Water Drafting Workshop

CALIFORNIA DEPARTMENT OF FISH & WILDLIFE

2016

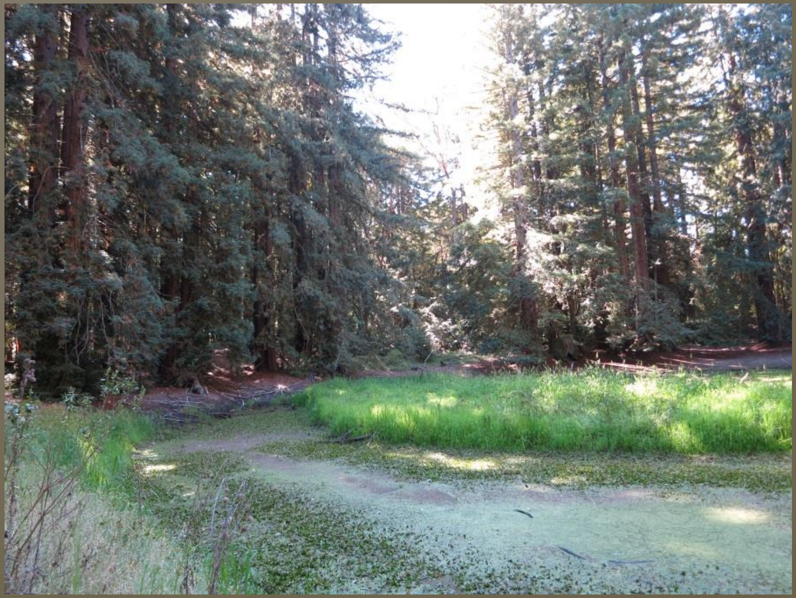
CALIFORNIA DEPARTMENT OF FORESTRY & FIRE PROTECTION CAL FIRE SINCE 1885

Overview

- Effects of Drafting
- Regulatory Considerations
- Common Water Drafting/Diversion Types
- Hydrology and Geomorphology Considerations
- Methods of Streamflow Measurement
- Minimizing Water Use and Alternatives to Drafting
- Protection Measures/BMPs

Introduction

- Goals
- Caveats
- Purpose/Need for Water Drafting
- What is Streamflow?



Pond adjacent to a haul road in Santa Cruz County

Workshop Goals

For agencies, RPFs, and LTOs to understand:

- Regulatory requirements for water drafting in the Forest Practice Rules and Fish and Game Code
- Common water drafting/diversion types
- Techniques and standard operating procedures to measure stream flow
- Water drafting best management practices (BMPs) to reduce potential impacts on aquatic species

Workshop Caveats

- This workshop provides a basic overview
- The recommendations that follow should:
  - Be applied on a site-specific basis
  - Not be treated as CDFW/CAL FIRE policy, instructions, or requirements

© Pete Cafferata
Mokelumne River Watershed

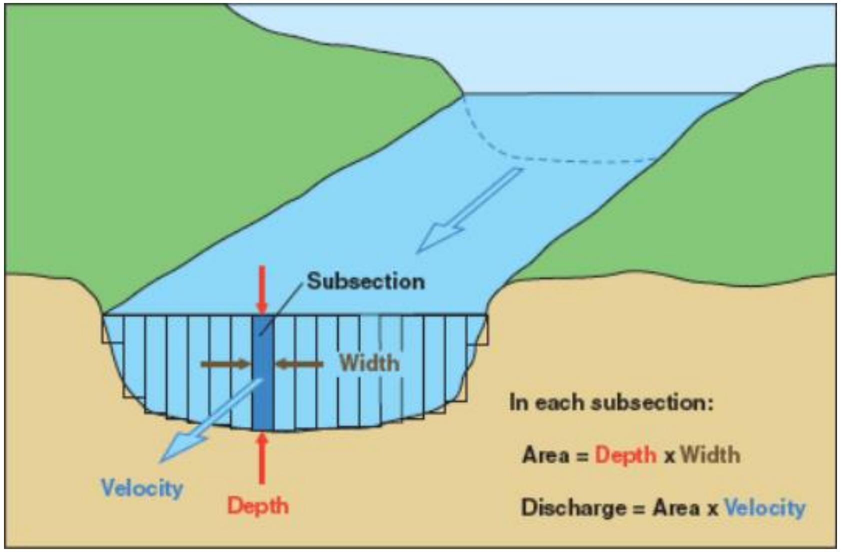
Purpose/Need for Water Drafting

- Dust abatement
- Fire suppression
- Post-wildfire road repair
- Construction/ reconstruction

©Roger Petersen (CalFire)

What is Stream Flow or Discharge?

- The volume of water that moves over a designated point over a fixed period of time
- Area x Velocity = Flow (Q)
- Expressed as:
  - cubic feet per second (cfs)
  - gallons per minute (gpm)



Effects of Drafting on Aquatic Organisms

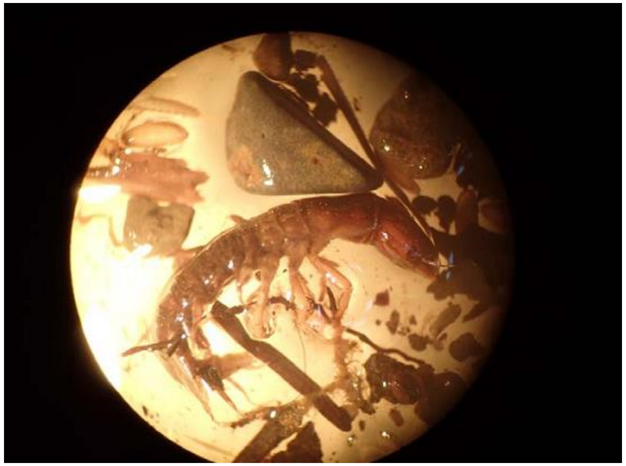
- Fish and Amphibians
- Cumulative Effects

Effects on Fish and Amphibians

- Immediate:
  - Stranding
  - Impingement
  - Predation
  - Egg desiccation
- Long-term
  - Reduced food base (stream invertebrates)
  - Displacement
  - Water Quality

Flow Reduction Impacts on Stream Invertebrates (Fish and Amphibian Food Base)

- Sudden increase/ decrease in flows
  - Increased insect drift
  - Reduced food base
- Lack of habitat
  - Loss of rearing space
  - Increased competition
  - Changes composition, diversity, and richness



Cumulative Effects

Multiple water users on a single stream or within a watershed

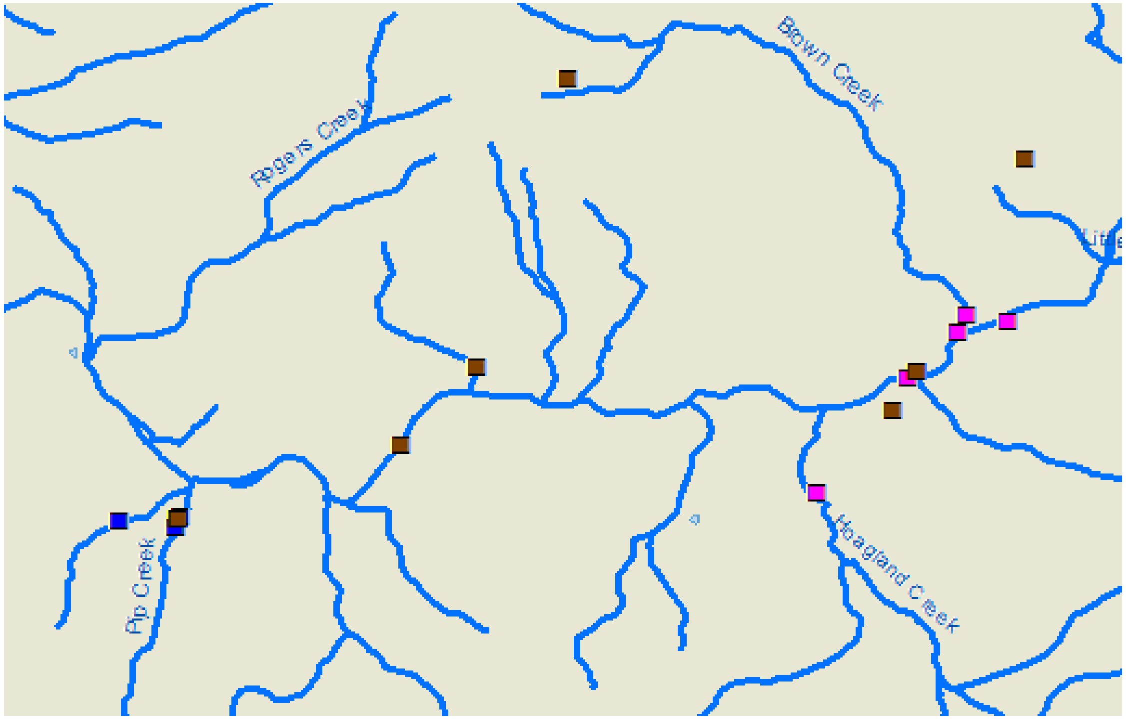


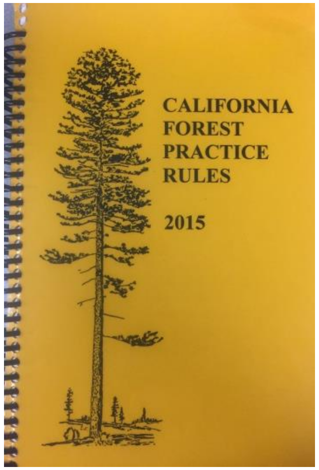
Image from eWRIMS web mapping application, showing the registered water users along an Eel River tributary

Regulatory Considerations

- CEQA and Regulations
- Forest Practice Rules
- Protected Species: CESA and ESA
- Fish and Game Code § 1600 *et seq*.
- Reporting

CEQA and Regulations

- CEQA requires all project impacts be disclosed and an analysis of how to reduce impacts to less than significant
- The California Forest Practice Act and Rules were developed to ensure timber harvest activities comply with CEQA
- Other laws also regulate activities
  - Fish and Game Code 1600 et seq.
  - California Endangered Species Act
  - Endangered Species Act
  - California Water Code



Forest Practice Rules

Maintenance and Monitoring of Logging Roads and Landings

14 CCR § 923.7 [943.7, 963.7] (C)

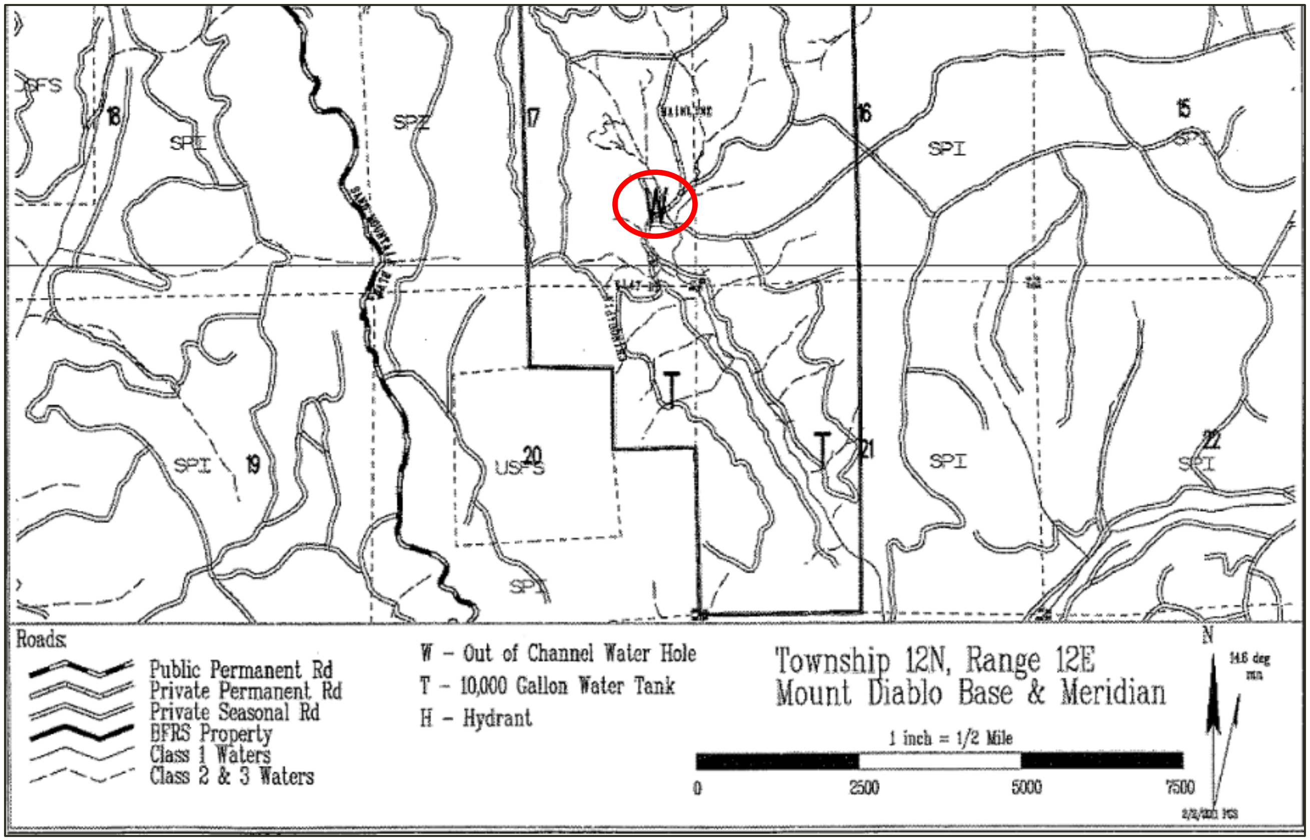
During timber operations, road running surfaces in the logging area shall be treated as necessary to prevent excessive loss of road surface materials

Forest Practice Rules

Contents of Plan

14 CCR § 1034 (x)(4)(C)

Maps shall show logging roads that provide access to rock pits and water drafting sites, and <u>the location of water drafting sites.</u>



Forest Practice Rules

Anadromous Salmonid Protection (ASP) Watersheds

14 CCR § 923.7 [943.7, 963.7](l)(2)

(1) Comply with Fish and Game Code Section 1600, et seq.

(2) Describe the water drafting site conditions and proposed water drafting activity in the plan

A. Map
B. Watercourse Classification
C. Drafting Parameters
D. Drainage area above diversion
E. Estimated streamflow, pumping rate and drafting duration
F. Discussion of potential effects on aquatic habitat downstream
G. Proposed alternatives
H. Methods used to measure streamflow

Forest Practice Rules

ASP Watersheds

14 CCR § 923.7 [943.7, 963.7](l)(3)(A)-(G)

A. Intake screen and velocity limits to avoid fish impingement
B. Approaches rocked
C. Barriers to sediment transport
D. Drip pans and absorbent blankets in WLPZ
E. On Class I streams
    (1) Bypass flows at least 2 cfs
    (2) Diversion rate less than 10 percent of surface flow
    (3) Pool volume reduction less than 10 percent
F. Drafting logs
G. RPF and drafting operator field meeting

Protected Species

California Endangered Species Act (CESA)
Endangered Species Act (ESA)

CESA

- Take of state-listed candidate, threatened or endangered species
- Fish & Game Code defines "take" as: Hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill

ESA

- Take of federally listed threatened or endangered species
- "Take" defined as: Harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct
- Includes protection of species' habitat

List of California federal and state-listed animals can be found: http://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=109406&inline=1

Fish and Game Code (FGC)§ 1600

The Legislature finds and declares that the **protection and conservation of the fish & wildlife resources** of this state are of utmost public interest

Eel River, Fall 2013

Fish and Game Code

Lake and Streambed Alteration § 1600 *et seq.*

An entity may not *substantially* divert or obstruct the natural flow of, or *substantially* change or use any material from the bed, channel, or bank of, any river, stream, or lake…unless CDFW is notified.

Beaver Creek, Tuolumne County, Nov 2015

Fish and Game Code § 45 Definition of "Fish"

"Fish" means wild fish, mollusks, crustaceans, invertebrates, or amphibians, including any part, spawn, ova, thereof

Other Applicable Fish and Game Code Sections

- § 5650 – Water Pollution; Prohibited Materials
- § 5901 – Prevent or Impede Fish from Passing in Streams; Unlawful
- § 5937 – Sufficient Water for Fish Existing Below Dams
- § 5948 – Log Jam, Debris, or Artificial Obstruction in Streams; Unlawful

Reporting

- CDFW may recommend monthly drafting information to ensure:
  - Compliance with Lake and Streambed Alteration Agreement
  - Flow measurements/drafting rates appear reasonable

- In ASP watersheds the drafting operator shall keep a log that records, for each time water is drafted:
  - The date
  - Total pumping time
  - Pump rate
  - Starting time
  - Ending time
  - Volume diverted

Common Water Drafting/Diversion Types

- Direct Drafting
  - In-channel
    - Instream with or without impoundments
  - Off-channel
    - Isolated ponds
    - Excavated basin

- Diversion and Storage
  - Tanks
  - Wells

Direct Drafting In-Channel

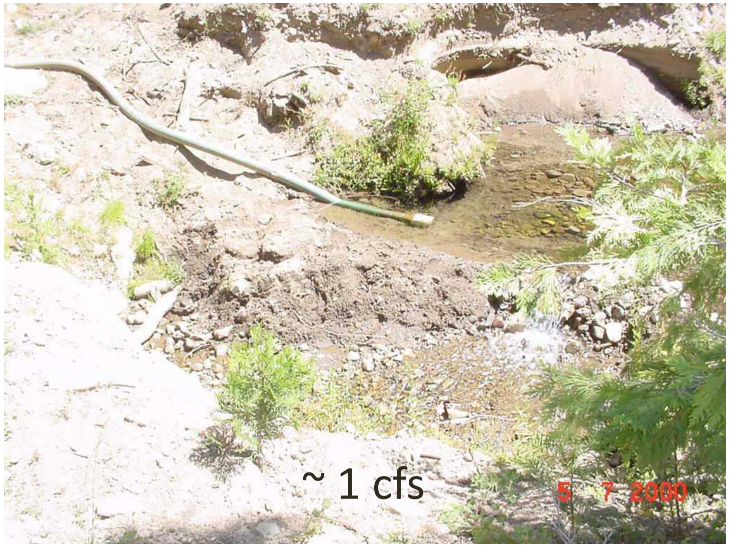
- Streams and rivers where adequate flow exists in which aquatic resources will not be adversely affected
- Usually greater than 2 cfs

Direct Drafting
Example from LSA Agreement in ASP Watershed

Table 1. Class I Watercourse Requirements: Maximum Allowable Water Drafting Rates

Source Flow (streamflow) in cfs (gpm)	Range of allowable water drafting rates (gpm)	Estimated time to draft 3,200 gallons	REQUIREMENTS
> 7.8 (3500)	350	9 minutes	Maximum removal rate shall be < 10% of source flow (streamflow)
> 6 - 7.8 (2693 – 3500)	270 – 350	9 – 12 minutes	Maximum removal rate shall be < 10% of source flow (streamflow)
> 2.25 - 6 (1009 – 2693)	101 – 270, depending on flow	12 – 32 minutes	Drafting Logs Required; Maximum removal rate shall be < 10% of source flow (streamflow); Trucks likely require smaller pumps; pumping rate verification required
>2 – 2.25 (898 – 1010)	90 – 101, depending on flow	32 – 48 minutes	Drafting Logs Required; Maximum removal rate shall be < 10% of source flow (streamflow); Trucks will require smaller pumps; pumping rate verification required
≤ 2 (898)	**NO DRAFTING**		**WATER DRAFTING PROHIBITED**

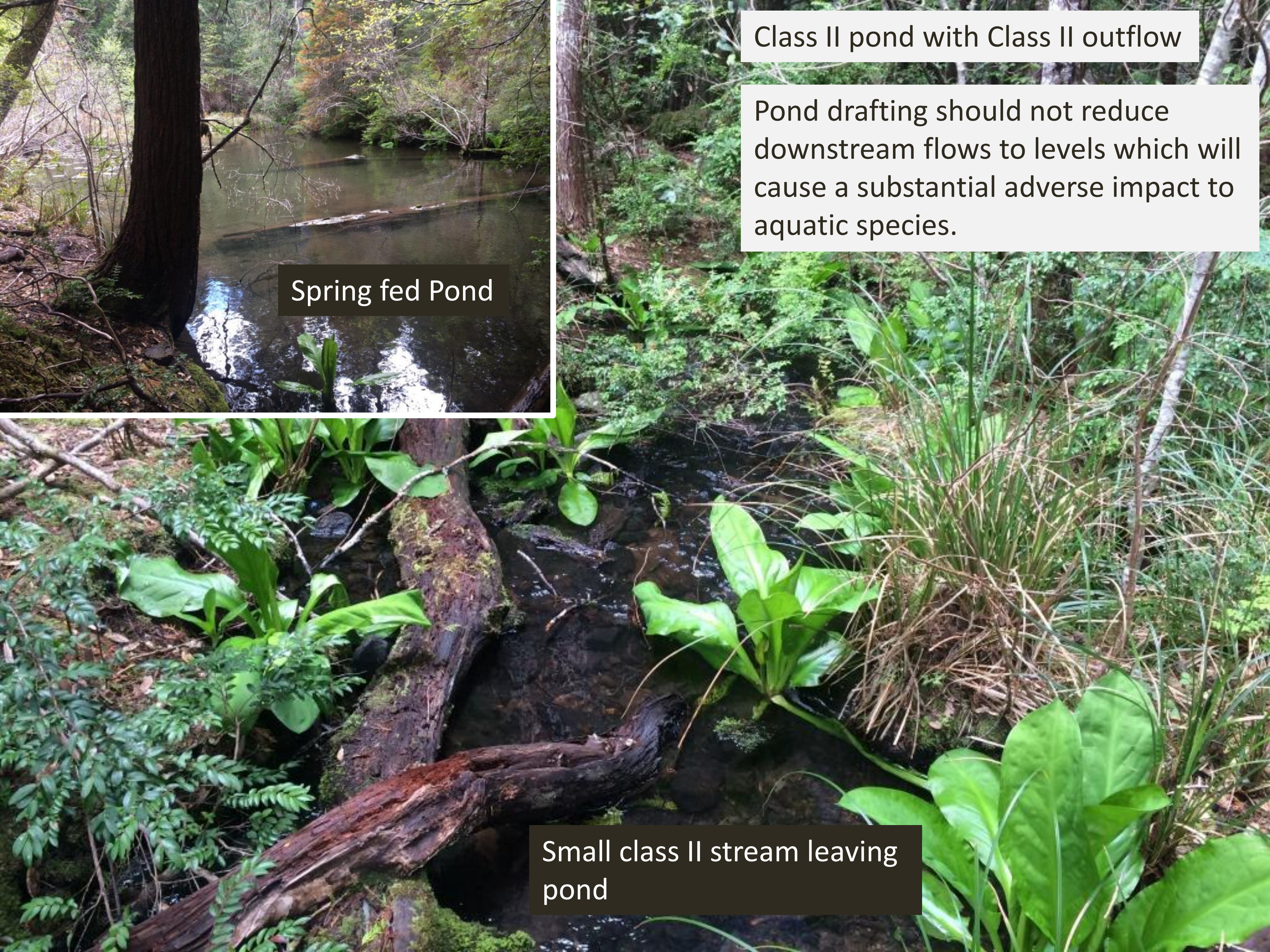
Instream Impoundments (or ponds with perennial outflow)



- Locations selected based on streamflow
- Impoundments allow fish passage
- Diversion / bypass flows should not exceed a rate that cause substantial adverse impacts to aquatic resources

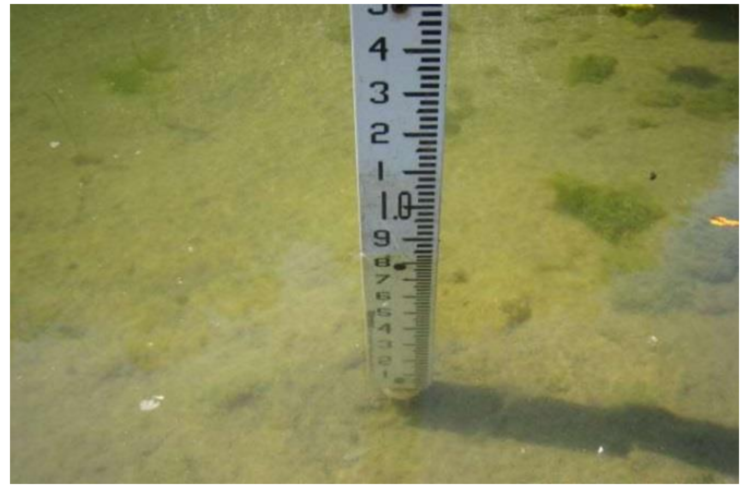
Class II pond with Class II outflow

Pond drafting should not reduce downstream flows to levels which will cause a substantial adverse impact to aquatic species.



Off- Channel
Isolated Ponds (No Outflow)

- Staff gauge establishes bench marks
- Avoid drying of nearshore vegetated zone and associated aquatic species

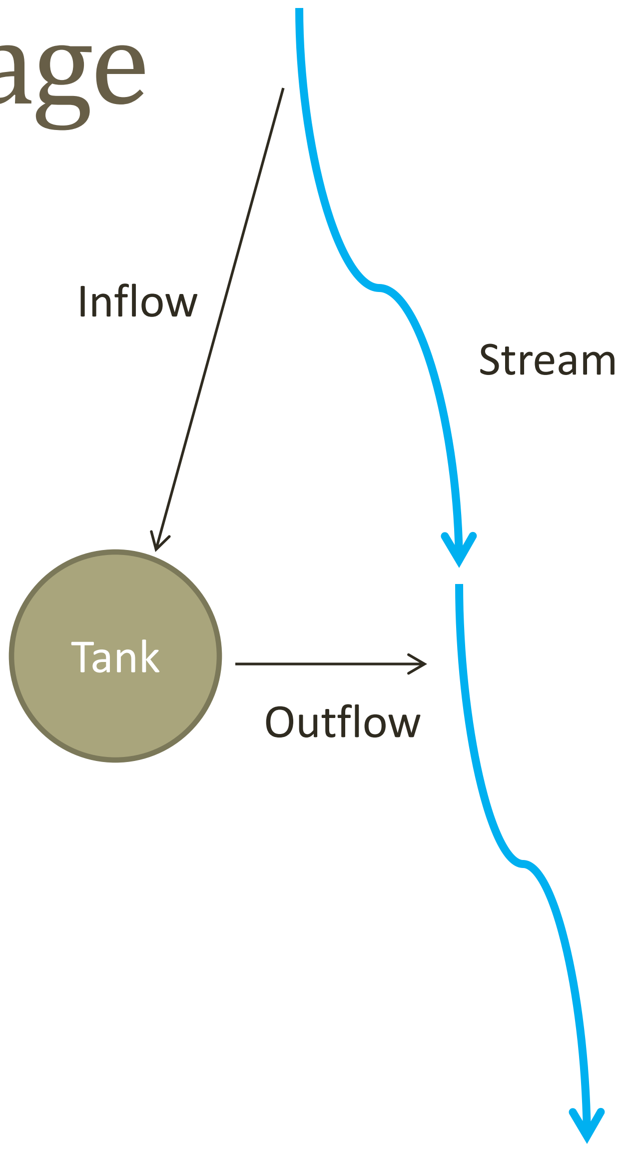


Off-Channel Excavated Basins

- Excavated basins near active stream channel
- Unconfined alluvial channels only
- Avoids instream fish impingement
- Slow infiltration reduces instream flow diversion
- Evaluate infiltration/diversion rate effects on instream flow and adjust diversion rates accordingly
- Recontouring off channel water drafting holes

Diversion and Storage

- Gravity system or solar powered pumps feed 3 tanks via 2 to 4-inch PVC pipe.
- Mainly used on small streams with low flow (< 2 cfs), where direct drafting is not feasible
- Can take a long time to fill (half an hour to two days to refill tank, depending on stream flow)
- Considerations



Class II water drafting intake screen (Mesh)

Class II water drafting intake

PVC pipe leading from intake to tank

Class II Water Drafting Tank


Class II Water Drafting Tank:
No float valve: flow through
system

Wells

Is groundwater within CDFW jurisdiction?

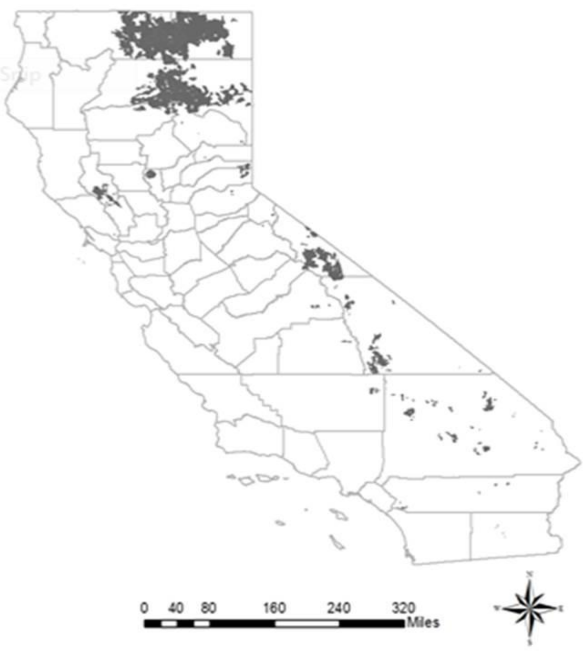
- Depends on whether pumped water will affect nearby streams

Hydrology and Geomorphology Considerations

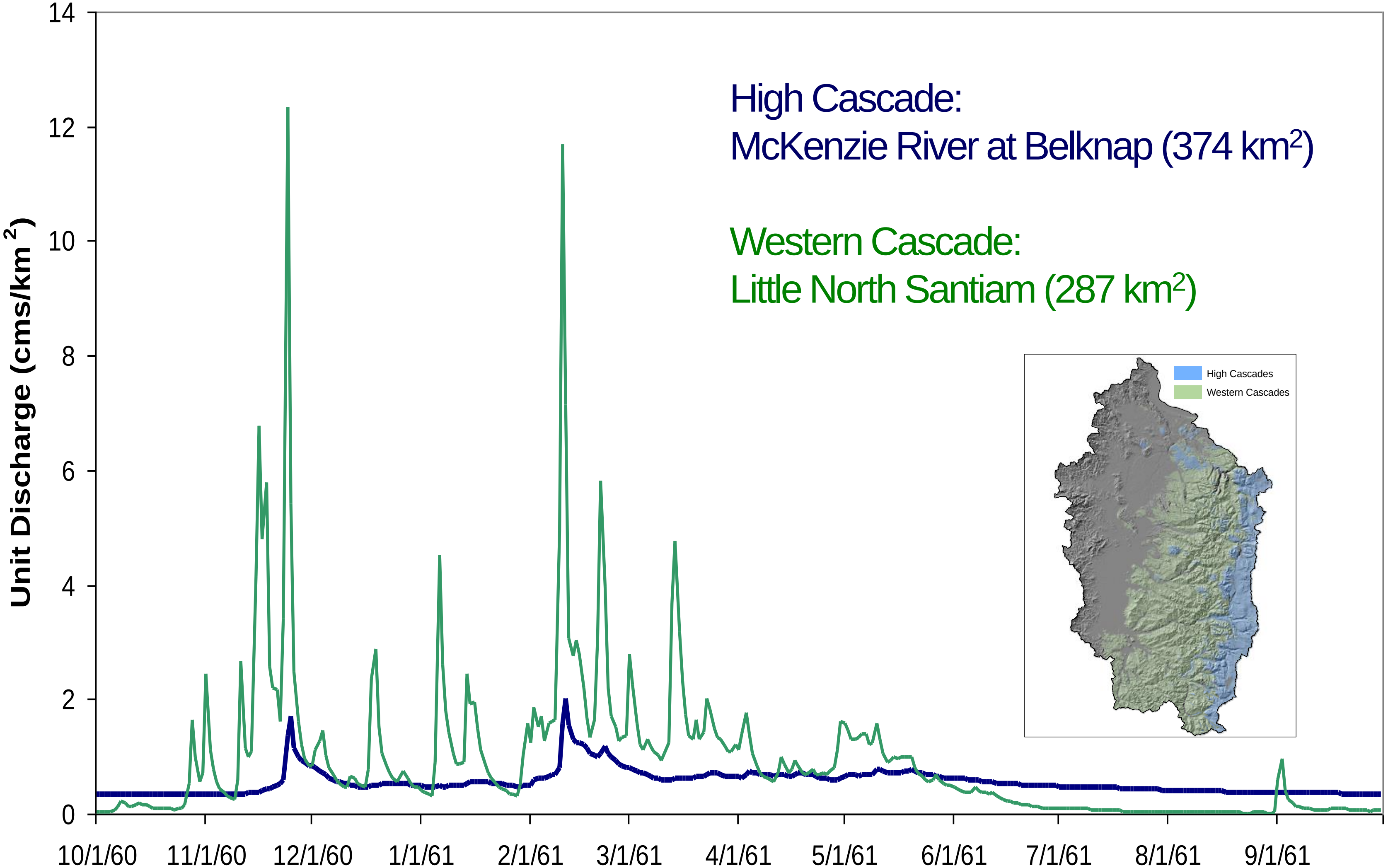
- Planning for and identifying the best sites and drafting methods
  - Water availability
  - Site constraints

Hydrological Variation

Spring-fed (groundwater dominated) versus precipitation-fed (runoff dominated)

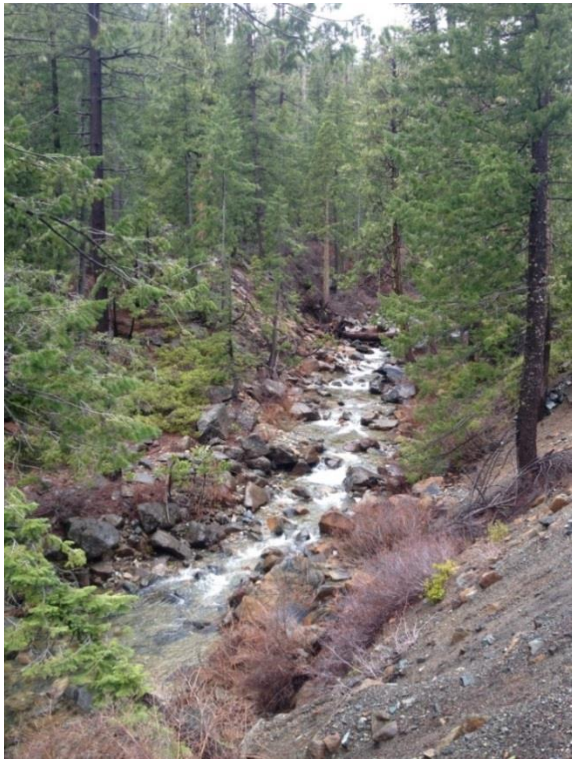


Groundwater versus Precipitation



Ingebritsen 1992

Geomorphology Considerations Channel Configuration

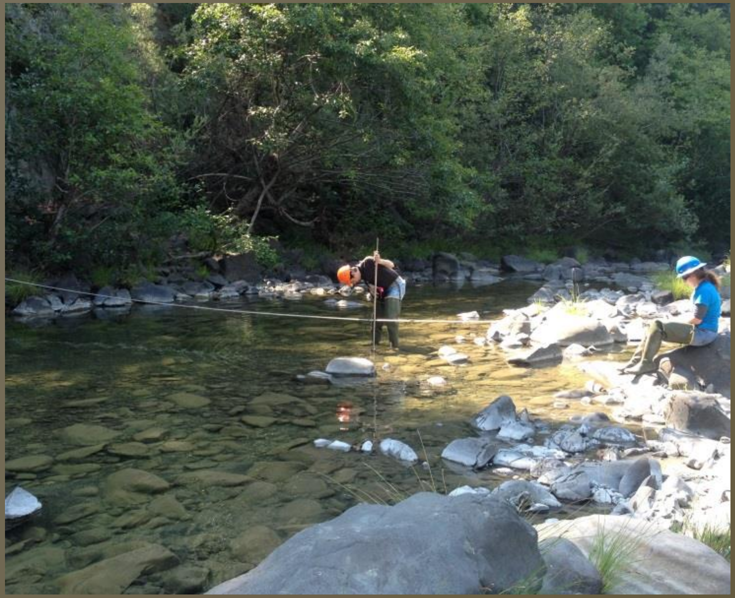


Confined/ steep slope /rough channel

Broad/flat/alluvial reach gentle slope/ smooth channel

Methods of Streamflow Measurement

- What is Streamflow?
- Determination of Estimated Flow Prior to Use
- Stream Flow Measurement Methods:
  - Flow Meter
  - Float
  - Bucket
  - Weir
  - Riffle Crest Depth
  - Wetted Perimeter
  - Pressure Transducers
- Field Material Cost



What is Stream Flow or Discharge?

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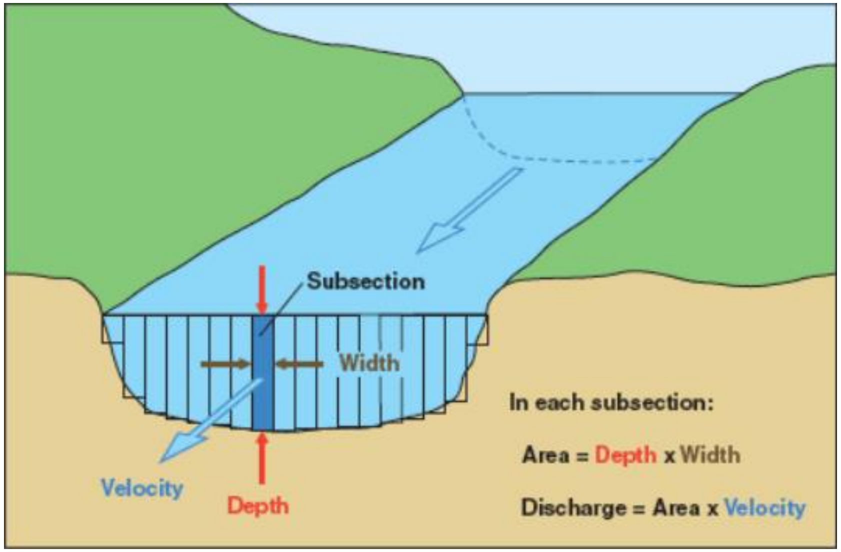


Determination of Estimated Flow Prior to Use

- Field level evaluation
- Collect wetted perimeter and cross sectional area measurement

Manning's Equation

$$v = \left(\frac{1.49}{n}\right)\left(\frac{A}{WP}\right)^{2/3} S^{1/2}$$

Where:

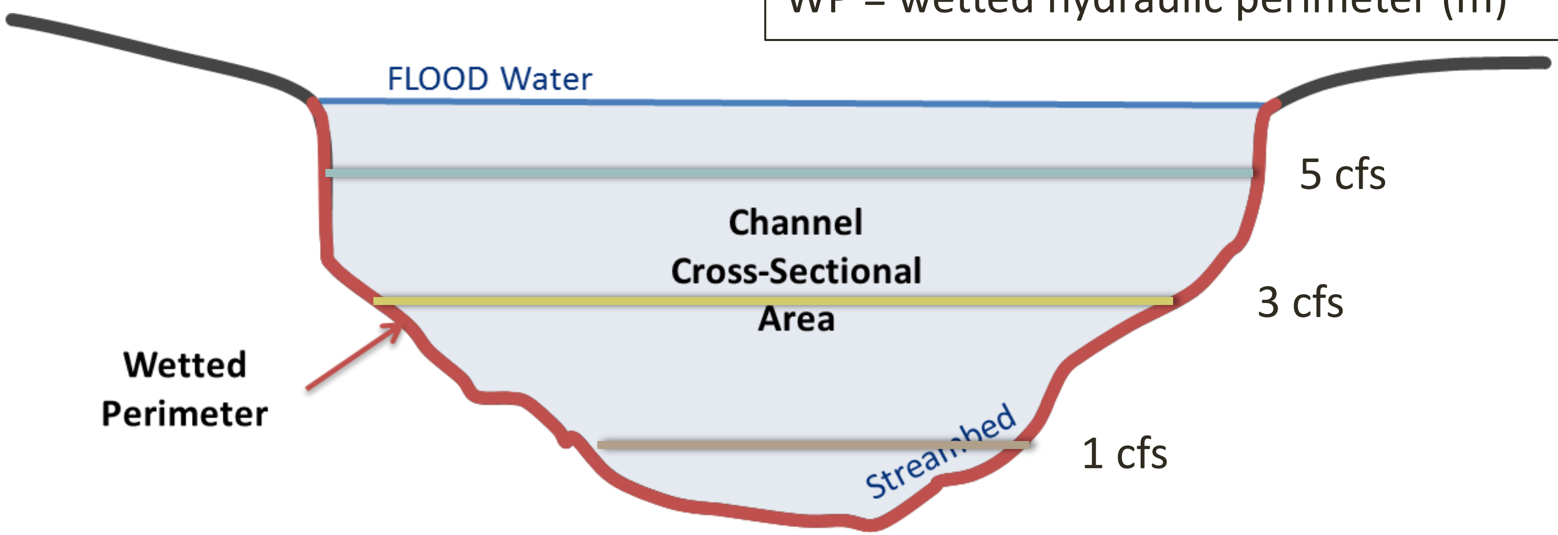
v = average flow velocity (m/s)

n = Manning's roughness coefficient

S= channel slope (e.g. slope of energy grade line) (m/m)

A = wetted cross-section area (m^2)

WP = wetted hydraulic perimeter (m)



Flow Transference Method

- Used for an ungaged basin when discharge data from a downstream station or nearby gaged (hydrologically similar) site is available.

- Adjusts summer base flow discharge from the gaged basin for the difference in drainage area between the ungaged basin and the gaged basin by using a simple equation.

Drafting Site: Drainage Area = 10 sq. miles

Stream Gauging Site with 20 years of Record: Drainage Area = 100 sq. miles

Flow Transference Method

$$Q_{base\ flowu} = Q_{baseflowg}\ (A_u/A_g)^b$$

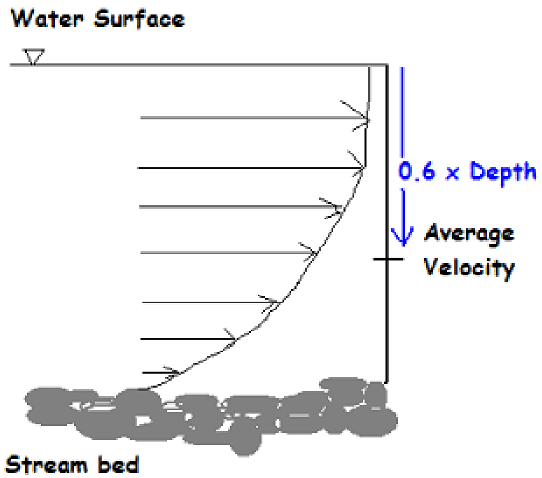
where:

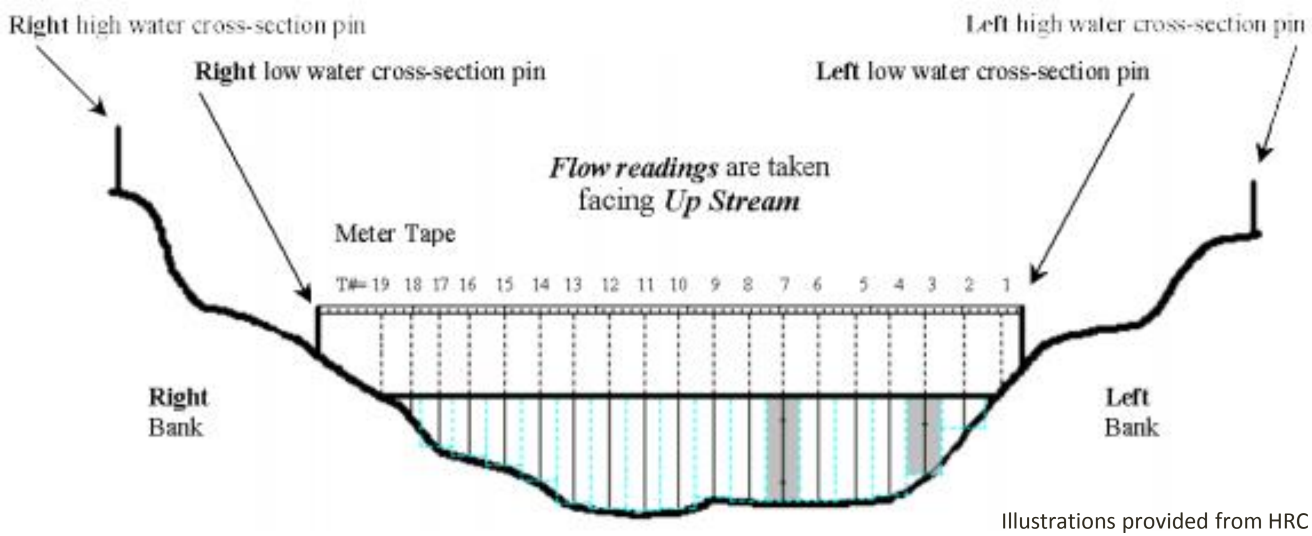
- $Q_{baseflowu}$ = base flow discharge at ungaged site
- $Q_{baseflowg}$ = base flow discharge at gaged site
- A_u = drainage area of ungaged site
- A_g = drainage area of gaged site
- b = exponent for drainage area from the appropriate USGS Regional Regression Equation

  (= 0.77 for 100-yr equation for Sierra Region)

Flow Meter Method

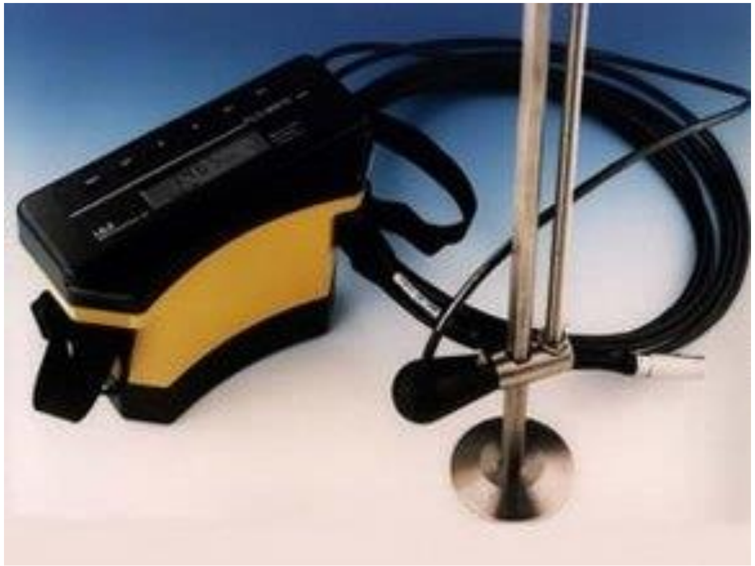
- Velocity x Cross Sectional Area
- Accuracy (+/- 10% error)
- Depth/velocity measurements
  - 0.6 depth (average of 0.2 and 0.8 depth)





Illustrations provided from HRC WOP-02

Marsh McBirney



For use on stream channels with depths greater than 3 inches (~ 8 centimeters) and velocities greater than 0.01 feet per second.

Pygmy Meter

For use on stream channels with depths greater than 3 inches (~ 8 centimeters) and velocities greater than 0.1 feet per second.

SonTek FlowTracker

For use in:

- Natural streams
- Weirs and flumes
- Open channels

Measures **velocities** with a range as low as **0.001 m/s (0.003 ft/s) and up to 4.5 m/s (15 ft/s)**.

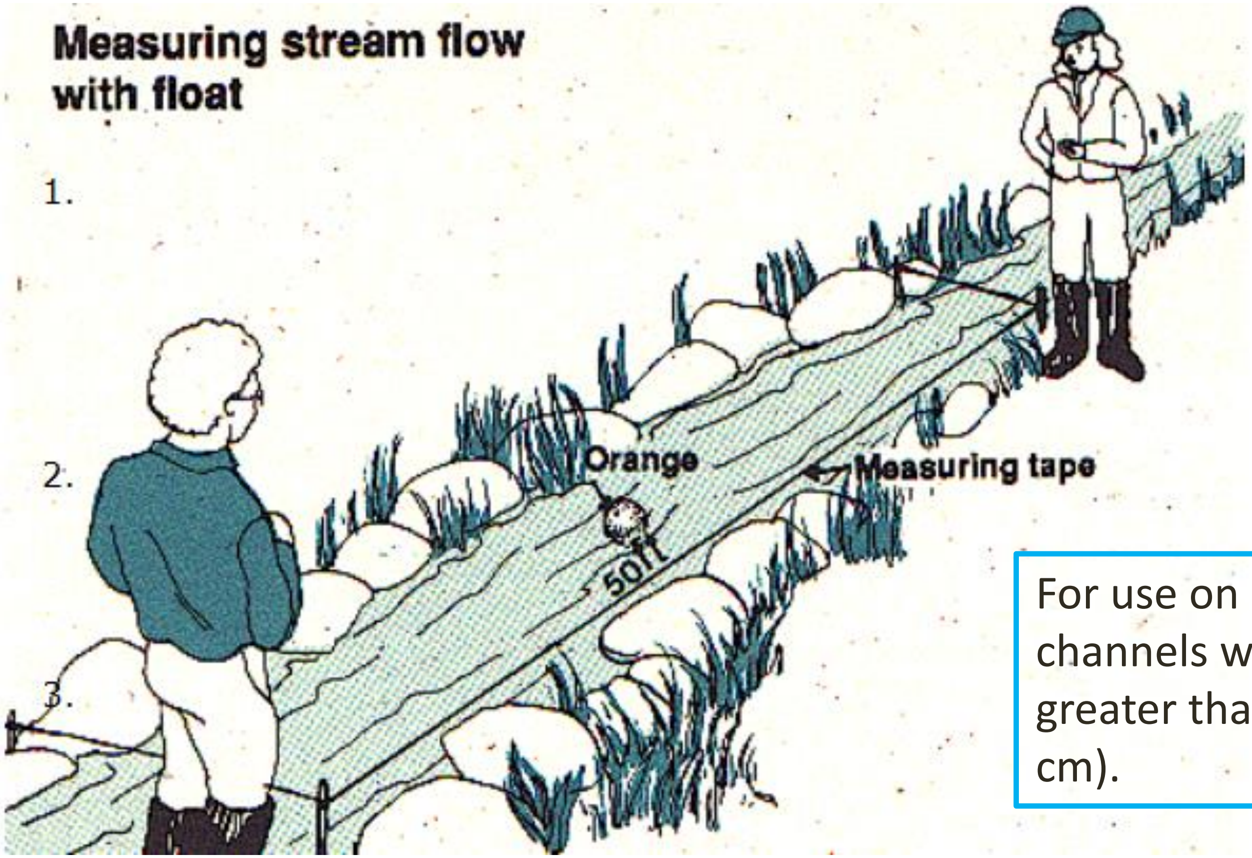
Max depth: Wadeable streams less than 1 meter deep
Min depth: probe fully submerged (≈ 2 inches)

Source: FlowTracker® User's Manual, 2009

Flow Probe

For use on stream channels with depths greater than 3 inches (~ 8 centimeters) and velocities greater than 0.1 feet per second.

Float Method



For use on small stream channels with depths greater than 1 inches (2.5 cm).

Because surface velocities are typically higher than mean or average velocities $V_{mean} = k V_{surface}$ where k is a coefficient that generally ranges from 0.8 for rough beds to 0.9 for smooth beds (0.85 is a commonly used value)

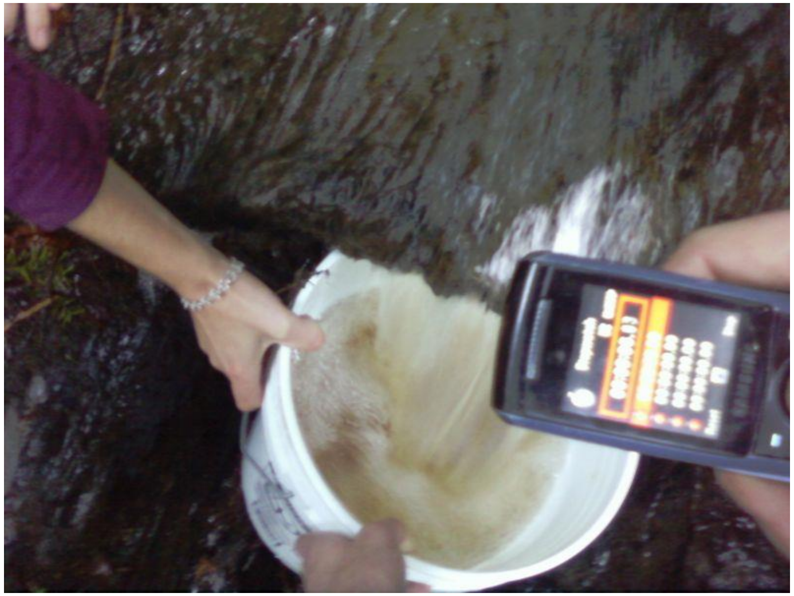
Float Method

Depth

Area = Mean Depth x Mean Width
Velocity = Feet/second
Flow = Area x Velocity x Correction Factor (0.85)

Flow Path Variability

Bucket Method



- 5 gallons=0.65 cubic feet
- 0.65 cubic feet ÷ seconds to fill a five gallon bucket = flow (cfs)

For use on steep, confined, small stream channels (less than 1 cfs), usually where a culvert is present.

How long does it take to fill a 5 gallon bucket?

- 0.25 cfs = 2.7 seconds
- 0.5 cfs = 1.3 seconds

Weir Method

- Temporary weirs installed on small streams
- Weir installation would require 1600 notification

For use on small stream channels with depth where other methods are not feasible, or a high degree of accuracy is required (Flow studies).

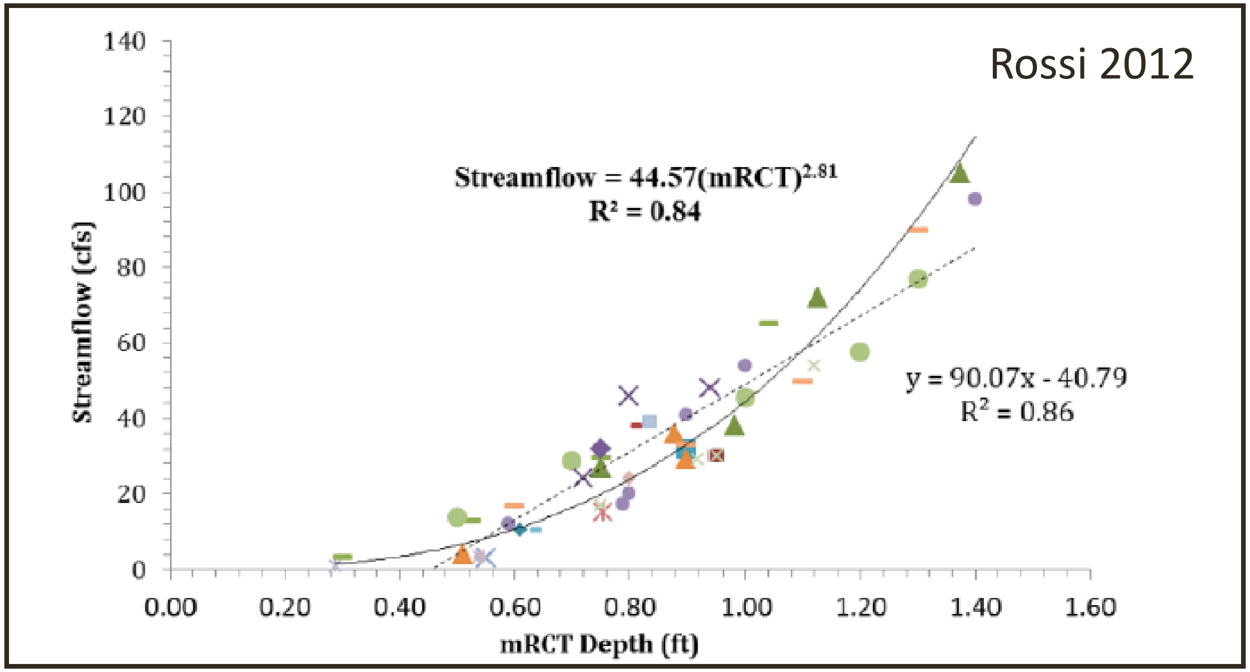
Critical Riffle Depth

Photo and caption from Rossi 2012

Figure 5. A typical alluvial riffle crest observed below active channel flow. The V-shaped inflection in the water surface generally indicates the presence of the thalweg. Here, the white arrow points at the RCT location.

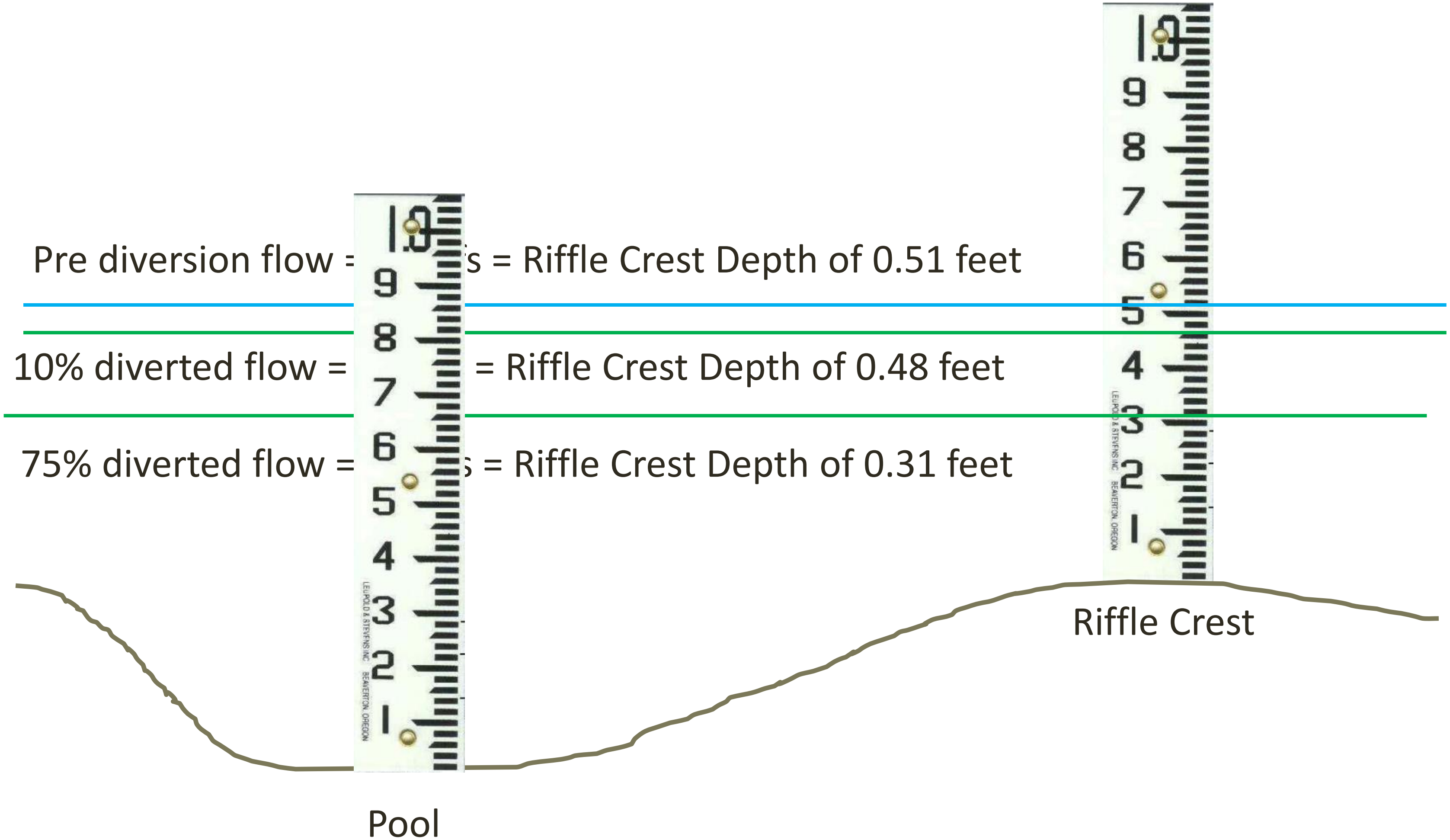
Critical Riffle Depth Method

- Estimates stream flow by using relationship curve between discharge and median riffle crest depth
- Also for identifying minimum fish passage flows



For use on larger streams with riffle crest depths greater than 3 inches or flows greater than 2 cfs.

Critical Riffle Depth



Wetted Perimeter Method

- Determines flow needs for maintaining productive riffle habitats
- Limited to riffles with rectangular streambed profiles
- Wetted Perimeter = (Average Depth x 2) + Wetted Width

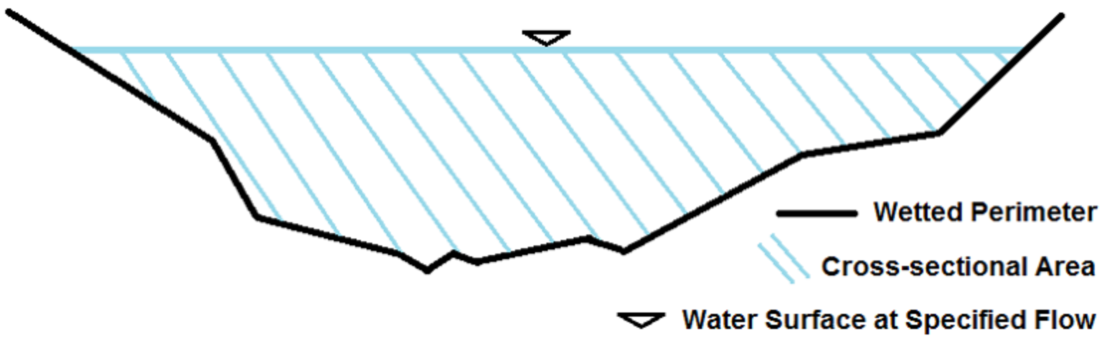
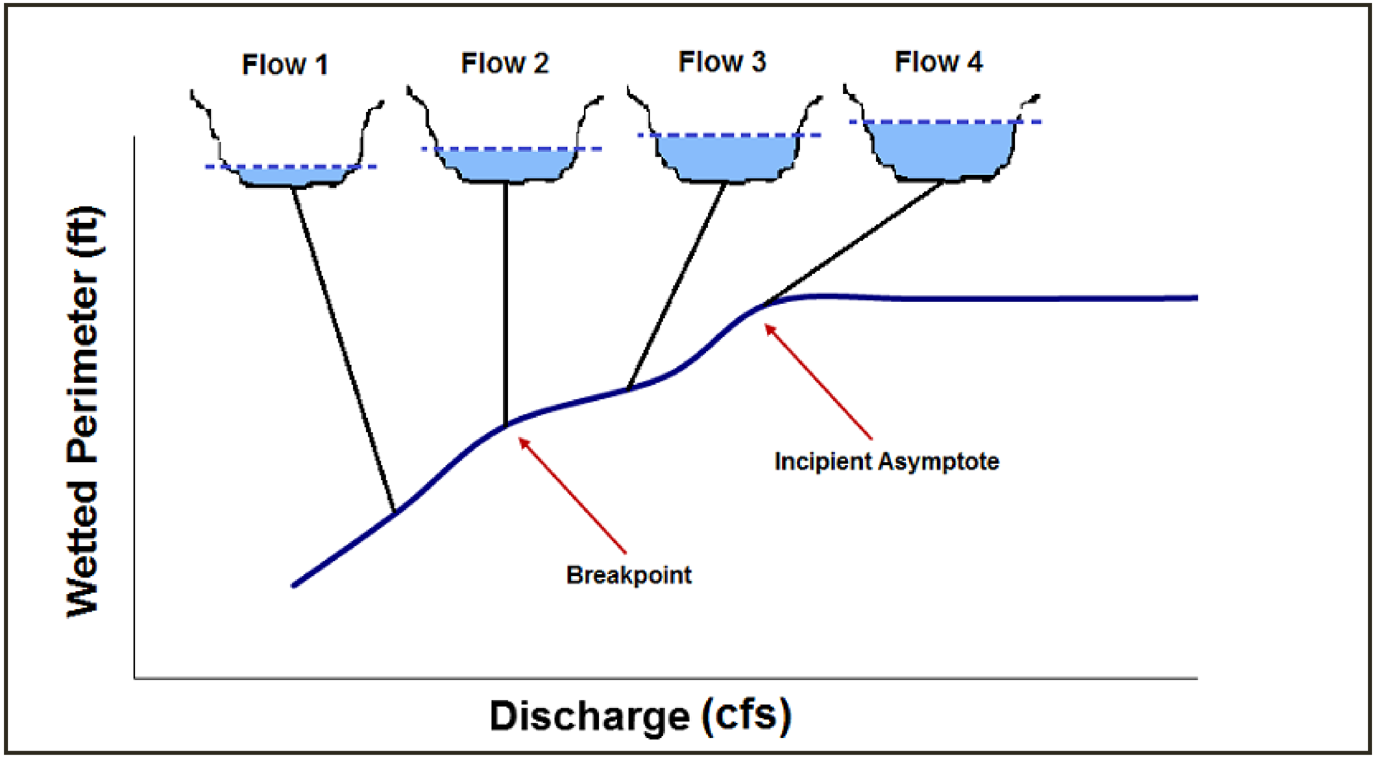


Figure 1. Visual representation of wetted perimeter

For use on larger streams with riffle crest depths greater than 3 inches or flows greater than 2 cfs.

Wetted Perimeter Method

- Discharge + Wetted Perimeter measurements captured over a variety of flows to identify a *breakpoint*
- *Breakpoint*: Threshold where habitat for invertebrates decline



Wetted Perimeter Method

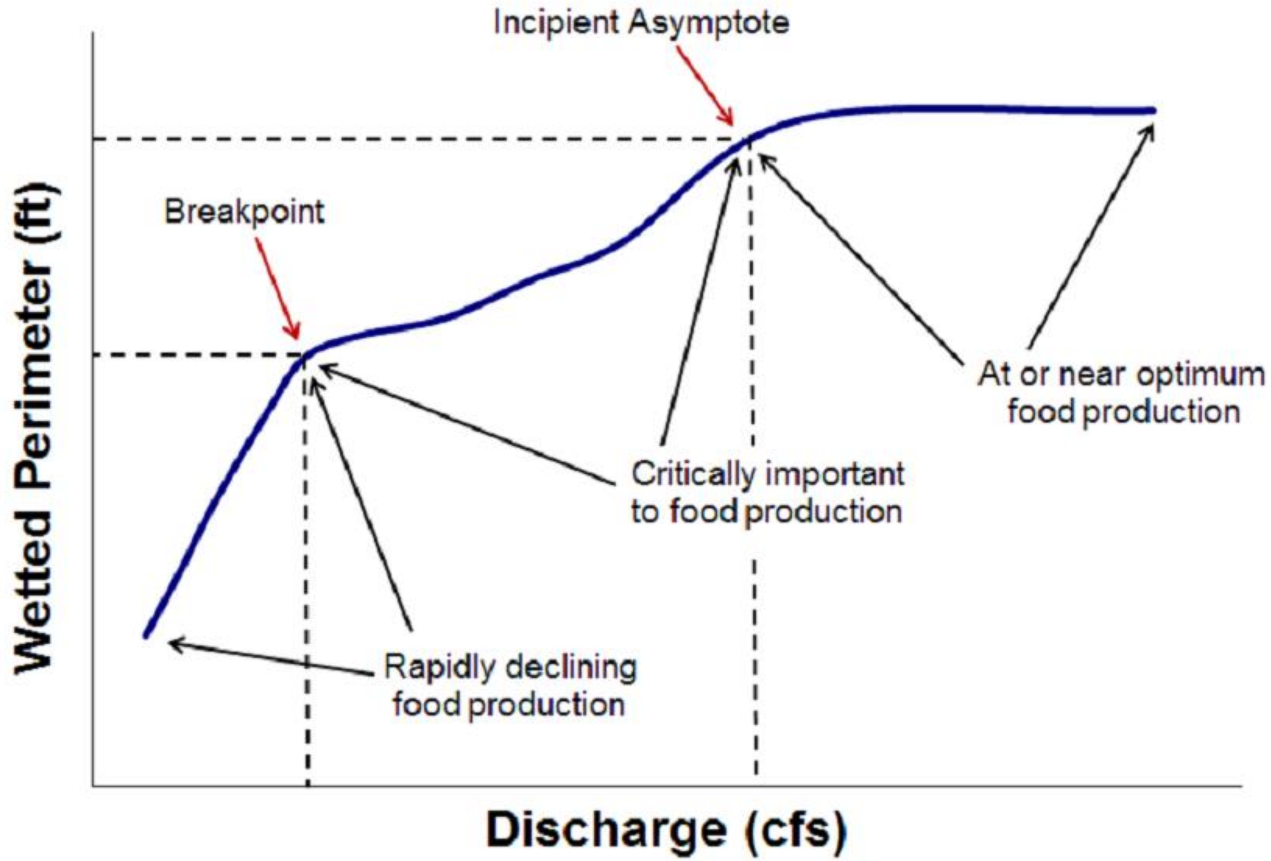
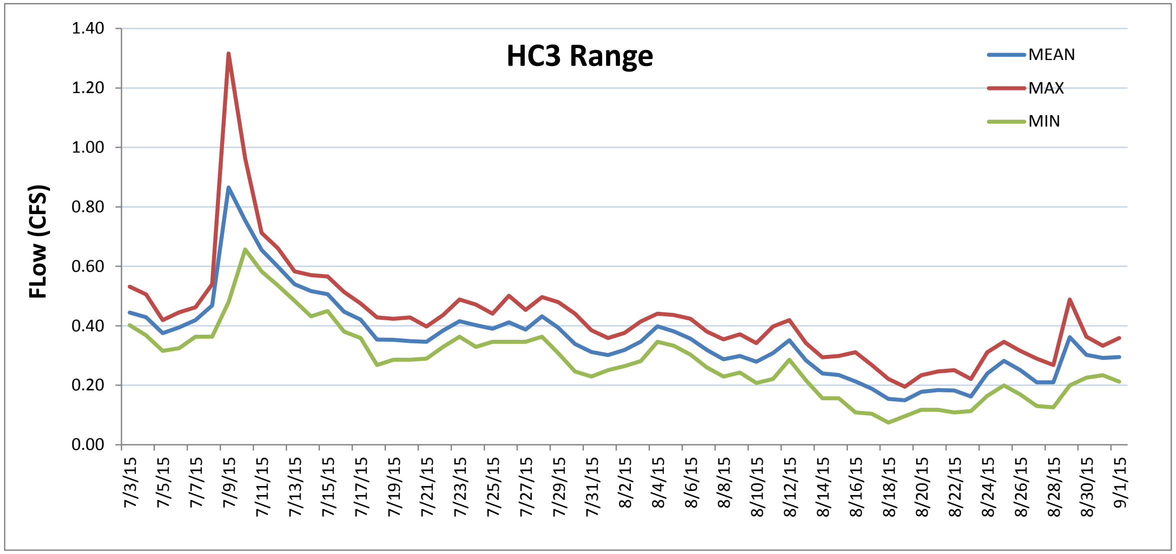


Figure 3. An example wetted perimeter - discharge curve showing relationship between breakpoints and fish food production

Pressure Transducers

- Measures water level continuously all year
- Stage-discharge relationships
- Demonstrates compliance from water tenders or other water users



Stage-discharge Relationship Methods
Flow Studies

Flow studies show specific diversion rate and bypass flows that are effective at protecting aquatic species

Field Materials

Equipment List	Cost
Measuring tape	$15
Small hammer or mallet	$4
Field data sheets	varies
Float	$1
Flagging	$2
Permanent marker	$1
Camera	$50 and up
Calculator	$1
Small carabiners or spring clamps	$1
5 gallon bucket	$3
Stadia rod	$150 and up
Staff gauge	$40
GPS	$100 and up
Flow meter	$2000-$4000
Wading rod (USGS top-setting)	$400-$500

Minimizing Water Use and Alternatives to Drafting

- Rocking or Paving Roads
- Dust Palliatives
- Relocation of Sites
- Water Tanks

http://www.garfield-county.com/
road-bridge/mag-chloride.aspx

Rocking or Paving Roads

Reduces the need for applying water

Dust Palliatives Types

- Water absorbing products
  - Calcium chloride, magnesium chloride, Sodium chloride (salt)
- Organic petroleum products
  - Asphalt emulsions, cutback asphalt, dust oils
- Organic nonpetroleum products
  - Animal fats, lignosulfonate, molasses/sugar beet, tall oil emulsions, vegetable oils
- Electrochemical products
  - Enzymes, ionic products, sulfonated oils
- Synthetic polymer products
  - Polyvinyl acetate, vinyl acrylic
- Clay additives
  - Bentonite, montmorillonite

©Jacobi et al. 2009

Dust Palliatives Considerations

- Environmental impact: water quality and biota
  - Goodrich et al. 2009 study
- Application methods and maintenance
- Limitations and cost

Dust Palliatives Best Management Practices

- Water in the early morning (1 to 3am) to infiltrate the road
- Regular, light watering is more effective than less frequent, heavy watering
- Determine appropriate application rate and frequency to water roads only as needed
- Minimize driving speed

Relocation of Sites

Propose drafting locations that do not have a significant impact to listed species

Examples:

- Some large Class II streams
- Above natural barriers

Water Tank Benefits and Cost

- 5,000 gallon tank costs $2,000-3,000 each
- Cost difference between tank installation and construction/maintenance costs of culvert inlet impoundment installation
- On small streams, tanks maintain constant bypass flows for downstream aquatic species more effectively than direct drafting

Protection Measures/ BMPs

- Develop a Drafting Plan
- Stream Drafting Rates
- Temporal and Spatial Variation in Streamflow
- Pond Drafting Rates
- Screened Intakes
- Treatment of Approaches
- Hazardous Wastes
- Prevent the Spread of Disease and Invasive Species

Drafting Plan

- How much water is needed?
- What are the options for access to the most water?
- What methods will be used to draft water?
- What is the timing of operations?
- Is there sudden oak death or invasive species in the watershed?
- Is the water tender aware of all requirements?

Stream Drafting Rates

- Streams / aquatic features with listed species
  - Diversion rates and protection measures determined on a case by case basis.
- Class I and Class II: Diversion / bypass flows should not exceed a rate that causes substantial adverse impacts to aquatic resources.
- Class II: Ensure diversions are not reducing Class I flows below levels necessary to avoid substantial adverse impacts to aquatic resources

Class II Drafting Rates
Avoid Impacts to Aquatic Resources

A maximum 25 percent drafting rate is a low risk strategy for avoiding significant impacts to aquatic resources on Class II streams

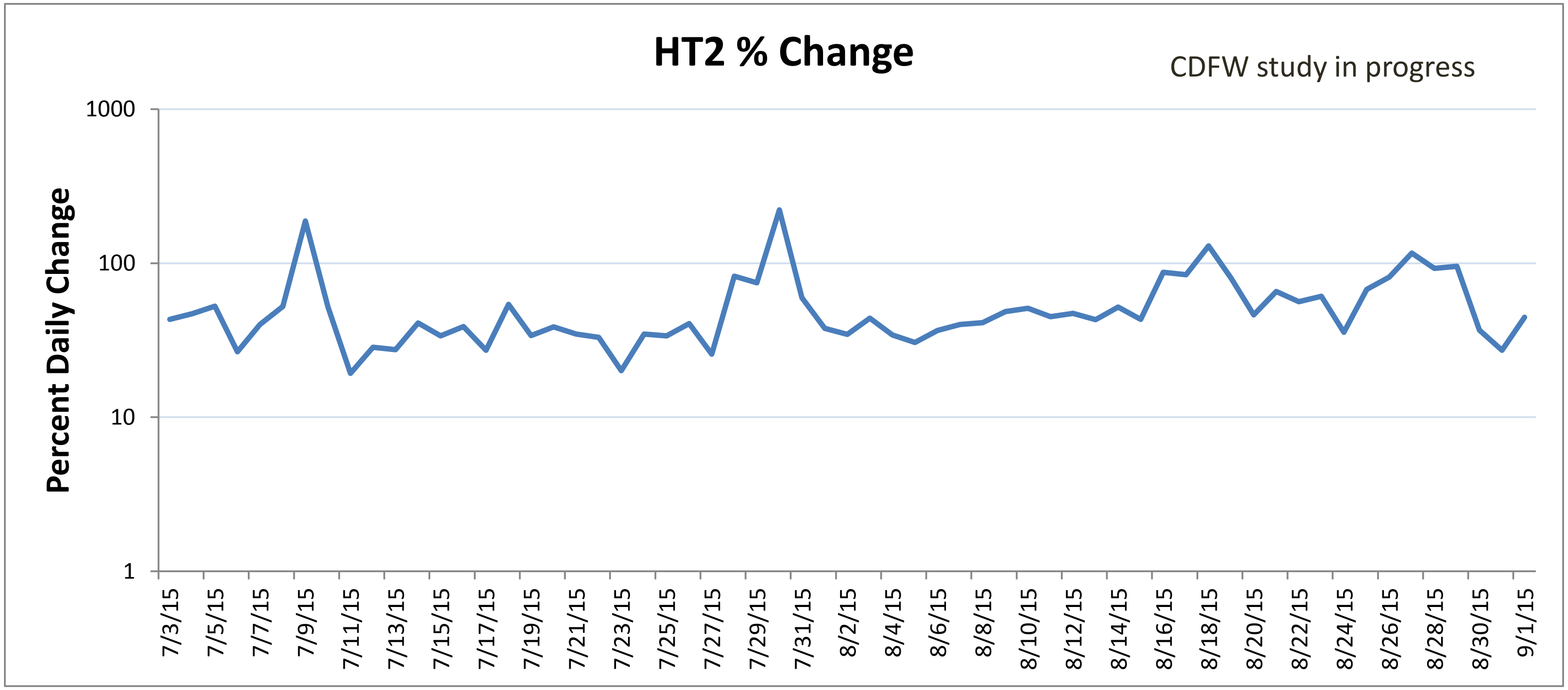
- Wipfli (2002):
  - Headwater streams export significant macroinvertebrates to downstream fish bearing reaches
- Minshall and Winger (1968):
  - Significant macroinvertebrate drift when greater than 25 percent of flow was diverted
  - A reduction in macroinvertebrate food base for amphibians
- Ray (1958):
  - Prolonged drying of the stream bed can lead to amphibian mortality

Temporal and Spatial Variation in Streamflow

- Flow measurement sites vary due to subsurface flows and substrate volumes/porosity
- Specific stream reaches fluctuate daily and seasonally due to evapotranspiration

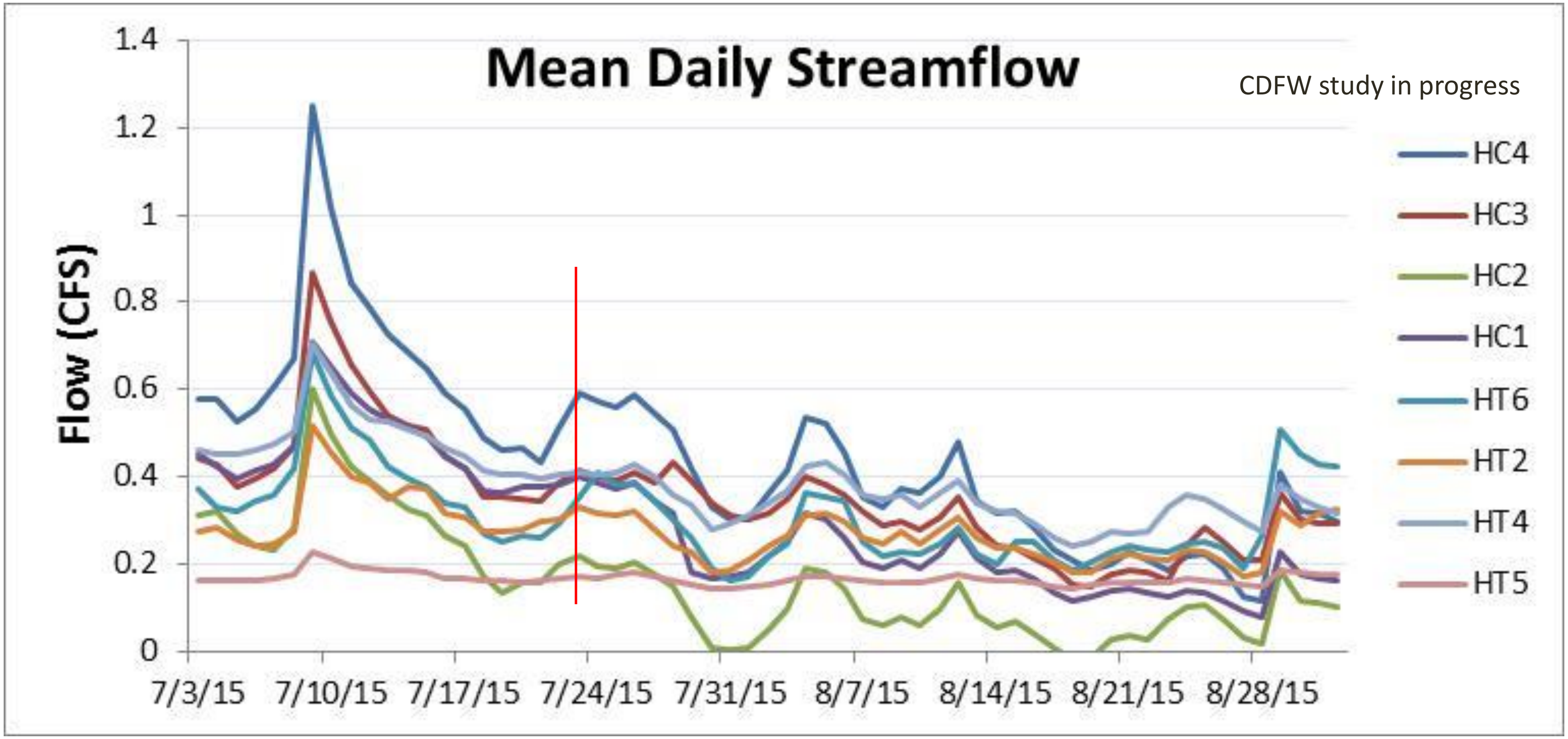
Evaporation + Transpiration = EvapoTranspiration (ETo)

Diurnal Flow Variation



- On large streams (> 2 cfs), diurnal flow variation typically does not exceed 30%
- On small streams (< 2 cfs), diurnal flow variation can exceed 100%

Spatial Flow Variation



How to Compensate for Variation

On sites with low flows (< 1 cfs):

- Pay close attention because these streams have high spatial and diurnal variation
- Measure flow in multiple locations upstream and downstream to assess variation
- Use mean flows between sites to establish bypass flows and diversion rates

Pond Drafting Measures

- Maintain enough water to avoid, reduce, or minimize substantial impacts in the pond and the pond outflow.

- For isolated ponds, establish benchmarks which will protect the shallow areas during critical amphibian breeding periods.
- Are there escape ramps for drafting pools?

Pond Drafting

Screened Intakes

- Avoid uptake/impingement of aquatic species
- Protects equipment from drawing in gravel or debris

Screened Intakes

ASP watersheds

14 CCR § 923.7 [943.7, 963.7] (l)(3)(A)

Water drafting for timber operations shall screen all intakes to prevent impingement of juvenile fish against the screen. There are requirements for screens in Class I waters for the following:

- The size of slot openings
- The amount of screen surface submerged in water
- Maintenance
- The approach velocity (water moving through the screen)
- The diversion rate

Treatment of Approaches

Treatment of Approaches

- Straw Wattles
- Hay Bales
- Angular rock on approaches and "river rock" on parking pads (in flood prone areas such as gravel bars)
- Brow log

Prior to the winter period and after completion of operations, remove straw wattles, drip blankets, etc.

Hazardous Waste

14 CCR § 923.7 [943.7, 963.7] (I)(3)(D)

To prevent soil and water contamination from motor oil or hydraulic fluid leaks, water drafting trucks parked on streambeds, floodplains, or within a WLPZ shall use:

- drip pans
- adsorbent or absorbent blankets
- sheet barriers
- other materials as needed

Prevent the Spread of Disease and Invasive Species

- Sudden Oak Death Syndrome
- Chytrid fungus
- New Zealand mudsnails
- Quagga and zebra mussels

Dreissenid mussels

New Zealand Mudsnail

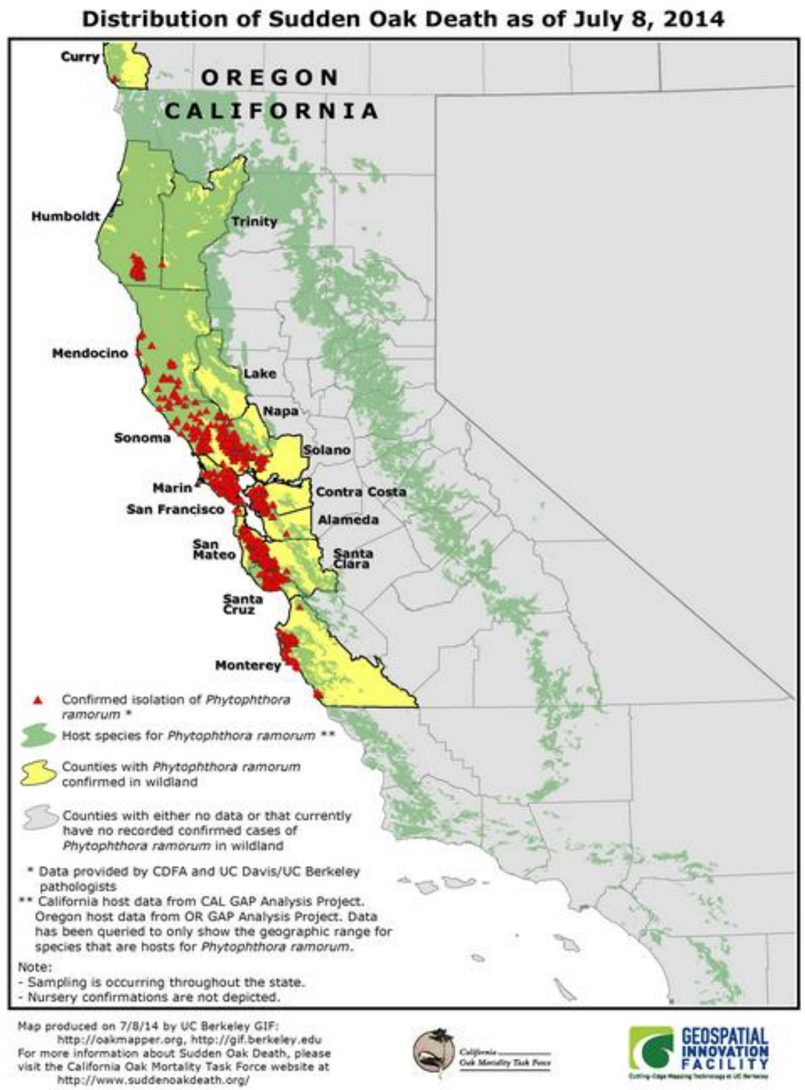
Tanoak mortality in Humboldt Co. 2006

Effects of chytrid fungus

Prevent the Spread of Disease and Invasive Species

Sudden Oak Death

- Where are the known infestations?
- Draft from areas upstream of known infestations or from uninfested drainages
- If drafting from an infested watercourse, do not water roads with that source in uninfested areas
- Treatment with Ultra Clorox
  - 1 gallon of Ultra Clorox Bleach per 1000 gallons of drafted water



Source: CA Oak Mortality Task Force

Prevent the Spread of Disease and Invasive Species

Chytrid Fungus

- Soaking gear in chemical disinfectants:
  - 70% ethanol for 20 seconds
  - .001% quaternary ammonium compound 128 for 30 seconds
  - 1% NaClO (bleach) for 30 seconds
  - 5% NaCl (salt) for 5 minutes
- Heating gear:
  - 100°C for 1 minute
  - 60°C for 5 minutes

Southern Mountain Yellow-legged Frog ©USGS

Source: Johnson et al. 2003

Prevent the Spread of Disease and Invasive Species

Equipment Decontamination Methods for Mudsnails and Mussels

First, scrub gear with a stiff-bristled brush to remove all organisms. Then use one of the following options:

- Dry
  - Allow equipment to thoroughly dry for a minimum of 48 hours
- Hot Water Soak
  - Immerse gear in 140° F or hotter water for a minimum of 5 minutes
- Freeze
  - Freeze below 32°F for at least 8 hours

Source: CDFW 2013 Decontamination Protocol

Current CDFW Drafting Studies

- Class II tank water drafting study with Humboldt Redwood Company and Green Diamond Resource Company
  - Impacts on macroinvertebrates
  - Flow characteristics of small streams
- Active inspections and annual summary reports
- South Fork Eel Instream Flow study

Available Resources

- CDFW Document Library: THP Water Drafting Folder https://nrm.dfg.ca.gov/documents/ContextDocs.aspx?cat=THP-WaterDrafting
- CDFW Water Branch's Instream Flow Program https://www.wildlife.ca.gov/Conservation/Watersheds/Instream-Flow
- CNDDB/BIOS http://www.dfg.ca.gov/biogeodata/bios/
- CDFW Aquatic Invasive Species Decontamination Protocol nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=43333
- eWRIMS website: Map viewer of all water rights in California http://www.waterboards.ca.gov/waterrights/water_issues/programs/ewrims/index.shtml
- NOAA Water Drafting Specifications http://www.westcoast.fisheries.noaa.gov/publications/hydropower/water_drafting_specification_guidelines.pdf

Conclusion
Topic Overview

- Effects of Drafting
- Regulatory Considerations
- Common Water Drafting/Diversion Types
- Hydrology and Geomorphology Considerations
- Methods of Streamflow Measurement
- Minimizing Water Use and Alternatives to Drafting
- Protection Measures/BMPs

Conclusion
Take Home Messages

- Water drafting has many different variables to consider when assessing impacts
- Choosing the best management practice is site-specific
- An entity may not "substantially divert" without complying with FGC § 1602
- Consultation with local agencies is available

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