Factors that affect steelhead (and salmon) catch and release survival in freshwater sport fisheries throughout Washington state

Ian Courter, Thomas Buehrens, Forrest Carpenter, Benjamin Briscoe, Joshua Richards, and Scott Gibson

**MOUNT HOOD** ENVIRONMENTAL



Updated July 2016

A/22/1992 12/28/1993 4/22/1992 10/25/1999 11/20/1991 12/28/1993 8/18/1997 9/2/2005 1/5/2006 3/24/1999 9/2/2005 8/18/1997 9/2/2005 1/6/2000 Willamette / Lower Columbia Rec wery Domai 3/25/1999 9/2/2005 3/24/1999 9/2/2005 5/28/2005 2/24/2006 1/19/1918 9/2/2005 1/5/200 3/24/1999 9/2/2005 3/25/1999 9/2/2005 1/5/2008 **Oregon Coast Recovery Domain** 2/11/2008 2/11/2008 Southern Oregon / Northern California Coast Recovery Domain 5/6/1997 5/5/1999 North-Central California Coast Recovery Domain 9/16/1999 9/2/2005 10/31/1996/ 6/28/2005 (8 5/5/1999 4/2/2012 (18 8/18/1997 9/2/2005 1/5/2006 6/7/2000 9/2/2005 1/5/2004 **Central Valley Recovery Domain** 3/15/1998 9/2/2005 (5/2h/nc 9/16/1999 9/2/2005 11/5/1990 ( 6/16/1993 1/4/1994 (8 South-Central / Southere California Coast Recovery Do B/18/1997 9/2/2005 1/5/2006 8/18/1997 5/1/2002 (85 9/2/2005 1/5/2006 ESA = Endangered Species Act. CH = Critical Habitat. RE = Range Extension E = Endangened, T = Threatened,

**ESA** 

Status

Date of ESA

Listing

3/25/1999

3/25/1999

3/24/1999

\$/11/2003

3/25/1999

1/5/2006

Date of D1

Designation

9/2/2005

9/2/2005

9/2/2005

2/24/2006

9/2/2005



MOUNT HOOD ENVIRONMENTAL

# EFFECTIVE JULY 1, 2017 - JUNE 30, 2018 SPORT FISHING RULES

Photo By Scott Mayfield



#### Columbia Basin Rivers - Special Rules

ADDITIONAL RULES

ABERNATHY CREEK (Cowlitz Co.) from mouth (Hwy. 4 Bridge) to 200° above Abernathy Fails and all tributaries (501) Co. 8. Samon/Sterbard Endorsement (p. 14) Bortone notes manual fr frammo/Sterbard (p. 14)	CLOSED WATERS above Abernathy F	3 - 11
Above Abernathy Fails and all tributaries (501) Oct. R. Samon/Stantaud Endorsement (p. 14) Retries noise required for Samon/Stantaud (p. 14) Retries noise required for Samon/Stantaud (p. 14)	above Abernatiny r	and Man
(501) Od. II. Samon/Stechast Endorserent (p. 14) Batteres horse required for Samon/Stechaed (p. 14)	TELEVISION OF	ans.
Col. H. Samon/Steatward Endomorrant (p. 14) Barbana hooks required for Salmon/Steethead (p. 14)	TROUT	No
independent sources required for salimon sineemed (p. 14)	Other Game Fish	Fint
Mandatory Hatchery Steelnead Retention (p. 54)	SALMON	&N Nrs
	GALMON	(40)
from 200' above Abernathy Falls	ALL SPECIES - SE	Nach
upstream and as tributanes (501)	TROUT	Fed
Mandatory Hatchery Steelhead Retention (p. 14)	Other Game Fish	Fed
AHTANUM CREEK (Yakima Co.)	CLOSED WATERS	s - in
including NORTH FORK and MIDDLE	Shellneck Creek (a	bout
FORK	Section 34 upstrea	m to
	Other Game Fish	Fed
	Garler Garlier Fian	
AMERICAN RIVER (Yakima Co.) from	TROUT	Fet
mount to may, 410 bridge at river mile 5.4	Other Game Fish	P.ed.
from Hwy. 410 Bridge at river mile	TROUT	First
5.4 to Mesatchee Creek Trail river	Other Game Fish	First
or cooling at their time to o	TROUT	Set
A server and an average	Other Game Fish	Set
from Mesatchee Creek Trail river	TROUT	Fed
crossing at river mile 15.8 upstream	Other Game Fish	Fet
all tributaries except Union and Kettle creeks	All Game Fish	Fel
AMON WASTEWAY (Benting Co.)	TROUT	Fed
Anon masterial (penanco.)	Other Game Fish	Finit
ABOTH ODEEK (Analis Coll and	Loudd to Patrice	
NORTH FORK from mouth to USES	ALL SPECIES - se	to th
boundary	All Game Fish	First
	All Carrie Flat	Fred
(tributary to South Fork Tieton River) upstream from fails about 3/ mile upstream of USFS Road 1000 Bridge	All Game Fish	Fist
BIG MEADOW CREEK (Chelan Co.)	ALL SPECIES - 56	Nect
	EASTERN BROOK TROUT	Satu
		Mer
	Other TROUT	Merr
	Other Game Fish	Satu Mer
all tributaries	All Game Fish	Satu
		Marr
BIG ROCK CREEK (Clark/Skarnania Co.)	All Game Fish	First.
BIRD CREEK (Klickitat Co.)	TROUT	Sahu
	Other Green Einth	Satu
	ourse came rish	Mer
BITTER CREEK (Clark Co.)	All Game Fish	Fet
BLOCKHOUSE CREEK (Klickitat Co.)	TROUT	Fest
	Other Game Fish	First
BLUE CREEK (Lewis Co.) from mouth	ALL SPECIES - ni	ant c
to posted sign above rearing pond outlet	hooked inside the	nout
(507)	TROUT	Jun
Battless hopis required for Salmon Steelhard (n. 14)		
Mandatory Hatchery Steelness Retention (p. 14)	SALMON	Aug
BLUE LAKE CREEK (Lewis Co.)	All Game Fish	First
BOBCAT CREEK (Adams Co.)	All Game Fish	Apr
BONAPARTE CREEK (Okanonan Co.)	All Game Fish	Sette
and all tributaries from the falls at river mile 1.0 upstream	r s como rian	Мет

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Wild/Hatchery ID	Eastside
Public Beach Season Information	Marine

Shellfish Gear Rules





Author	Location	Species/life-history	<b>Mortality Rate</b>
Cowen et al. (2006)*	Nicola River, BC	Summer-run Chinook	0.90%
Bendock & Alexanderdottir (1993)*	Kenai River, AK	Early and late-run Chinook	7.60%
Lindsay et al. (2004)*	Willamette River, OR	Spring Chinook	12.2% (total); 3.2% (wild only)
Fritts (2016)	Yakima River, WA	Spring Chinook	10-12.2%
Nelson et al. (2005)*	Chilliwack River, BC	Winter steelhead	3.60%
Donaldson et al. (2011)*	Fraser River, BC	Sockeye	<5% (Immediate), 16% (Spawning)
Vincent-Lang et al. (1993)*	Little Susitna River, AK	Coho	11.70%
Thomas (1995)	Skeena River, BC	Coho, steelhead	2.27%, 4.55%
Taylor & Barnhart (1996)	Mad & North Fork Trinity River, CA	Summer steelhead	8.30%
Ashbrook et al.( <i>unpublished</i> )	Samish River, WA	Winter steelhead	14.70%
Buehrens et al. (2012- present)	Wind River, WA	Summer steelhead	In Progress
Hooton (1987)	Keogh River, BC	Winter and summer steelhead	3.40%
Hooton (1988)	Salmon River, BC	Winter and summer steelhead	5.70%





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#### Limitations of Existing Work

Variable environmental conditions
Species
Gear types
Angling methods
Data types recorded
Duration of post-release monitoring
Use of controls

### Solution: HM model (Bentley and Rawding 2016):

- **1. Water Temperature**
- 2. Hooking Location
- 3. BUT....only steelhead, limited sample sizes, many variables still not included





### **Project Objectives**

 Quantify the effect of environmental factors, angling methods, and gear types on salmon and steelhead hooking mortality rates

2. Improve the accuracy of WDFW's hooking mortality model





















- Method & Gear Type
- Hook location
- Hook Size/Type/Barb
- Fight Time
- Handling Time
- Species

•Sex

- Fork-length
- •Angler Exp.
- Fish Condition
- Knotted vs. Knotless nets
- •Water temp.







### Data Collection Year-1: July - December 2017

I THEFT





## **Tagging Progress**

Species	Tagged	CSH Salmon Separator Returns
Fall Chinook	31	4,348 (2017)
Coho	246	35,059 (2017)
Summer Steelhead	21	1,592 (2017)
Spring Chinook*	17	9,393 (2017)
Winter Steelhead**	NA	24 (2018)

\*Captures were incidental, full effort will take place between April and June 2018. \*\*Sampling effort currently underway











### Coho Salmon











#### **H**<sub>1</sub>:

#### Longer handling time will cause mortality to increase. -Handling time affected by angler experience and barbs?













H<sub>2</sub>:

Anglers using barbed hooks will land a greater percentage of fish compared to anglers using barbless hooks.













H<sub>3</sub>:

Fish hooked in critical locations will experience a higher mortality rate compared to those hooked in non-critical location.













**H**4:

# Fish captured using bait will have a lower survival rate than fly or lure caught fish.













### Next Steps

- Increase sample sizes
- Full HM model construction
- Consider ways to incorporate previous study results via priors or meta-analysis techniques







### Acknowledgements

- WDFW Hatchery Staff and Creel Surveyors
- Tacoma Power
- Columbia River Salmon and Steelhead Recreational Advisory Board
- Cowlitz River Ad Hoc Advisory Group
- Andy Coleman
- Angling Vendors/Suppliers
- Volunteers
- FundingWDFW





### Interested in Volunteering?

Contact Us to Help Angle and Tag Salmon and Steelhead: <u>Phone #</u>: (503) 676-4873 <u>Email</u>: info@mthoodenvironmental.com

#### Follow Project Progress at: http://mthoodenvironmental.com/cowlitz/



