

RESOLUTION NO. 123

A RESOLUTION AUTHORIZING AN INTERLOCAL AGREEMENT BETWEEN THE CITY OF WOODINVILLE AND ALL OTHER CITY AND COUNTY GOVERNMENTS IN THE LAKE WASHINGTON AND SAMMAMISH WATERSHEDS, FOR THE MANAGEMENT AND FUNDING OF THE LAKE WASHINGTON STUDIES.

WHEREAS, the Lake Washington/Cedar River Watershed Forum, in coordination with the Sammamish Watershed Forum, has identified the funding and management of the Lake Washington Studies as its first major project; and

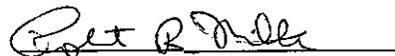
WHEREAS, the City of Woodinville recognizes that the survival rates of juvenile sockeye salmon in Lake Washington appear to have been below normal since the mid-1980's, reducing adult returns and placing the future of the fishery at risk; and

WHEREAS, the City of Woodinville recognizes that the sockeye salmon fishery is of economic, cultural, and environmental benefit to the area and to the residents of the City; and

WHEREAS, pursuant to RCW 39.34 the Interlocal Cooperation Act, the participants are each authorized to enter into an agreement for cooperative action;

NOW, THEREFORE, BE IT RESOLVED by the City of Woodinville Council that the Mayor be authorized to enter into an interlocal agreement, as attached, to provide for the management and funding of the Lake Washington Studies.

ADOPTED BY THE CITY COUNCIL AND SIGNED INTO AUTHENTICATION OF ITS PASSAGE THIS 10TH DAY OF FEBRUARY, 1997.


Robert R. Miller, Mayor

ATTEST:


James K. Katica
City Clerk/Treasurer

SUMMARY OF LAKE WASHINGTON STUDIES INTERLOCAL AGREEMENT

Key Groups:

- Lake Washington/Cedar River and Sammamish Forums: Lake Washington Forum will receive regular presentations on findings and progress. Sammamish Forum will receive written reports and presentations on request. Both forums will discuss study recommendations and responsibilities to implement them.
- Lake Washington Studies Executive Committee: Made up of elected officials or citizen representatives from all local governments contributing to the studies, including governments active in the Sammamish Forum. Is expected to meet in conjunction with Lake Washington Forum meetings. Initially, each government will have one vote, but is expected to establish weighted voting for at least some issues, based partly on contribution levels. Responsible for approving work plans and budgets of studies.
- Project Management Committee: Made up of staff designees from participating governments, plus staff representatives from Washington Department of Fish and Wildlife and Muckleshoot Indian Tribe; may include representatives of other funders, as approved by the Executive Committee. Responsible for general project management (review study scopes, budgets, reports, etc.) and recommendations to Executive Committee. Lead staff will be watershed coordinator.
- Technical Committee: Made up of scientific staff from key agencies, as approved by the Project Management Committee. Initially, will be same technical committee that has overseen the Lake Washington Studies up to now, chaired by Department of Fish and Wildlife representative.
- Financial Administrator: King County will receive and disburse funds, receiving in-kind credit up to \$5,000 against its contribution to the studies.

Other Key Terms:

- Duration: Three years (through 1999), with option for participating governments to renew.
- Billings: Once a year.
- Work Plans: 1997 is attached; Executive Committee must approve work plans and budgets for 1998 and 1999.
- Termination: Any jurisdiction that chooses not to contribute in future years will thereby terminate its participation in the agreement and the Executive Committee.

MOTION NO. _____

A MOTION authorizing an interlocal agreement between King County and all other city and county governments in the Lake Washington and Sammamish watershed, for management and funding of the Lake Washington Studies.

WHEREAS, King County has taken a leadership role in establishing and supporting watershed forums, which are developing and coordinating regional actions to address fish habitat, flooding and water quality concerns in the region's major watersheds; and

WHEREAS, the Lake Washington/Cedar River Watershed Forum, in coordination with the Sammamish Watershed Forum, has identified the funding and management of the Lake Washington Studies as its first major project; and

WHEREAS, throughout the 1970s and 1980s, adult sockeye returned to the Lake Washington and Sammamish watersheds in large enough numbers to support the most valuable recreational fishery in the State of Washington; and

WHEREAS, survival rates of juvenile sockeye in Lake Washington appear to have been below normal since the mid-1980s, reducing adult returns and placing the future of the run at risk, even after implementation of recent and proposed regional investments of tens of millions of dollars to protect and enhance fish habitat in the Lake Washington and Sammamish watersheds; and

22 WHEREAS, scientists do not know the reasons for the low survival rates of juvenile
23 sockeye in Lake Washington but have formulated some promising hypotheses, which are
24 being tested as part of the Lake Washington Studies; and

25 WHEREAS, King County believes that the region has compelling environmental,
26 cultural and economic interests in carrying out the Lake Washington Studies; and

27 WHEREAS, pursuant to RCW 39.34, the Interlocal Cooperation Act, the participants
28 are each authorized to enter into an agreement for cooperative action;

29 NOW, THEREFORE, BE IT MOVED by the Metropolitan Council of King County:

30 The Executive is authorized to enter into an interlocal agreement, in substantially
31 the same form as attached, and to enter into such other agreements as may be necessary
32 for its implementation, to provide the proper management and funding of the Lake
Washington Studies.

34 PASSED by a vote of _____ to _____ this _____ day of

35
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37 _____, 19____.

38
39 METROPOLITAN KING COUNTY COUNCIL
40 KING COUNTY, WASHINGTON

41
42
43 _____
44 Chair

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47 ATTEST:

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50 _____
51 Clerk of the Council

52 Attachment:

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55 A. Agreement for Management and Funding of the Lake Washington Studies

Date

The Honorable Jane Hague, Chair
Metropolitan King County Council
Room 1200
COURTHOUSE

Dear Councilmember Hague:

This letter transmits a motion for Council action authorizing King County to enter into an interlocal agreement with all other city and county governments in the Lake Washington and Sammamish watershed for management and funding of the Lake Washington Studies.

The Lake Washington Studies are designed to provide recommendations to increase the survival rate of juvenile sockeye salmon in Lake Washington, which appears to have generally been below normal since the mid-1980s. Low lake survival of juveniles reduces adult returns and places the future of the run at risk, even after implementation of recent and proposed regional investments of tens of millions of dollars to protect and enhance fish habitat in the Lake Washington and Sammamish watershed. Throughout most of the 1970s and 1980s, adult sockeye returns to the watershed were large enough to support the most valuable recreational fishery in the State of Washington.

Establishing the proper management and funding of the Lake Washington Studies has been the first major project of the Lake Washington/Cedar River Watershed Forum, which has worked on the project in coordination with the Sammamish Watershed Forum. More than 15 local governments participating in the two forums have budgeted the contributions for the studies that were proposed for them in 1997, totaling more than \$400,000. King County's share of \$142,000 was included in the adopted budget for the Water and Land Resources Division.

The accompanying motion, when passed by the Council, will allow King County to serve as administrator of the studies, contracting with the agencies that will perform the proposed scientific research. When at least four other local governments, whose contributions (together with King County's) equal at least 75 percent of the total local funding to be raised in 1997, have also adopted the agreement, it will become effective, establishing the new governance structure for the studies.

The Honorable Jane Hague

Date

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The proposed agreement has been reviewed and approved as to form by the Prosecuting Attorney's Office and by attorneys for Seattle, Bellevue, Mercer Island and other participating cities.

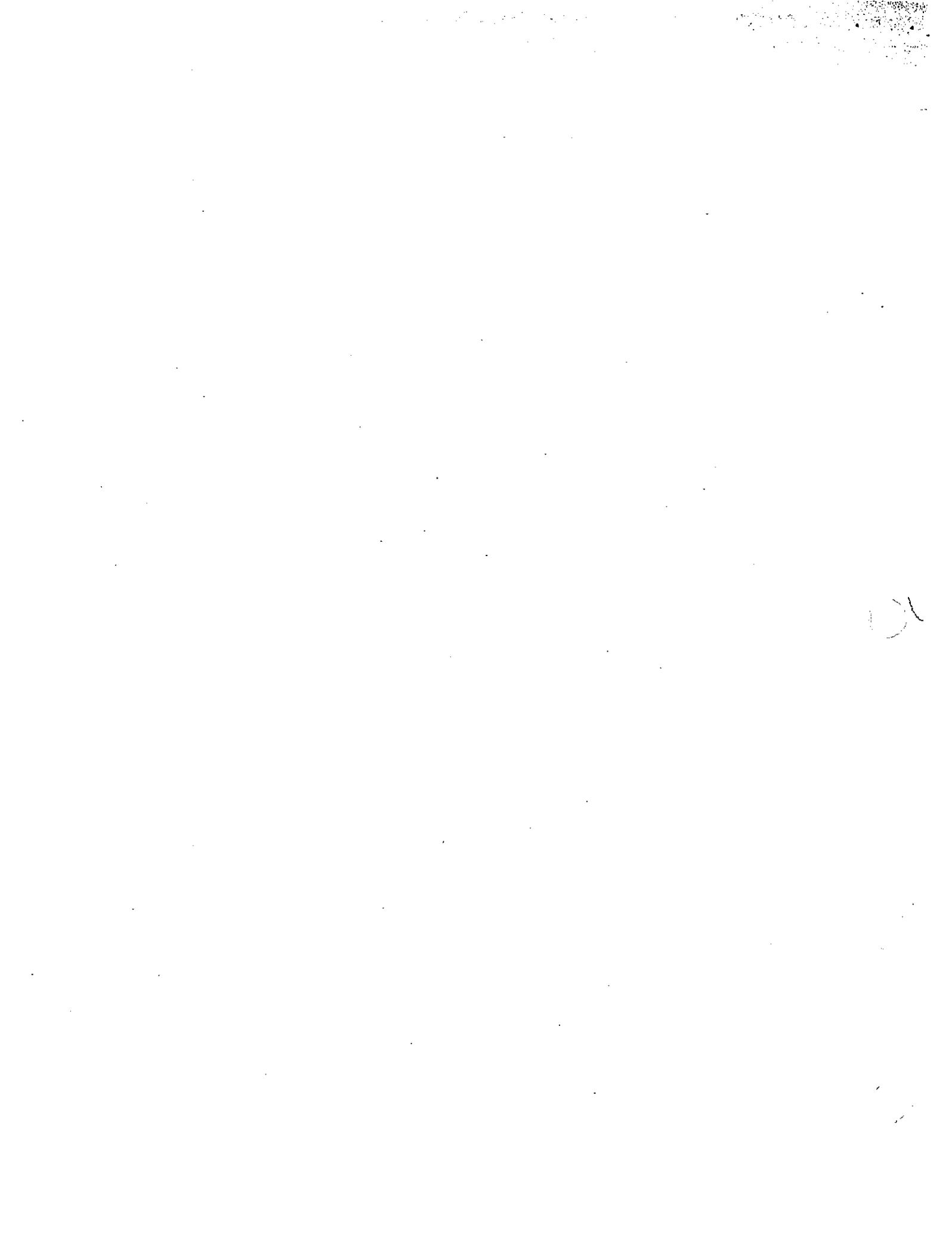
Thank you for your attention to this matter. If you have any questions or need more information, please call John Lombard, Watershed Coordinator, Lake Washington/Cedar River Watershed, at 296-8051.

Sincerely,

Ron Sims
King County Executive

Enclosures

cc: Metropolitan King County Councilmembers
ATTN: Jerry Peterson, Administrator
Pam Bissonnette, Director, Department of Natural Resources
John Lombard, Watershed Coordinator, Lake Washington/Cedar River Watershed



AGREEMENT FOR MANAGEMENT AND FUNDING OF THE LAKE WASHINGTON STUDIES

This Agreement is made and entered into by the local governments signing it, collectively known as the "Participants." The Participants are a subset of the city and county governments that have jurisdiction within the Lake Washington and Sammamish watersheds, which qualifies them for membership in the Lake Washington/Cedar River and Sammamish Watershed forums. This currently includes the Towns and Cities of Beaux Arts Village, Bellevue, Bothell, Brier, Clyde Hill, Edmonds, Everett, Issaquah, Hunts Point, Kent, Kirkland, Lake Forest Park, Lynnwood, Medina, Mercer Island, Mill Creek, Mountlake Terrace, Newcastle, Redmond, Renton, Seattle, Shoreline, Woodinville and Yarrow Point, and the counties of King and Snohomish. A local government may be a member of the Lake Washington/Cedar River or Sammamish Watershed forums and participate in their discussions without becoming a Participant in this Agreement. To become a Participant in this Agreement, a member of the forums must contribute funding to the Lake Washington Studies under terms of this Agreement.

I. Recitals

WHEREAS, the Lake Washington/Cedar River and Sammamish Watershed Forums are dedicated to developing and coordinating regional actions to address fish habitat, flooding and water quality concerns in their respective watersheds; and

WHEREAS, sockeye salmon are by far the most numerous anadromous fish species in the Lake Washington and Sammamish watersheds; and

WHEREAS, all juvenile anadromous fish in the Sammamish watershed must pass through Lake Washington to reach marine waters; and

WHEREAS, throughout the 1970s and 1980s, adult sockeye returned to the Lake Washington and Sammamish watersheds in large enough numbers to support the most valuable recreational fishery in the State of Washington; and

WHEREAS, survival rates of juvenile sockeye in Lake Washington appear to have been below normal since the mid-1980s, reducing adult returns and placing the future of the run at risk even after implementation of recent and proposed regional investments of tens of millions of dollars to protect and enhance fish habitat in the Lake Washington and Sammamish watersheds; and

WHEREAS, scientists do not know the reasons for the low survival rates of juvenile sockeye in Lake Washington but have formulated some promising hypotheses, which are being tested as part of a program known as the "Lake Washington Studies"; and

WHEREAS, the Participants believe that the region has compelling environmental, cultural and economic interests in carrying out the Lake Washington Studies; and

WHEREAS, the Participants believe that the studies will be best conducted and their recommendations best implemented if they are managed and funded through a partnership that involves local governments; and

WHEREAS, pursuant to RCW 39.34, the Interlocal Cooperation Act, the Participants are each authorized to enter into an agreement for cooperative action;

NOW THEREFORE, the Participants agree as follows:

II. Purpose

This Agreement establishes the basis for joint funding and management of the Lake Washington Studies by the Participants, who believe that without further study and informed action, sockeye salmon runs in the Lake Washington and Sammamish watersheds are likely to dwindle. The Lake Washington Studies are intended to recommend actions that address, at a minimum, four broad questions:

- Are young sockeye dying because of food shortages in the lake?
- Are lake predators eating large numbers of young sockeye?
- Are there structural and operational improvements that should be made to the Ballard Locks to improve fish passage to and from Puget Sound?
- Why, in some years, do survival rates for sockeye from the Sammamish system seem to be significantly better than those for sockeye from the Cedar River?

Continuation of the studies and implementation of their recommendations should allow the region to realize full value from the tens of millions of dollars that it is investing in habitat protection and enhancement, hatchery production, and other fish management actions. This Agreement also provides the flexibility to receive additional funding for the studies from federal, state and private sources, consistent with a goal of raising half of their cost from non-local sources.

III. Effectiveness and Duration

This Agreement is effective upon signature by at least five Participants, whose financial contributions in 1997 must equal at least 75% of the total to be raised from Participants for the year. This Agreement will remain in effect until December 31, 1999, unless extended by written amendment by the Participants.

IV. Project Management

A. Executive Committee

1. Membership and Authority

A "Lake Washington Studies Executive Committee" (hereinafter known as the "Executive Committee"), made up of one elected official or citizen designee representing each of the Participants, shall be established to oversee performance of the studies. The Executive Committee shall determine the work plan and budget of the studies, except as it may delegate to the Project Management Committee (described in Section IV.B. of this Agreement). The Executive Committee shall also determine the requested annual financial contributions of individual Participants toward the studies and may approve additional members for the Project Management Committee, to represent other parties that contribute funding to the studies.

2. Meeting and Voting Rules

The Executive Committee is expected to hold most of its meetings in conjunction with meetings of the Lake Washington/
Cedar River Watershed Forum, but may meet at other times, as requested by its chair or four or more of its members. It shall operate under Robert's Rules of Order and shall initially be chaired by a representative of the Bellevue City Council. Five Participants or a majority of Participants, whichever is larger, shall constitute a quorum for the conducting of Executive Committee business. Decisions shall be made by consensus whenever possible but by majority rule when necessary, each Participant initially having one vote. If approved by a majority of the Executive Committee, with votes by proxy allowed, the Executive Committee may amend these voting rules. Such amendment shall become an attachment to this Agreement.

B. Project Management Committee

1. Membership and Authority

A "Lake Washington Studies Project Management Committee" (hereinafter known as the "Project Management Committee"), made up of one staff representative each from the Washington Department of Fish and Wildlife, the

Muckleshoot Indian Tribe and the Participants, shall be responsible for general project management of the Lake Washington Studies, including review of budgets, scopes, findings and recommendations of the studies. It shall make recommendations to the Executive Committee, as specified in this Agreement or requested by the Executive Committee, and shall provide a status report on the studies for every meeting of the Lake Washington/Cedar River Watershed Forum and, as requested, for meetings of the Sammamish Watershed Forum.

2. Meeting and Operating Rules

The Project Management Committee shall designate a chair and vice-chair, who shall serve at the pleasure of a majority of the committee's members. Meetings shall be held at least quarterly and also as requested by the chair and vice-chair together, or by the chair of the Executive Committee. Decisions shall be made by consensus whenever possible but by majority rule when necessary, each committee member having one vote. Where it cannot achieve consensus, the Project Management Committee shall incorporate minority views into its reports to the Executive Committee. Formal amendments or additions to these meeting and operating rules must be approved by the Executive Committee and shall become attachments to this Agreement.

C. Technical Committee

A "Lake Washington Studies Technical Committee" (hereinafter known as the "Technical Committee"), which shall include at least one staff representative from each of the agencies conducting the Studies, shall be designated by the Project Management Committee and shall prepare initial work plans, budgets, findings, and recommendations for the Studies, for review by the Project Management Committee. Initially, the membership of the Technical Committee shall be the same as that of the existing Cedar River Sockeye Salmon Technical Committee.

- B. Designate an elected official or citizen representative to serve on the Executive Committee and a staff representative to serve on the Project Management Committee.
- C. Through its designated representatives, review and comment on proposed study budgets, scopes of work, findings and recommendations and vote on study budgets, scopes and other business brought before the Executive and Project Management committees.

VII. Financial Arrangements

A. Billing and Payment

In 1997, the Administrator shall be responsible for billing each Participant for the entire amount of its designated allocation within 30 days after the Agreement has become effective and the Participant has signed it. In 1998 and 1999, the Administrator shall be responsible for billing each Participant for the entire amount of its designated allocation by January 31. Non-payment of invoiced allocations that are more than 60 days due shall result in the suspension of all rights of the Participant under this Agreement until payment is made. Upon request, the Executive Committee may approve a reduction in a Participant's allocation.

B. In-Kind Contributions

The Executive Committee shall allow the Administrator to receive reimbursement, or to deduct from the contribution designated for it in Exhibit 2, up to \$5,000 for reasonable salaries, benefits and overhead charges for its financial management of the Lake Washington Studies, as approved by the Executive Committee. The Executive Committee, at its sole discretion, may also approve reimbursements or deductions for extraordinary services provided by Participants. This is not to include normal service on the Executive and Project Management Committees or, in 1997 and 1998, services provided by the Watershed Coordinator.

VIII. Ownership of Work Products

All work products approved by the Technical Committee, Project Management Committee or Executive Committee shall be the non-exclusive property of all of the Participants.

D. Administrator

1. Selection

King County shall be the Administrator of this Agreement, unless determined otherwise by the Executive Committee.

2. Responsibilities

The Administrator shall provide lead staff support to the Project Management Committee and shall also be responsible for the receipt, accounting, and management of funds made available by the Participants or other sources for conduct of the Studies. Acting at the direction of the Executive Committee, the Administrator shall disburse funds for the conduct of the Studies through interagency agreements or contracts, subject to any applicable public bidding laws and standard procurement procedures.

V. Work Plan and Budget

The Work Plan and Budget for the Lake Washington Studies in 1997 is attached as Exhibit 1 and incorporated herein. The Technical Committee is expected to submit preliminary Work Plans and Budgets for 1998 and succeeding years to the Project Management Committee by April 30 of the previous year. The Project Management Committee shall submit a proposed Work Plan and Budget for 1998 and succeeding years to the Executive Committee by August 31 of the previous year. The Executive Committee shall have 60 days in which it may modify the recommended Work Plan and Budget, after which the Work Plan and Budget shall be considered approved and incorporated herein. The Executive Committee may, however, modify the Work Plan and Budget at any time by a two-thirds vote, based on scientific findings or the availability of funds and after consultation with the Project Management Committee.

VI. Responsibilities

Each Participant to this Agreement shall:

- A. Contribute funds for the conduct of the Lake Washington Studies in the amount designated for it in the "Local Cost Allocation" for 1997 attached to this Agreement as Exhibit 2 and incorporated herein. Exhibit 2 shall be amended by new local cost allocations for 1998 and 1999, which shall be approved by the Executive Committee by October 30 of the previous year. Future contributions by the Participants depend upon funding appropriations by the legislative bodies of the Participants.

such claims under the Industrial Insurance provisions of Title 51 RCW. In the event that any Participant incurs any judgment, award, and/or cost arising therefrom, including attorneys' fees, to enforce the provisions of this Article, all such fees, expenses, and costs shall be recoverable from the responsible Participant to the extent of that Participant's culpability.

IN WITNESS WHEREOF, the Participants hereto have executed this Agreement on the _____ day of _____, 19____.

Approved as to Form

Town of Beaux Arts Village

By: _____
Title: _____

By: _____
Title: _____

Approved as to Form

City of Bothell

By: _____
Title: _____

By: _____
Title: _____

Approved as to Form

Town of Brier

By: _____
Title: _____

By: _____
Title: _____

Approved as to Form

Town of Clyde Hill

By: _____
Title: _____

By: _____
Title: _____

Approved as to Form

City of Edmonds

By: _____
Title: _____

By: _____
Title: _____

Approved as to Form

City of Everett

By: _____
Title: _____

By: _____
Title: _____

IX. Termination and Amendment

- A. Any Participant may terminate its role in this Agreement by written notice to the Administrator at any time, but past contributions shall not be reimbursed.
- B. This Agreement may be amended, altered, or clarified and additional Participants can be added only by written agreement of the Participants hereto, on the recommendation of the Executive Committee.
- C. This Agreement is not assignable by any Participant, either in whole or in part.
- D. This agreement is the complete expression of the terms hereto and any oral or written representations or understandings not incorporated herein are excluded.
- E. The Participants recognize that time is of the essence in the performance of the provisions of this agreement.
- F. Waiver of any default shall not be deemed to be waiver of any subsequent default. Waiver of breach of any provision of this agreement shall not be deemed to be a waiver of any other or subsequent breach and shall not be construed to be a modification of the terms of the agreement unless stated to be such through written approval by the Participants which shall be attached to the original agreement.
- G. The Participants represent that funds for the 1997 budget of this project have been appropriated and are available.

X. Counterparts

This Agreement may be executed in counterparts.

XII. - Indemnification and Hold Harmless

Each Participant shall protect, defend, indemnify, and save harmless the other Participants, their officers, officials, employees, and agents, while acting within the scope of their employment as such, from any and all costs, claims, judgments, and/or awards of damages, arising out of, or in any way resulting from, each Participant's own negligent acts or omissions. Each Participant agrees that its obligations under this paragraph extend to any claim, demand, and/or cause of action brought by, or on behalf of, any of its employees or agents. For this purpose, each Participant, by mutual negotiation, hereby waives, with respect to the other Participants only, any immunity that would otherwise be available against

Approved as to Form

By: _____
Title: _____

City of Issaquah

By: _____
Title: _____

Town of Hunts Point

By: _____
Title: _____

City of Kent

By: _____
Title: _____

City of Kirkland

By: _____
Title: _____

City of Lake Forest Park

By: _____
Title: _____

City of Lynnwood

By: _____
Title: _____

City of Medina

By: _____
Title: _____

Approved as to Form

By: _____
Title: _____

City of Mercer Island

By: _____
Title: _____

City of Mill Creek

By: _____
Title: _____

City of Mountlake Terrace

By: _____
Title: _____

City of Newcastle

By: _____
Title: _____

City of Redmond

By: _____
Title: _____

City of Renton

By: _____
Title: _____

City of Seattle

By: _____
Title: _____

Approved as to Form

By: _____
Title: _____

Approved as to Form

By: [Signature]
Title: City Attorney

Approved as to Form

By: _____
Title: _____

Approved as to Form

By: _____
Title: _____

Approved as to Form

By: _____
Title: _____

City of Shoreline

By: _____
Title: _____

City of Woodinville

By: [Signature]
Title: City Manager

Town of Yarrow Point

By: _____
Title: _____

King County

By: _____
Title: _____

Snohomish County

By: _____
Title: _____

EXHIBIT 1

1997 LAKE WASHINGTON ECOLOGICAL STUDIES: OVERVIEW

Work to be performed as part of the Lake Washington Ecological Studies in 1997 will focus on five general issues. The following presents a brief overview of each issue, including some of the key questions that will be addressed as part of the studies, a brief discussion of the work to be performed to address each issue, and a list of study elements with an estimate of the total funding (as of 1/10/97) requested from the Forum (i.e., exclusive of in-kind, administrative and overall technical management costs). A funding level from the Forum of about \$530,000 has been assumed (which includes about \$100,000 in unspent past appropriations). Additional funding that may be secured from other sources (e.g., EPA/NSF or Sea Grant) could be used to expand the scope of some or all study elements depending upon the amount that we actually receive. The institutions that are expected to perform this work are also identified. The following organizational abbreviations are used:

WDFW	Washington Department of Fish and Wildlife
UW	University of Washington
MIT	Muckleshoot Indian Tribe
US COE	US Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
EPA	Environmental Protection Agency
NSF	National Science Foundation

Issue 1: Passage of juvenile salmon through the Ballard Locks

Key Questions

1. What is the mortality of juvenile salmon passing through the Ballard Locks?
2. What are the sources of mortality of juvenile salmon passing through the Ballard Locks?
3. What can be done to improve the survival of juvenile salmon passing through the Ballard Locks?

Narrative

During the first year of the Lake Washington Studies (1994), a program was initiated to trap and capture some of the sockeye smolts that were leaving the Lake Washington Watershed at the Ballard Locks in order to determine the number of hatchery fish (from the Cedar River/Landsburg Hatchery) exiting the Watershed. While performing this work, it became apparent that some juvenile salmon were being killed while passing through the Locks and that reducing this mortality could potentially increase the numbers of returning adults of all species. Subsequent work in 1995 and 1996 confirmed that juvenile salmon passage at the Locks has an important influence on the overall performance of all anadromous species in the system. To date, work conducted at the

Locks on juvenile salmon passage issues has focused on identifying the sources of mortality of juvenile salmon passing through the facility. The issue is complex because the fish can migrate through the facility using a number of different routes (e.g., small locks vs. large locks) and various environmental factors (e.g., tidal stage and time of day) can affect the routes the fish use and their subsequent mortality. In addition, how the Locks are operated (e.g., fill rate, amount of vessel traffic, amount of spill) affects mortality.

Objectives of studies conducted during 1997 will be to first complete a more detailed analysis of some of the data collected in 1995 and 1996 (especially the hydroacoustics data collected by the US COE) to better understand how salmon migrate through the facility. Second, field work will be conducted to: 1) evaluate effects of changes in fill rate on mortality and injury in the large locks, 2) determine how many fish are killed directly and injured during operation of the large locks, and 3) evaluate effects of some operational and structural modifications (e.g., scrapping the walls clean of barnacles) on migrating smolts. Additional questions may be addressed depending upon how successful we are at addressing these three issues. In addition, the otoliths and genetic makeup of some sockeye smolts collected at the Locks will be analyzed to determine the population composition of sockeye migrating through the facility (i.e., the relative contributions of hatchery vs. wild sockeye and relative contributions of fish from North Lake Washington tributaries vs. other populations).

The general approach to conducting studies at the Locks is to mark and recapture fish in the large locks with a large purse seine under various operational and environmental conditions. Mark-recapture estimates that are generated allow a determination of numbers of fish that used the large locks. Fish using the smolt slide are also enumerated by observers. Acoustics will continue to be tested as a way of enumerating fish passing through the large locks. Work will be conducted in May and June during the peak of the smolt outmigration at the Locks.

Study Elements and Approximate Costs

<u>Element</u>	<u>Institution</u>	<u>Cost</u>
Evaluate passage by smolts and stock separation	WDFW	\$ 30,000
Identifying and evaluating passage improvements	COE	\$ 23,000 ¹
TOTAL		\$ 53,000

Issue 2: Food supply for juvenile sockeye in Lake Washington, especially during the early lake life of sockeye salmon fry

Key Questions

1. Is there enough food of the right kind and size for sockeye fry entering the south end of Lake Washington from the Cedar River during their first several months of life in the Lake?
2. What food items do sockeye presmolts eat in littoral habitats?

¹ The COE anticipates being able to provide a 100% match to this amount with a Planning Assistance to the States Grant.

Narrative

Naturally-produced sockeye fry migrate into Lake Washington from the Cedar River between late December and mid-July with the peak occurring in March and April. Hatchery-produced fry enter the lake somewhat earlier than naturally produced fry with their peak in February and March. Survival of these fry in the lake is probably highly dependent upon the availability of zooplankton at this time of year. The fry are entering the lake at a time of year when the amount of food in the lake is seasonally at its lowest. Thus, a change in the amount or size composition of the food supply present at this time of year could affect sockeye salmon survival. Work conducted by W.T. Edmondson as part of the Lake Washington Studies suggests that there has been a change in the amount of several species of zooplankton present in late winter to early spring.

One weakness in the existing information is that we still have a poor understanding of what prey items the sockeye fry are eating at this time of year relative to what is available. Thus, analyses of sockeye stomach samples from 1994 and 1995 will need to be conducted. Moreover, although we have completed analyses of zooplankton samples from the south part of Lake Washington collected in 1994, we have incompletely analyzed samples collected during the spring of 1995. (Zooplankton and sockeye stomach samples from south Lake Washington were not collected in 1996.) Analyzing samples from both odd and even years is important because the dramatic odd-even year populations of smelt may result in different zooplankton populations due to predation by the smelt.

In 1997, the following is proposed. First, analyses of sockeye stomach and zooplankton samples from 1994 and 1995 will be conducted in order to fill in crucial information on the early lake life of sockeye salmon. Second, samples of sockeye fry, juveniles, and zooplankton will be collected from littoral and limnetic habitats in the late winter and spring of 1997. The stomachs of the sockeye will be analyzed to determine what they are eating; this will then be compared to zooplankton samples collected at the same time. The focus will be on the south end of the lake because this is where the fry are most concentrated, although samples will also be collected and analyzed from other parts of the lake as well. Even though mostly fry (young-of-the-year) stomachs will be collected, some presmolts will also be retained to determine if they are feeding on the same zooplankton as the fry. Monthly population estimates of the number of sockeye salmon in the lake will be obtained from March to June and in October so that we can estimate consumption of zooplankton by the salmon population. Otoliths will be retained on a portion of the salmon collected to allow growth and mortality of hatchery fish to be computed. (Note: we will also complete some of the analyses of otoliths and acoustic data obtained in 1994-6 to complete some of the major gaps in studies conducted over the last 3 years.)

Obtaining stomach samples of sockeye and zooplankton in 1997 is especially critical because this will likely be the largest number of sockeye salmon fry entering the lake in the last 8 years and for the foreseeable future, assuming a large flood does not occur. Thus, the large number of fry entering the lake represents a scenario where food is most likely to be limiting.

Study Elements and Approximate Costs

<u>Element</u>	<u>Institution</u>	<u>Cost</u>
<i>Completion of 1994 and 1995 samples</i>		
Zooplankton samples	UW	\$ 26,000
Sockeye salmon stomachs	UW	\$ 17,500
Otolith analyses	WDFW	\$ 22,200
<i>1997 sample collection and analyses</i>		
Zooplankton samples	UW	\$ 30,000
Collection of stomach samples, pop. estimates	WDFW	\$ 64,000
Otolith analyses	WDFW	\$ 14,000
Analysis of stomach samples, littoral fish collect	UW	\$ 40,000
TOTAL		\$213,700

Issue 3: Predation on juvenile sockeye salmon in Lake Washington

Key Questions

1. What are the major predators of sockeye salmon juveniles in the Lake Washington Watershed, especially in the south end of the lake and in the lower Cedar River?
2. What are the losses of sockeye fry to predators in the lower Cedar River and south end of Lake Washington?
3. What is the spatial and temporal overlap of predators and prey (i.e., sockeye) and has this changed from historical conditions?
4. What are the consumption rates of sockeye by key predators?

Narrative

The Lake Washington Watershed is an unusual sockeye salmon system because it possesses a diverse fish fauna of nearly 40 species. In addition, numerous bird species reside either permanently or temporarily in the Watershed. Many of these bird and fish species are capable of consuming juvenile sockeye salmon. While predation on sockeye salmon was intensively studied in the late 1960's and early 1970's, few studies of predation have been conducted subsequently. Notable exceptions are the work by David Beauchamp on rainbow trout predation in the lake in the mid-1980's, the recently completed studies by Andy Fayram on bass predation in littoral areas of the lake, and a new study by a University of Washington student focusing on northern squawfish predation. At present, we have a poor understanding of the role that predation has played in the recent decline of sockeye salmon in the system. For example, we do not know what species are currently the most important predators in the system. Moreover, it is unclear if predation rates have changed over time due to shifts in prey distribution, changes in predator distribution, or changes in predator abundance.

In 1997, predator related studies are being planned to address several issues. First, support for the student working on northern squawfish will continue. This student is seeking to track individual northern squawfish to determine their daily and seasonal

patterns of movements and then relate this information to patterns of sockeye salmon movements. Some squawfish stomachs are also being collected for analysis of their contents. Second, we hope to fund another student beginning in fall 1997 to address some of the same questions for cutthroat trout and/or yellow perch that are being addressed for squawfish. Third, studies on predation in the north and south part of Lake Washington and in the lower Cedar River will continue (Note that studies in the lower Cedar River have been partially supported by the US COE 205 Flood Control Work in the Lower Cedar). A major question that will be addressed is whether sockeye predators aggregate in the lower river and in the south part of Lake Washington when large numbers of fry are migrating into the lake. This question is especially relevant this year because of the large number of fry expected to migrate from the Cedar River. Thus, an aggregative response is especially likely this year. Finally, over the last several years of sampling, it has become apparent that predation by sculpins in the river could be a major source of mortality of sockeye fry. Recent work suggests that predation by sculpins may vary with such factors as flow and abundance of fry. The importance of sculpin predation will be further studied by collecting sculpins and examining their stomachs in the lower Cedar River; if feasible, a population estimate of the number of sculpins will be made as well.

Study Elements and Approximate Costs

<u>Element</u>	<u>Institution</u>	<u>Cost</u>
Predator studies (e.g., squawfish)	UW	\$ 54,000
Collection and analysis of stomach samples, L. Wash.	MIT	\$ 63,000
Predator sampling in the Cedar River	USFWS	\$ 35,000
TOTAL		\$152,000

Issue 4: Big Bear Creek and Lake Sammamish Studies

Key Questions

1. What is the timing and production of sockeye salmon fry from Big Bear Creek?
2. Where do sockeye salmon juveniles from Big Bear Creek and other Lake Sammamish tributaries rear and for how long?
3. When do sockeye salmon juveniles migrate into Lake Washington from Big Bear Creek?
4. What is the ecology (e.g., distribution, abundance, and feeding) of sockeye salmon fry and juveniles in Lake Sammamish?

Narrative

Sockeye salmon that spawn in the Lake Washington Watershed do so in many different streams throughout the watershed; the two largest spawning populations are found in the Cedar River and Big Bear Creek. On several occasions since 1990, the number of sockeye salmon spawning in Big Bear Creek has been larger than expected, relative to the Cedar River returns, suggesting that the two populations experience different survival regimes. If this is true, then it indicates that the recent decline in survival

of Lake Washington sockeye salmon has occurred because of the lower survival of the Cedar River fish and not of the Lake Washington population as a whole. Thus, an understanding of what factors have the most important influence on survival of the Cedar River and Big Bear Creek populations could provide insight into what is "wrong" with the Cedar River population and how it can be fixed.

One possible explanation for any difference in performance of the two populations is that egg-to-fry survival of Big Bear Creek sockeye is greater than of the Cedar River fish. Another possible explanation is that the juvenile sockeye produced from the two systems have different behavioral patterns. Behavioral differences could involve distribution, abundance, when key life history events occur, and where and what they feed on. For example, if sockeye from Big Bear Creek rear in different areas than the Cedar River fish, then it would suggest that rearing conditions for the Cedar River fish are worse than for the Bear Creek fish.

A major objective of this work will be to define where fish from the Big Bear Creek system rear and for how long. An additional objective will be to determine the migration timing and egg-to-fry survival of fish from the Big Bear system. A third objective will be to collect some basic ecological data (limnology, distribution, abundance, and feeding ecology) on sockeye salmon rearing in Lake Sammamish. The level of effort anticipated in Lake Sammamish will be pilot scale to determine if a full scale sampling effort is justified and how best to accomplish this in the following year.

Study Elements and Approximate Costs

<u>Element</u>	<u>Institution</u>	<u>Cost</u>
Fry trapping	WDFW	\$ 31,000
Collection and analysis of fish samples	WDFW	\$ 6,000
Limnology of Lake Sammamish	UW	\$ 11,000
TOTAL		\$ 48,000

Issue 5: Enumeration of Sockeye Fry Entering Lake Washington from the Cedar River

Key Questions

1. What are the numbers of naturally and artificially produced sockeye salmon fry entering Lake Washington from the Cedar River?

Narrative

In order to determine why the numbers of returning sockeye salmon adults has declined to historically low levels (<30,000 in 1995), knowledge of the mortality of sockeye salmon at different stages in their life history is needed. A key to calculating mortality rates of sockeye is determining the number of sockeye fry entering the lake, especially from the Cedar River which is the largest source of sockeye in the Watershed. By determining the number of fry entering the lake from the Cedar River, it is possible to then estimate egg-to-fry and fry-to-smolt mortality rates. Further, by computing fry

abundance estimates separately for hatchery and naturally produced fish, the performance of each of these groups of fish can be compared throughout their life cycle.

Estimates of the number of fry entering Lake Washington from the Cedar River have been made for the past five years. This work will be continued in 1997. Fry will be enumerated with a modified floating inclined plane trap located just upstream of the mouth of the Cedar River using the same techniques employed by WDFW for the last 5 years. In addition, a portion of the captured fry will be retained for otolith analysis so that we can determine the proportion of hatchery and wild fish passing the trap.

Study Elements and Approximate Costs

<u>Element</u>	<u>Institution</u>	<u>Cost</u>
Fry trapping	WDFW	\$ 50,000
Otolith analysis of captured fry	WDFW	\$ 15,000
TOTAL		\$ 65,000

EXHIBIT 2

1997 LOCAL COST DISTRIBUTIONS FOR LAKE WASHINGTON STUDIES

King County	\$142,000	Woodinville	\$4,000
Seattle	\$142,000	Medina	\$3,000
Bellévue	\$45,000	Lake Forest Park	\$3,000
Redmond	\$20,000	Newcastle	\$3,000
Snohomish County	\$20,000	Shoreline	\$3,000
Kirkland	\$20,000	Clyde Hill	\$1,000
Renton	\$15,000	Hunts Point	\$1,000
Mercer Island	\$12,000	Yarrow Point	\$1,000
Issaquah	\$6,000	Beaux Arts Village	\$1,000
Bothell	\$6,000	Kent	\$1,000

Allocations are based primarily on an average of four factors: the percentage of geographic area, population, assessed value and impervious surface that a jurisdiction has within the overall watershed. Final proposed allocations have been rounded up or down based on four additional factors: rounding down for jurisdictions in the Lake Sammamish watershed; rounding up or down based on how much shoreline a jurisdiction has on Lake Washington or Lake Sammamish; rounding up if a major salmon run returns to a particular jurisdiction; and establishing a \$1,000 minimum contribution.

