Comments from Fishway Guidelines
Peer Review Workshop, Yakima, 5/24/00

These notes summarize comments and discussion from a guideline peer review workshop in Yakima on May 24, 2000. There were about 45 participants at the workshop representing federal, state, and local agencies and consultants in resource management, timber, tribes, hydroelectric and irrigation interests.

Comments came from a variety of workshop participants. They will all be considered when we edit the guidelines. There was limited time for discussion at the workshop; just because an issue wasn't discussed there, it doesn't mean it's not significant and merits discussion. A tape recording was made of the entire workshop; it will be used to verify uncertainties in notes while we edit. In our original workshop notes, we've recorded who made each statement. We'll check back with the individuals that made specific comments if we feel we need more explanation. These notes were taken and reported by Julie Nelson, Pat Powers and Bruce Heiner and recorded on tape for verification.

Introduction

Guideline project overview
Guideline Peer Review Workshop
- Discussion and Input
- Big and contentious issues
- Buy-off
- Further comments

NMFS perspective on Guidelines

(Note; ESA management considerations will not be directly included in Guidelines other than to provide techniques and level of protection consistent with ESA needs.)
There are three ESA options
- HCP- 50 year agreement (language should instate fluidity)
- Section 7 consultation
- 4(d)- general reference

NMFS will error on the side of the fish without science in place, and consultation is required again if new species are listed. Fish issues at same priority as engineering. Cost and risk may not be controlling factors. Long term vs. short term impacts are heavily impacted by take limitations

Which of 3 options are most flexible for adaptive mgmt with emerging technologies?
How does "take" relate to existing facilities?

General Fishway and Screen Guideline issues

Need to set maximum performance standards
Make guidelines a conservative default, but rebuttable

Avoid making a manual; encourage critical thinking, not cookbook.

WAC development-

- WAC historically dealt with 6@ salmonids; is that adequate?
- RCW deals with Afishlife@
- WAC cannot refer to guidelines directly. Relationship between the two will be made by guiding principles and nomenclature.
- There are many "must" statements in Guidelines. Need to clarify language.
  - Must = regulatory language. Should = guidance language.
  - Are the criteria "feel good" or just suggested

Emerging and developing technologies

- Establish a protocol for emerging technologies (test, acceptance, etc)
- Performance standards will allow adaptive mgmt
- How long will it take for emerging technologies to be accepted?
- How do agencies accept new technology?

Should define explicitly when or where not to use certain technologies or approaches.

- When is a fishway needed?
- Where not to use screens?
- Are there situations where fishway or screen would increase risk to fish?
- Consider temporary vs. Permanent Structures and their effects on ecological connectivity.
- Should state that anything new/ retrofitted should provide passage.
- Suggestion of higher standards for new structures or ESA streams, lower standard for retrofits to best apply recovery funds.
- Who determines what is needed for an upgrade?
- discussion of seasonal passage at irrigation diversions; impacts from many years delay in correcting barriers due to cost of permanent solution
- Need table of species and life stage vs. which fishways are or are not appropriate.

Guiding principles

- The guiding principles language/ explanation should be added to the fish passage documents.
- Guiding principles might conflict with one another. Need to prioritize. This becomes a mgmt issue.
- Water quality should be added to guiding principles.
- Minimize operation/maintenance needs.
- ADon=t fight the system.@- i.e. pool and shoot passage moves debris rather than retaining it.
- Passage through a project should minimize delay.

    - Consider entire project including reservoir. Is there information pertaining to reservoir and lake passage? Could delay in fishway be offset by faster passage through reservoirs?
- Seek alternative conservative designs that are easy to apply.

Add to Issues list

- sediment and debris considerations
- when should FW operate
- juveniles
- temperature control
- monitoring and evaluation as required by NMFS
- acceptance criteria (const tolerances, criteria tolerances)
- performance criteria
- criteria for choosing between FW and trap-and-haul
- minimum flows at diversions that remove most of river flow – this is not a fishway guidance issue
- Define how the Amaximum height@ for fish passage is determined
    - passage can be completed in 6 hours
    - Consider total height and forebay fluctuations separately

Timing, species and hydrology

- Consider both season and flow; example spring chinook and steelhead tend to move during high flows
- Was 90% target based on fish info, or a mgmt decision? Mgmt.
- Studies from Humboldt State show fish move upstream during peaks.
- Also from Humboldt, flows above 10% exceedence can be a single long block of time. 10% exceedence works better in small watersheds
- Farther south (California) fish are more dependent on freshets and peak flows- the steepness of watersheds also influences these factors), etc.
- Target species overlap should be addressed (lamprey, sturgeon, etc.)
- Protection measures should take into account- adult fish, juvenile fish, and resident species.
- The different upstream passage requirements of different life-stages should be considered (i.e. turbulent flows of Denil ladders and effects on juveniles, weaker swimmers, etc.)
- How much delay is allowable? Tolerance?

Add references that support decisions. Need discussion of what is known, what studies have been done.

Why are tide gates in this section? They don't fit 90% rule. Standard cast iron gates are always a barrier. Suggested criteria: exceed fish passage criteria no more than a four hour period any day.

Number of fishways and total flow is a primary design issue

- Suggestion to use table of recent successful experiences as guide

- Style of FW impacts the ratio of FW flow: river flow. Example - Town Dam
- In California they use 10% flow as a starting point, but will alter it relative to river size.
- Have stream/river criteria reflect the natural characteristics of the system (network of flow).
- Jim Buell referenced dam removal information (Laura Wildman)
- Is there screening criteria for juveniles in auxiliary water? Is there criteria for juvenile bypass on a screen? Need to consider energy diffusers, opening sizes, hydraulic jumps, are the fish in control, using EDF.
- In California they are using 10 ft.lbs/s/cuft in some situations. WDFW has tabulated experiences of screen downwells and suggests and EDF approaching 100.
- Auxiliary flow systems have many problems. Suggest putting resources into larger FW rather than auxiliary flow.

Fishways in Steep Channels

How do we apply (and/or develop) fish passage criteria for streams that, in themselves, exceed the normal criteria?

- Define criteria as a function of the site; frequency and height of drops.
- Channels are flexible and change over time; engineered structures don't.
- Natural channels have diversity of conditions that might allow passage corridors at a greater range of flows than does a typical "sterile" engineered facility.
- Bed material might assist fish passage in a natural channel but might worsen it in a formal structure.

Roughened channel fishways

- What is an example of how this type of fishway would apply? A perched culvert could be backwatered by a steep constructed channel
- Are some of these designs species specific? Do they apply at manmade barriers?
- At a project in Montana (4th of July Pass) a steep 6% cut rock channel was constructed.
- The stair step profile works best at slopes greater than about 5%.
- The steeper the stream the less efficient it is at moving fish upstream. Should we relax the 90% criteria? Designs have complex flow lines and are not typical of fishway design criteria.
- Steep channels can also become obstructions, by large rocks and logs trapping material and becoming obstructions. They also can become a liability.
- Natural barriers in steep channels are often ephemeral lasting months or years.
- Bed load will impact structures more than in low gradient.

Pool and chute

In pool and chute systems, flow plunges at low flows and streams in the center but plunges along the margins at the high fish passage design flow.

- Alignment affects sediment deposition.
- How high can pool/chute be?
  - 4-5 ft recommended.

    - Up to 8-9 ft have been built in California.
    - Limitation is based on hydraulic uncertainties; research needed
- Consider effects of structures with/ or without orifices toward the outer edges of structures. Is there passage through chutes or orifices?

Juvenile Passage

Juvenile salmonids can apparently pass a high step more efficiently by leaping than by swimming. Most juvenile fishway designs are for fish jumping, not swimming.

- Jump height for pool/weir FW? In Oregon they use 6" steps but don't have studies to justify.
- Observations at H-flume in Alaska; juveniles moved rapidly through steps up to 1 ft.
- The height of drop into a structure is less important than hydraulics of flow coming into/under the structure.
    - Clean and shallow nappe
    - Narrow crested weir
    - EDF in pool. What is appropriate EDF?
    - Channel weirs- sharp crested VS narrow crested.
- At a site in California nearly all of passage was through orifices. What site, height, species, shape of weir?
- Are boulder weirs good juvenile passage? Any structure that requires passage through high velocity by swimming and does not optimize leaping, may be a barrier.
- A roughened channel and/or natural channel on the other hand would likely provide a diverse set of passage corridors that would provide good.
- Channel weir VS roughened channel.
- Discussion of Mason Bryant study showing good juvenile passage through McKinley-Webb baffles in culvert - Passage level generally no better than 30-40%
- Designs need to incorporate smooth pool areas.

Fishway evaluation and monitoring

Fishway evaluation and monitoring is necessary.

- Monitoring is usually not required is the design criteria are met. Should have post construction monitoring as well as no-flow and on going monitoring for the life of the project. We need to avoid the build it/forget it approach. More field assessments are needed
- Currently, only big MEGA projects get funded for evaluation.
- Ongoing monitoring is needed. Items such as seals on screens break 5 years down the road.
- Washington has a monitoring compliance plan for some screens.
- Two areas need to be monitored on facilities
    - Operation as intended, flows, water surface elevations, etc.
        - Performance criteria should determine operational compliance.
    - is the concept working? Is 99% compliance with the hydraulic design good enough?
- Monitoring and evaluations need to feed the continued development and improvement of technology. That is one purpose of the guidelines; to bring that information to one point.

- Guidelines are needed for biological monitoring. Are fish of all sizes passing? Are fish spawning at the entrance?
- Monitoring and evaluation must be tied to initial objectives of project. Be sure those objectives are clear to start with.
- Concept review should help determine inspection and reporting protocol. Guidelines for monitoring = biological evaluation (are fish passing, congregating below the structure, etc.). Are criteria real (soundly and scientifically based) or feel-good?
- When are evaluations of existing fishways NOT necessary? New fishways criteria should determine when a fishway is not good enough (passability criteria)
- The guidelines should provide a framework for evaluation of biological and hydrologic characteristics and monitoring activities.

Need projected life expectancy of facilities (dams and culverts). When the life is up consider current criteria or natural channel.

- Consider requiring the designer to stipulate the life expectancy and maintenance requirements of the project. This will be difficult for designers.
- Permitting of a project should include some expectancy of maintenance.
- If the structure fails at a flow above the design criteria, it is not a failure; it is expected.

Evaluation of barriers

- WDFW has barrier criteria (definition from WAC); changes to criteria should recognize this
- Guidelines are needed for existing projects
- WDFW has criteria for existing projects based on WAC definition.

Emerging technologies

Emerging technologies and the level of acceptance for these techniques should be defined or at least addressed a bit more comprehensively. If we use experimental facilities, we need to require study and contingency plans, assess their applicability, and advance our scientific understanding of their effectiveness. There should be different scales of protocols to address experimental structures (i.e. the life of the experiment does not necessarily extend to the life of a project).

The NMFS/WDFW Technology Development Protocol requires that earlier research be considered, a study plan be submitted, lab research conducted, units of measurement be established and study results compiled.

Experimental facilities

- There should be proposed guidance for experimental facilities.
- New technologies should be tested on a wide number of species, different habitat types and hydraulics, etc. A broader scope of application will provide more useful results.
- Life of experiment does not equal the life of the project. If failure, then replacement.
- Need incentives to water users to develop new technologies with low risk to resource. We can't expect no risk if technologies are to be advanced.

- Is WDFW speaking for NMFS and ODFW, and does anyone have a parallel to these guidelines? NMFS has adopted some protocols
- We should be striving to to test over a wide range vs narrow range. We need a broader view that this project will help other projects and what the application is.