Progress on a range-wide inventory for Pacific salmon monitoring data.

Peter S. Rand[1], Xanthippe Augerot[1], Cathy (Pearson) Kellon[2], Charles Steinback[2], Greg Robillard[2]

State of the Salmon Program (SoS)

[1] Wild Salmon Center

[2] Ecotrust

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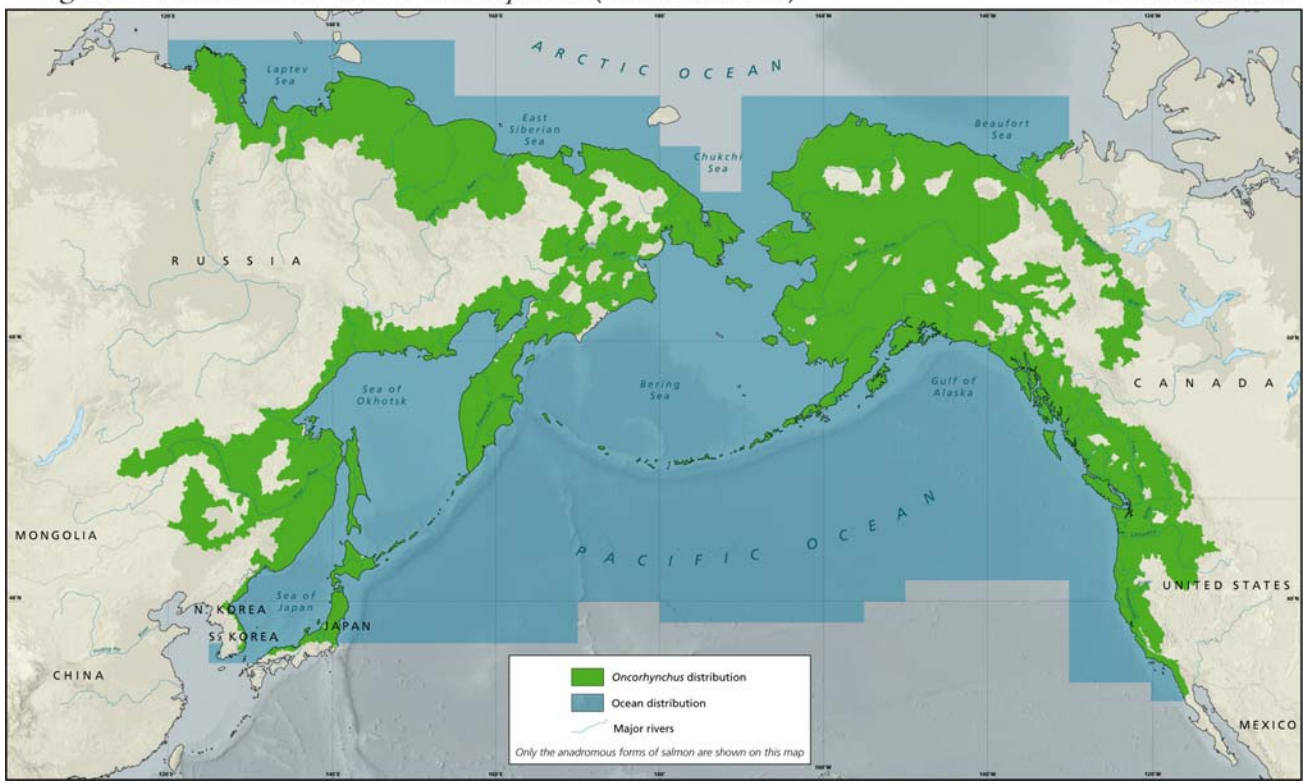
STATE OF THE SALMON

KNOWLEDGE ACROSS BORDERS ЗНАНИЕ СКВОЗЬ ГРАНИЦЫ 国境を超えた知識

Original Distribution of Genus *Oncorhynchus* (Pacific Salmon)



The State of the Salmon Monitoring Data Inventory

Goals:

- Describe distribution and quality of monitoring efforts
- Develop an approach to use data to track status and trends

Approach :::

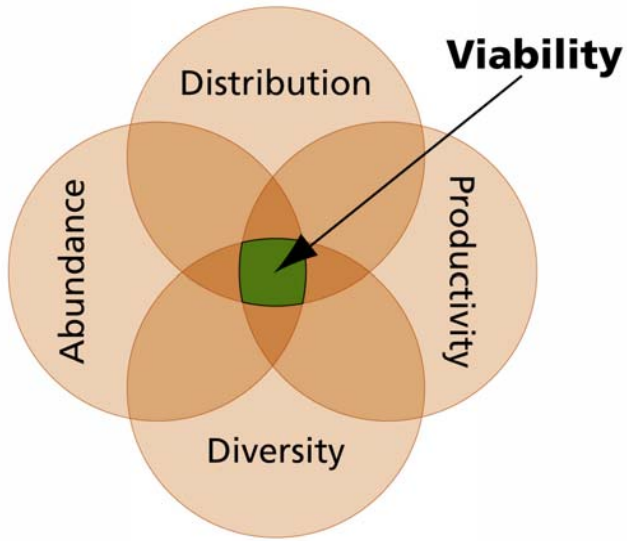
Conceptual framework to identify, describe, and organize data

- Criteria – 10+ yrs (w/ exceptions), viability parameters
- Classification – raw/derived, monitoring tier, area of inference
- Utility – quality

Criteria :::

- Focus on four biological parameters – **distribution, diversity, abundance and productivity (DDAP)**.

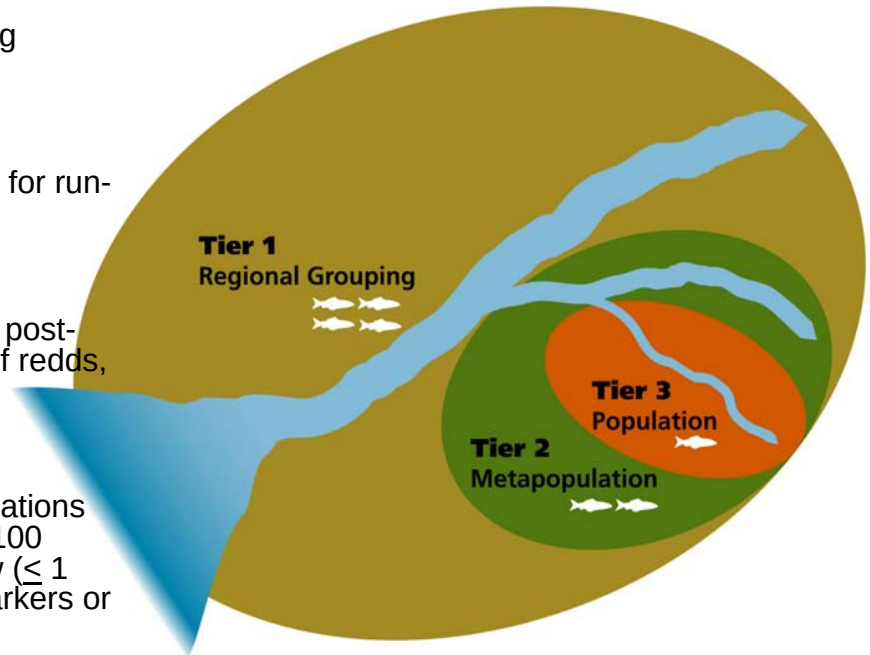
≥ 1 = considered for inclusion.



Classification

SOS DICHOTOMOUS KEY

1. Is the sampling conducted on live, mature adults intercepted during their spawning migration?
   - Yes, go to..... 2
   - No, go to..... 4
2. Does sampling design conform to established run-timing period for individual species?
   - Yes, go to 3
   - No ..... *MT 1*
3. Is the location and timing of spawning known precisely for run-timing group?
   - Yes..... *MT 3*
   - No, go to..... 6
4. Is the sampling conducted to enumerate adults (pre or post-spawn) on the spawning grounds, or to quantify number of redds, eggs, alevin or recently emerged fry from gravel?
   - Yes ……*MT 3*
   - No, go to …….5
5. Can sampled individuals be assigned to discrete populations defined either by their replaceability (irreplaceable within 100 year time horizon) or by a measure of restricted gene flow (≤ 1 migrant per generation, estimated using either genetic markers or data on straying rate)?[1]
   - Yes..... *MT 3*
   - No, go to..... 6
6. Are sampled individuals assigned to discrete metapopulations defined using Waples' (1991) criteria of evolutionary significance, or an accumulated measure of inter-population gene flow or straying among populations comprising the metapopulation (10 migrants per generation exchanged among populations) or evidence of demographic distinctness from other metapopulations?
   - Yes..... *MT 2*
   - No ..... *MT 1*



Monitoring Tier	SoS Research Questions
MT1 Regional Grouping	**Q1. What are the trends in abundance and productivity by species in the region?** - as measured by total catch, CPUE, or coarse measures of escapement. *Published examples: Beamish and Bouillon (1995), Hare and Francis (1995), Radchenko and Mathisen (2004)* **Q2. What are the trends in species composition and diversity in the region?** -- as measured by catch, CPUE, or coarse measures of escapement. *Published example: Brodeur et al. (1999)* **Q3. What are the trends in marine derived nutrient transport into a region or basin?** – as measured by long-term escapement trends or lake coring records. Published examples: *Finney et al. (2002)*
MT2 Metapopulation	**Q1. What are the trends in abundance and productivity among species-specific metapopulations or comparable stock units, and the degree of spatial coherence?** – typically reported by brood year and age and normalized as recruits per spawner at a metapopulation or managed stock level *Published examples:.Hilborn, et al. (2003), Yoshiyama et al. (1998)***,** *Welch et al. 2000, Mueter et al. (2002)* **Q2. What are the trends in metapopulation diversity? Are there significant shifts in the relative contribution of metapopulations within a region or basin?** *Published example: Brown et al. (1994)* **Q3. What are the unique metapopulations by species?** -- as defined by artificial, genetic, or elemental markers and/or unique life history traits. *Published examples: Waples (1991).*
MT3 Population	**Q1. What are the trends in abundance and productivity at the population level?** Published examples: *Schubert et al. (2002).* **Q2. Are there trends in survival rates across life stages?** -- as measured by abundance counts at each key life history stage such as fry counts, smolt outmigration, juvenile snorkel counts, escapement, redds/spawner, etc. *Published examples: Ward (2000)* **Q3. What are the trends in life history diversity at the individual population level?** -- as measured by five or six key life history parameters such as run timing, life history type, egg size, adult body size, emergence timing. *Published examples: Cox and Hinch (1997)* **Q4. What are the unique populations by species?** -- as defined by artificial, genetic, or elemental markers. *Published examples: Wood et al. (1994), Habicht et al. (2004), Olsen et al. (2003).*

Operating Principles :::

State of the Salmon:

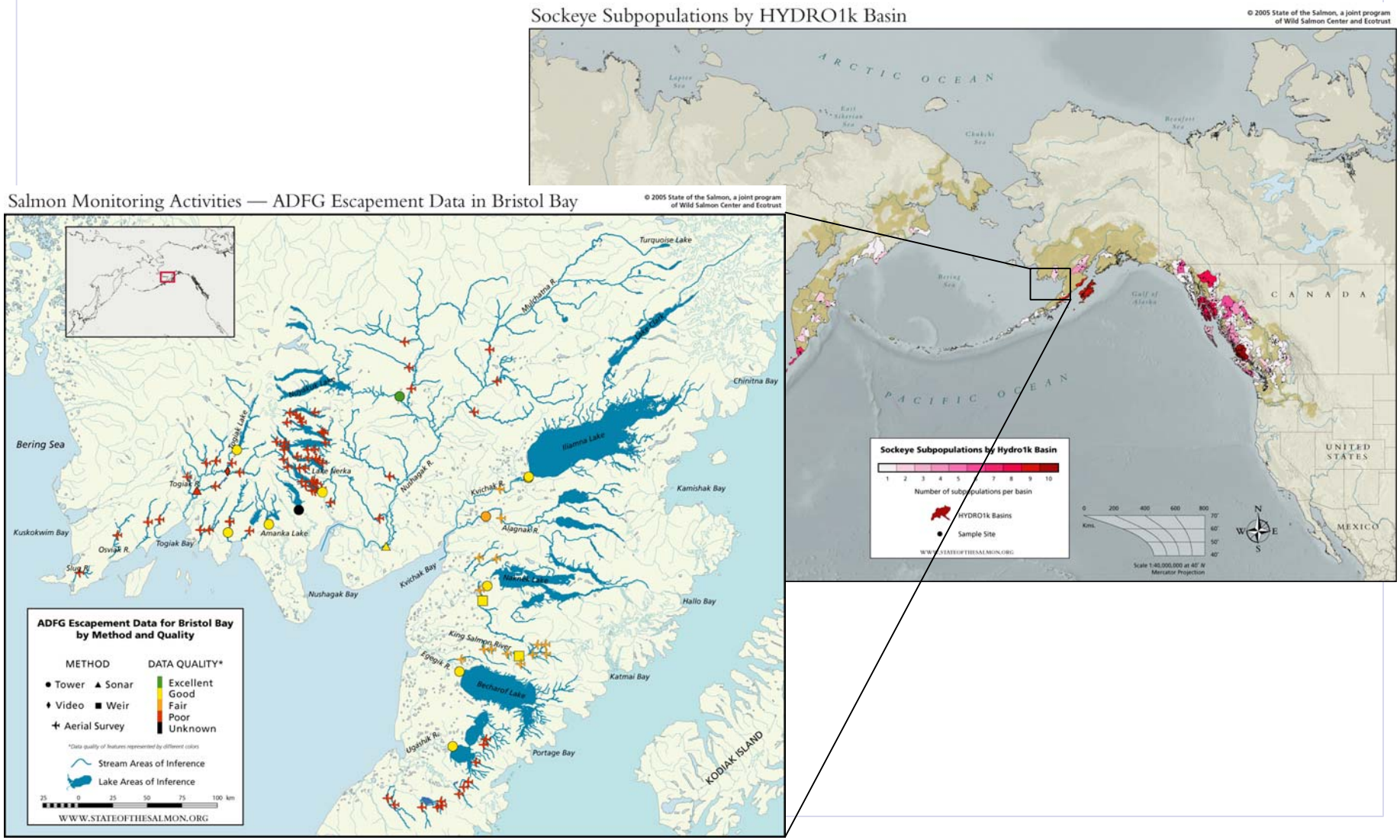
- will work closely with agency and other monitoring entity staff to ensure appropriate identification and characterization of datasets.
- will make every effort to minimize its requests of staff time.
- does not presume any influence or role in an organization's internal practices and procedures.
- is interested in acquiring specific values or parameters from existing datasets/databases to answer key questions about the status and trends of salmon at various biological scales
- does not intend to become a data warehouse, create redundant databases, or otherwise re-create data systems already in existence.
- respects data security, data use restrictions, and statutory obligations concerning the release and sharing of datasets as specified by donor organizations.
- adheres to recognized standards for data exchange and discovery.
- will pursue innovative technologies, including open-source and free-ware when available and appropriate, to facilitate data sharing and communication of resulting analyses.

Progress to date :::

We expect to complete the North American inventory next year and initiate soon the Western Pacific inventory.

- Alaska
- Canada (BC/Yukon)
- Washington, Oregon, California, Idaho
- Russian Far East
- Japan

Products :::


Sockeye Subpopulations by HYDRO1k Basin
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ARCTIC OCEAN
PACIFIC OCEAN
CANADA
UNITED STATES
MEXICO
Sockeye Subpopulations by Hydro1k Basin
Number of subpopulations per basin
HYDRO1k Basins
Sample Site
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Salmon Monitoring Activities — ADFG Escapement Data in Bristol Bay
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Bering Sea
Kuskokwim Bay
Togiak Bay
Nushagak Bay
Kvichak Bay
Chinitna Bay
Kamishak Bay
Hallo Bay
Katmai Bay
Portage Bay
KODIAK ISLAND
Turquoise Lake
Iliamna Lake
Lake Nerka
Amanka Lake
Becharof Lake
King Salmon River
ADFG Escapement Data for Bristol Bay by Method and Quality
METHOD
Tower
Sonar
Video
Weir
Aerial Survey
DATA QUALITY*
Excellent
Good
Fair
Poor
Unknown
Stream Areas of Inference
Lake Areas of Inference
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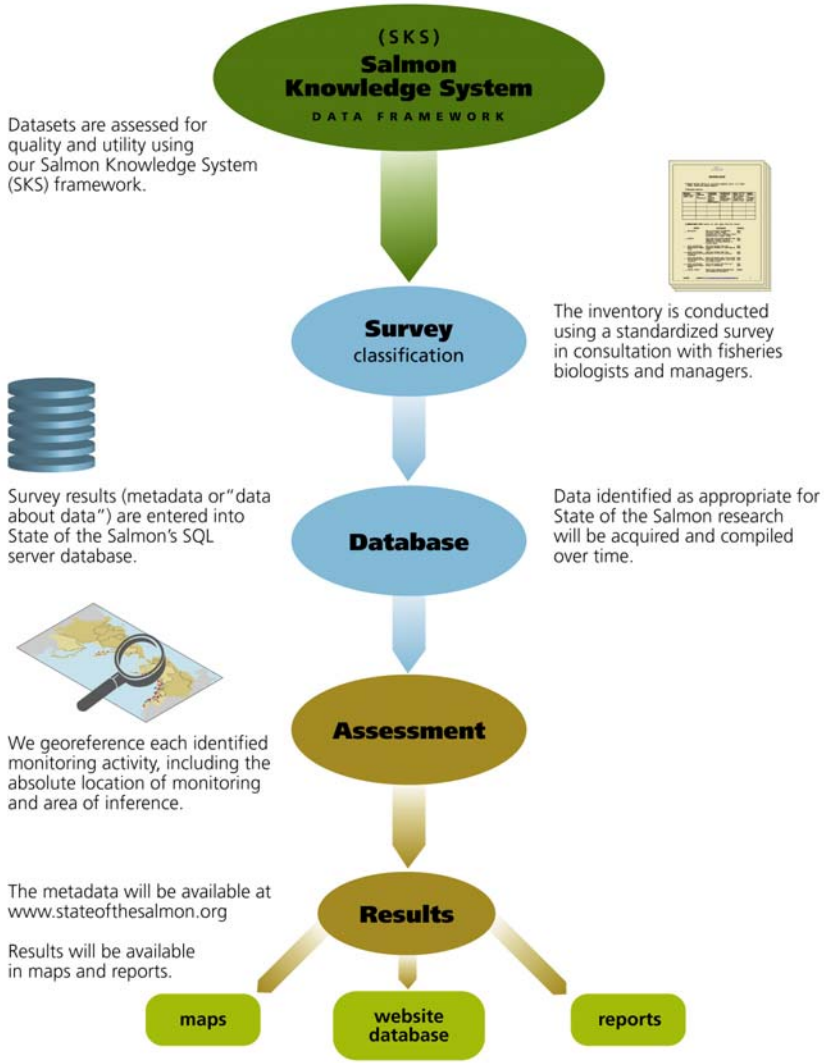
Synergy with other efforts :::

- Wild Salmon Center and University of Montana has established a network of “salmon observatories” (SaRON) and a river typology classification approach to address relationship of river complexity with life history variability in *Oncorhynchus spp.*
- Wild Salmon Center and University of Washington has proposed to develop an approach to simulate marine migration and growth of pink salmon in the Gulf of Alaska (GLOBEC)

Looking ahead :::

Results will be available in multiple formats.

- The metadata database will be fully searchable on our website, including an Arc-IMS site.
- Analytical results will be available in peer-reviewed publications, white papers, and other report formats.
- Results incorporated into the next edition of the PICES Ecosystem Status Report?



Conclusion :::

Our inventory effort will ...

- help advance progress and standardization in data collection and management;
- provide, for the first time, a way of visualizing the heterogeneity of the “data landscape” intended to monitor the condition of Pacific salmon; and
- provide a platform from which to conduct status assessments for these species, in the spirit of the PICES Ecosystem Status Report

STATE OF THE SALMON

STATE OF THE SALMON IS A JOINT PROGRAM
OF WILD SALMON CENTER AND ECOTRUST

THE WILD SALMON CENTER

ecotrust