AGENDA FOR JOINT MEETING OF:

John H. Kerr 216 Study Diadromous Fish Team
John H. Kerr 216 Study Downstream Aquatic Habitat Team

DATE & TIME:

November 18, 2003
10am – 3pm

LOCATION:

USFWS Office, Conference Room
Pylon Drive, Raleigh, NC

ITEMS FOR DISCUSSION:

1. Welcome, introductions, and recruitment of a good "note-taker".
2. Review of the 216 process- the three phase study approach and the structure of the project delivery team
3. Review of tasks in Study Subject 3, Downstream Aquatic Habitat
4. Review of tasks in Study Subject 8, Diadromous Fish
5. Discussion on merging the study subjects and workgroups
6. Brainstorming session- what will it take to accomplish the tasks in the two study subjects? Who are likely candidates to do the work as we move into Phase 2? Are there other tasks that should be added?
7. Meeting summary, review of action items, discussion of next meeting

Kerr Reservoir 216(b) Study
Joint Meeting of Diadromous Fish and Downstream Aquatic Habitat Teams
November 18, 2003
USFWS Ecological Services Conference Room, Raleigh, NC

Present: Bob Graham (Dominion Generation), Wilson Laney (USFWS-Fisheries), Joe Hightower (USGS, NCCFWRU), Pete Kornegay (NCWRC), Bud LaRoche (VADGIF), Chuck Wilson (USACOE), Dave Penrose (NCDWQ), and Jim Mead (NCDWR).

10:06 AM–Pete convened the meeting, noting that those absent were already familiar with the COE process, so we should go ahead and convene the meeting. Pete asked that we do introductions for Dave's benefit.

Agenda Item 1: It was noted the first item was to elect a note taker, and Wilson Laney was asked if he would do the duties. Wilson noted besides the fact he would do it anyway, it would help to maintain his OCD and keep his ichthyodementia active, so he accepted the role.

Agenda Items 2-4: Chuck Wilson reviewed the COE process that we will be following, as well as reviewing the agenda (Chuck provided handouts of the presentation; copy attached). Chuck reviewed the Feasibility Study Purposes and noted that a report would be prepared. The cost-sharing sponsors are the states of NC and VA.

Chuck reviewed the structure of the JHK 216. Pete noted that the Water Quality Working Group was going to modify their tasks. Chuck noted that we might want to modify the name of our group to "Diadromous" rather than "Anadromous." The group felt we should change the name, since we would be working with American eel. Chuck noted that we would be interacting with other groups as well, noting that Pete was also on the Water Quality group.

Chuck and Pete noted that we are in Phase I of the study approach. This is sort of a low-key phase. The high intensity phase will come in Phase II. Phase III will be the reporting phase. Chuck noted that if we find a smoking gun, we don't have to wait for implementation. We might be able to proceed under Section 206, or Section 1135. If the group wants to recommend that we proceed with some project under the continuing authorities, we can do so.

Chuck noted the question posed to the Downstream Aquatic Habitat Working Group, and noted the sponsors were very interested in not reinventing the wheel. Dave and Pete suggested that the effects of flood-control operations clearly extended into the tributaries to the main channel. Wilson concurred, but asked if the Downstream Flow Regime and the Effect on the Riparian Ecosystem Working Group was handling this issue. Chuck didn't think they were. Jim thought that they were dealing primarily with terrestrial issues.

Pete noted the complicated structure of the entire study. It was noted that Bill Adams would be reviewing all the minutes, to try and make sure that duplication was avoided and information

shared. Jim Mead noted that studies would be limited by funding; however, we shouldn't let that keep us from developing any studies we felt should be conducted.

ACTION ITEM: The group decided they would recommend the Downstream Aquatic Habitat Working Group's charge be altered to include effects on tributaries in addition to the main channel.

Wilson asked about combining the two groups, as well as suggesting that the group compile a list of issues for which they felt responsible, and which they wanted to address. Pete noted the Water Quality Working Group had done so and found it a useful exercise. He suggested that Chuck complete the review and then we discuss combining the groups and make a list.

Pete asked about including flood control along with hydroelectric peaking. Bob noted that some of the Dominion Generation teams would be working on some of the same issues.

Dave asked someone to define "mesohabitat." Jim Mead did so for the group, noting that this was a relatively new approach that has been developed at Cornell University. He explained how it was done. Dave asked if this precluded mapping habitat at a smaller scale. Jim advised it didn't.

Jim noted that the aspect of peaking affected by SEPA was not addressed during relicensing, so that is why it was included in the 216.

Wilson suggested that once the Dominion license was accepted, we should evaluate work that would be done by Dominion teams and try to avoid any duplication. Bob noted that it could be a while before the Dominion teams are established and begin work. Bob expressed the hope that the American eel and shad work could possibly begin this spring. Wilson noted that the Gaston-Roanoke Hydropower Relicensing team had built a provision for future COE involvement into some of the studies that would be needed for Kerr Reservoir, and wondered if that might enhance the potential for studies being funded. Jim Mead wasn't sure.

10:39 AM–Chuck continued review of the charge to the Diadromous Fish Working Group.

Bob noted he felt that the estimated costs and time allocated for the development of a detailed study plan were low. He noted how many of us were in the room today, and what the combined costs would be for the total. Wilson asked if any overage could be put into a "piggy bank" which could build equity toward a future federal match.

Bud asked who would be writing up the detailed study plan. Pete indicated he thought some of the minds on the group would be doing the work. Jim noted that some of the other groups were thinking about using an outside contractor to develop proposals.

Pete noted that on the Project Delivery bubble chart he had provided, we are a SMS, a Subject Matter Specialist Group. Chuck explained some of the terms on the chart. Pete noted that he and Chuck would be the two team leaders. There will be meetings of all the team leaders, and

team leaders are required to send in monthly reports. Chuck noted that we can reach out and grab information from outside subject matter experts.

Agenda Item 5: Pete indicated that he and Chuck had discussed combining the two groups, and it seems to be a "no-brainer" to them. Pete noted that Dave might have to endure more fish discussion than he wanted. Dave indicated he was always looking for new places to fish. Pete noted that Callie had told us that some of the IBI indices in the lower river were declining. Bob noted she had said that some of that might be attributable to Hurricane Floyd. Dave asked if he should approach someone like Bryn Tracey, one of their fish experts, to participate. Wilson noted that we could definitely reference Bryn as an outside Subject Matter Expert. Jim noted that if we are going to combine the groups, then he just might represent both components of DWR, freeing Tom Fransen for other duties.

Dave asked if there would be an opportunity for all the SMS's to meet. Jim noted that the Sponsors Advisory Committee did meet as a group, so that provided an opportunity for dialog between groups. Jim noted that there are two members, Sara Winslow (NCDMF) and Prescott Brownell (NMFS) who were likely primarily interested in diadromous fish, rather than the downstream impacts.

ACTION ITEM: The group recommends combining the Downstream Aquatic Habitat and Diadromous Fish Teams.

Wilson asked if we needed a new name. We discussed the potential for overlap with the Reservoir Resources Workgroup. Various names were discussed. Bob advocated we use the name "Riverine Aquatic Resources Team." Wilson suggested "Downstream Aquatic Habitat and Diadromous Fish Team."

Chuck asked about the relationship between Kerr flows and the hydropower releases downstream. Bob Graham explained the relationships. He noted that there was a temperature relationship. During flood flows, hypolimnetic waters from Kerr filled both reservoirs and also tributaries downstream. Bob felt these were the two principal water quality issues of concern.

Chuck noted that the focus of this group should be the fisheries downstream of Roanoke Rapids perhaps, if we decide that we are going to focus on the resources downstream. Chuck asked Bud LaRoche to take this issue to the Reservoir Resources Group.

ACTION ITEM: Bud LaRoche will take the Gaston tailwater low-oxygen issue to the Reservoir Resources Workgroup for discussion as a possible addition to their issues.

Dave suggested that this group was overly-specialized. He suggested that all the downstream groups, those dealing with salinity, sedimentation and so forth, should be combined into one group. Chuck noted that there was logic behind the assignments. Pete, Chuck and Jim noted that Team 12 was an integration team, which was supposed to take the products of all the other teams and integrate them into a coherent picture. Jim noted they would be responsible for determining if a proposed operation option was an overall improvement, or not. Jim noted that water quality

in the lakes, as well as hydropower generation, would be considered especially during the integration process. Jim noted that you had to pigeonhole workgroups, in order to get some of the work done. Chuck agreed, and noted this group would be tasked with coming up with the best option for managing for our resources. This would keep them focused on their issue. Team 12 would be responsible for putting all the "building blocks" together. Jim noted that this group was a nice sized one. He noted that the Downstream Flow Regime and the Effect on the Riparian Ecosystem Team is much larger and will be a challenge to manage. Jim noted that we just need to make sure that issues don't fall through the cracks. Bud noted that the oxygen issue might fit in one of the tasks (5.D.1) assigned to the Reservoir Resource Team.

After discussion, it was decided that the group focus would be the river below Roanoke Rapids Dam, plus diadromous fish and their habitats.

ACTION ITEM: Jim Mead will request that the list serve for these two work groups be combined.

11:16 AM–We returned to the subject of a new name for the group and agreed on "Diadromous Fish and Riverine Aquatic Resources Team" and if approved, our abbreviated name for internal use will be the "DFR Team".

ACTION ITEM: Pete and Chuck will request the name of the new group be Diadromous Fish and Riverine Aquatic Resources Team.

We discussed who would have to approve the changes proposed. Pete thought that we might want to hold off on the request to merge the list serve until the name change and merger were approved.

Agenda Item 6: All agreed that the question posed to the Downstream Aquatic Habitat Team (Task 3.A) should be shortened to: "How does alteration of the downstream flow regime affect habitat for aquatic organisms?"

Pete asked Jim Mead to address the utility of the IFIM study that was done during relicensing. Jim noted that its utility was somewhat limited. One of the jobs we have is to say what it does and doesn't do. Jim noted that fluctuating flows, as well as impacts of flood control operations on tributaries, are not really addressed by the IFIM study. He asked if we had all the fish models that we might need. Jim noted that we had elected to use single species, since we had models available that essentially represented guilds of species.

Dave asked how the Dominion Generation study and the IFIM study inter-relate. Chuck noted that one task we have is to avoid duplicating work already done. That IFIM study done during the Dominion relicensing is pretty much all the information available. If we want to answer the tributary questions, we will have to design studies to answer those questions. If we could supplement the IFIM study and obtain answers, we could do that as well. Dave asked who did the IFIM study. Jim noted the field data were collected by USGS, but everyone (all the agencies) were involved in selecting the transects. Jim noted the modeling was done by Jim Gore. The

analysis of the data was done by NCDWR, but provided to the whole Technical Group for interpretation. Jim noted that the group had looked at various conditions to come up with a base flow recommendation. Chuck noted the things this committee might be asked to describe would be: what is the ideal flow for these resources? The riparian group might come up with a different flow designed to benefit trees. Jim noted he was trying to think of potential gaps in what was done for relicensing, versus what we should look at here. He noted that the transects for the relicensing went only a limited distance downstream, a couple of miles below the Weldon boat ramp. He noted it won't address tributary questions. He suggested that we might also want to take a look at the species we used. We also might want to take a look at the anadromous species models used, and see if further tweaking is needed to the HSI parameters used for them. A third potential gap, with which we wrestled a lot, was the fluctuating flow issue. The fishery collection data suggested that the fish community was doing fairly well; however, we noted it was hard to say what species should be present but weren't. Dave asked if we had done some comparisons with Virginia rivers. Jim and Bob noted that we had done so, looking at the Neuse, Tar and James River fish assemblages. Jim noted that the IFIM didn't really pick up any side or backwater areas. It was felt that those areas would be difficult to cover logistically, so they focused on the major channels. If people believe those are really important, we should consider that they weren't sampled during the IFIM. Dave asked if we as a work group were to review the previously done documents. Chuck noted that any previous work done by FWS and Dominion would not be included in the estimated time to complete our task. The task of the group is to decide if the IFIM data are adequate for addressing the impacts of flood flows. Bob Graham noted that the data do extend downstream as far as Scotland Neck, based on the transects selected.

11:38 AM–Chuck noted the question really at hand is that we agree the tributary impacts are important, but do we need a study to address them? Jim noted that the major purpose of that project was to come up with base flows for the Dominion project. But, he noted, that we had left Dominion the option of providing the weekly declaration, rather than the base flow, if the declared amount was less. Jim noted that one way we could reduce impacts might be to recommend specific base flows from Kerr, using the weekly declaration.

Bob Graham suggested that the best thing to do would be to summarize what was done during the IFIM, how it relates to Kerr, and what should be done in Phase II. Options could include using the existing work, or developing other models if we feel those might be useful. Bob noted that we might want to have a graduate student do a literature review. Jim noted that it might be food to have some fresh people involved in this process. Chuck noted that one reason the line items for this group were so small is that there was a perception that these topics were already well-covered during the Dominion study. If that is not the case, we can recommend more funding.

Dave asked if there were any other data. Jim and Bob noted there are NCWRC data, as well as NCDWQ benthic data. Chuck noted the first step we should consider is what data will be needed to answer the questions. Wilson noted that Roger Rulifson has been funded by Weyerhaeuser to gather three years of data on larval fish, which we should seek to obtain. Wilson noted there were other questions also that were germane that we didn't yet have answers to, such as where

the Atlantic sturgeon are spawning. Jim noted that we needed to go back and ask the questions that we want to answer. Pete indicated that to some extent, we had made a full circle back to where we were at the beginning of the Dominion relicensing process. Jim felt that we were in pretty good shape regarding the base flow. He indicated that he wouldn't put as high a priority on the question of whether that is a good base flow or not, versus the question of what the effect of peaking is on the fish community.

Jim noted that we hadn't dealt at all with the effects of flood control on fish. Other groups are going to address the question relative to terrestrial resources. Pete expressed that he thought we would not make much headway using IFIM results to address peaking issues. Also, he felt that flood flows would not really be addressed. He asked how much time we needed to spend on the IFIM data. He asked, if Roanoke Rapids and Kerr were not there, and we had base flows from Kerr, how would we approach this issue? Bob Graham suggested that in cases where we had left some openers, additional work could be done to examine the base flows, in particular for anadromous fish. Pete agreed that the depth of water for shad spawning could be investigated. Bob felt that we had summer flows pretty well covered. Jim noted that we were kind of doing the review of the IFIM data as we talked. Jim noted that he pretty much shared Pete's thinking on the subject. Jim noted the sorts of questions remaining were shad spawning depths, and sturgeon spawning habitat, and so forth. He noted the answers were got from the IFIM were not perfect, but they did address the issues. Bob noted that peaking was an issue that would be assigned to a team. Specific organisms were not identified, but they will include fish and benthic organisms. Chuck noted that the base flow, versus peak flow, issue would be a major one. Pete wasn't sure he agreed. He noted that what SEPA does, pretty much dictates what Dominion will do. Jim noted that Progress Energy and Dominion could also call on the Corps as well.

Pete suggested that the impacts of peaking, since they were intrinsically related to what goes on at Kerr, should be included on our charge. Bob noted that demand, as well as the lake level requirements, really constrained peaking, and he wasn't sure how much we would be able to get at the peaking issue, through the Kerr 216. Jim noted also that there are adjustments built into the long-term adaptive study built into the settlement agreement. Jim suggested that it may be the 216 study may not end up with a single answer. There may be a recommendation, but it could be that we just recommend a first step, and propose to incorporate the recommendations from the FL relicensing teams. That could be an answer, rather than a specified regime at this time. Bob noted that he would welcome Corps financial support of those studies. Pete noted that he didn't want to confine our study to only base and peak flows. Jim noted that we should also consider the role of SEPA in the process. Jim noted that there has been a proposal now to allow the preferred customers, rather than SEPA, to dispatch water. If that happens, that will affect how Dominion can generate. Bob indicated that his understanding was that SEPA could only specify daily minimum amounts. Chuck wasn't sure exactly how it worked.

12:01 PM--Bud suggested we refocus on our task. Jim and Pete agreed. Jim suggested some questions could be, where do the sturgeon spawn and are they affected? What are the effects of peaking? What are the effects in the tributaries? Dave asked if there are other habitat models out there that we haven't used. Jim noted the Cornell mesohabitat approach, as well as 2-D modeling. Jim noted if he had Roanoke to do over again, he would have done low-level aerial

videography, to map the habitat, and probably would have recommended two-dimensional modeling in at least the braided areas. The problem with IFIM is it wants water to go in only one direction. Two-dimensional modeling allows consideration of backwaters and other features. Pete indicated that Don Orth has just published a paper, Bob thought on the Smith River, that was featured in the latest issue of the Fish and Wildlife Reference Service newsletter.

Dave asked about details of mesohabitat approach. Jim noted that it required channel mapping to conduct that approach. Jim noted the focus for this approach has been on rivers that were wadeable. Dave asked if there are GIS tools that can be used. Bob and Jim noted that there is a suite of three models that the Riparian Ecosystem Team will be using to assess the Corps' putting water into the backwater reaches of the model. Bob reviewed those for the workgroup. The first model is the Reservoir Operations Model, which models flows through Kerr and out Roanoke Rapids. The model is available for general use and can assess how flows down to the lower river are delivered. A second model addresses how river stage at different locations relate to the flows from Roanoke Rapids, and is linked in turn to a digital elevation model that addresses the terrestrial component of the system.

Jim explained how the models could be used to model hypothetical scenarios or historical data. Outputs include an animation, as well as tables of acres flooded and duration. Bob indicated you could get big time period estimates, but not for short-term events, although they are talking about changing it to an hourly time step. Bob noted that some of the natural streams, in the floodplain model, may have been assumed to be permanently wet habitat. Jim noted the model was GIS-based, and did contain a number of data layers.

Jim asked what the concern was about how flood flows affected fish in the tributaries? Pete noted flood flows really affected fish behavior. Wilson noted that it was really a combination of two factors, the expanded areal extent of aquatic habitat, and fish behavior. He noted that some work had been done by the National Marine Fisheries Service on this issue of whether certain anadromous species might be attracted into artificial cuts during flood events, and spawn needlessly, etc. Wilson indicated that it might be possible to do some modeling, using the hydrological model, and also using Joe's data on the temporal presence of fish in the river, to develop a matrix of when and what species might be affected in the tributaries.

Dave asked about sediment interactions. The group noted that was an issue.

12:18 PM–The group adjourned for lunch (Arby's on Hillsborough Street–the apple turnovers proved very popular).

1:22 PM–The meeting reconvened. Chuck advised that Ron Sechler had called and indicated that he would serve as an alternate member of the workgroup when Prescott Brownell could not attend, and asked to be added to the electronic mailing list.

ACTION ITEM: Jim Mead will request that Ron be added to the list.

Pete suggested that we had a question: How does alteration of the downstream flow regime affect

habitat for aquatic organisms? He suggested that we then address peaking, and flood control effects, as two subcategories. Chuck noted that there are conditions when floodplain inundation is viewed as beneficial. Wilson agreed and suggested that we might be able to model flooding and develop a matrix of the duration, extent and seasonality when such flooding is undesirable. Chuck asked what factors were that made flooding undesirable. Wilson and Pete noted aseasonal flooding that resulted in undesirable temperatures and other variables would be undesirable. Chuck wondered if we would be able to measure some of the variables, such as temperature or other factors. Bob wondered if we might be able to look at herring, for example, and assess whether their spawning might be adversely affected, or not. We thought that we might be able to obtain some information that might be useful in assessing whether impacts might occur. Pete thought that blueback herring were pretty adaptable and able to spawn under a wide variety of conditions. The basic problem he saw is that if year after year, fish are presented with a man-induced hydrograph to which they can't adapt, and bluebacks are probably the most adaptable, other species that might be more constrained might be more impacted.

Chuck noted that gives us something to work with. He was looking for tools we can use to make a judgment about doing one thing versus another. Chuck noted that most of the resources would probably benefit from some return to a normative flow. The further you depart from that, the more likely you are to encounter conflict. Pete noted that the dams are operating to do just that. Chuck noted that our job was to try to develop methods to avoid those effects.

Bob Graham noted that the riparian group is looking at different species of vegetation, and looking at their flood tolerances, as well as looking at different levels of drainage or flooding that effect access to the forest. Jim noted that they were looking at survival, germination, growth and other parameters. Bob noted they were trying to relate it to the amount of mast produced each year.

Wilson suggested that we might want to try a two-tiered approach. The first tier would be to produce a matrix of when Corps flood-control events were likely to occur, then overlay it with the species present during those times. The next step would be to further assess the potential impacts. Chuck noted that for some species, such as striped bass, we know that high-flow years are not good, and noted the JAI for this year. Pete noted that the high flows apparently produced a banner year for white perch. Wilson noted the same phenomenon had apparently occurred on the Pee Dee, where redbreast sunfish were the beneficiaries of high flows.

Chuck wondered if there was some way we could relate flow to physical characteristics, then relate that to habitat value, we might be able to assess the overall impact. Chuck asked Pete about some work they had done, to try to assess impacts, using egg buoyancy as a factor. Pete noted that he had gotten some data from Joe Hightower. Chuck wondered if we could compare discharge to egg buoyancy and attempt to assess the impact on striped bass. Joe noted that USGS had some additional data, but additional data would be needed, if we wanted to assess the impact down the entire river. Chuck felt that would be a good study to undertake. If we can use known parameters, such as discharge, and relate them to habitat parameters, that would be a good thing.

Bud asked if we were going in circles. Wilson suggested that at some point, we should begin to

write down some of the ideas we had.

Dave asked if we had considered looking at other nearby rivers. Wilson and Pete noted we had looked at the Cape Fear, with regard to comparing the amount of woody debris and the amount of streambank erosion. Dave asked about the Chowan. Pete noted it was more of a blackwater system.

Chuck noted that the Corps was doing some work on Roanoke logperch, using transects. He wondered if we might not be able to do some sort of a discharge-habitat model, that would tell us how much "good" versus "bad" habitat there was present at a given discharge. Pete noted there wasn't any more water coming down the river than there used to be historically. The issue here is that the water is "squeezed" into a different pattern. Pete noted that Terry Brown had done some modeling to answer Pete's question about what would have happened historically, during the present year. Terry's modeling showed that we would have had some relatively short-duration, 90,000 cfs events. The real question is "What are the consequences of extending the duration of those flows?".

Chuck said to him it appeared that the low-flow period would control populations, because that is the most stressful time of the year. The flood flows expand habitat, so the impact of that he felt would not be as great as when the flows are once again confined to the channel. He felt that the low-flow habitat would really define the population size. Pete acknowledged that might be the case, for some resident species. Pete noted that historical high-flow events would not have expanded habitat for that long a period. The artificially extended flows expand the habitat for weeks at a time. Chuck asked, what are the habitat effects?

Pete indicated that we know that what is happening now is bad, so asked, what could we do to decrease the duration. Bud asked if he meant, increasing the flow release to 35,000. Pete responded in the affirmative, noting that there would be impacts on other resources, such as agriculture. Chuck agreed that would happen, and noted when the farmers are flooded, they hear about it very quickly. He noted that at some point, we would have to have some good information, because we are going to be in the position of trading trees for fish.

Pete noted landowners downstream have learned through the years where to draw the line, so that if we change things, adjustments will have to be made.

Bob suggested that we look at the task and try to assess where we should go. He read the three tasks. He noted that they really don't get at some of the things we have been discussing. He asked if we were locked in to the tasks as developed, or do we have the latitude to amend them. Chuck indicated that we would have to justify any proposed changes. Bob noted that the terrestrial group was also focusing on how current operations differ from the historical flow regime, and that seemed to be where we were also heading.

Pete suggested that: 1) we needed to characterize the changes in the flow regime; and 2) characterize what the impacts have been to the downstream flow regime (i.e., prolonged and aseasonal flooding of the backswamps). Bud suggested that we just change the wording of

"hydropower peaking" to "project operations."

Joe suggested that we look at the pre-impoundment regime for each day of the year, and see where the differences are greatest, then look at each section of the river and assess which species might be impacted. Joe felt that we might be able to add a layer to the model that would predict habitat quality for each species of fish. We could then identify parts of the river that would be good or bad for different species. Bob thought that habitats that were good might fall out of such an analysis. Joe noted that it might depend on the time of year, for example if it happened in June, it might be good for redbreast sunfish, but if it happened in September, it might not be a good thing. Dave thought that would be a good analysis, and asked if we had a model to do that sort of analysis.

Jim indicated the Digital Elevation Model would yield certain types of information only, such as the depth and areal extent of coverage. Dave asked if there was a flow component to the data produced. Jim noted that was a good question that we had asked this fall, regarding whether the water was stagnant, or moving via sheet flow. Bob noted that once a steady state has been reached, the data were pretty good. Chuck noted that we could ground-truth the results, by sending someone out into the floodplain to take some data. Chuck noted the tree folks were trying to do the same thing with the trees, that we wanted to do with the fish. Perhaps one model that could tell us what the water does, and we can assess how it would impact our resources of interest.

Jim asked if we were looking at putting another layer in the flood model, to assess the utility of aquatic habitat, and basically saying that water quality is a driving factor? Bob felt that there would have to be some work done to the model, to account for permanently wetted areas. Perhaps that could be done on a small scale. In terms of the water quality aspect, perhaps you could address that through a temperature parameter. Bob noted that once the temperature gets up, regardless of the time of year, the DO is lost fairly rapidly. Prior history of flooding in a given year doesn't appear to have much effect. These are all hypotheses that can be tested. It would take a seasonal approach to test some of these things.

Dave asked if we were talking about developing a habitat quality index model. Bob indicated to Jim that the other group was looking at wetted versus non-wetted habitat. Jim felt there might be some potential for partnering with the Water Quality Team to address this issue.

Pete asked if we hadn't already characterized the pre-impoundment and post-impoundment flows. Jim indicated that the tools are there for us to look at the daily time step. Jim indicated some of the whisker plots we did by week had addressed this question. Pete noted that he and Wilson had done something similar back in the 1980's, during Roanoke River Water Flow Committee days.

The consensus was to do the following:

1) Characterize changes in the hydrograph, pre- and post-impoundment.
2) Concentrate on periods of greatest divergence from historical patterns.

3) Model areas of inundation.
4) Determine the spatial-temporal distribution of species in the affected floodplain.
5) Add a habitat quality index layer to the model (for species of interest), or use some sort of functionality index, setting habitat parameters for the most sensitive species.

Dave indicated the EEP is looking at the development of functional assessments for wetlands. Perhaps we might be able to develop a functional assessment for this part of the Roanoke. Wilson noted that a more generic functional analysis might be an easier way to approach the subject, perhaps using a very sensitive species to conduct a worst-case analysis. Dave thought that TVA might have done some sort of similar analysis. Chuck suggested that parameters such as DO, temperature, cover and other features might be of use. He noted that there would likely be some sort of shift in regimes from a terrestrial-dominated system to an aquatic one.

Dave suggested that we might try a dual approach, of looking at what we have now, and also establishing some research needs for future study.

Joe noted that he was intrigued by the mesohabitat modeling and mapping approach. Pete also felt that it intuitively made sense. Joe drew a diagram of how we might be able to look at different flow regimes, and what kinds of habitat are created. Then we might be able to avoid looking at individual species. Jim noted that the flood model can tell us the depth within about a foot. He noted it wouldn't tell us whether the water was moving or not. It can't at present predict sheet flow versus stagnant conditions. Jim noted this might be useful for the water quality folks as well.

Chuck asked if we had HSI information for species of interest. There is information for some species, not all.

Bob Graham noted that there is a hydrodynamic model that covers the river through Scotland Neck, that might provide information for the river channel habitat. Pete and Bob noted there are some areas above Scotland Neck that do fill with water in the backswamps, which do have water quality problem potential. Dave noted that he was working on some models that use recurrence intervals to measure connectivity with the floodplain. He noted that recurrence interval might be a tool that we could use as well.

Bob noted that he liked Wilson's idea of developing a matrix. He noted that we had certain species, and certain issues to address. He drew a matrix on the board that he thought might help us get our thoughts together for a study plan and a literature review. He suggested we include: Species, Issue, Mesohabitat, IFIM, Functional Assessment, Behavioral Studies, Floodplain Model, and HSI. This might help us to focus.

Pete and Bob both noted that stripers will use the floodplain, but that their use is highly flow-dependent. Jim suggested that the flow parameter would be one we would want to assess, and we don't currently have a tool to generate that information. Bob and Jim both noted it would be a complex analysis. Bob suggested that it might be possible to concentrate on a small area to generate the information. He noted that Coniott Creek might be a good candidate. Wilson noted

that there was a water control structure on the artificial canal at the upper end of Company Swamp, and wondered if it was closed during this summer's flood event.

Dave noted that he liked the approach we were taking here. Chuck noted that there has been a commitment to do the study as a GIS-based approach.

Bud asked how fixing the DO problem at Kerr might influence the water quality issues downstream. Wilson and Pete didn't think it would help much. Jim felt it might help things in the main channel.

Chuck noted that one thing that could be done, that might help, would be to plug the artificial canals along the Roanoke. He asked how many there were. Pete and Wilson thought that there was some information on those in the Roanoke River Water Flow Committee reports. Chuck noted that there was some concern early on about filling those, based on anadromous fish use of the habitat. Bob noted that filling them would change the base conditions in the hydrological model. Chuck noted that the Environmental Assessment for such a project would be fairly easy, and that funding might be available.

Wilson briefly reviewed the development of thought regarding the relationship between the artificial canals and anadromous fish use of the backswamps. In the beginning, there was concern from the fishery management agencies that filling the canals would have an adverse impact on anadromous fishes, due to precluding access to spawning sites. As more was learned about the hydrology of the systems, and the adverse consequences of the canals in routing water into and out of the backswamps, and creating adverse water quality, the concerns have lessened. Also, Wilson noted that if the fish did just fine prior to the canals being there, and that was another factor in changing opinions. He thought that there would be a higher level of support for filling the artificial canals today than there was historically.

We had a discussion of who might oppose and support such a proposal. Jim thought that there was opposition from TNC. He noted that the hydrology models might have to be altered or re-done, if the canals were filled. Bob thought that Jean Richter had expressed some concerns. Wilson thought that Jean was concerned with putting in water control structures, not will plugging the canals. Jim thought that if we changed conditions, the model would have to be changed to reflect the new conditions.

ACTION ITEM: Pete asked Jim Mead to check with TNC to see what their opinion is regarding plugging the canals. Wilson will check with Jean Richter.

Pete referred us to Task 3 on page 20 of the scoping document. He and Chuck will recommend changing the term "hydropower peaking" to "project operations." Bud noted that the language in tasks 3 and 8 for diadromous species appear similar. It was noted that task 3 dealt with downstream habitats, while task 8 deals with the passage issue. Chuck asked if we should move ahead using the existing draft Diadromous Plan, or wait for the revision. Wilson and Pete advised that we should move ahead, given that there won't be any substantive changes in the recommendations.

Chuck asked about American eels. Wilson noted that the Corps could benefit from the work that will be done on Roanoke Rapids and Gaston. Bob noted that he was still concerned about the potential effects of the introduced air bladder parasite. Wilson noted that he had discussed that issue with Dave Secor, and that no one knew very much about the ecological implications of new parasite introductions. Wilson felt that given that the parasite was likely already present in the system, due to the use of live American eels as bait for striped bass, the issue was essentially moot, but he agreed that further discussion was warranted.

Pete wanted to wrap up the meeting. He asked Wilson to send the meeting notes to him and Chuck, for review and subsequent distribution to the entire group.

ACTION ITEM: Pete will talk to Jared Bales about his opinion regarding plugging the canals. Jim will talk to TNC about the same issue.

Jim noted that he would add Ron Sechler to the list for this work group.

Pete and Chuck noted that they would attend a SMS leaders meeting in December and report on our progress.

Wilson asked what was next. Bob volunteered to complete the matrix he had proposed as a decision-making tool. Wilson suggested that proceeding to the next matrix that examined the periods of greatest divergence and meshed it with the spatio-temporal distribution of affected species would be beneficial as well. Jim noted once we got to step five, where we add a habitat quality index layer to the model, we would have to break new ground. Bob suggested that it would be beneficial, especially if the Water Quality Team would find this beneficial, for us to send a memorandum up supporting more development of the flood model. Jim noted that TNC was funding more work on that model. Phil Townsend had indicated to Jim and Bob that the model had been peer-reviewed, at least part of it.

Agenda Item 7: We were supposed to summarize the meeting, including action items and set a date for the next meeting, but we disbanded due to travel times of some of the committee members.

The meeting adjourned at 3:13 PM.