Instream Flows for the Dungeness River

- **Brad Caldwell**
  - Washington Department of Ecology

- **Hal Beecher**
  - Washington Department of Fish and Wildlife

WASHINGTON STATE DEPARTMENT OF ECOLOGY

Washington Department of FISH and WILDLIFE

A minimum instream flow is not the minimum amount of water that will be left in the stream for fish.

Why?

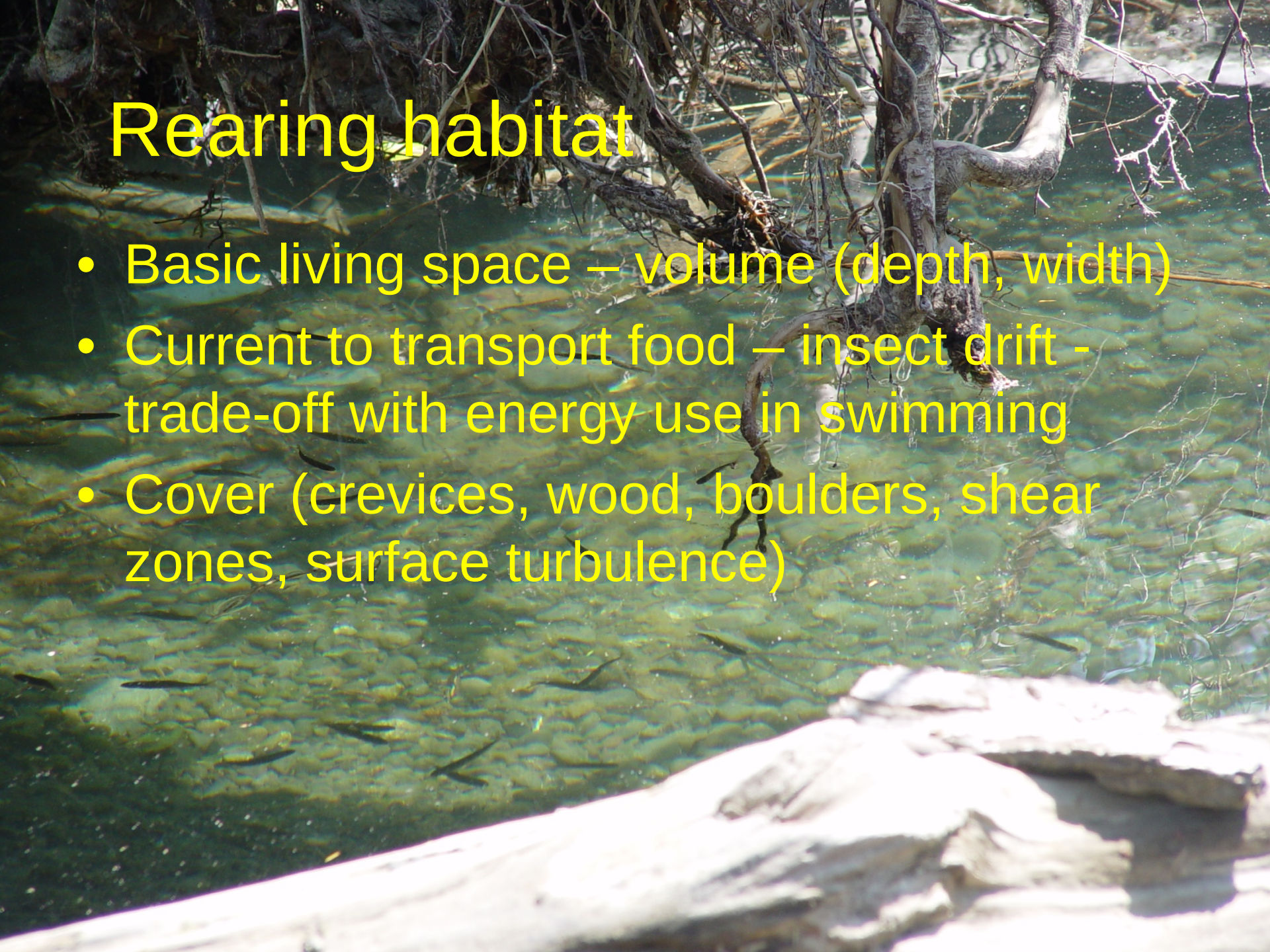
Ecology cannot affect existing water rights. We cannot make someone with a water right put water back in the river to help fish.

The instream flow is a number used to determine when there is surplus water in the river(unneeded for protecting fish and other water users) that can be diverted out of the river for other future uses.

What law guides Ecology on setting instream flows?

The **Water Resources Act of 1971** requires Ecology to set instream flows to prevent further degradation of existing instream resources.

Nearly 41 years ago the legislature found that rivers were being dried up and the salmon numbers had dropped dramatically. This law was enacted to try and slow the decline of streamflows and salmon.



Rearing habitat

- Basic living space – volume (depth, width)
- Current to transport food – insect drift - trade-off with energy use in swimming
- Cover (crevices, wood, boulders, shear zones, surface turbulence)

Spawning habitat

- Gravel – spaces for eggs & water
- Current
  - fast enough to oxygenate & flush waste
  - not so fast adults can't swim
  - not so fast as to scour
- Depth
  - deep enough for adult fish to be covered

Incubation habitat

- Where fish spawned
- Suitable incubation conditions for duration of incubation – EGGS CAN'T FLEE
  - too fast → scour →lost
  - too slow → sedimentation →smothered

Dungeness River Instream Flow Study

- Approach was to use Physical Habitat Simulation **(PHABSIM)** models of Instream Flow Incremental Method **(IFIM)** because it addresses life-stage-specific details of habitat

- Used in Washington to determine the streamflows needed for salmon and trout spawning and rearing

- Conducted by **U.S. Fish and Wildlife Service (Wampler and Hiss)** with assistance from Ecology (Brad Caldwell et al), Wildlife (Hal Beecher et al), Fisheries (Ken Bruya et al) and NMFS (Brian Winter).

Dungeness PHABSIM Study

- 1) Select sites to represent river reaches of interest
- 2) Characterize stream bed and banks (survey, measure & categorize)
- 3) Develop hydraulic model, based on flow measurements at transects
- 4) Develop habitat model, based on fish preferences

1) Select sites to represent river reaches of interest

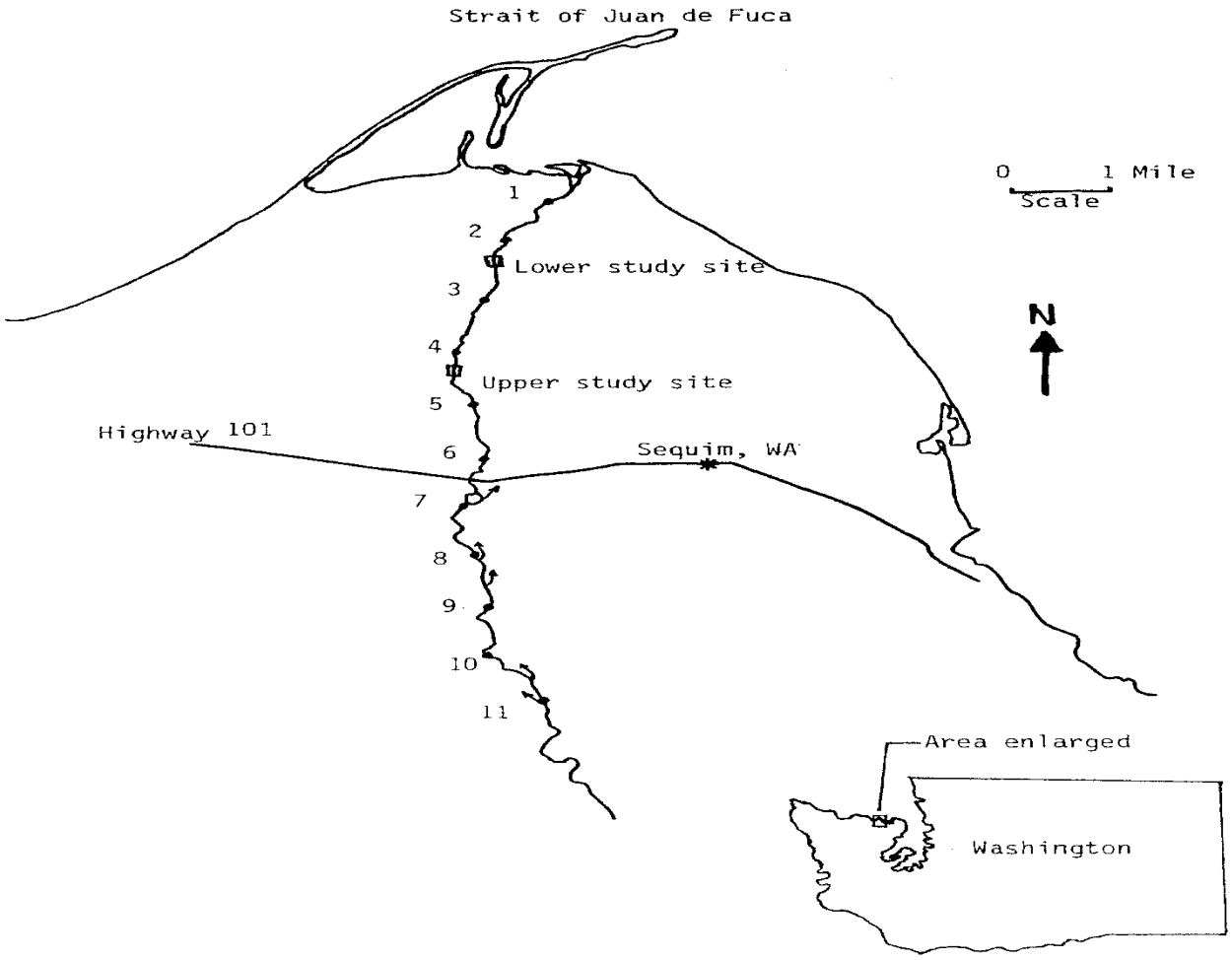


Figure 1. Lower Dungeness River, showing river miles (numbered) and study sites (boxes). Points of irrigation withdrawal are indicated by arrows leaving the river.

2) Characterize stream bed and banks (survey, measure & categorize)

- Multiple transects to represent habitat types
- Fixed points (on transects) characterized by substrate and relative elevation (surveyed)

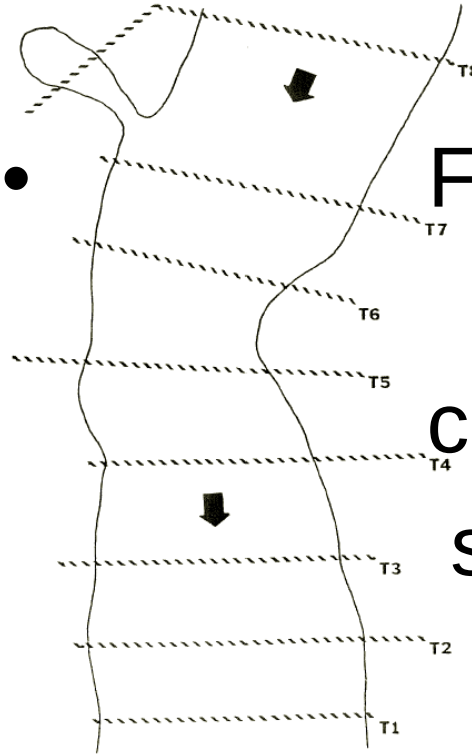


Figure 7. Plan view of the lower IFIM study site at river mile 2.3 on the Dungeness River.

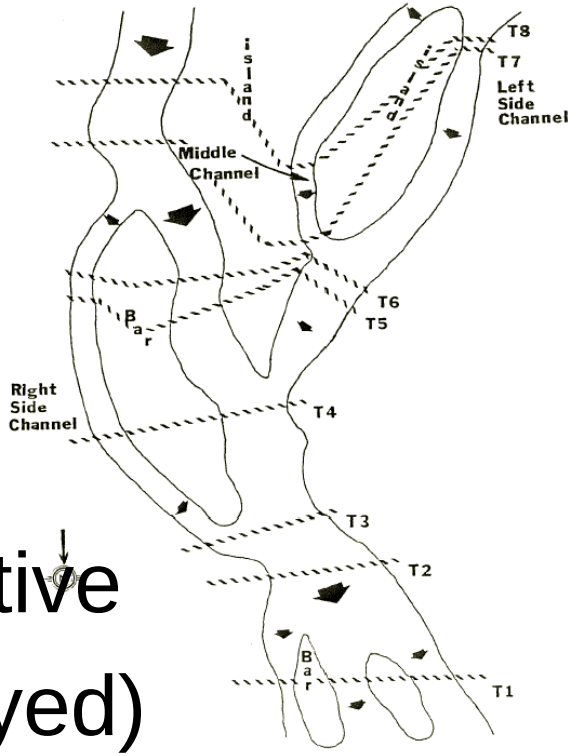


Figure 6. Plan view of the upper IFIM study site at river mile 4.2 on the Dungeness River.

3) Develop hydraulic model, based on flow measurements at transects

- Measure stream along several cross-sections at low, medium, and high streamflows

- Upper Site – 720, 325, 32 cfs
- Lower Site – 441, 351, 37 cfs
- Calculate Stage-Discharge Relationship – Depth at each point on each transect at each modeled flow
- Calculate Velocity Regression – Velocity vs. Stage (water surface elevation) at each point on each transect

4) Develop habitat model, based on fish preferences

- For each life stage for each fish species for each flow you want to model:
- Habitat Value (WUA) = Value of Depth multiplied times the Value of Velocity multiplied times the Value of Substrate for one point on a transect
- Total WUA for a flow = WUA for a point on a transect multiplied times the Area each point represents, then add all WUA areas together

- Hal Beecher snorkeled the Dungeness River to determine depth, velocity, and substrate preferences for chinook, steelhead, coho, and bull trout .

Fish Habitat (WUA) results from PHABSIM model for upper site

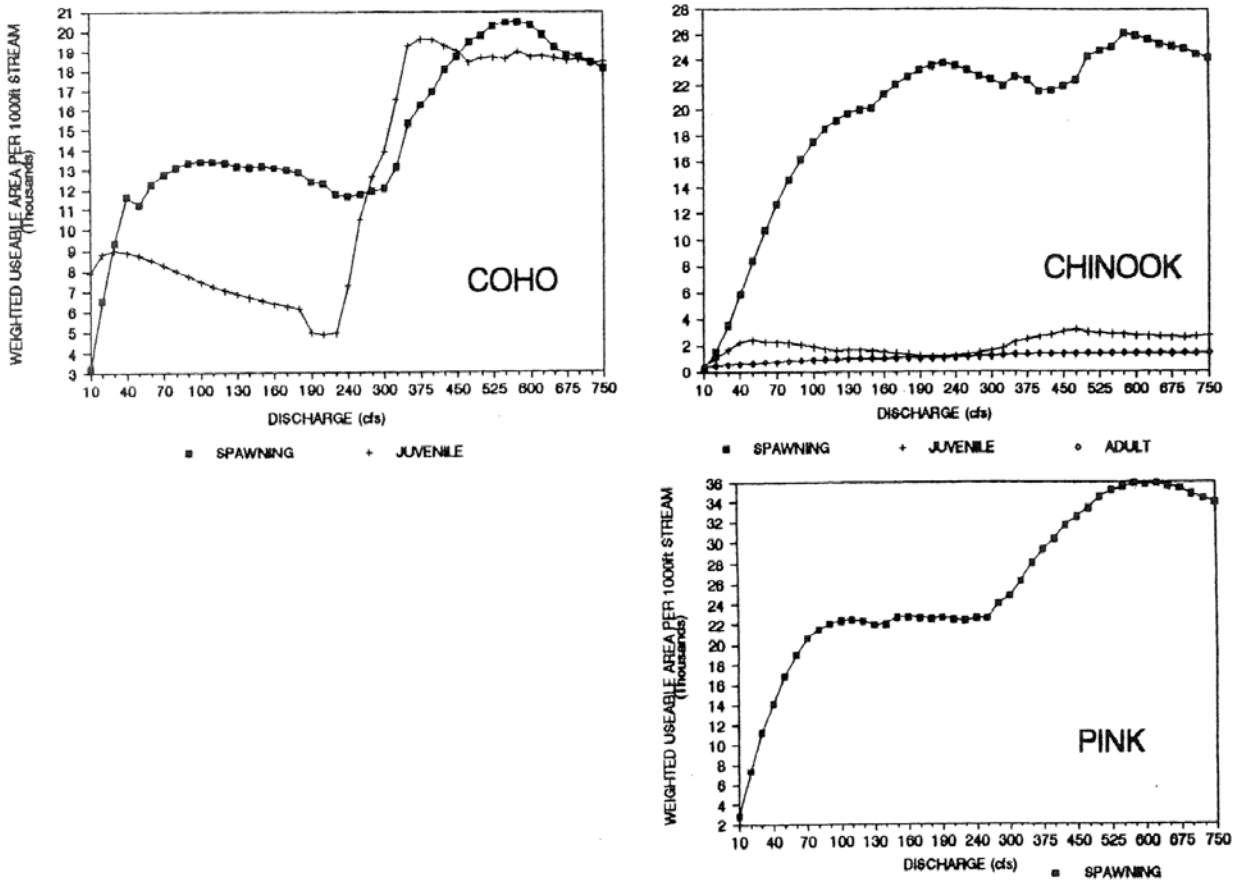


Figure 20. Predicted WUA of habitat for coho, chinook and pink salmon, from the combined models for the upper study site, river mile 4.2.

Fish Habitat (WUA) results from PHABSIM model for lower site

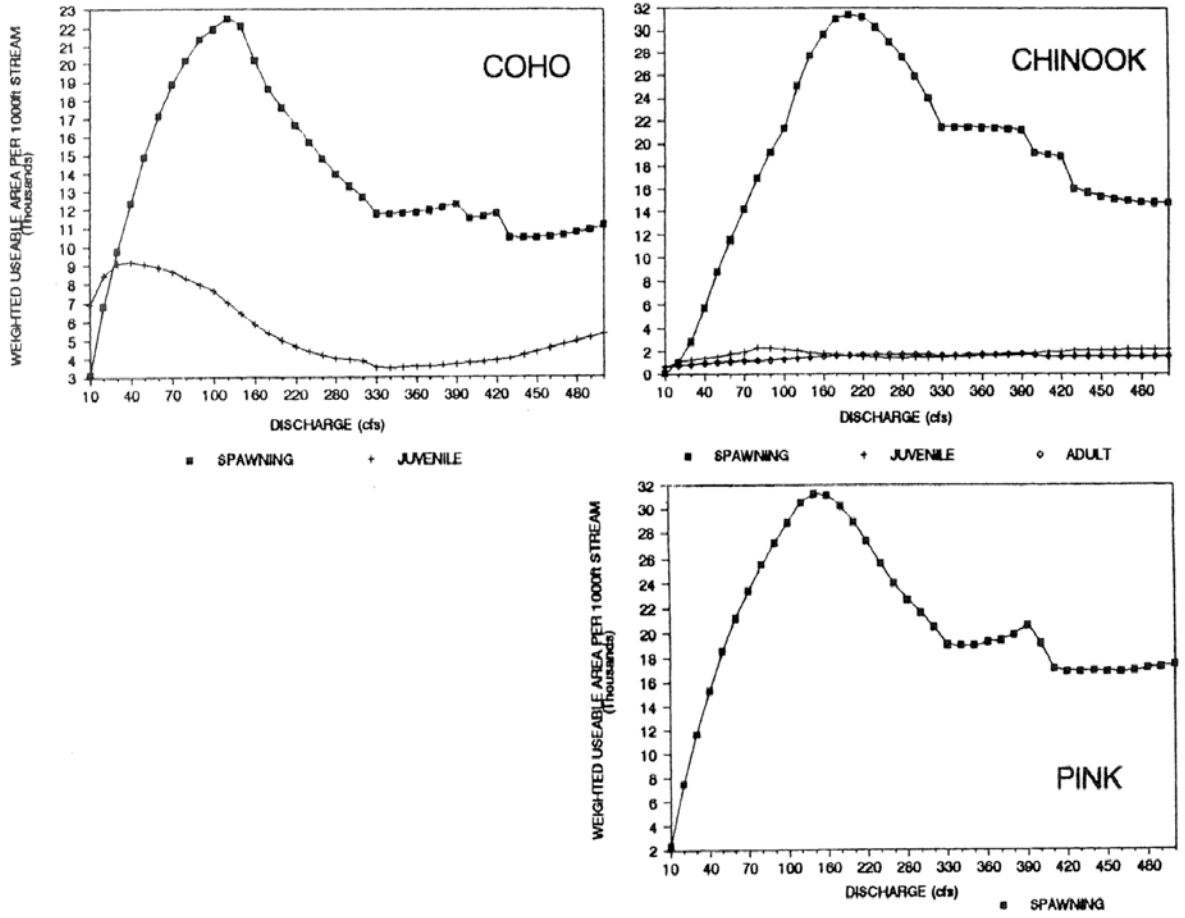
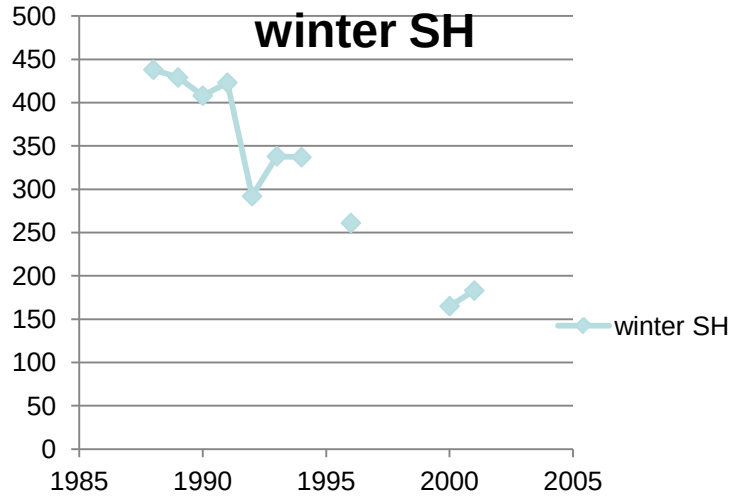


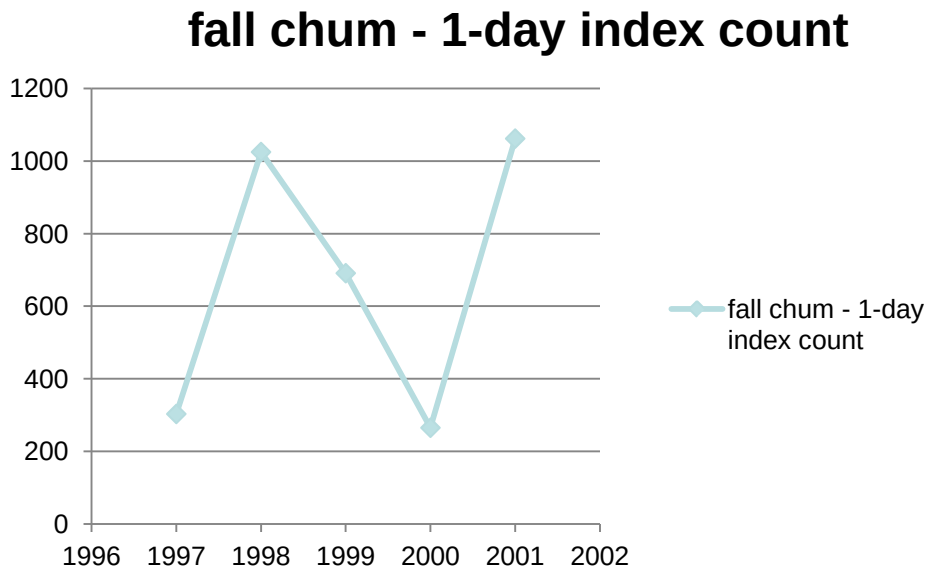
Figure 22. Predicted WUA of habitat for coho, chinook and pink salmon, from the combined models for the lower study site, river mile 2.3.

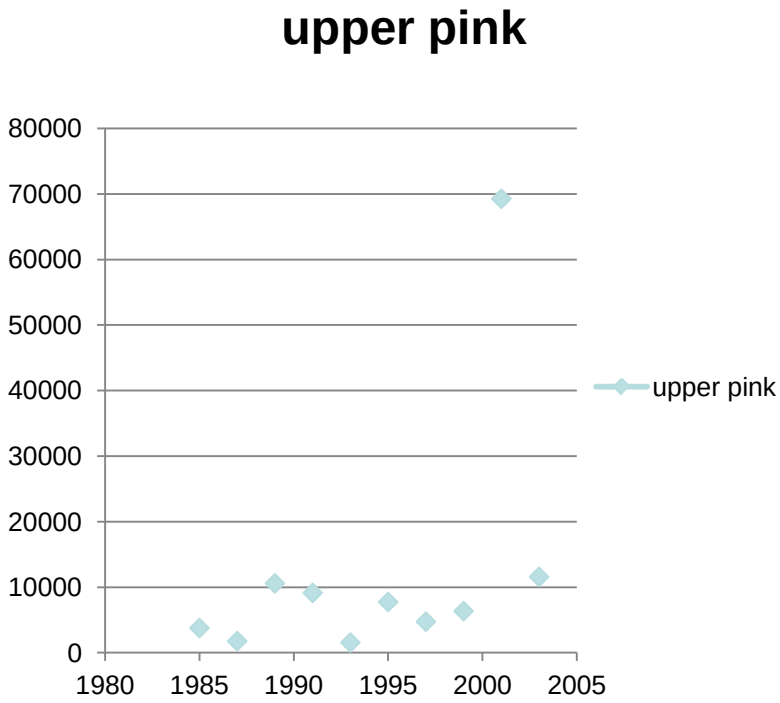
WUA is compared to the timing of fish spawning, rearing, incubation, and smolt outmigration.

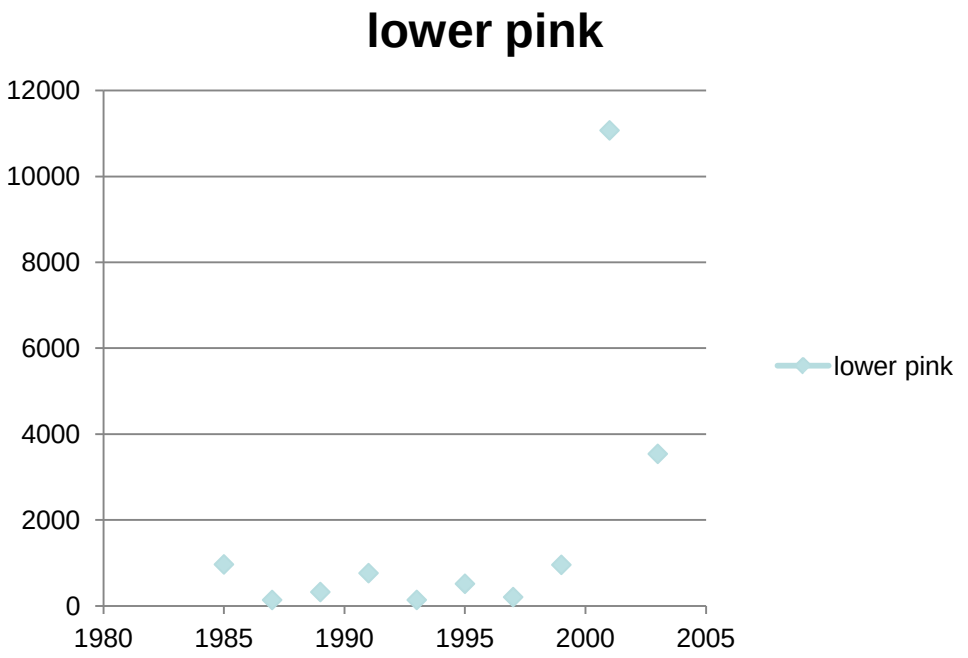
Bull Trout		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	spawn												
	incubate												
	rear												
Cutthroat													
	spawn												
	incubate												
	rear												
Steelhead													
	spawn												
	incubate												
	rear												
	smolt												
Coho													
	spawn												
	incubate												
	rear												
	smolt												
Chinook													
	spawn												
	incubate												
	rear												
	smolt												
Chum													
	spawn												
	incubate												
Pink													
	spawn												
	incubate												
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Dungeness River Fish Counts from WDFW

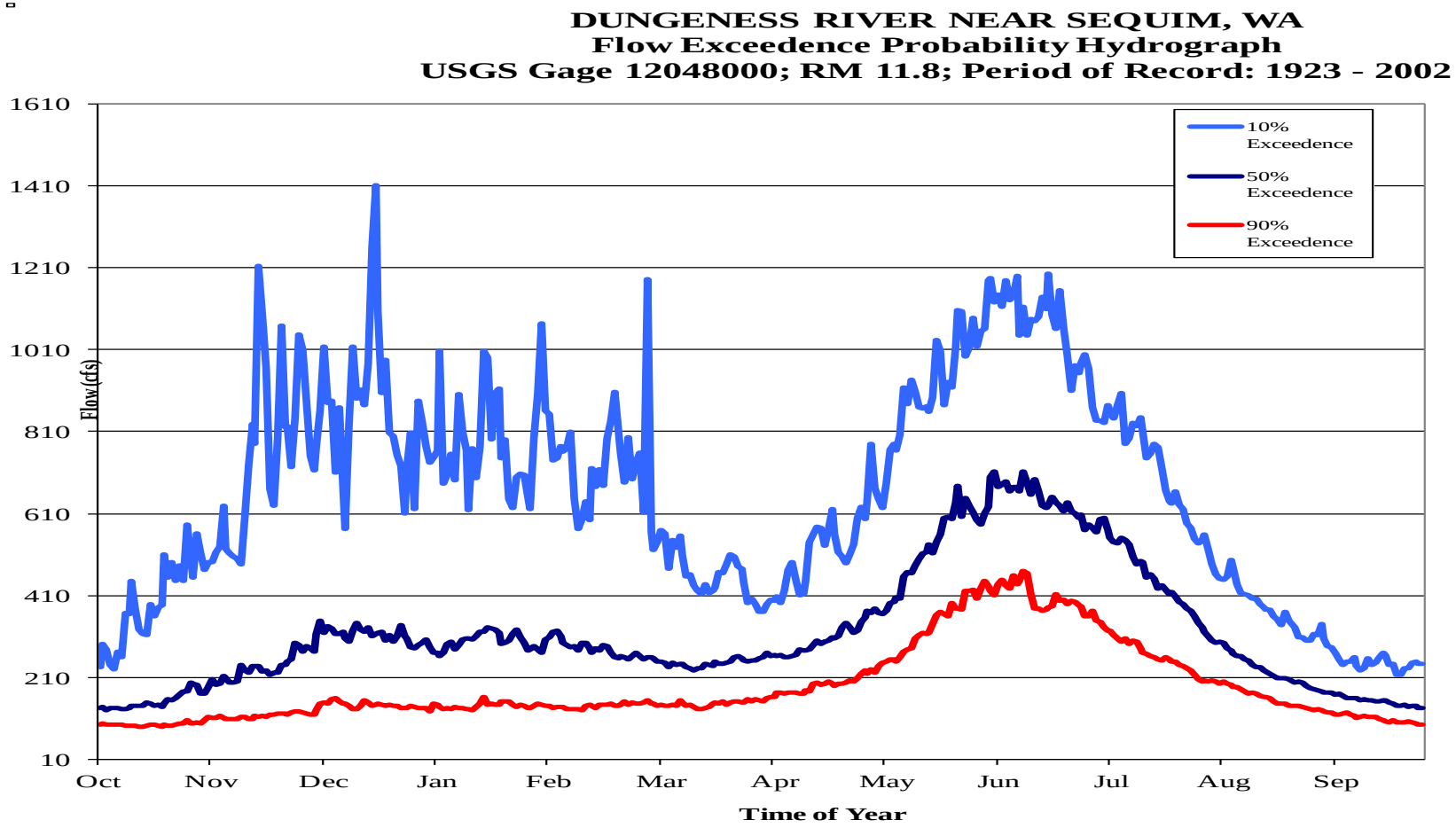








A hydrograph will tell us how much flow has been in the river in the past. WUA for each species for each lifestage for each study reach is compared to the hydrograph month by month to determine conflicts.



This table shows the difference in the streamflow needed to protect fish by reach and by species and by lifestage depending on whether side channel habitat was included or not. Even though Chinook spawning habitat is maximum at 575 cfs, biologists chose 180 cfs for Chinook spawning based on the hydrograph showing the streamflow did not reach 575 cfs with enough frequency during September.

TABLES

Table 1. Flows providing maximum habitat area for each species and life stage, as determined from IFIM. Source: Wampler and Hiss (1991).

Species	Stage	Lower reach	Upper reach	
			Main channel	All channels
Chinook	Migration[A]	390	240	575
	Spawning	200	220	575
	Rearing	80[B]	50[B]	475
Pink	Spawning	140	150	575
Coho	Spawning	120	110	575
	Rearing	40[B]	30[B]	375
Chum	Spawning[C]	200	220	575
Steelhead	Migration[A]	120	80	80
	Spawning	180	260	600
	Rearing	180	130	475
Dolly Varden	Rearing	220	160	650

This is a listing of the priority fish species and lifestages month by month. To the right is the flow determined by state, federal, and tribal biologists that would protect all fish species.

Table 3. Monthly ranking of species and life stages, maximum habitat area flow (cfs), and recommended flows based on rank of species and life stages.

Month(s)	Species	Life stage	Status rank[A]	Stage rank[B]	Reliability[C]	Total score	Maximum habitat flow[D]	Species combined[E]
Jan	Coho	Spawn	1	1	1	3	575	575
	Steelhead	Rear	1	1	1	3	475	
	Chinook	Rear	1	0	1	2	475	
	Dolly V.	Rear	0	0	1	1	650	
Feb-Mar	Steelhead	Spawn	1	1	1	3	600	575[F]
	Steelhead	Rear	1	1	1	3	475	
	Chinook	Rear	1	0	1	2	475	
	Dolly V.	Rear	0	0	1	1	650	
Apr-Jun	Chinook	Rear	1	1	1	3	475	475
	Steelhead	Rear	1	1	1	3	475	
		Spawn	1	0	1	2	600	
	Coho	Rear	0	1	0	1	375	
Jul	Chinook	Rear	1	1	1	3	475	475
	Steelhead	Rear	1	1	1	3	475	
	Chinook	Migr.	1	0	1	2	575	
	Steelhead	Migr.	1	0	1	2	80	
	Coho	Rear	0	1	0	1	375	
Aug	Chinook	Spawn	1	1	1	3	220	180
	Pink	Spawn	1	1	1	3	150	
	Steelhead	Rear	1	1	1	3	130	
	Chinook	Rear	1	0	1	2	50	
		Migr.	1	0	1	2	240	
	Chum	Spawn	1	0	1	2	220	
	Coho	Rear	0	0	0	0	30	
Sep	Pink	Spawn	1	1	1	3	150	180
	Chinook	Spawn	1	1	1	3	220	
	Chum	Spawn	1	1	1	3	220	
	Steelhead	Rear	1	1	1	3	130	
	Chinook	Migr.	1	0	1	2	240	
Oct	Pink	Spawn	1	1	1	3	150	180
	Chum	Spawn	1	1	1	3	220	
	Steelhead	Rear	1	1	1	3	130	
Nov-Dec	Coho	Spawn	1	1	1	3	575	575
	Chum	Spawn	1	1	1	3	575	
	Steelhead	Rear	1	1	1	3	475	
	Dolly V.	Rear	0	0	1	1	650	

MEMBERS OF DUNGENESS INSTREAM FLOW GROUP

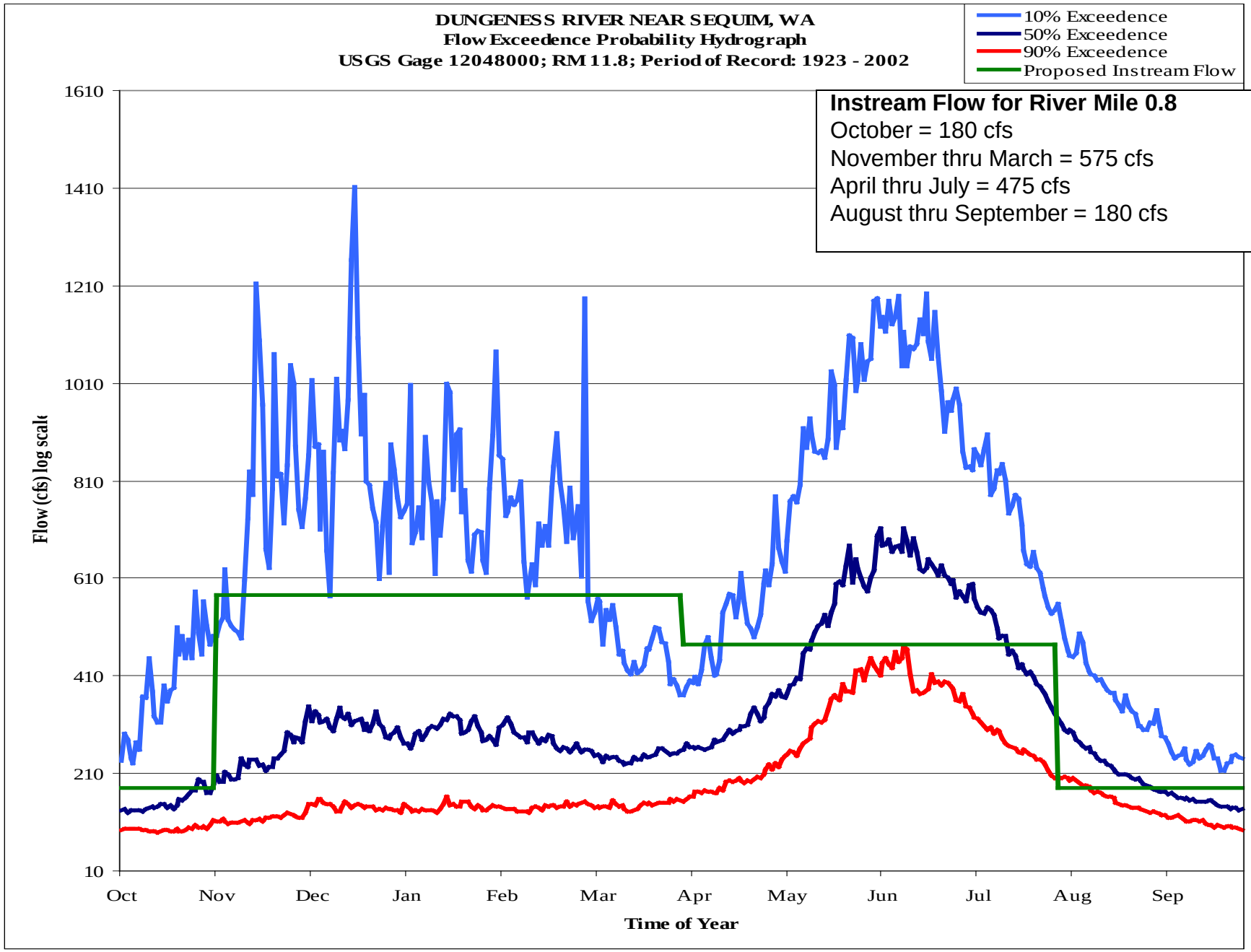
The following persons, almost all of whom helped design and implement the Dungeness Instream Flow Study, also met in late 1992 and early 1993 to definitively interpret the study results.

Jamestown S'Klallam Tribe	Mike Reed Ann Seiter Brad Sele
National Marine Fisheries Service	Brian Winter, Ph.D.
Washington Department of Ecology	Brad Caldwell
Washington Department of Fisheries	Randy Johnson
Washington Department of Wildlife	Hal Beecher, Ph.D. Tim Rymer
U.S. Fish and Wildlife Service	Joseph M. Hiss Philip L. Wampler

ABSTRACT

The Dungeness Instream Flow Group evaluated the data from the Dungeness River Instream Flow Study (Wampler and Hiss 1991) and recommended the following monthly flows for maximum fish habitat in the lower Dungeness River immediately downstream of the irrigation diversions, in cubic feet per second (cfs):

November through March	575 cfs;
April through July	475 cfs; and
August through October	180 cfs.


DUNGENESS RIVER NEAR SEQUIM, WA
Flow Exceedence Probability Hydrograph
USGS Gage 12048000; RM 11.8; Period of Record: 1923 - 2002
10% Exceedence
50% Exceedence
90% Exceedence
Proposed Instream Flow
Instream Flow for River Mile 0.8
October = 180 cfs
November thru March = 575 cfs
April thru July = 475 cfs
August thru September = 180 cfs
Flow (cfs) log scale
1610
1410
1210
1010
810
610
410
210
10
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Time of Year

Additional studies of the side channels in the river by the Bureau of Reclamation in 2003 and again by R2 and Anchor consultants in 2007 supported the instream flows especially the 180 cfs as being correct for the Dungeness River.

Dungeness River In-Stream Flow
Side Channel Study

PREPARED FOR:
STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY AND CLALLAM COUNTY

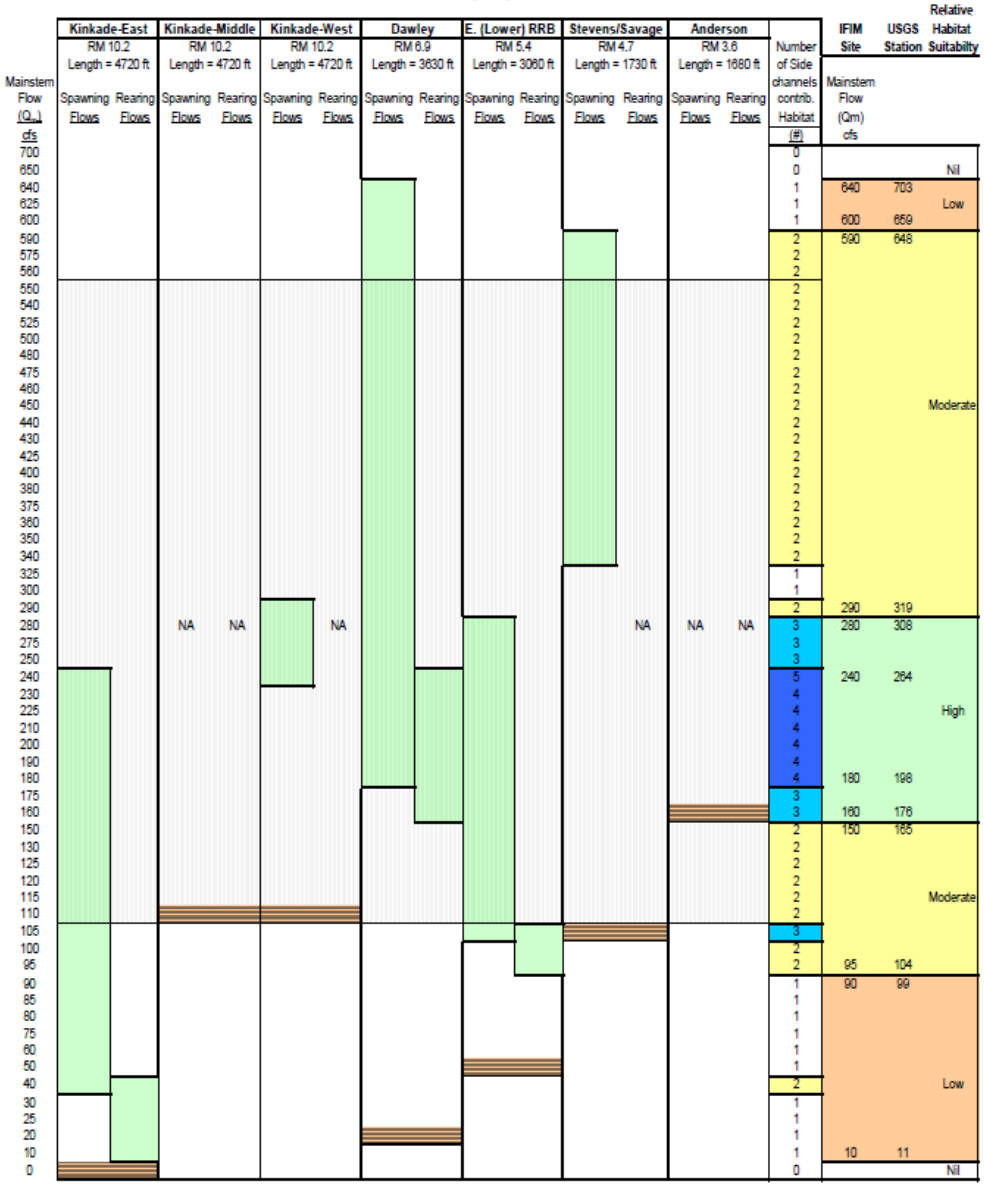
REPORT PREPARED BY:
TECHNICAL SERVICE CENTER
BUREAU OF RECLAMATION
DENVER, COLORADO

IN COOPERATION WITH:
JAMESTOWN S'KLALLAM TRIBE

FEBRUARY 2003

Chinook Salmon Summary

Figure B-3. Assessment of mainstem Dungeness River flows for preferred Chinook salmon spawning and rearing habitat conditions in surface water-connected side channels after Daraio et al. (2003).



1) = Estimated % exceedance levels at the upper IFIM study site (RM 4.2) under average baseline (1999-2002) irrigation withdrawals.

= Suitable habitat range (Daraio et al. 2003; Tables 7 and 8)

= Range of flows surveyed in Summer 2002, within the suitable habitat range (Daraio et al. 2003)

= Empirically derived connection of mainstem and side channel (Daraio et al. 2003; Table 4)

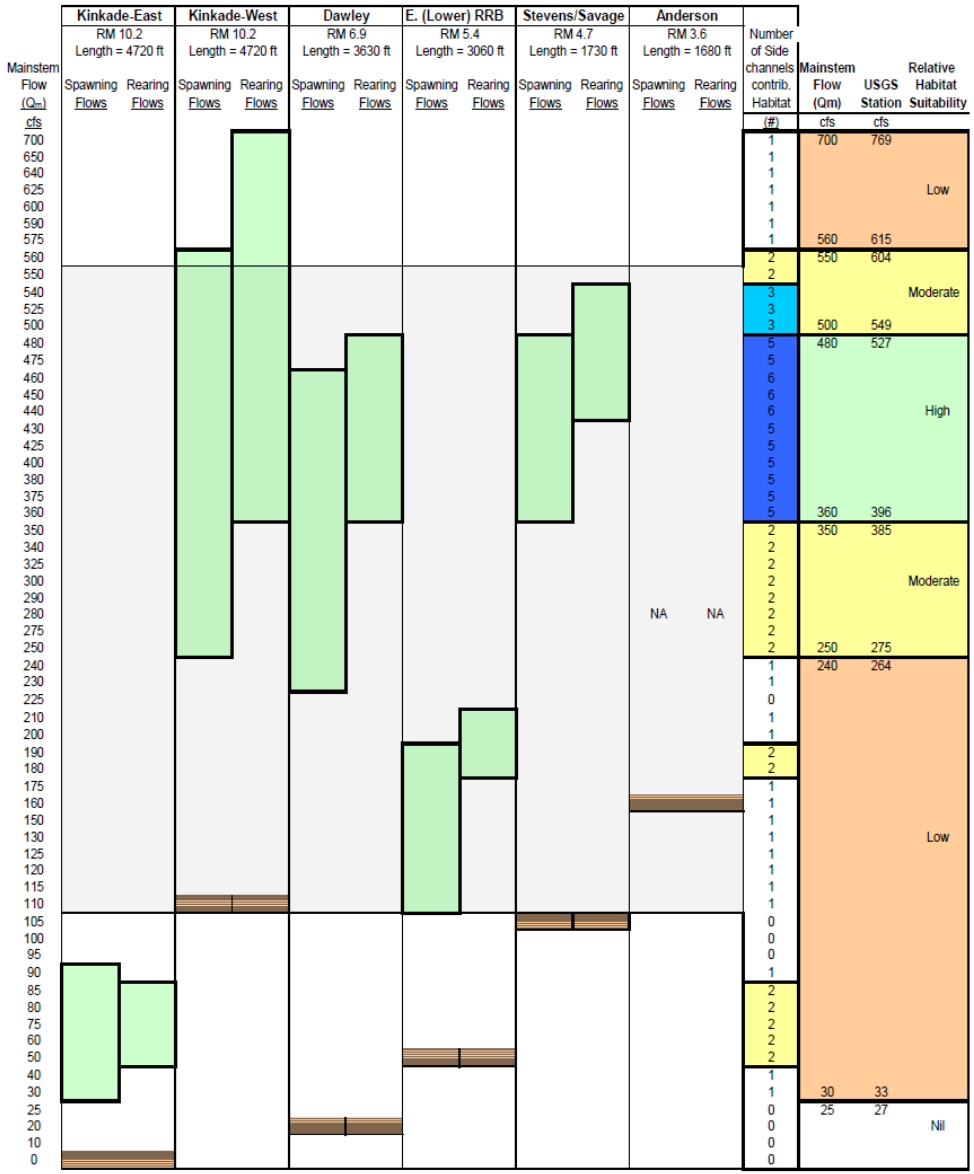
Q_m = Mainstem River Discharge (cfs) at side channel entrance as a function of mainstem river discharge at the USGS site and volume of irrigation diversions during the summer of 2002.

NA = Chinook salmon habitat suitability not attainable at any flows surveyed in Summer 2002.

Number of side channels contributing either spawning or rearing habitat

4 - 5
3
2
0 - 1

Figure B-2. Assessment of mainstem Dungeness River flows for preferred steelhead trout spawning and rearing habitat conditions in surface water-connected side channels after Daraio et al. (2003).



1) = Estimated % exceedance levels at the upper IFIM study site (RM 4.2) under current irrigation withdrawals.

Talley of the number of either spawning or rearing habitat life stages per increment of discharge.

= Preferred habitat range (Daraio et al. 2003; Tables 7 and 8)

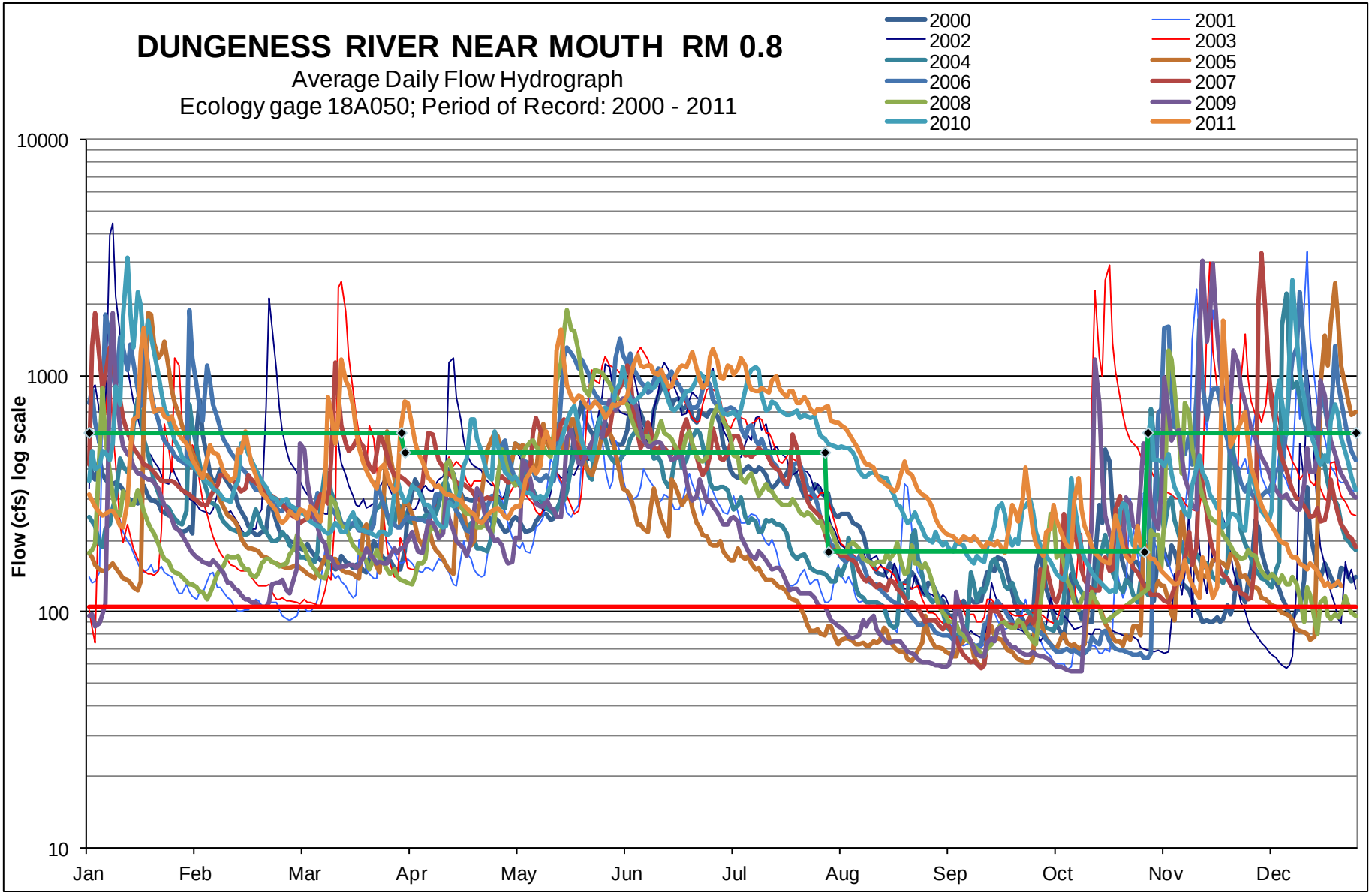
= Range of flows surveyed in Summer 2002 (Daraio et al. 2003)

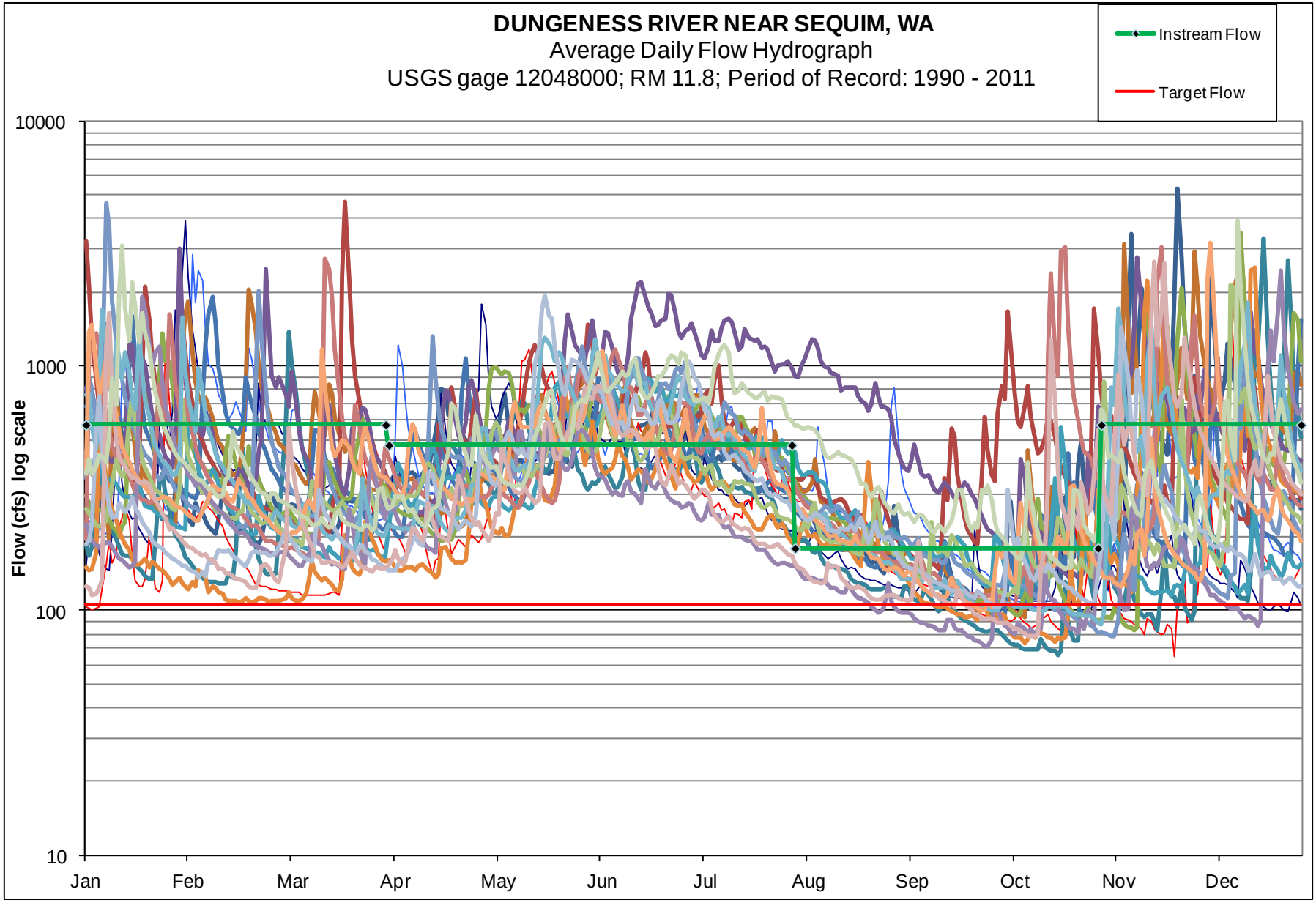
= Empirically derived connection of mainstem and side channel (Daraio et al. 2003)

Q_m = Mainstem River Discharge (cfs) at side channel entrance as a function of mainstem river discharge at the USGS site and volume of irrigation diversions during the summer of 2002.

NA = Chinook salmon habitat suitability not attainable at any flows surveyed in Summer 2002.

4 - 6
3
2
0 - 1


DUNGENESS RIVER NEAR MOUTH RM 0.8
Average Daily Flow Hydrograph
Ecology gage 18A050; Period of Record: 2000 - 2011
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
10000
1000
100
10
Flow (cfs) log scale
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec


DUNGENESS RIVER NEAR SEQUIM, WA
Average Daily Flow Hydrograph
USGS gage 12048000; RM 11.8; Period of Record: 1990 - 2011
Instream Flow
Target Flow
Flow (cfs) log scale
10000
1000
100
10
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec

The average September flow in the lower Dungeness River was **200 to 225 cfs** (RM 0.9) from 1899-1901; flow dropped according to spot measurements of **21** to **26 cfs** (RM 3.3) in September from 1987-1989; the average September flow stayed down at **57 cfs** in 1993 (RM 5.6); diversions were limited to 50% of flow starting 1994; the monthly September average increased to **90 to 125 cfs** (RM 0.9) from 2000 to 2001; and has stayed about the same having averaged **113 cfs** (RM 0.8 Ecology Gage) from 2000 to 2011 with highs of **212 cfs** in 2010 and **222 cfs** in 2011. The Ecology gage is at https://fortress.wa.gov/ecy/wrx/wrx/flows/station.asp?sta=18A050#block2

USGS 12049000 DUNGENESS RIVER AT DUNGENESS RM 0.9

00060, Discharge, cubic feet per second,												
YEAR	Monthly mean in cfs (Calculation Period: 1898-10-01 -> 2001-09-30)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1898										229	165	231
1899	458	394	297	304	470	664	521	233	200	222	1,162	784
1900	589	296	1,179	670	604	827	529	339	224	294	326	1,340
1901	572	420	375	330	855	810	664	456	225	180	669	504
1999											880	700
2000	311	314	171	296	409	689	385	217	*125	163	125	150
2001	195	114	139	166	342	316	176	128	*90			

*Note in 1994 the irrigation district began voluntary target flow of 100 cfs and not taking more than 50% OF flow at USGS gage at 11.8.

USGS 12048650 DUNGENESS RIVER AT RR BRIDGE RM 5.6

00060, Discharge, cubic feet per second,												
YEAR	Monthly mean in cfs (Calculation Period: 1993-09-01 -> 1994-05-31)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1993									57	70	61	246
1994	197	160	347	287	380							

USFWS, Ecology, & USGS measured flows in Dungeness River weekly from August to October 1986-1989.

On 10/23/1986 they measured **26** cfs at river mile 3.3 at Woodcock Bridge with diversions of 63 cfs.

On 9/1/1987 they measured **26** cfs at river mile 6.4 at Hwy 101 Bridge with diversions of 125 cfs.

On 9/12/1988 they estimated **39** cfs at river mile 3.3 at Woodcock Bridge with diversions of 99 cfs.

On 9/11/1989 they measured **21** cfs at river mile 3.3 at Woodcock Bridge with diversions of 81 cfs.

Why do we have gages only at river miles 11.8 and 0.8 when the reach most critical to fish is from river miles 6.4 to 2?

The USGS gage at RM 11.8 has been there for 89 years (since 1923). There is a bedrock channel there that doesn't move. Ecology's gage went in at RM 0.8 in 1999. When the 1994 and 1998 agreements with the irrigation district were made on taking no more than 50% of the flow with a 100 cfs target flow, it was the only gage on the river - that's why it was used in the agreements.

Ecology has had a gage at Schoolhouse Road at RM 0.8 since 1999. The lower 11.8 miles of the Dungeness River were not gaged from 1903 to 1999. The irrigation diversions occur in the 11 miles between the USGS and Ecology gages. The difference between the gages is due to 1) rain and 2) diversions and 3) inflow from Matriotti Creek (around 13 cfs in Sept 1999) and 4) a loss from losing reaches upstream of RM 0.8 somewhere around 10 cfs in August.

We have not been able to create a gage at HWY 101 at RM 6.4, or at the Railroad Bridge at RM 5.6, or at Old Olympic HWY at RM 4.0, or at Woodcock Road at RM 3.3 because those river crossings are too unstable due to braiding in the river which causes the channel is to jump back and forth – sometimes on a weekly basis. A couple of years ago Ecology put in transducers to measure the water surface for a gage at Railroad Bridge but gave up after a month because the channel kept moving so much. At Schoolhouse Road at RM 0.8 is there a bridge on one side and a dike on the other side creating a stable, single channel for measuring streamflow.

How have the low summer flows changed in the lower Dungeness River over the last 100 years?

The average September flow in the lower Dungeness River was **200 to 225 cfs** (RM 0.9) from 1899-1901; flow dropped according to spot measurements of **21** to **26 cfs** (RM 3.3) in September from 1987-1989; the average September flow stayed down at **57 cfs** in 1993 (RM 5.6); diversions were limited to 50% of flow starting 1994; the monthly September average increased to **90 to 125 cfs** (RM 0.9) from 2000 to 2001; and has stayed about the same having averaged **113 cfs** (RM 0.8) from 2000 to 2011 with highs of **212 cfs** in 2010 and **222 cfs** in 2011.

6. In January 2004, the DRMT and EMMT approved the Elwha-Dungeness Watershed Plan, after working independently as two teams, collaboratively together, and with input from the public for five years through the process identified in RCW 90.82.

7. RCW 90.82.130 requires the County to conduct at least one public hearing on proposed watershed plans prior to Board decision for approval or remand; three hearings were held in September and October 2004.

8. In May 2005 the DRMT and EMMT approved a list of amendments to plan recommendations for the Board's consideration prior to making its decision.

9. A final public hearing on the Elwha-Dungeness Watershed Plan was held on June 7, 2005.

10. RCW 90.82.130 requires the Board of Clallam County Commissioner to consider the Elwha-Dungeness Watershed Plan after the public hearing and to decide to approve or reject the Plan.

NOW, THEREFORE, BE IT RESOLVED by the Board of Clallam County Commissioners in consideration of the above findings of fact:

1. That the Elwha-Dungeness (WRIA 18) Watershed Plan as presented on 7 June 2005 is approved.

PASSED AND ADOPTED this 7th day of June 2005

BOARD OF CLALLAM COUNTY COMMISSIONERS

Michael C. Chapman, Chair

Howard V. Doherty, Jr.

Stephen P. Tharinger

ATTEST:

~~Trish Perrott~~, CMC, Clerk of the Board
Penelope Linterman

c: Department of Community Development

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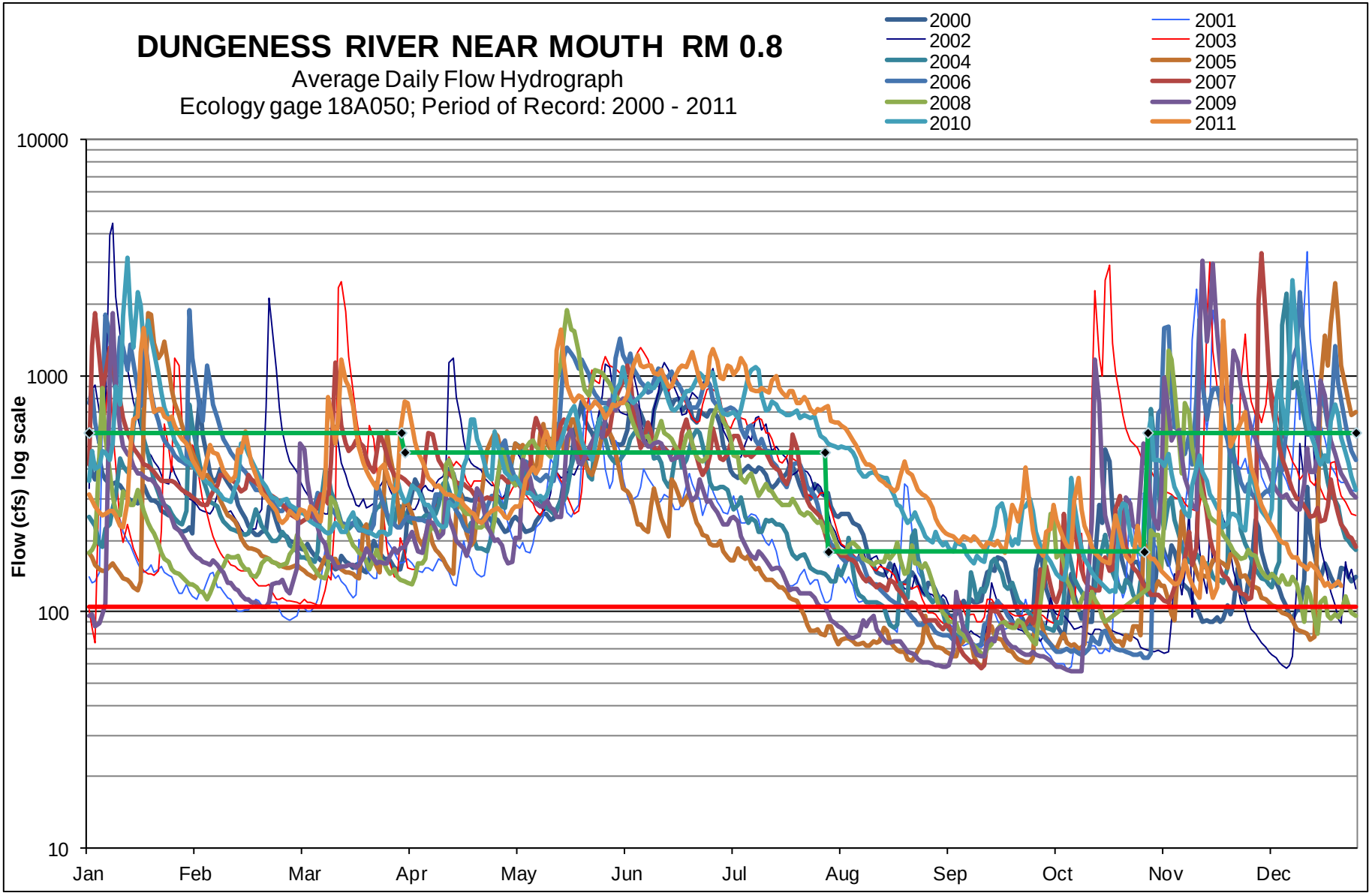
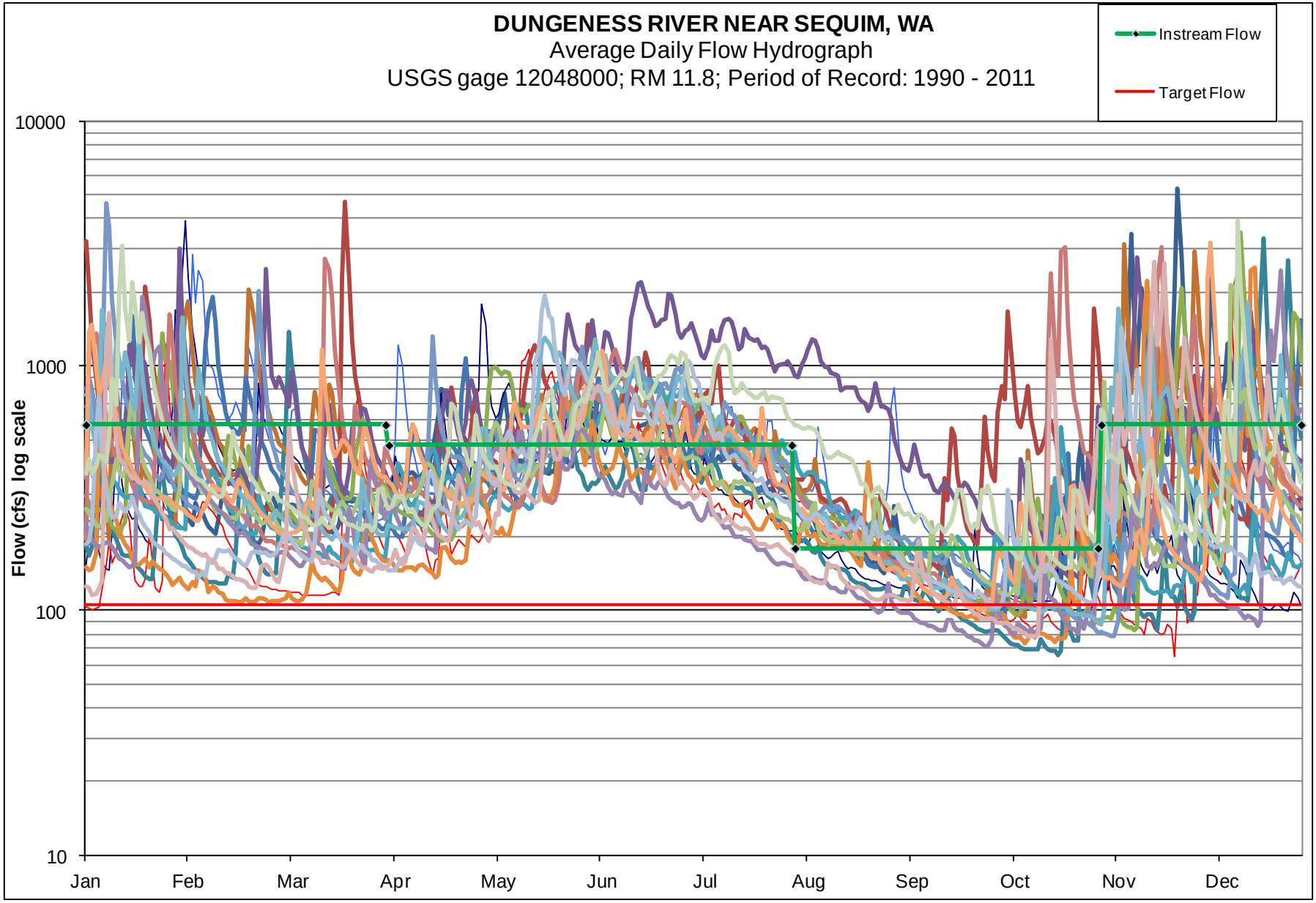
What would happen if the 180 cfs instream flow number is lowered in the rule?

- Under the Watershed Planning Act 90.82 **Ecology is obligated by law to adopt the instream flow numbers in the Watershed Plan.** The instream flow numbers were approved by the Clallam County Commissioners, and initiating governments: Clallam County, City of Port Angeles, Elwha Klallam Tribe, Jamestown S'Klallam Tribe, Agnew Irrigation District, Ecology and the Planning Unit members. It was approved in June, 2005 with the 180 cfs instream flow number and can only be changed by unanimous consensus of the initiating governments and a majority of the non-governmental Planning Units members.
- **Ecology would not be in compliance with the Water Resources Act of 1971 90.54 antidegradation standard** which requires Ecology to set an instream flow that protects and preserves fish and other instream resources.
- A lower instream flow number would **not be defensible in court** because it would have to ignore 20 years of extensive, peer-reviewed scientific biological and hydrologic studies on the habitat requirements of the ESA-listed salmonids.
- M**illions of dollars spent on flow and salmon restoration might be wasted.** The Irrigation District lined their ditches and reduced flow loss to put water back into the Dungeness River. A low instream flow would allow Ecology to begin issuing new water rights for new diversions to give away the water the District and Tribes and Ecology and many others have worked so hard to restore.


DUNGENESS RIVER NEAR MOUTH RM 0.8
Average Daily Flow Hydrograph
Ecology gage 18A050; Period of Record: 2000 - 2011
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
10000
1000
100
10
Flow (cfs) log scale
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec


DUNGENESS RIVER NEAR SEQUIM, WA
Average Daily Flow Hydrograph
USGS gage 12048000; RM 11.8; Period of Record: 1990 - 2011
Instream Flow
Target Flow
Flow (cfs) log scale
10000
1000
100
10
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec

The average September flow in the lower Dungeness River was **200 to 225 cfs** (RM 0.9) from 1899-1901; flow dropped according to spot measurements of **21** to **26 cfs** (RM 3.3) in September from 1987-1989; the average September flow stayed down at **57 cfs** in 1993 (RM 5.6); diversions were limited to 50% of flow starting 1994; the monthly September average increased to **90 to 125 cfs** (RM 0.9) from 2000 to 2001; and has stayed about the same having averaged **113 cfs** (RM 0.8 Ecology Gage) from 2000 to 2011 with highs of **212 cfs** in 2010 and **222 cfs** in 2011. The Ecology gage is at https://fortress.wa.gov/ecy/wrx/wrx/flows/station.asp?sta=18A050#block2

USGS 12049000 DUNGENESS RIVER AT DUNGENESS RM 0.9

00060, Discharge, cubic feet per second,												
YEAR	Monthly mean in cfs (Calculation Period: 1898-10-01 -> 2001-09-30)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1898										229	165	231
1899	458	394	297	304	470	664	521	233	200	222	1,162	784
1900	589	296	1,179	670	604	827	529	339	224	294	326	1,340
1901	572	420	375	330	855	810	664	456	225	180	669	504
1999											880	700
2000	311	314	171	296	409	689	385	217	*125	163	125	150
2001	195	114	139	166	342	316	176	128	*90			

*Note in 1994 the irrigation district began voluntary target flow of 100 cfs and not taking more than 50% OF flow at USGS gage at 11.8.

USGS 12048650 DUNGENESS RIVER AT RR BRIDGE RM 5.6

00060, Discharge, cubic feet per second,												
YEAR	Monthly mean in cfs (Calculation Period: 1993-09-01 -> 1994-05-31)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1993									57	70	61	246
1994	197	160	347	287	380							

USFWS, Ecology, & USGS measured flows in Dungeness River weekly from August to October 1986-1989.

On 10/23/1986 they measured **26** cfs at river mile 3.3 at Woodcock Bridge with diversions of 63 cfs.

On 9/1/1987 they measured **26** cfs at river mile 6.4 at Hwy 101 Bridge with diversions of 125 cfs.

On 9/12/1988 they estimated **39** cfs at river mile 3.3 at Woodcock Bridge with diversions of 99 cfs.

On 9/11/1989 they measured **21** cfs at river mile 3.3 at Woodcock Bridge with diversions of 81 cfs.

Why do we have gages only at river miles 11.8 and 0.8 when the reach most critical to fish is from river miles 6.4 to 2?

The USGS gage at RM 11.8 has been there for 89 years (since 1923). There is a bedrock channel there that doesn't move. Ecology's gage went in at RM 0.8 in 1999. When the 1994 and 1998 agreements with the irrigation district were made on taking no more than 50% of the flow with a 100 cfs target flow, it was the only gage on the river - that's why it was used in the agreements.

Ecology has had a gage at Schoolhouse Road at RM 0.8 since 1999. The lower 11.8 miles of the Dungeness River were not gaged from 1903 to 1999. The irrigation diversions occur in the 11 miles between the USGS and Ecology gages. The difference between the gages is due to 1) rain and 2) diversions and 3) inflow from Matriotti Creek (around 13 cfs in Sept 1999) and 4) a loss from losing reaches upstream of RM 0.8 somewhere around 10 cfs in August.

We have not been able to create a gage at HWY 101 at RM 6.4, or at the Railroad Bridge at RM 5.6, or at Old Olympic HWY at RM 4.0, or at Woodcock Road at RM 3.3 because those river crossings are too unstable due to braiding in the river which causes the channel is to jump back and forth – sometimes on a weekly basis. A couple of years ago Ecology put in transducers to measure the water surface for a gage at Railroad Bridge but gave up after a month because the channel kept moving so much. At Schoolhouse Road at RM 0.8 is there a bridge on one side and a dike on the other side creating a stable, single channel for measuring streamflow.

How have the low summer flows changed in the lower Dungeness River over the last 100 years?

The average September flow in the lower Dungeness River was **200 to 225 cfs** (RM 0.9) from 1899-1901; flow dropped according to spot measurements of **21** to **26 cfs** (RM 3.3) in September from 1987-1989; the average September flow stayed down at **57 cfs** in 1993 (RM 5.6); diversions were limited to 50% of flow starting 1994; the monthly September average increased to **90 to 125 cfs** (RM 0.9) from 2000 to 2001; and has stayed about the same having averaged **113 cfs** (RM 0.8) from 2000 to 2011 with highs of **212 cfs** in 2010 and **222 cfs** in 2011.

6. In January 2004, the DRMT and EMMT approved the Elwha-Dungeness Watershed Plan, after working independently as two teams, collaboratively together, and with input from the public for five years through the process identified in RCW 90.82.

7. RCW 90.82.130 requires the County to conduct at least one public hearing on proposed watershed plans prior to Board decision for approval or remand; three hearings were held in September and October 2004.

8. In May 2005 the DRMT and EMMT approved a list of amendments to plan recommendations for the Board's consideration prior to making its decision.

9. A final public hearing on the Elwha-Dungeness Watershed Plan was held on June 7, 2005.

10. RCW 90.82.130 requires the Board of Clallam County Commissioner to consider the Elwha-Dungeness Watershed Plan after the public hearing and to decide to approve or reject the Plan.

NOW, THEREFORE, BE IT RESOLVED by the Board of Clallam County Commissioners in consideration of the above findings of fact:

1. That the Elwha-Dungeness (WRIA 18) Watershed Plan as presented on 7 June 2005 is approved.

PASSED AND ADOPTED this 7th day of June 2005

BOARD OF CLALLAM COUNTY COMMISSIONERS

Michael C. Chapman, Chair

Howard V. Doherty, Jr.

Stephen P. Tharinger

ATTEST:

~~Trish Perrott~~, CMC, Clerk of the Board
Penelope Linterman

c: Department of Community Development

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What would happen if the 180 cfs instream flow number is lowered in the rule?

- Under the Watershed Planning Act 90.82 **Ecology is obligated by law to adopt the instream flow numbers in the Watershed Plan.** The instream flow numbers were approved by the Clallam County Commissioners, and initiating governments: Clallam County, City of Port Angeles, Elwha Klallam Tribe, Jamestown S'Klallam Tribe, Agnew Irrigation District, Ecology and the Planning Unit members. It was approved in June, 2005 with the 180 cfs instream flow number and can only be changed by unanimous consensus of the initiating governments and a majority of the non-governmental Planning Units members.
- **Ecology would not be in compliance with the Water Resources Act of 1971 90.54 antidegradation standard** which requires Ecology to set an instream flow that protects and preserves fish and other instream resources.
- A lower instream flow number would **not be defensible in court** because it would have to ignore 20 years of extensive, peer-reviewed scientific biological and hydrologic studies on the habitat requirements of the ESA-listed salmonids.
- M**illions of dollars spent on flow and salmon restoration might be wasted.** The Irrigation District lined their ditches and reduced flow loss to put water back into the Dungeness River. A low instream flow would allow Ecology to begin issuing new water rights for new diversions to give away the water the District and Tribes and Ecology and many others have worked so hard to restore.