Northwest Power and Conservation Council

February 25, 2010

DECISION MEMORANDUM

TO: Council members

FROM: Mark Fritsch, project implementation manager

SUBJECT: Step 1 review of the *Mid-Columbia Coho Restoration Project*, Project # 1996-040-00.

PROPOSED ACTION

I. The Council staff recommends that the Council support this project to proceed with step 2 and 3 (i.e., preliminary and final design) activities.

II. It is recommended that the Council condition this recommendation on 1) the inclusion of additional information in a revised master plan addressing the issues raised by the ISRP; and 2) the submission of the revised plan for consideration during the steps 2/3 review.

SIGNIFICANCE

On November 21, 2008 the Confederated Tribes and Bands of the Yakama Nation (YN) submitted a revised version of the Mid-Columbia Coho Restoration Master Plan (MCCRP) for review by the Council and ISRP. The YN's long-term vision for coho reintroduction is to re-establish naturally spawning coho populations in mid-Columbia tributaries to biologically sustainable levels that can provide significant harvest in most years. The Master Plan presents a proposal for the future of coho reintroduction efforts in two mid-Columbia subbasins, the Wenatchee and the Methow.

To overcome the absence of an existing locally adapted population, the YN used feasibility studies to determine whether a lower Columbia River hatchery stock of coho could be used to establish a broodstock capable of returning to mid-Columbia basins in sufficient numbers to eliminate use of lower river fish. The feasibility phase which began in 1996 also addressed critical uncertainties regarding ecological interactions between coho and other sensitive fish species. In 2009, 100 percent of the coho smolts released in both basins were progeny of

second- and third-generation mid-Columbia broodstock. The 2009 run of coho past Rock Island Dam totaled nearly 20,000 adults, and interaction studies with the hatchery coho showed little or no negative interactions with other sensitive fish species.

The implementation phase (2010 – 2028) will focus on continuing local adaptation, distribution of natural production throughout the subbasins, and development of a self-sustaining population. After broodstock development goals are met, the natural production phases aim to develop the program to the point where PNI is greater than 0.5, that is the proportion of natural-origin fish in the hatchery broodstock exceeds the proportion of hatchery-origin fish on the spawning grounds.

BUDGETARY/ECONOMIC IMPACTS

Program costs associated with this project, to date, total approximately $24.1 million[1]. The total of estimated construction costs for the new and renovated facilities outlined in the master plan is $7,410,000. The total construction cost estimate includes construction, construction management, and inspection. The budget estimate used master planning guidance of +/- 35 to 50 percent and will be refined as part of the next submittal associated with steps 2/3.

Planning and Development (2009 to 2012) is expected to total $1,440,000 and includes master plan completion, submittal and support for reviews during the Step process, design work costs, both preliminary and final, as well as costs associated with completing environmental compliance which will include environmental impact statement and facility permitting.

Future program expense budgets, which include annual operation and maintenance (O&M) as well as monitoring and evaluation (M&E) costs, that are associated with the *Mid-Columbia Coho Restoration Project* peak in 2013 at $3,090,000. Costs will decrease post-implementation through the natural production phases as fish-release numbers gradually decrease.

Regional action agencies (BPA, the U.S. Army Corps of Engineers, and the U.S. Bureau of Reclamation) and three Columbia Basin tribes (the Confederated Tribes of the Umatilla Indian Reservation, the Confederated Tribes of the Warm Springs Indian Reservation, and the Confederated Bands and Tribes of the Yakama Nation) are operating under a memorandum of agreement (MOA) titled *3 Treaty Tribes-Action Agency Agreement*, dated April 4, 2008, that funds habitat and hatchery actions in the Columbia River Basin. Support for all programs proposed by the three tribes under the MOA is over a 10-year period. The MCCRP portion of this total is $28,827,000 plus inflation at 2.5 percent.

In addition to this direct-program funding, cost sharing, also provides funding support. Both rearing and monitoring and evaluation costs are partially contributed by Grant County Public Utility District (GCPUD), Chelan Public Utility District (CCPUD), and Douglas County Public Utility District (DCPUD). The current program also shares rearing costs with the National Oceanic and Atmospheric Administration (NOAA) through the Mitchell Act, and shares monitoring and evaluation costs with the Washington Department of Fish and Wildlife (WDFW).

[1] Estimated through FY 2010.

The following cost figures (in millions) are based on estimates from YN and Bonneville. Future estimated costs have been aligned, based on environmental review, permitting and future decision points. In addition, design and costs will be refined further as part of the step 2/3 submittal.

A. Costs to Date (costs are in millions of dollars)

FY	**96**	**97**	**98**	**99**	**00**	**01**	**02**
Planning	.03	.03	.25	.14	-	.11	.21
Construction		.05	.18	.13	-	.33	.29
O&M	.08	.10	.18	.19	.05	.95	.97
M&E	.04	.15	.25	.25	.05	.69	.66
BPA Total Cost	.15	.33	.86	.71	.10	2.08	2.13

FY	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**
Planning	.11	.09	.15	.18	-	-	.71	-
Construction	.36	.17	-	-	-	-	-	-
O&M	1.00	1.15	1.37	1.37	-	1.27	2.74	1.94
M&E	.65	.80	.68	.73	-	.86	.41	.39
BPA Total Cost	2.12	2.21	2.20	2.28	.60	2.13	3.86	2.33
Cost Share[2]	n/a	n/a	n/a	n/a	.47	1.51[3]	.95	.99
Project Total Cost	2.12	2.21	2.20	2.28	1.07	3.64	4.81	3.32

B. Future Costs (costs are in millions of dollars)

FY	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**
Planning	.55	.18	-	-	-	-	-	-
Capital Costs[4]	-	.80	6.61	-	-	-	-	-
O&M	1.47	1.48	2.35	2.06	2.10	1.43	1.44	1.46
M&E	.58	.60	.74	.76	.78	.80	.82	.84
BPA Total Cost	2.60	3.06	9.70	2.82	2.88	2.23	2.26	2.30
Cost Share[2]	1.03	1.08	1.12	1.17	1.21	1.26	1.31	1.35
Project Total Cost	3.63	4.14	10.82	3.99	4.09	3.49	3.57	3.65

[2] GCPUD and YN entered into an *Agreement for Professional Services* for the period March 1, 2008 to March 1, 2018 that provides funding for implementation of the MCCRP. This funding commitment totals $7,375,212 over the 10 year period and does not include any correction for inflation.

CCPUD and YN signed the *Agreement to Meet Coho Salmon Hatchery Obligations for the Chelan County PUD Rocky Reach and Rock Island Hydroelectric Projects*. This provides $3,060,000, plus inflation at the Consumer Price Index rate, over a 10-year period. The inflation rate assumed for CCPUD funding is 3% per year, the long-term average value.

[3] DCPUD agreed to a single payment of $600,000, made in 2008. A regional office in the Methow watershed was purchased with this obligation.

[4] This budget reflects costs associated with land purchase, facility and acclimation site construction.

BACKGROUND

The Wenatchee and Methow subbasins are part of the Columbia Cascade Province, which extends over an area of 14,333 square miles. The province, in north central Washington, encompasses the Columbia River from Wanapum Dam to the limit of anadromous fish passage at the base of Chief Joseph Dam. Besides the Wenatchee and Methow subbasins, the province includes the Entiat, Lake Chelan, Okanogan, and Upper Middle Mainstem Columbia River subbasins.

The Wenatchee subbasin lies entirely within Chelan County. The subbasin comprises 9.3 percent of the Columbia Cascade Province and consists of approximately 854,000 acres (1,300 square miles). Approximately 81 percent of the subbasin is in federal (primarily U.S. Forest Service) and state ownership. The remaining 19 percent is privately owned. The watershed originates in the Cascade Mountains and includes the Alpine Lakes and Glacier Peak wilderness areas. The Wenatchee River enters the Columbia River at river mile 470. Five major tributaries—the Chiwawa, White, and Little Wenatchee rivers, and Nason and Icicle creeks—are the source of over 94 percent of the surface waters within the subbasin even though their drainage area represents only 58 percent of the total subbasin area.

The Methow subbasin lies entirely within Okanogan County. The subbasin comprises 12.7 percent of the Columbia Cascade Province and consists of 1,167,764 acres. The Methow River's confluence with the Columbia is at river mile 524 near Pateros, Washington. The Methow subbasin is characterized by large tracts of relatively pristine habitat contrasted with a growing human population. Less than 2% of the subbasin's land is irrigated. Six fish species and fourteen wildlife species are listed as Endangered, Threatened, or as Species of Concern. Logging, mining, orchards, farming, and grazing have played a substantial role in the Methow Valley for nearly a hundred years. Farming and grazing are confined primarily to the lower and middle reaches of the subbasin. Orchards and small farms growing alfalfa and other irrigated crops constitute the majority of the subbasin's agricultural activities.

Among subbasins in the upper Columbia region, the Wenatchee supports the greatest diversity of populations and overall abundance of salmonids. There are core populations of sockeye salmon, steelhead, bull trout, and both spring and later-run Chinook salmon in the upper Wenatchee subbasin that are relatively strong as compared to other populations in the Columbia Basin.

Six hydroelectric projects are downstream of this province: Wanapum Dam, Priest Rapids Dam and four federally-owned projects (McNary, John Day, The Dalles, and Bonneville dams).

Mid-Columbia coho salmon populations were decimated in the early 1900s by impassable dams, harmful forestry practices, and unscreened irrigation diversions in the tributaries, along with an extremely high harvest rate in the lower Columbia River. The loss of natural stream flow degraded habitat quality and further reduced coho productivity. Over the years, irrigation, livestock grazing, mining, timber harvest, road and railroad construction, development, and fire management also contributed to destruction of salmon habitat.

By the end of the 1900s, indigenous natural coho salmon no longer occupied the mid-Columbia river basins. Since Priest Rapids Dam was completed in 1960, the peak escapement of adult coho upstream of the dam was probably never greater than 10,000 fish and, as of 1998, had not exceeded 1,300 since 1974. From 1988 to 1994, adult counts at Priest Rapids Dam averaged only 16 coho, probably a result of releases from Turtle Rock Hatchery, which annually produced about 600,000 coho smolts, until the program was terminated in 1994.

To offset the loss of anadromous salmonid production by the federally built projects, the federal government built and continues to operate the Leavenworth National Fish Hatchery (NFH) in the Wenatchee subbasin, and the Entiat and Winthrop NFHs in the Entiat and Methow subbasins, respectively. The Mid-Columbia Coho Restoration Project is expected to increase the abundance and distribution of naturally spawning coho in the Wenatchee and Methow rivers and in the Columbia River below Wells Dam.

I. History of the Mid-Columbia Coho Restoration Project – Feasibility Phase

This project was formally established in 1995 with the adoption of the Tribal Restoration Plan, *Wy-Kan-Ush-Mi Wa-Kish-Wit,* by the four Columbia River treaty tribes (Nez Perce, Umatilla, Warm Springs, and Yakama).

In April 1996 the project was one of the 15 high-priority supplementation projects recommended for funding by the Council and was incorporated into the Fish and Wildlife Program (program measures 7.1H, 7.4A, 7.4F, and 7.4O). These high-priority supplementation projects were forwarded with strong endorsements from both the *US v. Oregon* Policy Committee and the National Marine Fisheries Service.

Studies of the feasibility of reintroducing coho in the Wenatchee and Methow subbasins began in 1996. The Yakama Nation, along with project participants and the Mid-Columbia Technical Work Group, developed two goals from which to determine the feasibility of reintroducing coho to mid-Columbia tributaries:

> *1) Determine whether a broodstock can be developed from lower Columbia River coho stocks whose progeny can survive in increasing numbers to return as adults to the mid-Columbia region, and*
>
> *2) Initiate natural reproduction in areas of low risk to sensitive species and in other select areas to study the risks and interactions with sensitive species.*

Both feasibility studies' goals have been achieved. The feasibility phase demonstrated that a local broodstock can be developed from lower river stocks and that a survival advantage can be achieved with one generation of selection. To date, three generations of broodstock development have occurred and use of lower Columbia River coho as broodstock has been discontinued. In 2009, nearly 20,000 coho adults passed Rock Island Dam. Extensive spawning ground surveys and radio-telemetry studies documented spawning escapement and distribution into natural habitat; observed redds are producing smolts and the smolts are returning as adults.

To address Feasibility Goal 2, critical uncertainties regarding species interactions were investigated. The issues identified included the following:

- rate of predation by hatchery coho on spring Chinook fry;
- rate of predation by hatchery coho on sockeye fry;
- amount of superimposition of spring Chinook redds by spawning coho;
- rates of residualism; and
- amount of competition for space and food during freshwater rearing of naturally produced coho juveniles as measured through micro-habitat use and growth evaluations.

Two predation evaluations were conducted during the initial phase of the project to determine the rate of predation by hatchery coho on newly emerged spring Chinook fry. Results of both studies indicated that predation rates were low with less than 1 percent (0.96 percent in 2001 and 0.14 percent in 2003) of the spring Chinook fry population in Nason Creek were consumed by coho smolts.

With the completion of many species-interaction evaluations and most critical uncertainties answered, the monitoring and evaluation plan is designed to coordinate the coho reintroduction effort with other ongoing programs, such as the Chelan and Douglas PUD HCP Hatchery Compensation M&E Plan and the Integrated Status and Effectiveness Monitoring Program (BPA Project # 2003-017-00), to monitor the status of listed and endangered species. Much of the data previously or currently being collected by this program, or that is currently proposed by other programs, can be used to help detect negative effects, if any, of coho reintroduction.

II. Mid-Columbia Coho Restoration Master Plan – Implementation Phase

The proposed Master Plan builds on the success of the feasibility phase. The YN's long-term vision for coho reintroduction is:

> *To re-establish naturally spawning coho populations in mid-Columbia tributaries to biologically sustainable levels which provide significant harvest in most years.*

Restoration approaches are described in terms of biological objectives and numeric goals.

> *Biological Objective: By 2028, develop a locally adapted naturally spawning population in the Wenatchee and Methow river subbasins capable of supporting harvest.*

Coho reintroduction will be considered successful when the following metrics are achieved:

> *Metric 1 - The three-year mean escapement of natural origin returns in the Wenatchee (upstream of Tumwater Dam) and the Methow river subbasins exceeds 1,500 per subbasin, and*
> *Metric 2 - A total harvest rate of 23 percent, which includes a 10-percent mixed stock harvest, 10 percent mainstem harvest, and 5 percent terminal harvest in most years.*

The conceptual restoration plan for coho salmon in the Wenatchee and Methow subbasins includes five distinct phases, to be concluded in approximately 2028.

- Broodstock Development Phase 1 (BDP1) is designed to develop a mid-Columbia broodstock from lower Columbia River coho so that they become increasingly adapted to the longer migration to mid-Columbia tributaries. BDP1 focuses on eliminating reliance on lower Columbia stocks and transitioning to a local broodstock. This phase has been completed in the Wenatchee and Methow subbasins.
- Broodstock Development Phase 2 (BDP2) is designed to encourage further adaptation of the broodstock by moving broodstock capture sites farther upstream where stamina and run-timing constraints of the existing broodstock may be reaching their limits. Both Wenatchee and Methow subbasins are expected to operate in this phase until 2013 or later.
- Natural Production Phases focus on decreasing domestication selection and increasing fitness in the natural environment. Hatchery coho will be introduced to habitat areas predicted by EDT to be the most successful for coho. Also, hatchery and natural broodstock compositions will be managed to increase the proportion of natural influence (PNI[5]) in the population, with the goal of having a PNI value ≥ 0.5; that is, the natural environment must have a greater influence on the population than the hatchery environment. The natural production phases are described below:
  - Natural Production Implementation Phase (NPIP) represents initial releases into most habitat areas and will proceed for one generation. The NPIP seeks to begin the local adaptation[6] process by acclimating enough hatchery-reared fish in the natural environment to result in a spawning aggregate in each tributary of sufficient size that natural selection can act upon the population and that enough first-generation natural-origin adults will return so that they can be incorporated into the broodstock as the natural production phases continue. The Wenatchee and Methow subbasins are expected to begin this phase in 2013. The duration of this phase will be a minimum of one generation (three years).
  - Natural Production Support Phases 1 and 2 will emphasize further local adaptation and naturalization. Initially, release numbers will be reduced by 30 percent, with a goal to increase the proportion of natural origin fish in the broodstock (pNOB) to 35 percent and to limit the proportion of hatchery origin fish (pHOS) on the spawning grounds to 75 percent. When this initial goal is reached, the number of fish reared in the hatchery would continue to be reduced, the pNOB would increase and the pHOS would decrease to the point at which the PNI value is greater than 0.50 (pNOB = 80 percent, pHOS < 65 percent). A PNI > 0.5 is predicted to result in increased natural fitness and associated survival rates for the population. The Wenatchee and Methow subbasins are expected to begin this phase in 2016. The total expected duration of the support phases is four generations (12 years).

[5] If pNOB is the percent natural-origin fish in the hatchery broodstock and pHOS is the percent hatchery origin fish among natural spawners, then PNI= pNOB/(pNOB+pHOS).

[6] The YN use the term "local adaptation" to refer to the process of naturalization: addressing the loss of fitness that occurs with hatchery stocks by emphasizing selection in the natural environment so that the population becomes adapted to habitats within each subbasin and ultimately achieves PNI > 0.5. "Local adaptation" is distinguished from "broodstock development," which selects for coho that can return to the Wenatchee and Methow rivers but does not address loss of fitness and adaptation to the natural environment.

A variety of facilities and operating procedures will be evaluated and employed to reduce risk, minimize impacts to natural populations, speed reintroduction, and test alternative strategies as this project proceeds to future step reviews. These include:

- Trapping adults at hatchery and acclimation return sites, existing dams, existing tributary weirs, and in small temporary weirs;
- Rearing fish in existing hatcheries and acclimation facilities;
- Acclimating and releasing smolts from hatcheries, constructed semi-natural ponds, existing semi-natural ponds, temporary impoundments, and in-river seine enclosures;
- Acclimating fish over the winter at sites where cold weather operation is possible and for shorter periods where it is not;
- Planting excess adults in appropriate under-seeded habitat at locations where acclimation sites are impractical;
- Alternating releases from multiple sites in watersheds where several acclimation alternatives exist;
- Developing release sites on small tributaries in future years.

The program described in the master plan is a conceptual design that will be adaptively managed as more is learned about carrying capacity and habitat use for inland coho stocks through the monitoring and evaluation plan. Applying adaptive management principles could result in changes to brood capture, acclimation methods, locations, and release numbers. As well, the NEPA process could result in changes to alternative approaches and facility locations.

The M&E program is designed to monitor and evaluate the results of reintroduction so that operations can be adaptively managed to optimize hatchery and natural production while minimizing any negative ecological impacts. Pursuing this goal, research data collection and analysis is structured to: 1) demonstrate when the reintroduction program is meeting the established phased restoration goals; 2) determine whether a change in status of sensitive species is occurring and whether it is a result of coho reintroduction; and 3) provide science-based recommendations for management consideration. The M&E plan is closely coordinated with other monitoring efforts in the Wenatchee and Methow subbasins, resulting in cost sharing and preventing the duplication of efforts.

New facilities are not required in the broodstock development phases. Fish produced for the broodstock development phases would be captured at existing adult traps currently in use by other hatchery programs and released from acclimation sites that do not require new capital construction. However, modifications to these existing facilities may be necessary in order to meet project goals.

Beginning in 2013 with the natural-production phases, the plan proposes to continue rearing most program fish at existing hatcheries. Coho then would be acclimated in a combination of existing and new sites in EDT-predicted coho spawning and rearing habitat. Most acclimation sites are existing semi-natural ponds or small, constructed semi-natural ponds. To have the

required new facilities completed by these dates, construction would begin in 2012 after the completion of the step reviews[7] at the end of 2011.

Capital costs are expected to total $7,410,000 and will include land purchase and facility construction mostly for adult holding, spawning, and early incubation. To minimize capital costs, the proposed facility plan for the project makes extensive use of existing regional facilities, including those for brood capture, rearing, and some acclimation.

Operating expenses include the operation and maintenance of these facilities as well as the monitoring and evaluation program and general and administrative project costs.

On April 2, 2009 the Council received a letter from the YN seeking approval to initiate Step 2 activities (i.e., environmental review) concurrently with addressing master plan review elements as part of Step 1. The environmental review (i.e., EIS) will take a minimum of 18 months, and the NEPA Record of Decision is anticipated in the summer of 2011. The YN felt that if the environmental review was postponed until there was a decision associated with Step 1 it would not be complementary to the current conceptual approach of the project development. The Council felt that this was a reasonable request to initiate environmental review concurrent to responding to the ISRP as part of the Step 1 review, and on May 1, 2009 sent that direction to Bonneville.

III. Major Project Review (The Three-Step Process)

The ISRP has participated in numerous reviews of the coho restoration Master Plan and feasibility study including annual reviews of proposals for funding through the Fish and Wildlife Program for fiscal years 1998, 1999, and 2000; a partial step review in 2000 (ISRP 2000-5); a provincial review for fiscal years 2003-2005 funding; a concurrent master plan review and FY 2007-09 proposal review in 2006[8] (ISRP 2006-5).

On November 21, 2008 the YN submitted a revised version of the Mid-Columbia Coho Restoration Master Plan for review by the Council and ISRP.

On March 18, 2009 the Council received the ISRP review of the master plan (ISRP Document 2009-6). The ISRP found that the revised Master Plan does not meet scientific review criteria. The ISRP members stated that they remain supportive of a well-designed and monitored effort to reintroduce coho to these areas where they have been effectively extirpated for many years and offered to meet with the YN to discuss their comments and concerns.

[7] Due to the approach this project has taken and the use of existing facilities, the next review will combine steps 2/3 activities and decisions.

[8] The original Mid-Columbia Coho Restoration Master Plan was submitted in January 2006. At the Council's request, the ISRP reviewed both the original Master Plan, as part of Step One of the Council's Three Step Review, and the 2007 - 2009 solicitation proposal for this project (#1996-040-00). Although the ISRP recommended partial funding in August of 2006, the Council determined that budget limitations in the Columbia Cascade Province would not allow funding. The project continued to operate using transitional sources of funding until May 2008, when the Yakama Nation signed a Memorandum of Agreement (2008 MOA) with Bonneville Power Administration, the U.S. Army Corps of Engineers, and the Bureau of Reclamation.

The ISRP found the Mid-Columbia Coho Master Plan deficient due to the following:

1) The performance metrics at each stage of the project were insufficient;
2) The reporting of the feasibility studies did not provide explicit status of the appropriate metrics;
3) The rationale for the design of Broodstock Development Phase 2, Natural Production Implementation Phase, and Natural Production Support Phases I and II were not scientifically supported by the results from the feasibility studies or modeling.

The ISRP and YN met in May 2009 to discuss a path for responding to the ISRP's March 2009 review.

On September 21, 2009 the Council received a response from the YN, including a Master Plan that was supposed to have been modified in response to the ISRP March comments and comments from subsequent meetings. However, in late January the YN discovered that the revised Master Plan mistakenly lacked some key modifications that had appeared in an August version.

On November 24, 2009 the ISRP provided its review (ISRP document 2009-47). The ISRP's recommendation was "*Response Requested – the Master Plan does not currently meet scientific review criteria*". The ISRP found the master plan did not adequately address the three concerns outlined above. In addition to these three concerns, the updated contingency plan and decision process needed a clearer description of the performance objectives for each phase that will trigger contingency actions and especially the analysis of monitoring data that will be used to decide on the causes of not achieving production objectives.

ANALYSIS

Overall, since 1998 this project has had a favorable track record with the ISRP. Due to the project's experimental approach, it is one of the most reviewed projects in the program. Although the most recent ISRP review found the master plan did not meet scientific review criteria the ISRP wants to continue to have dialogue with the YN as this project proceeds. The ISRP remains supportive of the continued monitoring and evaluation associated with the project and acknowledges the success of the project in developing a local stock of coho that returns to the mid-reach of the Wenatchee watershed between Tumwater Dam (RM 31) and Dryden Dam (RM 19).

The principal uncertainty raised by the ISRP relates to the plan for Broodstock Development Phase 2 (BDP2) which is intended to encourage further local adaptation of the mid-Columbia stock developed during feasibility studies to areas in the upper watersheds of both subbasins. The uncertainty is not with the conceptual approach, but with the strategy used to encourage local adaptation; the ISRP's concern is rooted in uncertainties surrounding the mechanism of genetic adaptation. As might be expected, there are many untested hypotheses for what constitutes the fastest and most effective path forward to achieve the stated goals, and the best way forward has not been proven to a scientific certainty.

The Mid-Columbia Coho Restoration Project is currently at the conceptual stage (i.e., master plan) in the step review process. The ISRP acknowledges this in its concern regarding performance metrics (i.e., concern #1), stating that it has been adequately addressed for this conceptual planning stage.

In regard to the ISRP concern associated with the status of the feasibility studies and the appropriate metrics (i.e., concern #2), this information was compiled by the YN but mistakenly left out of the September 23 version of the Master Plan reviewed by ISRP. This corrective information has since been provided to Council staff, who are satisfied that the documentation adequately responds to the ISRP concerns.

In addition, and concurrent with the project's development, dialogue between the YN and the ISRP should continue in the future on the plan for BDP2 (i.e., concern #3). It is anticipated that this can be addressed through the continued refinement of the contingency plan regarding the course of action if BDP2 goals are not met. As the ISRP stated in its latest review (ISRP document 2009-47), the current contingency plan is a good start, but more specific details are needed for all the phases.

The experimental nature of this project over the past 14 years does not conform to the norm for the development of an artificial-production project. This project has evolved with the science, and in doing so, has used existing facilities and natural sites as was envisioned in 1996 when the feasibility studies were approved for implementation. The monitoring and evaluation plan guided the evaluation of the feasibility studies and the development of the current proposed approach. It will continue to do so in order to ensure that critical uncertainties are monitored and linked to contingency plans so that action can be taken in case goals for each phase are not met on the schedule predicted.

As discussed, the basic premise of the Mid-Columbia Coho Restoration Master Plan is that non-local, domesticated hatchery stocks can be used to develop self-sustaining, naturally reproducing populations in the Wenatchee and Methow subbasins. Results to date have demonstrated that the concept is viable. The YN has presented, through 14 years of studies, an opportunity to convert a hatchery stock into at least one naturally reproductive and viable population in new habitat. The project is attempting to be a truly regional, integrated, and ecological recovery strategy.

Based on the ISRP reviews and the Yakama Nation's corrective response, and in the context of the current conceptual phase of the project's development, Council staff recommends that the Council support this project to proceed with Step 2 and 3 activities (i.e., preliminary and final design). This recommendation is based on the understanding that the concerns raised by the ISRP regarding appropriate metrics (i.e., concern #1), the status of feasibility studies (i.e., concern #2), and contingency plans (i.e., concern #3) have been met at an appropriate level for a Step 1 review. This recommendation is conditioned on the YN addressing the three issues raised by the ISRP in a revised master plan[9] that includes updating the issues where appropriate and providing additional details of the approach the YN is taking regarding the plan for Broodstock Development Phase 2. The step 2/3 submittal will be submitted in late 2011 after the NEPA

[9] This would include the corrective information that was mistakenly left out of the plan version that was submitted to the ISRP for review in September 2009.

Record of Decision is complete. It is also expected that the Environmental Impact Statement prepared under the National Environmental Policy Act will address ISRP concerns about alternative approaches and strategies.

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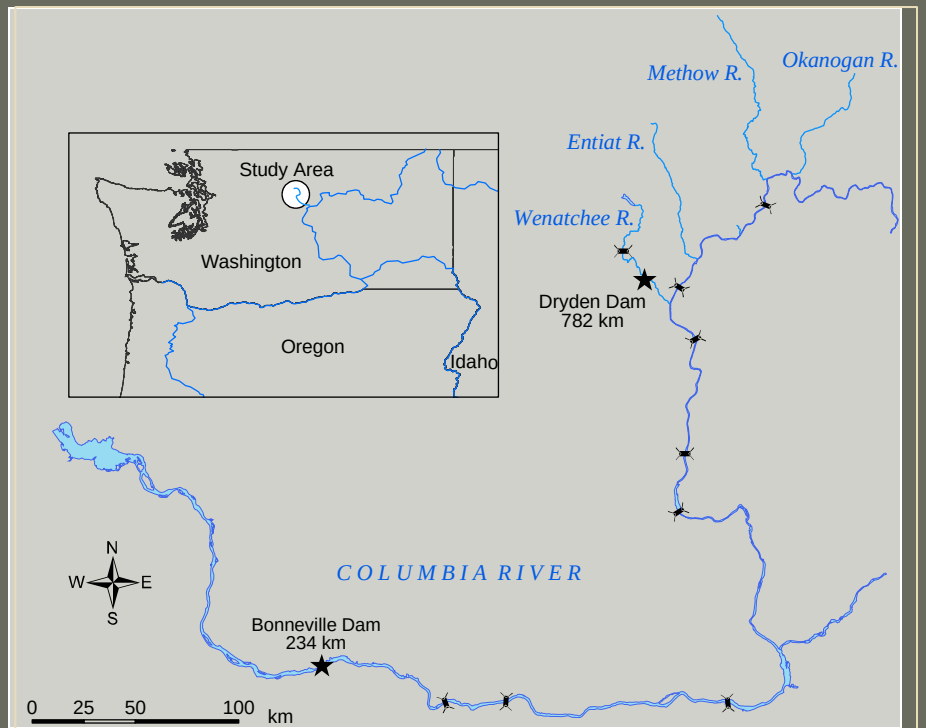
Coho Reintroduction in the Wenatchee and Methow Basins

Presented by:
Fisheries Resource Management
Yakama Nation

Mid-Columbia Tributaries

- Historical Abundance (Mullan 1983)
  - Wenatchee: 6,000-7,000
  - Entiat: 9,000-13,000
  - Methow: 23,000-31,000



Coho Salmon

Methow River 1910, Mullan (1992)

Limiting Factors

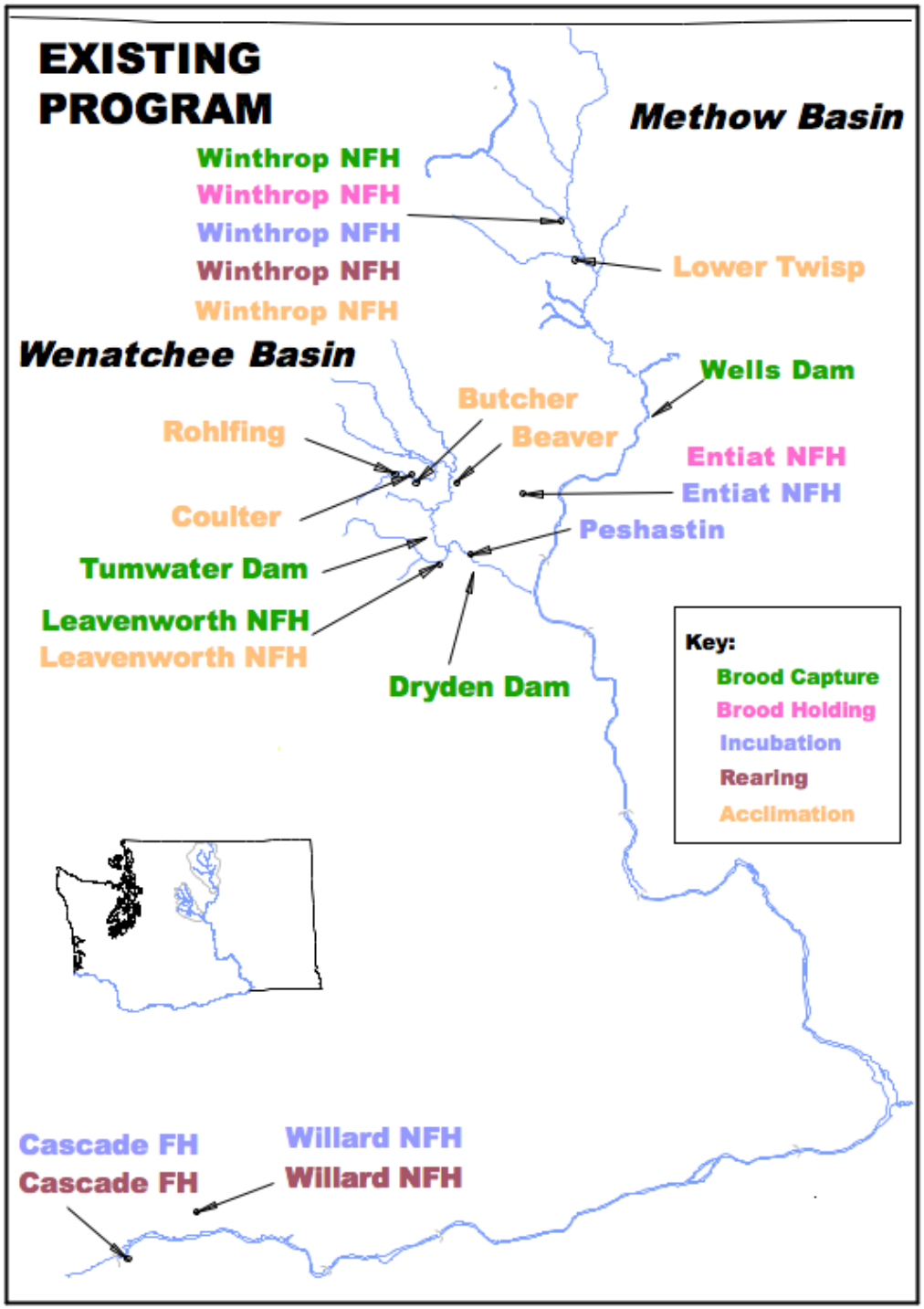
- Extirpation of coho in the region
- Lack of fish production and acclimation/release facilities

Why is Coho Restoration Important to YN?

- It is important to the Yakama Nation to restore anadromous fishes to rivers and streams
- *Wy-Kan-Ush-Mi Wa-Kish-Wit (TRP)* provides the goal to restore the Columbia River salmon, which is, simply: **put the fish back into the rivers**

Feasibility Study Goals

1. To determine if a local broodstock could be developed from lower Columbia River stocks
2. Initiate natural production
3. Answer critical uncertainties regarding species interactions.


EXISTING PROGRAM
Methow Basin
Winthrop NFH
Winthrop NFH
Winthrop NFH
Winthrop NFH
Winthrop NFH
Lower Twisp
Wenatchee Basin
Wells Dam
Butcher
Rohlfing
Beaver
Entiat NFH
Entiat NFH
Coulter
Peshastin
Tumwater Dam
Leavenworth NFH
Leavenworth NFH
Dryden Dam
Key:
Brood Capture
Brood Holding
Incubation
Rearing
Acclimation
Cascade FH
Cascade FH
Willard NFH
Willard NFH

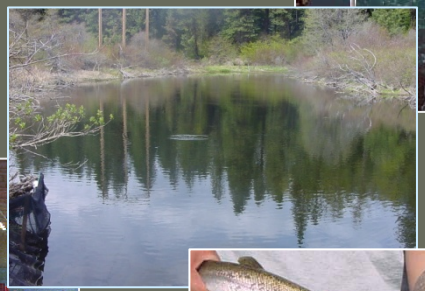
Goal 1: Broodstock Development

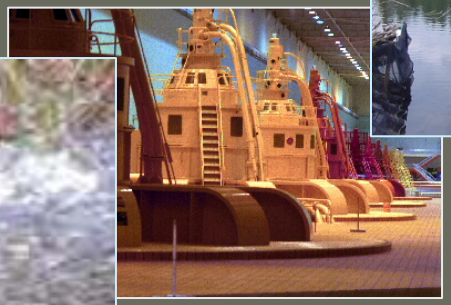
- Wenatchee River
  - Icicle Creek
    - Primary broodstock development site
  - Nason and Beaver Creeks
    - Species interaction
    - Natural production
- Methow River
  - Winthrop NFH
    - Broodstock development

Broodstock Development
How we measure success

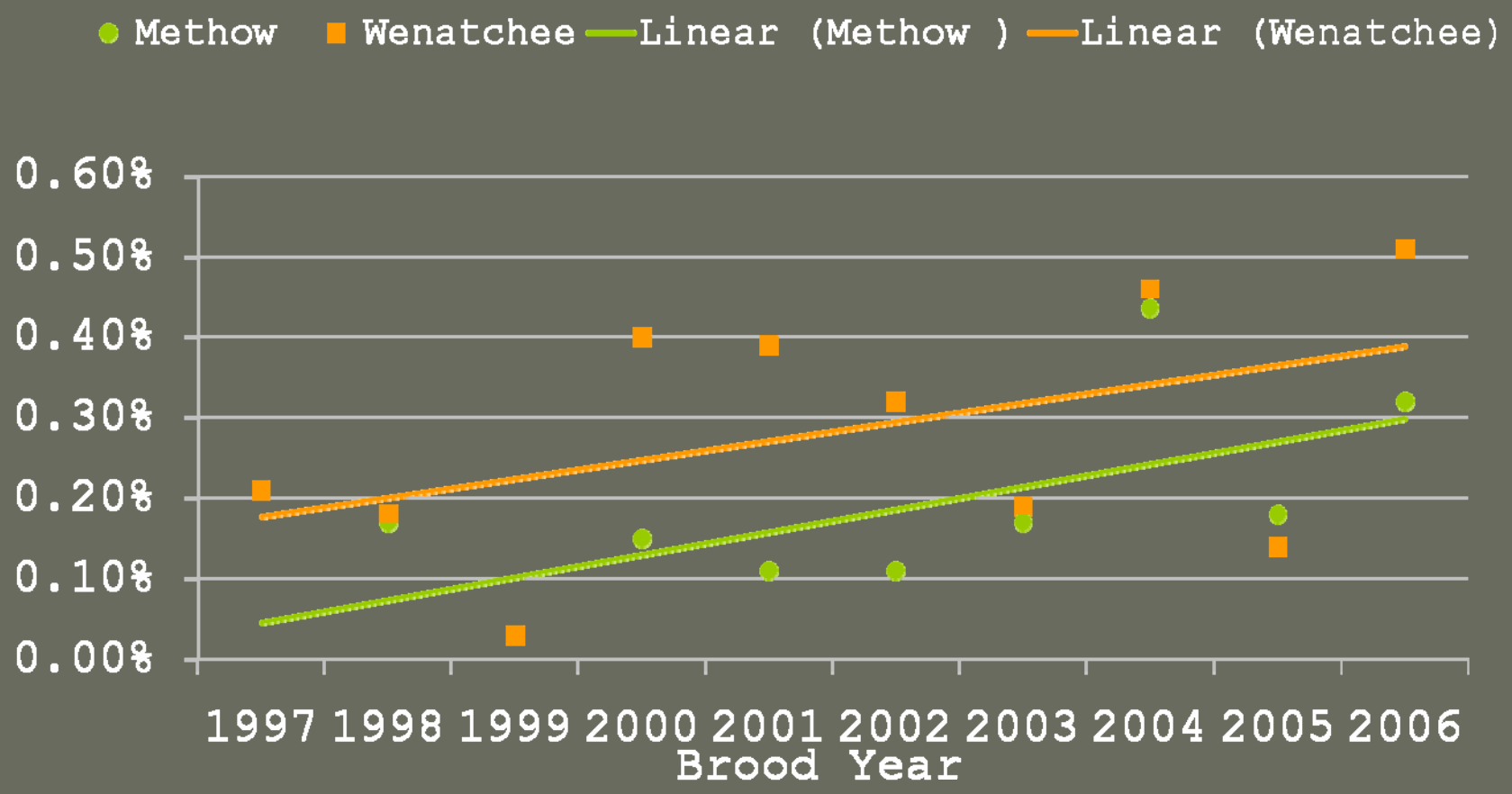
- Release-to-McNary Dam survival rates
- Smolt-to-adult survival rates
- Natural production



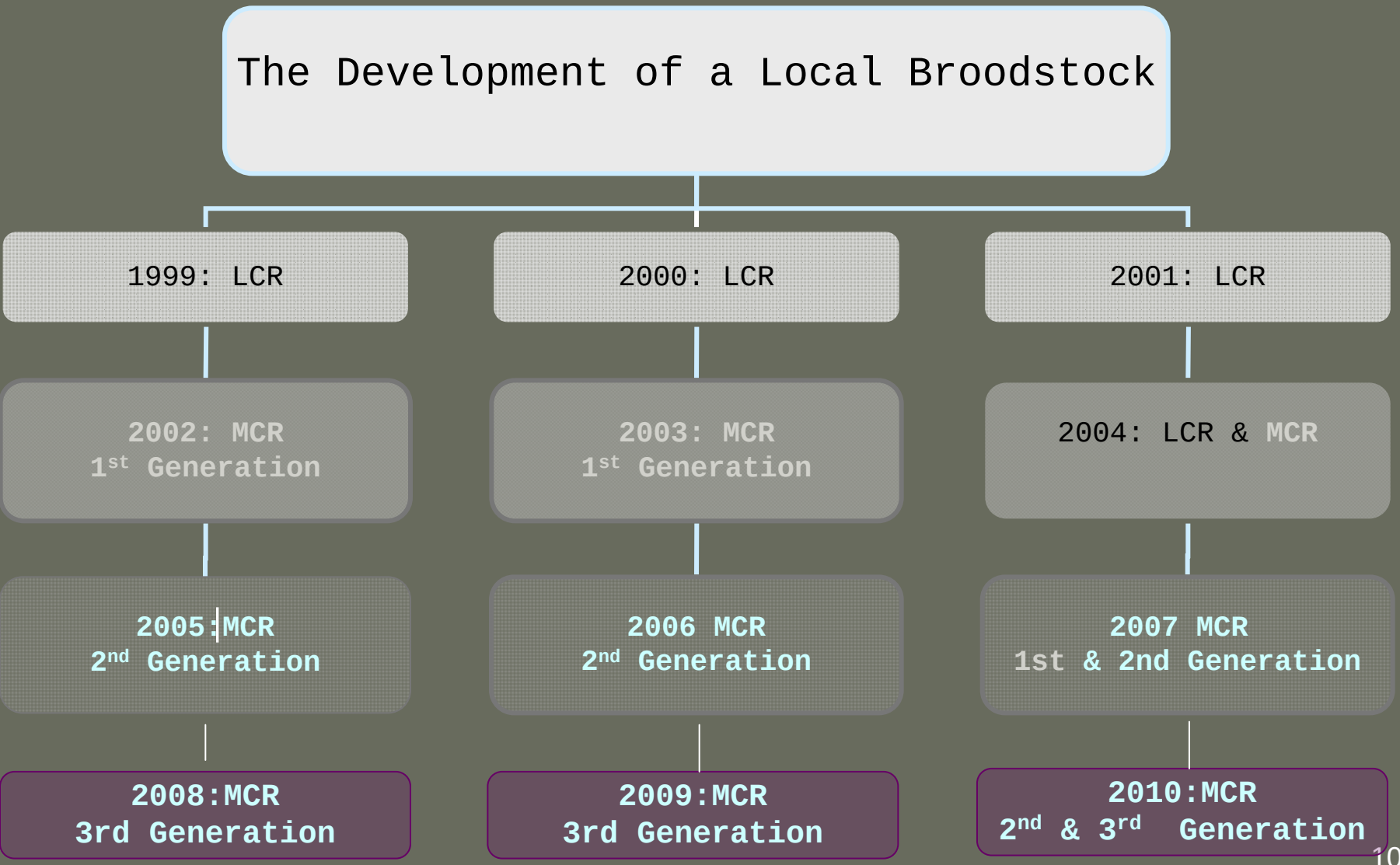



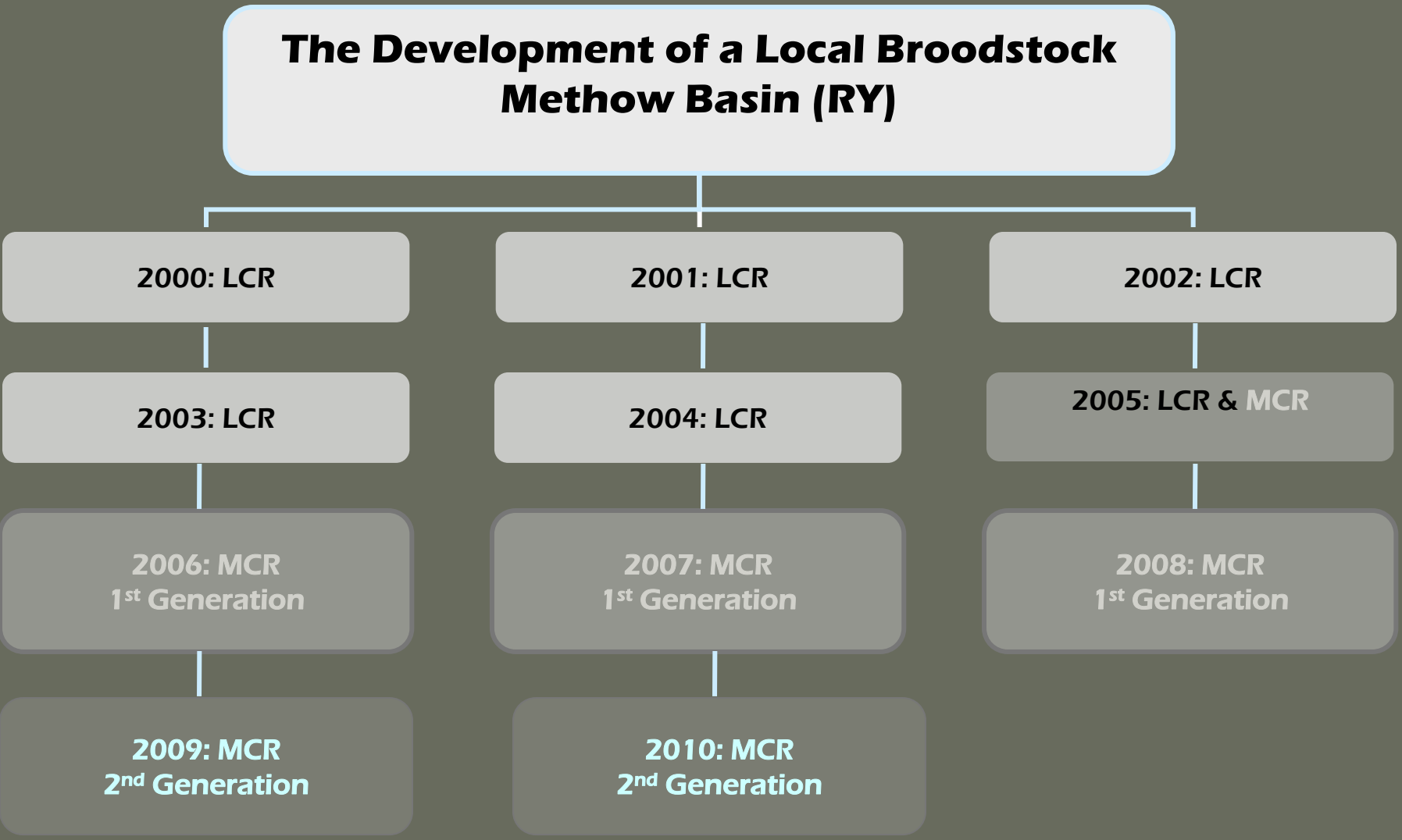
Survival
Smolt to Adult



Broodstock Development

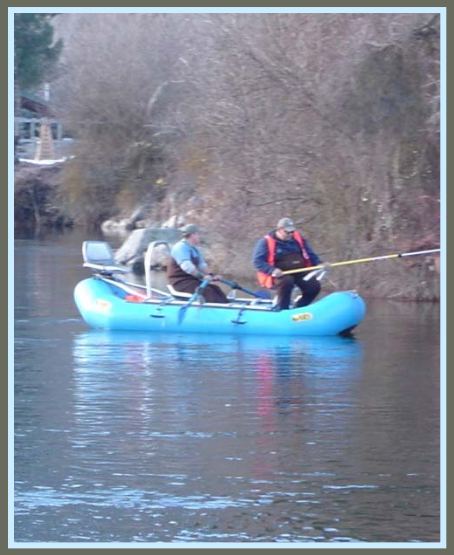


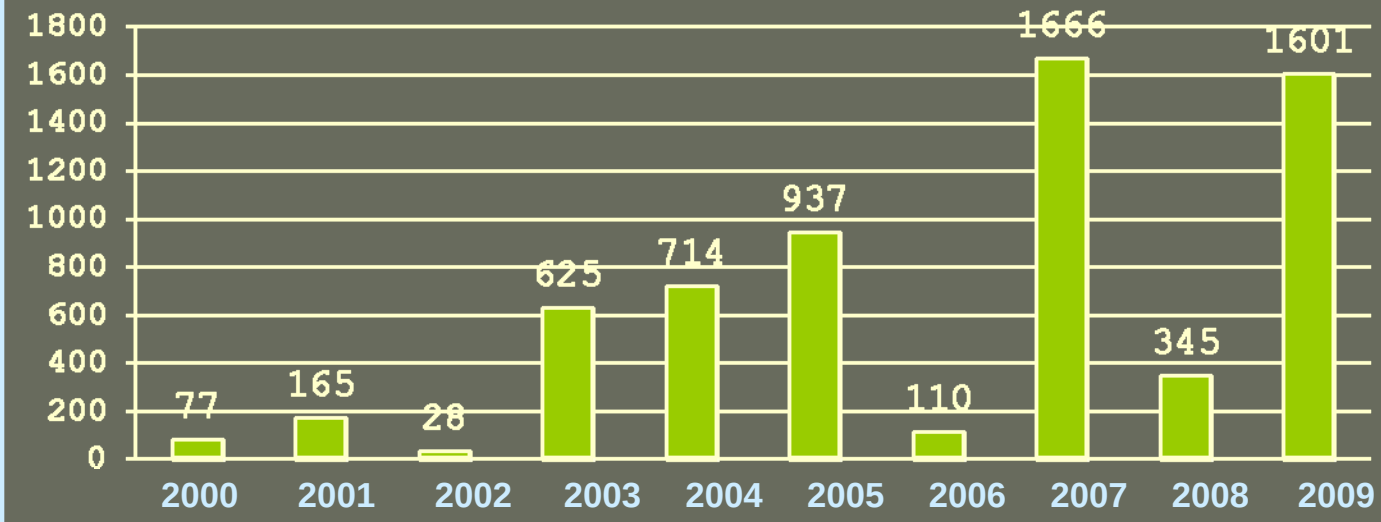
Goal 1: Broodstock Development



Goal 2: Natural Production

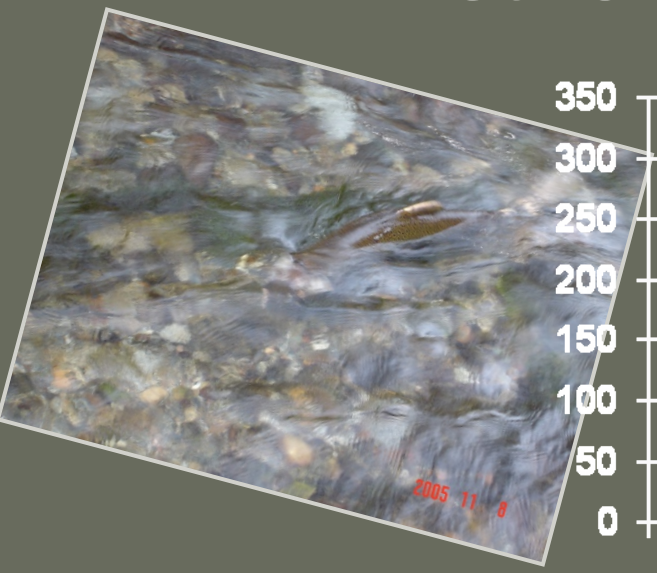
Wenatchee Basin Redd Counts

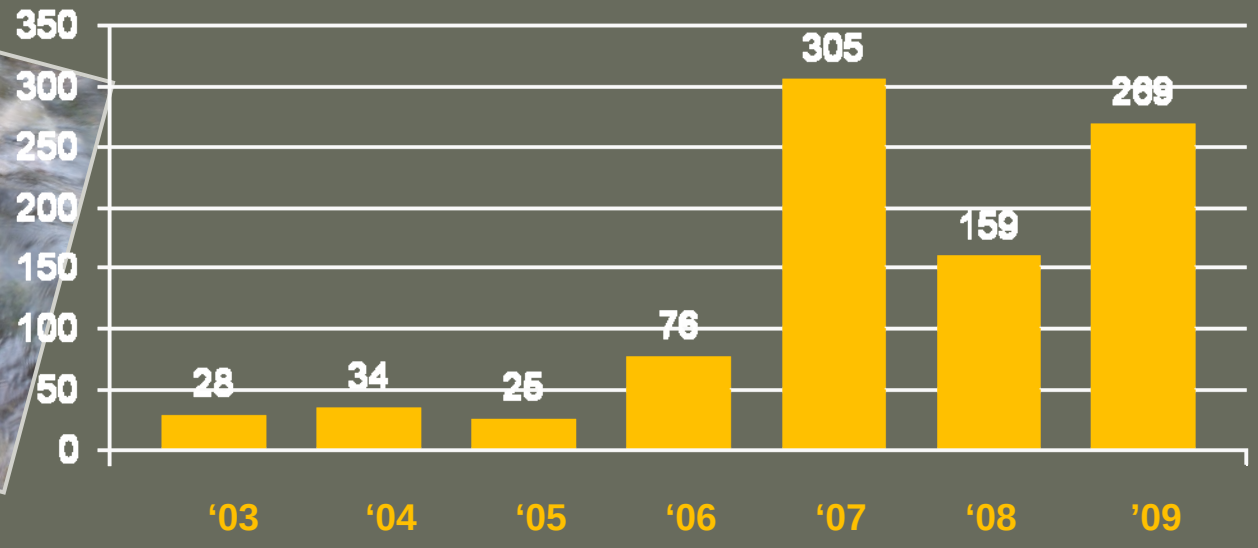




	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Icicle Creek	74	151	21	507	504	629	88	1263	197	818
Nason Creek	3	3	1	6	35	41	4	10	3	14
Peshastin Creek	na	na	1	13	33	25	6	88	19	214
Mission Creek	na	na	na	24	21	18	6	47	51	72
Wenatchee River	na	11	5	75	121	224	6	258	75	12 483

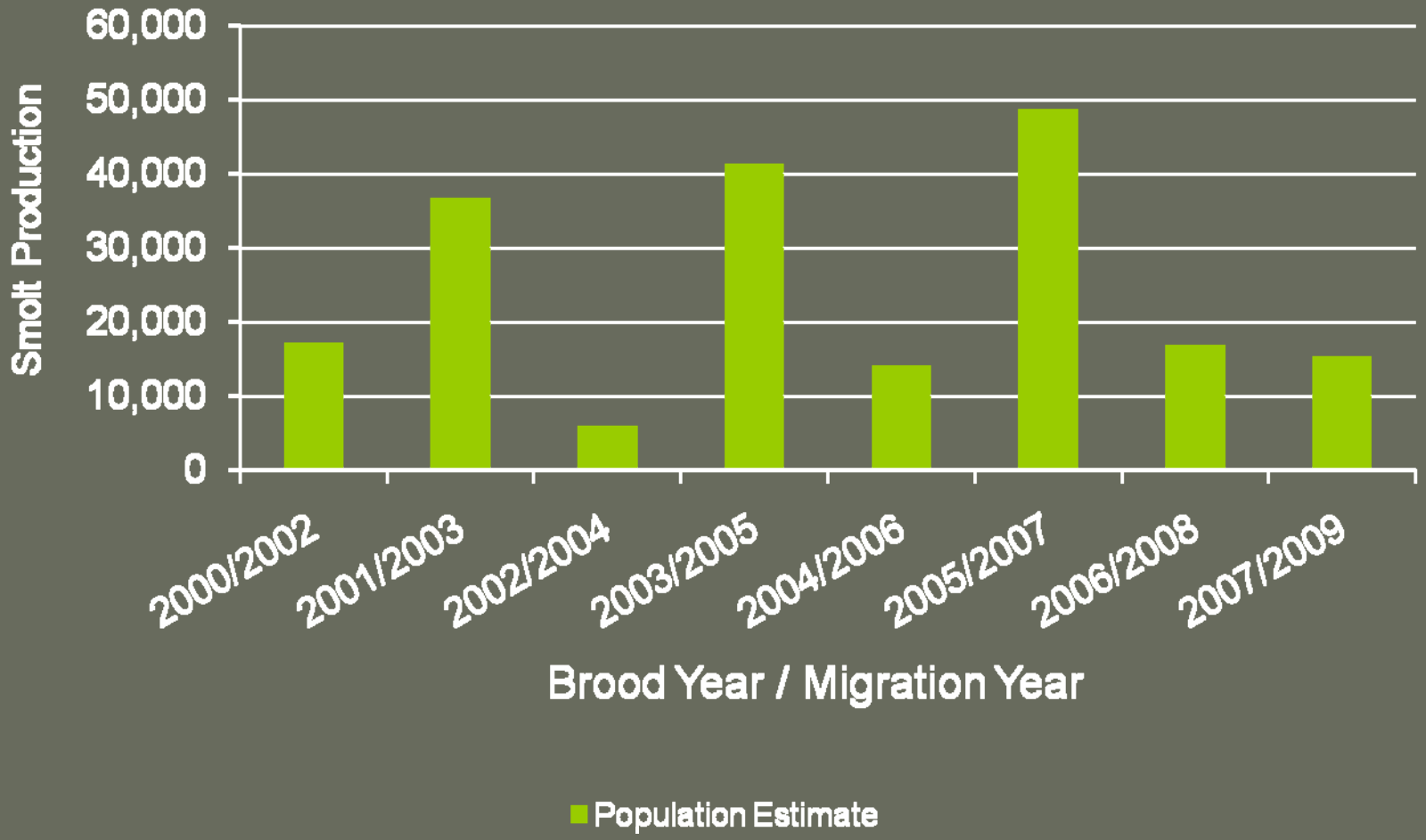
Goal 2: Initiate Natural Production
Methow Basin Redd Counts



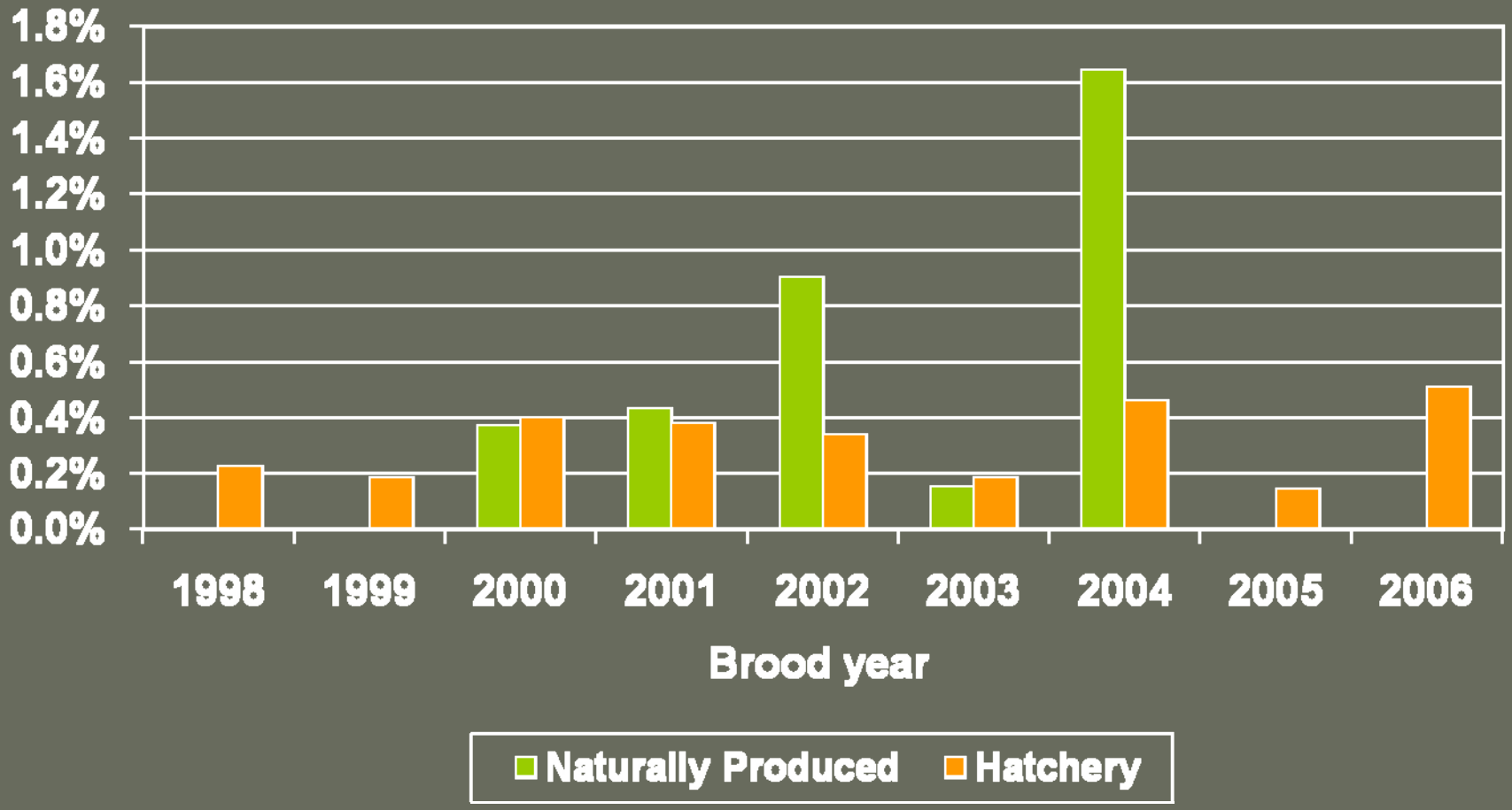


	‘03	‘04	‘05	‘06	‘07	‘08	’09
Methow River	13	13	0	28	176	113	151
WNFH/Methow FH outfalls	7	17	25	44	121	40	112
Chewuch River	0	0	0	0	0	4	0
Twisp River	0	N/A	0	2	0	1	0
Beaver Creek	5	1	0	1	8	0	2
Libby Creek	0	0	0	1	0	1	1
Gold Creek	3	3	0	N/A	N/A	N/A	3

Wenatchee Coho Natural Production



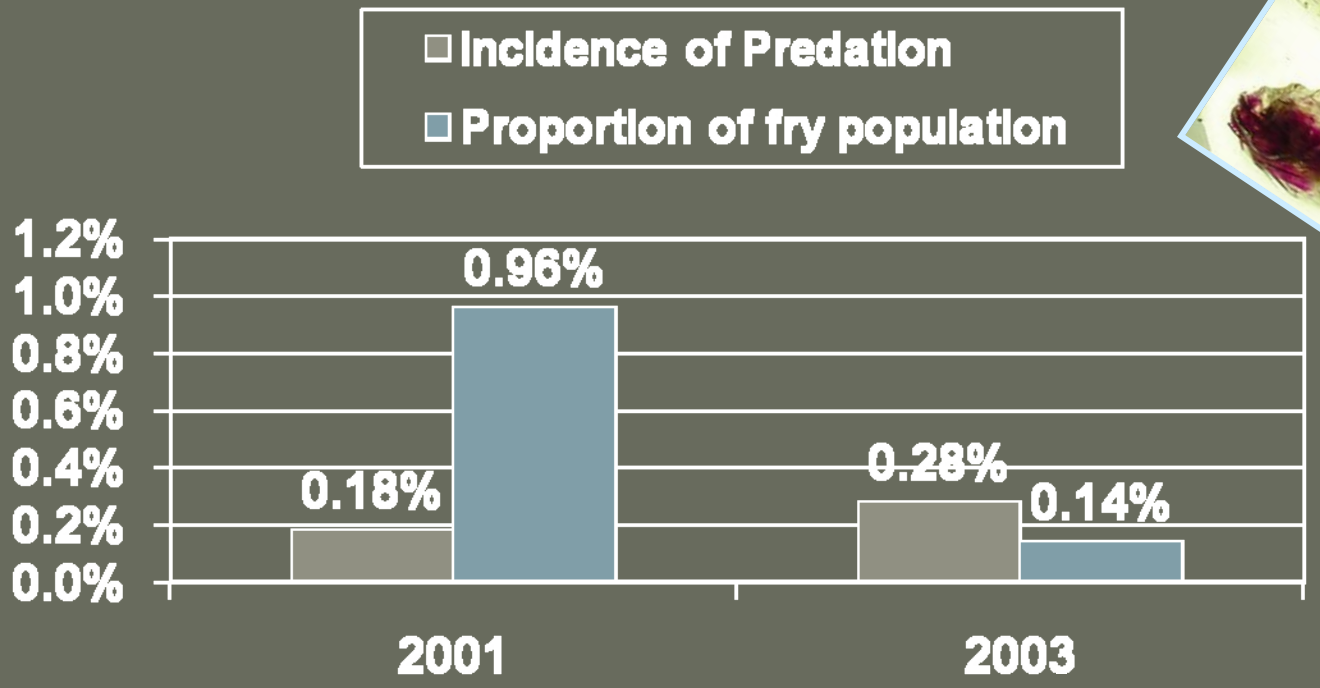
Smolt to Adult Survival Rates Wenatchee River



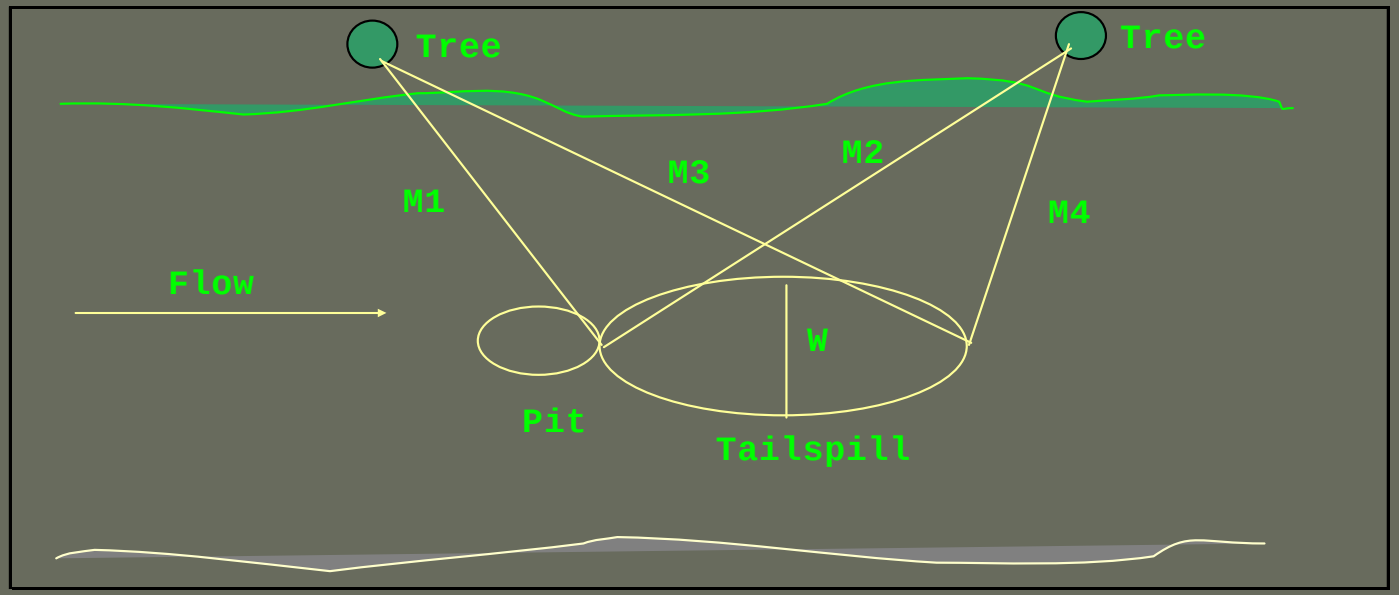
Goal 3: Species Interactions

- Predation
- Redd superimposition
- Residualism
- Competition

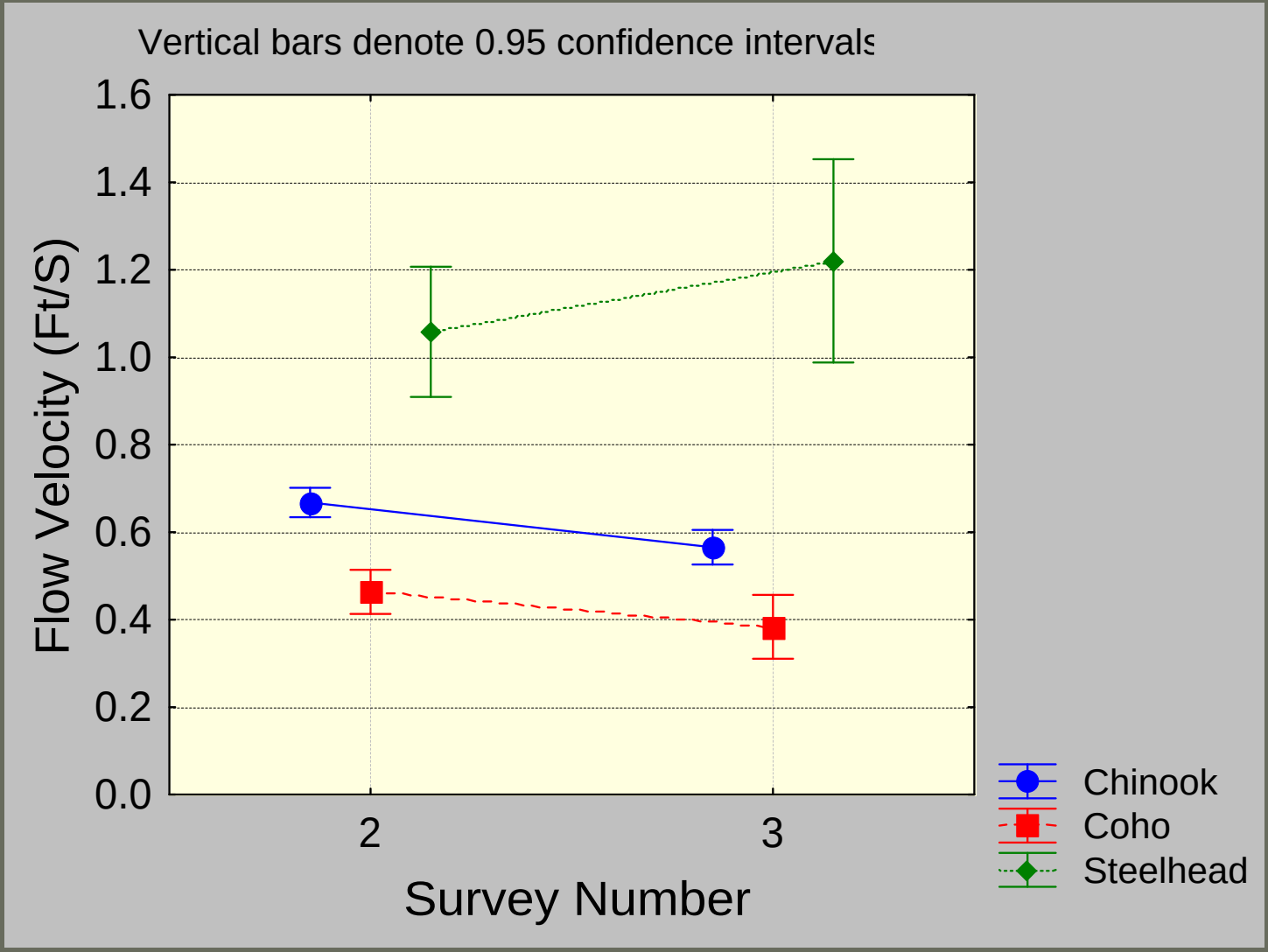
Predation Rates



Redd Superimposition



Habitat Use and Competition Chinook, Coho, and Steelhead



Where do we go from here?

- Feasibility study goals have been achieved

Future Plan for Coho Restoration

- To re-establish naturally spawning coho populations in mid-Columbia tributaries to biologically sustainable levels which provide opportunity for significant harvest in most years.

A Phased Approach

- Broodstock Development Phases
- Natural Production Phases

Broodstock Development Phases

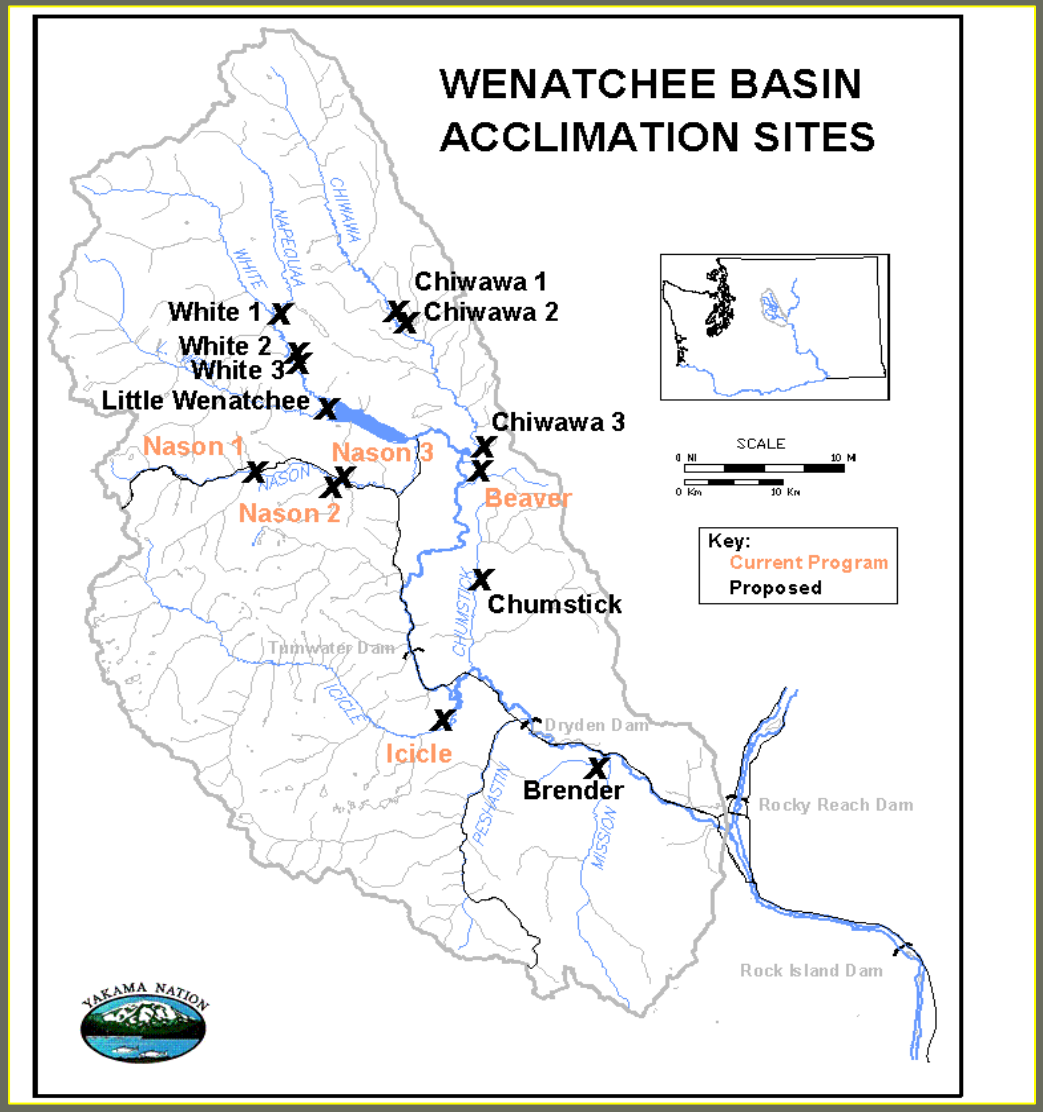
- Phase I (BDP1)
  - Focus: Initial broodstock development
- Phase 2 (BDP2)
  - Focus: “fine-tune” broodstock development

Natural Production Phases

- Loss of fitness is addressed through AHA
- Local adaptation is emphasized
- Implementation
  - Initiate releases into most habitat areas, begins the ‘local adaptation’ process
- Support
  - Three steps
  - Systematically reduces release size while increasing pNOB and PNI

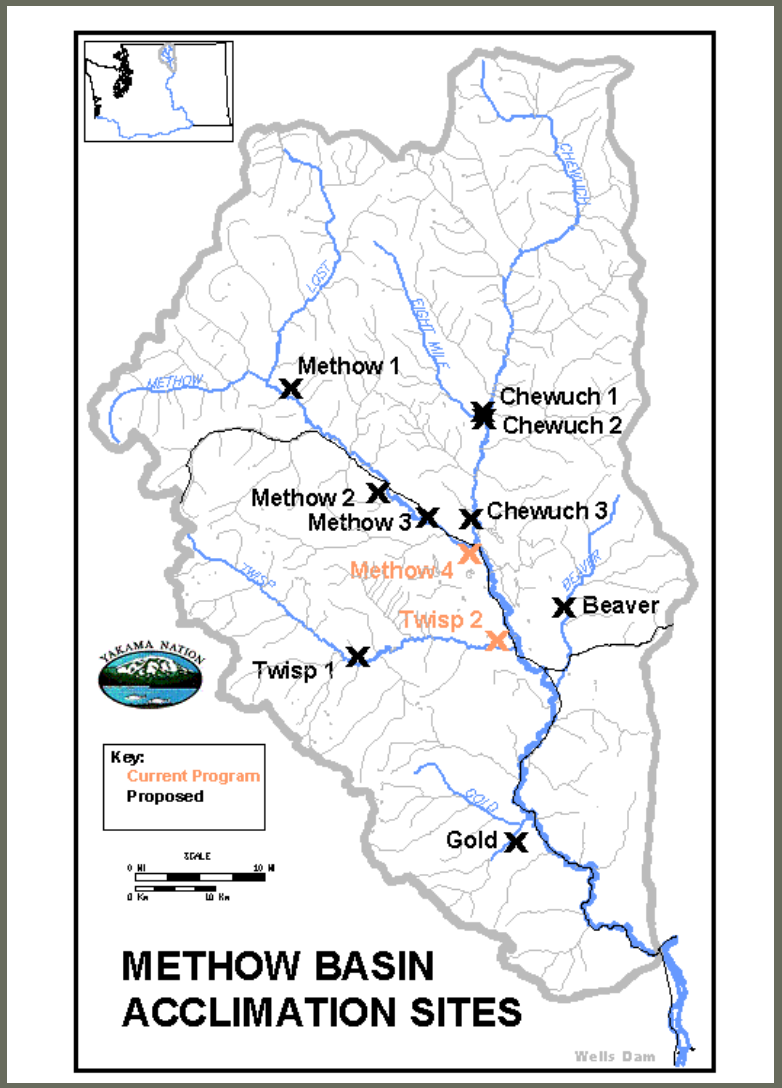
Acclimation Sites: Natural Production Phases

- Upper basin tributaries are the primary focus:
  - Chiwawa River
  - White River
  - Little Wenatchee River
  - Nason Creek



Acclimation Sites: Natural Production Phases

- Upper basin watersheds are the primary focus
  - Beaver Creek
  - Chewuch River
  - Gold Creek
  - Twisp River
  - Upper Methow River



Natural Acclimation Sites

- Disconnected waterways
  - Beaver ponds
- Constructed earthen ponds
- Existing waterways
  - Side channels/wetland complexes

Natural Production Phases Wenatchee River

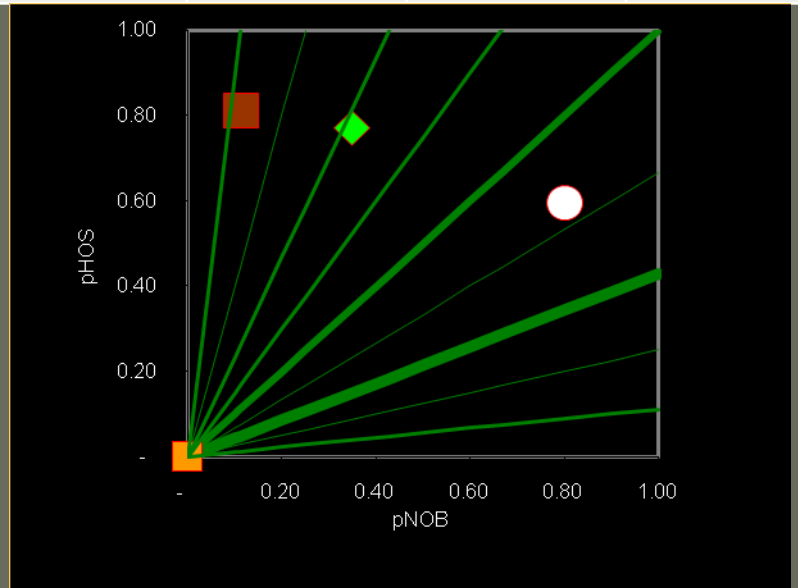
Location	**Implementation** (≈1 generation)	**Support Phase 1** (≈3 generations)	**Support Phase 2** (PNI >0.5; ≈2 generations)
Chiwawa River	350,000	245,000	122,500
White River	210,000	147,000	73,500
Nason Creek	210,000	147,000	73,500
Little Wen. River	120,000	84,000	42,000
Upper Wen. River	100,000	70,000	35,000
Chumstick Creek	65,000	45,500	22,750
Misc. Small Tributaries	Undetermined	Undetermined	Undetermined
Icicle Creek	100,000	70,000	35,000
Total	**1,155,000**	**808,500**	**404,250**

Natural Production Phases Methow River

Location	**Implementation** (≈1 generation)	**Support Phase 1** (≈3 generations)	**Support Phase 2** (PNI >0.5; ≈2 generations)
Mid-Upper Methow	350,000	245,000	122,500
Chewuch River	300,000	210,000	105,000
Twisp River	250,000	175,000	87,500
Beaver Creek	50,000	35,000	17,500
Misc. Small Tributaries	50,000	35,000	17,500
Total	**1,000,000**	**700,000**	**350,000**

Release Numbers and Expected Results (Chiwawa Example)

Phase	P	Adult Capacity	Release #	pNOB Goal	pHOS Goal	PNI	Avg. NOR Escapement
Implementation	1.52	1435	350,000	10%	90%	0.10	298
Support (1)	1.52	1435	245,000	35%	75%	0.32	371
Support (2)	1.75	1435	113,000	80%	65%	0.55	423
Recovered (PFC)	2.10	1500	None	N/A	N/A	1.0	449



Monitoring and Evaluation

- Goal: to monitor and evaluate the results of reintroduction so that operations can be adaptively managed
  - Demonstrate when phased restoration goals are met
  - Provide science based recommendations for management consideration

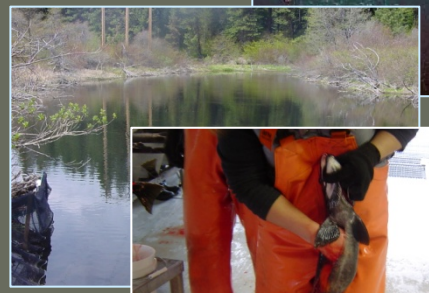
Monitoring and Evaluation

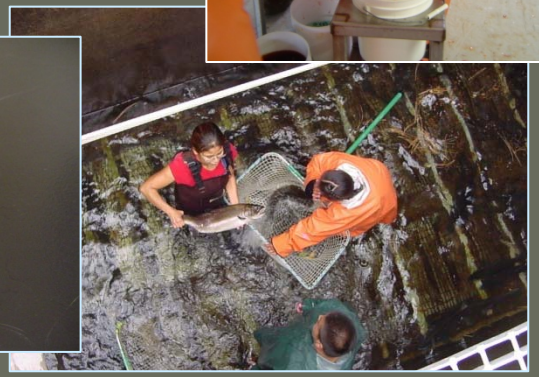
- Project performance indicators
- Species interactions
- Adaptability to local conditions

Project Performance Indicators

- Natural replacement rate
- Hatchery replacement rate
- Natural SAR
- Hatchery SAR
- Spawning escapement (NOR & HOR)
- Spawning distribution
- PNI
- Egg-to-emigrant survival rates
- In-pond survival
- Release-to-McNary survival








Species Interactions

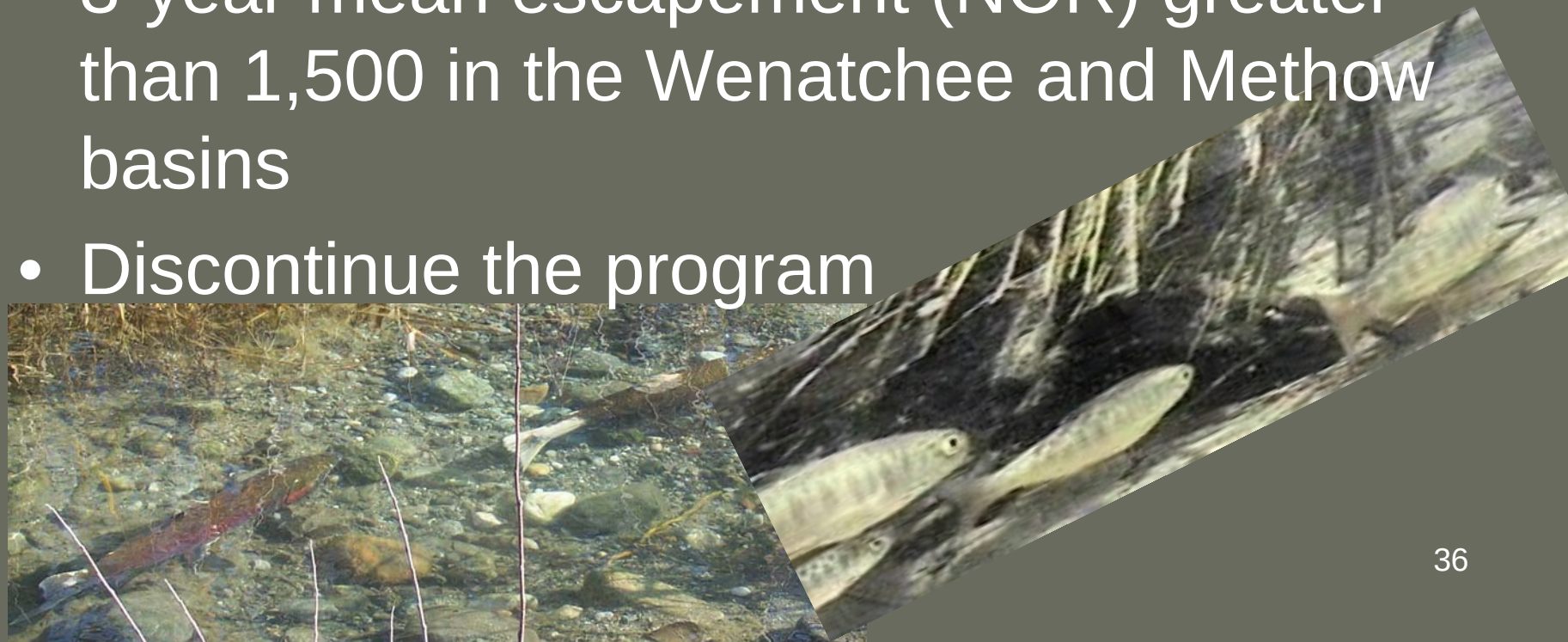
- Status of NTTOC (non-target taxa of concern)
  - Size
  - Abundance
  - Distribution
- Mechanisms of Interaction
  - Competition
  - Predation

Adaptability to Local Conditions

- Genetics Monitoring
- Morphometrics and life history traits
  - Adult energetics study
  - Juvenile swim performance

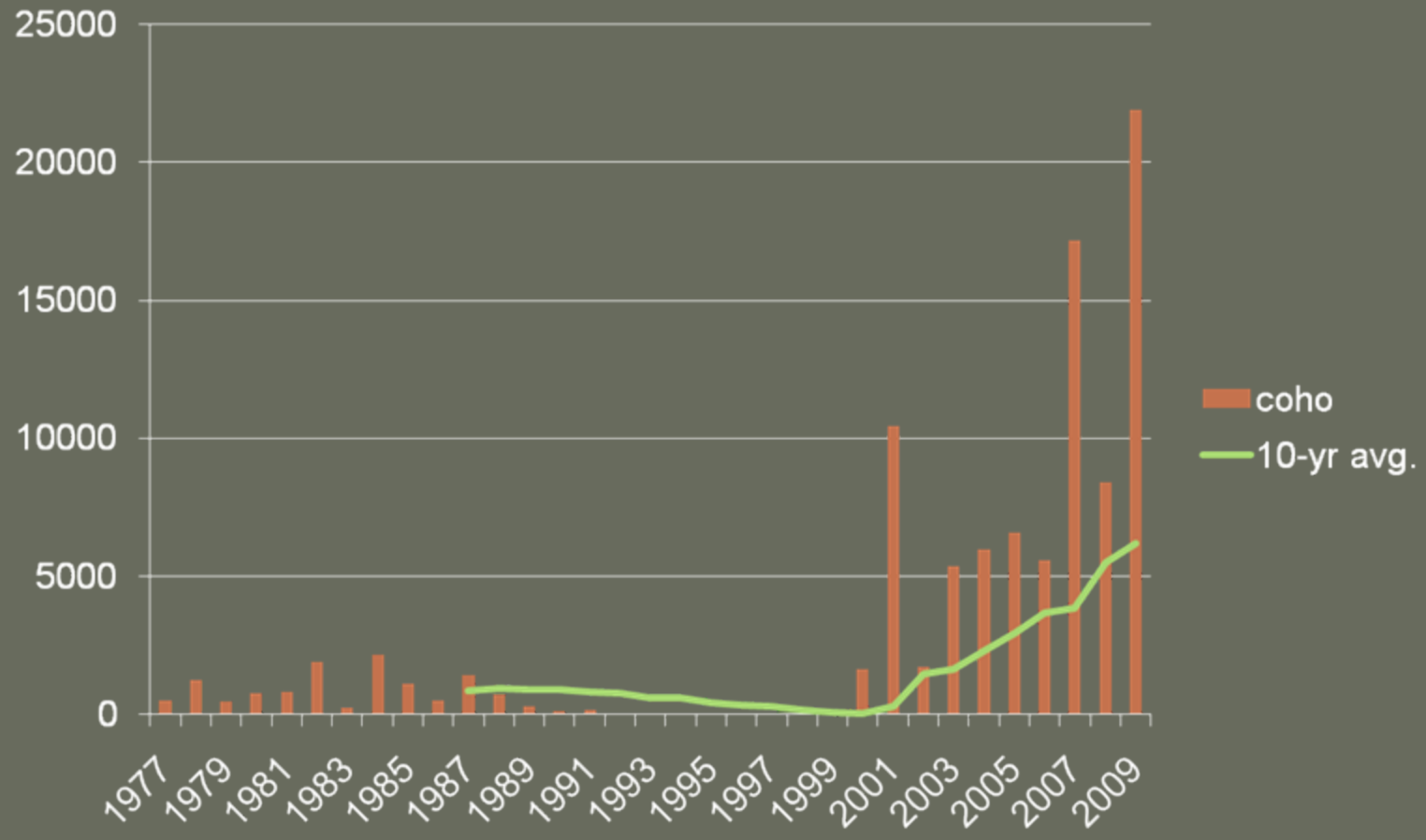
End Result

- Achieve a locally adapted naturally spawning population by 2028
- Provide harvest opportunities in most years
- 3-year mean escapement (NOR) greater than 1,500 in the Wenatchee and Methow basins
- Discontinue the program



Coho at Rock Island Dam

(1977 to present)



Coho at McNary Dam