Lake Creek IFIM

Appendix C

Summary of Consultation
Lake Creek Instream Flow Study

Meeting of the Packwood Lake Hydroelectric Project
Fish, Aquatics and Instream Flow Committee

Date: April 22, 2004

Location: Packwood

Present
Energy Northwest - Laura Schinnell, Bernice Kasko, Bill Kiel, Dan Ross, Randy Crawford
EES Consulting - John Blum, Kent Doughty
Washington Department of Ecology (WDOE) - Deborah Cornett, Rusty Post
Washington Department of Fish and Wildlife (WDFW) - Lauri Vigue, Hal Beecher
United States Fish and Wildlife Service - Lou Ellyn Jones
United States Forest Service (USFS) - John Roland, Ken Wieman, Margaret Beilharz, Dean Grover
Cowlitz Tribe - Mike Iyall

List of Handouts Provided
Agenda
Previous meeting minutes, including comments provided by Ken Wieman
Comment letter received from WDFW
Comment letter received from WDOE
Comment letter received from USFS
Map of the water quality sampling sites and Management Quality Objectives
Lake Creek Proposed Study Sites and Reaches, including proposed transect photographs

Concurrence on Minutes for the March 22, 2004 Meeting

Ken Wieman provided clarification on his comments of the March 22 meeting minutes. Comments will be incorporated as appropriate and minutes resubmitted to the committee members with a due date for additional comments on the revised minutes. If no comments are received, the record will show acceptance of the March 22, 2004 meeting minutes.

Review of Habitat Assessment Performed on Lake Creek

John Blum provided information on the survey done on Lake Creek and showed a video of the proposed study sites. A CD with photos of the habitat sites will be provided to each of the committee members along with a report summarizing the findings. The habitat survey was conducted in order to gain an adequate understanding of habitat distribution for the purpose of selecting transects for the instream flow study. Transect selection and weighting will be based on this habitat survey. Historical habitat survey information was used as baseline information and a starting point for understanding the various habitat types found within Lake Creek; however, the assessment and proposed transects are based on the recent survey of Lake Creek conducted by EES Consulting in April 2004. Lake Creek was divided into 5 reaches based on

channel gradient, confinement, inflow and geomorphology, with 4 study sites selected to represent the habitat found from the Drop Structure downstream to the confluence of Lake Creek with the Cowlitz River. Margaret Beilharz asked if transects will be tied together in the survey. John replied that transects within a study site are surveyed and tied in to an arbitrary elevation control benchmark. Each transect is modeled individually and then weighted according to habitat frequency when calculating reach results. Reach results are then weighted according to the percentage of stream length each reach represents.

John gave a brief description of each of the reaches and study sites. Reach 1 (study site 1) starts at the mouth of Lake Creek and was viewed in the afternoon by the committee members, Reach 2 (study site 2) starts at river mile 0.7 and is difficult to access, Reach 3 (also study site 2) starts at river mile 1.3 and is also difficult to access, Reach 4 (study site 3) starts at river mile 3.5 while Reach 5 (study site 4) starts at river mile 4.9 and extends upstream to the Drop Structure at approximately RM 5.4. Due to snow and safety concerns, the physical habitat surveys for Reaches 4 and 5 will be completed at a later date. It was asked if study site 2 was a good representation of reaches 2 and 3. John clarified that the site had a good representation of the habitats found within these two reaches

Dean Grover commented that there is a glide transect in Reach 1 but the habitat survey does not list glides. John replied that glide type habitat exists, which may be a portion of the tailout on a pool; therefore, he thought it merited having a transect. The group requested that the report on habitat surveys and transect selection document any apparent discrepancies between transect types and habitat distribution. There was discussion on the definitions of the habitat; a definition of each habitat was included in the handouts. It was suggested that the committee needs a common understanding of the definitions.

An anadromous barrier was identified at mile 2.05. In addition, at mile 1.05 there is a chute that is potentially a barrier. John proposed using the analysis of barriers as proposed by Powers & Orsborn (1984) to determine if upstream adult passage is possible at the chute found at RM 1.05. Hal Beecher commented that it is a basis that WDFW uses and provides good information; however, the criteria are not necessarily definitive. Questionable barriers require site specified evaluation over a range of flows that would occur during migration periods. John noted that photo documentation would support the quantitative analysis. John suggested that if high velocities pose a barrier at low flows then they would most likely also be a barrier at higher flows unless turbulence creates resting places. Hal noted that determination of passage is not critical to implementation of the instream flow study at this time. The approach is the same. Anadromous fish suitability curves can be applied to the sections that are later determined to be potentially anadromous.

EES was asked if they had used IFIM to model habitat on other streams similar in steepness to Lake Creek. They replied that they had performed instream flow analyses on a number of high gradient creeks, where suitable fish habitat was found among the higher gradient sections. These streams have included Martin, Big, Clearwater, and Warm creeks as well as the Upper

South Fork Snoqualmie River in Washington State; in Oregon, Kent and John had worked on the Clackamas Creeks projects, which included a number of high gradient streams as well.

EES Consulting will send out a schedule of when they will be conducting field studies for the instream flow analysis and water quality sampling. The committee members are welcome to go with them.

Fish utilization has not been determined for Lake Creek; however it is known that rainbow trout use Lake Creek. Charles Morrell would be a good contact for data about the Cowlitz River and fish reintroduction. EES Consulting will compile fish utilization information and distribute to the group. It was asked if any snorkel or electrofish surveys would be conducted in Lake Creek. John replied that ESA consultation may be necessary before it can be determined if fish surveys will be conducted, particularly electroshocking surveys.

USFS asked if we were looking at anything other than fish. Amphibians are an example of another group of species that may be relevant. Other studies such as amphibian surveys may be conducted in the future but are not part of the studies at this time. John commented that suitability curves for other species could be applied when modeling the transects.

Discussion on Comment Letters

EES Consulting will be reviewing hydrological data for Lake Creek and the Cowlitz River. Historic operational flow data are only available in hard copy so time is needed to complete data entry. The Lake Creek stream gauging record dates back to 1911 (actually, the gaging record for lower Lake Creek extends back to 1907). A daily hydrograph for Lake Creek is being constructed for the period of record when comparisons of are valid (i.e., both gauges were in operation from 1911 – 1977). Natural flows will be estimated by combining the daily plant flow with the daily instream fish flow. Data will be summarized monthly, seasonally and annually along with exceedence curves.

Discussion for the need for an instream flow study within the diversion reach of the Cowlitz River was deferred until additional hydrologic analysis is completed. Kent Doughty asked if a threshold flow in the Cowlitz relative to the flow in Lake Creek could be identified. Margaret replied that flow data and information on the geomorphology of the Cowlitz diversion reach (width ratios and gradient) would facilitate making a threshold determination. A quick habitat assessment might be beneficial. It was clarified that the distance between Lake Creek and the tailrace is 4 miles versus 13 miles.

There was a discussion about "waters of the state." WDOE clarified that the tailrace could be consider "waters of the state;" however, the tailrace would be considered a project facility, which factors where the point of compliance will be determined.

Margaret commented that the project might affect upstream fish passage from Packwood Lake to tributaries. She asked if this is an issue that WDOE would consider in the 401 certification.

She noted that there might be aquatic issues that are not pertinent to the 401 but are relevant to the FERC process. Rusty Post replied that the WDOE's authority represents all water related issues.

Kent asked about the comment regarding continuous total dissolved gas monitoring. Rusty commented that spot measurements in the stilling basin would not be sufficient. A discussion of what would be sufficient was conducted. Bill Kiel noted that spill at the drop structure is very infrequent. It was asked if Energy Northwest has a way to measure overtopping. A curve has been developed to determine the amount of water that overtops the drop structure. USFS asked if we had a record of the number of days the drop structure had been overtopped. That information is currently being compiled and will be provided to the committee members.

A map of the water quality sampling sites was distributed along with a table of Management Quality Objectives (MQOs) for sampling. Kent asked for feedback on the MQOs.

Kent commented that very low nutrient levels are expected to be seen at the Packwood Lake. It is believed that we will not need to do any more sampling than monthly. The USFS would like to see weekly or bi-weekly sampling from April to October. Department of Ecology will address the issue whether monthly sampling is adequate, and/or if increased sampling for just one month would be satisfy concerns to obtain representative data.

Kent suggested that the two planned coliform samples at Packwood Lake could be collected from a single location judged to be in close proximity to a high use camping area on the lakeshore. The duplicates improve quality assurance. The group concurred with this approach.

Energy Northwest asked if it was acceptable to the group for water quality sampling as described in the study plan to be initiated next week. The group concurred that sampling could begin.

Energy Northwest agreed to distribute an interim water quality report in winter 2005 that summarizes the findings from sampling in 2004. Rusty noted that the results of the first season would help determine the needs for an additional season of sampling beyond the planned study completion in April 2005. Kent noted that climatological conditions and runoff would be characterized during the study period relative to long term ranges. The need for meteorological data (temperature and relative humidity) at the Lake and powerhouse was discussed. Rusty noted that multiple years of data might be necessary to evaluate water quality relative to natural variability. There may be a need to determine the effects of a very low flow with a low snow pack. Rusty also stated that in addition to the interim report the Department of Ecology would like to see the raw data.

Energy Northwest noted that the project has a water right for 260 cfs but that is not the depletion rate since the project does not operate at capacity at all times. Average power generation is 10 megawatts. Packwood Lake is a naturally occurring lake, which was formed

by a debris slide about 1,000 years ago. The debris from the landslide was removed and the drop structure placed to maintain the natural lake elevation.

Energy Northwest agreed to prepare a written response to each comment and distribute by June 4.

Action Items

Kent will send questions for WDOE to answer regarding continuous monitoring and clarifications on WDOE comments that could not be resolved during today's meeting. WDOE will respond by May 21.

Comments specific to the scope of the proposed studies are due by May 21.

Energy Northwest will prepare and distribute a written response to comments on draft study plans, by June 4th.

Revised draft study plans will be distributed by June 4. Revised drafts will include hydrology information.

Energy Northwest will provide information on frequency of overtopping of the drop structure.

Next Meeting Date

The group will meet on June 24 in Packwood; included will be discussion on the final draft study plans and a tour of Packwood Lake and Energy Northwest's intake facility and drop structure.

Powerhouse Site Visit

Committee members toured the powerhouse and control room. The spare turbine, stilling basin, and upper tailrace were observed.

Tailrace/Slough Area

The tailrace is not considered to be functional habitat, creates false attraction to anadromous fish. Hal stated that it would be important to screen out adult fish, potential species include steelhead and chinook . Two level loggers will be used to track level change during ramping. Hal suggested that the ramping studies be done at a couple of different levels of the Cowlitz River to determine if the Cowlitz River acted as the hydraulic control for the side channel at certain flows. It was agreed that a water quality sampling station and thermograph would be added in the Cowlitz side channel (slough) that the tailrace flows into.

Lower Lake Creek

The group changed the location of transect H in study site 1. Consensus was to proceed with installation of those transects that had been identified. EES Consulting will review the sites that were picked and identify any gaps. Finalization of transects will be completed by June 1.

WDOE and Mike Iyall noted that high flow releases could create a flood hazard for homes along Lake Creek. The following flow rates were agreed upon: Low 6 cfs, Medium 15 – 18 cfs, High 35 - 40 cfs. There will be some timing constraints due to lake levels and inflows to the lake.

WDOE and Mike also noted that they observed salmonid fingerlings in lower Lake Creek at two different locations.

DRAFT

PROPOSED STUDY SITE AND TRANSECT WEIGHTING FOR PACKWOOD LAKE HYDROLECTRIC PROJECT

FERC NO. 2244

Presented to:

Dr. Hal Beecher
Washington Department of Fish and Wildlife
Olympia, WA

OK
Hall A. Beache
4/18/07

Prepared by:

EES Consulting, Inc.
Bellingham, WA

Prepared for:

Energy Northwest
Richland, WA

APRIL 18, 2007

DRAFT

LAKE CREEK INSTREAM FLOW REPORT

CALIBRATION REPORT

STUDY SITE 1, TRANSECTS 1-9

3 VELOCITY SET CALIBRATION

OK
Hal A Beech
4/18/07

Prepared for:

Dr. Hal Beecher
Washington Department of Fish and Wildlife Service

Prepared by:

EES Consulting, Inc.
Jean Caldwell and Associates

APRIL 18, 2007

LAKE CREEK INSTREAM FLOW REPORT

CALIBRATION REPORT

STUDY SITE 2, TRANSECTS 1-8

3 VELOCITY SET CALIBRATION

OK
Hal A Beecher
5/3/07

Prepared for:

Dr. Hal Beecher
Washington Department of Fish and Wildlife Service

Prepared by:

EES Consulting, Inc.
Jean Caldwell and Associates

MAY 3, 2007

ADD STA 11 TO TRANS 7

DRAFT

LAKE CREEK INSTREAM FLOW REPORT

CALIBRATION REPORT

STUDY SITE 3, TRANSECTS 1 – 6

3 VELOCITY SET CALIBRATON

This is a good, complete calibration
3/16/07
Hal A. Beech

Prepared for:

Dr. Hal Beecher
Washington Department of Fish and Wildlife Service

Prepared by:

EES Consulting, Inc.

MARCH 16, 2007

DRAFT

LAKE CREEK INSTREAM FLOW REPORT

CALIBRATION REPORT

STUDY SITE 3, TRANSECTS 1 – 6

HIGH FLOW CALIBRATION REPORT

This appears to be a reasonable set of model
3/16/07
Hal A Beecher

Prepared for:

Dr. Hal Beecher
Washington Department of Fish and Wildlife Service

Prepared by:

EES Consulting, Inc.

MARCH 16, 2007

DRAFT

CALIBRATION REPORT

LAKE CREEK INSTREAM FLOW STUDY

STUDY SITE 4

TRANSECTS 1 – 11

3 VELOCITY SET CALIBRATON

OK - see insert on T3 high 3/16/07 Hall

Prepared for:

Dr. Hal Beecher
Washington Department of Fish and Wildlife

Prepared by:

EES Consulting

for

Energy Northwest

DRAFT

CALIBRATION REPORT

LAKE CREEK INSTREAM FLOW STUDY

STUDY SITE 4

TRANSECTS 1 – 11

1 VELOCITY SET CALIBRATON
HI FLOW MODEL

Approved pending one change at 9.50 on Transe

Hal Beecher 4/18/0

Prepared for:

Dr. Hal Beecher
Washington Department of Fish and Wildlife

Prepared by:

EES Consulting

for

Energy Northwest

7 February 2007

TO: Charlene Andrade
Marc Hayes
Bob Vadas, Jr.

FROM: Hal Beecher

SUBJECT: Amphibian habitat suitability criteria for instream flow study – Packwood Lake Hydroelectric Project (FERC 2244)

This morning I met with Dr. Marc Hayes (WDFW) to discuss instream flow suitability criteria, and summarized criteria for Lake Creek stream-breeding amphibians. In the afternoon, with Charlene Andrade and Bob Vadas, we collectively reviewed this summary and modified the habitat suitability criteria or indices (HSI); this memo will reflect the final conclusions. Dr. Hayes indicated that three genera were likely to be present and flow sensitive: torrent salamanders (*Rhyacotriton*), represented by the Cascade torrent salamander (*Rhyacotriton cascadae*); tailed frogs (*Ascaphus*), represented by the coastal tailed frog (*Ascaphus truei*); and giant salamanders (*Dicamptodon*), comprising potential two species in the study area, Cope's giant salamander (*Dicamptodon copei*) and coastal giant salamander (*Dicamptodon tenebrosus*). Certain life stages, generally the younger developmental stages, are more sensitive to flow and flow change. Other species have been found in amphibian surveys of the project area, but are more terrestrial and less likely to be affected by stream flow modification and management. The surveys did not find Cascade torrent salamanders, but as the species is known to occur in the Cowlitz River drainage over the elevation range encompassed by the project, they are considered possible residents in the Lake Creek drainage.

Each of these three amphibians will be discussed below. Before doing so, one should note that habitat-suitability-index (HSI) criteria for Pacific Northwest stream amphibians are in a nascent stage of development (Vadas 2000), requiring some assumptions. First, we focused on the most aquatic and sedentary life stages, as they were most likely to be sensitive to alterations in flow. This includes eggs and hatchling larvae, and assumes similar habitat use for these two stages for all species except giant salamanders, which have less-sedentary hatchling larvae. Second, to formulate sensible velocity-HSI criteria, we assumed that velocities sufficient to wash away substratum of sizes just below those used by a given species or life stage (i.e., HSI = 0) would be detrimental either through scour or fill damage. This assumption did not affect velocity HSIs for substratum-generalized torrent salamanders, but did so for the other two genera.

Cascade torrent salamanders (*Rhyacotriton cascadae*) deposit unattached eggs in flowing headwaters (1st order) and seeps, with seeps used more by larvae except during drought. Eggs are intolerant of desiccation and appear vulnerable to predation, so very shallow and deeper water may increase risk. The following criteria were agreed upon for eggs and larvae in tandem.

Depth (cm)	Depth (feet)	HSI value
0.0	0.0	0.0
3.0	0.1	1.0
6.0	0.2	1.0
10.0	0.3	0.2
15.0	0.5	0.0
100.0	3.3	0.0

Velocity (cm/s)	Velocity (ft/sec)	HSI value
0.0	0.00	0.5
1.0	0.03	1.0
5.0	0.16	0.1
10.0	0.30	0.0
15.0+	0.50+	0.0

Substrate	HSI value
Silt	0.7
Sand	0.8
Pea gravel (0.2-0.5” = 0.5-1.3 cm)	1.0
Medium gravel (0.5-1.5” =1.3-3.8 cm)	1.0
Large gravel (1.5-3” = 3.8-7.6 cm)	1.0
Small cobble (3-6”=7.5-15 cm)	0.2
Large cobble (6-12”=15-30 cm)	0.0
Boulder	0.0
Bedrock	0.0

Islands surrounded by main current on both sides have habitat area (weighed unit area [WUA]) reduced by half for torrent salamanders as they are less likely to cross the main channel. Hence, a unit containing this kind of habitat condition would have its HSI value reduced by half.

Coastal Tailed frog (*Ascaphus truei*) has a two-year larval stage in this area. Oviposition occurs in mid-summer and eggs and attached larvae are vulnerable to flow through summer and early fall. We recommend the following HSI values for eggs and larvae in tandem.

Depth (cm)	Depth (feet)	HSI
0.0	0.0	0.0
1.0	0.08	1.0
7.0	0.23	1.0
10.0	0.3	1.0
15.0	0.5	1.0
100.0	3.28	1.0

Velocity (cm/s)	Velocity (ft/sec)	HSI
0.0	0.0	0.0
1.0	0.03	1.0
50.0	1.64	1.0
60.0	1.97	0.5
70.0	2.30	0.0

Our rationale for the upper limit on velocity suitability is that Dr. Vadas provided tables from Hynes (1970) that indicated 60-80 cm/sec is the average water-column velocity range that initiates clean-water movement of smaller (pea/medium) gravels that are somewhat smaller than substrata used by tailed frog larvae (to provide a conservative criterion to avoid larval displacement). His rationale for 60 cm/s as a good cutoff for velocity suitability is related to velocity differences between fast (rapid) versus slow (lower-gradient) riffles (Vadas and Orth 1998, Table 9). The reason is that fast riffles had notably more large (boulder/bedrock) rocks and large cobble; whereas slow riffles were slow enough to not have major gravel displacement. We also discussed approaches to determining mean water column velocity that would initiate gravel movement with Pat Klavas, WDFW Habitat engineer.

Substrate	HSI value
Silt	0.0
Sand	0.0
Pea gravel	0.0
Medium gravel	0.0
Large gravel (1.5-3” = 3-7.5 cm)	0.3
Small cobble (3-6”=7.5-15 cm)	0.7
Large cobble	1.0
Boulder	0.7
Bedrock	0.0

Giant salamanders (*Dicamptodon copei* and *D. tenebrosus*) deposit jelly pedicelled eggs under boulders, where eggs are invariably sheltered from high velocity flows. We assumed that the boulder under which the eggs are deposited would be perched above the stream bed on other cobbles or boulders, or a portion of the boulder itself that creates a space between the bed and the bottom of the rock, but we assume that the space will not be large (≤10 cm)). Under this assumption, about 10 cm of depth is needed to inundate the suspended eggs, but any greater depth is sufficient. We are uncertain of suitability at ranges of depth greater than 30 cm. We recommend separate habitat suitability criteria for eggs and larvae, because of the different hydraulic and substrate requirements of each. Any wetted depth (> 0 cm) will provide some moisture and depth greater than 3 cm will cover the larvae and prevent desiccation. Our rationale for the upper limit on first-year larvae velocity suitability is that Dr. Vadas provided tables from Hynes (1970) that indicated 20-50 cm/sec as the average water-column velocity range that initiates clean-water movement of fines that are somewhat smaller than substrata used by 1st-year giant salamander larvae (to provide a conservative criterion to avoid larval displacement). His rationale for 25 cm/s as a good cutoff for velocity suitability is related to velocity differences between pools and faster (riffle/run) habitats (Vadas and Orth 1998, Table 9). Pools had notably more fines, given that faster habitats had major mud/sand displacement. We also discussed approaches to determining mean water-column velocity that would initiate gravel movement with Pat Klavas, WDFW Habitat engineer.

Eggs

Depth (cm)	depth (feet)	HSI value
0.0	0.0	0.0
6.0	0.2	0.0
10.0	0.3	0.1
15.0	0.5	1.0
100.0	3.2	1.0

Velocity (cm/s)	Velocity (ft/sec)	HSI value
0.0	0.0	1.0
100.0	3.2	1.0

Substrate	HSI value
Silt	0.0
Sand	0.0
Pea gravel	0.0
Medium gravel	0.0
Large gravel (1.5-3” = 3-7.5 cm)	0.0
Small cobble (3-6”=7.5-15 cm)	0.4
Large cobble	0.8
Boulder	1.0
Bedrock	0.0

Giant salamander 1st-year larvae

Depth (cm)	depth (feet)	HSI value
0.0	0.0	0.0
3.0	0.1	1.0
15.0	0.5	1.0
100.0	3.2	1.0

Velocity (cm/s)	Velocity (ft/sec)	HSI value
0.0	0.00	0.2
0.5	0.02	1.0
1.0	0.40	1.0
5.0	0.16	0.5
10.0	0.33	0.1
25.0	0.80	0.0
100.0	3.20	0.0

Substrate	HSI
Silt	0.0
Sand	0.0
Pea gravel	0.2
Medium gravel	0.6
Large gravel (1.5-3” = 3-7.5 cm)	1.0
Small cobble (3-6”=7.5-15 cm)	0.5
Large cobble	0.1
Boulder	0.0
Bedrock	0.0

Literature Cited

Hynes, H.B.N. 1970. The ecology of running waters. Liverpool University Press. Liverpool, England. 555 pp.

Vadas, R.L. Jr. 2000. Instream-flow needs for anadromous salmonids and lamprey on the Pacific coast, with special reference to the Pacific Southwest. Environmental Monitoring and Assessment 64: 331-358.

Vadas, R.L. Jr., and D.J. Orth. 1998. Use of physical variables to discriminate visually determined mesohabitat types in North American streams. Rivers 6:143-159 (cf. http://www.frii.com/~sel/abstracts/6-3-124.html).

Chronological Record of Email Correspondence for Final Revisions to Amphibian Periodicity and Habitat Suitability Indices (HSI)

From: John Blum [mailto:blum@eesconsulting.com]
Sent: Tuesday, May 08, 2007 10:54 AM
To: 'Charlene Andrade'; lschinnell@energy-northwest.com
Cc: Nyman, Stephen; BEECHHAB@dfw.wa.gov; hayesmph@dfw.wa.gov; 'Pete Rittmueller'
Subject: Amphibian preference curve meeting
Importance: HighHi All: I received the notes from Charlene re: your meeting on the 24th. When I met with Hal on May 3, we also pulled Marc in for a few minutes to go over what the spreadsheet. These are the conclusions that were drawn from that: 1. Use predominant substrate only, EXCEPT when. Embeddedness was involved. For purposes of the model, we used silt and sand
as indicators of embeddedness. When embeddedness was:o Hi: (ie., the
subdominant percentage was 50%), the value for the dominant substrate was
given a value of 0o Mid level: the dominant value was reduced. For
example, when embed = 40%, the dominant substrate value was reduced by 75% (dom sub multiplied by .25); when embed = 30%, the dominant sub was reduced by 50% (dominant sub * 0.50); when embed = 20%, dom substrate reduced by 25%
(dom sub * .75)o Low. When dominant substrate was lo, dominant substrate remained the same. I have included the spreadsheet that you sent me, with the HSI curves embedded (sorry) in each species and life stage. Please review these and get back to me with your comments. Looks good to me I also asked Charlene to provide periodicity for the amphibs. What is listed below is her recommendation; however, Charlene acknowledged that Marc was not available to comment; I don't think Stephen has seen these, either.
Please also review this and let me know what you think. Giant Salamander
eggs: spring and well into fall (march through October) yes Giant Salamander larvae: year round yes Coastal Tailed Frogs: eggs: June into fall (through October) Literature says they lay eggs in June or early July; however, we found frogs in amplexus in late May, early June -- this may suggest earlier egg laying because females reportedly store sperm for a year before laying eggs (or these females may not have laid any eggs in the year we observed them); eggs hatch in late summer or early fall. To be sure, we may want to run this period from mid-May through October Coastal Tailed
Frogs: Larvae: year round yes Cascade Torrent Salamander: eggs: late spring or later into winter (May through December) Eggs of this species have never been found, but for this and other torrent salamander species the literature guesses the egg-laying "peaks in spring to early summer" and eggs are known to develop very slowly (more than 200 days required); you might want to change this to April through December. Cascade Torrent Salamander:
larvae: year round yes I've included both the original memo from Hal, and
this spreadsheet. Please review and get back to me as soon as we can, since I'm in the midst of running the models. Thanks! John

From: Nyman, Stephen [mailto:Stephen.Nyman@DevineTarbell.com]
Sent: Tuesday, May 08, 2007 11:31 AM
To: John Blum; Charlene Andrade; lschinnell@energy-northwest.com
Cc: BEECHHAB@dfw.wa.gov; hayesmph@dfw.wa.gov; Pete Rittmueller
Subject: RE: Amphibian preference curve meeting
John: See comments below (Above)

>>> "John Blum" <blum@eesconsulting.com> 05/24/2007 4:40 PM >>>

Hi Charlene: I want to get final confirmation on the HSI curves for amphibians. There seems to be general concurrence on most things. There is one discrepancy, and one clarification I need, and then I can run the curves.
Agreement: Giant Salamanders Eggs: March – October, Larvae: Year Round
Coastal Tailed Frogs: Larvae: Year Round
Cascade Torrent Salamander: Larvae: Year Round
Clarification: Coastal Tailed Frog Eggs:
Stephen: mid-May – October
Marc: May - first half of August **(WDFW Preferred)**
Cascade Torrent Salamander: Eggs:
Stephen: April - December **(WDFW Preferred)**
Marc: May * December: Note: Marc states that "Steve's modification of April to December is probably not significantly different from May * December since we do not know enough of the details." Marc, can I assume this is concurrence?

Need for Approval: HSI Curves Stephen wrote back that he was ok with the HSI curves and how I combined the substrates.

Marc and Charlene, I need your concurrence on this; Charlene, as the PM for the state, please let me know how this all sits with you and if it has your approval. As soon as I get this information, I will run the curves, put it into the model, then magic happens, and we'll have our answer! Thanks everyone. John

>>> "Charlene Andrade" <andracaa@DFW.WA.GOV> 05/25/2007 8:57 AM >>>
Hello John,

I've coordinated with Marc this am, and WDFW supports (and concurs) with the collaborative approach listed below, with two clarifications for eggs of Coastal Tailed Frog and for eggs of Cascade Torrent Salamanders (see notes within email below in bold). "WDFW Preferred" denotes our recommendations.

With those two changes, we formally approve of the initial parameters developed herein and look forward to the development of a realistic amphibian model that hopefully can be cross walked with the fisheries model runs and is useful for developing flows in Lake Creek.

Good luck in the runs. And we send our appreciation to you, Laura, and Stephen.

Best Regards,

Charlene A. Andrade
Washington Department of Fish and Wildlife
Habitat Program
Major Projects Section
Mailing address: 600 Capitol Way, North
office location: 1111 Washington Street SE
Olympia, WA 98501-1091
ph: 360-902-2546
fax: 360-902-2946

-----Original Message-----
From: Marc Hayes [mailto:hayesmph@DFW.WA.GOV]
Sent: Friday, May 25, 2007 9:12 AM
To: Stephen.Nyman@DevineTarbell.com; andracaa@dfw.wa.gov; blum@eesconsulting.com; lschinnell@energy-northwest.com
Cc: BEECHHAB@dfw.wa.gov; hayesmph@dfw.wa.gov; rittmueller@eesconsulting.com
Subject: RE: Amphibian preference curve meeting

Hi Folks,

I note that the notes that Charlene intended in bold did not come out that way in my e-mail, so I just wanted to make certain everyone got our suggestions, and add another slight twist based on the attached paper. The differences in Steve's and my suggestions are minor, but our preference would be to split the difference for the Coastal tailed frog eggs largely because of lack of evidence of oviposition in October (see attached paper) and limited effort for egg mass searches in May with an interval that runs May-September. For Cascadae torrent salamander, the month difference between April (Steve's suggestion) and May (my suggestion) is probably not significantly different, so I would go with Steve's suggestion of April to December for their interval. In both cases, an attempt is being made to be conservation.

Thanks all.

Marc

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