Rocky Reach Fish Forum

Wednesday, 3 May 2017
9:00 a.m. – 4:00 p.m.
Grant PUD, 11 Spokane St., Suite 205B
Wenatchee, WA

Meeting called by Steve Hemstrom
Notes taken by Meaghan Connell

Chairperson, Tracy Hillman

Attending Representatives:

Hemstrom, Steve	Chelan PUD	(509) 661-4281	steven.hemstrom@chelanpud.org
Rose, Bob*	YN	(509) 865-5121	rosb@yakamafish-nsn.gov
Truscott, Kirk	CCT	(509) 978-8031	Kirk.truscott@colvilletribes.com
Verhey, Patrick	WDFW	(509) 754-4624	Patrick.verhey@dfw.wa.gov
Zimmerman, Breean*	WDOE	(509) 575-2808	Breean.zimmerman@ecy.gov

Attending Participants:

Clement, Mike	Grant PUD	(509) 754-5088	Mclemen@gcpud.org
Connell, Meaghan	Chelan PUD	(509) 661-4757	meaghan.connell@chelanpud.org
Hillman, Tracy	BioAnalysts	(208) 321-0363	tracy.hillman@bioanalysts.net
Jackson, Aaron*	CTUIR	(541) 969-6254	aaronjackson@ctuir.org
O'Connor, Rod	Grant PUD	(509) 754-5088	roconnor@gcpud.org
McIntyre, Erin	Grant PUD	(509) 754-5088	Emcinty@gcpud.org
Maenhout, Julie	Blue Leaf	(509) 210-7424	jmaenhout@blueleafenviro.com
Mott, Chris	Grant PUD	(509) 754-5088	Cmott@gcpud.org
Nelle, RD	USFWS	(509)548-7573	RD_Nelle@fws.gov
Squeochs, Doris	Wanapum	(509) 754-5088	dsqueoc@gcpud.org
Skiles, Tom*	CRITFC	(503) 731-1289	skit@critfc.org

* Joined via phone.

Meeting Minutes

I. Welcome and Introductions

Tracy Hillman welcomed everyone to the Rocky Reach Fish Forum (RRFF or Forum) meeting. Participants introduced themselves. This meeting was held jointly with the Priest Rapids Fish Forum (PRFF).

II. Agenda Review

The agenda was reviewed and approved.

III. Approval of Meeting Minutes

The April RRFF meeting minutes were reviewed and approved with edits.

IV. Review Action Items

Due to time constraints, the April action items will be reviewed with the May action items at the June RRFF Meeting.

- Alene Underwood will provide the RRFF with a revised copy of the Tumwater Dam Lamprey Passage Feasibility Study. **Ongoing**
- Ralph Lampman will provide an update on the detection of the adult lamprey released in 2016 downstream from and within Tumwater Dam. **Ongoing**
- Steve Hemstrom will contact the Army Corps of Engineers to see if they have examples of loss in distribution vs loss from mortality for adult lamprey or a similar fish. Steve has emailed the Army Corps of Engineers and is waiting for a response. **Ongoing**
- Steve Lewis will check into who will represent the USFWS on the Rocky Reach Policy Committee. **Ongoing**
- Lance Keller will provide the sturgeon diet analysis survey report to the RRFF in April or May. **Ongoing**
- Steve Hemstrom will describe how Chelan PUD's 2016 adult lamprey monitoring study to quantify Rocky Reach Dam passage and tributary escapement met the objective under each section of the draft report. **Complete**
- Ralph Lampman will provide the RRFF with a report describing results from the 2016 release of adult lamprey in the Wenatchee River by 15 March 2017. **Ongoing**
- Steve Hemstrom will share PIT-tag array detection efficiencies for salmon to Ralph Lampman. **Ongoing**

- Tracy Hillman will invite Julie Sanderson, Chelan County Noxious Weed Control Board, to the June RRFF meeting to discuss the Board's request for Chelan PUD to chemically treat milfoil in the project area. **Complete**
- Marcie Clement will send Julie Sanderson's contact information to Tracy Hillman. **Complete**
- Marcie Clement will forward a copy of Chelan PUD's comment letter to the RRFF. **Complete**
- Steve Lewis will forward a copy of the USFWS comment letter to the RRFF. **Complete**
- The RRFF will send questions for Julie Sanderson to Tracy Hillman, who will send the questions to Julie to help her prepare for the discussion in June.
- Lance Keller will provide a copy of the draft 2016 sturgeon monitoring report prepared by Blue Leaf Environmental to the RRFF by late April. **Complete**
- Chad Jackson, Donella Miller, or Tom Skiles (CRITFC) will send Tracy Hillman an update on broodstock collection after their Friday conference call. **Complete**
- Tracy Hillman will send out an agenda for the joint RRFF/PRFF Pacific lamprey NNI meeting. **Complete**
- Steve Hemstrom will do correlation analyses between river flows and conversion rates and will send those analyses to the RRFF. **Complete; provided in PowerPoint presentation.**
- The RRFF will send their comments on the 2017 full-duplex study to Steve Hemstrom before the release of the 2017 study plan.
- The RRFF will send comments to Steve Hemstrom on anything they see in the 2016 study that should be included in the 2017 study.
- Steve Hemstrom will look at lamprey counts at The Dalles Dam and compare those to counts at Rocky Reach Dam.
- Tracy Hillman will coordinate with John Ferguson to see if Daniel Deng (PNNL) can have more time for his presentation and questions during the lamprey workshop. **Complete**
- RRFF members are encouraged to attend the bull trout meeting with the USFWS and Chelan PUD on 8 May at the USFWS building on Easy Street. **Complete**

V. Sturgeon Updates

Juvenile Rearing and Release

Chris Mott reported that Grant PUD released juvenile sturgeon from their 2016 broodstock on 2 May 2017. A total of 2,000 juvenile sturgeon were released at Frenchman Coulee (Wanapum Reservoir) and 1,250 juveniles into the Wanapum tailrace (Priest Rapids Reservoir). Chris noted that all fish looked good as they were released.

Steve Hemstrom reported that the 2017 juvenile sturgeon post-tagging QA/QC screening was conducted on 25 April through 27 April. Hatchery staff are currently waiting for river temperatures to approach 10°C before they release the fish. It is anticipated that the fish will be released around 15 May.

Broodstock Collection

Chris Mott reported that he, Corey Wright (Blue Leaf Environmental), and Lance Keller (Chelan PUD) have been tracking water temperatures to determine when they can collect broodstock. Chris said temperatures are tracking closely with the ten-year average and therefore they are planning to collect broodstock from 30 May through 5 June. Chris said that 30 May was selected because it will be after Memorial Day weekend when it is very busy in that area. They project that water temperatures will be around 13.5°C by 30 May. It was noted that they traditionally look at a water temperature of 13°C for broodstock collection, but there was agreement to try to get past the Memorial Day weekend. Chris stated that he talked with Donella Miller and she is comfortable waiting until after Memorial Day to receive fish at Marian Drain.

Tracy Hillman noted that during the last meeting there was a discussion on whether broodstock could be collected in the McNary tailrace. Chris Mott said that Grant PUD will be given seven days to collect broodstock downstream from McNary Dam and will be limited to 12 fish; 6 females and 6 males (6x6 matrix). Mike Clement stated that Grant PUD's plan is to reassess the situation after the seven days. Steve Hemstrom agreed that this is the plan.

Bob Rose asked what will happen if a female or male sturgeon is collected that is not reproductively ready. Can it be released and broodstock collection continue, or will all fish collected regardless of their maturation count toward the 6x6 matrix? Mike Clement noted that the former is what has happened in the past and this is coordinated with Donella at Marion Drain. If a fish is found to be out of synch with the rest, that fish is delivered back to the river and crews try to capture others that are more in synch. Mike added that this decision will be made onsite or via phone with the Yakama Nation after they have assessed female PI values. Mike continued that the only other concern in a high flow year is what happens if crews fish the seven days and end up with half-sib families. Under this scenario, crews may do some exploratory fishing elsewhere or request that WDFW, ODFW, and the Tribes extend broodstock collection in the McNary tailrace.

Steve Hemstrom reported that Chelan PUD, like Grant PUD, is waiting for river temperatures to approach 13.5°C. The estimated start date for broodstock collection is 30 May, but may be adjusted depending on river temperatures. Collection will start in the McNary tailrace and will be limited to seven fishing days in a ten-day window. No more than six ripe males and six ripe females (6x6 matrix) can be collected.

Mike Clement noted under a worst-case scenario of a 2x1 or 1x1 matrix, crews may have to leave the McNary tailrace and collect broodstock downstream from Priest Rapids Dam or Rock Island Dam.

Mike Clement reminded the group that there is only one transport trailer to be shared between Grant PUD and Chelan PUD.

VI. Current Adult Pacific Lamprey Passage Success

Priest Rapids Project Passage

Rod O'Connor gave a presentation on adult lamprey passage through the Priest Rapids Project Area.

Rocky Reach Project Passage

Steve Hemstrom gave a presentation on adult lamprey passage through the Rocky Reach Project Area (see Attachment 1).

Steve Hemstrom reported that 211 adult lamprey were tagged in August 2016. Of those tagged lamprey, 169 have been detected (80.1%). A total of 164 tagged lamprey have been in the Rocky Reach fishway. Of those, 162 were detected at the upper fishway exit. Steve said of the PIT-tagged lamprey detected each week within the fishway, one lamprey was detected in the fishway and did not pass during the week of 11 August, and one lamprey that was in the fishway also did not pass during the week of 18 August.

Steve Hemstrom presented data on the adult lamprey ladder counts at Rocky Reach Dam from 2000-2016. He noted that the trend line is going up and more lamprey are being observed. The reason for the increasing trend is unknown.

Steve Hemstrom compared Rock Island and Rocky Reach Monthly Fishway Counts for 2016 during May through November. He noted that the conversion between Rock Island and Rocky Reach based on these counts appears to be good and shows very little dam and reservoir effects.

Steve Hemstrom presented 17 years of Rocky Reach flow data and fishway count conversions and noted that if there is a correlation between river flow and count conversion, it appears to be very weak. Bob Rose asked if daily or weekly river flows could be correlated with daily or weekly lamprey passage behavior at Rocky Reach Dam. Steve suggested that weekly passage numbers and weekly flows could be compared. Steve noted that lamprey pass quickly through Rocky Reach Dam, so the data can be accessed and compared. Tom Skiles asked if the visual count conversion had been corroborated with the PIT-tag conversion. Steve Hemstrom reported that it has, and the two metrics corroborate well showing good passage rates.

Steve Hemstrom presented data on Rocky Reach Dam mean daily discharge and time duration (d) to pass the middle 90% of adult lamprey run at large from 2000-2016. From the data, there does not appear to be a relationship of how many days it takes to pass the run based on Rocky Reach discharge during the lamprey run. Bob Rose agreed noting that water velocities during high and low water flows may not hinder lamprey in the reservoirs. Steve noted that lamprey appear to be hydraulic experts and know how to get where they need to go.

Steve Hemstrom noted that at a previous meeting, Ralph Lampman suggested that the reason there are no lampreys passing Rocky Reach Dam and the mid-Columbia Projects in March, April, and May is

because overwintered lampreys are too tired to pass the dams. To asses this, Steve presented four years of monthly accumulative count data that compared present run timing from 2013-2016 at Rock Island Dam and to historic run timing at Rock Island from 1934-1937 during the Grand Coulee Fish Roundup. Steve reported the data showed that historically when Rock Island was the only dam on the river, there were not large numbers of lamprey passing Rock Island in March through June, and lamprey run timing is not significantly different today than it was historically. Kirk Truscott noted that there were different factors within the lower Columbia before this time period that may have affected lamprey populations. Steve Hemstrom noted that these data were meant to show pre-dam conditions, and what pre-dam run timing of lampreys was in the mid-Columbia when only one dam existed on the Columbia River. RD Nelle noted that the historic counts are not absolutes and noted that trapping was not taking place from 2400 to 0400 hours. Steve Hemstrom agreed that the historical count is not absolute but the data presented was meant to highlight timing of the lamprey run, and noted that if there were 100,000 lamprey passing Rock Island it might be assumed that there would be more than 12,375 counted lamprey over the four years that trapping occurred at Rock Island Dam.

Lastly, Steve Hemstrom presented on the 2017 Rocky Reach Lamprey Passage Study. He noted that the 2017 Passage study is still in development.

Action Item:

- **Steve Hemstrom will provide the RRFF with data of the weekly fishway count passage numbers compared to weekly flows.**

How to Calculate Passage Success

Tracy Hillman summarized the current passage efficiency estimates from entrance to exit for Priest Rapids, Wanapum, and Rocky Reach dams. It was noted that “fishway exit” and “passage success” includes those lampreys later detected upstream of the dams, but may not have been detected at the dam.

Priest Rapids Dam	**84.0 %**
Wanapum Dam	**87.1 %**
Rocky Reach Dam	**98.8 %**

Steve Hemstrom reported that Chelan PUD has not used the estimated PIT-detection efficiency at Rocky Reach to adjust lamprey passage rates to date, but he would follow the same efficiency calculation and adjustment as Grant PUD did. This adjustment includes lamprey not being detected exiting the fishway but are later detected at an upstream location. These fish obviously passed the project even though they were not detected at the fishway exit. Thus, they do not represent a project effect but rather a detection issue. Kirk asked if it was possible to put confidence bounds on the estimates provided by Grant PUD. Rod O’Connor said they can calculate confidence bounds on passage estimates. Mike Clement noted that all of Grant PUDs tagged fish, once they get above Rock Island can be used by Chelan PUD to estimate passage efficiency at Rocky Reach Dam.

It was noted that the current passage efficiency numbers are preliminary as there could be additional detections of overwintered PIT-tagged fish this spring and summer. Mike Clement asked if overwintering fish are truly a part of the fish passage efficiency calculation. The group agreed that overwintered fish, detected in the spring or summer the following year, should be counted and included in the passage efficiency estimate. Mike noted that Rod O'Connor has tracked this over the past three years and has demonstrated that 3-4% of the tagged fish overwinter and contribute to upstream passage the following year. The group also agreed with how passage success is being calculated and further agreed to calculating confidence limits on the passage estimates if detection efficiency adjustments are made.

What if a "Failed" Passage Ends with Fish in a Downstream Tributary?

Tracy Hillman presented a question that has been asked in the RRFF: Is an adult lamprey that is detected in the fishway and does not pass but is later detected somewhere downstream considered a passage failure?

Steve Hemstrom asked if there is any information on the behavior of migrating Pacific lamprey and the choices they make as adults as a means to determine the rates of natural behavior and upstream and downstream movements they make in free-flowing, unblocked, river systems. This could be used to assess downstream movement as a natural choice lamprey make in the absence of dam effects. Rod O'Connor noted, based on his evaluation of the literature, that downstream movement of adult lamprey is a common behavior. For example, there are adult lamprey that show up at Bonneville Dam and then move downstream and into the Willamette River. Steve stated that it would be beneficial to have acoustic telemetry to help determine if a barrier affects this result. He asked if there was radio telemetry in the Yakama or elsewhere to observe rates of downstream movement in systems with no barriers. RD Nelle stated that there were some lamprey that move down in the Yakima River, but more work is needed to determine the extent of this behavior. Mike Clement noted that Grant PUD released PIT-tagged lamprey in the forebay at Priest Rapids Dam and some of those fish were later detected at McNary Dam. Tracy Hillman noted that calculation of passage success is sensitive to the size of the denominator, so it is important to know what to do with those fish that enter the fishway but do not pass the project and are later detected downstream. Are these fish included in the denominator or not?

Steve Hemstrom noted that there are two issues: (1) what are the effects on the study and its results and (2) what do we do with those results. Steve noted that within a typical adult salmon passage model, the adult fish should move upstream and any that do not are considered unsuccessful. In contrast, for the lamprey model, an adult failing to pass a project may not be unsuccessful if it is later detected in a spawning area downstream from the project. The lamprey passage model must consider the behavior of an adult that decides to move downstream and spawn in a downstream location. RD Nelle noted that the issue is concerned with distribution and has been discussed before. Even if we do not know where they are going and they spawn in another tributary, the distribution is not what it once was. Steve stated that this is why it would be beneficial to have a fishway passage model that incorporates the natural rate of downstream movements of tagged lampreys that make the choice to move downstream during an upstream passage study. Rod O'Connor discussed research conducted in the Umpqua River basin that looked at overwintered adult lamprey and their behavior in the spring. The study found that adult lamprey movement is sporadic and they move both upstream and downstream in the absence of barriers.

Tracy Hillman asked if there are other studies that can be used to help adjust the passage efficiency ratio. RD Nelle asked what is being done on the lower dams to adjust for downstream movement behavior. Mike Clement stated that he participates on the Lamprey Technical Passage Work Group and the workgroup agreed that there is no standardized recognized formula because there are too many unknowns about adult lamprey and their upstream passage behavior. Tracy asked if anyone is opposed to subtracting downstream moving fish from the passage efficiency equation. To be removed from the equation, these fish must be detected within a fishway, not detected exiting the fishway (no upstream passage), and later detected in a downstream spawning location. Steve Hemstrom noted that it would be best if the lamprey was re-detected in a tributary. RD Nelle suggested any area where they are spawning. Mike noted that there is a large behavioral component that is unknown, but there is also a tag effect and it depends on the type of tag used. Tracy indicated that if a fish is detected at a downstream dam, you know that the fish did not die in the project area.

Tracy asked the group how far downstream a lamprey would need to be detected before it would not be included in the passage efficiency calculation. For example, would a fish detected at Priest Rapids then at McNary and possibly at a Snake River dam but never in a tributary be included in the Priest Rapids Dam calculation? Mike noted that there is documented mainstem spawning in rivers and lakes, but this cannot currently be measured. Steve Hemstrom agreed but noted that if a lamprey is within a tributary, we can be relatively certain that it will spawn there and therefore we can remove it from the passage efficiency calculation as long as the number of lamprey that do this is not a large proportion of the tagged fish. RD Nelle noted that hypothetically, under this scenario, if no fish pass the project and all go downstream, then it could be said that there is no project effect. Patrick Verhey noted that there may be specific times of the year where more fallback might occur, but he assumes that if the lamprey enter the fishway, the intent is to pass the dam and had the dam not been there, the fish would have continued upstream. His asked if a lamprey enters a dam and is later found to reproduce downstream, is there a dam effect? Tracy reminded the groups that the numbers of adult lamprey entering fishways and then later detected downstream are small.

Regarding distribution, Steve Hemstrom noted that lamprey, unlike salmon, are non-philopatric (do not home back to natal areas to spawn) and therefore there is no guarantee they will migrate back to the same place where they were spawned. Kirk Truscott suggested that we need to determine what percent of those fish entering the ladder and return downstream to spawn is appropriate. Steve Hemstrom said that he is interested in looking at an undammed river system where upstream lamprey movement has been studied to determine if rates of downstream volitional movement by lamprey can be quantified where no barrier exists to affect upstream movement. Steve noted that based on Rocky Reach's current passage efficiency, he did not think downstream movement rates of 2-3% would affect passage success much. Kirk suggested picking an appropriate target to be validated. This could be done by releasing tagged fish downstream from the confluence of the Wenatchee River and determining what proportion of those fish end up in the Wenatchee River. Steve said he does not believe there would be any data showing more than 10% downstream movement, but he could analyze the rate. The group decided to look at additional research from other rivers and studies, including the study titled, *Movements, Habitat Use, and Population Characteristics of Adult Pacific Lamprey in a Coastal River*. It was also noted that there were 50 adult lamprey released by Douglas PUD in the forebay of Rocky Reach Dam that could be used to estimate downstream movement.

Mike Clement asked if it should be assumed that those lamprey that enter the fishway want to pass the dam. Steve noted this is why a natural system should be observed to determine the rate of those fish

that choose to go downstream when there is no barrier present. Mike Clement recalled an adult steelhead tagging study conducted by all three PUDs where released steelhead were detected within 36 hours in the Methow River and 72 hours later they were detected at Lower Granite Dam.

The group agreed to subtract out those fish that enter the fishway and are later detected downstream provided they make up less than 10% of the fish entering a fishway (or whatever the number is from research in undammed systems). If more than 10% of the tagged fish detected in a fishway are later detected downstream, the downstream moving fish exceeding the 10% limit will be included in the calculation of passage efficiency.

Action Items:

- **Rod O'Connor will send to the Forums the publication titled, *Movements, Habitat Use, and Population Characteristics of Adult Pacific Lamprey in a Coastal River.***
- **RD Nelle will look at the movements of adult lamprey released upstream and downstream of a diversion dam on the Yakima River.**
- **Steve Hemstrom will compile data to look at the natural downstream movement behavior of Pacific lamprey in natural rivers to use in fishway passage estimates.**
- **Mike Clement will estimate the proportion of acoustic tagged fish released at Desert Aire or Vantage Bridge that moved downstream over the past two years.**
- **Tracy Hillman will contact Carl English (LGL) about the movement of steelhead during the 2002 radio-tag study.**

VII. Are there Additional Actions that can be Implemented Within the Fishways to Improve Passage Success?

Steve Hemstrom reported that Chelan PUD will finish plating the fishway at Rocky Reach Dam.

Mike Clement indicated that all plating and screening has been completed at Priest Rapids and Wanapum dams and there are no other improvements left to do. Patrick Verhey asked if there was any aversion to the lights in the fish ladder. Mike reported that no aversion to light has been observed.

VIII. What is the Upper Passage Limit for Calculating NNI?

Given an agreed on the method to use for estimating adult lamprey passage efficiency, Tracy Hillman asked how the group intends to calculate NNI. In other words, what passage value represents the upper limit for calculating NNI? Steve Hemstrom stated that 100% is not appropriate for adult lamprey given that there are no data to support a target of 100% passage. Patrick Verhey noted that once fallback has been determined, you could then subtract that number from NNI. Mike Clement noted that the Tribal Restoration Plan with the CRITFC Tribes and U.S. Fish and Wildlife Services stated that 80% was the goal. Mike noted that there was no calculation to determine the 80%, but it was a starting point. Kirk Truscott asked if 80% is the goal, would anything less than 80% be NNI? Steve Hemstrom noted that NNI was not discussed, it was only about dam passage rates.

RD Nelle asked why NNI could not be 100% and why we would think lamprey survival through the project would be lower than for salmonids. Steve Hemstrom stated that we do not know, but passage rates could be only 90% because of the plasticity that exists in lampreys we are studying. Kirk Truscott recalled the discussion earlier about some fish entering the ladder and going back downstream. Currently, there are no data that indicate these fish turned around in the ladder unless they are detected downstream. He asked what are the chances that lamprey are going to make a decision within the ladder and go someplace else. It was suggested a paired release could be implemented to find out if this phenomenon was related to those fish that choose to stay in the ladder.

Steve asked how to deal with the variability of passage and noted that the highest passage rate measured (i.e., 98.8% at Rocky Reach Dam) was the capability of the fishway at Rocky Reach to pass lampreys, so how do researchers account for passage variability from year to year? Patrick Verhey suggested variability in pheromones upstream from the fishway may affect passage success. Steve noted that pheromone levels would not be a passage problem issue within the fishway itself, but would be a consequence of the natural environment and therefore it is important to separate environmental conditions unrelated to the project from fishway passage problems to determine how many years of study are needed to estimate fishway passage efficiency. He said fishway conditions (criteria) at Rocky Reach Dam are measured continuously and those conditions are relatively constant regardless of river and environmental variability present from year to year. Therefore, a high passage rate as measured at Rocky Reach Dam in 2016 demonstrates very good in-fishway passage. The anadromous Habitat Conservation Plans use three years of data to capture the variability in the river environment. Kirk noted that there are years where you may have different flow rates in the ladder even though you are within operating criteria for the head differential.

Tracy Hillman noted that the Pacific Lamprey Subgroups discussed calculating the mean from at least three years of fish-passage data to estimate passage efficiency (see Sections 3.1 and 4.0 in the August 2016 Pacific Lamprey Subgroups Meeting Notes). Steve Hemstrom noted if three years of data are needed, then Chelan PUD would not calculate or consider NNI before the studies are completed.

Tracy Hillman shared the Concept Paper for Evaluations to Determine Project Effects and Implementation of NNI that was prepared by the managers and facilitated by Bob Rose in 2014. He read from the section titled “Rationale for Employing NNI” where 80% was the goal for passage efficiency. RD Nelle noted that 80% was discussed as a starting point and specific to Rocky Reach project. Tracy noted that if 80% is used as a starting point for NNI, then the Priest Rapids and Rocky Reach projects have met or exceeded the target. Tracy asked if the goal in the CRITFC plan is that all projects achieve 80% adult passage. Members present did not know. It was noted that no other projects in the Columbia River basin have an NNI component. Steve Hemstrom noted that a 100% passage target does not take into consideration what happens naturally and lamprey survival was never 100% in the natural system. Steve Hemstrom suggested using new lamprey data that is now available to help determine an NNI target. Patrick Verhey stated that if a lamprey is in the fishway, it is a fair assumption that it wants to pass the dam but fallback and mortality should be considered. Patrick suggested looking at the fallback rate and other data to help determine NNI. Patrick asked if the management plans state that once the passage

objective is achieved, then there is no NNI. Steve noted that this is unclear. Kirk stated that for some parties, the interpretation may be that you have a passage standard (e.g., 80%) and an NNI target.

Tracy Hillman asked what we need to do to identify the upper limit for NNI and if this will be a value based on mark-recapture/resight studies or a negotiated value. Mike Clement said the Agreement states that we need to address unavoidable project impacts. Grant PUD's expectation is that the impacts are identified and measured so these impacts can be mitigated or there is a negotiation that is amendable to all parties in fulfillment of that obligation. Mike noted that existing project impacts represent the environmental baseline. He added that this is not to say there are no project impacts, but to fulfill the NNI obligation would mean mitigation for unavoidable project operational impacts. Issues such as potential for overwintering, mainstem spawning, and predation are not measurable project impacts.

The group agreed that critical perspectives are needed to provide input on mitigation for known project impacts. The group noted that next steps will need to be discussed once the unavoidable impact is calculated.

Action Item:

- **Tracy Hillman will check with Bob Rose and Steve Lewis to confirm their availability for the 5 July meeting.**

IX. Update on Juvenile Lamprey Passage Estimation

Tag Technology and Survey Design Issues

Tag technology is currently in field trials and advancing. Several assumptions of possible survey designs are still compromised because of the behavior of macrophthalmia.

X. Next Steps

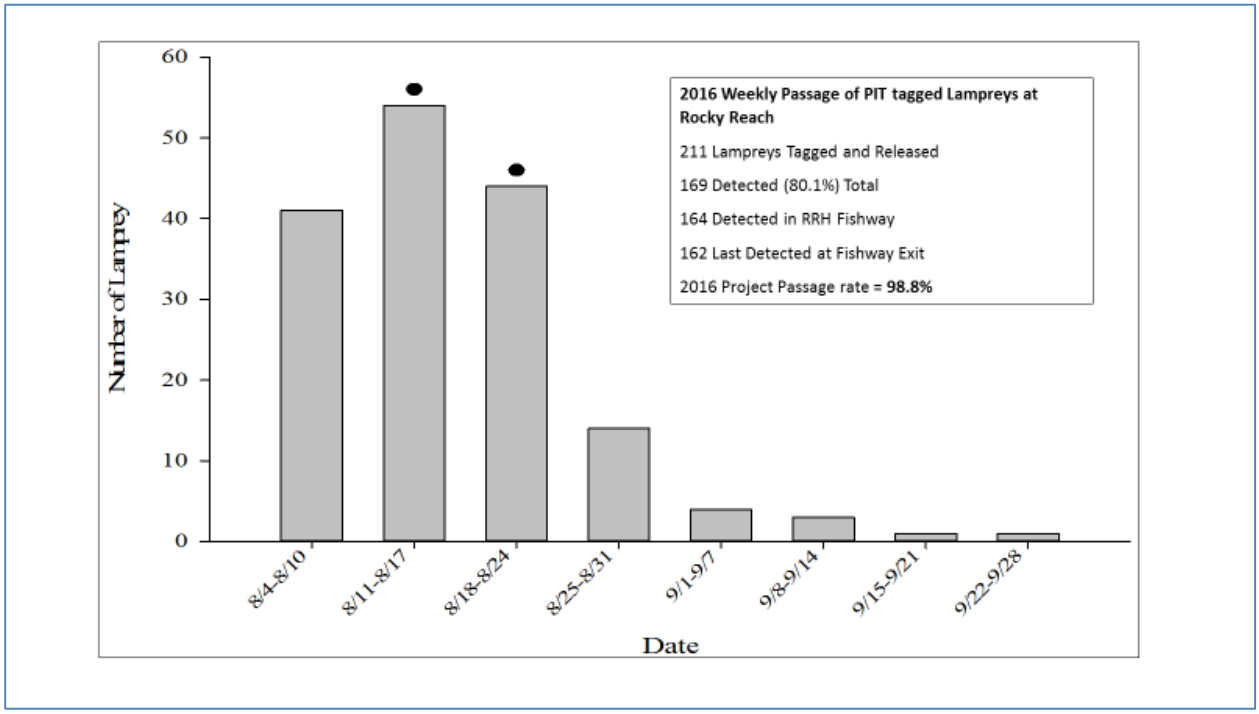
The 5 July 2017 meeting of the RRFF will be a joint meeting with PRFF to continue the discussion of Pacific lamprey NNI. Location and time will be confirmed at a later day.

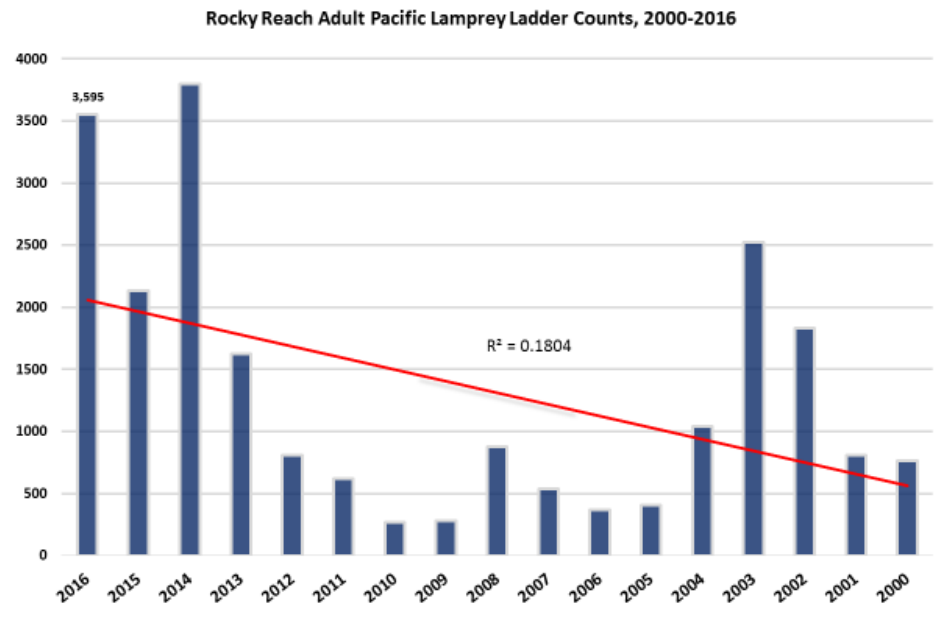
XI. Next Meeting

The next meeting of the RRFF is scheduled for Wednesday, 7 June 2017 from 1:00 to 4:00 p.m. and will be held at the Chelan PUD office in Wenatchee at 327 N. Wenatchee Avenue (2nd Floor Conference Room).

Attachment 1

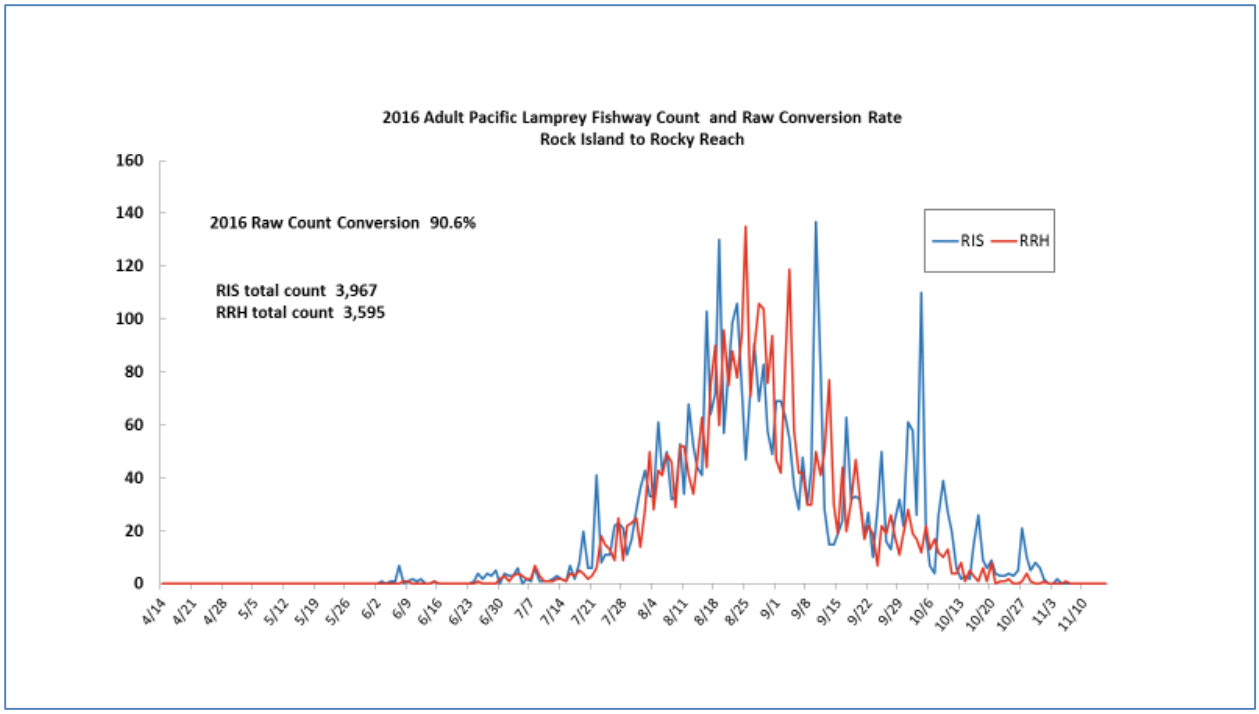
Presentation by Steve Hemstrom on Adult Pacific Lamprey Passage Success at Rocky Reach Dam





2016 Rock Island and Rocky Reach Monthly Fishway Count Comparison

2016	May	June	July	August	September	October	November
RIS Total Lamprey Count	0	36	278	1,912	1,162	547	4
RRH Total Lamprey Count	0	6	222	1,992	1,159	214	2


2016 Adult Pacific Lamprey Fishway Count and Raw Conversion Rate
Rock Island to Rocky Reach
2016 Raw Count Conversion 90.6%
RIS total count 3,967
RRH total count 3,595
RIS
RRH
160
140
120
100
80
60
40
20
0
4/14
4/21
4/28
5/5
5/12
5/19
5/26
6/2
6/9
6/16
6/23
6/30
7/7
7/14
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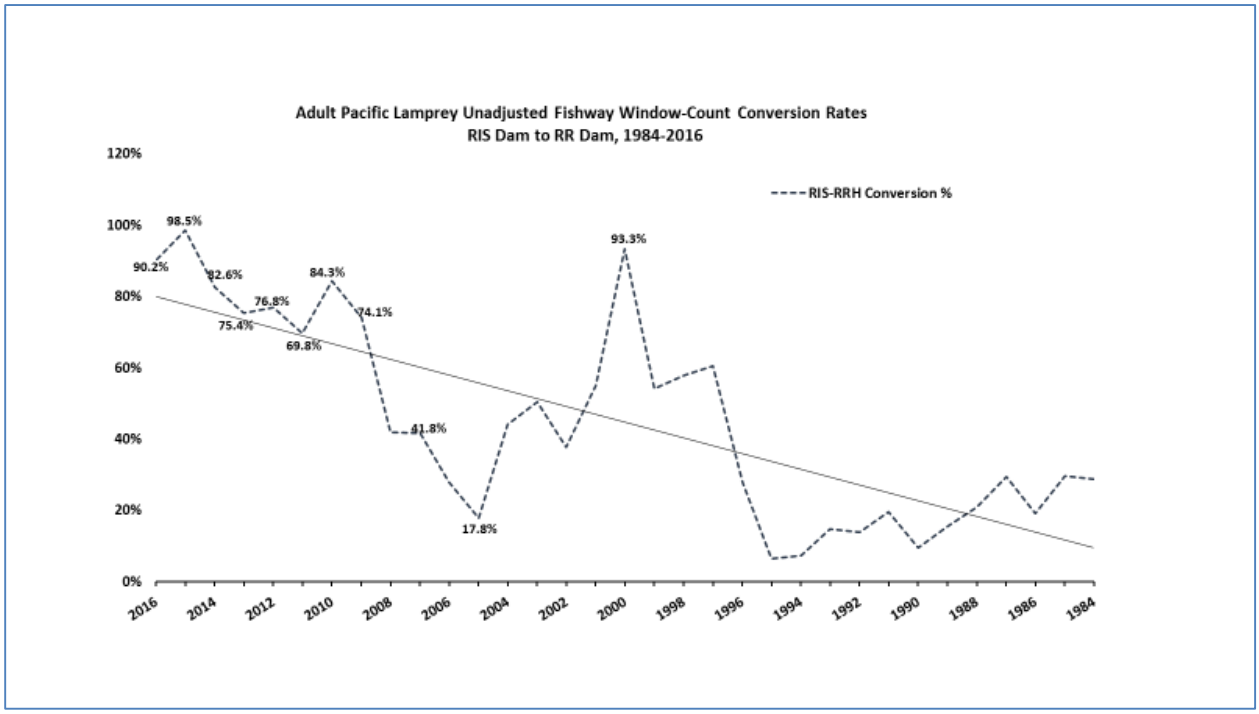
Adult Pacific Lamprey Unadjusted Fishway Window-Count Conversion Rates
RIS Dam to RR Dam, 1984-2016
RIS-RRH Conversion %
120%
100%
80%
60%
40%
20%
0%
90.2%
98.5%
82.6%
75.4%
76.8%
69.8%
84.3%
74.1%
41.8%
17.8%
93.3%
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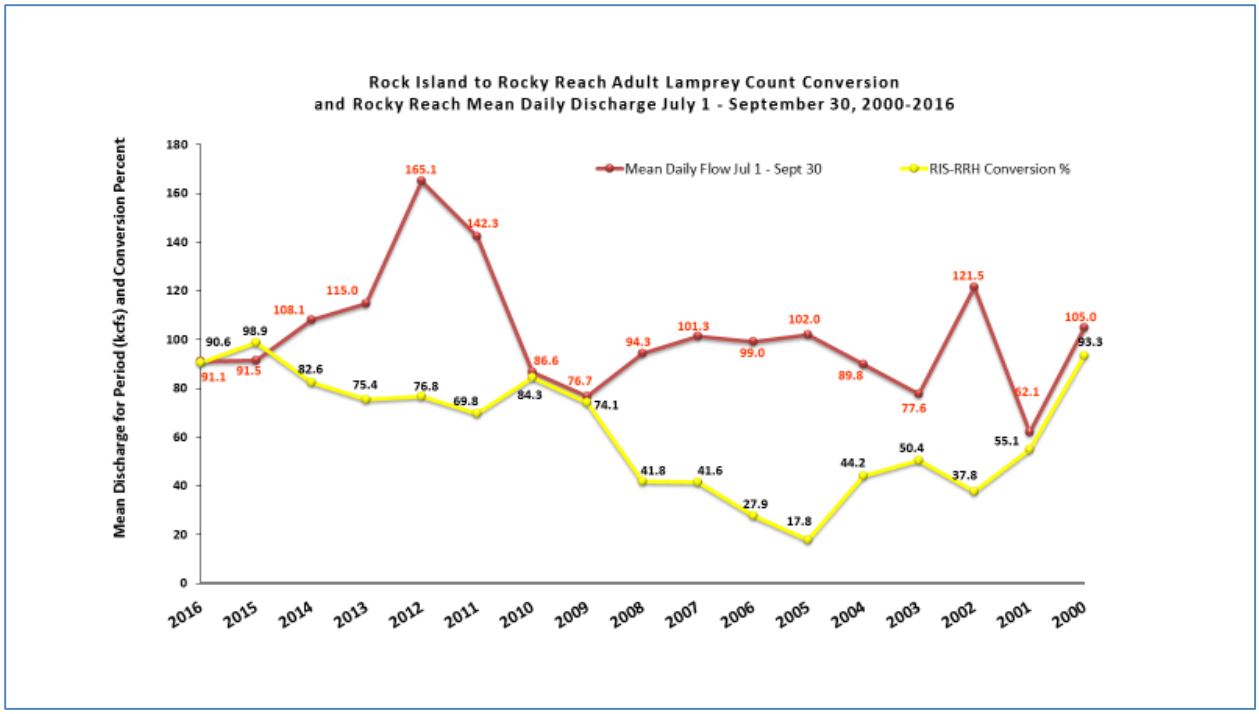
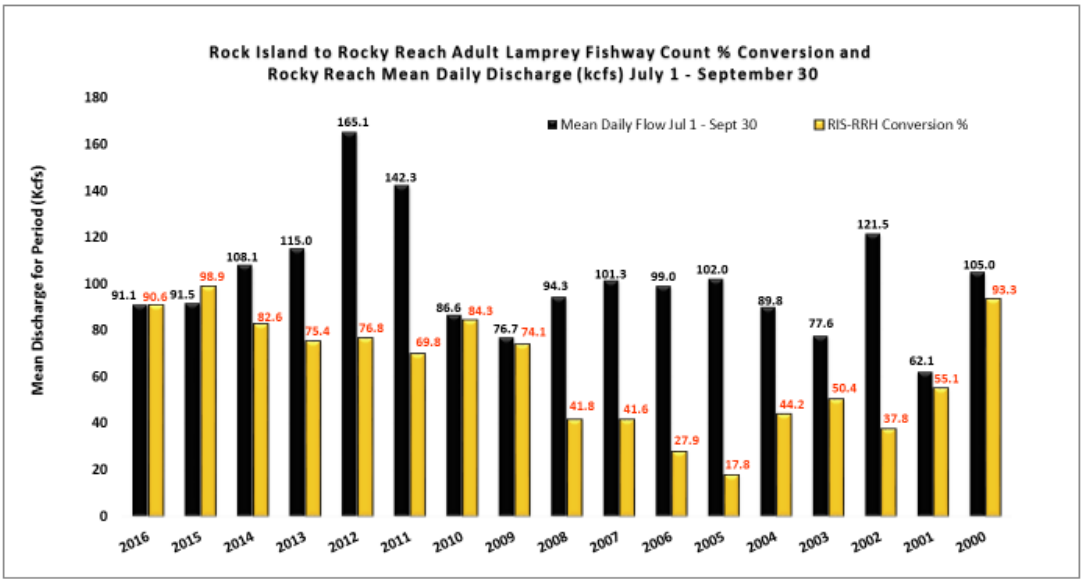
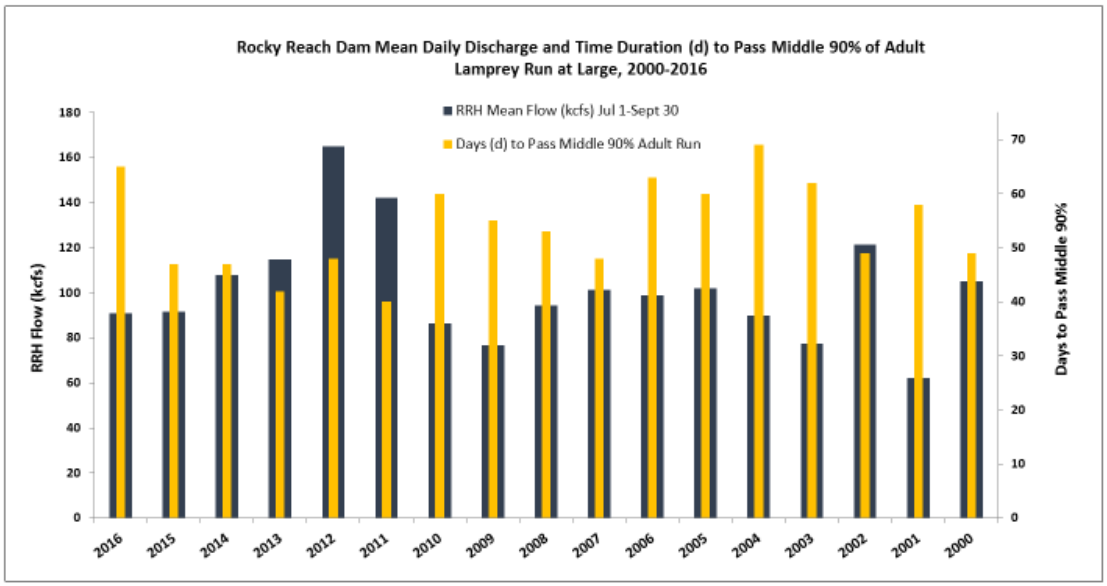
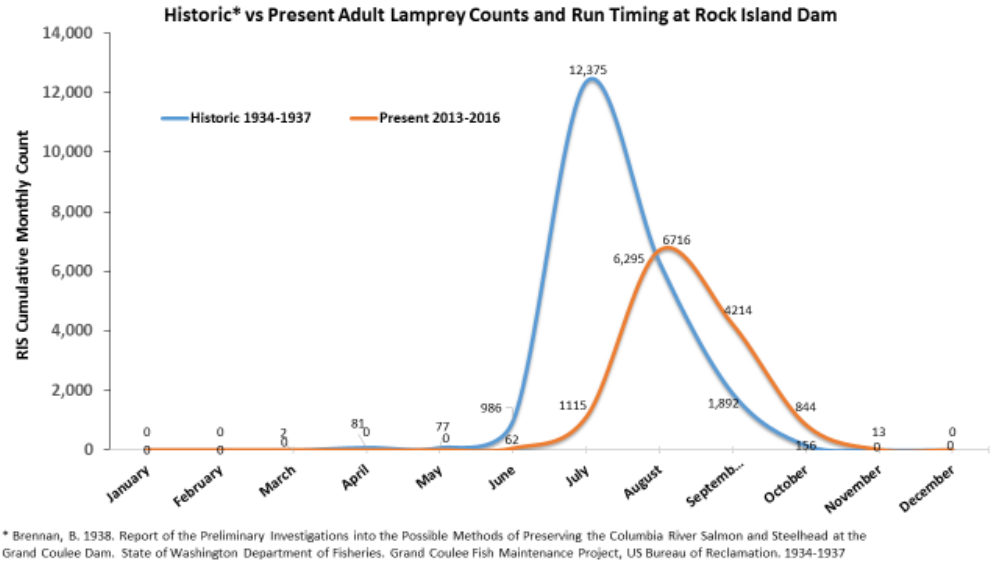

Rock Island to Rocky Reach Adult Lamprey Count Conversion
and Rocky Reach Mean Daily Discharge July 1 - September 30, 2000-2016
Mean Discharge for Period (kcfs) and Conversion Percent
Mean Daily Flow Jul 1 - Sept 30
RIS-RRH Conversion %
0
20
40
60
80
100
120
140
160
180
2016 2015 2014 2013 2012 2011 2010 2009 2008 2007 2006 2005 2004 2003 2002 2001 2000
91.1 91.5 108.1 115.0 165.1 142.3 86.6 76.7 94.3 101.3 99.0 102.0 89.8 77.6 121.5 62.1 105.0
90.6 98.9 82.6 75.4 76.8 69.8 84.3 74.1 41.8 41.6 27.9 17.8 44.2 50.4 37.8 55.1 93.3


Rock Island to Rocky Reach Adult Lamprey Fishway Count % Conversion and
Rocky Reach Mean Daily Discharge (kcfs) July 1 - September 30
Mean Discharge for Period (Kcfs)
Mean Daily Flow Jul 1 - Sept 30
RIS-RRH Conversion %
0
20
40
60
80
100
120
140
160
180
2016 2015 2014 2013 2012 2011 2010 2009 2008 2007 2006 2005 2004 2003 2002 2001 2000
91.1 91.5 108.1 115.0 165.1 142.3 86.6 76.7 94.3 101.3 99.0 102.0 89.8 77.6 121.5 62.1 105.0
90.6 98.9 82.6 75.4 76.8 69.8 84.3 74.1 41.8 41.6 27.9 17.8 44.2 50.4 37.8 55.1 93.3





* Brennan, B. 1938. Report of the Preliminary Investigations into the Possible Methods of Preserving the Columbia River Salmon and Steelhead at the Grand Coulee Dam. State of Washington Department of Fisheries. Grand Coulee Fish Maintenance Project, US Bureau of Reclamation. 1934-1937

2017 Rocky Reach Lamprey Passage Study

- Repeat of 2016 Passage Study at Rocky Reach
- Capture Fish at Priest Rapids (Thank you Grant PUD)
- PIT Tag Approx 200 Adult Lampreys, Same Release Points RIS Res
- Track Fish For a Year
- Assess Rocky Reach Passage Rate
- Assess Fishway Passage Times, Fall Back, Drop Back
- Assess Tributary Escapement
- Assess Reservoir Overwintering to Extent Possible
- Define Biological Meaning of "Passage Success or Failure"