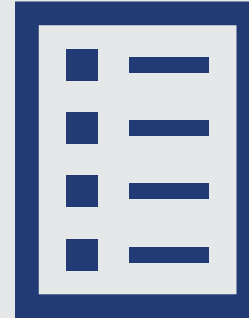
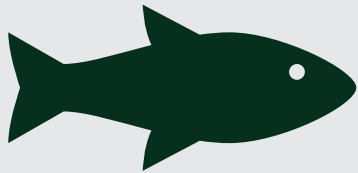


FPA STREAM MODELING

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Private Forest Accord Objectives for Streams and Riparian Areas



Develop new stream network for fish use and stream flow

Simplify geographic regions for administration of riparian rules

Equitable and consistent riparian management across the state

Provide management options for Small Forestland Owners



Rule Requirements

Division 635-200 > Water Classification

- (15) For each of the five beneficial use categories listed in (4), streams shall be categorized further according to three size categories: large, medium, and small.
- The size categories are based on average annual flow.
 - (a) Small streams have an average annual flow of two cubic feet per second or less.
 - (b) Medium streams have an average annual flow greater than two and less than 10 cubic feet per second.
 - (c) Large streams have an average annual flow of 10 cubic feet per second or greater.



Rule Requirements

Division 635-200 > Water Classification

- The assignment of size categories to streams on forestland will be done by the State Forester as follows:
 - (a) The State Forester will index average annual flow to the **upstream drainage area** and **average annual precipitation**. The methodology is described in Forest Practices Technical Guidance. The State Forester shall calculate average annual flow for streams and publish the appropriate size classes in stream classification maps within the department's reporting and notification system. (*Statewide Flow Line Hydrography*)



Rule Requirements

- Division 635-200 > Water Classification

- (b) Actual measurements of average annual flow may substitute for the calculated flows described in the Forest Practices Technical Guidance.
- (c) Any stream with a drainage area less than 200 acres shall be assigned to the small stream category regardless of the flow index calculated in (15)(a).



Tech Note #1 and Flow Lines

Western Oregon

$$\log.(\text{FLOW}) = -11.972 + 0.990 * \log.(\text{AREA}) + 1.593 * \log.(\text{PRECIP})$$

n = 48; adjusted squared multiple $R^2 = 0.96$
standard error of estimate = 0.31

Eastern Oregon

$$\log.(\text{FLOW}) = -15.712 + 1.176 * \log.(\text{AREA}) + 2.061 * \log.(\text{PRECIP})$$

n = 23; adjusted squared multiple $R^2 = 0.83$
standard error of estimate = 0.55

where: FLOW = average annual flow (cfs, cubic feet per second)
AREA = upstream drainage area (acres)
PRECIP = average annual precipitation (inches)

By rearranging the terms in the above equations, the relationships can be

Western Oregon

$$\text{AREA} = 178600 * \text{FLOW}^{1.010} * \text{PRECIP}^{-1.609}$$

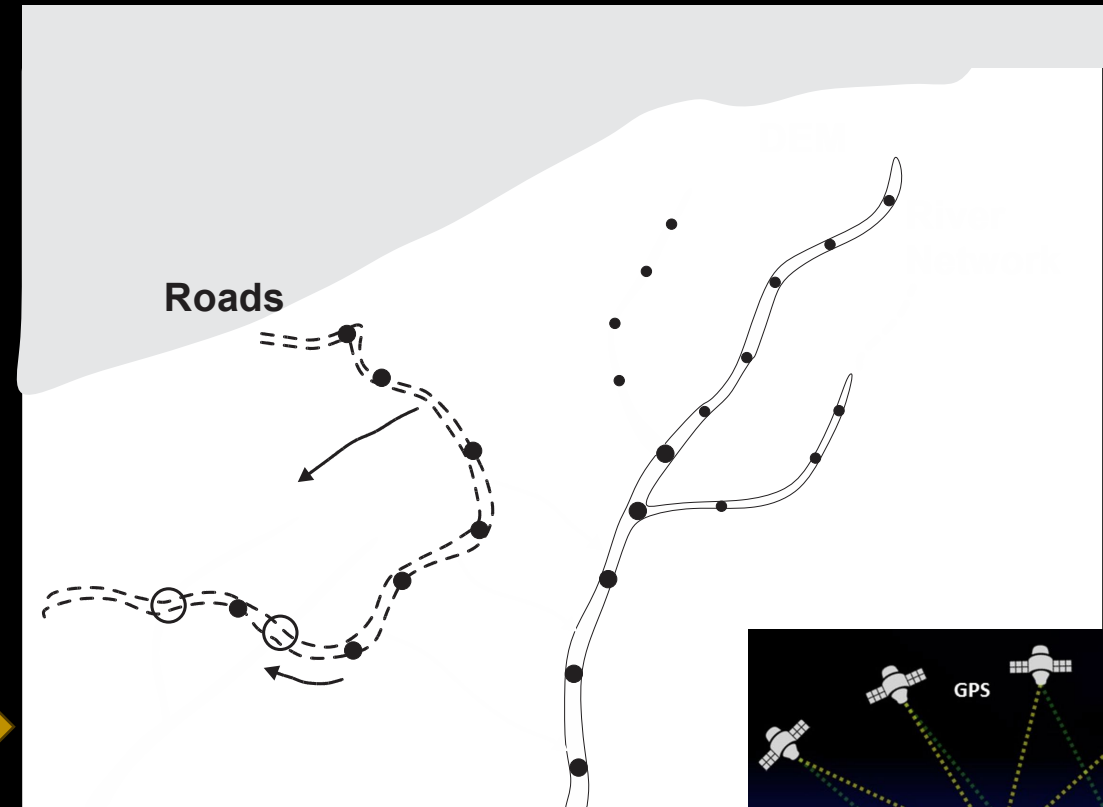
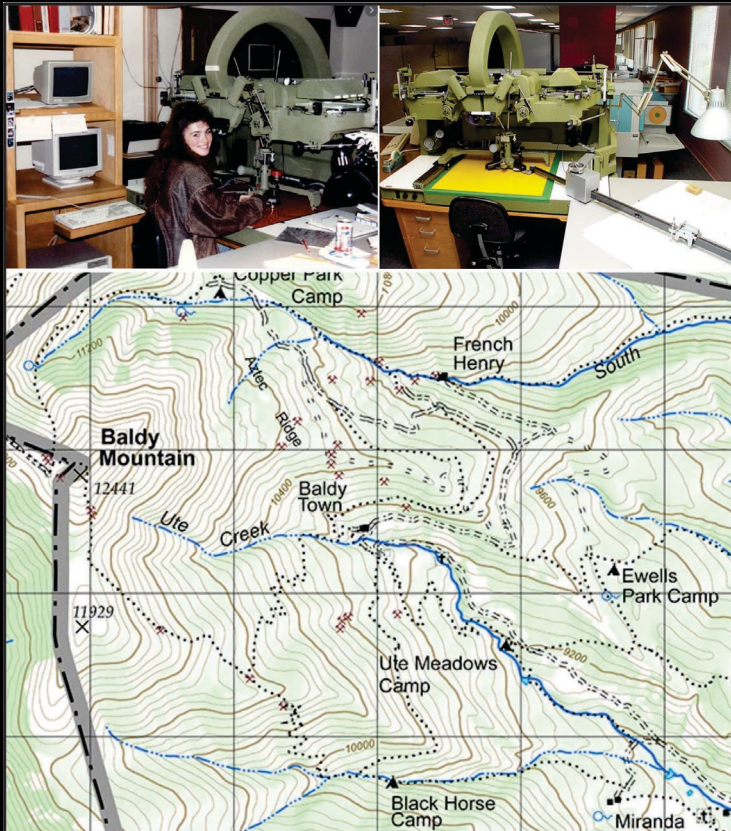
Eastern Oregon

$$\text{AREA} = 634300 * \text{FLOW}^{0.850} * \text{PRECIP}^{-1.753}$$

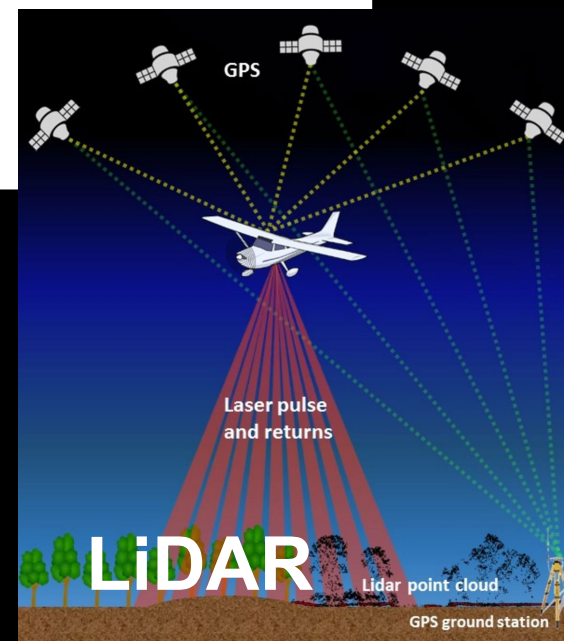
- Average annual precipitation data was obtained from Oregon Climate Service (aka OSU PRISM)
- Upstream drainage area calculated using the DEM developed from either 1-M lidar or the best available elevation data in each HUC-10 watershed
- The Tech note references the best data available when published circa 1994

Stream Network Development

Cartographic



Synthetic

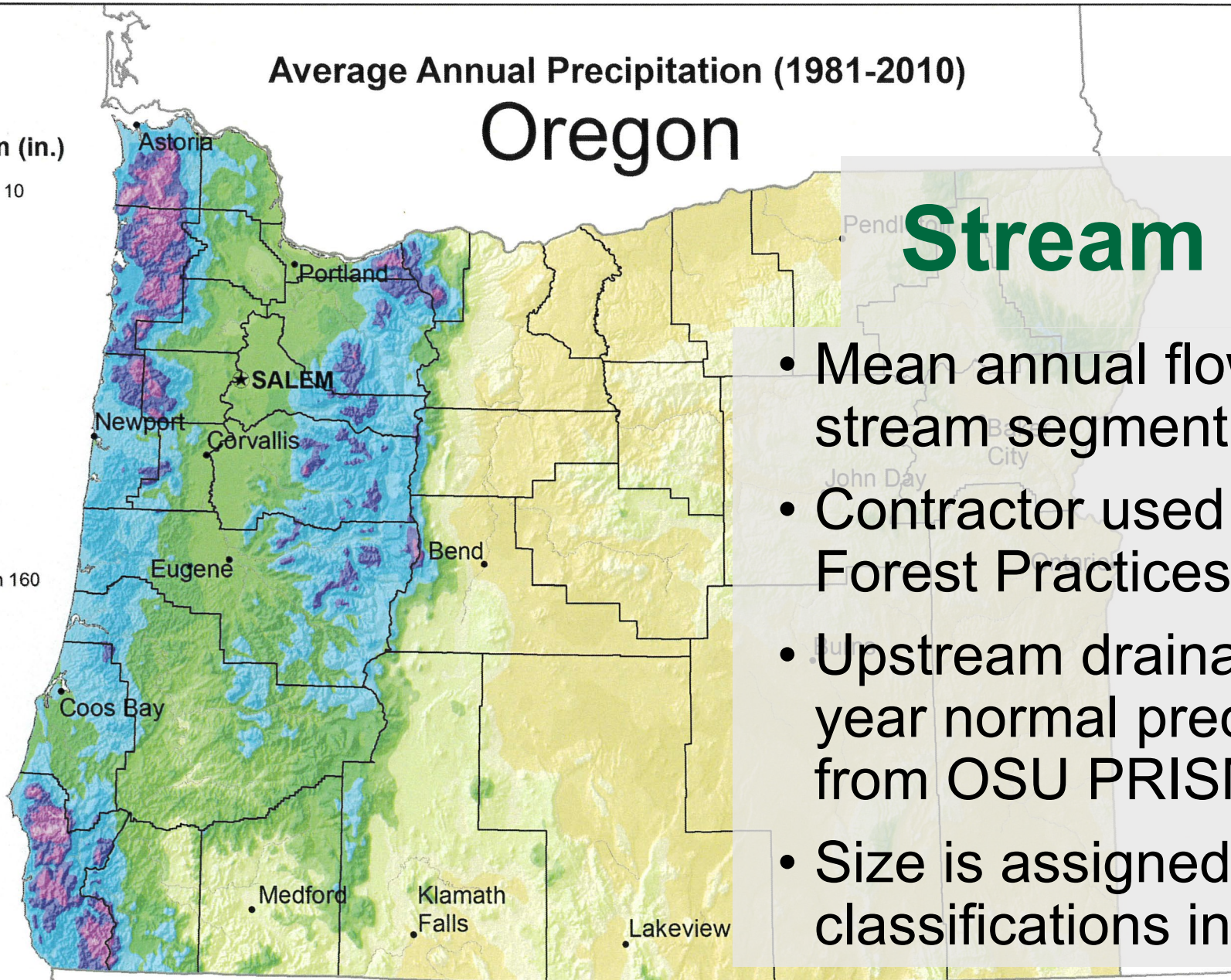
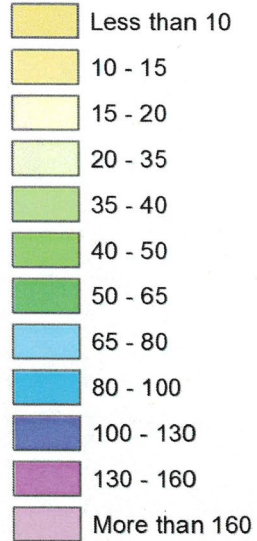


Courtesy Terrainworks LLC



Average Annual Precipitation (1981-2010) Oregon

Precipitation (in.)



Stream Sizing

- Mean annual flow assigned to each stream segment
- Contractor used algorithms from Forest Practices Technical Note #1
- Upstream drainage area and 30-year normal precipitation values from OSU PRISM data
- Size is assigned based on the 3 classifications in the FPA rules



Flow Line Data – Stream Size



- Example of attributes in the full stream data
- Due to constraints not all attributes in published Flow Line data due to constraints on size and accessibility
- Stream size based on the 3 classifications of mean annual flow in rule

747,171.21E 843,723.21N ft

Select By Attributes Zoom To Switch Clear Delete Copy Highlighted: Unselect Reselect

Known SSBT	SSBT Status	Geometry Source	AREA_SQKM	Mnanprc_M	MeanAnnCMS
265.905128	<Null>	Lidar	1.0282	2.49156	0.061
377.500404	<Null>	Lidar	0.7989	2.4879	0.0467



Other Variables

- Certain geographic locations and topographic features may not provide for accurate stream size based on the Tech Note calculations
- Features that may influence stream flow calculations include:
 - Springs and subsurface flow patterns not recognized in the equation variables
 - Direct flow measurements may be needed to substitute for the drainage area and annual precipitation relationship





Fish Use Classification

- Fransen et. al (2006) fish distribution model was incorporated into the synthetic stream network
- Model predicts upstream extent of fish occurrence
- Field surveys that identify “end of fish” locations override the modeled extent of fish distribution





**Forest
Resources**

STREAM SURVEYS

UPDATE AND MANAGEMENT

- Current Status and workflow YTD
 - Fish Surveys = 72
 - Flow Surveys = 469
 - Using email routing for all review, tracking, and approval
- Flow Line updates occurring regularly based on workloads/staff time
- Launching internal survey tracking application early May 2024



Questions

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