Exposure Module

Exposure Scenarios – Fish Consumption Rates within the larger Tribal Exposure Context

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Issues and Opportunities for the Pacific Northwest
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BASIC CONCEPT

Contemporary suppression of resource use. **Contemporary uses may be restricted due to contamination (e.g., fish advisories, contaminated sites), legal issues (rights of access), etc.**

-- Do you want to know current FCR & exposures for public health reasons?

-- Do you want to know what FCR and risks would be if people used the resource in an unrestricted manner (e.g., a baseline CERCLA risk assessment; Trust/Treaty analysis)? Do Not assume that a fish consumption survey will tell you the "tribal rate."

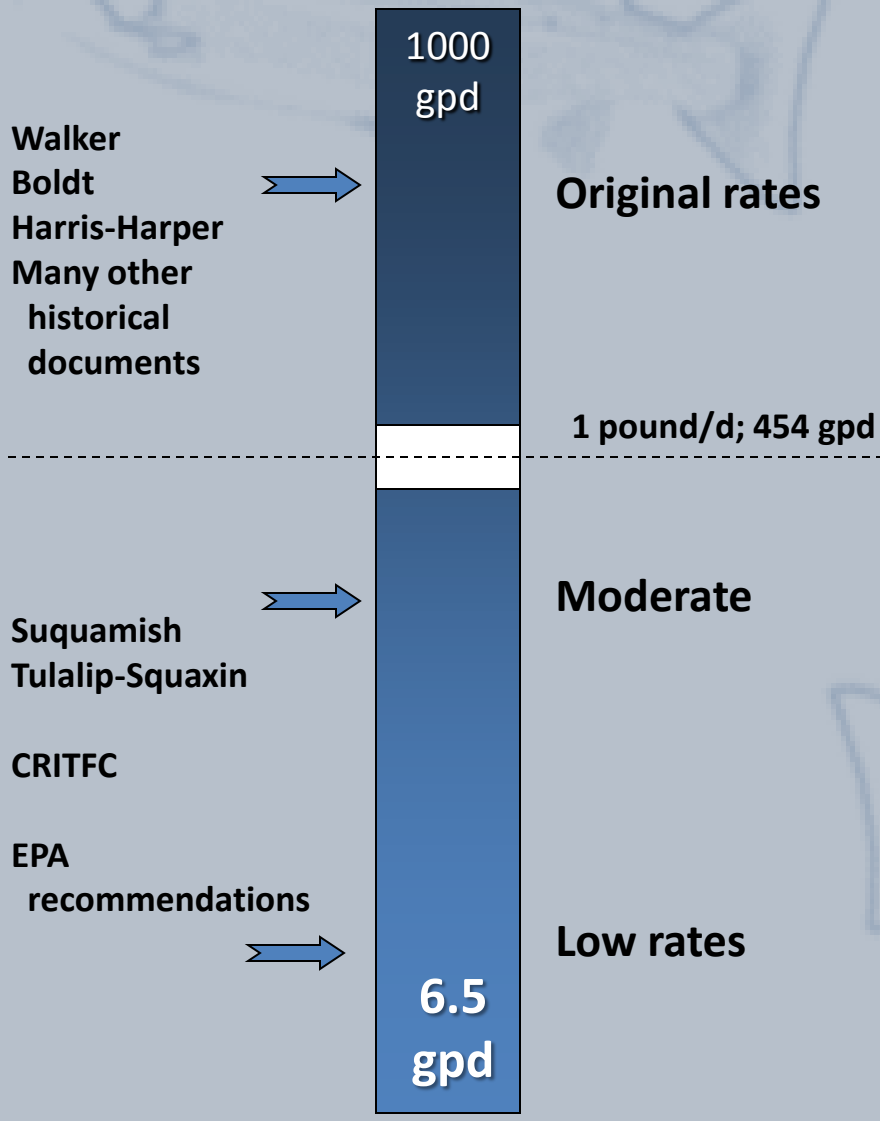
Past

Present

Future

Do you know if your Tribe is bimodal (several Tribes; several lifestyles)? Status of fishing rights? Tribal policies? ***Cross-sectional data are statistical averages, not a cultural description of either a traditional or current subsistence lifestyle or diet.***

Culturally-competent fish consumption surveys must consider:



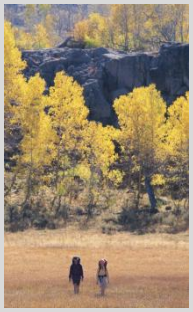
Originally, everyone ate an average within the high-consumer range; today fewer people may eat that much, but the mean of this range is still valid for high consumers.

Tribal data is often BIMODAL.

Within a Tribe there will be a range of fish consumption rates. Many are moderate or low due to lost access, prosecution, lack of time, awareness of contaminants, mistrust, etc.

Cross-sectional surveys mostly include the people with moderate or lower rates, and tend to miss elders or more traditional members. Accuracy is affected by fear of prosecution, other psychology. Need culturally competent tools, not necessarily computer-based questionnaires.

Larger Tribal Exposure Context: Ecologically-Based exposure scenarios for use in risk assessment that reflect <u>traditional subsistence Tribal lifestyles</u>



Where you live

What you do

What you eat

Scenario – a set of activities and diet(s) that describe a lifestyle and its degree of environmental contact

Exposure factors – the numbers or rates that explain the frequency, duration, and intensity of exposure for each pathway

Baseline scenarios describe how the resources are used if they are available and are not contaminated.

<u>Numerical components</u>:

- Traditional subset, not contemporary cross-section.
- Needs to be in CERCLA format.
- Nutritionally-complete diets equivalent to a food pyramid. Staples, not lengthy lists, yet complete.
- Soil ingestion rate – extensive literature review; local climate, housing and living conditions
- Inhalation rate – physiologically able to support active lifestyle
- Water intake rate – climate based plus sweat lodge

METHODS used to develop regional subsistence exposure scenarios.

Premise: *The scenario should describe traditional resource usage; therefore surveys are used for confirmation, not statistics.*

(1) description of eco-cultural zones (the environmental setting);

(2) reconstruct an original subsistence diet using multiple lines of evidence in the anthropological and biomedical literature; interviews to confirm;

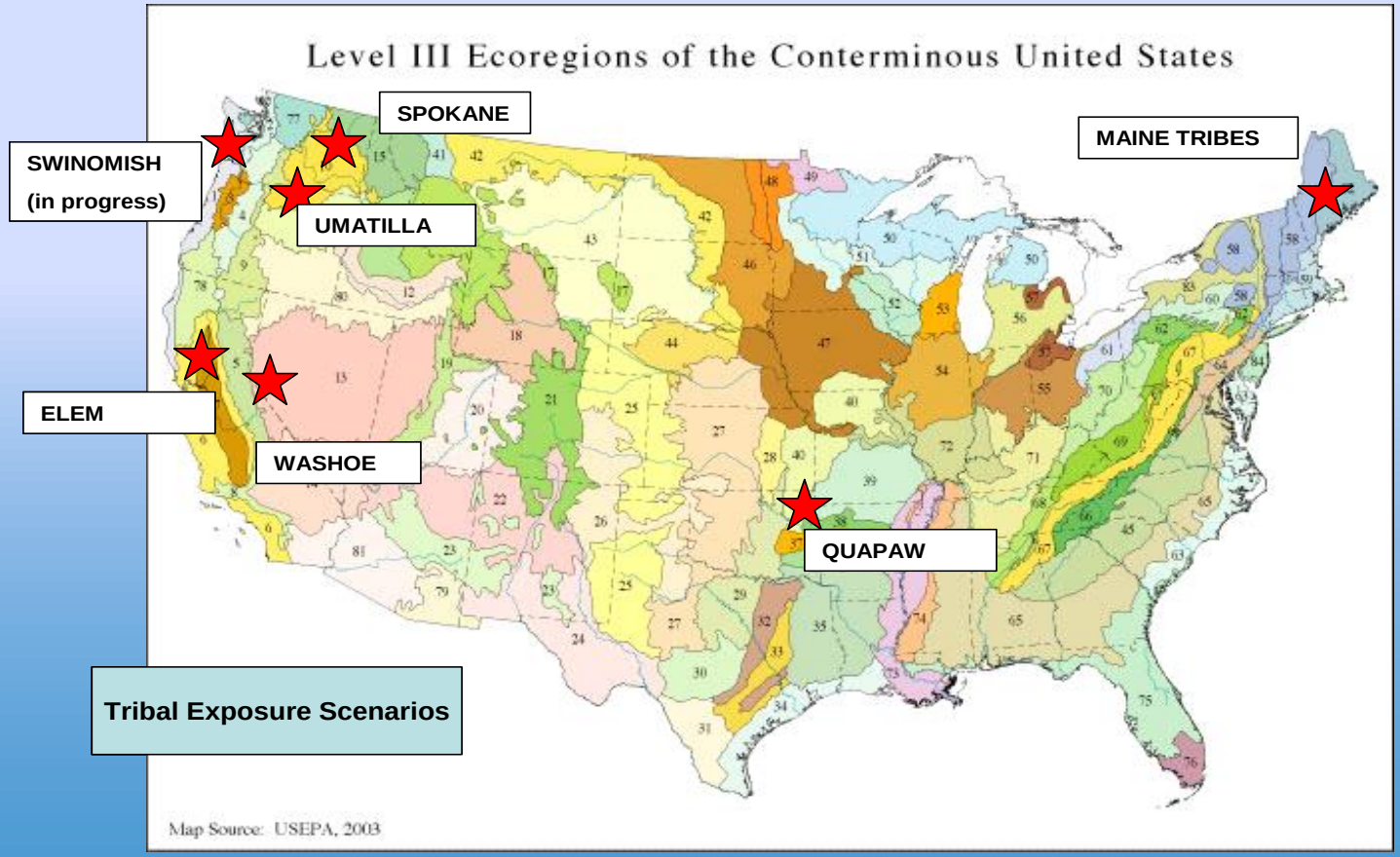
(3) determine general and unique tribal exposure pathways through activities of traditional people, such as hunting, gathering, making material items, fishing;

(4) identify direct exposure factors (activities and their frequency, duration and intensity, and resource use); and,

(5) quantify exposure factors for use in the development of CERCLA-style exposure scenarios (soil, water, air intake rates).

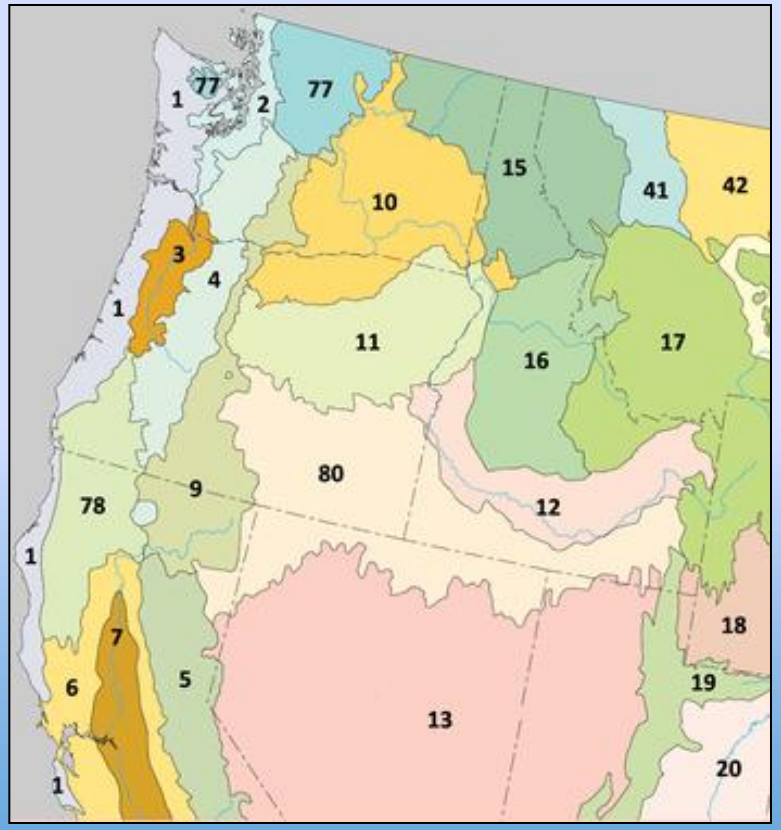
(6) More accurate, quantitative, scientific, almost as precise (statistical).

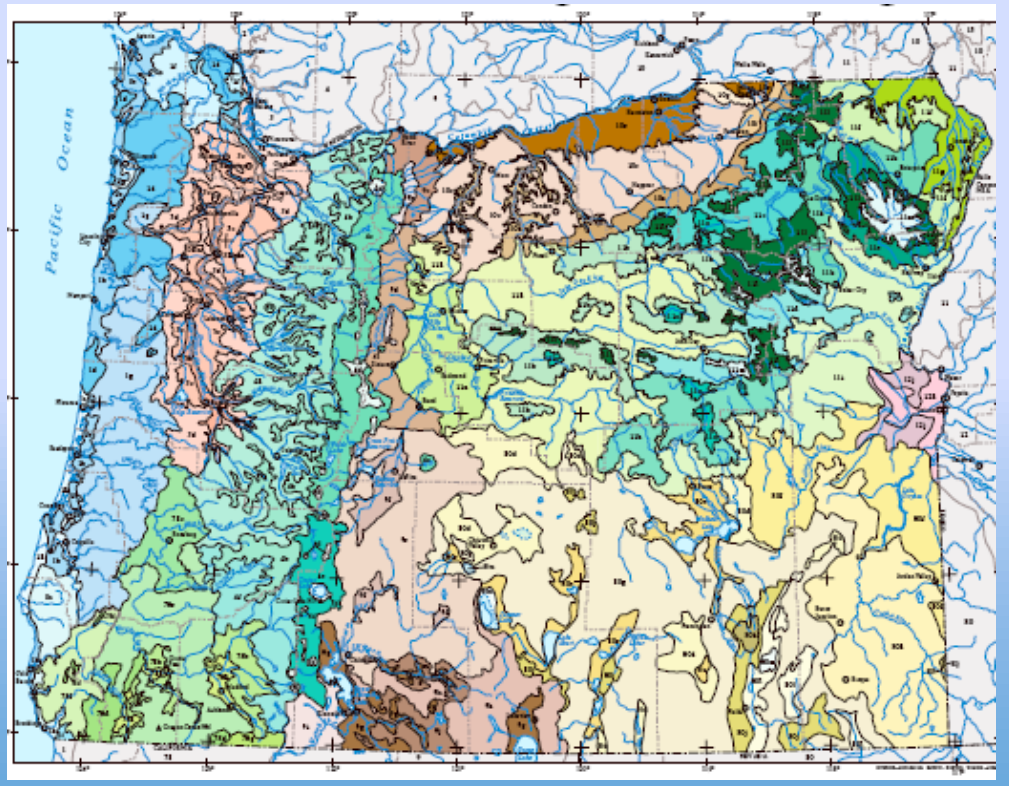
CASES. Of the scenarios developed to date, most are being used at Superfund sites in baseline risk assessments. Another is being used to support the development of water quality standards



www.hhs.oregonstate.edu/ph/tribal-grant-main-page

Ecosystem-based descriptions as basis for scenarios



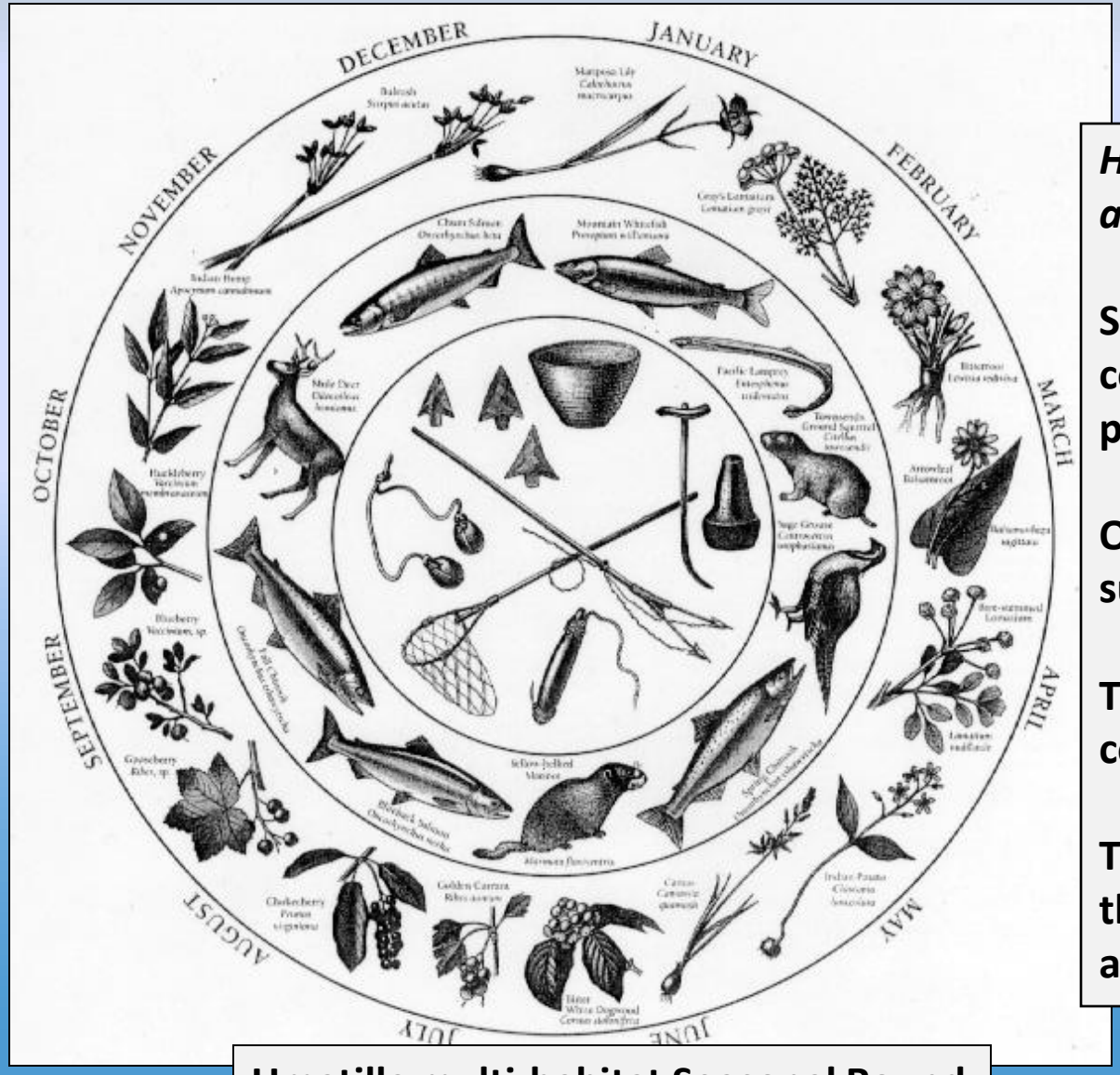


Western Level III Ecoregions

Level IV Ecoregions of Oregon

Purpose: Diets and materials will reflect the local ecology; used to identify dietary staples, material culture in combination with TEK and the anthro/ethno literature.

Local ecologies, Natural resource use, Seasonal Rounds



Umatilla multi-habitat Seasonal Round

Handling mobility in a risk assessment context:

Seasonal rounds must be compressed into exposure points to be used in CERCLA.

On-site resources are substituted so that FC = 1.

The diet is nutritionally complete (2000 – 2500 kcal).

This is an EJ issue to preserve the same margin of exposure as the suburban resident has.

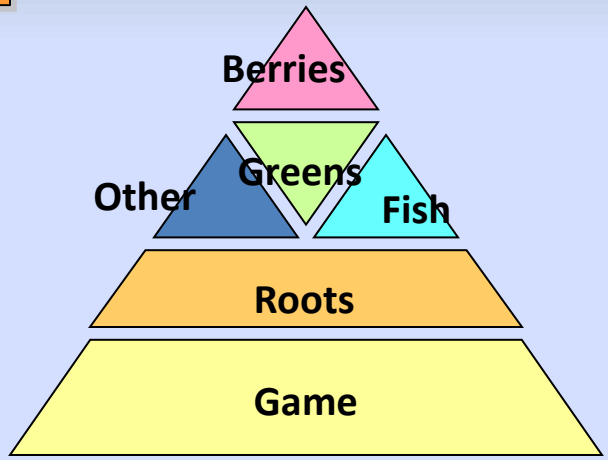
Describing Traditional Subsistence Diets

1. **What natural resources are present that are edible, medicinal, or materially useful. Typically ~ 200 species for multi-habitat tribes. But we do not want to list all of them.**
   - **Ecological information**
   - **Anthropological information**
   - **TEK and interviews with cultural and academic experts**
2. **Identify staples with rough apportions among food categories. NOT a simple substitution of food pictures, but description of what the diet actually was/is.**
3. **Estimate quantities and percents of calories among food groups**
4. **Check USDA nutritional database – kcal/100g portion of actual or nearest food (same plant family), same food prep method.**
5. **Ensure totals of 2000 kcal/day and about 1500 grams/day (about 3 lbs/day)**

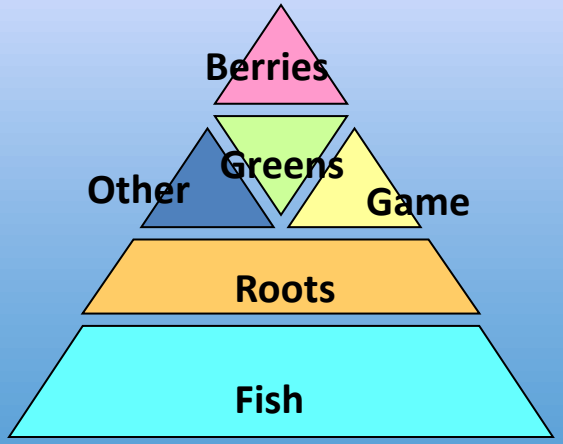
Local Diet

Food Category	Grams Per Day	Kcal per day	% of 2500 kcal
Fish	620	1000	40%
Game, fowl, eggs (reversed for upland Tribes)	125	150	6
Roots	800	800	32
Berries, fruits	125	125	5
Greens, medicinal leaves, tea, stems, pith…	300	300	12
Other: sweeteners, mushrooms, etc.	125	125	5%

Cayuse (Upland peoples)



Walla Walla, Umatilla (River peoples)



Harper & Harris 2006

Fish Ingestion Rates
All West coast anadromous salmon rivers

500 pounds per person per year

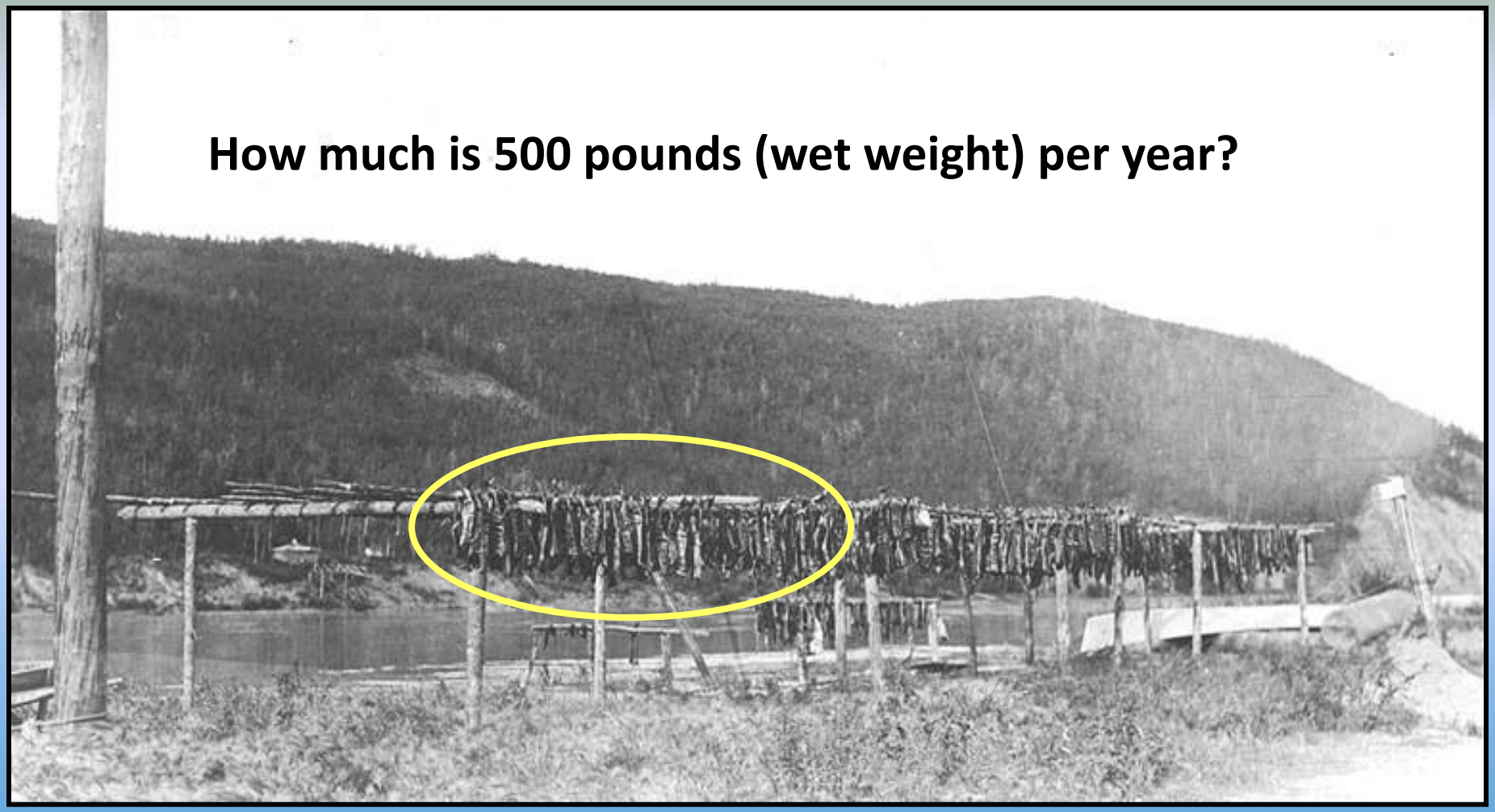
Treaty-Based and Current Subsistence Fish Consumption Rate
620 grams/day, or 500 pounds/year

Cited by Boldt, 1974 (note 151), as a defensible and reasonable Treaty-based rate; documented as currently valid for a subset of tribal members.

Multiple lines of evidence, court-tested, highly documented, very robust:

- **Early observers/trained naturalists (Lewis & Clark, etc)**
- **Missionaries (amateur anthropologists) – direct observation of fish catches and human population counts, storage & traded amounts.**
- **Pre-dam fish buying records, fish catch records**
- **Post-dam fishing site use & catch records, through 1950s (Walker)**
- **Reviews of early survey data (Hewes, Boyd, Anastasio, others)**
- **New ethnographic survey data from current traditional fishers (Walker, Harris); not captured in CRITFC survey.**
- **Nutritional ethnography and reanalysis of older data (Walker, Hunn)**
- **Nutritional, physiologic re-evaluation, with foraging theory data (Harper, Harris, Walker, Smith, others)**
- **Supporting evidence of health data; paleomedicine; archaeology; new research on benefits of clean fish; new medical survey data.**

For people who think 500 pounds is unreasonable…



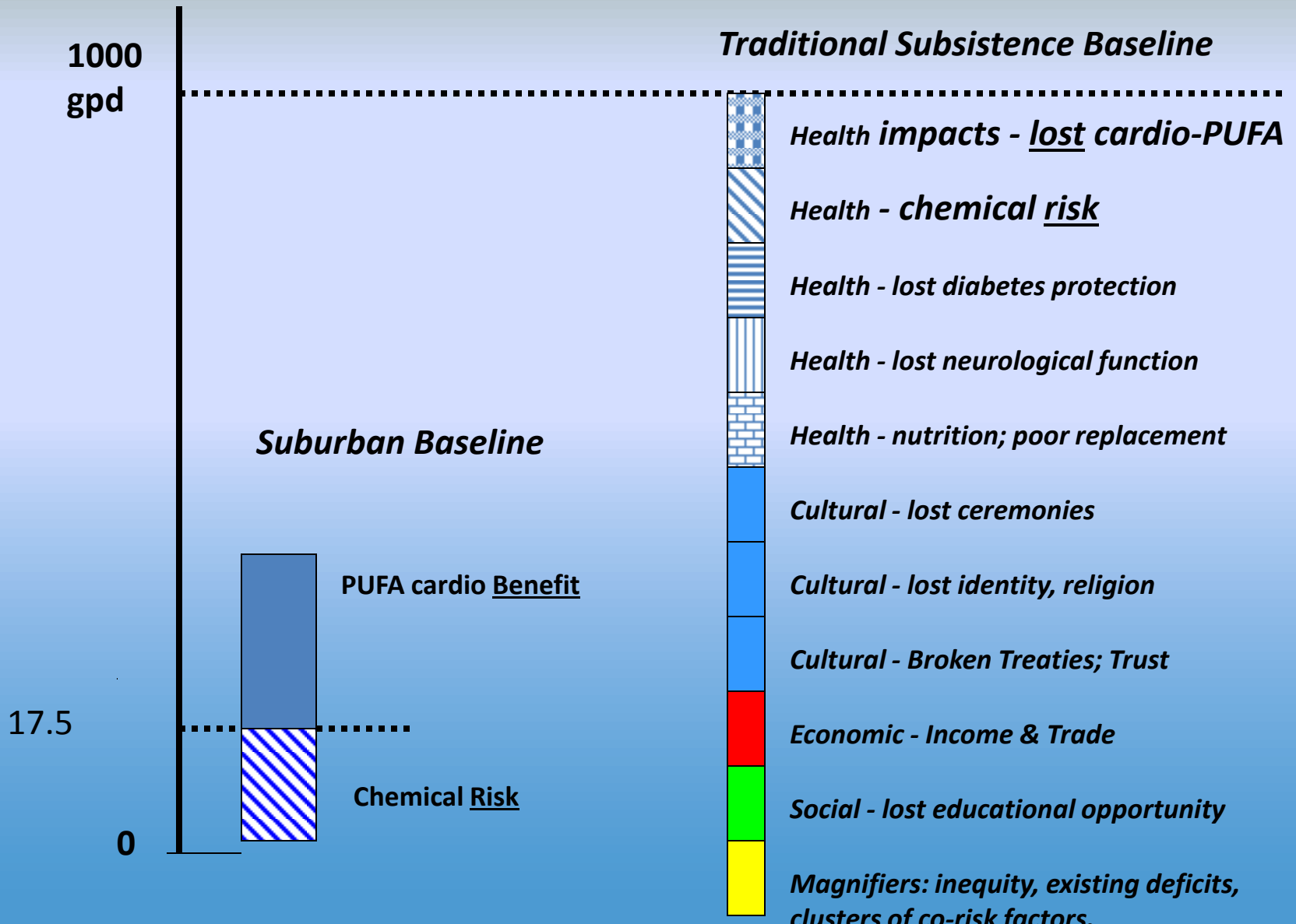
Yukon fish drying

Medium salmon = 20 pounds; 10 pounds per fish is fillet.
Therefore, 50 fish = 500 pounds
Circle = one person's entire annual protein and lipid

Fish Consumption Rates used in Regulation and Risk Assessment

Amount Eaten	Rationale
6.5 gpd	EPA Office of Water quality current rate for water quality standards
17.5 gpd	EPA Office of Water Quality proposed rate for the general population
48.5 gpd	EPA & FDA recommend rate eating 2 6-ounce meals per week
63.2 gpd	CRITFC average for current fish consumers; about 1 pound/week
142 gpd	EPA recommended CRITFC 95th percentile for current consumers
175 gpd	Oregon proposed
389 gpd	CRITFC 99th percentile minus subsistence "outliers"
454 gpd	1 pound per day; commonly cited level by Tribal members
540 gpd	Harris and Harper rate for true current Umatilla subsistence
620 gpd	Boldt Decision cited 500 lbs per capita – Columbia River
	Used in Hanford risk assessments; half resident / half anadromous
650 gpd	Walker mid-range of top 10% of Yakama members using the Columbia River during the 1950s and 1960s
1000 gpd	Walker estimate of pre-dam rates for Columbia Plateau Tribes (Celilo)

Example – Impact of lost & contaminated fish



Key Messages – Tribal context (Harper)

1. Average fish consumption rates are lower today than when everyone could safely eat fish at a traditional subsistence (Treaty-based) rate.
2. Today, people eat a range of fish amounts, from none to the original rate.
3. Which number do you need to know? Fish consumption surveys may not be not provide the answer you think it does.
4. Fish consumption is part of the subsistence diet; and exposure through the diet is part of a larger traditional tribal exposure context that includes water, soil, sediment, and air exposure pathways as the full range of traditional activities is pursued. Our goal is to understand this.
5. A description of traditional lifeways and baseline ecology, plus TEK interviews, tells us what the baseline "scenario" and diet are.
6. West-coast salmon rivers provided people with 500 lbs/year (620 gpd). This number is quite well documented.
7. Existing health and cultural deficits exist due to loss of fish and associated skills, language, places, etc. Chemical risk is then added on top, further impacting the larger context of health and well-being.