

# 2004 Update to the Columbia River Lamprey Program Summary

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Prepared by the  
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**Purpose:** This is an update to the 2002 Columbia River Lamprey Program Summary. Only the Critical Uncertainties, Reports and Publications, and Project Tables portions of the document were updated and are included here.

### **Critical Uncertainties (unprioritized)**

- **Lamprey Status**
  - Assess adult and juvenile abundance and distribution
  - Continue historic databases (dam counts, harvest estimates) and develop and implement new methods for evaluating status
- **Basic Biology/Ecology**
  - Better understand the biology and ecology of the species
    - Develop or refine methods for species and gender identification for the field and laboratory
    - Assess life history characteristics such as age, sex ratio, timing of movement, etc
- **Genetic Structure**
  - Evaluate the genetic structure of lamprey populations to aid management and recovery
- **Passage**
  - Assess and improve passage through mainstem and tributary dams, culverts, irrigation diversions, flow and thermal barriers, etc for all life stages of lamprey
- **Survival Estimates**
- **Limiting Factors**
  - Assess habitat requirements and availability for all life stages
  - Evaluate lamprey's response to environmental stressors
  - Assess host availability
- **Restoration Activities**
  - Identify needs for and evaluate the success of restoration activities such as supplementation, habitat restoration, transplantation, etc
- **Education and Outreach**

### **Reports and Publications**

Bayer, J.M., and J.G. Seelye. 2001. "Technical Assistance for Pacific Lamprey Studies: Report of Research." Pages 103-116 in D.A. Close editor. *Pacific lamprey Research and Restoration Project*. 1999 Annual Report to Bonneville Power Administration. Contract DOE/BP-00005455-1, Portland, Oregon.

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- Bayer, J.M. and J.G. Seelye. 2001. "Olfactory sensitivity of pacific lampreys to petromyzonol sulfate." 2000 Annual report to Confederated Tribes of the Umatilla Indian Reservation, Pendleton, OR. Contract number 406-01
- Close, D.A., and J.P. Bronson. 2001. "Distribution of Larval Pacific Lampreys (*Lampetra tridentata*) in Northeastern Oregon and Southeastern Washington Streams." Pages 48-62 in D.A. Close editor. *Pacific lamprey Research and Restoration Project*. 1999 Annual Report to Bonneville Power Administration. Contract DOE/BP-00005455-1, Portland, Oregon.
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- Close, D.A., and A.D. Jackson. 2000. "Historical and Current Observations of Pacific Lampreys (*Lampetra tridentata*) in Northeastern Oregon and Southeastern Washington." Pages 1-13 in D.A. Close editor. *Pacific lamprey research and restoration project*. 1998 Annual Report to Bonneville Power Administration. Contract DOE/BP-00000248-1, Portland, Oregon.
- Close, D.A. 2000. "Restoration Plan for Pacific Lampreys (*Lampetra tridentata*) in the Umatilla River, Oregon." *Pacific lamprey research and restoration project*. Report to Northwest Power Planning Council. Portland, Oregon.
- Cochnauer, T., and C. W. Claire 2001. "Evaluate Status of Pacific Lamprey in the Clearwater Drainage, ID." 2000 annual report to Bonneville Power Administration. Contract number 00000090-00001. Portland, Oregon.
- Hatch, D.R., A. Talbot, R. Hooff, C. Beasley, and J. Netto. 2001. "In-Season Homing of Pacific lamprey (*Lampetra tridentata*) in the Columbia River Basin." Pages 117-141 in D.A. Close editor. *Pacific lamprey Research and Restoration Project*. 1999 Annual Report to Bonneville Power Administration. Contract DOE/BP-00005455-1, Portland, Oregon.
- Lê, B., C. Luzier, and T. Collier. 2004. Evaluate Habitat Use and Population Dynamics of Lampreys in Cedar Creek. 2003 Annual Progress Report to Bonneville Power Administration. Contract DOE/BP-0000014-1, Portland, Oregon.
- Jackson, A.D., P.D. Kissner, B.L. Parker, D.R. Hatch, M.S. Fitzpatrick, D.A. Close, and H.W. Li. 1997. "Pacific Lamprey Research and Restoration Project." 1996 Annual Report to Bonneville Power Administration. Portland, Oregon.
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- Matter, M.L., J.J. Vella, L.C. Stuehrenberg. 2000. "Migration passage patterns of Pacific Lamprey at Bonneville Dam", 1996-1998. Pages 278-285 in J. H. Eiler, D. J. Alcom, and M. R. Neuman (editors). *Biotelemetry 15: Proceedings of the 15<sup>th</sup> International Symposium on Biotelemetry*. Juneau, Alaska, USA. International Society of Biotelemetry, Wageningen, The Netherlands.
- Meeuwig, M.H., J.M. Bayer, and J.G. Seelye. (in review). "Identification of larval Pacific lampreys (*Lampetra tridentata*), river lampreys (*L. ayresi*), and western brook lampreys (*L. richardsoni*) and thermal requirements of early life history stages of lampreys." 2001 Annual report to Bonneville Power Administration, Portland, OR. Project Number 2000-029, Contract Number 00AI23249
- Mesa, M.G., J.M. Bayer, J.G. Seelye, and L.K. Weiland. 2001. Swimming performance and exhaustive stress in Pacific lampreys (*Lampetra tridentata*): implications for

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### Project Table

First Year Funded	Sponsor	Funding Source	Project #	Title	Objectives	Critical Needs and Uncertainties Met	Project Status	Funding-to-Date
1994	Confederated Tribes of Umatilla Indian Reservation	Bonneville Power Administration	1994-026-00	Pacific lamprey research and restoration	<ol style="list-style-type: none"> <li>1. Develop a genetic database for determination of lamprey population structure in the Columbia Basin;</li> <li>2. Document presence/absence and distribution of lamprey in NE Oregon &amp; SE Washington subbasins;</li> <li>3. Develop and periodically update pilot lamprey restoration plan for Umatilla subbasin;</li> <li>4. Begin initial restoration plan actions: a) trap adults from John Day river; b) evaluate lamprey hatchery practices while holding adults at USGS Cook, WA lab; c) monitor Umatilla River for juvenile survival and growth; d) monitor lamprey migratory pheromone in water samples from the Umatilla &amp; John Day rivers to better understand adult lamprey attraction into tributaries; and</li> <li>5. Model larval lamprey habitat in the Umatilla River.</li> </ol>	<p>Lamprey status Basic biology/ecology Genetic structure Limiting factors Restoration activities Education &amp; Outreach (via publications)</p>	Ongoing	\$3,769,455
1996	National Oceanic and Atmospheric Administration	U. S. Army Corps of Engineers	ADS-P-00-8; ADS-P-00-10	Evaluation of adult salmon, steelhead, and lamprey migration past dams and through	<ol style="list-style-type: none"> <li>1. Assess passage efficiency of adult lamprey at lower Columbia River dams.</li> <li>2. Identify obstacles to lamprey passage via radiotelemetry and PIT tagging.</li> <li>3. Modify fishways to improve</li> </ol>	Passage	Placeholder & Ongoing	1,500,000

				reservoirs in the lower Columbia River and into tributaries	lamprey passage and test their efficacy. 4. Design and test a lamprey-specific bypass device.			
1999	Pacific Northwest National Laboratories	U. S. Army Corps of Engineers	BPS-W-00-4; BPS-W-00-15	Juvenile lamprey evaluation of extended length submerged bar screens	1. Laboratory flume swim performance; 2. Laboratory screen configuration tests; 3. Field assessment of juvenile lamprey impingement and injury during screening/bypass at MCN 4. Prototype ESBS testing at JDA	Basic Biology/Ecology Passage	Complete	
1999	University of Idaho	U. S. Army Corps of Engineers	ADS-P-00-8 (formerly MPE-99-1)	Passage of adult Pacific lamprey in the lower Columbia River	1. Document lamprey behavior and test fishway alterations in the laboratory.	Passage	Ongoing	200,000
2000	U. S. Fish and Wildlife Service	Bonneville Power Administration	2000-014-00	Evaluate habitat use and population dynamics of lampreys in Cedar Creek	1. Estimate abundance, examine biological characteristics, and determine migration timing of adult Pacific lampreys; 2. Determine larval lamprey distribution, habitat use, and examine biological characteristics; 3. Determine emigration timing and estimate the abundance of recently metamorphosed lampreys; and 4. Evaluate spawning habitat requirements of adult lampreys.	Lamprey Status Basic Biology/Ecology Genetic Structure Limiting Factors Education and Outreach	Ongoing	\$908,787
2000	Idaho Fish and Game	Bonneville Power Administration	2000-028-00	Status of Pacific lamprey in the Clearwater River drainage	1. Determine life history characteristics of adult and juvenile/larval lamprey; 2. Determine habitat requirements of adults and juvenile/larval lamprey;	Lamprey Status Basic Biology/Ecology Genetic Structure Passage Limiting Factors	Ongoing	\$346,524



					3. Determine distribution of adult and juvenile/larval lamprey; 4. Develop and implement strategies to protect adult and juvenile/larval habitat; and 5. Assess population structural characteristics of juvenile/larval lamprey.	Restoration Activities Education and Outreach		
2000	U. S. Geological Survey	Bonneville Power Administration	2000-029-00	Identification of larval Pacific lampreys, river lampreys, and western brook lampreys and thermal requirements of early life history stages of lampreys	1. Spawn three species in captivity & determine diagnostic characteristics of each; 2. Collect ammocoetes and hold through metamorphosis to verify identification techniques;and 3. Evaluate temperature effects on the survival and early development of three species.	Lamprey Status Basic Biology/Ecology Limiting Factors	Complete	373,144
2000	U. S. Geological Survey	Confederated Tribes of Umatilla Indian Reservation (subcontract under BPA project 1994-026-00)	1994-026-00	Olfactory sensitivity of Pacific lampreys to Petromyzonol sulfate	1. Measure the temporal variations in the responses of upstream migrating pacific lampreys using elect-olfactogram techniques	Basic Biology/Ecology Limiting Factors	Ongoing	Funds come from 1994-026-00
2002	U. S. Army Corps of Engineers	U. S. Army Corps of Engineers	ADS-P-00-8	Assessment of steel floor plates installed on diffuser gratings	1. Assess steel floor plates installed on diffuser gratings to facilitate passage of adult Pacific lamprey through fish ladders.	Passage	Complete - Draft final Report	90,000

				to facilitate passage of adult lamprey through fish ladders				
2002	U. S. Geological Survey	U. S. Army Corps of Engineers	ADS-P-00-8 (formerly MPE-99-1)	Characteristics of upstream migration of Pacific lamprey in the Columbia River	1. Evaluate adult maturation and physiology of adult lamprey collected at Bonneville Dam	Passage	Completed, awaiting final report	
2002	Confederated Tribes of the Warm Springs Reservation of Oregon	Bonneville Power Administration	2002-016-00	Determine lamprey species composition, larval distribution and adult abundance in the Deschutes Subbasin.	1. Determine larval distribution and associated habitat in the lower Deschutes R. sub-basin; 2. Determine species composition of Lampetra in the lower Deschutes R. sub-basin; 3. Estimate the numbers of lamprey emigrants, by developmental stage, from Warm Springs R. and Shitike Cr; and 4. Evaluate the feasibility of estimating the escapement of adult lamprey in the Deschutes River upstream of Sherar's Falls and estimate lamprey harvest at Sherar's Falls.	Lamprey Status Basic Biology/Ecology Limiting Factors Passage	Ongoing	312,632
2003	Oregon Department of Fish and Wildlife	Oregon Department of Fish and Wildlife /Portland General Electric/City of Portland/ U.	1448-13420-03-M203 (FWS provided \$8,000 in FY03)	Migration and distribution of lamprey in the Willamette River	1. Monitor migration and distribution of adult Pacific lamprey in the Willamette River; 2. Summarize and analyze existing data to map distribution of Pacific and brook lamprey in Portland area streams	Lamprey Status Basic Biology/Ecology Passage	Ongoing	\$65,796

		S. Fish and Wildlife Service						
2003	Oregon State University	U. S. Fish and Wildlife Service	010-3182S & 1448-13420-03-M162 (U. S. Fish and Wildlife Service provided \$10,985 and \$5,760 in FY03)	Spawning Behavior, Larval Drift, and Early Mortality in Pacific Lamprey	<ol style="list-style-type: none"> <li>1. Investigate the function of spawning behavior in relation to early-life mortality</li> <li>2. Monitor the diel and seasonal timing of reproduction and larval drift in relation to potentially important biotic and abiotic variables.</li> <li>3. Document sources of predation and explore the ecological role of Pacific Lamprey in the Coquille Basin.</li> </ol>	Basic Biology/Ecology	Ongoing	\$83,164
	U. S. Geological Survey	Bonneville Power Administration	2000-052-00	Upstream migration of Pacific lampreys in the John Day River: behavior, timing, and habitat use	<ol style="list-style-type: none"> <li>1. Trap adults and use radio telemetry to determine lamprey movement to spawning areas; and</li> <li>2. Describe overwintering and spawning habitat of radio tagged fish.</li> </ol>	Basic Biology/Ecology Limiting Factors	Complete	\$199,495
2002	U. S. Geological Survey	U. S. Army Corps of Engineers	ADS-P-00-9	Swimming performance and exhaustive stress in Pacific lampreys: implications for upstream migration past dams	<ol style="list-style-type: none"> <li>1. Evaluate swimming performance, metabolic condition, and exhaustive stress to assess efficacy of current upstream fish passage facilities at Bonneville Dam</li> </ol>	Passage	Complete	180,000

	U. S. Geological Survey	U. S. Geological Survey		Validation of statolith-based aging techniques for Pacific lamprey ammocoetes and macrophthalmia	1. Validate statolith-based aging techniques in laboratory and compare results to wild lamprey samples.	Basic Biology/Ecology	Complete	
2003	U. S. Fish and Wildlife Service	U. S. Fish and Wildlife Service	03-0461	Validation of existing screening criteria for lamprey macrophthalmia	1. Evaluate whether existing NOAA salmonid screening criteria will preclude lamprey macrophthalmia from impingement or entrainment by screened water intake structures	Passage	Ongoing	\$27,223
200?	U. S. Fish and Wildlife Service	U. S. Geological Survey (Science Support Program (SSP))	04-R1-	Survival and Tag Retention of Larval and Recently Metamorphosed Pacific Lamprey with Coded Wire Tags	1. Determine the effects of coded wire tags on survival of Pacific lamprey larvae and macrophthalmia. 2. Determine retention rates of coded wire tags.	Basic biology/ecology	Ongoing	\$13,661
2003	U. S. Fish and Wildlife Service	Internal, various offices	n/a	Phylogeography of Pacific Lamprey	1. Examine geographic patterns of genetic variability (mtDNA) and distinctiveness in the Pacific lamprey throughout its North American range from British Columbia to Southern California	Genetic structure	Ongoing	30,000