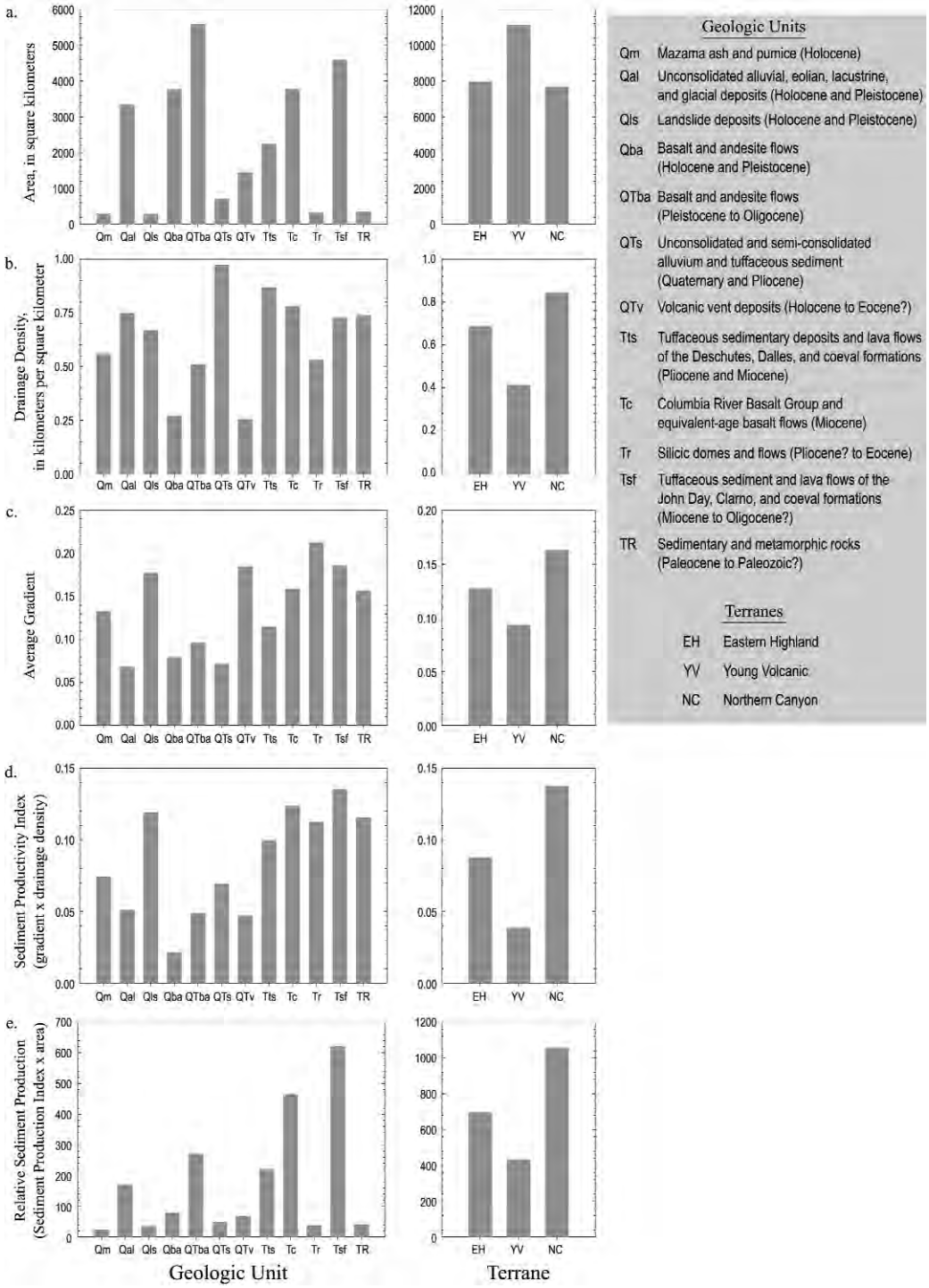

Figure 3. Geomorphic and physiographic attributes of each of the twelve major geologic units (Plate 1) and three terranes (Figure 4) within the Deschutes River basin. (a) Area of surface exposure. (b) Drainage density, from U.S. Geological Survey 1:100,000 digital hydrography. (c) Average hillslope gradient, calculated from U.S. Geological Survey 30-meter digital elevation data. (d) Sediment Production Index (SPI), calculated as the product of mean gradient and drainage density. (e) Relative potential for sediment production, calculated as the product of SPI and area.

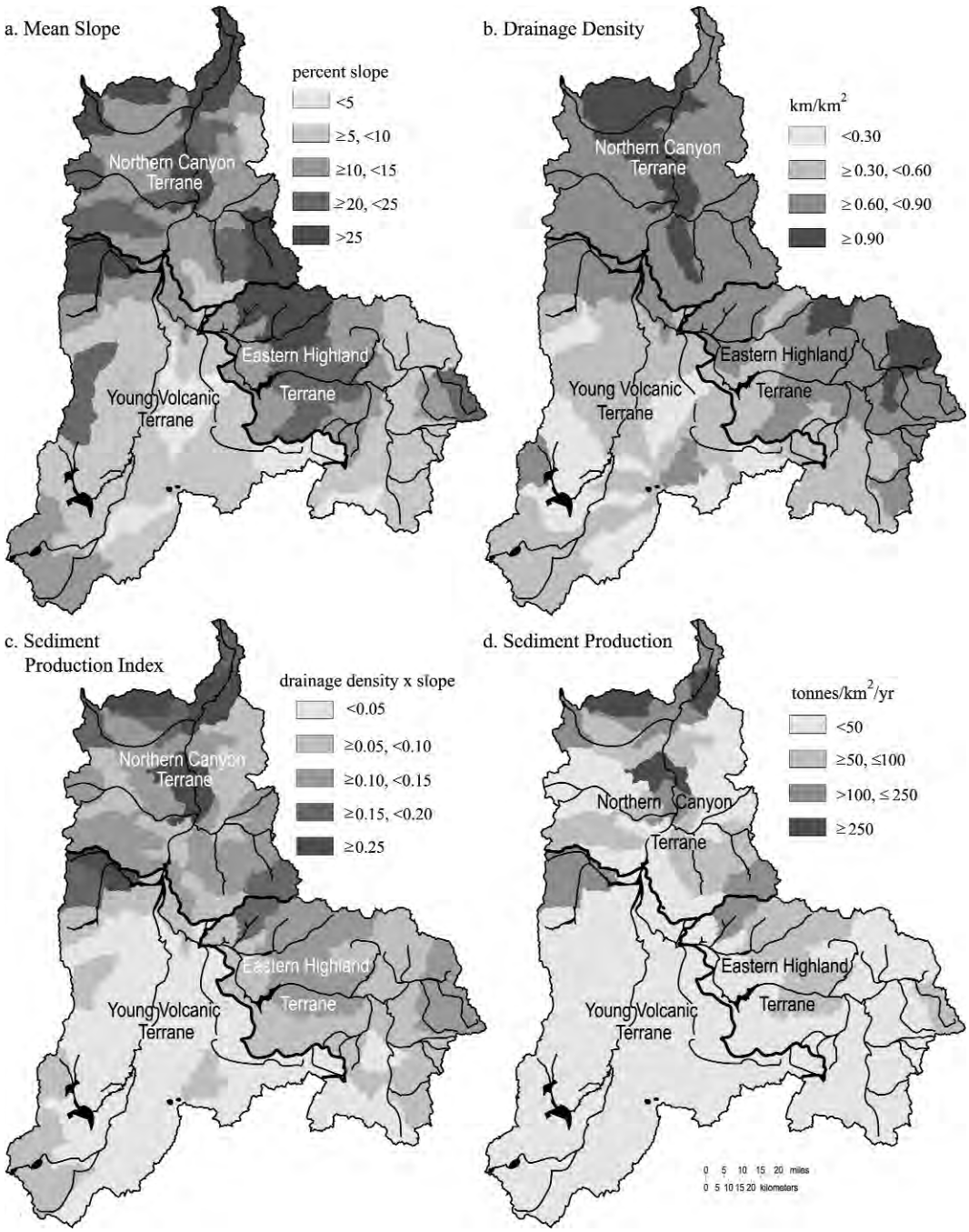

Figure 4. Distribution of geomorphic attributes and estimated sediment production for 100 approximately equal-sized subbasins of the Deschutes River basin. (a) Mean subbasin hillslope gradient, calculated from U.S. Geological Survey 30-meter digital elevation data (depicted in Figure 1). In many subbasins there are areas of significantly higher and lower slopes. (b) Subbasin drainage density, from mapped watercourses shown by U.S. Geological Survey 1:100,000 digital hydrography (shown on Figure 6). (c) Sediment Production Index (SPI), calculated as the product of mean gradient and drainage density as depicted (in a generalized fashion) in 4a and 4b (where slope is expressed as a fraction). (d) Calculated sediment yields, developed from empirical relation between SPI and surveyed accumulations in Deschutes River basin reservoirs (shown in Figure 14).

River basin are within these units (Plate 1). This landscape is one of the oldest in the Deschutes River basin, and more than 10 million years of weathering has produced a well-integrated hydrologic network in the erodible rocks of the region. The Ochoco Mountains have a high density of stream channels (Figure 4b) that connect steep hillslopes and source channels to trunk channels flowing within alluvial valleys.

Young Volcanic Terrane. The southern and southwestern part of the basin, drained by the Deschutes and Metolius Rivers upstream of the Pelton-Round Butte dam complex, is bounded by the high and rugged Cascade Range on the west, the western margin of Newberry volcano lava flows on the east, and indistinct low divides between the Klamath Basin and the Basin and Range Province to the south. The Young Volcanic terrane is underlain by young volcanic rocks (units QTba, Qba and QTv on Plate 1) and basin-filling deposits (unit Qal) that have accumulated behind drainage-blocking lava flows and fault scarps. Pleistocene glacial deposits and outwash locally mantle uplands along the east flank of the Cascade Range. Pumice from Mount Mazama (Crater Lake) forms a widespread surface layer in the southern part of the province (mapped as unit Qm on Plate 1 where it obscures the underlying bedrock). The largely constructional volcanic landscape coupled with Quaternary faulting and channel-damming lava flows has resulted in a sparse and locally disconnected surface channel network traversing low-relief alluvial and lacustrine basins (Figures 4a and 4b).

Northern Canyon Terrane. The northern part of the Deschutes River basin is composed of dissected tablelands formed along the eastern rampart of the Cascade Range and the western Columbia River Plain. The central axis of the basin consists of sharply etched canyons rimmed by young basalt flows and incised into basin-filling sediment and older volcanic and volcaniclastic rocks. From Lake Billy Chinook downstream, the Deschutes River is deeply incised within a canyon variously carved into the relatively soft John Day and Clarno Formations, cliff-forming CRBG basalts, and younger strata of the Simtustus, Deschutes, and Dalles Formations with their capping basalt flows. Large tributaries from the west drain the Cascade Range, whereas tributaries from the east drain tablelands of CRBG and landslide-dominated uplands of the John Day and Clarno Formations. This terrane has the highest average slope and drainage density of the entire basin (Figures 3 and 4).

Geology, Topography, and Drainage Pattern. Topographic and stream-network properties in the basin result from the strong correspondence of geomorphic properties, such as slope and drainage density, with geology. This correspondence gives each of the terranes its distinct topographic and hydrologic characteristics (Figures 3 and 4). The older rock units that underlie most of the uplands of the Eastern Highlands and Northern Canyons have the greatest average slope. Of the widely distributed units, the John Day and Clarno Formations (grouped on Plate 1 as unit Tsf) and the CRBG (unit Tc on Plate 1) have the greatest average hillslope gradients. Late Tertiary and Quaternary vent complexes (unit QTv) also have relatively high average gradients. The older high-relief uplands underlain by the John Day and Clarno Formations and the CRBG also have relatively high drainage densities (Figure 3). The greatest drainage densities in the Deschutes River basin have developed on the poorly consolidated and unconsolidated Tertiary and Quaternary sedimentary rocks. These units (Tts and QTs on Plate 1), which were deposited during times of basin filling, regional aggradation, and higher base levels, are now densely drained by closely spaced channels, especially in the Northern Canyons province. In contrast, the young volcanic rocks (units Qba, QTba, and QTv of Plate 1), which characterize the Young Volcanic terrane, have drainage densities typically less than half that of most other units in the basin (Figure 3).

Hydrology

The unique hydrologic characteristics of the Deschutes River basin are largely controlled by the geology, topography, and stream network [see also *Gannett et al.*, this volume]. Average annual runoff for the 26,860 km^2 basin is $5.2 \cdot 10^9$ m^3, which is equivalent to about 0.19 m over the entire drainage area. By far the largest portion of this water is derived from the high Cascade Range along the western part of the drainage basin, where high elevation and oceanward position promote greater precipitation and substantial winter snowpack (Figure 5). Farther east within the Cascade Range rain shadow, annual precipitation and runoff diminish rapidly, resulting in semi-arid rainfall and runoff conditions for much of the basin (Figures 5 and 6).

Near its confluence with the Columbia River, the Deschutes River has a mean monthly flow ranging from 124 m^3/s in August to 213 m^3/s in February (Figure 6, Deschutes River at Moody, 1965-1996). Prior to regulation, the highest monthly averages were in early spring and resulted primarily from snowmelt in the Cascade Range. Lowest flows are typically during the late summer months of July, August, and September. The relatively small range between low and high flows is unusual and was noted by *Russell* [1905], who wrote that:

> "The Deschutes is of especial interest to geographers, as it exhibits certain peculiarities not commonly met with.

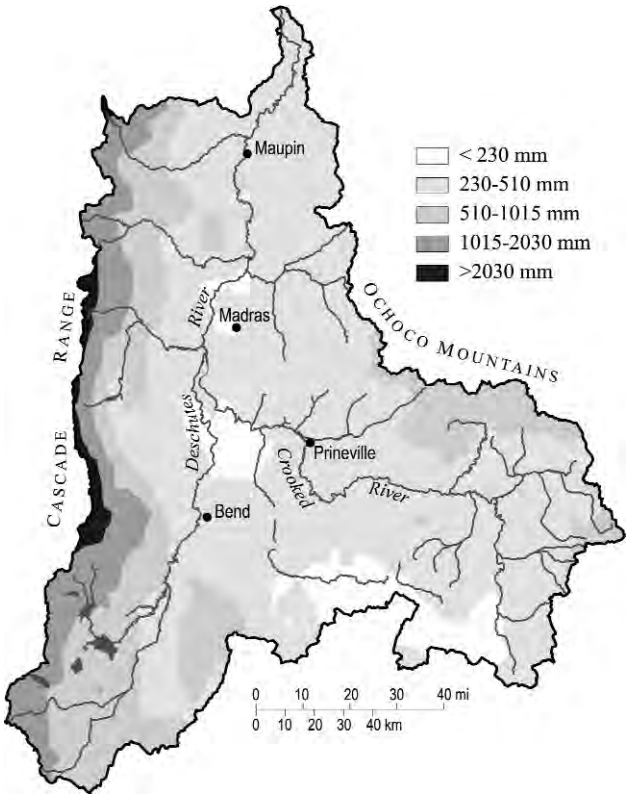

Figure 5. Mean annual precipitation in the Deschutes River basin for the period 1961-1990. From data provided by the Spatial Climate Analysis Service, Oregon State University. (http://www.ocs.orst.edu/prism/prism_new.html; August, 2001).

> Although flowing from high mountains on which precipitation varies conspicuously with seasonal changes and where snow melts rapidly as the heat of summer increases, its volume, throughout a large section of its course, is practically constant throughout the year."

and by *Henshaw et al.* [1914, p. 12] who more specifically observed:

> "The flow of the river is more remarkably uniform than that of any other river in the United States comparable with it in size, and its economic value is almost incalculable. At the mouth of the stream the maximum discharge is only six times the minimum. Ocular evidence of this uniformity of flow is presented by the low grass-grown banks between which the river flows for much of its course."

The steadiness of flow is illustrated by comparing the annual hydrographs and flood peak records of the Deschutes River basin with those of the adjacent and similar-sized basins to the west (Willamette Basin) and east (John Day Basin) (Figures 7 and 8). For the John Day River, the mean monthly discharge for April is more than thirty times that for September. Likewise for the Willamette River, the mean monthly discharge for January is about ten times that for August. In contrast, the Deschutes River varies only by a factor of 1.5 between the months of greatest and least flow. Just as the annual response to flow is tempered in the Deschutes River basin, so is the response to individual climatic events. The maximum meteorologic peak discharge for the Deschutes River just downstream from the Pelton-Round Butte dam complex was 540 m^3/s on February 8, 1996[2]—less than five times the mean flow of 125 m^3/s. In contrast, the largest flood discharges on both the Willamette and John Day Rivers have been more than twenty times the rivers' mean flows (Figure 8).

The uncommonly steady flow of the Deschutes River is due primarily to the poorly integrated surficial drainage system along the eastern flank of the Cascade Range in the southern and western parts of the Deschutes River basin. Much of the seasonal precipitation and snow melt infiltrates into extensive groundwater systems within the highly permeable young volcanic fields and basin fill deposits, emerging months to years later in large springs at the headwaters of the Metolius River, along the lower Crooked River, and between River Mile (RM) 100 and 120 on the Deschutes River[3] [*Russell*, 1905; *Henshaw et al.*, 1914; *Stearns*, 1931; *Manga*, 1996, 1997; *Gannett et al.*, 2001, *Gannett et al*., this volume]. Consequently, there is little monthly or seasonal variation in flow for many headwater drainages in the southern and western parts of the Deschutes River basin (Figure 6). As a result, the annual hydrograph of the Deschutes River shows minimal seasonal variation near the Pelton-Round Butte dam complex, where springs contribute the majority of the total flow volume [*Gannett et al.*, this volume]. In contrast, seasonal flow variations are much greater in the headwater basins of the older, steeper, and more dissected terrain in the eastern Deschutes River basin (Figure 6), but because the total volume of flow from these more arid drainages is small, they do not substantially affect the annual distribution of flow in the lower Deschutes River. Some additional flow regulation is provided by the abundant lakes and glaciers in Cascade Range headwaters, and also

[2]The February 8, 1996, flow was not substantially attenuated by the Pelton-Round Butte dam complex [*Fassnacht*, 1998]. A larger flow (640 m^3/s) on July 16, 1983, resulted from a short accidental release from the Pelton-Round Butte dam complex.

[3] Units given are metric except for locations, which are given as river miles (RM), or miles upstream from the river mouth as marked on USGS topographic maps. These values are close to, but not necessarily the same as, actual distances along the present channel. Fractional river miles given herein are based on interpolations between these published river miles.

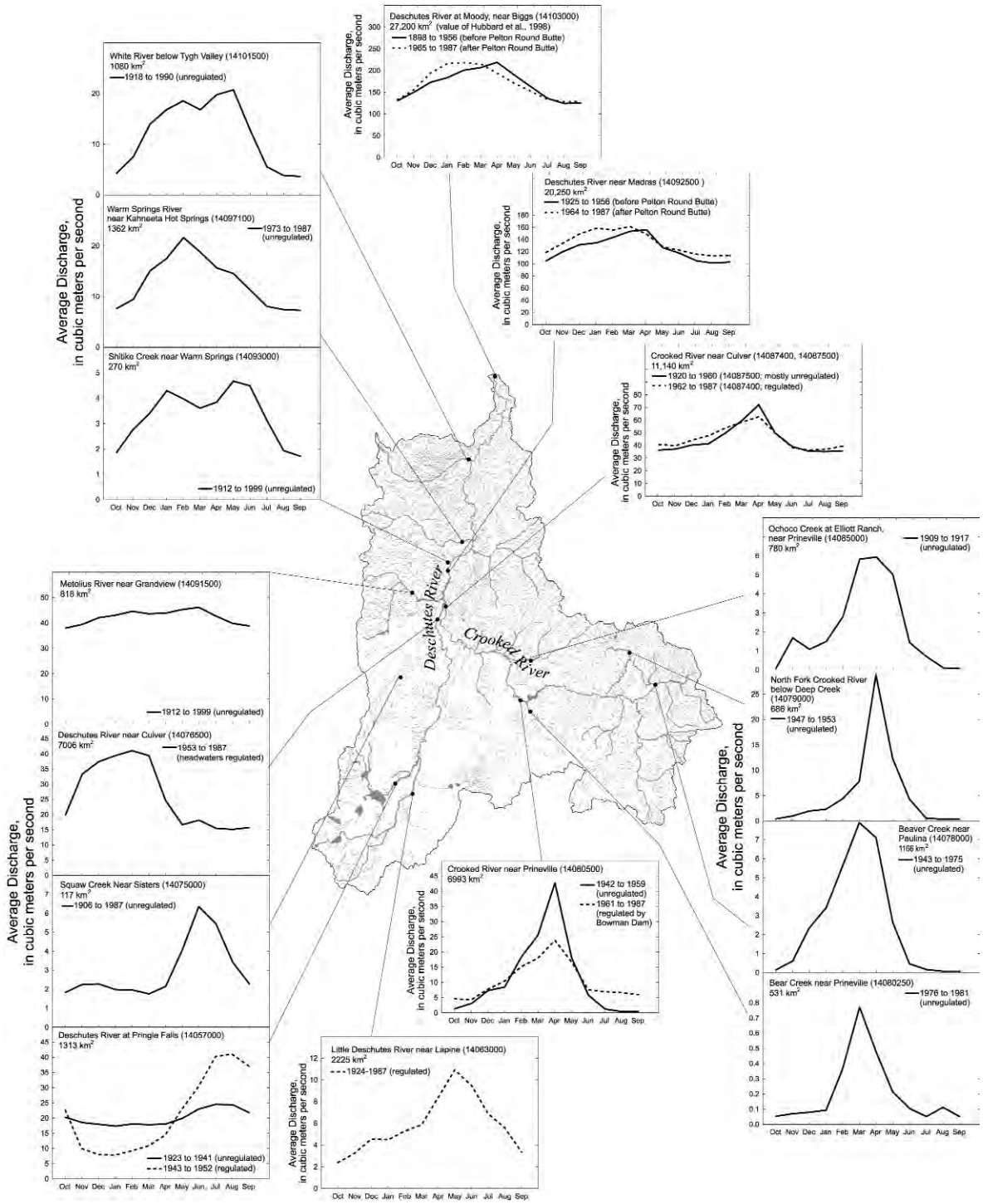

Figure 6. Hydrography and representative annual hydrographs for U.S. Geological Survey stream gaging stations in the Deschutes River basin. Data from *Moffatt et al.* [1990] and the U.S. Geological Survey National Water Information System (http://water.usgs.gov/nwis).

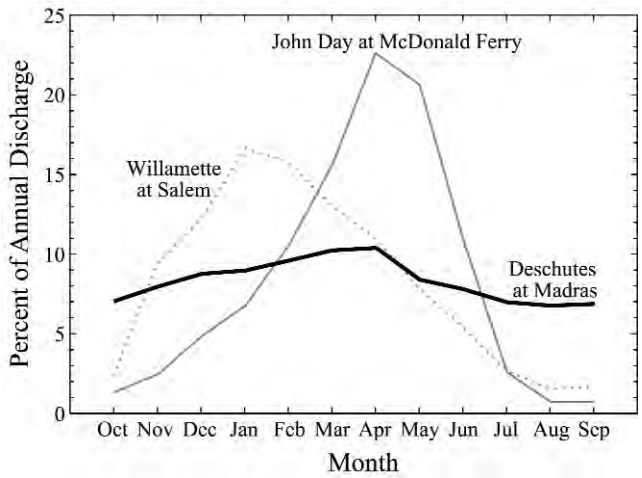

Figure 7. Mean monthly discharges for the John Day River at McDonald Ferry (station No. 14048000, period of record 1905-1987, drainage area 19,630 km^2), Deschutes River near Madras (14092500, 1925-1956, 20,250 km^2), and Willamette River at Salem (14191000, 1910-1941, 18,855 km^2). Discharges are expressed in terms of percent of annual flow to emphasize differences in seasonal distribution of runoff. Periods of record selected to minimize effects of upstream dams. Data from *Moffatt* et al. [1990]. Basin locations shown in Figure 1.

by two storage reservoirs in the Crooked River system and three reservoirs in the Deschutes River headwaters.

Steady discharge and muted response to individual meteorologic events are pronounced for flow entering Lake Billy Chinook at the Pelton-Round Butte dam complex, where the largest flows are less than five times the mean annual flow. However, flow response to individual runoff events becomes progressively greater downstream in the Northern Canyons terrane. For example, large inflows to the Deschutes River from Cascade Range tributaries (primarily Shitike Creek, Warm Springs River, and White River) during the February 1996 flood (the largest flood in nearly 100 years of record) increased the peak discharge from 540 m^3/s (Deschutes River near Madras) to 1990 m^3/s (Deschutes River at Moody), an increase of a factor of 3.7 despite only a 26 percent increase in drainage area. Similar increases occurred during the December 1964 flood, although more runoff was captured by storage reservoirs during this event [*Beebee and O'Connor*, this volume; *Hosman et al.*, this volume]. The large peak flows generated in the Northern Canyons terrane result from the steeper and more dissected tributary drainages and the absence of an extensive regional groundwater system such as found in the southern Deschutes River basin. This heightened storm response of the Northern Canyons tributaries is reflected in the early winter peaks and the greater month-to-month variation of the annual hydrographs for Shitike Creek, Warm Springs River, and White River compared to Cascade Range stations in the Deschutes River headwaters (Figure 6).

Regional Sediment Production and Transport

Together, the geology, geomorphology, and hydrology of the Deschutes River basin substantially influence the type and quantity of sediment delivered to the Deschutes River as well as the frequency of sediment movement. There are few data on actual sediment delivery in the Deschutes River basin, so the following discussion is largely qualitative and founded on consideration of the overall geologic history as well as current geomorphic and hydrologic characteristics. In a later section, we apply sparse sediment-transport measurements and the record of modern sediment delivery to Lake Billy Chinook, Prineville Reservoir, and Ochoco Reservoir to provide quantitative support for the inferences derived here from more general observations.

Within the Young Volcanic terrane of the southern and southwestern parts of the basin, the primarily basaltic and andesitic volcanic rocks are generally unweathered and do not produce large volumes of sediment. These lava flows typically break down to gravel (by physical weathering processes such as freeze-thaw) and clay (through chemical weathering). Modern processes produce very little sand. Reworked tephra, ash, and Mazama pumice also contribute in some degree to bedload. The low drainage density (Figure 4b) coupled with the small and steady surface flows in this part of the basin (Figure 6) result in only infrequent sediment transport in the river systems draining this terrane. In the southern part of the basin, much of the transported sediment is probably trapped in lakes and alluvial basins formed behind young lava flows and by basin-range faulting.

Nevertheless, large volumes of sediment have been produced episodically in the Young Volcanic terrane during periods of extensive glaciation and during large volcanic eruptions. Large glaciers and ice sheets covered much of the high Cascade Range during Pleistocene ice ages [*Crandell*, 1965; *Scott*, 1977]. These glaciers eroded and transported a substantial volume of gravel, sand, and silt derived from erodible Cascade Range stratovolcanoes and formed large moraines and outwash plains near their termini. These deposits compose much of the alluvium along the eastern flank of the Cascade Range (Plate 1, unit Qal). Sand and gravel outwash terraces can be traced from moraines down many of the tributaries to the Deschutes and Metolius Rivers [e.g. *Scott*, 1977; *Sherrod et al.*, in press], indicating that at times of peak sediment production there was abundant sand and gravel delivered continuously to the Metolius and Deschutes Rivers.

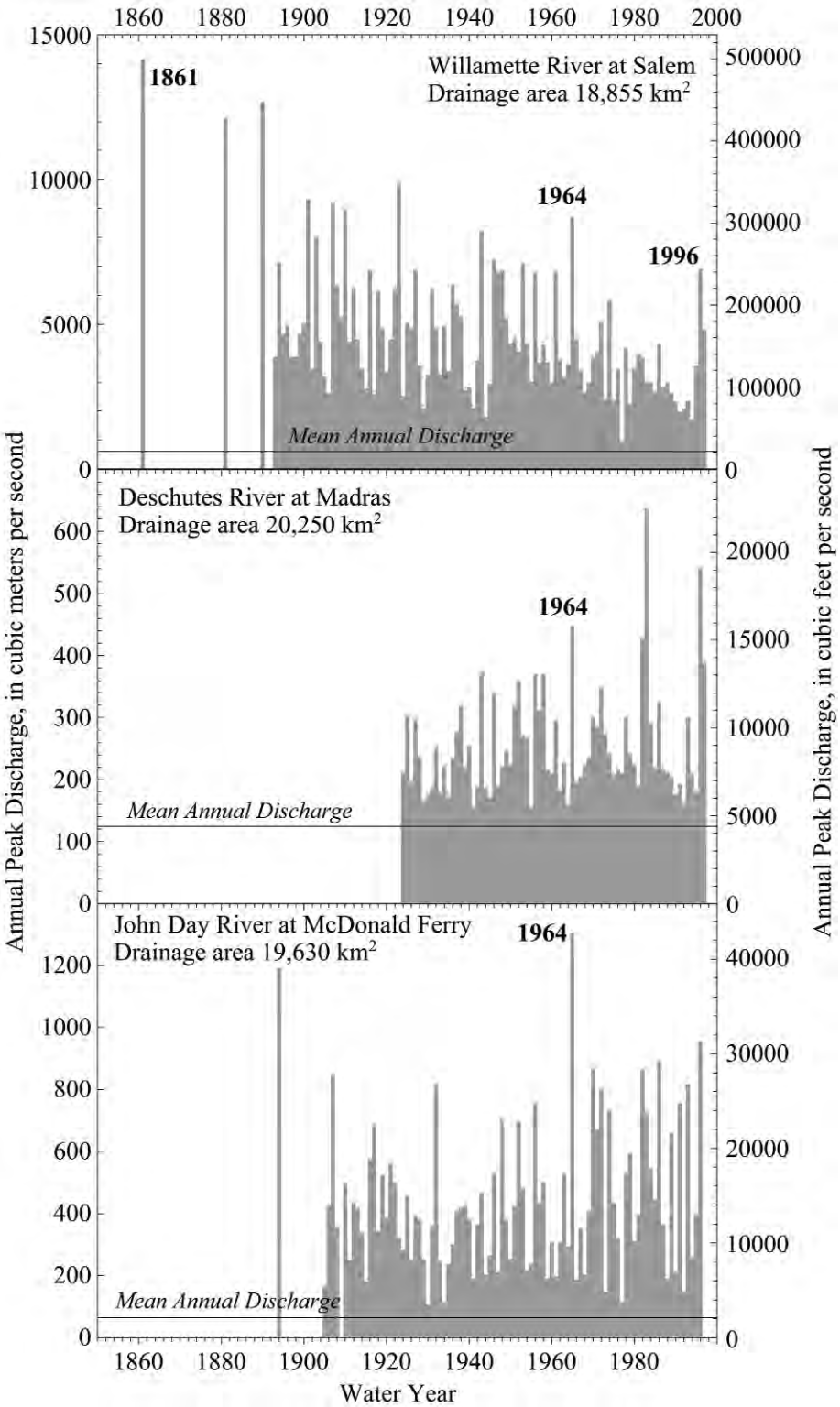

Figure 8. Annual peak discharges for the Willamette (station No. 14191000), Deschutes (14092500), and John Day (14048000) Rivers. Basin locations shown in Figure 1.

Most of the remaining glacial deposits, however, are perched on ridgetops, lava flows, and hillslopes away from active channels, so that little of this sediment now makes its way into modern channels.

Large volcanic eruptions have also episodically fed immense quantities of sediment to the Deschutes and Metolius Rivers. During the last 500,000 years, major eruptions from volcanic centers west of Bend [*Hill and Taylor*, 1989], Mount Jefferson [*Beget*, 1981; *Conrey*, 1991] and Mount Mazama [Crater Lake; *Sarna-Wojcicki and Davis*, 1991] have spread vast quantities of fallout ash and pumice over large parts of the Deschutes River basin, but the thickest accumulations have been along the eastern flank of the Cascade Range in the upper Deschutes and Metolius drainages. Several individual pumice and ash falls from the Tumalo volcanic center west of Bend are locally thicker than 10 m [*Hill and Taylor*, 1989]. The 7500-year-old Mazama pumice is sufficiently thick to obscure the underlying geology over more than 250 km^2 of the southern margin of the Deschutes River basin (unit Qm on Plate 1). Sand- and gravel-sized pumice is readily mobilized from hillslopes and transported downstream; consequently, during the decades following these major eruptions, there were likely periods of greatly enhanced sediment transport of silt-sized tephra and sand- and gravel-sized pumice grains, resulting in substantial channel aggradation. Pyroclastic flows (hot gas-rich flows of volcanic rock fragments) and lahars (volcanic debris flows) from Cascade Range eruptions have likely also episodically introduced large quantities of sand and gravel directly into the upper Deschutes and Metolius Rivers [e.g. *Smith*, 1986; *Hill and Taylor*, 1989]. Although there is sparse stratigraphic record of such events in Quaternary deposits above Lake Billy Chinook, deposits from a >75 ka[4] lahar from Mount Jefferson are preserved along the lower Deschutes River [*O'Connor et al.*, this volume].

Within the Eastern Highlands terrane, including the Ochoco Mountains and high lava plains of the southeastern part of the Deschutes River basin, the deeply weathered lava flows and poorly consolidated claystone, siltstone, and ashflow tuffs of the John Day and Clarno Formations are highly erodible, producing silt and clay from extensively dissected uplands. The fine-grained material produced in the uplands locally accumulates as valley fill along larger tributaries. Over geologic time scales, however, the dense stream network within this province efficiently conveys abundant fine-grained sediment from the eroding highlands into the Crooked and Deschutes Rivers.

The distinctly different hydrologic character of the Eastern Highland terrane of the Deschutes River basin likely amplifies sediment transport efficiency. The Crooked River has a more arid hydrologic regime with less total runoff but significantly greater month-to-month variation than does the upper Deschutes River (Figure 6). Prior to construction of Prineville Reservoir, the mean March flow of the Crooked River near Prineville was 100 times the mean August flow, whereas the variation for the Deschutes River near Culver is less than a factor of three [Figure 6; *Moffatt et al.*, 1990]. Because the ability to entrain and transport sediment increases exponentially with discharge, the flashier flows of the Crooked River probably expedited sediment delivery to the Deschutes River under pre-dam conditions.

As in the Young Volcanic terrane, there has probably been significant variation in the sediment delivery from the Ochoco Mountains over geologic and historic time scales. During the last 0.5 million years, the drainage area of the Crooked River has also been repeatedly blanketed by eastward drifting plumes of ash and pumice from Cascade Range eruptions. These deposits were probably eroded rapidly from steep hillslopes and moved into the channel system. There were no glaciers in the Ochoco Mountains during Pleistocene glacial periods, but the colder climates may have enhanced rates of weathering and hillslope sediment production. Pleistocene sand and gravel terraces 15 meters above the modern floodplain near Prineville reflect regional stream aggradation and increased sediment delivery that probably resulted from glacial climates.

Historic incision of fine-grained valley alluvium in the Crooked River basin has formed extensive gully networks [*Russell*, 1905; *Buckley*, 1992; *Welcher*, 1993] that continue to erode headward up the stream channel network (Figure 9). Incision has been widely attributed to overgrazing [e.g.

Figure 9. Bear Creek eroding fine-grained valley alluvium in the Crooked River drainage. Cut bank is about 3 m high. Photograph by J.E. O'Connor, 1998.

[4] "ka" = kilo-annum, or thousands of years before present.

Russell, 1905; *Buckley*, 1992]; however, in a study of Camp Creek in the upper Crooked River basin, *Welcher* [1993] identified several periods of prehistoric incision followed by aggradation that may have corresponded to subtle climate shifts. Regardless of their cause, periods of channel incision and gully formation would lead to substantially elevated rates of sediment transport downstream into the major watercourses.

Within the Northern Canyon terrane, a variety of sediment size and abundance is produced from the diverse rock types and environments. The John Day, Clarno, Simtustus, Deschutes, and Dalles Formations produce primarily silt and clay from fluvial erosion and mass movements of soft ashy beds. CRBG and younger basalts, as well as lava flows within the John Day, Clarno, and Deschutes Formations, physically weather into boulders and cobbles that enter the Deschutes River by tributary floods, debris flows, and canyon rockfalls. Chemical weathering of basalt typically generates clay minerals that are incorporated into overlying soils and can wash into the river system during periods of soil erosion.

With the Deschutes River flowing as much as 600 m below the adjacent uplands, many tributaries are short and steep. Larger tributaries such as the Warm Springs and White Rivers are incised into narrow valleys that lead directly from the Cascade Range. Consequently, the hydrologic response to both regional runoff events (such as December 1964 and February 1996 rain-on-snow events) and short-duration local events such as summer thunderstorms can be swift and intense. As described above, more than 70 percent of the February 8, 1996 peak discharge, was contributed by tributaries downstream of the Pelton-Round Butte dam complex. This integrated hydrologic network coupled with abundant sediment sources allows for efficient transport of relatively large quantities of sediment (compared to the areas of young lavas upstream) to the Deschutes River valley bottom during local and regional runoff events.

As with both the Young Volcanic and Eastern Highland terranes, Quaternary rates of sediment input to the Deschutes River system in the Northern Canyons have probably varied substantially. This section of the Deschutes River basin has also been episodically blanketed with ash and pumice falls, although not as thickly as have the southerly parts of the basin. Large glacial-age ice caps and glaciers formed around Mount Hood and the adjacent Cascade Range, resulting in outwash gravels that contributed significantly to the sediment load of the Deschutes River. Lahars and pyroclastic flows from Cascade Range eruptions have episodically delivered large quantities of gravel and sand to the Deschutes River. A recent example is a circa A.D. 1790 sandy lahar from Mount Hood (Jon Major, USGS, oral communication, 1998) that reached the Deschutes River via the White River. Large Quaternary landslides, primarily within the John Day and Clarno Formations have directly injected large volumes of sediment into the Deschutes River valley bottom [*O'Connor et al.*, this volume]. The northern part of this area has also been episodically mantled with windblown silt and fine sand derived from the Columbia Plain, and up to 10 m of silt and fine sand was deposited during backflooding 100 km up the lower Deschutes River valley during the late Pleistocene Missoula Floods [*O'Connor et al.*, this volume].

Deschutes River Basin Sediment Budget

These largely qualitative inferences on modern sediment supply are bolstered by limited data on sediment production and transport in the Deschutes River basin. Bathymetric surveys and bottom sampling of Lake Billy Chinook (the reservoir impounded by Round Butte Dam, Figure 1) undertaken as part of this study, as well as surveys of Prineville and Ochoco Reservoirs by the Bureau of Reclamation (Figure 1), furnish volume and size estimates for regional sediment production during the last 34-90 years. Suspended load measurements conducted by the U.S. Geological Survey for short periods at five gages provide sparse additional records of annual sediment production.

Reservoir Sedimentation Surveys. Surveys and sampling of sediment accumulated in Lake Billy Chinook provide estimates of the volume and type of sediment trapped by the Pelton-Round Butte Project operations and precluded from moving from the upper Deschutes, Crooked, and Metolius River basins to the lower Deschutes River. Each of the three arms of Lake Billy Chinook were surveyed by Portland General Electric crews during the summer and fall of 1998, allowing determination of the individual sediment contributions from the Deschutes, Crooked, and Metolius Rivers for the 34 years since closure of Round Butte Dam (Figure 10). Electronic total stations and satellite telemetry were used to gather positions of depths acquired by a vessel-mounted electronic depth finder. For each of the three arms of Lake Billy Chinook, 30 to 44 cross sections were measured from the point where the river entered the lake to approximately 3 km downstream (Figure 11). Resulting cross-sections were compared to cross-sections derived from 1.5-m (5-ft) contour maps surveyed by Portland General Electric prior to inundation. This analysis shows that deltas up to 15 m thick have formed where the Crooked and Deschutes Rivers enter Lake Billy Chinook. No detectable delta could be resolved by the repeat cross sections for the Metolius arm, although

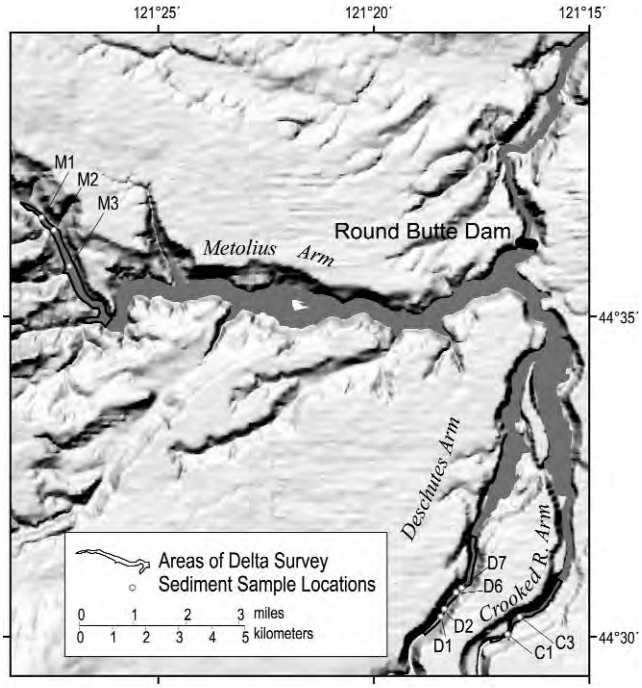

Figure 10. Location of delta surveys and sediment samples in Lake Billy Chinook. Survey and sample location data from Portland General Electric (Scott Lewis and Gary Reynolds, Portland General Electric, 1998 written communication). Hillshade topographic base from U.S. Geological Survey 30-m digital elevation data.

reconnaissance diving by Scott Lewis (Portland General Electric, oral communication, 1998) revealed local accumulation of silt, sand, and gravel up to 2 m thick, which is about the maximum uncertainty associated with comparing pre- and post-reservoir bathymetry.

The volumes of each of the Deschutes and Crooked River deltas were calculated by multiplying the average change in area for each pair of adjacent cross sections by the distance between each pair. Using this approach, the estimated volume of the delta where the Crooked River enters Lake Billy Chinook is about 627,000 m^3, and that for the Deschutes River is about 622,400 m^3 (Table 1). Composition of the deltas is not completely known, but reconnaissance augering and analysis of ten samples from the delta surfaces show that all three deltas are primarily composed of sand and gravel at their apices and become finer-grained farther and deeper into the reservoir (Figures 11 and 12). The Deschutes River delta is coarsest, having a pebbly delta apex that grades downstream to mostly sand. The Crooked River delta is distinctly finer than both the Deschutes and Metolius River deltas, with the upstream part of the delta formed primarily of sand, grading downstream to mostly silt and clay. These analyses support qualitative observations during reconnaissance diving and collection of the samples (Scott Lewis, written communication, 1998) that the Crooked River delta is primarily composed of silt, fine sand, and organic detritus; and the Deschutes River delta is composed of coarse sand with minor gravel at the delta apex grading to fine sand at the downstream crest of the delta.

Reservoir sediment volumes have also been measured by the Bureau of Reclamation for Prineville and Ochoco Reservoirs in the Crooked River drainage (Table 1; Ronald Ferrari, U.S. Bureau of Reclamation, written communication, 1999). In Prineville Reservoir, behind Bowman Dam on the Crooked River, a May 1998 survey indicated that about 5,657,400 m^3 had accumulated since the December 1960 closure of the dam. Ochoco Reservoir accumulated about 3,802,000 m^3 of sediment between January 1920 closure and a June 1990 survey. There are no available sediment-size data for these reservoirs.

These volume estimates were converted to masses by assuming *in situ* sediment densities of 1.3 to 1.5 tonnes/m^3 for sediment in Lake Billy Chinook and about 1.1 tonnes/m^3 for the presumably finer sediment in Ochoco and Prineville Reservoirs, for which large parts of their source areas are underlain by the John Day and Clarno Formations (Table 1). These sediment density values were based on empirical observations of reservoir sediment density presented in *Vanoni* [1975, pp. 38-44], which show that the density of reservoir deposits composed primarily of sand and gravel typically ranges between 1.3 and 1.5 tonnes/m^3. The 1.1 tonnes/m^3 density assumed for Ochoco and Prineville Reservoirs corresponds to an assumed sediment composition of silt and fine sand.

Sediment Yield. These measurements of reservoir sediment accumulation provide for independent decadal-scale estimates of modern sediment yield for parts of the basin (Table 1). The yield contributing to the Deschutes and Crooked River arms to Lake Billy Chinook for the 34-year period between 1964 and 1998 is remarkably low–on the order of 4 to 6 tonnes/km^2·yr. The yield from the Metolius arm is even lower. These low sediment yield values are all the more notable because the 34-year period that they encompass includes the two largest flow events in the last 140 years. Sediment yield in the upper Crooked River basin is substantially higher, ranging from 26 tonnes/km^2·yr in Prineville Reservoir (also including the sediment delivered by both the 1964 and 1996 floods) to 80 tonnes/km^2·yr for Ochoco Reservoir (only including the 1964 flood, but representing a much longer duration than the other reservoirs).

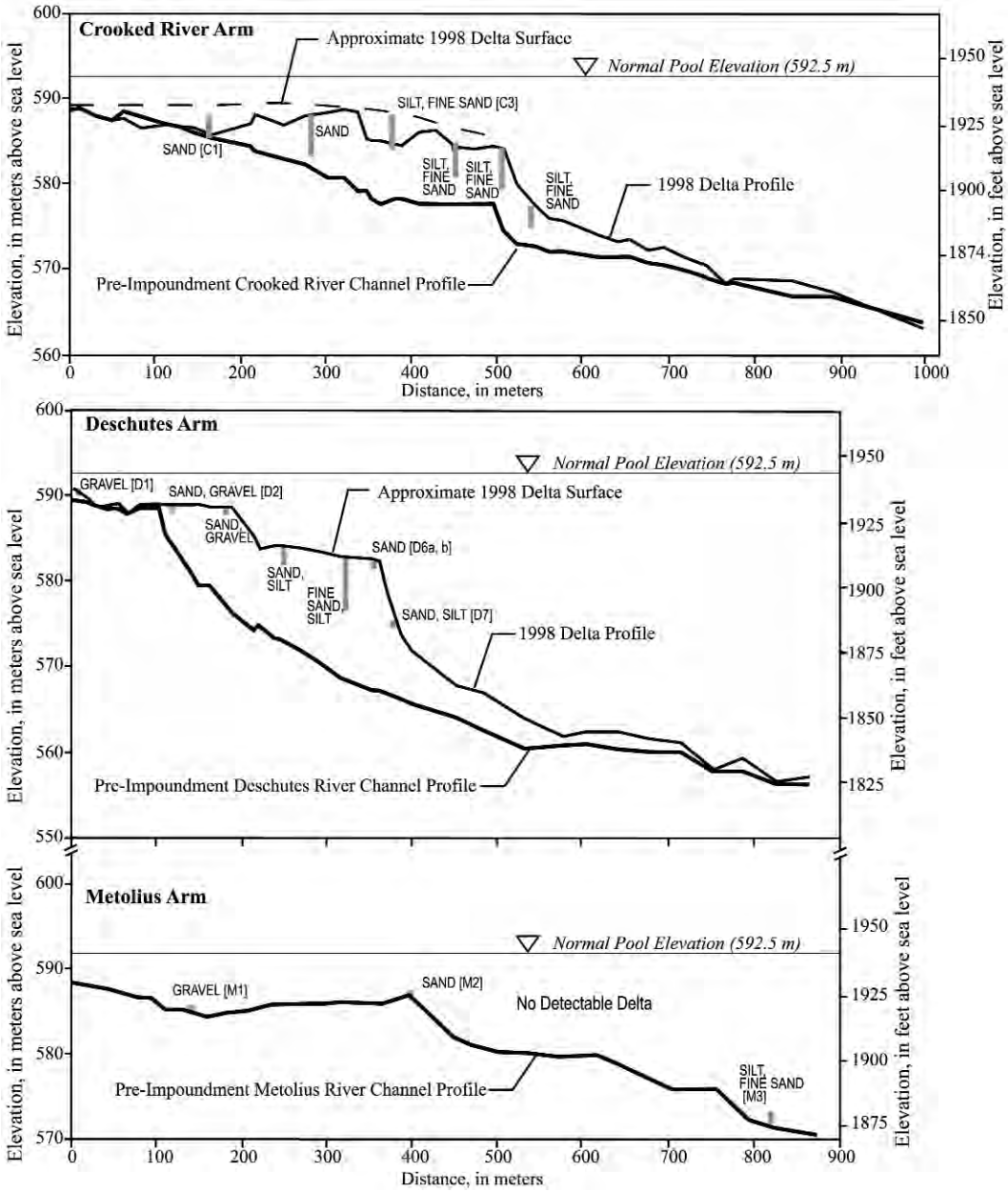

Figure 11. Upper 1 km of longitudinal profiles of the three arms of Lake Billy Chinook, showing pre-impoundment river profile, present delta profiles over the former channel thalwegs, and dominant substrate composition along each delta. Areas of surveys shown on Figure 10. There was no detectable difference between the present reservoir bottom and the former channel profile in the Metolius arm, although there has been up to 1.5 m of deposition locally (Scott Lewis, Portland General Electric, written communication, 1998). The approximate delta surface depicted for the Crooked Arm represents the overall uppermost elevation of delta deposits along the survey transects. In contrast, the surface of the Deschutes arm delta was more uniform across its breadth. Drawn from data from Portland General Electric (Gary Reynolds, 1998 written communication). Substrate descriptions from subsurface augering conducted by Scott Lewis (Portland General Electric, written communication, 1999; depth indicated by extent of vertical bars). Locations of analyzed samples (with sample designations) shown in Figure 10.

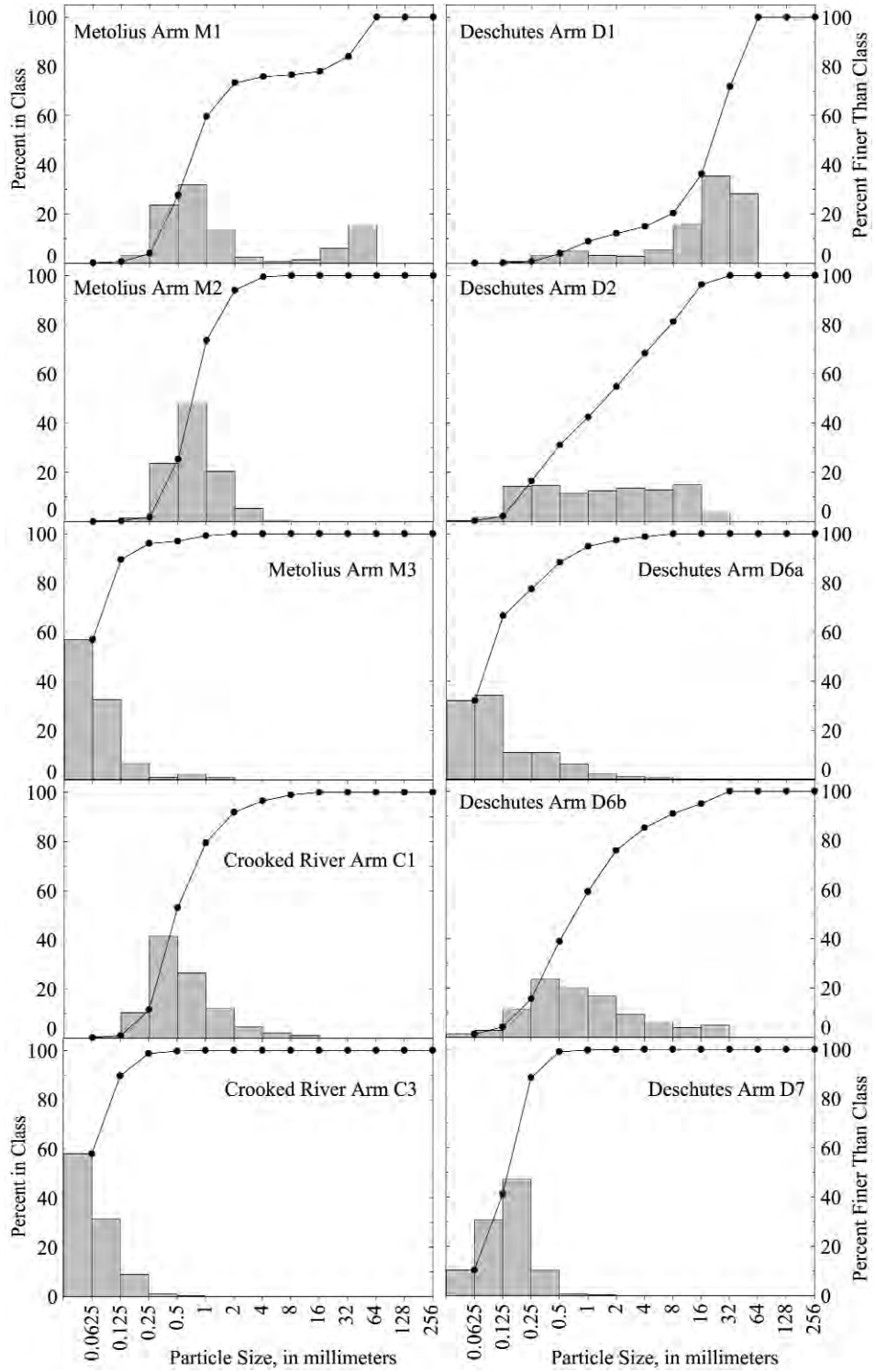

Figure 12. Grain size analyses showing percent in each size class (histogram) and cumulative weight percent (curve) for ten samples from Lake Billy Chinook. Sample locations shown in Figures 10 and 11. Samples collected by Scott Lewis, Portland General Electric. Analyses conducted by U.S. Geological Survey, Vancouver, Washington.

Table 1. Summary of sediment yield estimates determined from Deschutes River basin reservoir surveys.

Reservoir	Contributing Basin Area (km^2)	Closure and Survey Records	Surveyed Sediment Volume (m^3)	Assumed Sediment Density ($tonnes/m^3$)[1]	Sediment Mass (tonnes)	Sediment Yield ($tonnes/yr/km^2$)	Unit Area Sediment Production Index (km^{-3})
Deschutes Arm, Lake Billy Chinook	6000	Round Butte Dam closed Jan. 2, 1964; surveyed May 1998	622400	1.44	898700	4.4	0.032
Crooked River Arm, Lake Billy Chinook	3920	Round Butte Dam closed Jan. 2, 1964; surveyed May 1998	627000	1.25	803200	6.1	0.046
Prineville Reservoir	6346	Bowman Dam closed Dec., 1960; surveyed May, 1998[2]	5657400	1.12	6342000	26.0	0.078
Ochoco Reservoir	752	Ochoco Dam closed Jan., 1920; survey date June 1990[2]	3802000	1.12	4262100	80.4	0.136

[1]Estimated from measured and inferred delta composition and empirical observations of reservoir sediment density portrayed in *Vanoni* [1975, pp. 38-44].
[2]Sediment volumes, survey dates, and dam closure information provided by Ronald Ferrari, U.S. Bureau of Reclamation (written communication, 1999)

We have found no other measurements of regional sediment yield for equivalent contributing areas that are as low as the sediment yield of the areas contributing to the Crooked and Deschutes River arms of Lake Billy Chinook (Figure 13). These rates are generally two to seven times less than sediment yields reported by *Judson and Ritter* [1964] for the Columbia and Snake River basins, about seven to fifteen times less than reported for the Klamath River basin (as calculated from data attributed to Janda and Nolan in *Milliman and Syvitiski* [1992]), and more than two orders of magnitude smaller than those predicted by area-based regression equations developed by *Milliman and Syvitiski* [1992] for mountain drainage basins in temperate regions. These low overall rates of sediment yield from the areas contributing to Lake Billy Chinook reflect the predominance of young volcanic rocks (which produce little sediment), limited surficial hydrologic network in many of the sediment source areas, and the absence of modern processes that supply and deliver abundant sediment. The sediment yields of the areas contributing to Ochoco and Prineville Reservoir are more typical of other landscapes, but still lower than for most basins of similar size for which there are sediment yield measurements (Figure 13).

Sediment Budget. Sediment yield values from isolated parts of the basin document regional sediment contributions to the Deschutes River system, but do not fully portray basin-wide patterns of sediment yield. A basin-wide sediment budget is critical to fully evaluate the effects of impoundment on overall sediment flux. In this section we extrapolate the reservoir sediment yield data to the rest of the basin on the basis of basin physiography in order predict the spatial distribution of sediment input into the Deschutes River system and the effects of impoundment on overall sediment supply.

Our approach follows from the premise that in steady-state landscapes dominated by diffusive processes of surficial sediment mobilization (e.g. biogenic activity, rain-splash, soil creep, freeze-thaw action), sediment flux per unit stream length is proportional to the gradient of the flanking hillslope [*Culling*, 1960, 1963; *Hirano*, 1968], although this relation is not necessarily linear in steeper terrains [*Andrews and Buckman*, 1987; *Roering et al.*, 1999]. Consequently, the sediment yield per unit area will be proportional to the product of average slope gradient and drainage density, which we term *the sediment production index* (SPI). To apply this reasoning on a spatially explicit basis, we divided the Deschutes River basin into 100 approximately equal-sized and hydrographically defined subbasins for which area, drainage density, and average hillslope gradient were calculated from digital topographic and hydrographic data (Figure 4a, b). For each subbasin we then calculated the sediment production index as the product of subbasin drainage density and mean hillslope gradient (Figure 4c). Combining the areas now contributing sediment into the Crooked River and Deschutes arms of Lake Billy Chinook, and Prineville and Ochoco Reservoirs, and comparing the calculated sediment production index to actual sediment yields as recorded in the reservoirs yields the regression relation:

$$Q_s = 3.74\ (SPI)^{2.23} (r^2 = 0.98;\ P = 0.015),$$

where Q_S is sediment yield, in tonnes per square kilometer per year, and SPI is in units of km^{-1} (Figure 14).

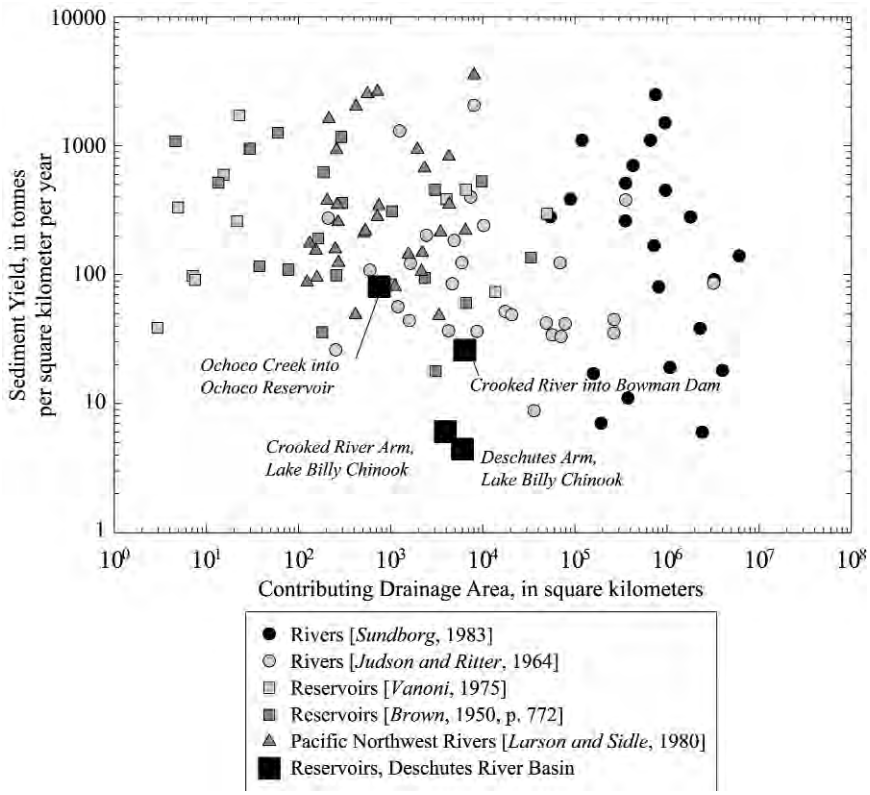

Figure 13. Compilation of sediment yield data from various sources, comparing sediment yield from parts of the Deschutes River basin to yields from other basins. Ochoco Creek and Crooked River sediment yields derived from surveyed sediment volumes behind Ochoco and Bowman Dams (Table 1; Ronald Ferrari, U.S. Bureau of Reclamation, 1999 written communication). Lake Billy Chinook (LBC) volumes measured by Portland General Electric survey crews in 1998 (Figures 10 and 11).

This result is only strictly applicable to transported bedload and suspended sand and silt (>0.004 mm) that drops out rapidly in these large reservoirs. Clay-sized particles probably stay in suspension long enough bypass the reservoirs. This result is also broadly consistent with the central tendencies (on a logarithmic plot) of the annual volumes of suspended load recorded at four U.S. Geological Survey gaging stations for short periods (Figure 14), although these gages also depict the substantial year-to-year variation in sediment transport. The results of a single year of suspended load measurements for White River, a large tributary draining the eastern Cascade Range and entering the Deschutes River downstream of the Pelton-Round Butte dam complex, are consistent with extrapolation of this relation to even higher values of SPI.

By applying this relation to the SPI calculated for each of the 100 subwatersheds (Figure 4d) and summing the resulting estimates of sediment yield downstream, we may estimate the overall downstream sediment flux and the incremental effects of impoundment in the Deschutes River basin (Figure 15). Under pre-impoundment conditions, modern sediment flux downstream of the confluence of the Deschutes, Crooked, and Metolius Rivers, 180 km upstream of the Columbia River confluence, is estimated to have been about 480,000 tonnes/yr. More than half of this volume was from the Crooked River basin. Downstream at the Columbia River confluence, the total annual sediment flux under pre-impoundment conditions is estimated to have been slightly more than 1,200,000 tonnes/yr, indicating that 60 percent of Deschutes River pre-impoundment sediment flux into the Columbia River is derived from below the Pelton-Round Butte dam complex. On the basis of this analysis, Trout Creek, Warm Springs River, and White River are likely to be major sources of sediment along the lower Deschutes River (Figure 15). In addition, the steep and dissected terrain formed where the Deschutes River has incised through the Mutton Mountains, between 120 and 90 km from the Columbia River confluence, (Figures 1 and 4) is also predicted to be an area of substantial sediment production and delivery. Consistent with this prediction is a concentration

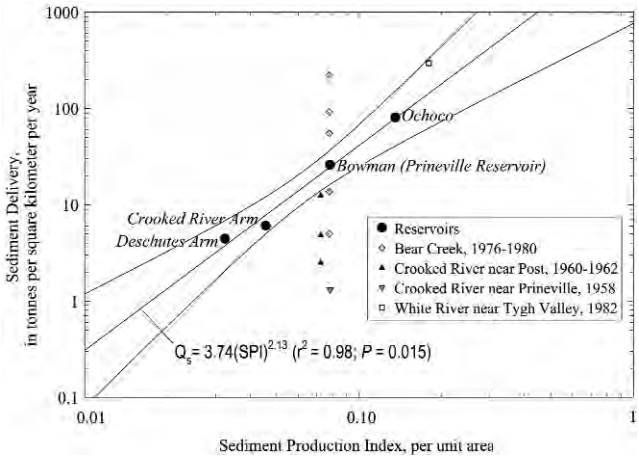

Figure 14. Regression and 95 percent confidence limits between unit Sediment Production Index values (SPI) and measured sediment yields (Table 1) for areas contributing to reservoirs in the Deschutes River basin. Shown for comparison are annual suspended load volumes measured at U.S. Geological Survey streamflow stations within the Deschutes River basin. Suspended load data from U.S. Geological Survey annual reports and water-supply papers.

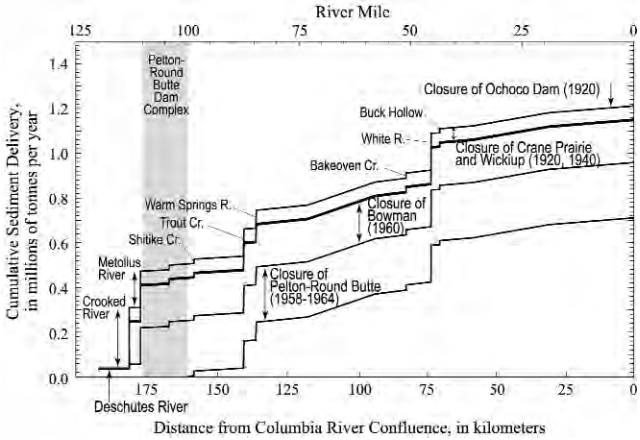

Figure 15. Calculated sediment budget for the lower 200 km of the Deschutes River showing spatial distribution of sediment input and the incremental effects of sediment trapping by upstream reservoirs. Sediment volumes determined on the basis of calculated SPI values (Figure 4) and the empirical relation between SPI and sediment yield shown in Figure 14. Uppermost curve shows calculated cumulative sediment delivery for preimpoundment Deschutes River upstream to Crooked River confluence, and lowest curve shows calculated cumulative sediment delivery after the stepwise reduction resulting from each of the major impoundments in the Deschutes River basin.

of tributary fan deposits along this section of Deschutes River [*Curran and O'Connor*, this volume), likely formed by floods and debris flows triggered by summer convective storms precipitating on the numerous short and steep tributaries.

These sediment yield and delivery estimates portrayed on figures 4c, 4d, 13, 14, and 15 represent modern pre- and post-impoundment conditions for the past 50 to 80 years, including the effects of two large regional floods. Nevertheless, the short time window of sedimentation recorded in Lake Billy Chinook and other basin reservoirs does not adequately reflect basin-wide sediment delivery over longer time scales that incorporate periods of volcanism, cataclysmic flooding, and glacial climates. Such events and processes that operate over longer time scales are important in controlling valley geomorphology and the transport of sediment into the Deschutes River system. Thus, a key to assessing the effects of Deschutes River basin dams on river, channel, and valley bottom conditions is the role of the modern sediment transport regime relative to sediment yield and delivery events that occur over geologic time scales. Several papers in this volume explore this matter in greater detail, but the remarkably low sediment transport rates of the modern (both pre- and post-impoundment) Deschutes River basin help tip the scales toward greater importance of rare high-magnitude events.

SUMMARY OF IMPORTANT BASIN-SCALE PROCESSES AND CONDITIONS

The cumulative result of the geologic history of the Deschutes River basin is that the basin has distinct geologic, hydrologic, and geomorphic attributes when compared to other western U.S. rivers. Of these attributes, the remarkably steady flows and low sediment flux are important factors for understanding the geomorphology of the Deschutes River below the Pelton-Round Butte dam complex. These modern processes and conditions, as well as the history of geologic events such as canyon cutting, volcanism, and glaciation, form the framework for the studies of valley geomorphology, channel processes, and fish ecology reported in accompanying papers. The most important aspects of this framework are:

1. The present stream network and valley morphology have resulted from tens of millions of years of tectonic, volcanic, and erosional processes. The overall northward course of the Deschutes River was established by about 12 million years ago. The present canyon of the lower Deschutes River was carved between 4 and 1 million years ago, but there have been subsequent episodes of partial

refilling and incision initiated by lava flows, volcaniclastic debris, and glacial outwash.

2. The vast extent of young and permeable volcanic rocks and the poorly developed surface channel network in the southern Deschutes River basin have resulted in a hydrologic system buffered by substantial groundwater flow. Consequently, flow entering the lower Deschutes River is unusually steady–the annual variation of flow is small and the response to regional climatic events is muted compared to other rivers of its size. More than 70 percent of the peak discharges of both the December 1964 and February 1996 flood flows in the lower Deschutes River entered downstream of the Pelton-Round Butte dam complex despite encompassing only 26 percent of the total drainage area.

3. The rock types in the southern and western parts of the Deschutes River basin, especially the Quaternary volcanic rocks, do not produce substantial sediment, and the sediment that has been produced is primarily gravel, silt, and clay deposited as glacial moraines and outwash now preserved on ridgetops and in disconnected alluvial basins. The older and more weathered volcanic rocks of the John Day and Clarno Formations that underlie the Ochoco Mountains are susceptible to landsliding and likely produce more sediment than any of the other broadly defined rock types in the basin. In the northern part of the basin, Tertiary lava flows of the CRBG are relatively resistant to erosion and produce mainly cobble- and gravel-sized material. Aside from the lahar-filled valley of the upper White River draining Mount Hood, there are few sources of sand readily accessible by the modern channel network anywhere in the Deschutes River Basin.

4. The steady stream flows coupled with low sediment supply have resulted in extremely low rates of sediment delivery to the Deschutes River. Sediment yield from the southern part of the Deschutes River basin, determined from reservoir surveys, is the smallest yet reported for basins of such size. The eastern part of the Deschutes River basin, underlain by the weathered and uplifted volcanic and volcaniclastic rocks of the John Day and Clarno Formations has greater sediment yield and is a major source of silt and clay, but most of the areas underlain by these formations are now upstream of reservoirs and do not contribute sediment to the lower Deschutes River. Extrapolation of sediment yield measurements from reservoir surveys on the basis of an empirical relation between sediment yield and physiography leads us to infer that more than 60 percent of the total Deschutes River sediment load was derived from downstream of the Pelton-Round Butte dam complex prior to impoundment in the basin. This also corresponds to the greater relative runoff volumes derived from the lower part of the basin. The Pelton-Round Butte dam complex now traps about 50 percent of the total, basin-wide, pre-impoundment sediment load entering the lower Deschutes River. But because of the large volume of sediment introduced from downstream, this equates to less than 25 percent of the total load at the Columbia River confluence (Figure 15).

5. Most sediment delivered to the Deschutes River over time periods of thousands to millions of years has probably been delivered in pulses by episodic events such as major pumice and ash falls, volcanic debris flows, landslides, or during periods of radically altered basin conditions such as extensive glaciation or short-lived rapid incision. The total volume of sediment, especially sand and gravel, delivered during these episodic events is probably orders of magnitude greater than the volume of sediment that enters the system during more quiescent times, such as those recorded by the 20th century reservoir surveys.

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Jim E. O'Connor and Tana L. Haluska, U.S. Geological Survey, 10615 SE Cherry Blossom Drive, Portland, OR, 97216

Gordon E. Grant, U.S. Forest Service, 3200 Jefferson Way Corvallis, OR 97331

From:	Linton, Judy L NWP
To:	"Alex Cyril"; "Bill Yocum"; "Bob Lobdell"; "Chuck Wheeler"; "Janine Castro"; "Jay Charland"; "Jim O"Connor"; "Jodi Fritts"; Linton, Judy L NWP; "Patty Snow"; "Robert Elayer"; "Todd Confer"; "Yvonne Vallette"; gwhess@usgs.gov
Cc:	"Frank Schnitzer"
Subject:	November Tech Team mtg notes - final
Date:	Friday, December 07, 2007 3:50:07 PM
Attachments:	20 Nov 2007 Tech Team mtg notes.doc

Attached are the final notes for the November meeting. I believe I addressed all comments except for the Mission Statement. This is something the Executive Team will need to define for us as they are ultimately responsible for directing our work.

Jim and Glen: did you get enough information at the meeting to prepare the draft scope of work or do you need additional information?

MEETING NOTES
CHETCO RIVER GRAVEL REMOVAL
TECHNICAL TEAM MEETING
NOVEMBER 20, 2007
1:00 to 3:00

ATTENDEES:
Judy Linton, US Army Corps of Engineers
Janine Castro, US Fish and Wildlife Service
Chuck Wheeler, National Marine Fisheries Service
Yvonne Vallette, Environmental Protection Agency
Bob Lobdell, Oregon Department of State Lands
Alex Cyril, Oregon Department of Environmental Quality
Jay Charland, Oregon Department of Land Conservation and Development (phone)
Patty Snow, Oregon Department of Fish and Wildlife
Robert Elayer, Tidewater Contractors, Inc
Bill Yocum, Freeman Rock, Inc
Chris Lidstone, Lidstone and Associates, Inc (phone)
Jim O'Connor, US Geological Survey
Glen Hess, US Geological Survey

AGENDA ITEMS:

1) Administrative Details:

Mission: The focus of the Technical Team is evaluating specific watersheds to objectively determine whether gravel mining can occur on a short-term or long-term basis. Such evaluation will include looking at direct and indirect impacts to sediment movement. Meetings are not to evaluate or discuss specific permit actions which may be under review by either the Corps of Engineers (Corps) or Department of State Lands (DSL).

Organization: The Corps and DSL will act as co-chairs for the Technical Team and will be responsible for setting up meetings, taking notes and generally making sure there is follow through with identified action items. Draft meeting notes will be sent to meeting participants for review prior to becoming final.

The Team will attempt to reach agreement on future actions – any insurmountable disagreements will be raised to the Executive Team for resolution.

Membership: It was agreed the membership should be fluid based on the watershed being studied.

2) Process and Data/Information Needs:

Timelines: The timelines for existing Chetco River gravel mining authorizations for Freeman Rock and Tidewater were clarified. The Department of the Army permit expires September 2009; Water Quality Certification is valid until August 2009; DSL permits require annual renewal for work occurring beyond 2008; and the Biological Opinions provide endangered species coverage through the 2008 work season (which runs from July 15 through September 30 above the Chetco River estuary). Therefore, if it is determined further mining can occur in the Chetco River beyond the 2008 season, permits must be in place by spring of 2009 for mining to occur uninterupted. At the November 15 Executive Team meeting it was suggested this Phase 2 study be completed by spring 2008 to allow one full year to complete the permit process should that be the direction taken. The Technical Team is concerned this timeframe will not provide adequate time for date to be collected and evaluated.

Information Needs/Process to Obtain Information: Sediment budget information is crucial. Most of the winter high flows have already passed so we may not be able to collect any data this year. Jim O'Connor suggested there may be a way to estimate sediment budget information without doing actual measurements, which can be refined as data is collected over time. He will have a better idea once he has a chance to review the Phase 1 work. USGS will also evaluate the Phase 1 work to determine if there is better way to structure the determination of whether a system is aggrading, degrading, or in equilibrium.

USGS could do sediment transport studies. They will need to know the specific questions to be answered (including timelines and spatial scope) and then can prepare a draft scope of work to include required funding (estimated). This scope of work would include 1) data collection that can be done within the immediate timelines and 2) data collection that can be done given a longer time period. Subsequent to the Chetco process, as we move forward to tackle more watersheds, USGS suggested it may make most sense to pick one river system that can represent all coastal systems rather than evaluate all systems separately. *(Post meeting note: whether one river system can represent all or a group of river systems for purposes of simplifying the necessary evaluation process caused much discussion in email comments stemming from the review of the draft meeting notes. This question will not be resolved here but needs to be given further consideration).* USGS estimated it will be the 1st or 2nd week of January 2008 before they are able to provide the draft scope of work. The Technical Team needs to recommend to the Executive Team that funding for USGS work is crucial.

Additional information that may be beneficial:
1) Cross-sectional information provided by the operators could potentially be used if combined with known water events. The evaluation would also need to include review of aerial photos at these same cross-sections.
2) Monitoring reports as required under existing mining permits. Freeman Rock has collected data and will have the reports out by December. Although Tidewater did not

mine in 2007 they do have pre-mine surveys and will also be doing pre-mine surveys in 2008.
3) Pre-mine surveys at Tidewater Bar: This information has been collected for past two years.
4) Suggestion made that we should also look at site specific responses to gravel removal within watersheds.

Regarding evaluation of other watersheds, the group agreed we need direction from the Executive Team on prioritization beyond the Umpqua River system (which will be studied next). DSL has a list of active gravel operators; the Corps has a list of pending permit applications which needs to be updated to add the Coquille River and Hunter Creek. The mention of Hunter Creek raised the question of how we will deal with sub-basins. All agreed that we should recommend to the Executive Team that we start the Phase 1 study process for the Umpqua River. The Executive Team will need to decide who will pull together the final product for that effort, however, as Janine is pretty well tied up with other work well into next year.

3) Next Steps:

- Brief the Executive Team at their December 19 meeting on Technical Team organization details and information needed for Phase 2 study work. Execs also need to be briefed on work being done by USGS to assist the Technical Team in refining information needs and estimated timelines. (It was suggested that perhaps the Executive Team should postpone their December meeting until more information is available about what data collection is possible).
- The next meeting of the Technical Team will be scheduled around mid-January (exact date pending receipt of draft scope of work from USGS.

From:	Linton, Judy L NWP
To:	Evans, Lawrence C NWP
Subject:	FW: Chetco Phase II: Agenda Items for 12/19/07 Meeting
Date:	Friday, December 07, 2007 1:24:39 PM
Attachments:	Tech Team meeting notes etc..msg RE Tech Team meeting notes etc..msg RE Tech Team meeting notes etc..msg RE Tech Team meeting notes etc..msg RE Tech Team meeting notes etc..msg RE Tech Team meeting notes etc..msg RE Tech Team meeting notes etc..msg RE Tech Team meeting notes etc..msg

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Larry: this apparently did not reach you because of incorrect email address (I wondered why you hadn't mentioned it to me!). Judy

-----Original Message-----
From: Ted Freeman, Jr. [mailto:tedf@hughes.net]
Sent: Wednesday, December 05, 2007 11:21 AM
To: Kevin Moynahan; Larry Evans
Cc: Linton, Judy L NWP; Terri (Smith) Moffett; Karmen (DeFazio) Fore; Molly (Wyden) McCarthy; Jon Barton; Wayne Krieger
Subject: Chetco Phase II: Agenda Items for 12/19/07 Meeting

Kevin and Larry,

I have reviewed the attached emails dealing with the Technical Teams meeting from November 20, 2007. These emails bring up two issues that the Executive Team needs to address. First is the decision-making authority and second is the budget. I am requesting that these issues are addressed at our December 19th meeting. Listed below is my view on these two issues.

The decision-making authority rests with the Manager/Executive Team, not the Technical Team. The Technical Team needs to develop a process that incorporates good science and allows the Manager the opportunity to make good permitting decisions. If there is not enough time to incorporate all of the science then the Technical Team needs to develop the process with identified data gaps. This way the Manager can do a risk assessment prior to making the decision on whether to permit or not to permit.

The budget and workload authority also rests with the Manager/Executive Team, not the Technical Team. If the Technical Team has identified a need for additional information to strengthen the Phase II process then this additional needs should be presented to the Executive Team with cost estimates. This way any proposed budget will have a direct link to a work plan. Then the manager can prioritize the need to merge this additional information into his/her existing budget.

Ted Freeman Jr.
Freeman Rock Inc.
541-469-2444

From:	Linton, Judy L NWP
To:	"Alex Cyril"; "Bill Yocum"; "Bob Lobdell"; "Chuck Wheeler"; "Janine Castro"; "Jay Charland"; "Jim O"Connor"; "Patty Snow"; "Robert Elayer"; "Yvonne Vallette"; "gwhess@usgs.gov"; "cdl@lidstone.com"
Cc:	Linton, Judy L NWP
Subject:	Tech Team meeting notes, etc.
Date:	Tuesday, November 27, 2007 1:52:18 PM
Attachments:	20 Nov 2007 Tech Team mtg notes.doc Deschutes River Overview (2).pdf

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Greetings: attached are the draft meeting notes for the November 20 Tech Team meeting. Please review and let me know of corrections, etc. I have also attached the Deschutes River sediment paper that Jim O'Connor mentioned at the meeting. I previously sent the Chetco River Phase 1 work products to Jim O'Connor, Glen Hess, and Chris Lidstone and so have not attached it here as I assume the rest of you have it already. If you do not have it, let me know and I can send it to you.

Here is the link to the paper discussing sediment work done on the McKenzie River. This paper was prepared in cooperation with the Corps.

Influence of Cougar Reservoir Drawdown on Sediment and DDT Transport and Deposition in the McKenzie River Basin, Oregon, Water Years 2002–04 <http://pubs.usgs.gov/sir/2007/5164/>

Have I forgotten anything? Please provide comments on the meeting notes as soon as possible. I will then finalize. Thanks - Judy

From:	Jay Charland
To:	Yvonne Vallette; Janine Castro; Bill Yocum; cdl@lidstone.com; Chuck Wheeler; Alex Cyril; Bob Lobdell; Patty Snow; Robert Elayer; Linton, Judy L NWP; gwhess@usgs.gov; Jim O"Connor
Cc:	Jodi Fritts; Jon Barton; JR TED FREEMAN; Rich Angstrom; Todd A Confer; Joy Smith
Subject:	RE: Tech Team meeting notes, etc.
Date:	Wednesday, November 28, 2007 10:38:40 AM

I agree about the lack of a single representative river.

I think the Exec Cmte should meet because I sensed a real disconnect between what the Exec Team thought was happening and what the Tech Team thought was happening.

Jay Charland
Oregon Coastal Management Program
Land Conservation and Development
635 NE Capitol St, Ste 150
Salem, Oregon 97301-2540
(503) 373-0050 x253
(503) 378-6033 fax
jay.charland@state.or.us
www.oregon.gov/lcd/ocmp/index.shtml

>>> "Patty Snow" <Patty.Snow@state.or.us> 11/28/2007 8:44 AM >>>

Hi Judy, I agree with Bill's statement, I don't think there is one river that will represent all coastal rivers. The Chetco River is geologically so different than the Umpqua for example. The other suggestion I didn't see was that the Executive Team may want to postpone their December meeting until there is more information available. Thanks for the good work, Patty

Patty Snow

Land and Water Use Coordinator

Wildlife Division

(503) 947-6089

From: Bill Yocum [mailto:byocum@hughes.net]
Sent: Wednesday, November 28, 2007 7:08 AM
To: Linton, Judy L NWP; CYRIL Alex; LOBDELL Bob; Chuck Wheeler; Janine Castro; CHARLAND Jay; Jim O'Connor; Patty Snow; Robert Elayer; Yvonne Vallette; gwhess@usgs.gov; cdl@lidstone.com
Cc: Jodi Fritts; TED FREEMAN, JR; Jon Barton; Rich Angstrom; Joy Smith
Subject: Re: Tech Team meeting notes, etc.

Hi Judy,

Good job on the notes. My only comment is dealing with the statement "It may make most sense to

pick one river system that can represent all coastal systems rather than evaluate all systems." The way that I remember the discussion is that some coastal rivers with similar attributes might be able to be lumped together for a preliminary analysis. For sure I do not see the Chetco (a coastal river) being able to represent the Rogue (2nd to the largest river in the State of Oregon).

Thanks again for your great job on running and documenting the meeting.

Bill

----- Original Message -----

From: Linton, Judy L NWP <mailto:Judy.L.Linton@usace.army.mil>

To: Alex Cyril <mailto:Cyril.Alex@deq.state.or.us> ; Bill Yocum <mailto:byocum@hughes.net> ; Bob Lobdell <mailto:bob.lobdell@state.or.us> ; Chuck Wheeler <mailto:Chuck.Wheeler@noaa.gov> ; Janine Castro <mailto:Janine_M_Castro@fws.gov> ; Jay Charland <mailto:jay.charland@state.or.us> ; Jim O'Connor <mailto:oconnor@usgs.gov> ; Patty Snow <mailto:Patty.Snow@state.or.us> ; Robert Elayer <mailto:relayer@twcontractors.com> ; Yvonne Vallette <mailto:Vallette.Yvonne@epa.gov> ; gwhess@usgs.gov ; cdl@lidstone.com

Cc: Linton, Judy L NWP <mailto:Judy.L.Linton@usace.army.mil>

Sent: Tuesday, November 27, 2007 1:52 PM

Subject: Tech Team meeting notes, etc.

<<20 Nov 2007 Tech Team mtg notes.doc>> <<Deschutes River Overview (2).pdf>>

Greetings: attached are the draft meeting notes for the November 20 Tech Team meeting. Please review and let me know of corrections, etc. I have also attached the Deschutes River sediment paper that Jim O'Connor mentioned at the meeting. I previously sent the Chetco River Phase 1 work products to Jim O'Connor, Glen Hess, and Chris Lidstone and so have not attached it here as I assume the rest of you have it already. If you do not have it, let me know and I can send it to you.

Here is the link to the paper discussing sediment work done on the McKenzie River. This paper was prepared in cooperation with the Corps.

Influence of Cougar Reservoir Drawdown on Sediment and DDT Transport and Deposition in the McKenzie River Basin, Oregon, Water Years 2002–04 <http://pubs.usgs.gov/sir/2007/5164/>

Have I forgotten anything? Please provide comments on the meeting notes as soon as possible. I will then finalize. Thanks - Judy

From:	CYRIL Alex
To:	Robert Elayer; Linton, Judy L NWP; Bill Yocum; LOBDELL Bob; Chuck Wheeler; Janine Castro; CHARLAND Jay; Jim O"Connor; Patty Snow; Yvonne Vallette; gwhess@usgs.gov; cdl@lidstone.com
Subject:	RE: Tech Team meeting notes, etc.
Date:	Friday, November 30, 2007 9:50:27 AM

Thanks for your willingness to discuss these issues, Robert. I do appreciate your position and all of our commitments to work through things cooperatively.
--Alex

-----Original Message-----
From: Robert Elayer [mailto:relayer@twcontractors.com]
Sent: Friday, November 30, 2007 8:27 AM
To: CYRIL Alex; 'Linton, Judy L NWP'; 'Bill Yocum'; LOBDELL Bob; 'Chuck Wheeler'; 'Janine Castro'; CHARLAND Jay; 'Jim O'Connor'; 'Patty Snow'; 'Yvonne Vallette'; gwhess@usgs.gov; cdl@lidstone.com
Subject: RE: Tech Team meeting notes, etc.

Alex,

The point I wanted to make was that I did not feel the process part of our task is getting ample billing. The emphasis seems to be investigation rather than develop a process, in fact, process is not even mentioned in the mission statement.

As for your second comment...

Tidewater has already suffered a lot because we have not been able to mine on either the Rogue or Chetco Rivers. When we paved Hwy 101 through Brookings a year ago we had to truck all the asphalt down from Gold Beach because we were not allowed to obtain the needed gravel from the Chetco River. You can imagine what the extra trucking from Gold Beach in relation to trucking from the Chetco River cost us on that contract. We are still trucking all our asphalt and concrete rock for the Brookings area from either Gold Beach or Smith River because we could not mine on the Chetco River this year (we only use river rock for making asphalt and concrete, all other uses come from upland quarries). We will get some rock from 2nd Bridge on the Chetco next year after the bridge is completed, but depending on our project demands, this may or may not be enough. What really hurt our business is not being able to mine at Tidewater Bar since 2004 and it was a double shock when we were told we would not be given a 2-year short-term permit there. To loose the possibility of mining at Tidewater Bar and 2nd Bridge will definitely hurt. Because we were not allowed to mine at Tidewater Bar this year, there is no new data on that site except for the survey, so there is nothing new to base a decision on for the long term. So, to answer your question, no, we would not be willing to forgo mining for another season, but of course, we realize that we may not get our wish nor have input into that decision. What would be wrong with a 1-year extension instead of curtailing mining for a year?

I am looking forward to seeing what the USGS comes back with for their recommendations. As Jim stated in the meeting, there are other ways to determine bed load that may be used to get a good handle on the amount of material moving down the river. I think that it is possible to obtain the needed information to make a good decision within the time constraints, but it may not be as complete as we would like. Is a calculated sediment budget based on point-in-time measurements better than a sediment budget estimated by empirical means that cover a longer period? We obviously do not have the luxury to do a long-term sediment budget analysis nor do we have the budget and labor power to do it for one river let alone all the mined rivers in western Oregon. To get the job done within a

reasonable time we need to think outside the box!

Robert

From: CYRIL Alex [mailto:Cyril.Alex@deq.state.or.us]
Sent: Thursday, November 29, 2007 12:11 PM
To: Robert Elayer; Linton, Judy L NWP; Bill Yocum; LOBDELL Bob; Chuck Wheeler; Janine Castro; CHARLAND Jay; Jim O'Connor; Patty Snow; Yvonne Vallette; gwhess@usgs.gov; cdl@lidstone.com
Subject: RE: Tech Team meeting notes, etc.

I agree with you, Robert. I think we all want a good process that results in a useful tool. Given that, would you also agree that we might not be able to accomplish this under the restrictive timeline proposed? In that case, would your company be willing to forgo mining on the Chetco for another season if permits cannot be issued (should that be the determination we get to) uninterrupted?

--Alex

-----Original Message-----
From: Robert Elayer [mailto:relayer@twcontractors.com]
Sent: Thursday, November 29, 2007 11:57 AM
To: 'Linton, Judy L NWP'; CYRIL Alex; 'Bill Yocum'; LOBDELL Bob; 'Chuck Wheeler'; 'Janine Castro'; CHARLAND Jay; 'Jim O'Connor'; 'Patty Snow'; 'Yvonne Vallette'; gwhess@usgs.gov; cdl@lidstone.com
Subject: RE: Tech Team meeting notes, etc.

Phase II Gravel Technical Team:

I agree with comments made by Bill and Alex. The meeting notes pretty much sum up what was discussed. However, I would like to throw out some ideas that I have been pondering over since the meeting.

The question I am having some trouble with is our mission statement. It states in the meeting notes that our mission focus is “evaluating specific watersheds to objectively determine whether gravel mining can occur on a short-term or long-term basis. Such evaluation will include looking at direct and indirect impacts to sediment movement. Meetings are not to evaluate or discuss specific permit actions .....” From this statement it is clear that we will be evaluating the technical aspects of each river system or river groups to determine their suitability and capacity for mining. This is as we discussed in the meeting when we also determined that given the time constraints that have been imposed on us by the Executive Team and permit expiration timing, this is a very daunting, if not impossible task.

As I remember from when this whole effort was first proposed by Bob Lohn in his letter of March 2, 2007 and the subsequent meeting with the group on April 25, 2007, the goal was defined as a two-phased approach. Phase I was to provide an immediate solution so gravel mining could continue

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That's my view!

Robert Elayer

Tidewater Contractors, Inc.

From: Linton, Judy L NWP [mailto:Judy.L.Linton@usace.army.mil]
Sent: Tuesday, November 27, 2007 1:52 PM
To: Alex Cyril; Bill Yocum; Bob Lobdell; Chuck Wheeler; Janine Castro; Jay Charland; Jim O'Connor; Patty Snow; Robert Elayer; Yvonne Vallette; gwhess@usgs.gov; cdl@lidstone.com
Cc: Linton, Judy L NWP
Subject: Tech Team meeting notes, etc.

<<20 Nov 2007 Tech Team mtg notes.doc>> <<Deschutes River Overview (2).pdf>>

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To: "CYRIL Alex"; Linton, Judy L NWP; "Bill Yocum"; "LOBDELL Bob"; "Chuck Wheeler"; "Janine Castro"; "CHARLAND Jay"; "Jim O"Connor"; "Patty Snow"; "Yvonne Vallette"; gwhess@usgs.gov; cdl@lidstone.com
Subject: RE: Tech Team meeting notes, etc.
Date: Friday, November 30, 2007 8:23:59 AM

Alex,

The point I wanted to make was that I did not feel the process part of our task is getting ample billing. The emphasis seems to be investigation rather than develop a process, in fact, process is not even mentioned in the mission statement.

As for your second comment…

Tidewater has already suffered a lot because we have not been able to mine on either the Rogue or Chetco Rivers. When we paved Hwy 101 through Brookings a year ago we had to truck all the asphalt down from Gold Beach because we were not allowed to obtain the needed gravel from the Chetco River. You can imagine what the extra trucking from Gold Beach in relation to trucking from the Chetco River cost us on that contract. We are still trucking all our asphalt and concrete rock for the Brookings area from either Gold Beach or Smith River because we could not mine on the Chetco River this year (we only use river rock for making asphalt and concrete, all other uses come from upland quarries). We will get some rock from 2nd Bridge on the Chetco next year after the bridge is completed, but depending on our project demands, this may or may not be enough. What really hurt our business is not being able to mine at Tidewater Bar since 2004 and it was a double shock when we were told we would not be given a 2-year short-term permit there. To loose the possibility of mining at Tidewater Bar and 2nd Bridge will definitely hurt. Because we were not allowed to mine at Tidewater Bar this year, there is no new data on that site except for the survey, so there is nothing new to base a decision on for the long term. So, to answer your question, no, we would not be willing to forgo mining for another season, but of course, we realize that we may not get our wish nor have input into that decision. What would be wrong with a 1-year extension instead of curtailing mining for a year?

I am looking forward to seeing what the USGS comes back with for their recommendations. As Jim stated in the meeting, there are other ways to determine bed load that may be used to get a good handle on the amount of material moving down the river. I think that it is possible to obtain the needed information to make a good decision within the time constraints, but it may not be as complete as we would like. Is a calculated sediment budget based on point-in-time measurements better than a sediment budget estimated by empirical means that cover a longer period? We obviously do not have the luxury to do a long-term sediment budget analysis nor do we have the budget and labor power to do it for one river let alone all the mined rivers in western Oregon. To get the job done within a reasonable time we need to think outside the box!

Robert

From: CYRIL Alex [mailto:Cyril.Alex@deq.state.or.us]
Sent: Thursday, November 29, 2007 12:11 PM
To: Robert Elayer; Linton, Judy L NWP; Bill Yocum; LOBDELL Bob; Chuck Wheeler; Janine Castro;

CHARLAND Jay; Jim O'Connor; Patty Snow; Yvonne Vallette; gwhess@usgs.gov; cdl@lidstone.com
Subject: RE: Tech Team meeting notes, etc.

I agree with you, Robert. I think we all want a good process that results in a useful tool. Given that, would you also agree that we might not be able to accomplish this under the restrictive timeline proposed? In that case, would your company be willing to forgo mining on the Chetco for another season if permits cannot be issued (should that be the determination we get to) uninterrupted?

--Alex

-----Original Message-----
From: Robert Elayer [mailto:relayer@twcontractors.com]
Sent: Thursday, November 29, 2007 11:57 AM
To: 'Linton, Judy L NWP'; CYRIL Alex; 'Bill Yocum'; LOBDELL Bob; 'Chuck Wheeler'; 'Janine Castro'; CHARLAND Jay; 'Jim O'Connor'; 'Patty Snow'; 'Yvonne Vallette'; gwhess@usgs.gov; cdl@lidstone.com
Subject: RE: Tech Team meeting notes, etc.

Phase II Gravel Technical Team:

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The question I am having some trouble with is our mission statement. It states in the meeting notes that our mission focus is "evaluating specific watersheds to objectively determine whether gravel mining can occur on a short-term or long-term basis. Such evaluation will include looking at direct and indirect impacts to sediment movement. Meetings are not to evaluate or discuss specific permit actions ....." From this statement it is clear that we will be evaluating the technical aspects of each river system or river groups to determine their suitability and capacity for mining. This is as we discussed in the meeting when we also determined that given the time constraints that have been imposed on us by the Executive Team and permit expiration timing, this is a very daunting, if not impossible task.

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To:	Linton, Judy L NWP; "Alex Cyril"; "Bill Yocum"; "Bob Lobdell"; "Chuck Wheeler"; "Janine Castro"; "Jay Charland"; "Jim O"Connor"; "Patty Snow"; "Yvonne Vallette"; gwhess@usgs.gov; cdl@lidstone.com
Subject:	RE: Tech Team meeting notes, etc.
Date:	Thursday, November 29, 2007 1:13:44 PM

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Subject:	RE: Tech Team meeting notes, etc.
Date:	Thursday, November 29, 2007 12:11:24 PM

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Subject:	RE: Tech Team meeting notes, etc.
Date:	Wednesday, November 28, 2007 12:20:53 PM
Attachments:	20 Nov 2007 Tech Team mtg notes (ac).doc

Hi Judy and all.
Thanks for providing the notes. I attached a marked up version with a few minor changes. I disagree with the comments about not using a single coastal stream to represent others, but clarified that this was suggested by USGS as a practical way to approach the many watersheds AFTER the Chetco process. Using a single coastal stream as a base representation which can have site specific info added as appropriate, may be the only reasonable approach for the many watersheds in line to begin the process (the Chetco is already at Phase II, remember). I also clarified that lack of data may preclude attaining the timing suggested by the Exec Team to allow uninterrupted mining. I agree with Jay that there appears to be a sharp disconnect between what the Tech Team views as possible and what the Exec Team would like to see. The Tech Team position on not making a determination without adequate data and time to review it should be strongly communicated to the Exec Team. Thanks for considering my viewpoint.
--Alex

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Sent: Tuesday, November 27, 2007 1:52 PM
To: CYRIL Alex; Bill Yocum; LOBDELL Bob; Chuck Wheeler; Janine Castro; CHARLAND Jay; Jim O'Connor; Patty Snow; Robert Elayer; Yvonne Vallette; gwhess@usgs.gov; cdl@lidstone.com
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MEETING NOTES
CHETCO RIVER GRAVEL REMOVAL
TECHNICAL TEAM MEETING
NOVEMBER 20, 2007
1:00 to 3:00

ATTENDEES:
Judy Linton, US Army Corps of Engineers
Janine Castro, US Fish and Wildlife Service
Chuck Wheeler, National Marine Fisheries Service
Yvonne Vallette, Environmental Protection Agency
Bob Lobdell, Oregon Department of State Lands
Alex Cyril, Oregon Department of Environmental Quality
Jay Charland, Oregon Department of Land Conservation and Development (phone)
Patty Snow, Oregon Department of Fish and Wildlife
Robert Elayer, Tidewater Contractors, Inc
Bill Yocum, Freeman Rock, Inc
Chris Lidstone, Lidstone and Associates, Inc (phone)
Jim O'Connor, US Geological Survey
Glen Hess, US Geological Survey

AGENDA ITEMS:

1) Administrative Details:

Mission: The focus of the Technical Team is evaluating specific watersheds to objectively determine whether gravel mining can occur on a short-term or long-term basis. Such evaluation will include looking at direct and indirect impacts to sediment movement. Meetings are not to evaluate or discuss specific permit actions which may be under review by either the Corps of Engineers (Corps) or Department of State Lands (DSL).

Organization: The Corps and DSL will act as co-chairs for the Technical Team and will be responsible for setting up meetings, taking notes and generally making sure there is follow through with identified action items. Draft meeting notes will be sent to meeting participants for review prior to becoming final.

The Team will attempt to reach agreement on future actions – any insurmountable disagreements will be raised to the Executive Team for resolution.

Membership: It was agreed the membership should be fluid based on the watershed being studied.

2) Process and Data/Information Needs:

Timelines: The timelines for existing Chetco River gravel mining authorizations for Freeman Rock and Tidewater were clarified. The Department of the Army permit expires September 2009; Water Quality Certification is valid until August 2009; DSL permits require annual renewal for work occurring beyond 2008; and the Biological Opinions provide endangered species coverage through the 2008 work season (which runs from July 15 through September 30 above the Chetco River estuary). Therefore, if it is determined further mining can occur in the Chetco River beyond the 2008 season, permits must be in place by spring of 2009 for mining to occur uninterupted. At the November 15 Executive Team meeting it was suggested that this Phase 2 study be completed by spring 2008 to allow one full year to complete the permit process should that be the direction taken. However, lack of data may preclude this.

Information Needs/Process to Obtain Information: Sediment budget information is crucial. Most of the winter high flows have already passed so we may not be able to collect any data this year. Jim O'Connor suggested there may be a way to estimate sediment budget information without doing actual measurements and which can be refined as data is collected over time. He will have a better idea once he has a chance to review the Phase 1 work. USGS will also evaluate the Phase 1 work to determine if there is better way to structure the determination of whether a system is aggrading/degrading/equilibrium.

USGS could do sediment transport studies. They will need to know the specific questions to be answered (including timelines and spatial scope) and then can prepare a draft scope of work to include required funding (estimated). This scope of work would include 1) data collection that can be done within the immediate timelines and 2) data collection that can be done given a longer time period. Subsequent to the Chetco process, i~~I~~t may make most sense to pick one river system that can represent all coastal systems rather than evaluate all systems, as we move forward to tackling more watersheds. USGS estimated it will be the 1st or 2nd week of January 2008 before they are able to provide the draft scope of work. Technical Team needs to recommend to the Executive Team that funding for USGS work crucial.

Additional information that may be beneficial:
1) Cross-sectional information provided by the operators could potentially be used if combined with known water events. The evaluation would also need to include review of aerial photos at these same cross-sections.
2) Monitoring reports as required under existing mining permits. Freeman Rock has collected data and will have the reports out by December. Although Tidewater did not mine in 2007 they do have pre-mine surveys and will also be doing pre-mine surveys in 2008.
3) Pre-mine surveys at Tidewater Bar: This information has been collected for past two years.

4) Suggestion made that we should also look at site specific responses to gravel removal within watersheds.

Regarding evaluation of other watersheds, the group agreed we need direction from the Executive Team on prioritization beyond the Umpqua River system (which will be studied next). DSL has a list of active gravel operators; the Corps has a list of pending permit applications which needs to be updated to add the Coquille River and Hunter Creek. The mention of Hunter Creek raised the question of how we will deal with sub-basins. All agreed that we should recommend to the Executive Team that we start the Phase 1 study process for the Umpqua River. The Executive Team will need to decide who will pull together the final product for that effort, however, as Janine is pretty well tied up with other work well into next year.

3) Next Steps:

- Brief the Executive Team at their December 19 meeting on Technical Team organization details and information needed for Phase 2 study work. Execs also need to be briefed on work being done by USGS to assist the Technical Team in refining information needs and estimated timelines.
- The next meeting of the Technical Team will be scheduled around mid-January (exact date pending receipt of draft scope of work from USGS.

From:	Patty Snow
To:	Bill Yocum; Linton, Judy L NWP; CYRIL Alex; LOBDELL Bob; Chuck Wheeler; Janine Castro; CHARLAND Jay; Jim O"Connor; Robert Elayer; Yvonne Vallette; gwhess@usgs.gov; cdl@lidstone.com
Cc:	Jodi Fritts; TED FREEMAN, JR; Jon Barton; Rich Angstrom; Joy Smith; Todd Confer
Subject:	RE: Tech Team meeting notes, etc.
Date:	Wednesday, November 28, 2007 8:41:40 AM

Hi Judy, I agree with Bill's statement, I don't think there is one river that will represent all coastal rivers. The Chetco River is geologically so different than the Umpqua for example. The other suggestion I didn't see was that the Executive Team may want to postpone their December meeting until there is more information available. Thanks for the good work, Patty

Patty Snow

Land and Water Use Coordinator

Wildlife Division

(503) 947-6089

From: Bill Yocum [mailto:byocum@hughes.net]
Sent: Wednesday, November 28, 2007 7:08 AM
To: Linton, Judy L NWP; CYRIL Alex; LOBDELL Bob; Chuck Wheeler; Janine Castro; CHARLAND Jay; Jim O'Connor; Patty Snow; Robert Elayer; Yvonne Vallette; gwhess@usgs.gov; cdl@lidstone.com
Cc: Jodi Fritts; TED FREEMAN, JR; Jon Barton; Rich Angstrom; Joy Smith
Subject: Re: Tech Team meeting notes, etc.

Hi Judy,

Good job on the notes. My only comment is dealing with the statement "It may make most sense to pick one river system that can represent all coastal systems rather than evaluate all systems." The way that I remember the discussion is that some coastal rivers with similar attributes might be able to be lumped together for a preliminary analysis. For sure I do not see the Chetco (a coastal river) being able to represent the Rogue (2nd to the largest river in the State of Oregon).

Thanks again for your great job on running and documenting the meeting.

Bill

----- Original Message -----

From: Linton, Judy L NWP <mailto:Judy.L.Linton@usace.army.mil>

To: Alex Cyril <mailto:Cyril.Alex@deq.state.or.us> ; Bill Yocum <mailto:byocum@hughes.net> ; Bob Lobdell <mailto:bob.lobdell@state.or.us> ; Chuck Wheeler <mailto:Chuck.Wheeler@noaa.gov> ; Janine Castro <mailto:Janine_M_Castro@fws.gov> ; Jay Charland <mailto:jay.charland@state.or.us> ;

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Cc: Linton, Judy L NWP <mailto:Judy.L.Linton@usace.army.mil>

Sent: Tuesday, November 27, 2007 1:52 PM

Subject: Tech Team meeting notes, etc.

<<20 Nov 2007 Tech Team mtg notes.doc>> <<Deschutes River Overview (2).pdf>>

Greetings: attached are the draft meeting notes for the November 20 Tech Team meeting. Please review and let me know of corrections, etc. I have also attached the Deschutes River sediment paper that Jim O'Connor mentioned at the meeting. I previously sent the Chetco River Phase 1 work products to Jim O'Connor, Glen Hess, and Chris Lidstone and so have not attached it here as I assume the rest of you have it already. If you do not have it, let me know and I can send it to you.

Here is the link to the paper discussing sediment work done on the McKenzie River. This paper was prepared in cooperation with the Corps.

Influence of Cougar Reservoir Drawdown on Sediment and DDT Transport and Deposition in the McKenzie River Basin, Oregon, Water Years 2002–04 <http://pubs.usgs.gov/sir/2007/5164/>

Have I forgotten anything? Please provide comments on the meeting notes as soon as possible. I will then finalize. Thanks - Judy