RECLAMATION

Managing Water in the West

Yakima River Basin Water Storage Feasibility Study, WA

Yakima Basin Science & Management Conference 2008

Joel Hubble

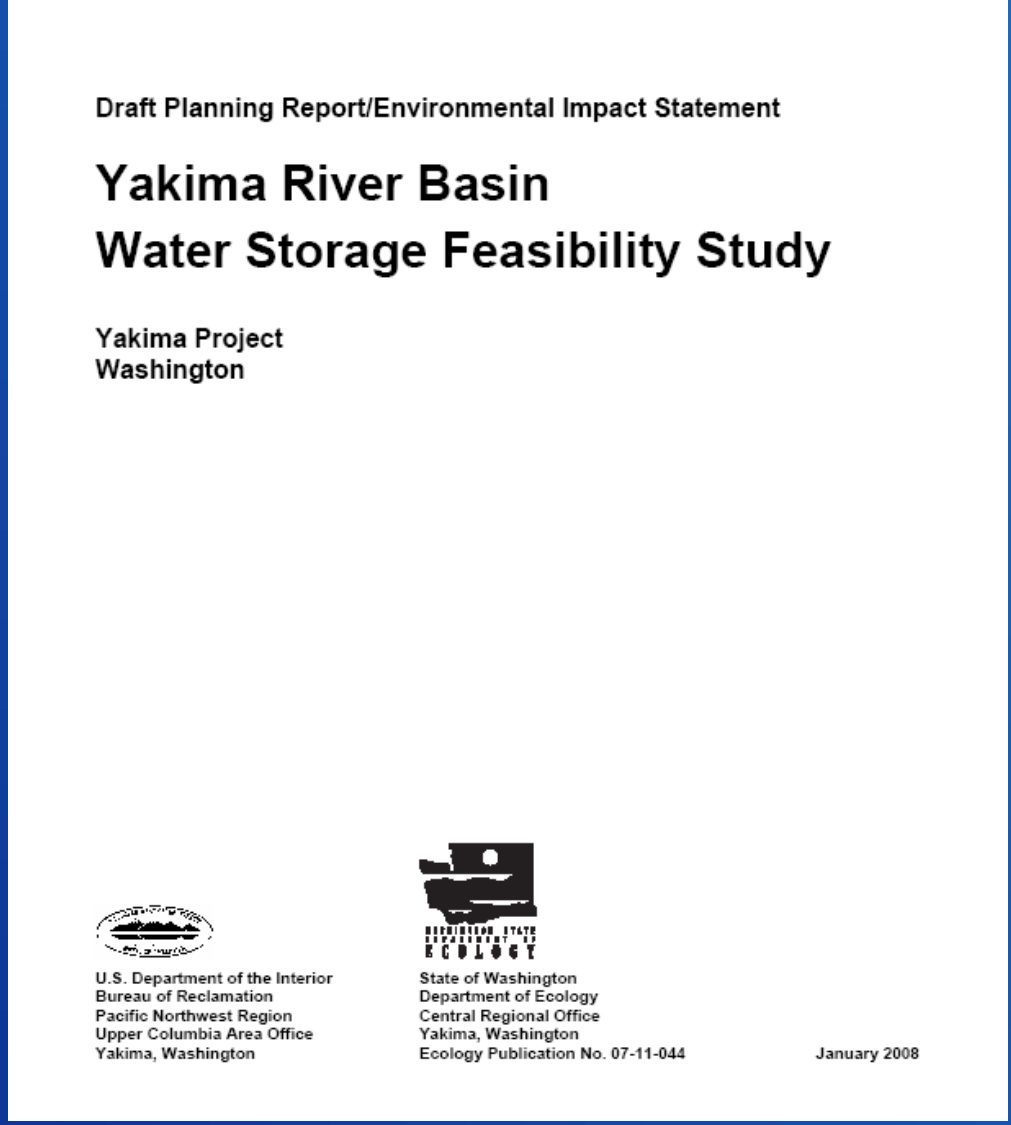
Upper Columbia Area Office

U.S. Department of the Interior
Bureau of Reclamation

Study Title

Yakima River Basin Water Storage Feasibility Study

- Authorized by Congress in 2003
- Public Law 108-7



Draft Planning Report/Environmental Impact Statement

Yakima River Basin
Water Storage Feasibility Study

Yakima Project
Washington

U.S. Department of the Interior
Bureau of Reclamation
Pacific Northwest Region
Upper Columbia Area Office
Yakima, Washington

State of Washington
Department of Ecology
Central Regional Office
Yakima, Washington
Ecology Publication No. 07-11-044

January 2008

RECLAMATION

Alternative Types Evaluated

1. Current river operation + YRBWEP conservation.
   - No Action Alternative

2. In-basin water supply + a water storage component
   - Wymer Only Alternative

3. Pump exchange (RID and SVID) near the mouth of the Yakima + a water storage component
   - Wymer Plus Alternative

4. Out-of-basin water exchange with the Columbia R. + a water storage component.
   - Black Rock Alternative

RECLAMATION

Today Going to Focus on-

- Some general study results for all species
- Flow-to-habitat relationships for upper Yakima Spring Chinook & Steelhead
- Future direction

RECLAMATION

Study Summary

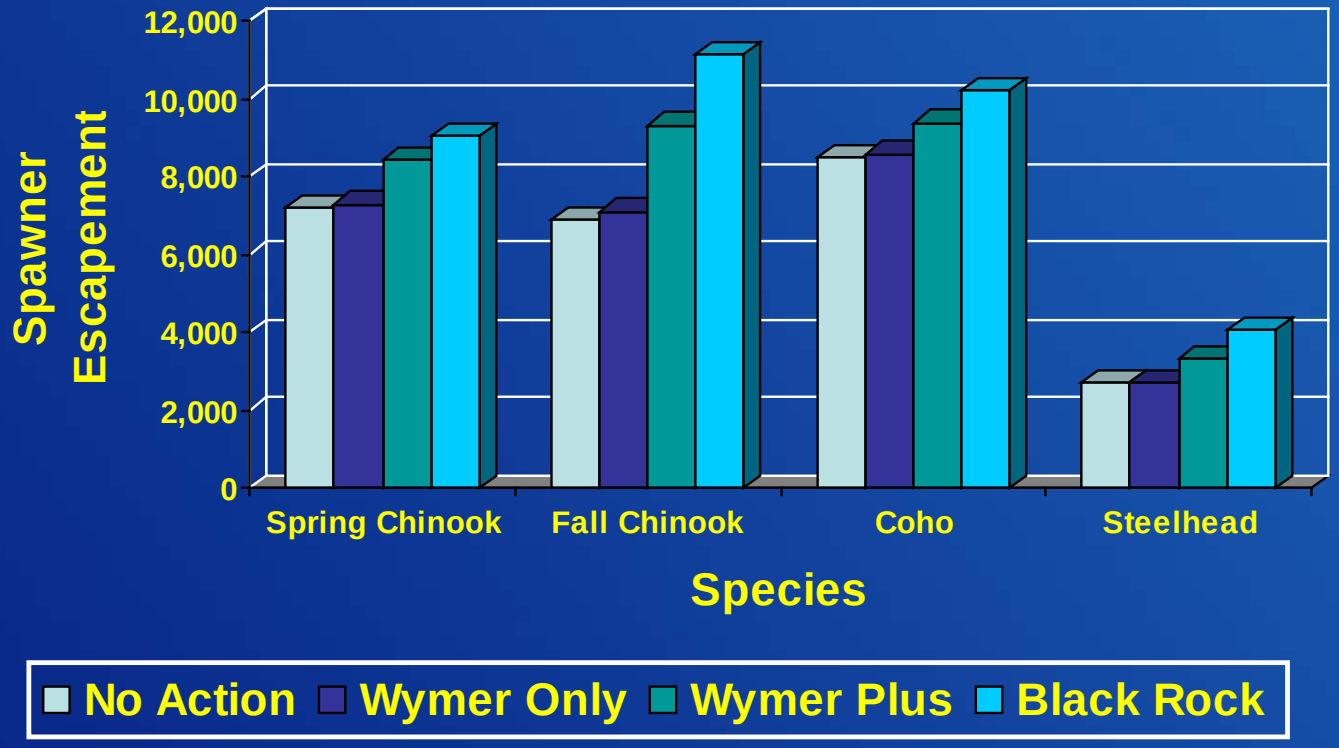
- **Increase in fish abundance (spawner escapement of all species combined) relative to No Action-**
  - **Black Rock = 37% increase.**
  - **Wymer Plus = 21% increase.**
  - **Wymer Only = 2% increase.**

- **There was minimal change in the amount of key habitat (5 floodplains) between alternatives.**

- **Most of the anadromous fishery benefit was attributed to improved smolt outmigrant survival (both in-river and at the diversion dams).**

Study Results- Abundance

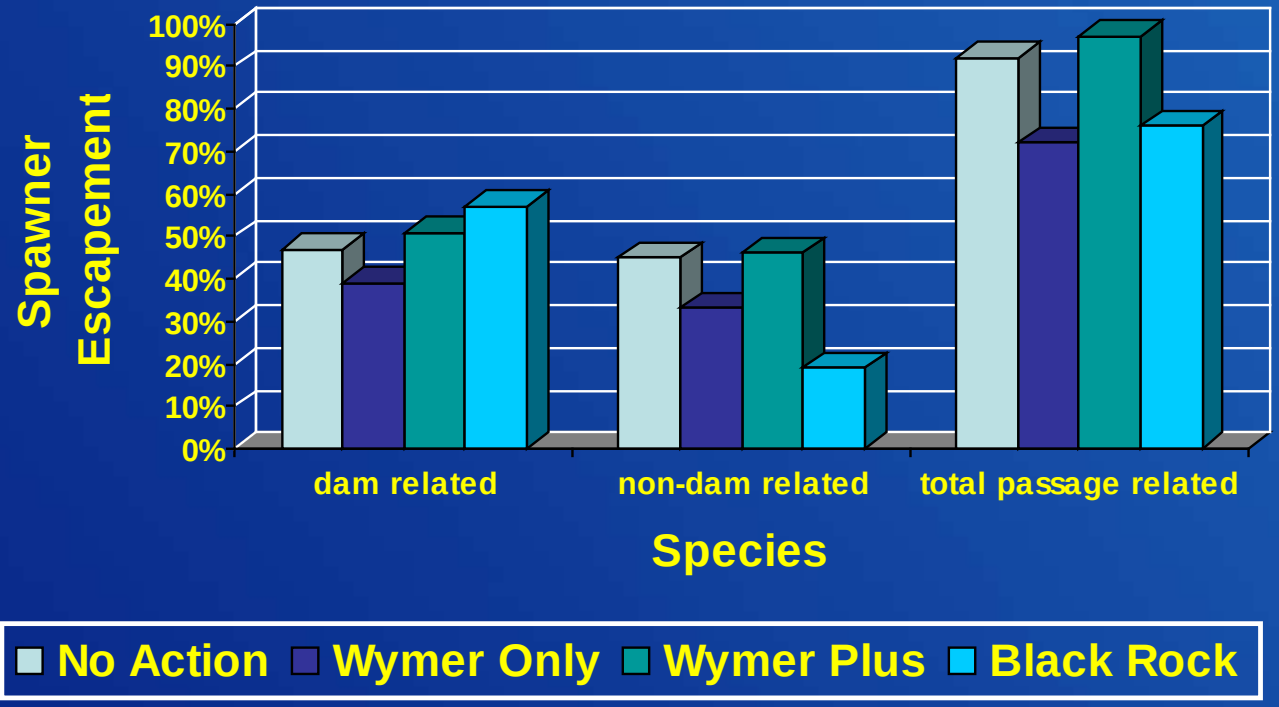
Fish Abundance
(spawner escapement natural + hatchery)



RECLAMATION

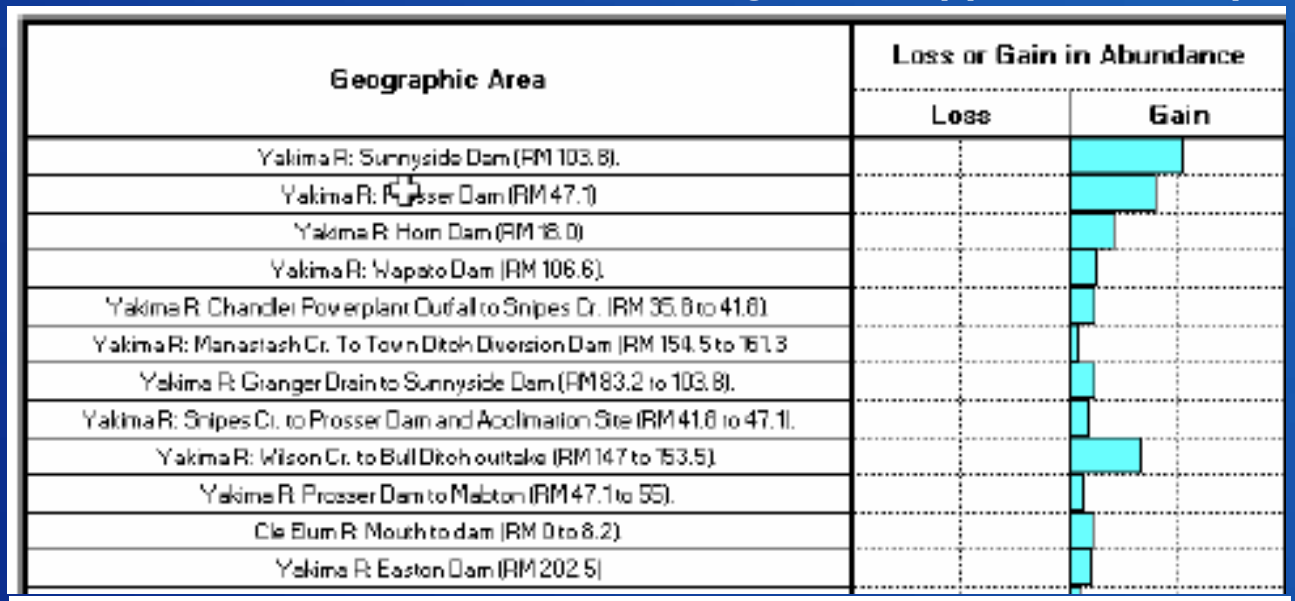
Study Results- Juvenile Passage

Percent Spring Chinook Abundance Increase Due to Juvenile Passage Improvements (from EDT diagnosis results)



RECLAMATION

EDT Tornado Diagrams: Upper Yakima Spring Chinook



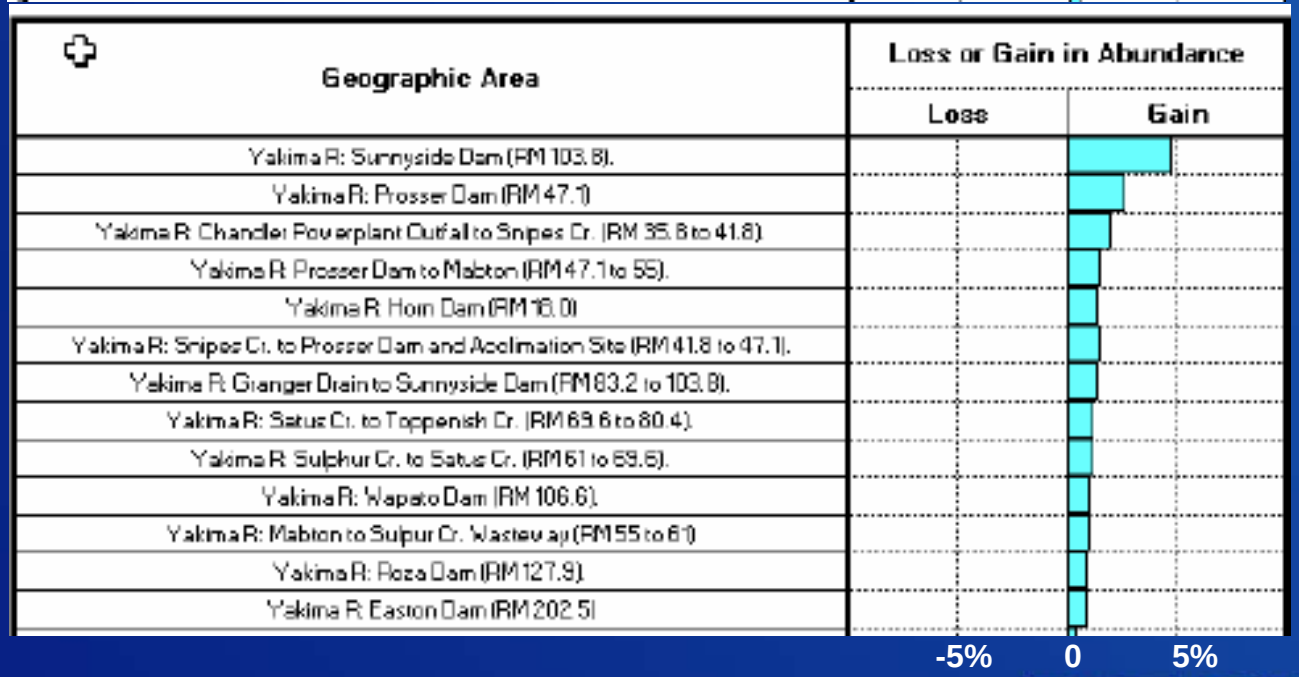
Black Rock

Diversions Dams <Yakima: 4

Reaches <Parker Dam: 4

Other Reaches: 3

Other Dams: 1



Wymer Plus

Diversions Dams <Yakima: 4

Reaches <Parker Dam: 7

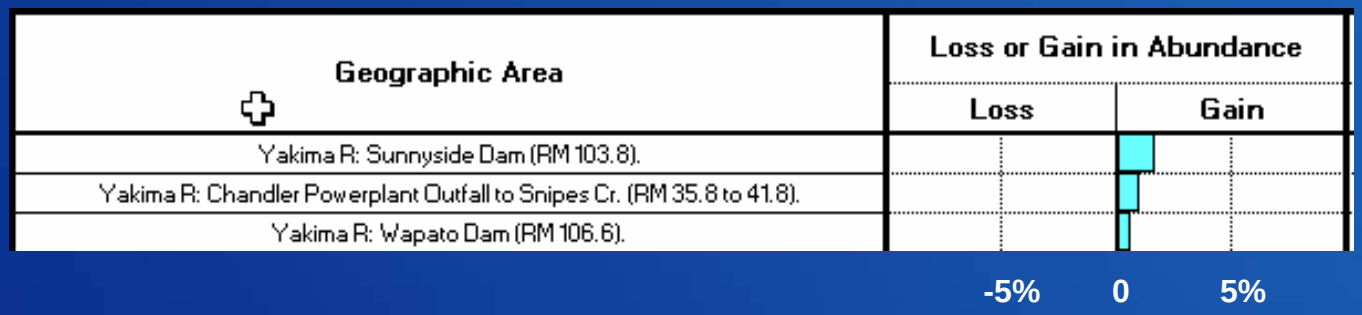
Other Reaches: 0

Other Dams: 2

RECLAMATION

EDT Tornado Diagrams: Upper Yakima Spring Chinook

Wymer Only



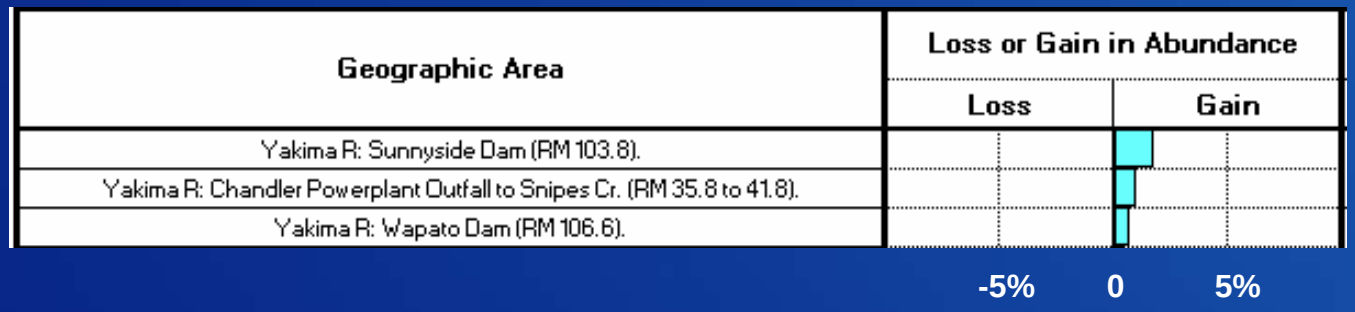
Diversions Dams <Yakima: 2

Reaches <Parker Dam: 1

Other Reaches: 0

Other Dams: 0

No Action



Diversions Dams <Yakima: 2

Reaches <Parker Dam: 1

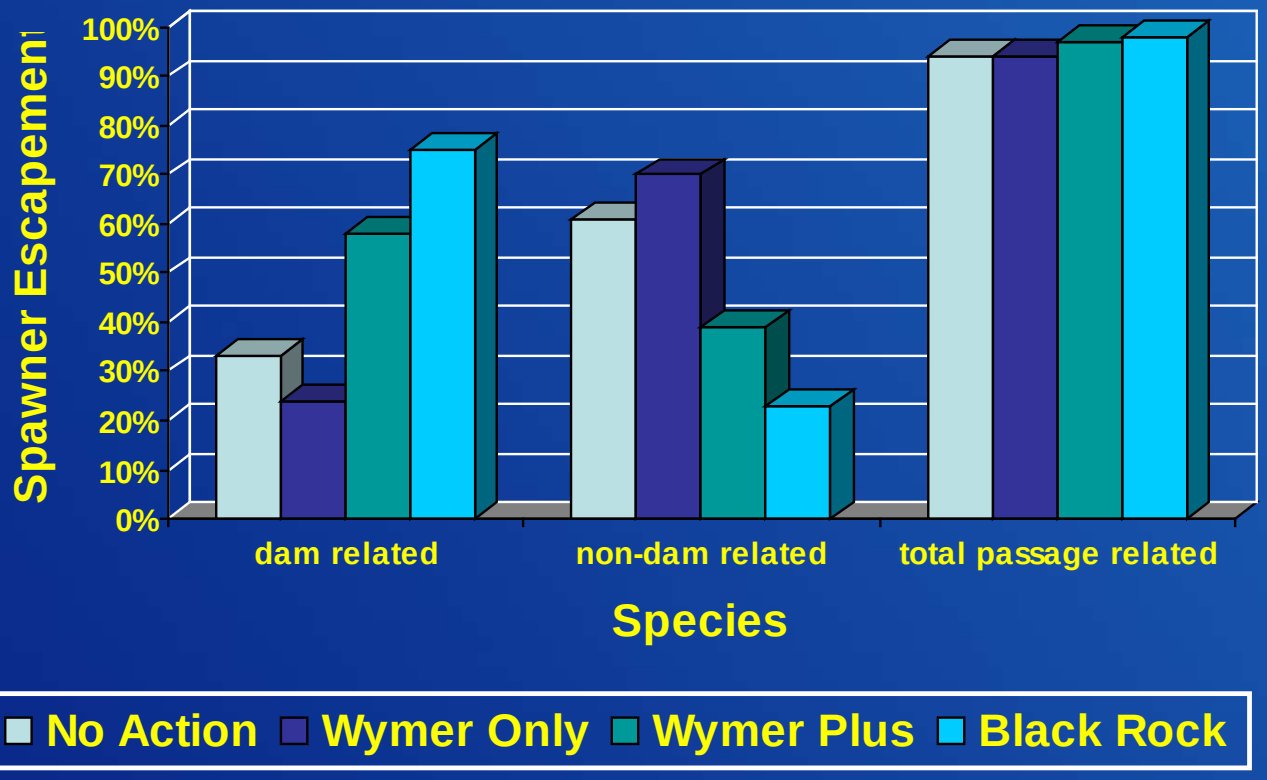
Other Reaches: 0

Other Dams: 0

RECLAMATION

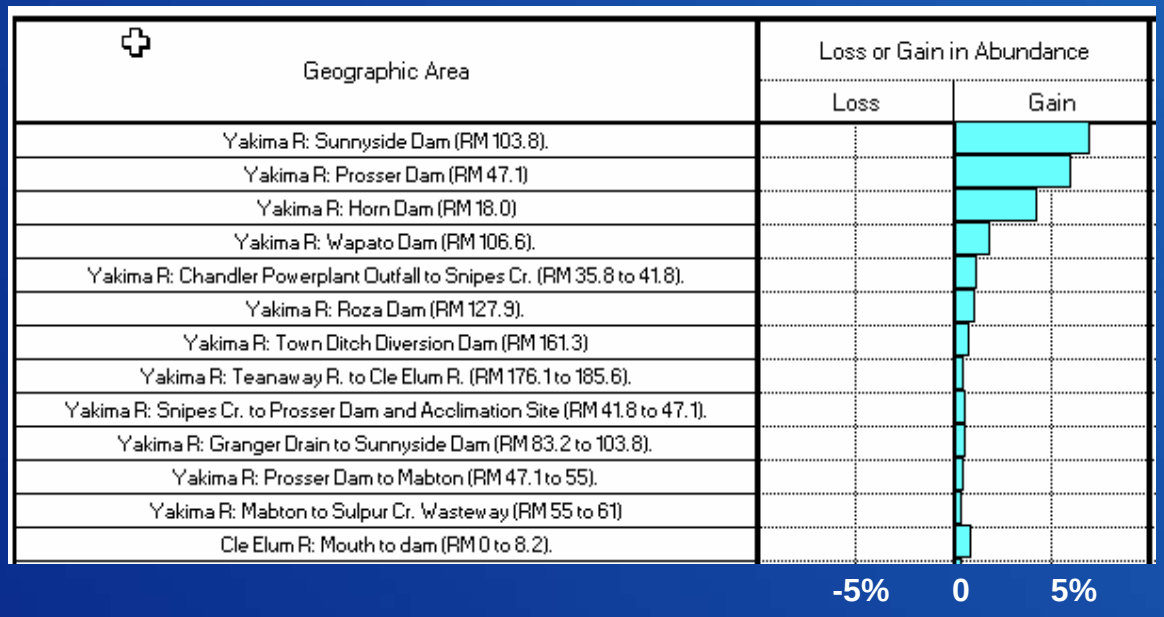
Study Results- Juvenile Passage

Percent Steelhead Abundance Increase Due to Juvenile Passage Improvements



RECLAMATION

EDT Tornado Diagrams: Upper Yakima Steelhead



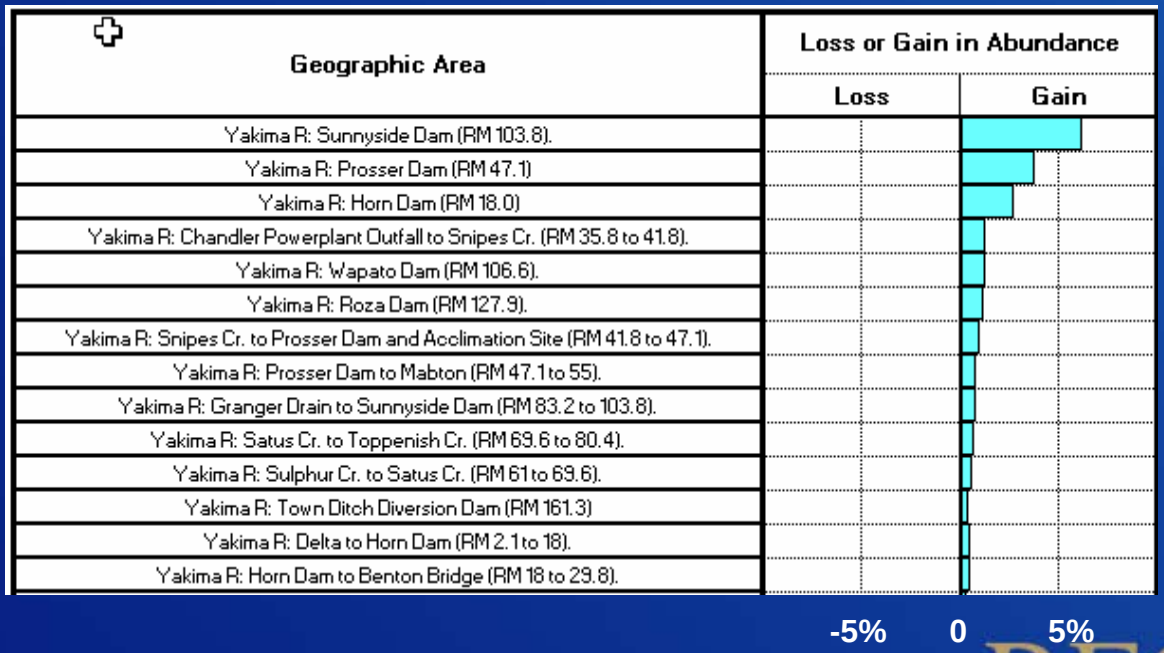
Black Rock

Diversions Dams <Yakima: 4

Reaches <Parker Dam: 5

Other Reaches: 3

Other Dams: 1



Wymer Plus

Diversions Dams <Yakima: 4

Reaches <Parker Dam: 8

Other Reaches: 1

Other Dams: 1

RECLAMATION

EDT Tornado Diagrams: Upper Yakima Steelhead

Wymer Only

Diversions Dams <Yakima: 2

Reaches <Parker Dam: 1

Other Reaches: 0

Other Dams: 0

No Action

Diversions Dams <Yakima: 2

Reaches <Parker Dam: 1

Other Reaches: 0

Other Dams: 0

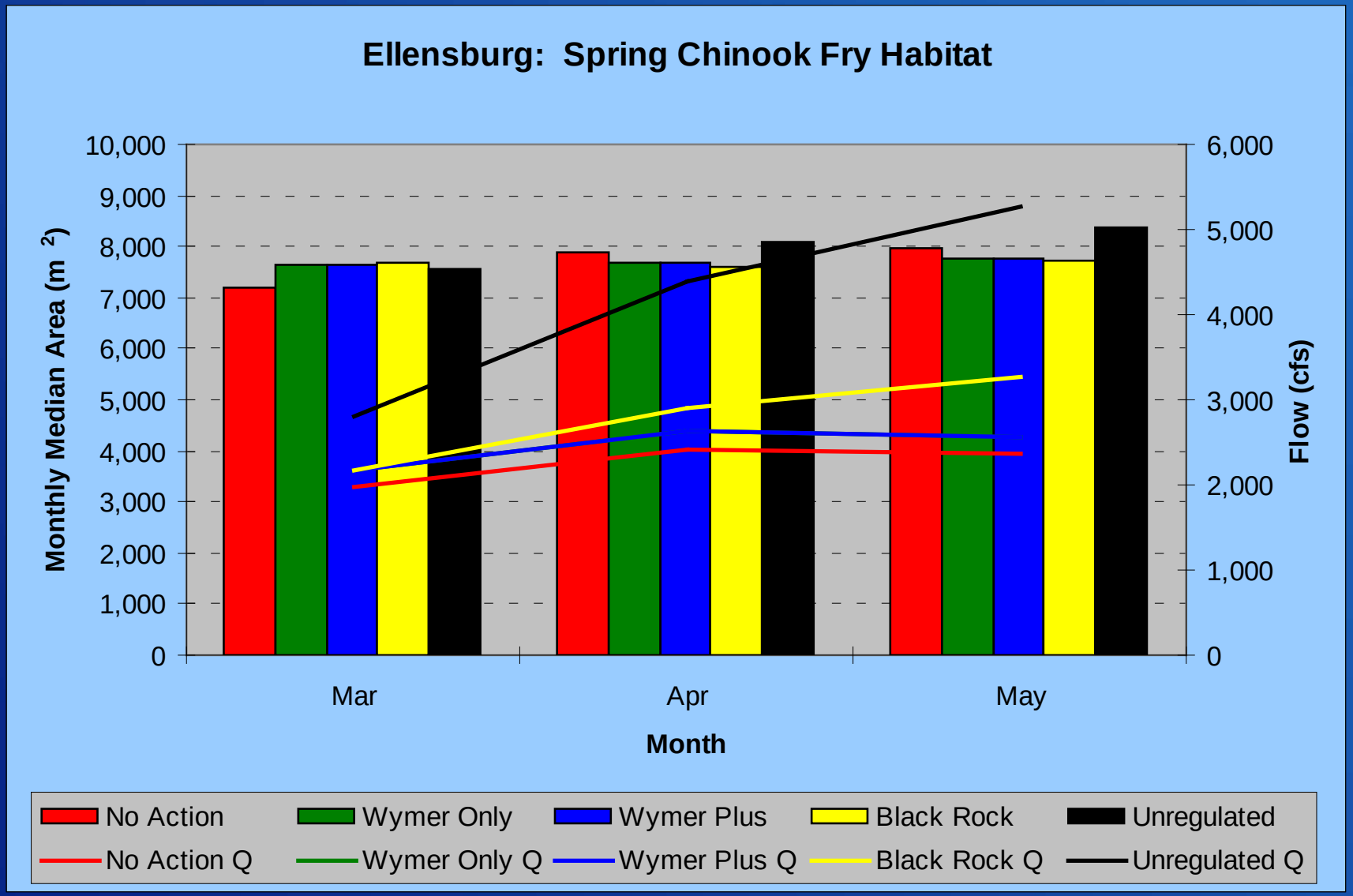
RECLAMATION

Estimated Lower Yakima River Smolt Survival Benefit Relative to No Action (applied in the All-H Analyzer model)

Alternative	Spring Chinook & Steelhead	Fall Chinook	Coho
Wymer Only	0.5%	2.4%	0.8%
Wymer Plus	3.8%	17.0%	5.6%
Black Rock	8.2%	35.4%	12.2%

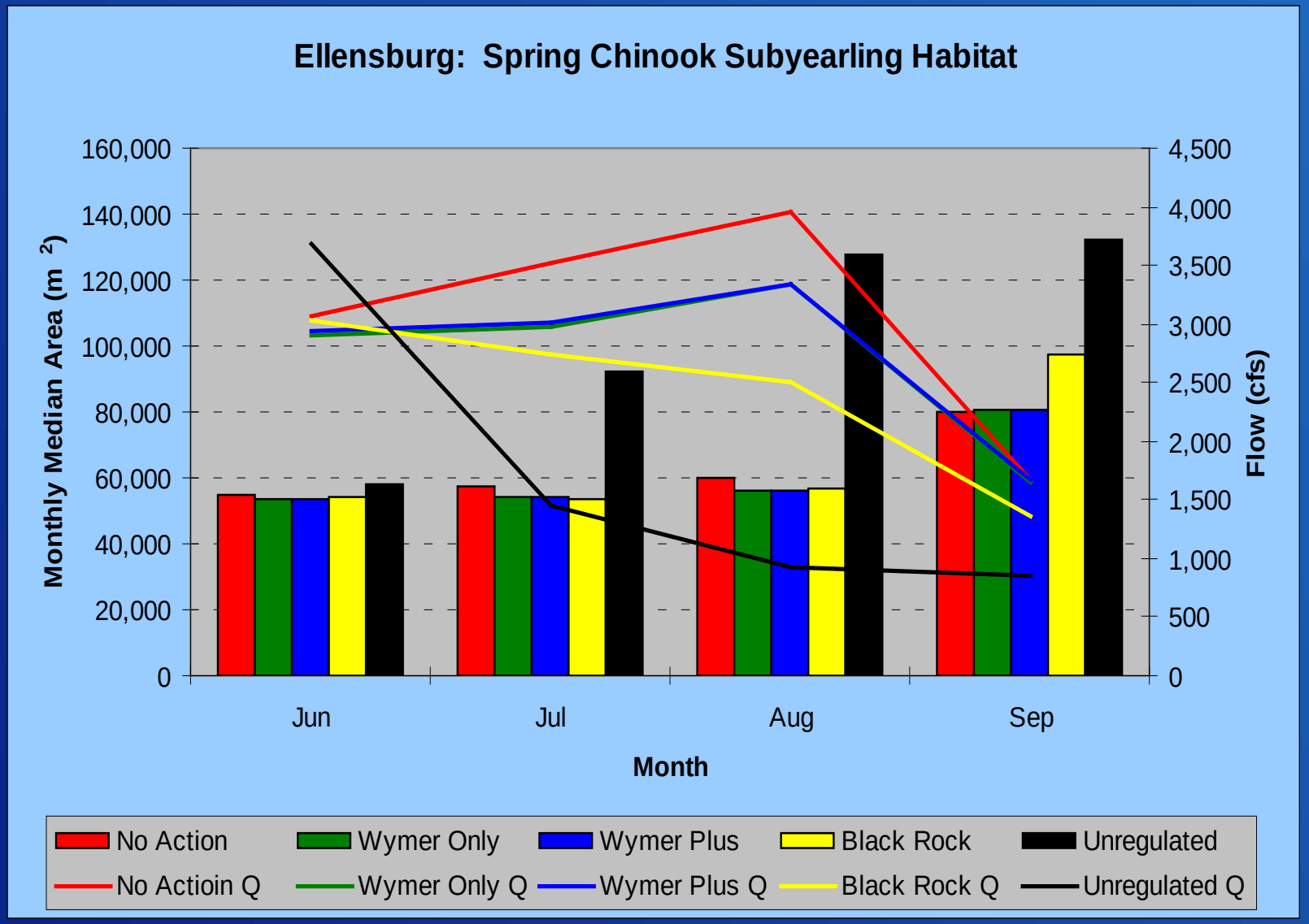
Based on Pyper and Smith (2005), Evaluation of Salmonid Survival Resulting From Flow Alterations To The Lower Yakima River.

Based on the 2-D hydraulic model & the Decision Support System model



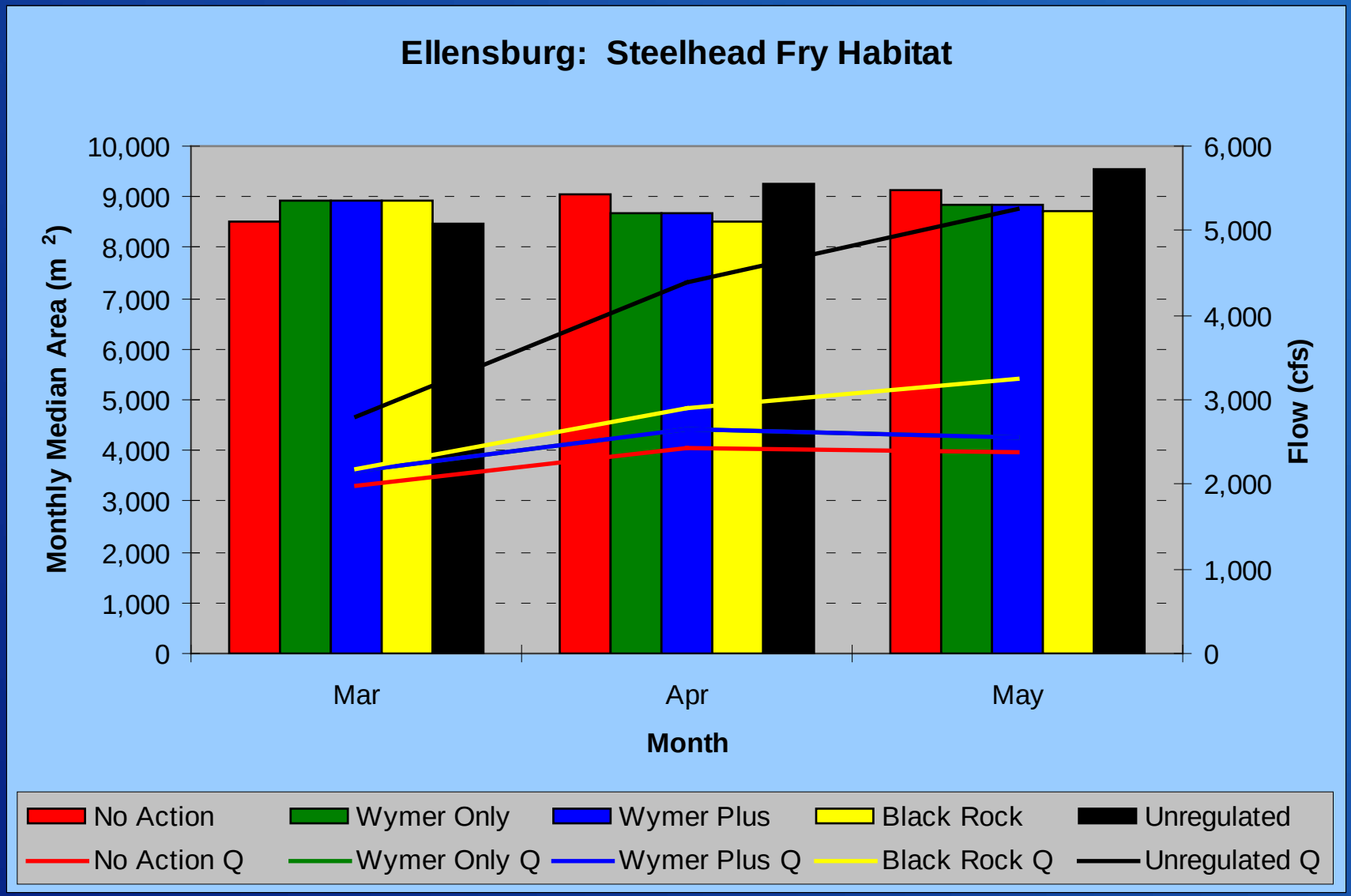
RECLAMATION

Based on the 2-D hydraulic model & the Decision Support System model



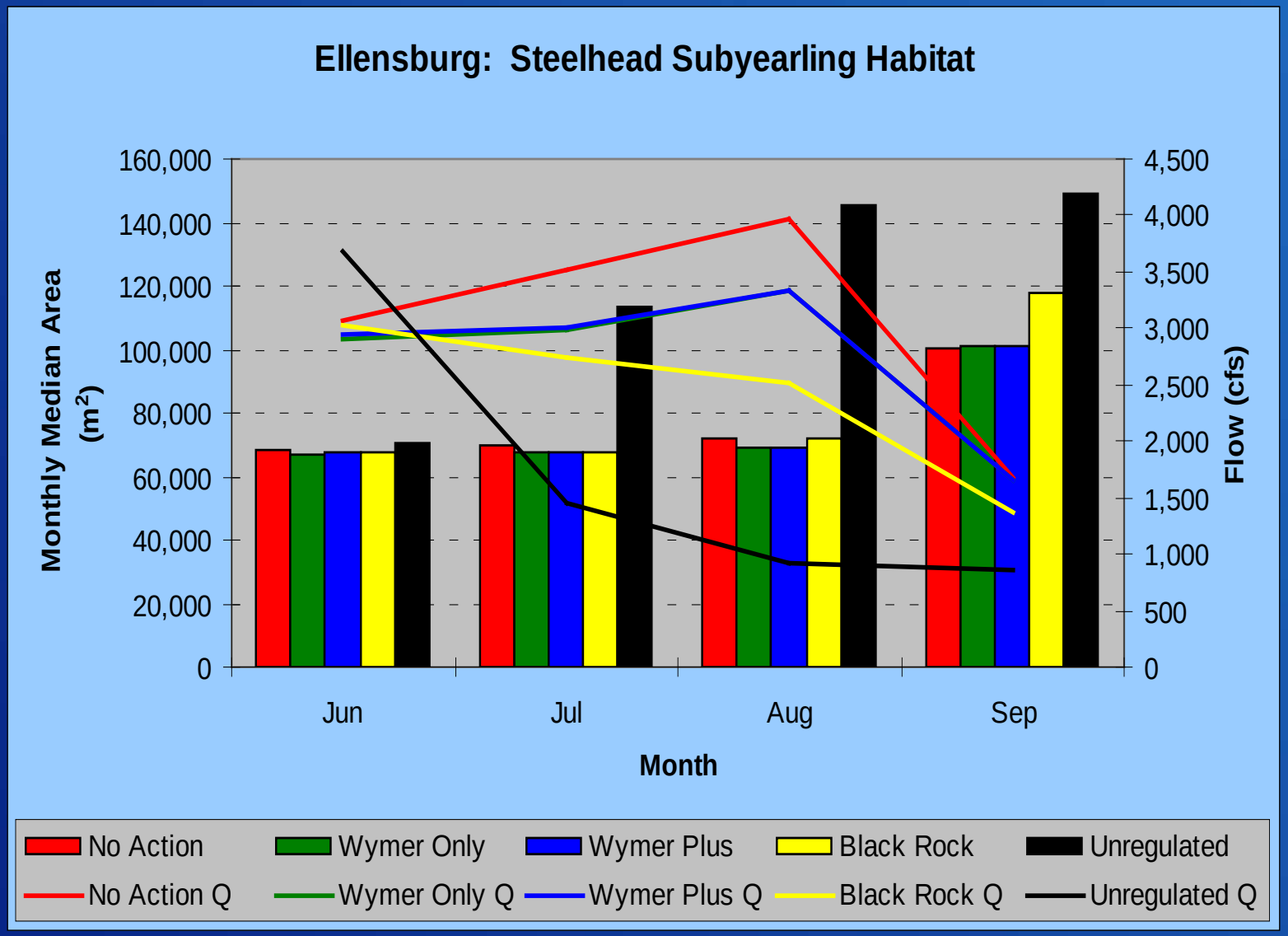
RECLAMATION

Based on the 2-D hydraulic model & the Decision Support System model

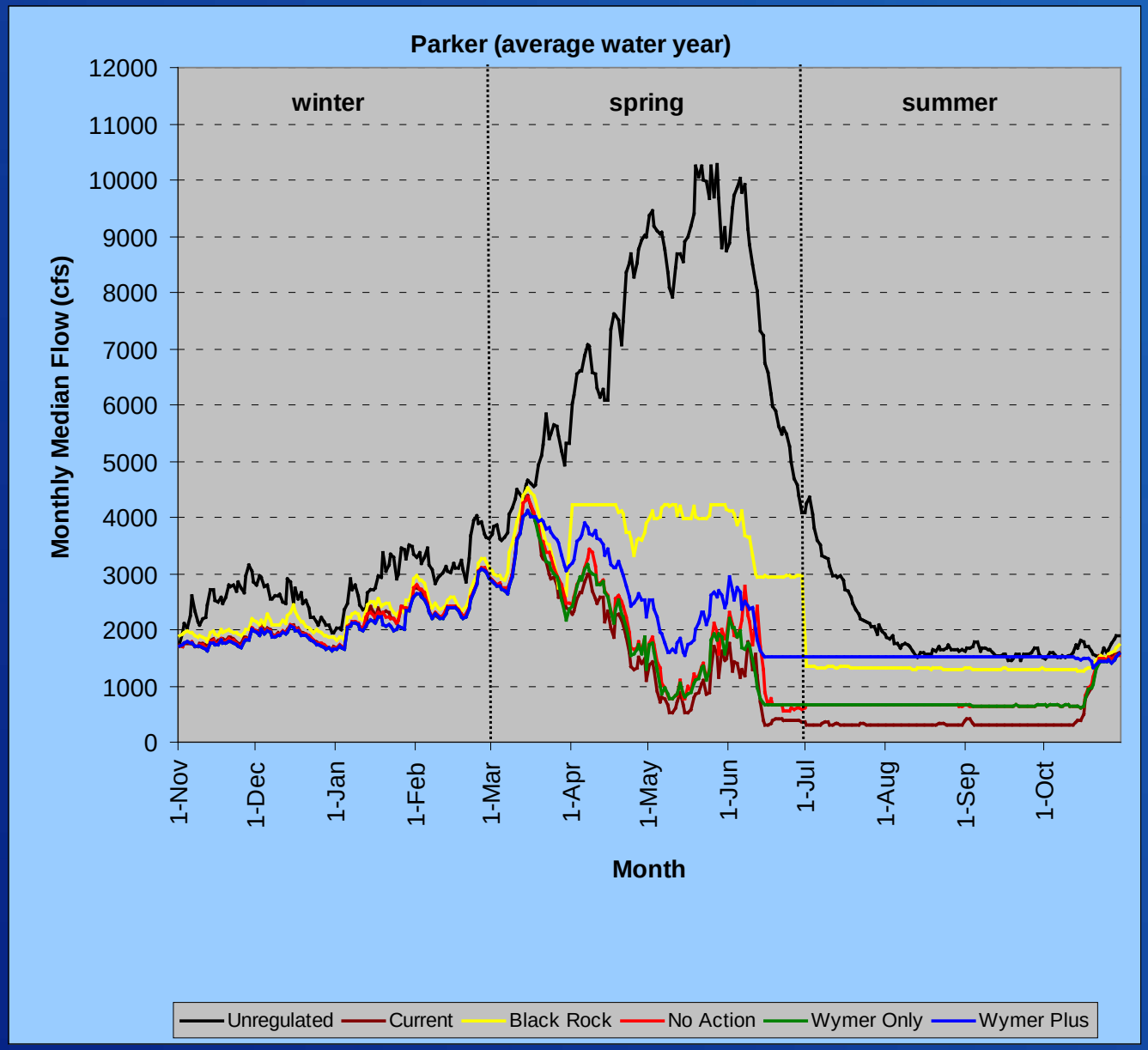


RECLAMATION

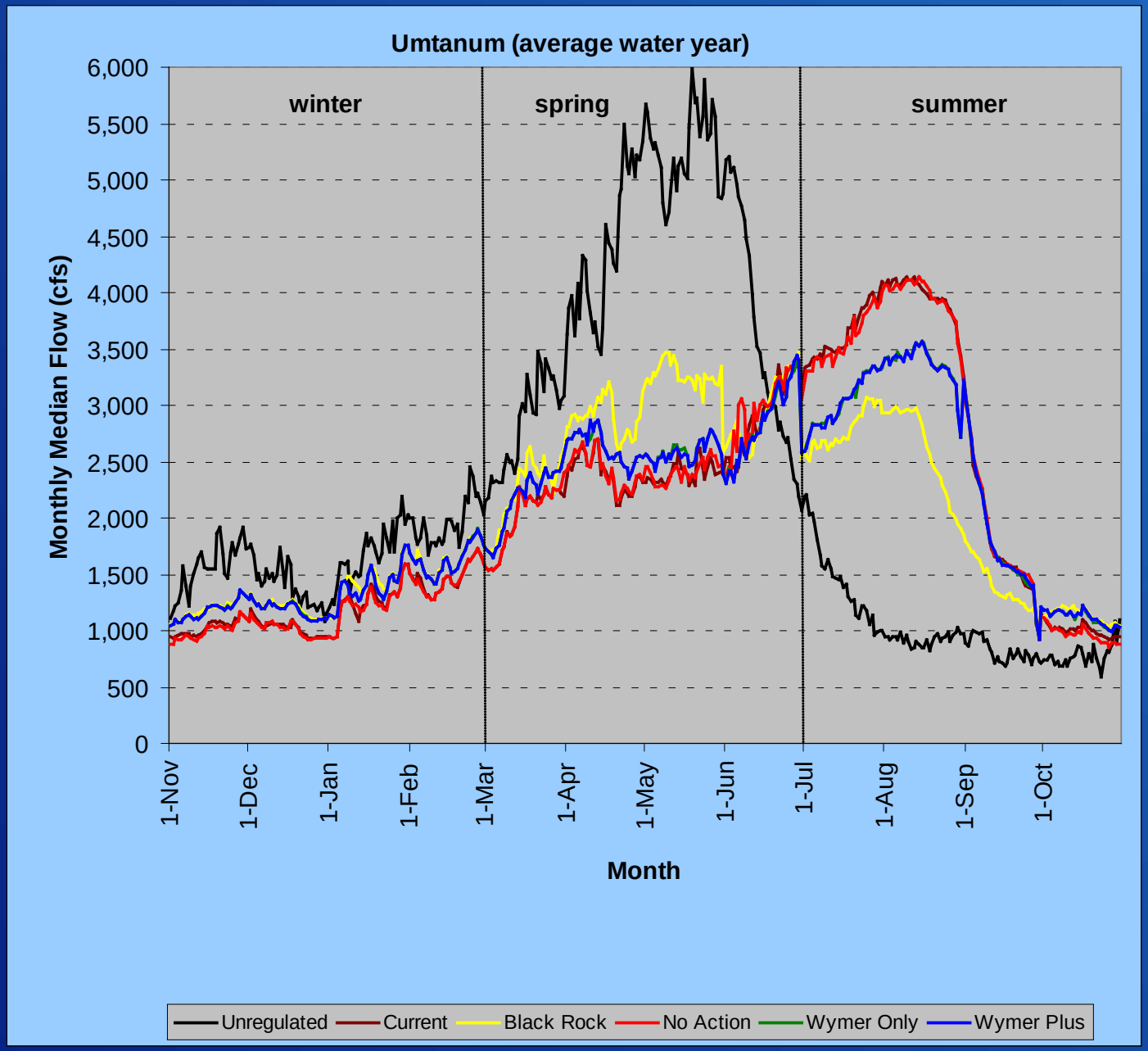
Based on the 2-D hydraulic model & the Decision Support System model



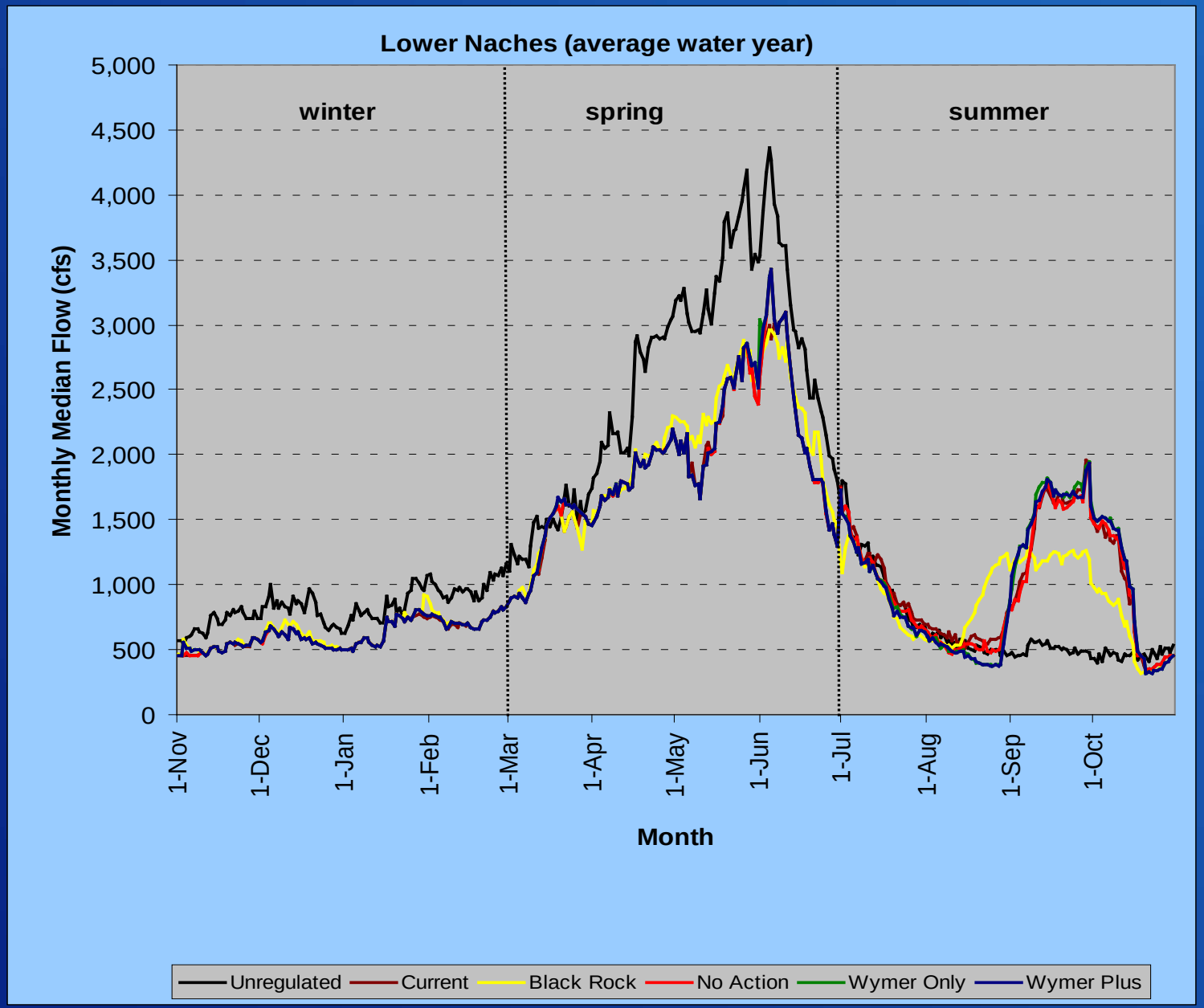
RECLAMATION



RECLAMATION



RECLAMATION



RECLAMATION

Cle Elum Dam Outlet Gage

	Summer	Winter
Average	-104,654	72,698
Minimum	-150,995	37,531
Maximum	-6,355	137,807

Parker Gage

	Spring	Summer
Average	277,917	120,292
Minimum	147,252	43,174
Maximum	412,479	157,801

Umtanum Gage

	Summer
Average	-143,894
Minimum	-182,191
Maximum	-86,444

Flow Volume Difference Between No Action and the Black Rock Alternatives For Selected Seasons

RECLAMATION

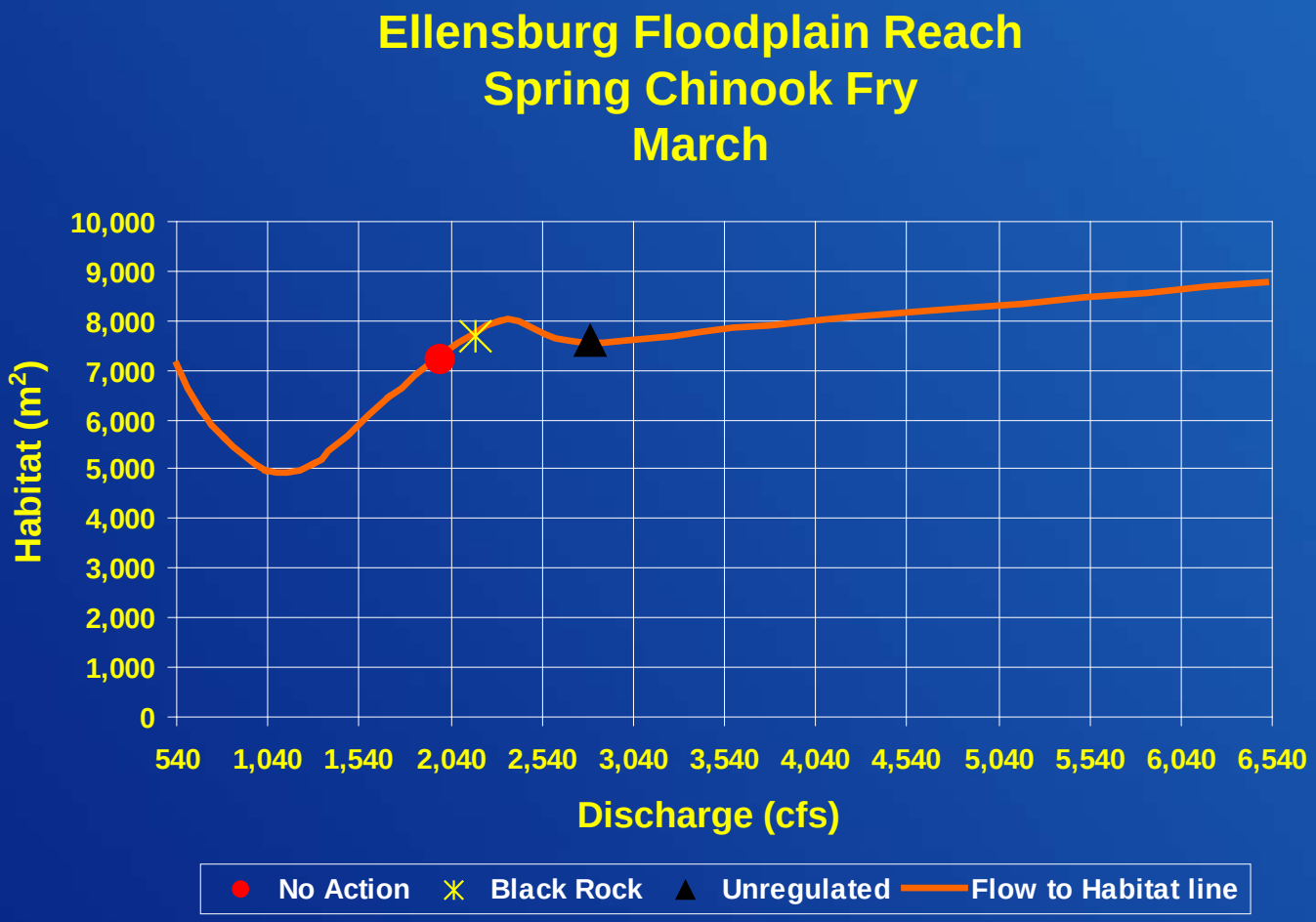
Flow-to-Habitat Curves by Month

(Based on the 2-D hydraulic model & the Decision Support System model)

- **Spring Chinook fry**
- **Spring Chinook summer parr**
- **Steelhead fry**
- **Steelhead summer parr**

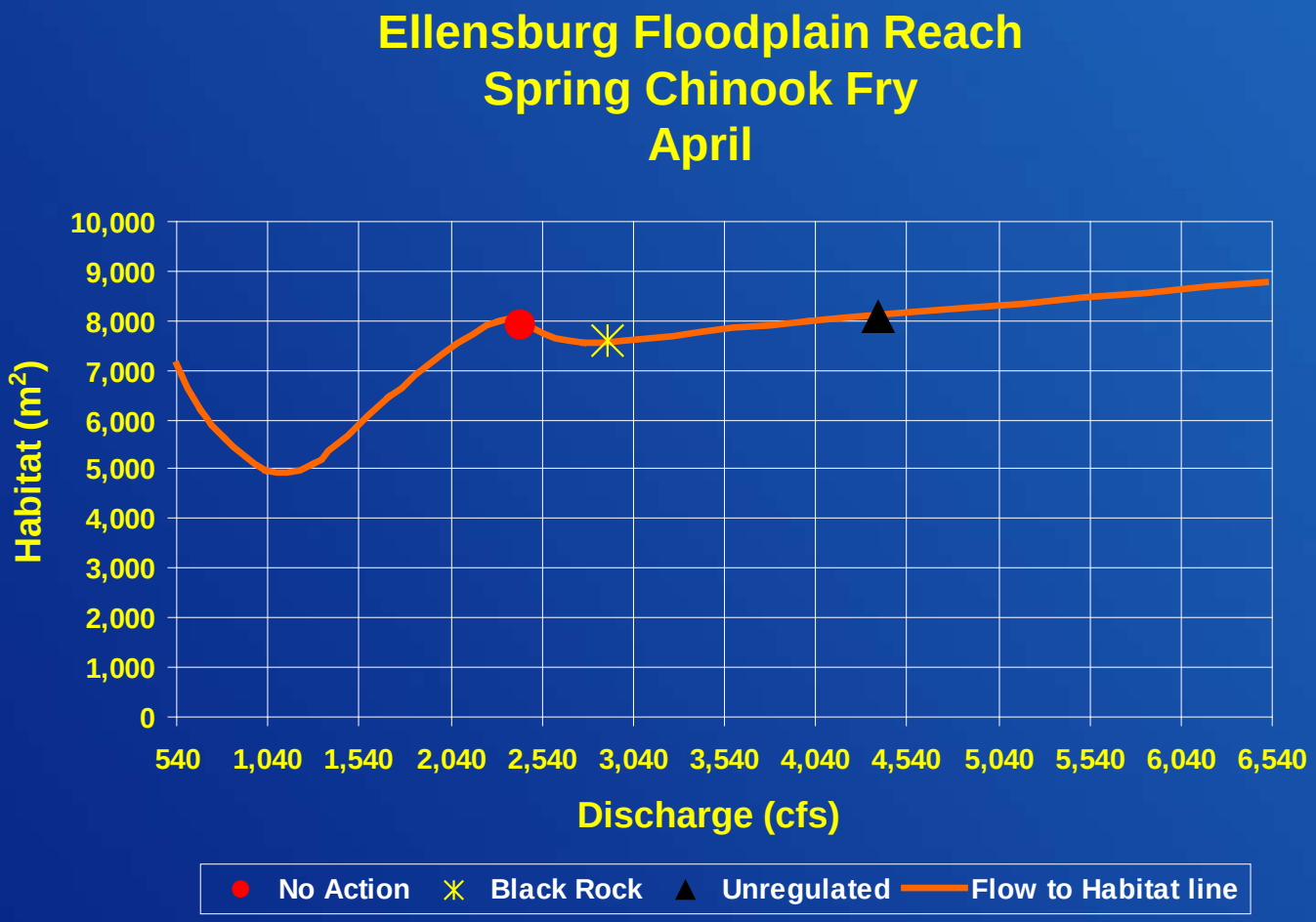
RECLAMATION

Study Results- Habitat



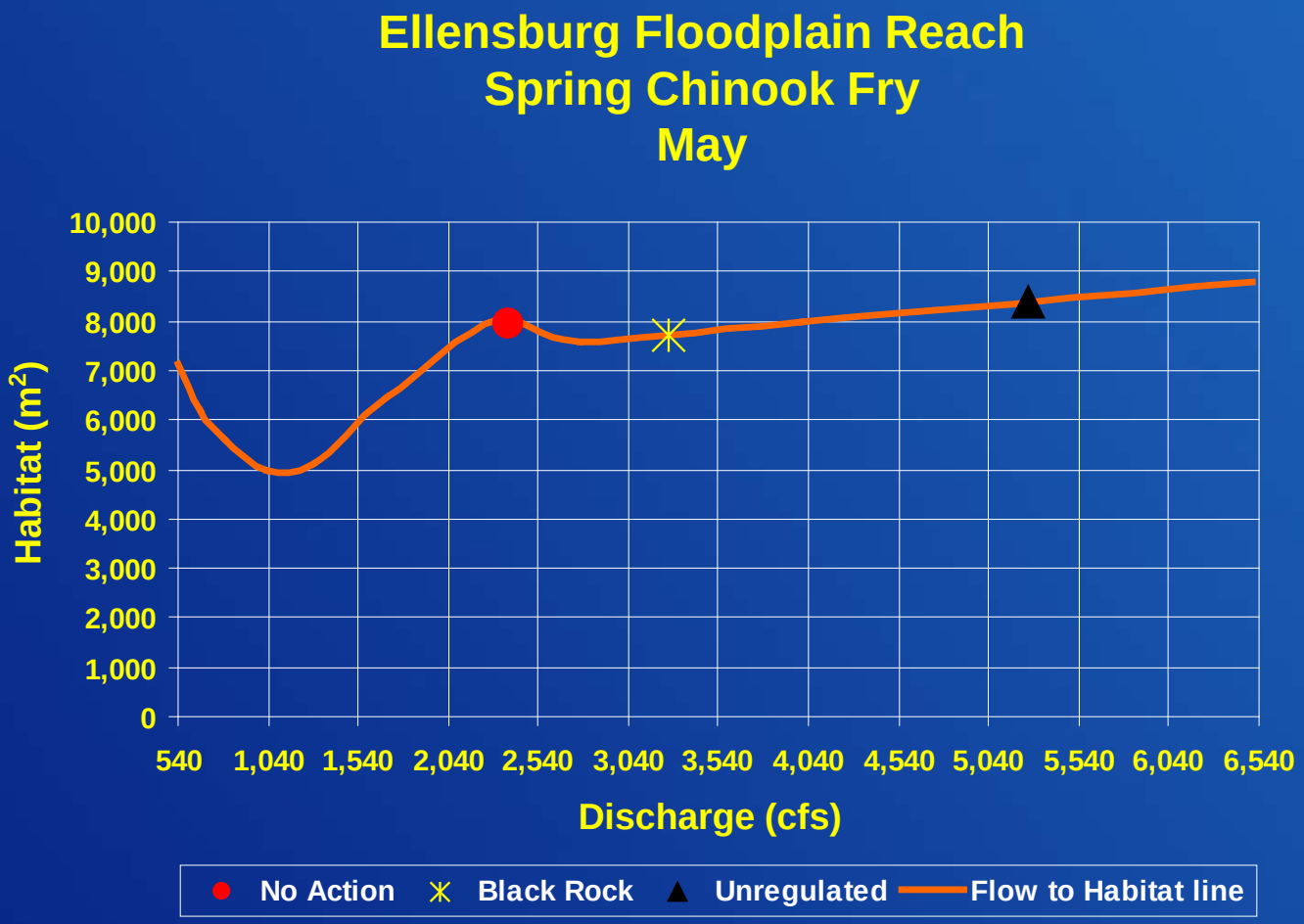
RECLAMATION

Study Results- Habitat



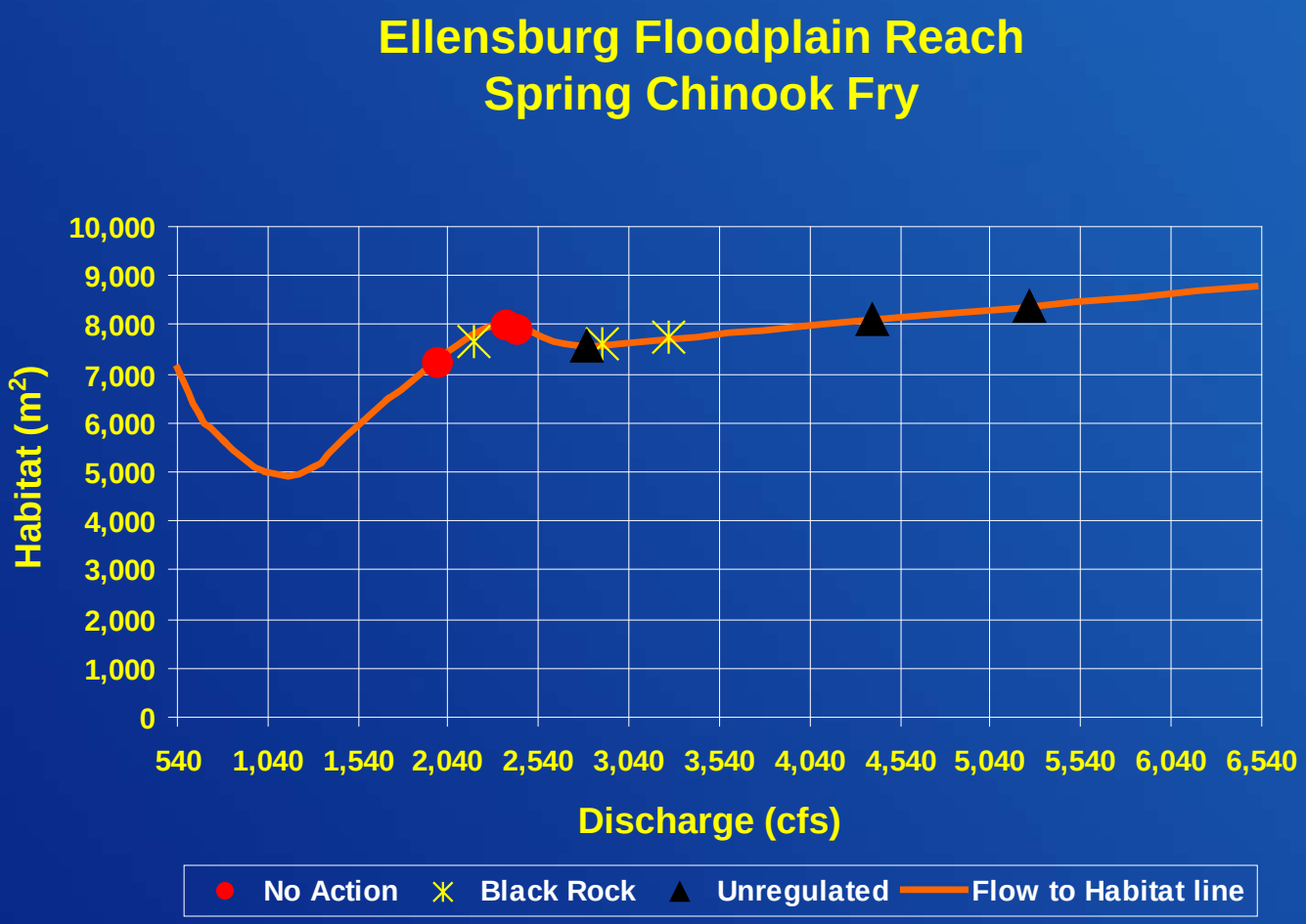
RECLAMATION

Study Results- Habitat



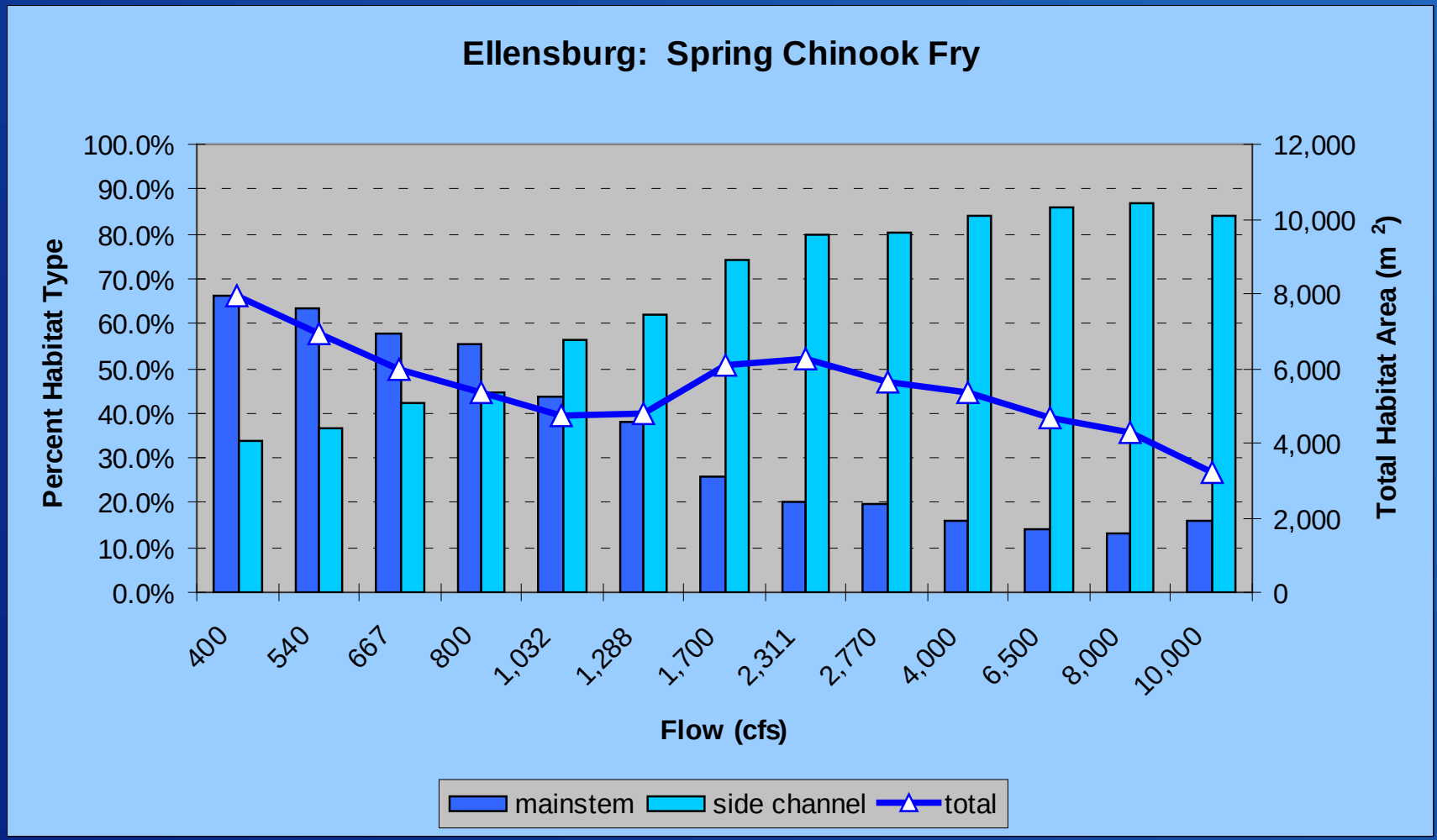
RECLAMATION

Study Results- Habitat



RECLAMATION

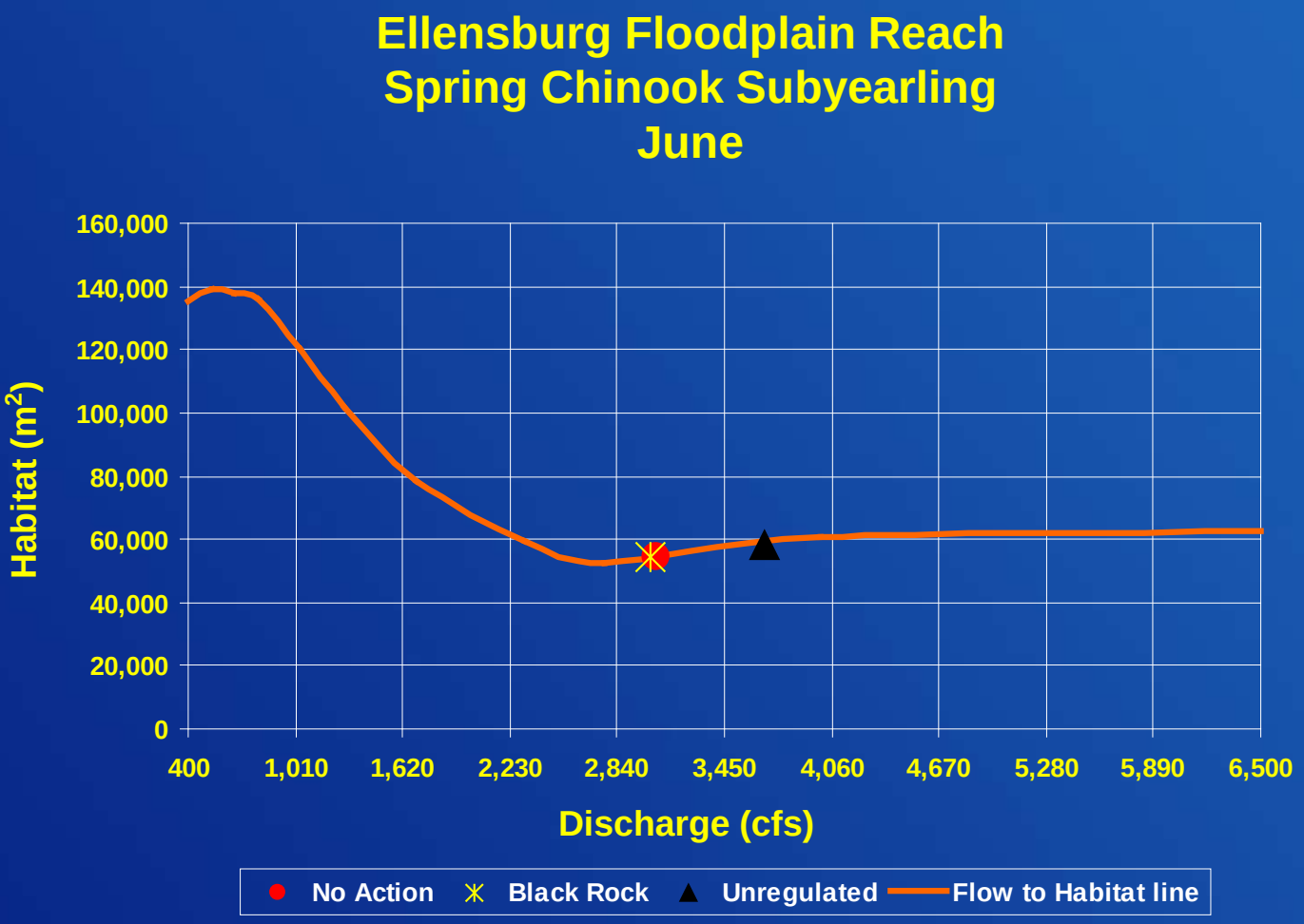
Percent Main stem vs. Side Channel Habitat as a Function of Flow



Based on the 2-Dimensional Hydraulic Model using Froude Number To Differentiate Habitat Types.

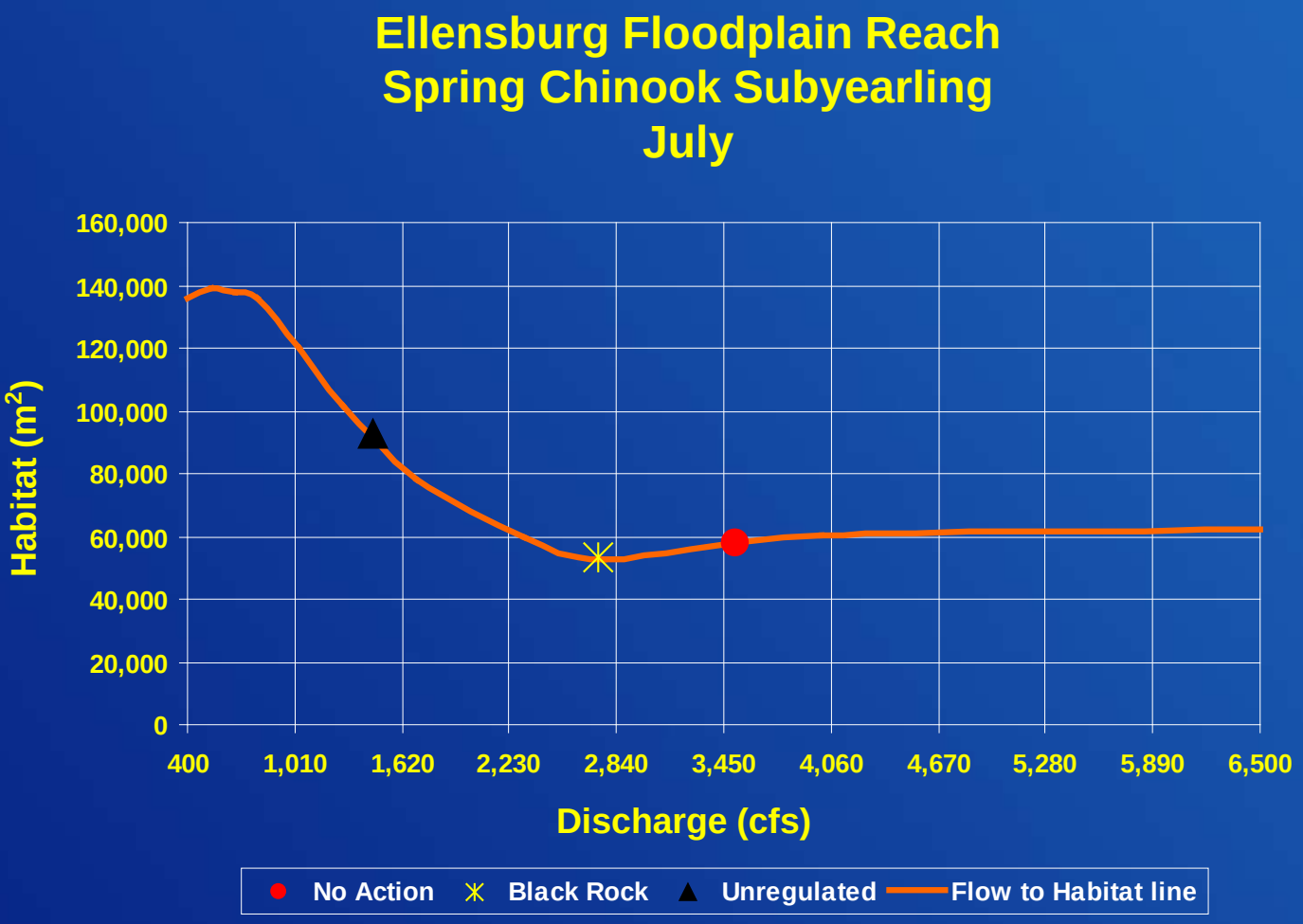
RECLAMATION

Study Results- Habitat



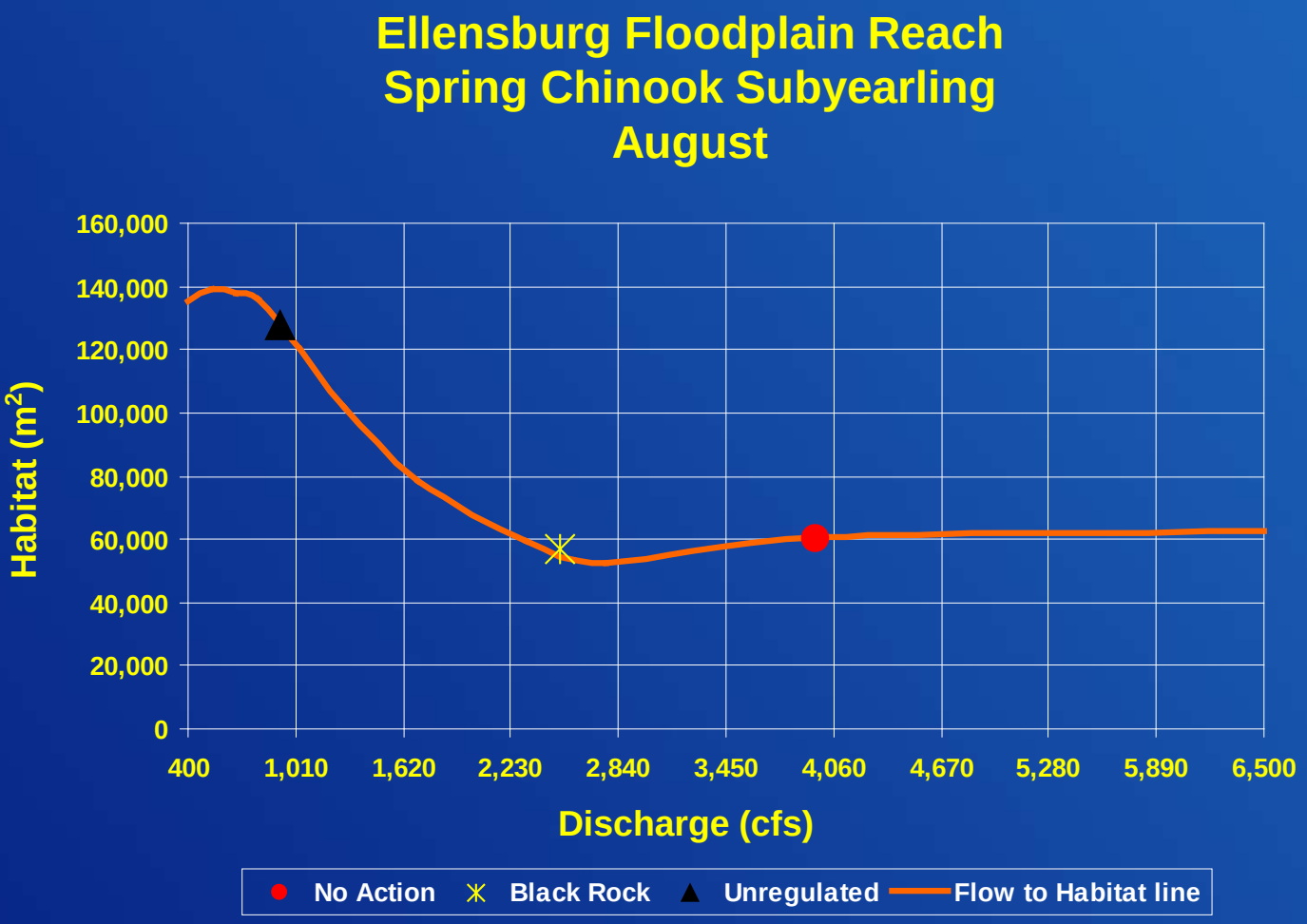
RECLAMATION

Study Results- Habitat



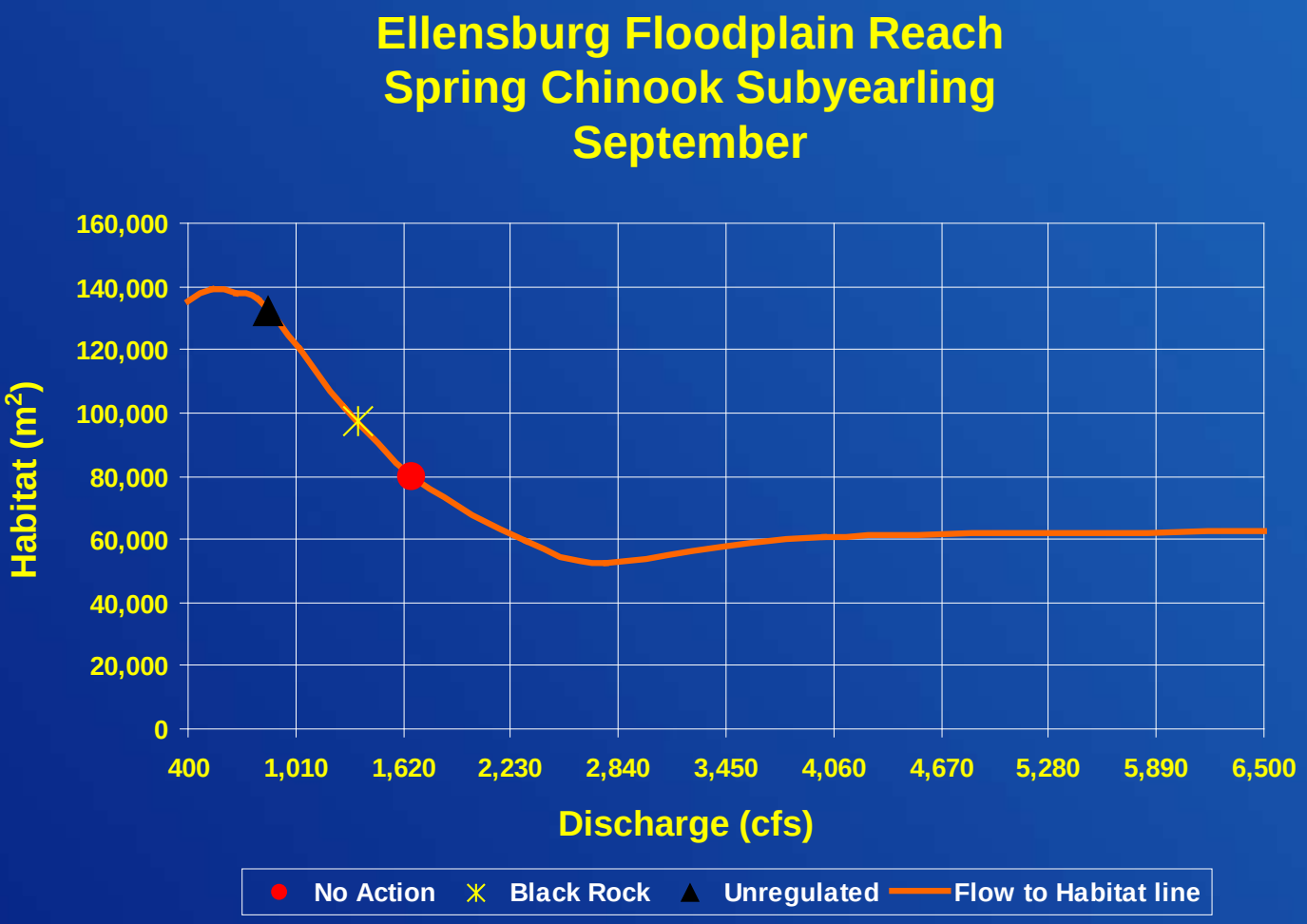
RECLAMATION

Study Results- Habitat



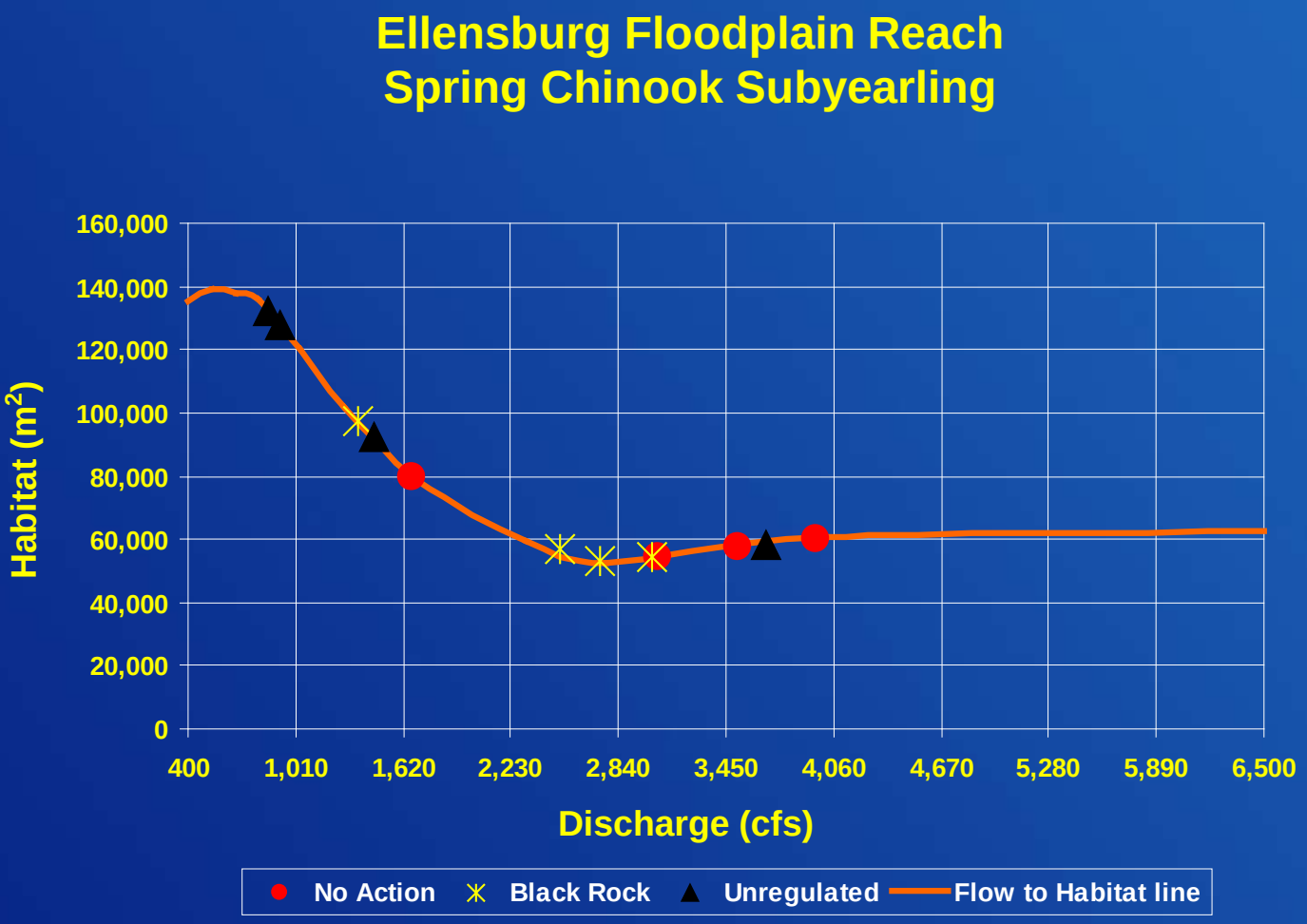
RECLAMATION

Study Results- Habitat



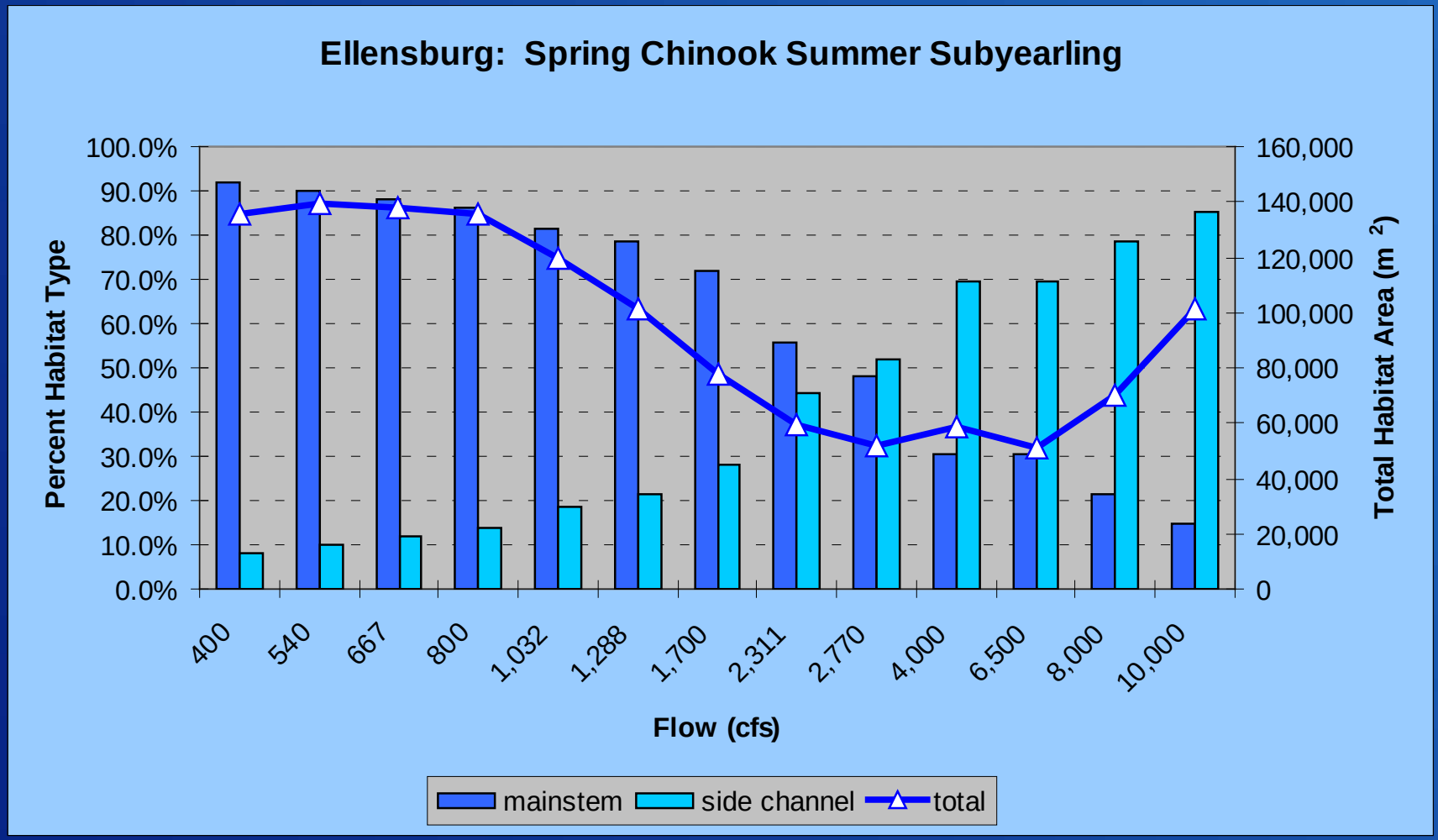
RECLAMATION

Study Results- Habitat



RECLAMATION

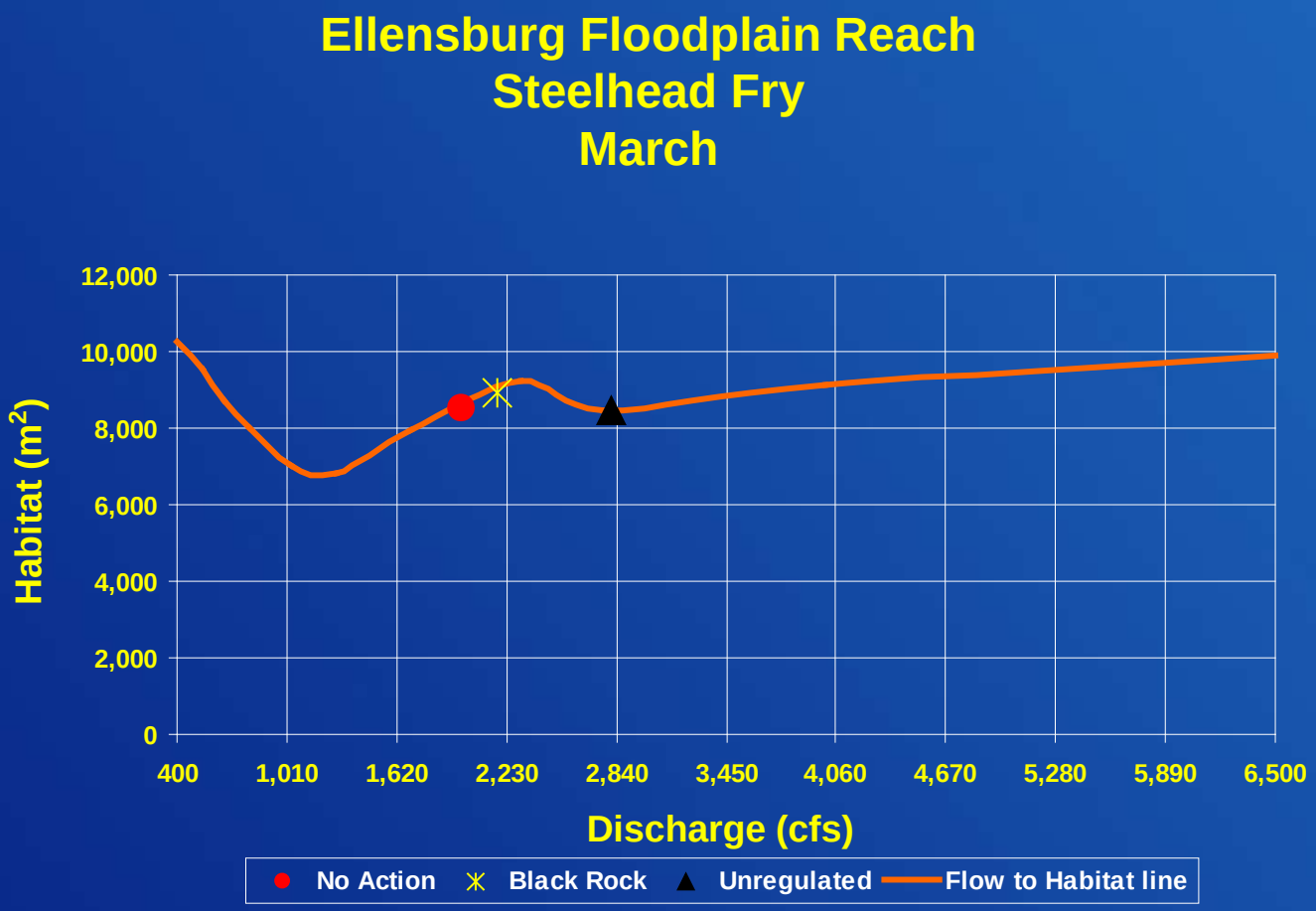
Percent Main stem vs. Side Channel Habitat as a Function of Flow



Based on the 2-Dimensional Hydraulic Model using Froude Number To Differentiate Habitat Types.

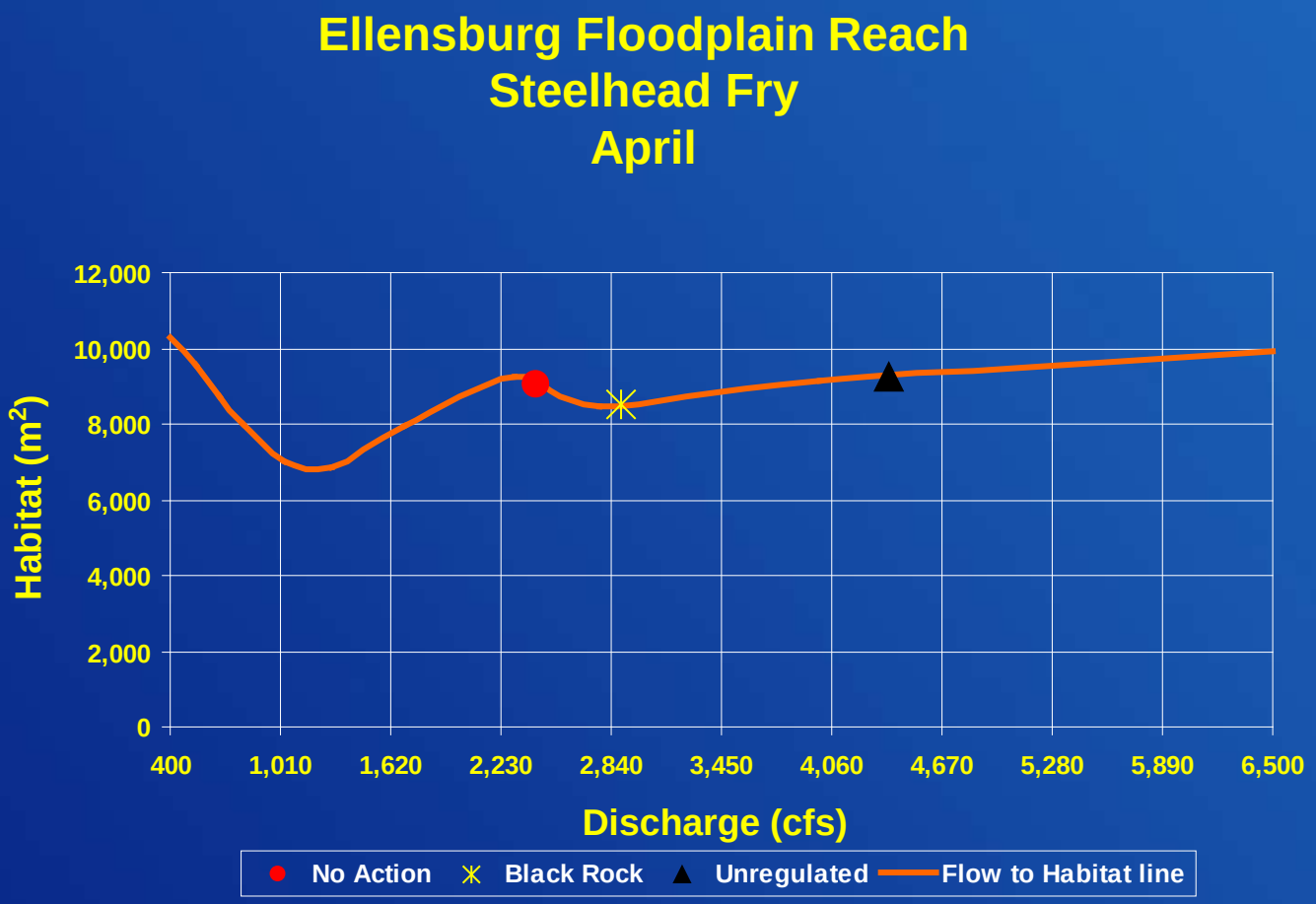
RECLAMATION

Study Results- Habitat



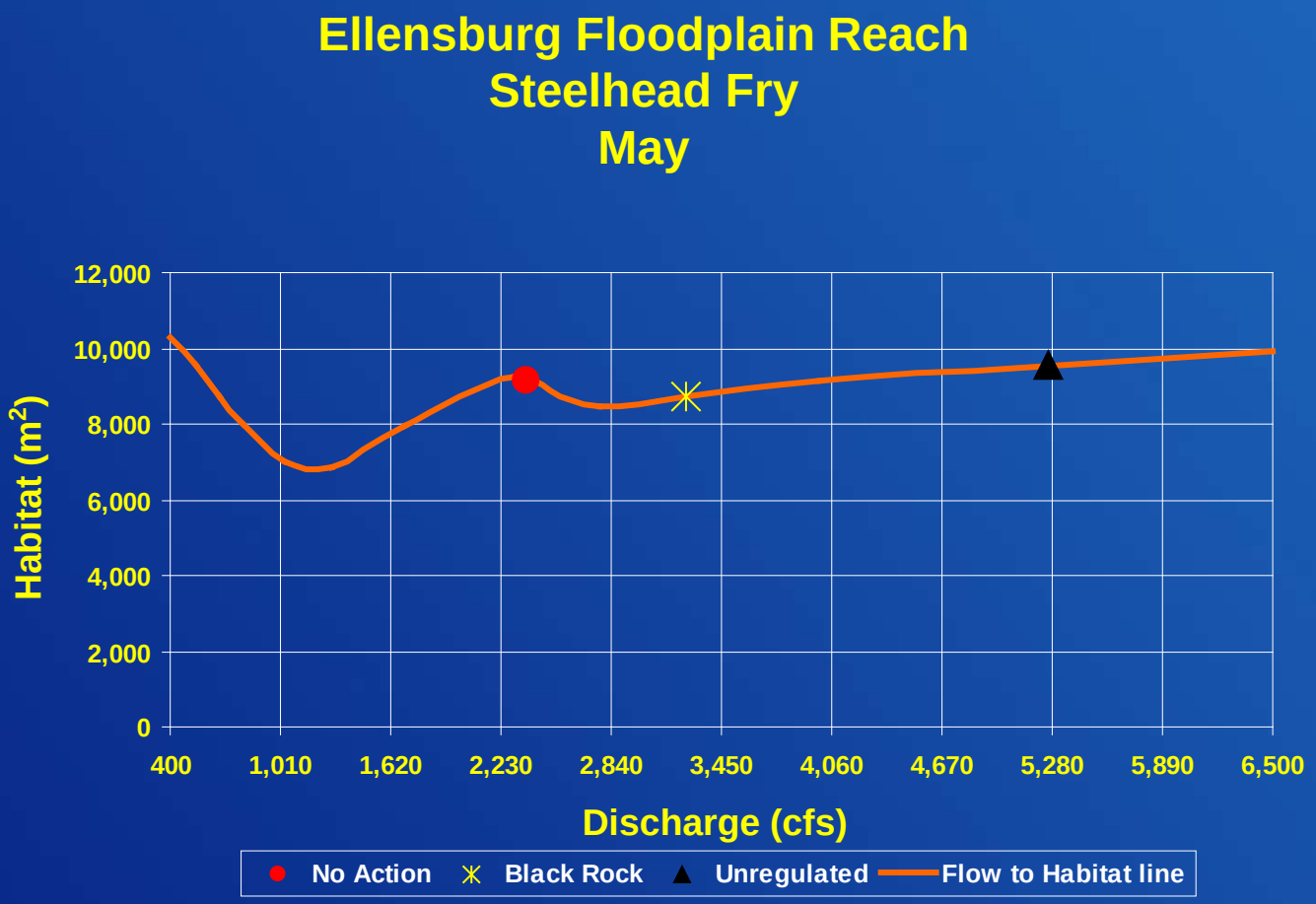
RECLAMATION

Study Results- Habitat



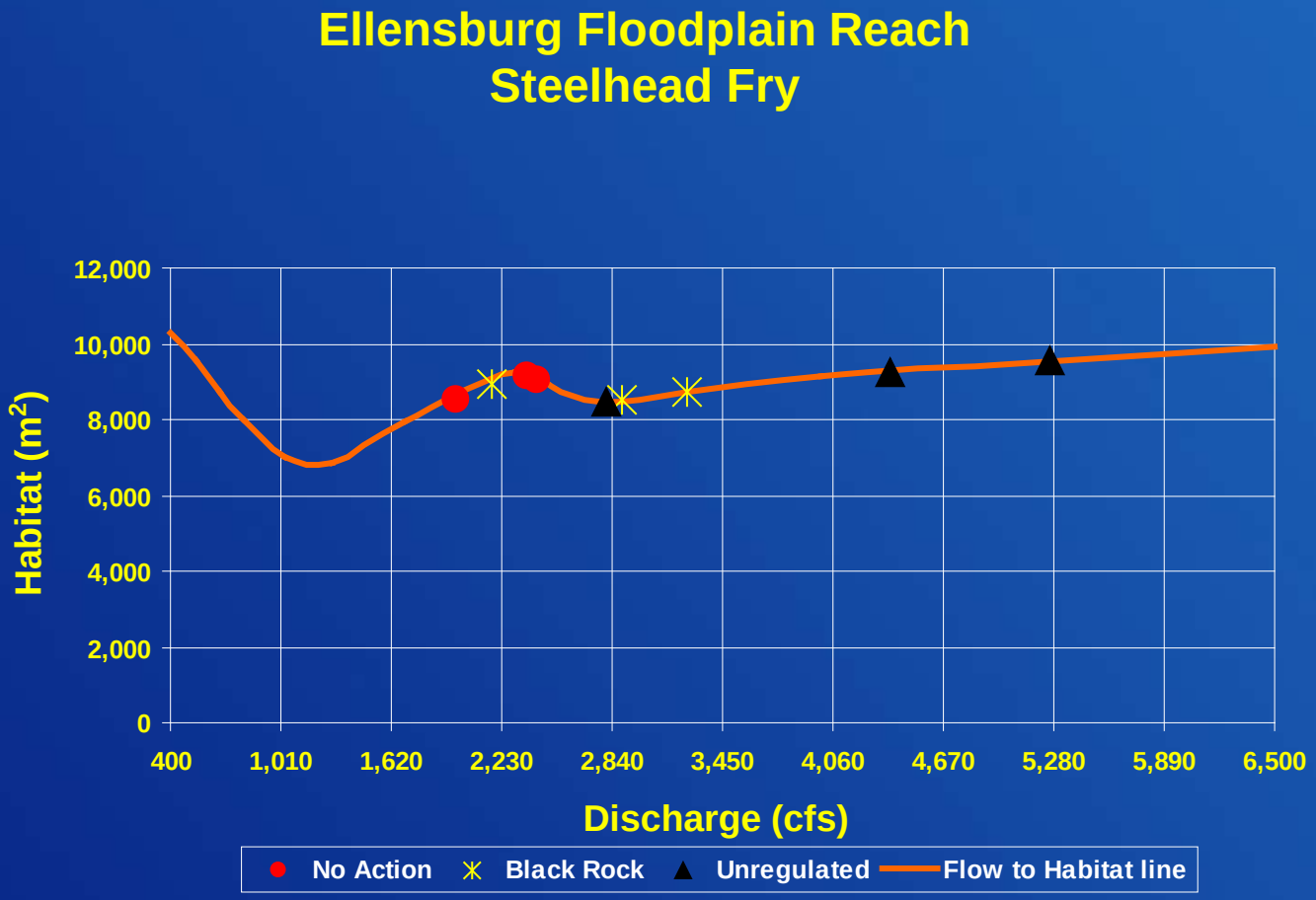
RECLAMATION

Study Results- Habitat



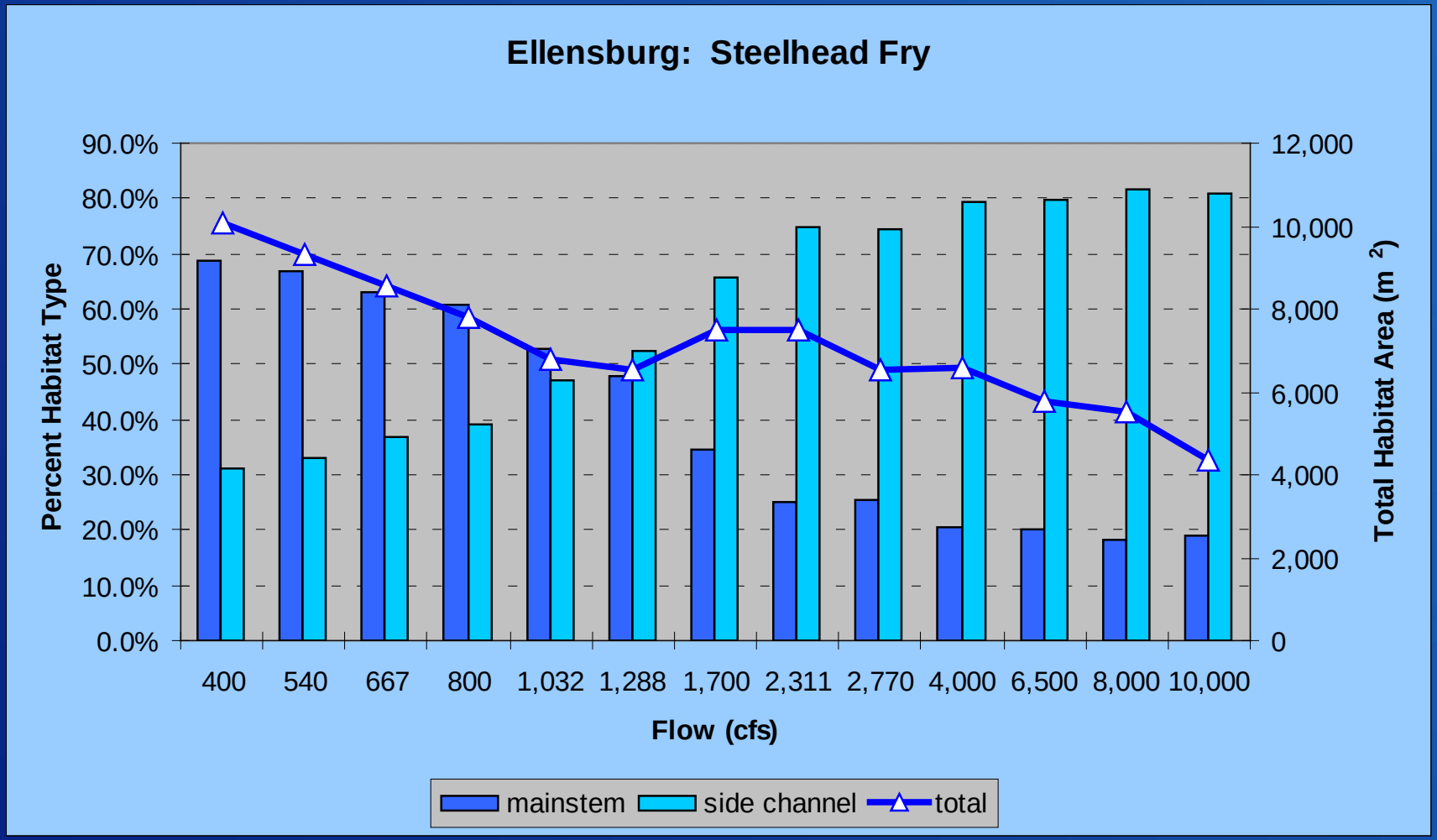
RECLAMATION

Study Results- Habitat



RECLAMATION

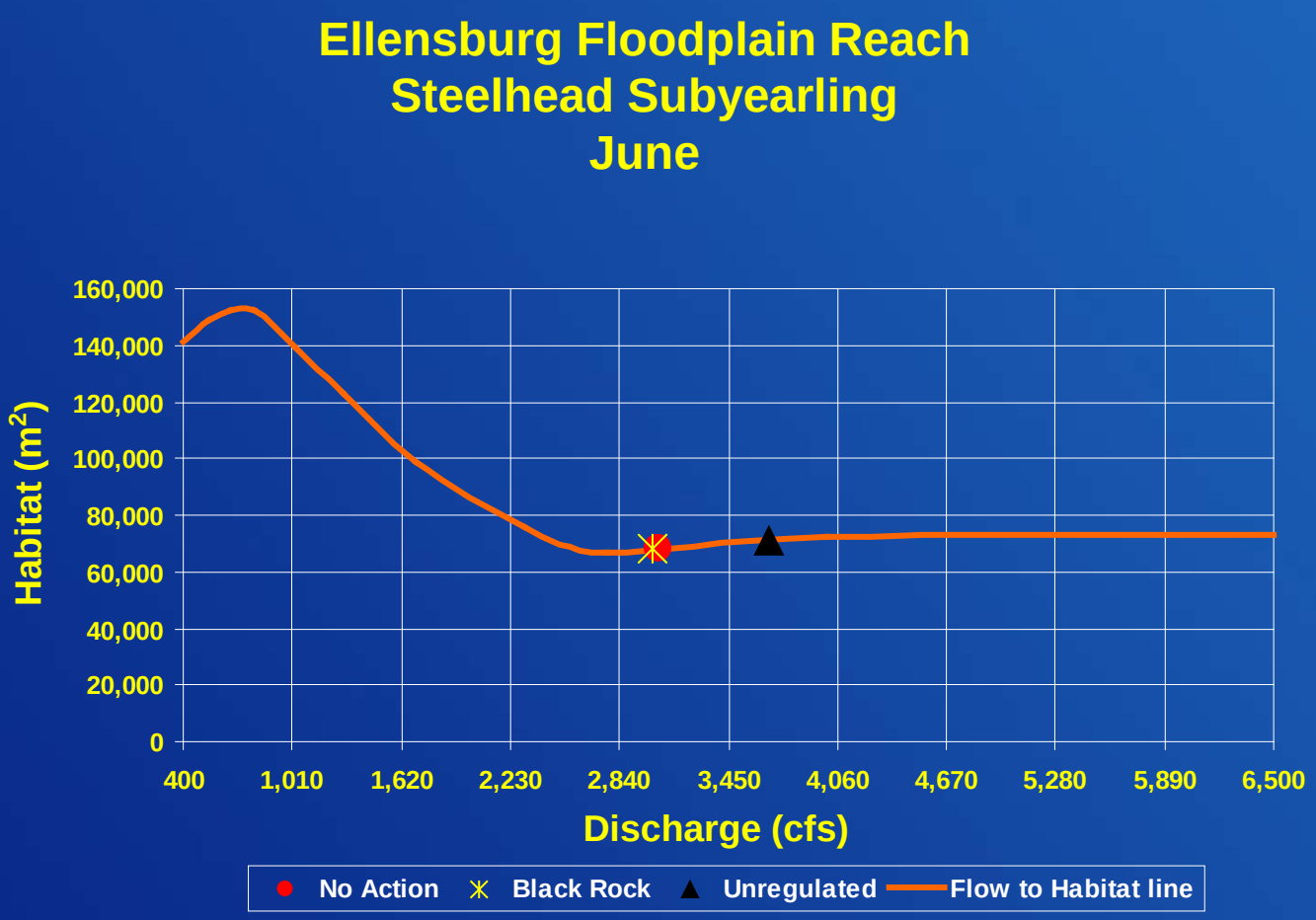
Percent Main stem vs. Side Channel Habitat as a Function of Flow



Based on the 2-Dimensional Hydraulic Model using Froude Number To Differentiate Habitat Types.

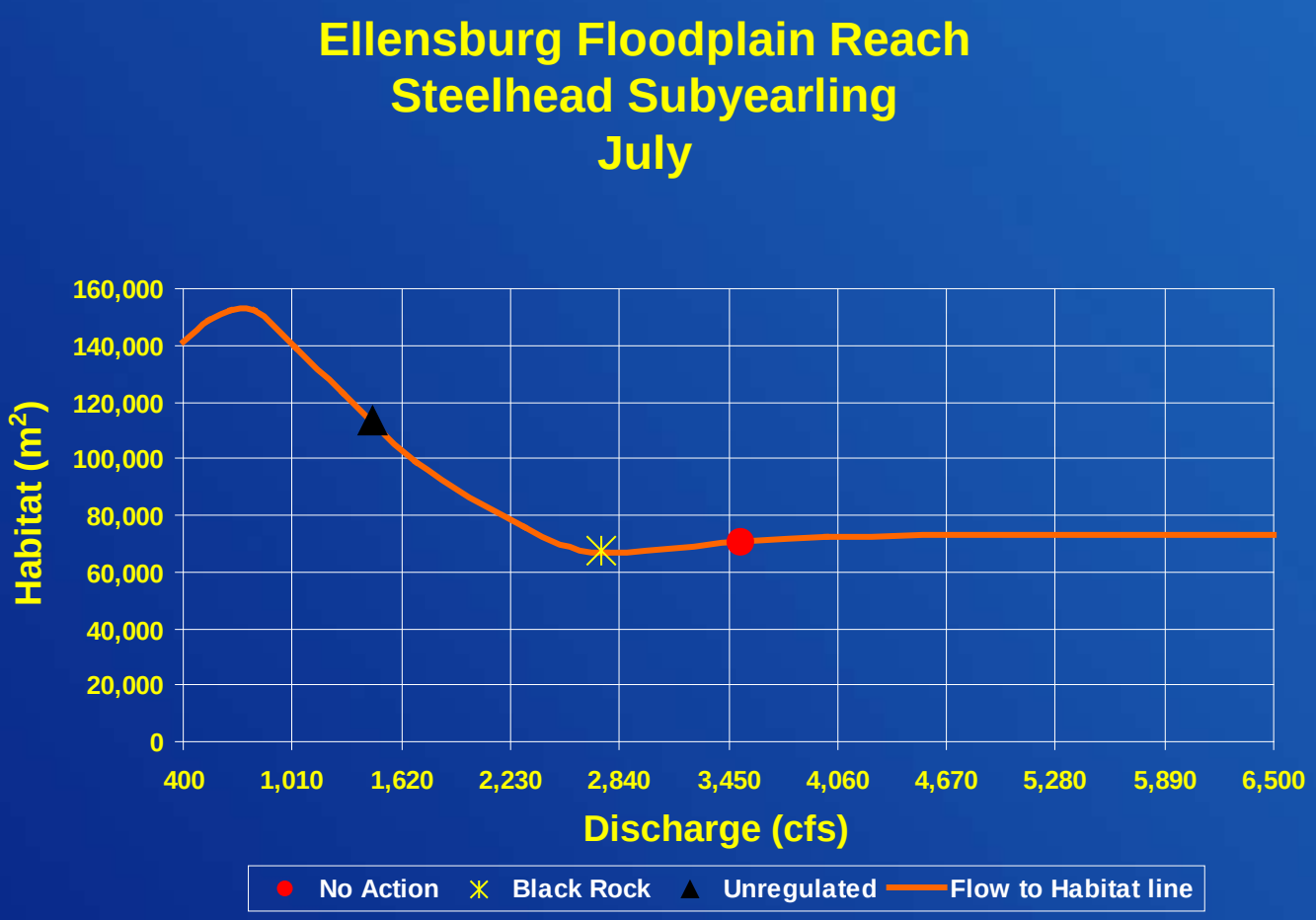
RECLAMATION

Study Results- Habitat



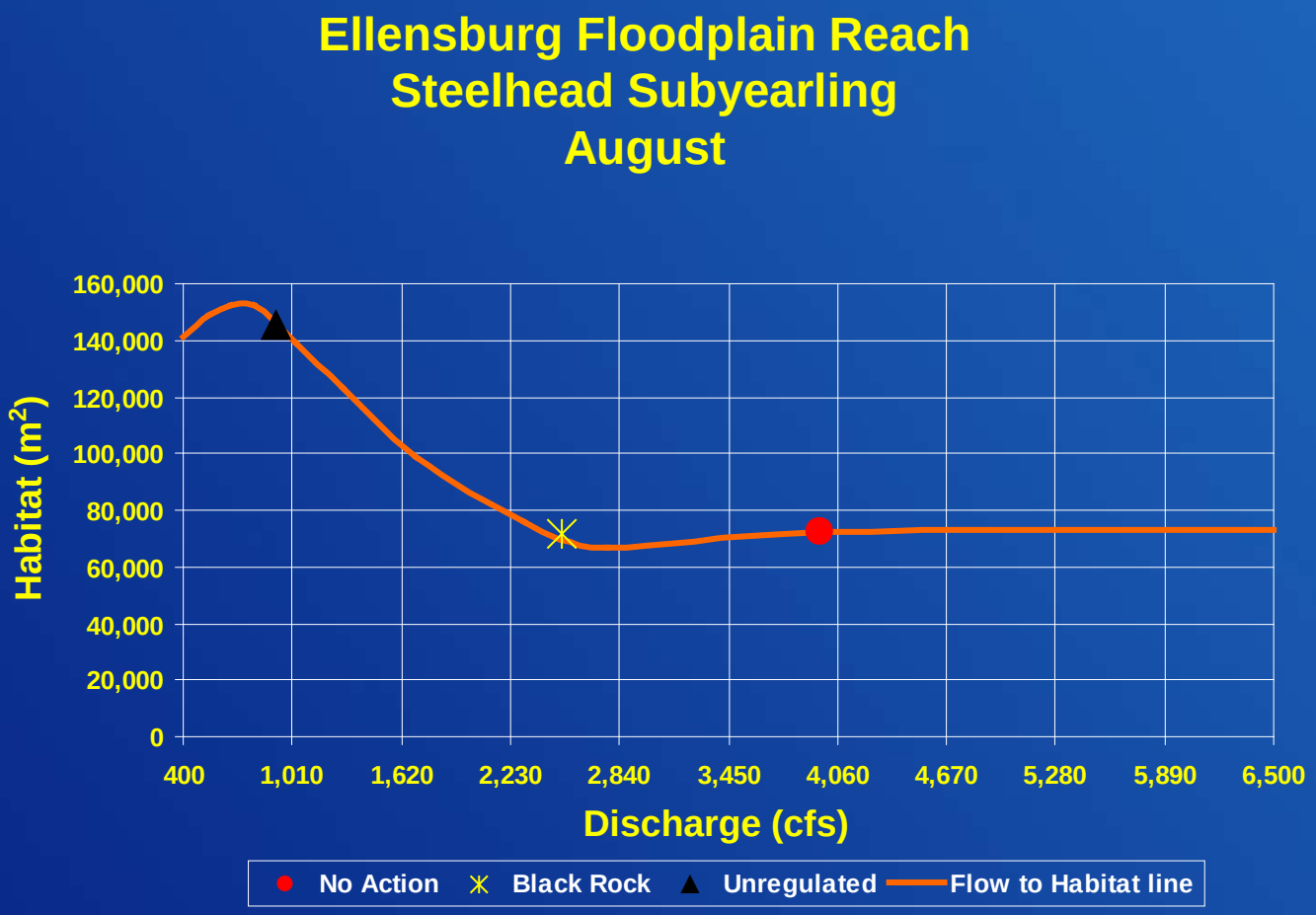
RECLAMATION

Study Results- Habitat



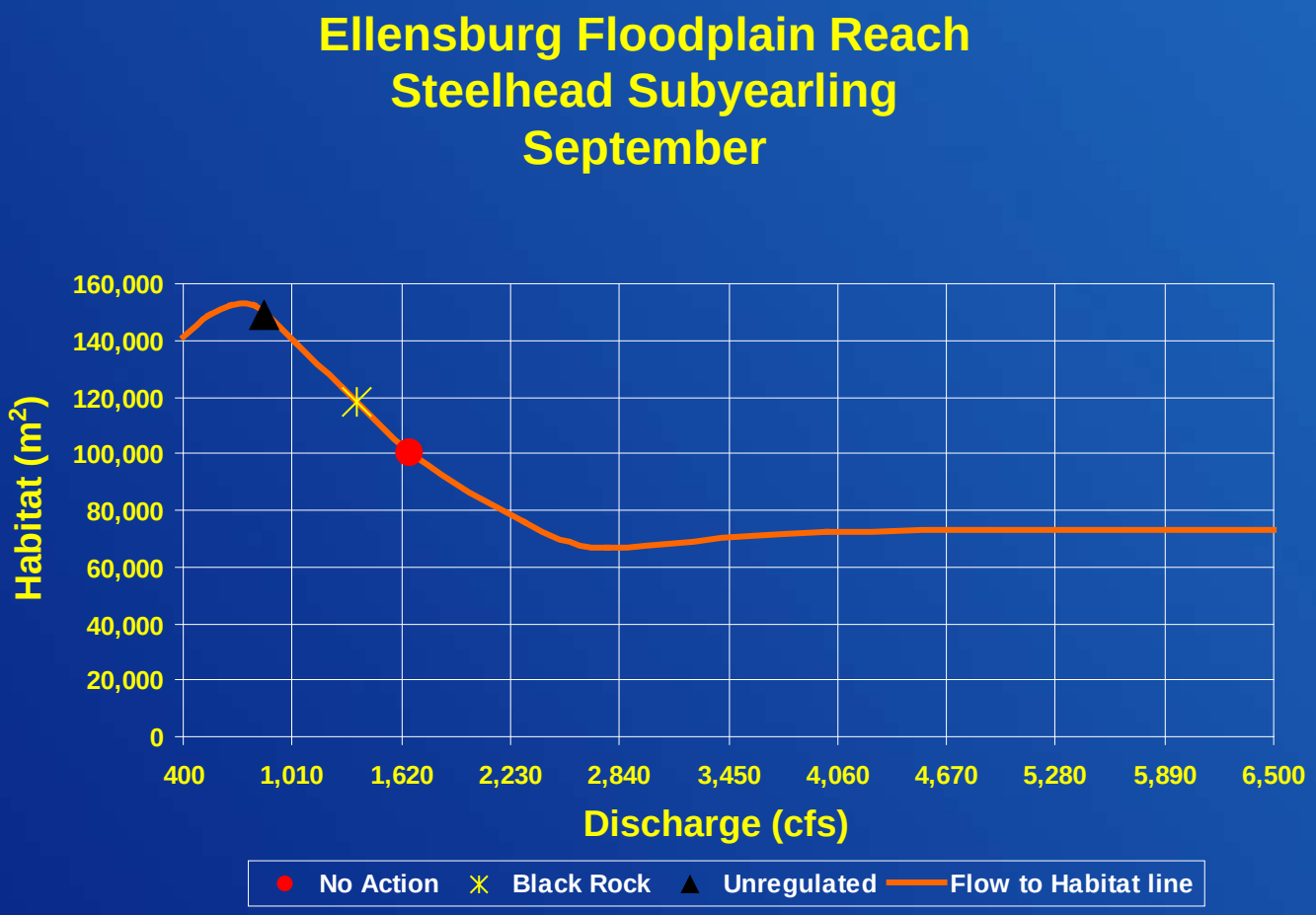
RECLAMATION

Study Results- Habitat



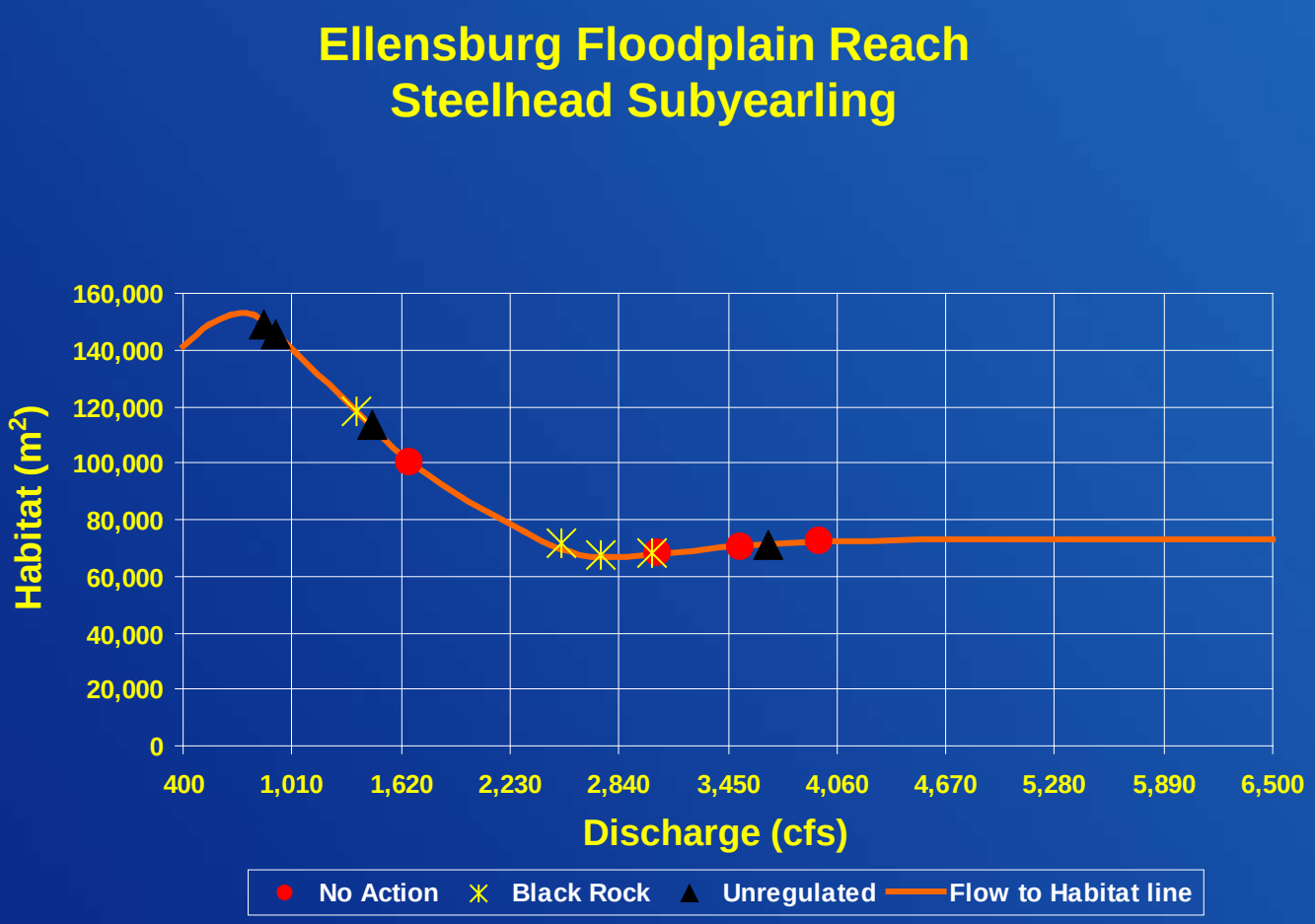
RECLAMATION

Study Results- Habitat



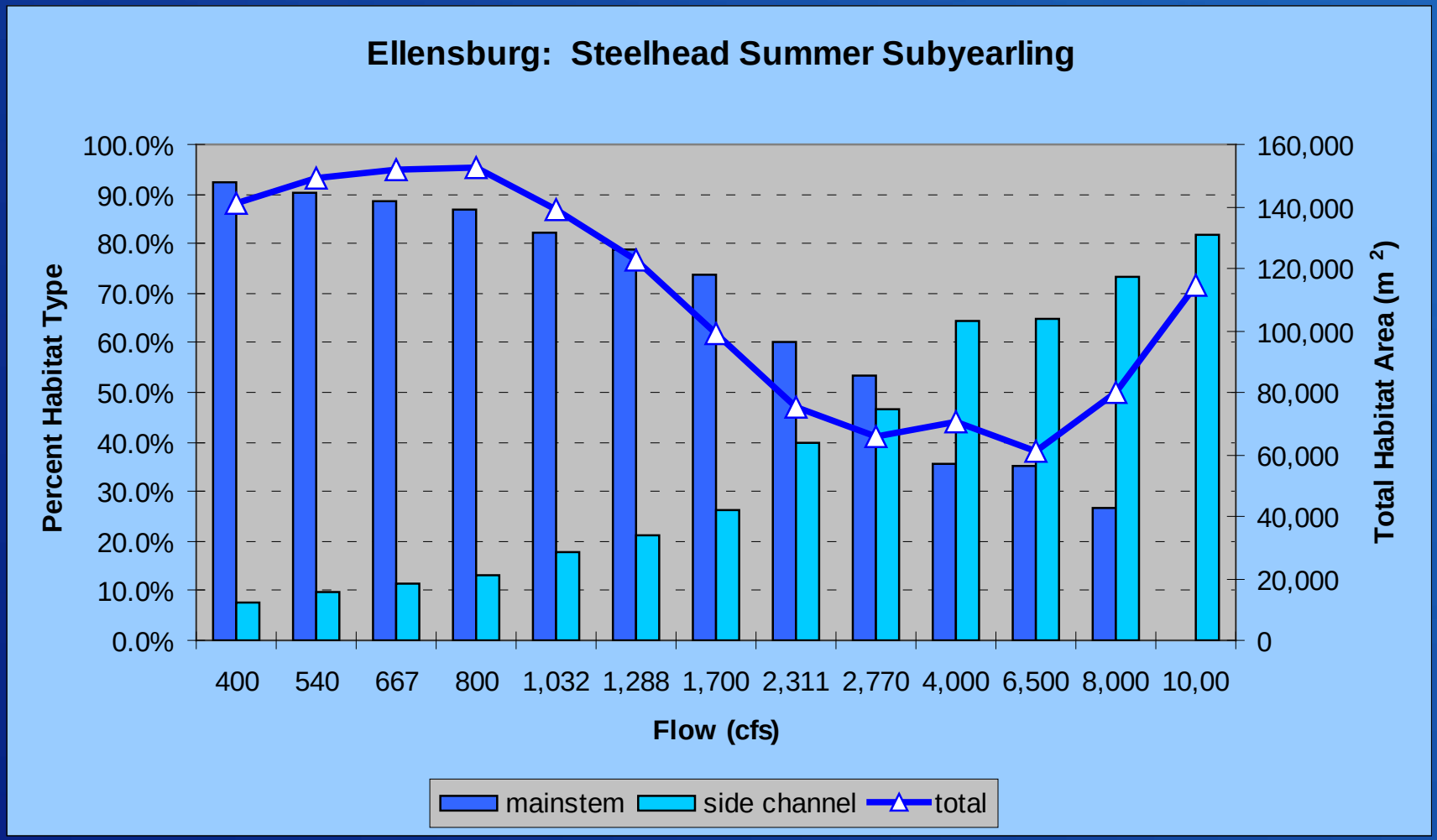
RECLAMATION

Study Results- Habitat



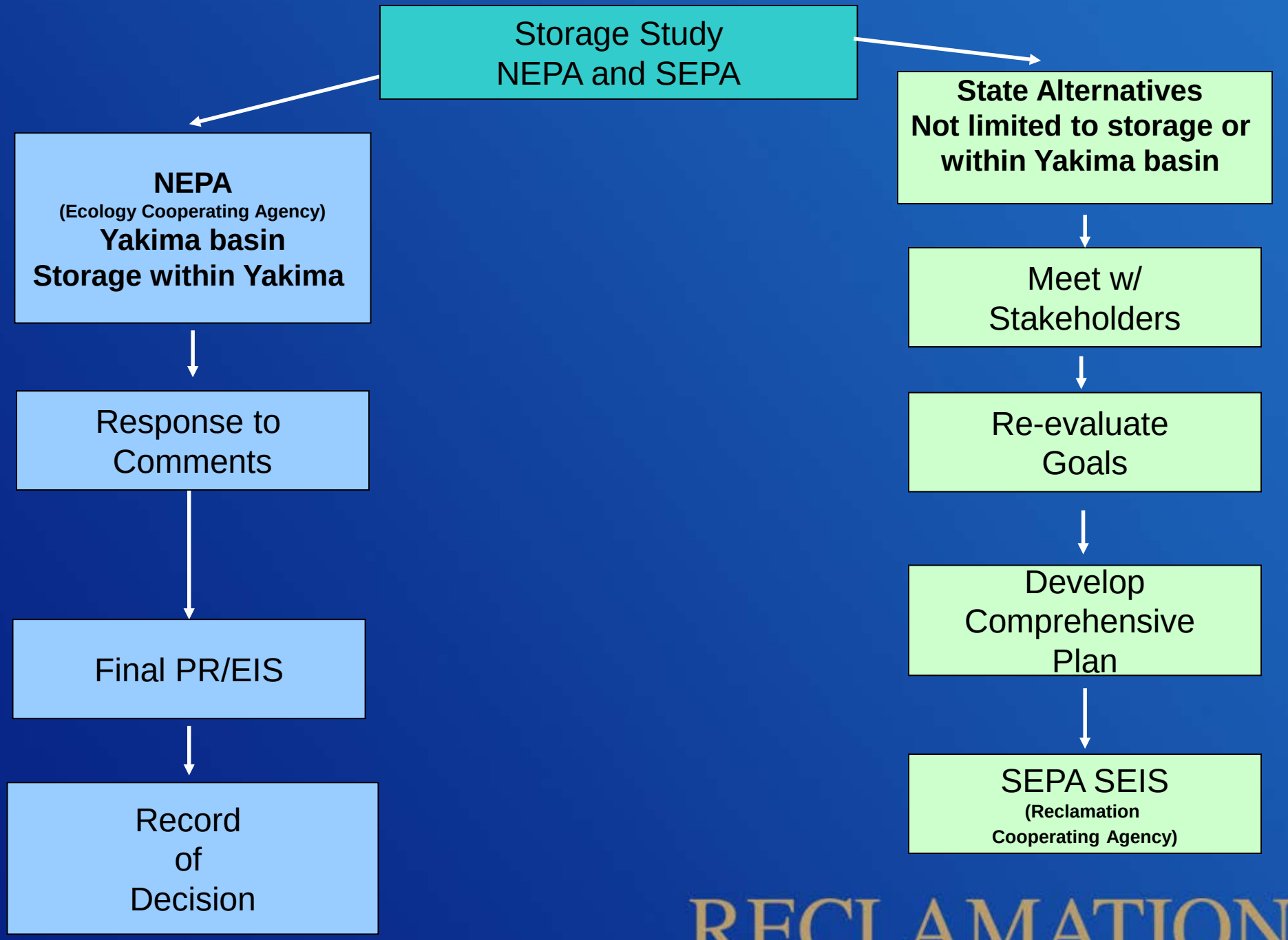
RECLAMATION

Percent Main stem vs. Side Channel Habitat as a Function of Flow



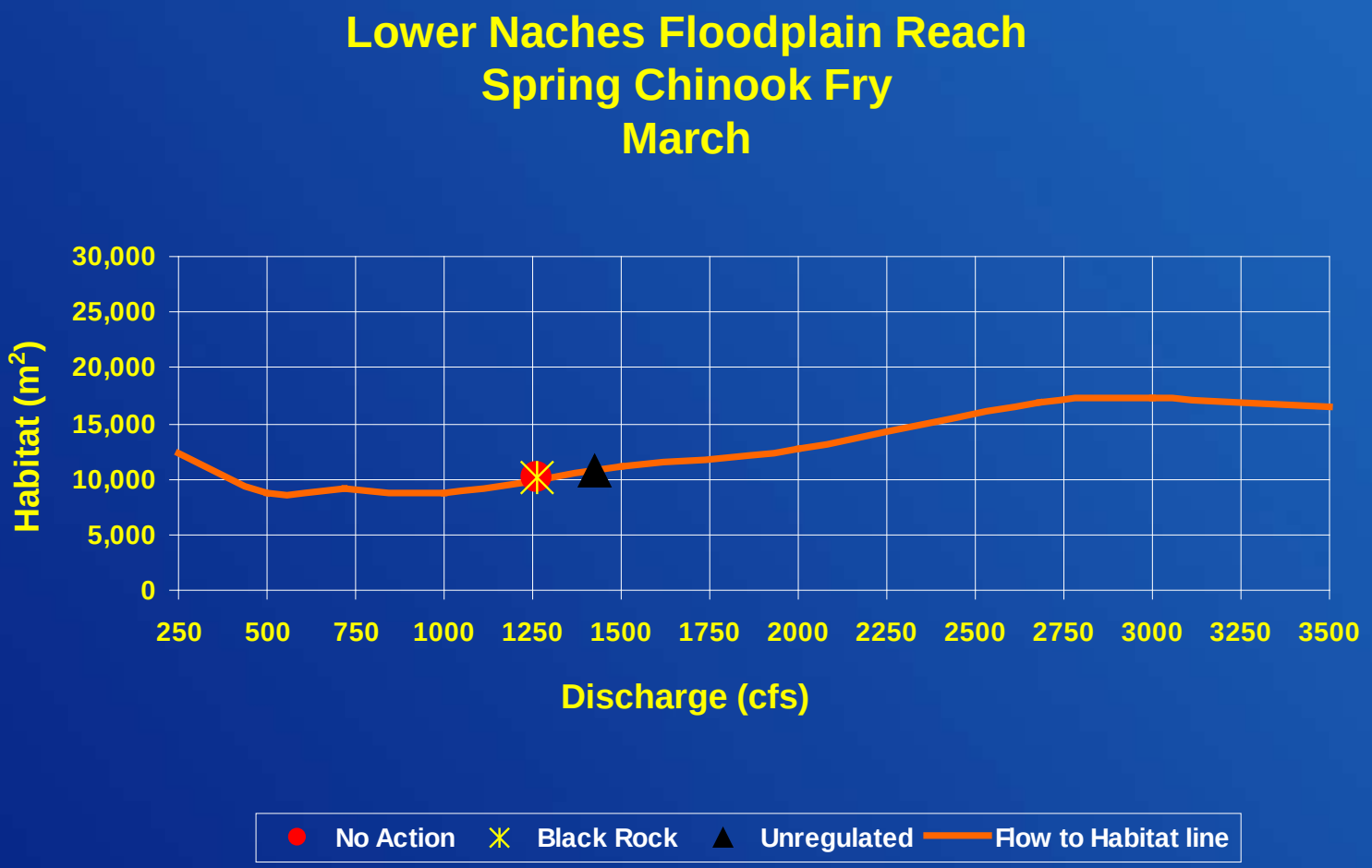
Based on the 2-Dimensional Hydraulic Model using Froude Number To Differentiate Habitat Types.

RECLAMATION


Storage Study
NEPA and SEPA
NEPA
(Ecology Cooperating Agency)
Yakima basin
Storage within Yakima
Response to Comments
Final PR/EIS
Record of Decision
State Alternatives
Not limited to storage or within Yakima basin
Meet w/ Stakeholders
Re-evaluate Goals
Develop Comprehensive Plan
SEPA SEIS
(Reclamation Cooperating Agency)
RECLAMATION

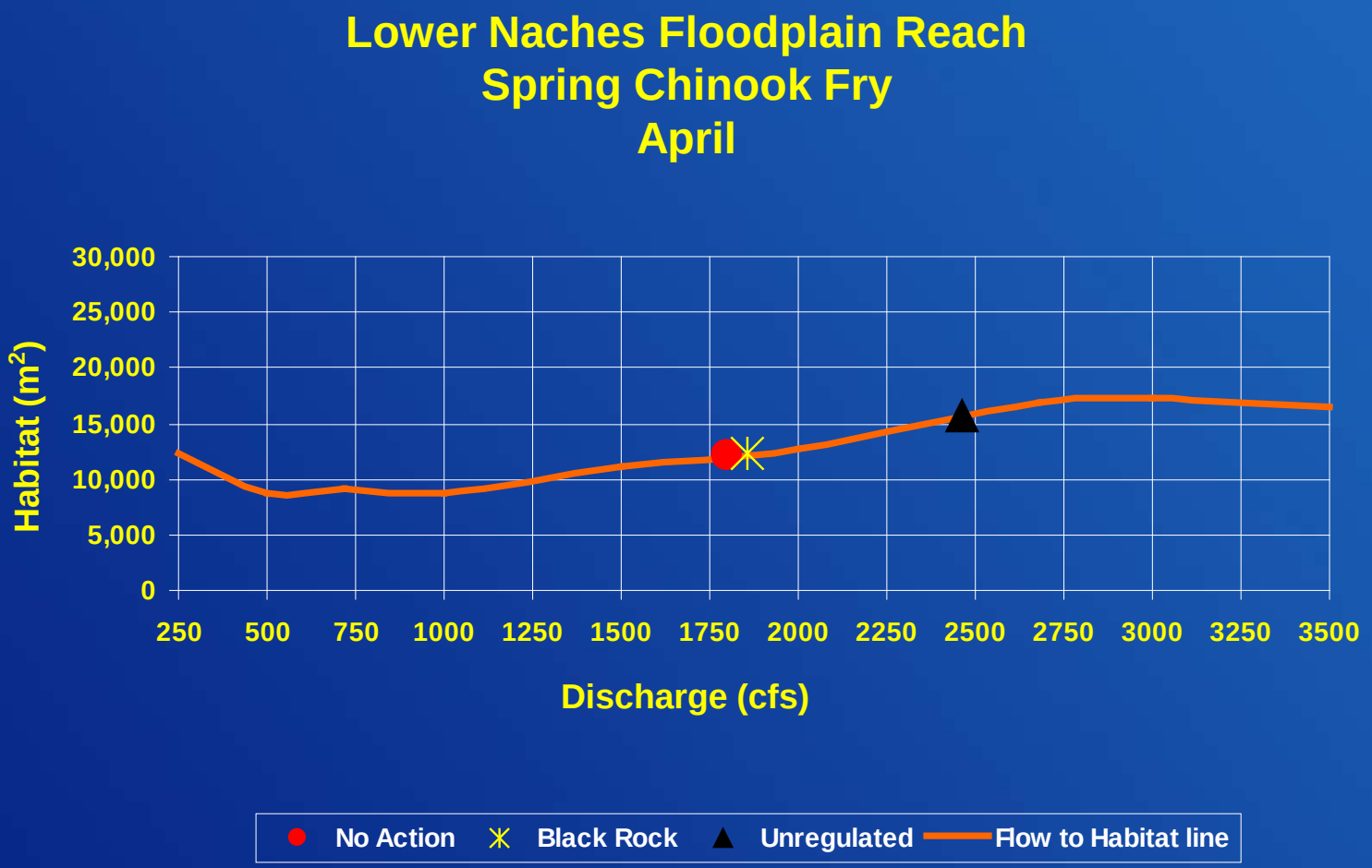
RECLAMATION

Study Results- Habitat



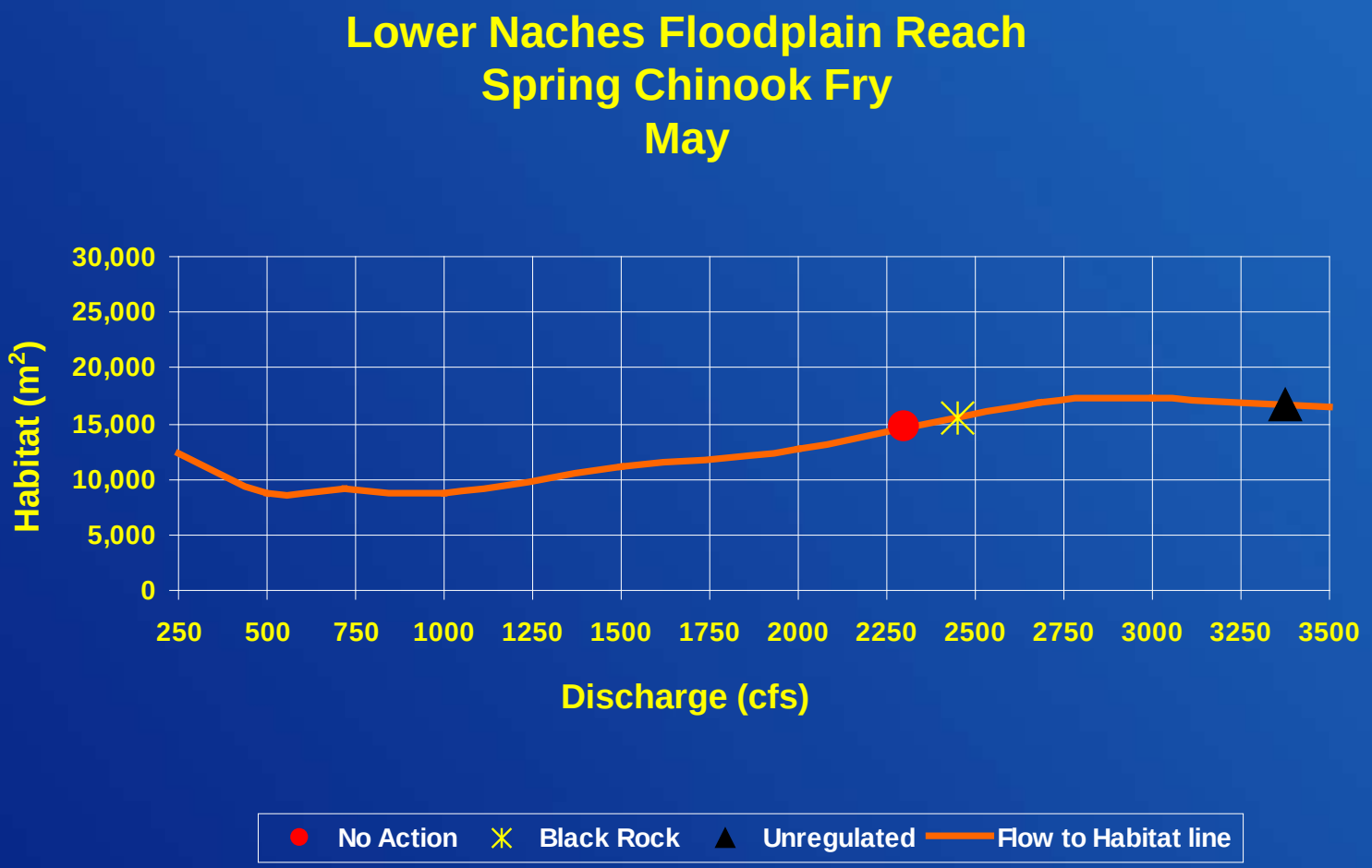
RECLAMATION

Study Results- Habitat



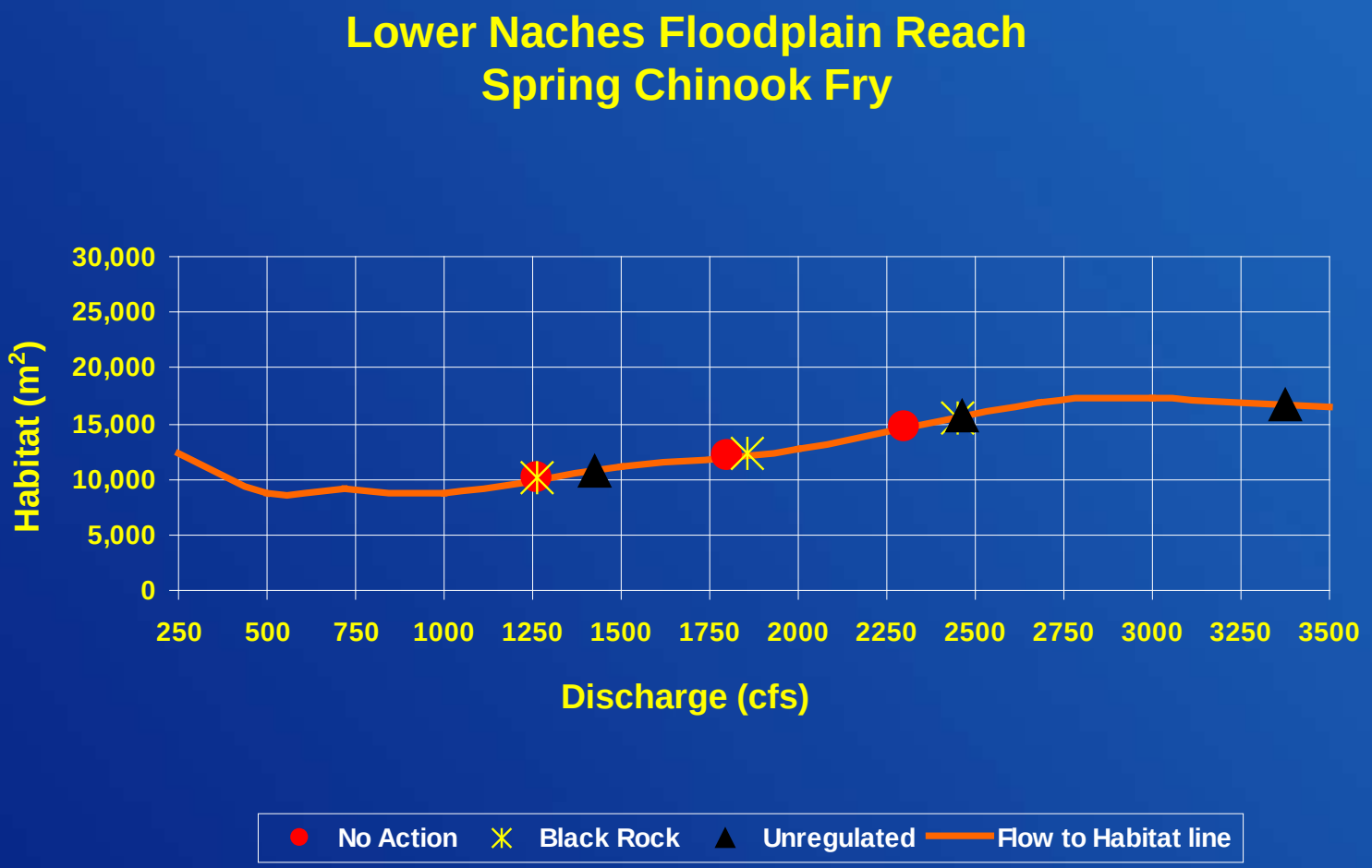
RECLAMATION

Study Results- Habitat



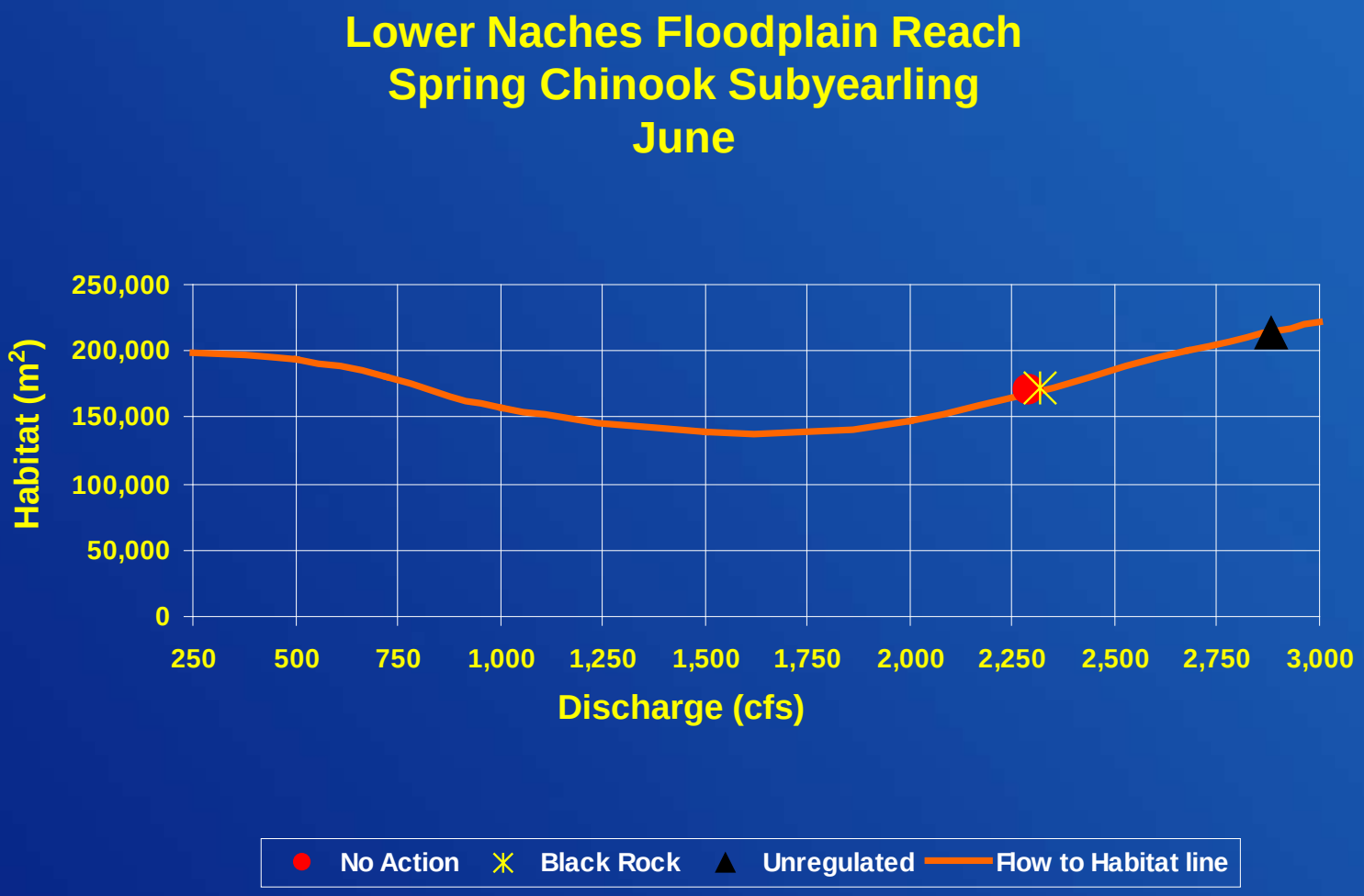
RECLAMATION

Study Results- Habitat



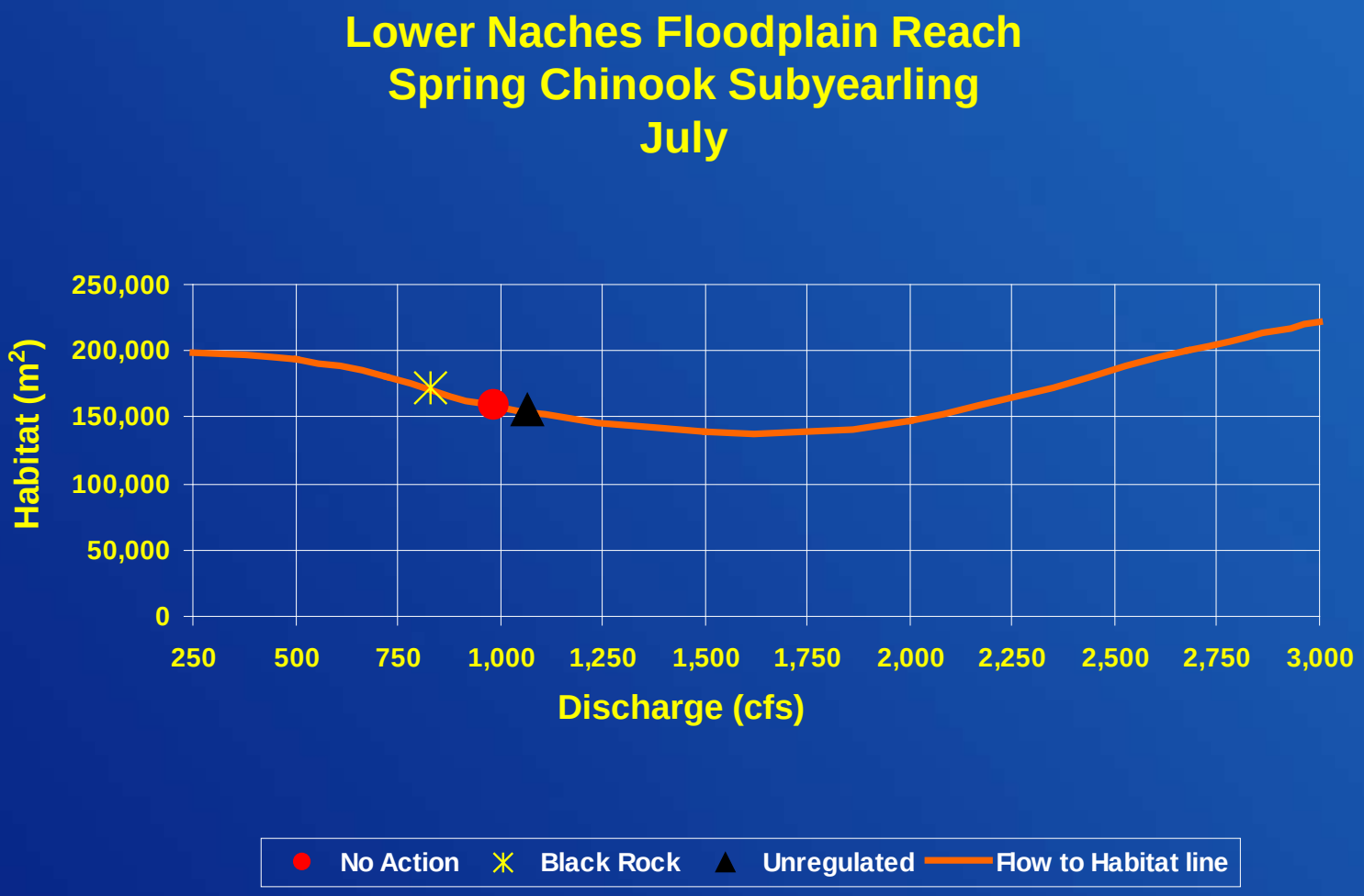
RECLAMATION

Study Results- Habitat



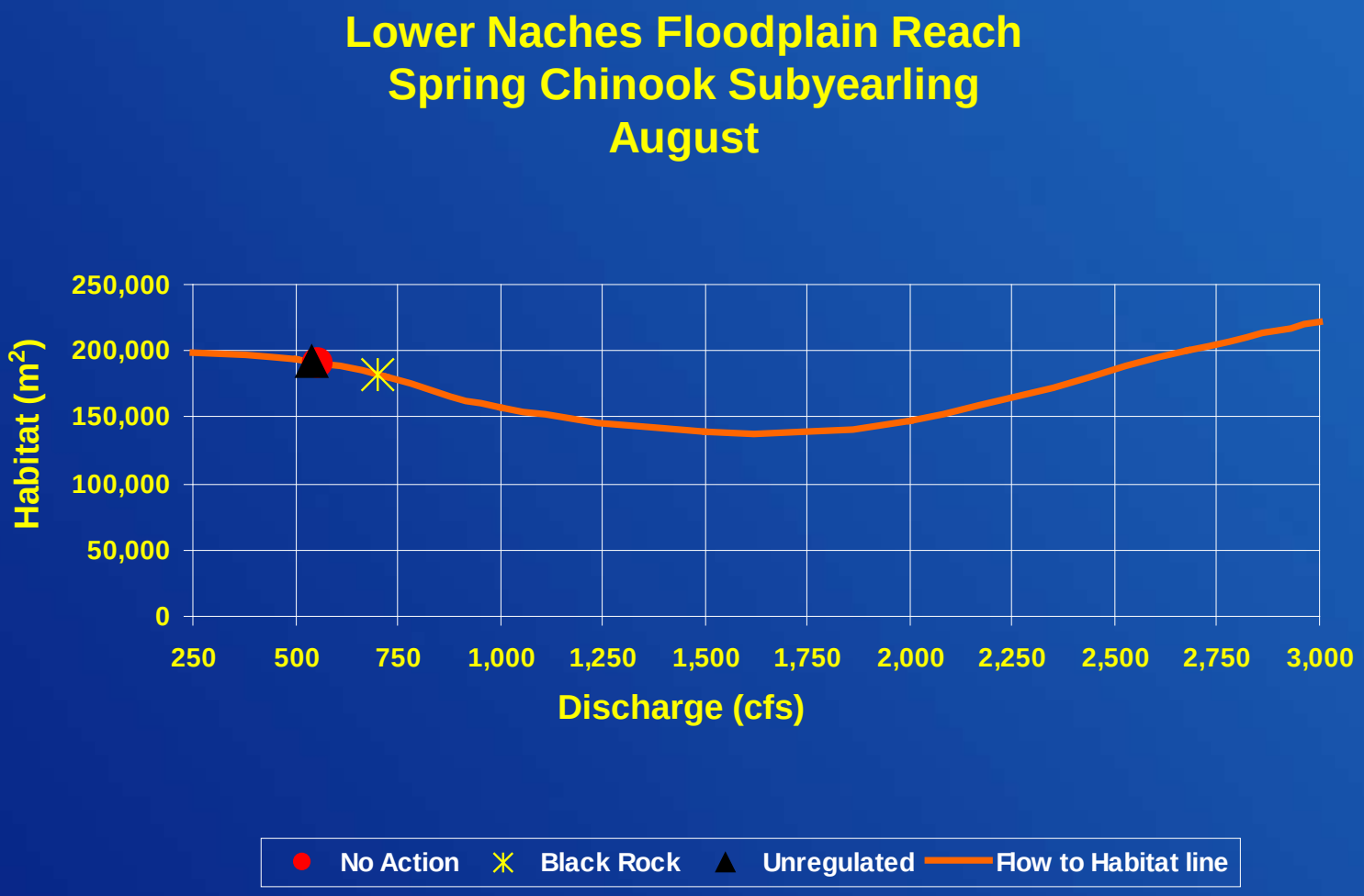
RECLAMATION

Study Results- Habitat



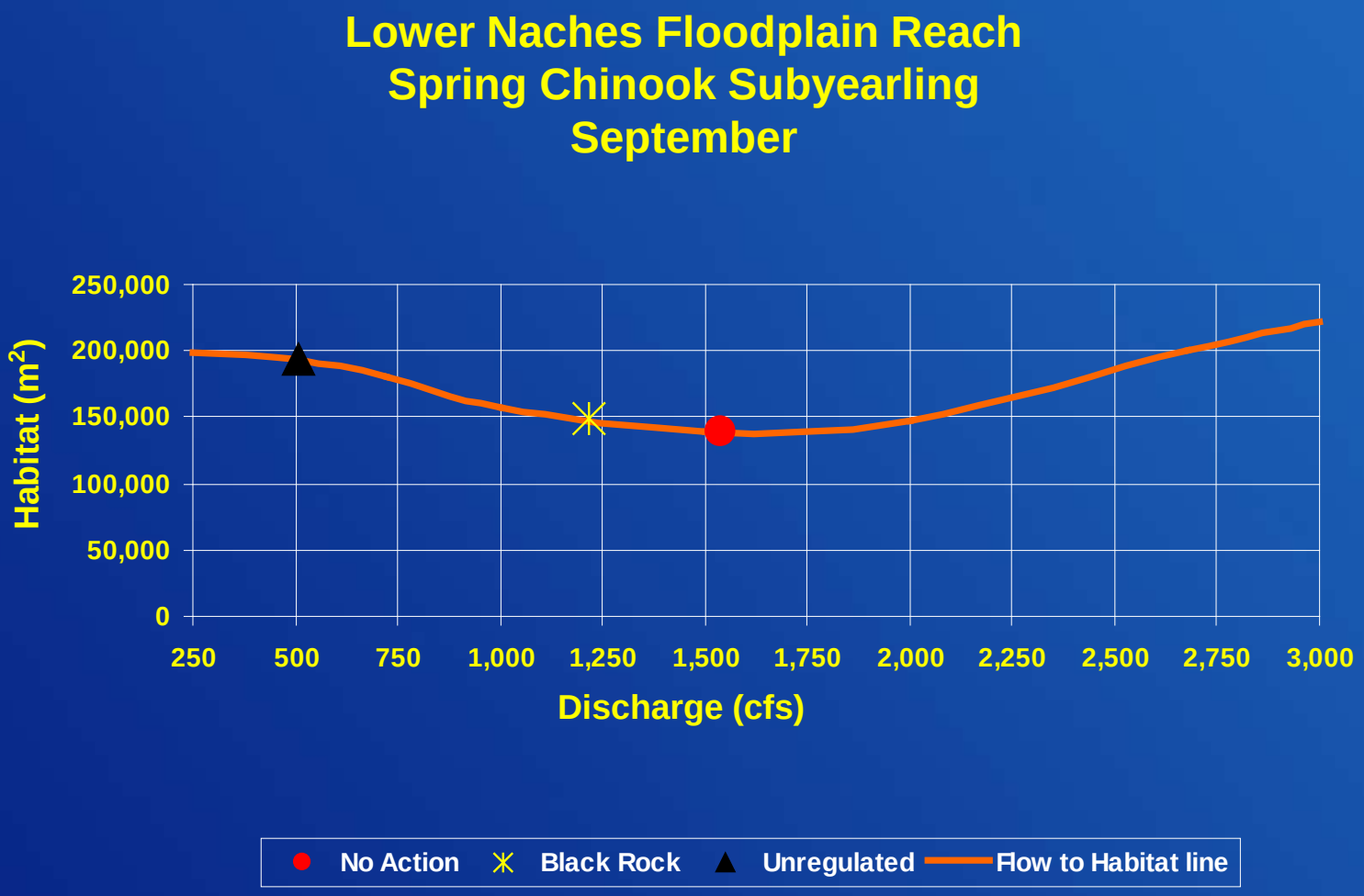
RECLAMATION

Study Results- Habitat



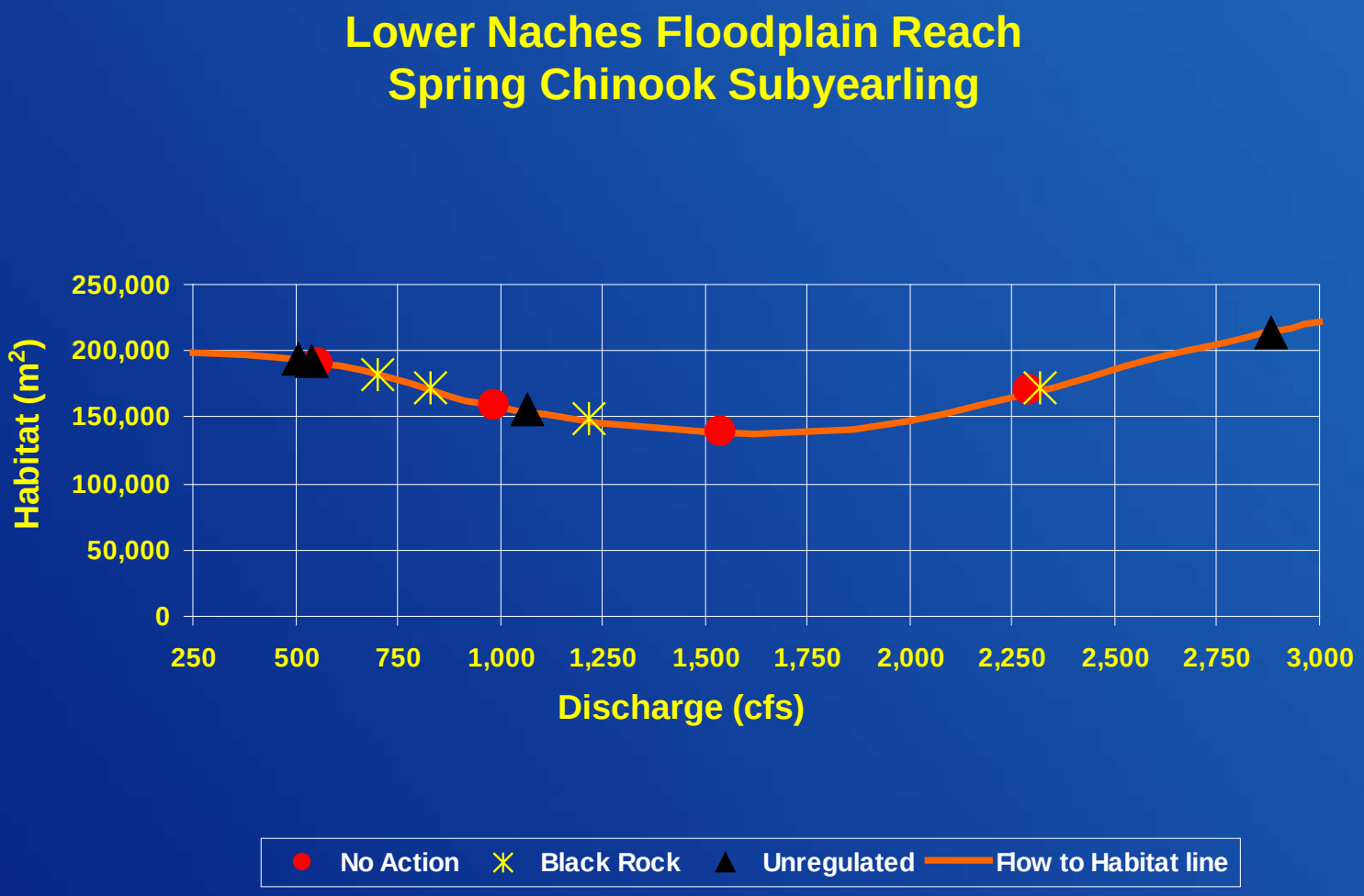
RECLAMATION

Study Results- Habitat



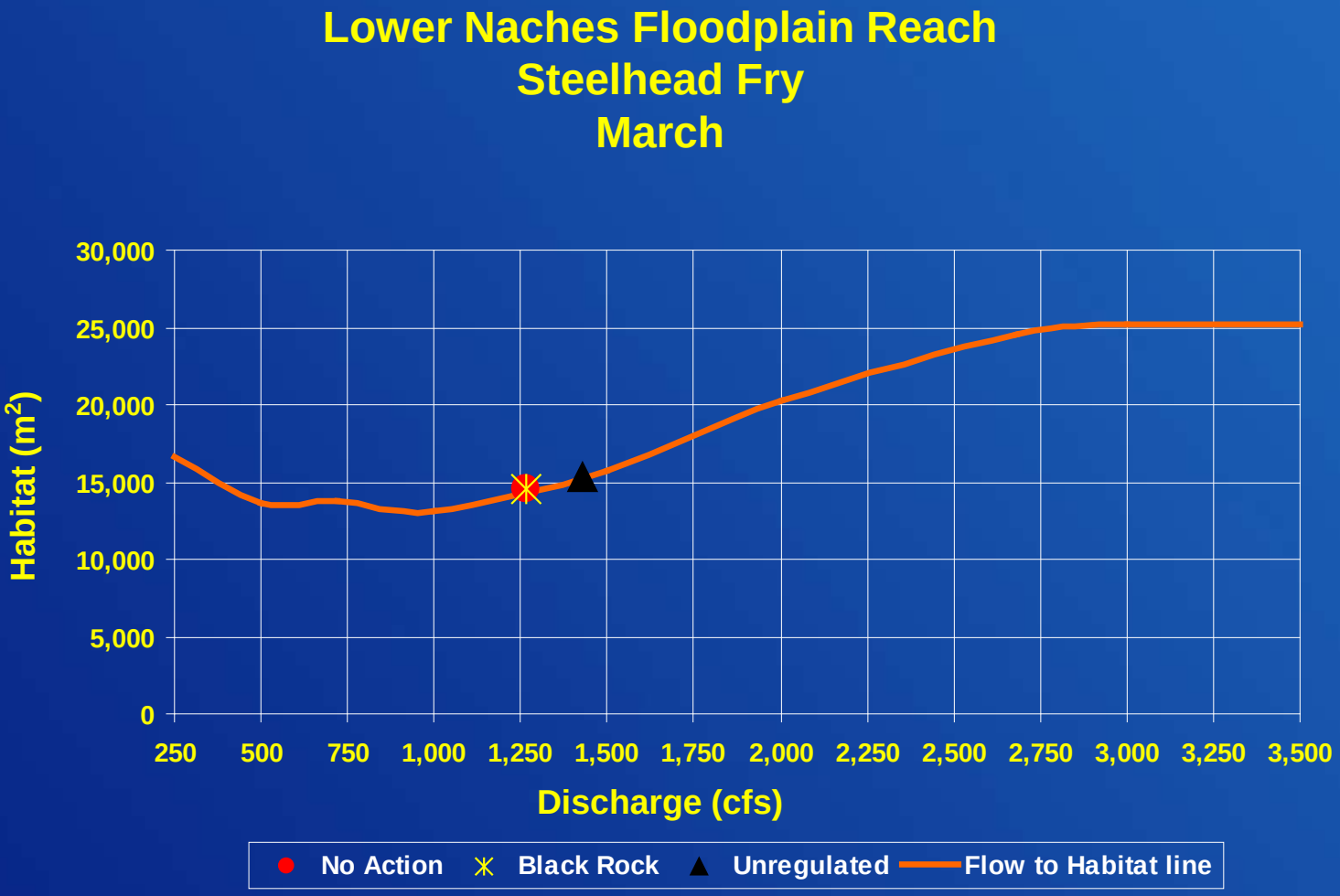
RECLAMATION

Study Results- Habitat



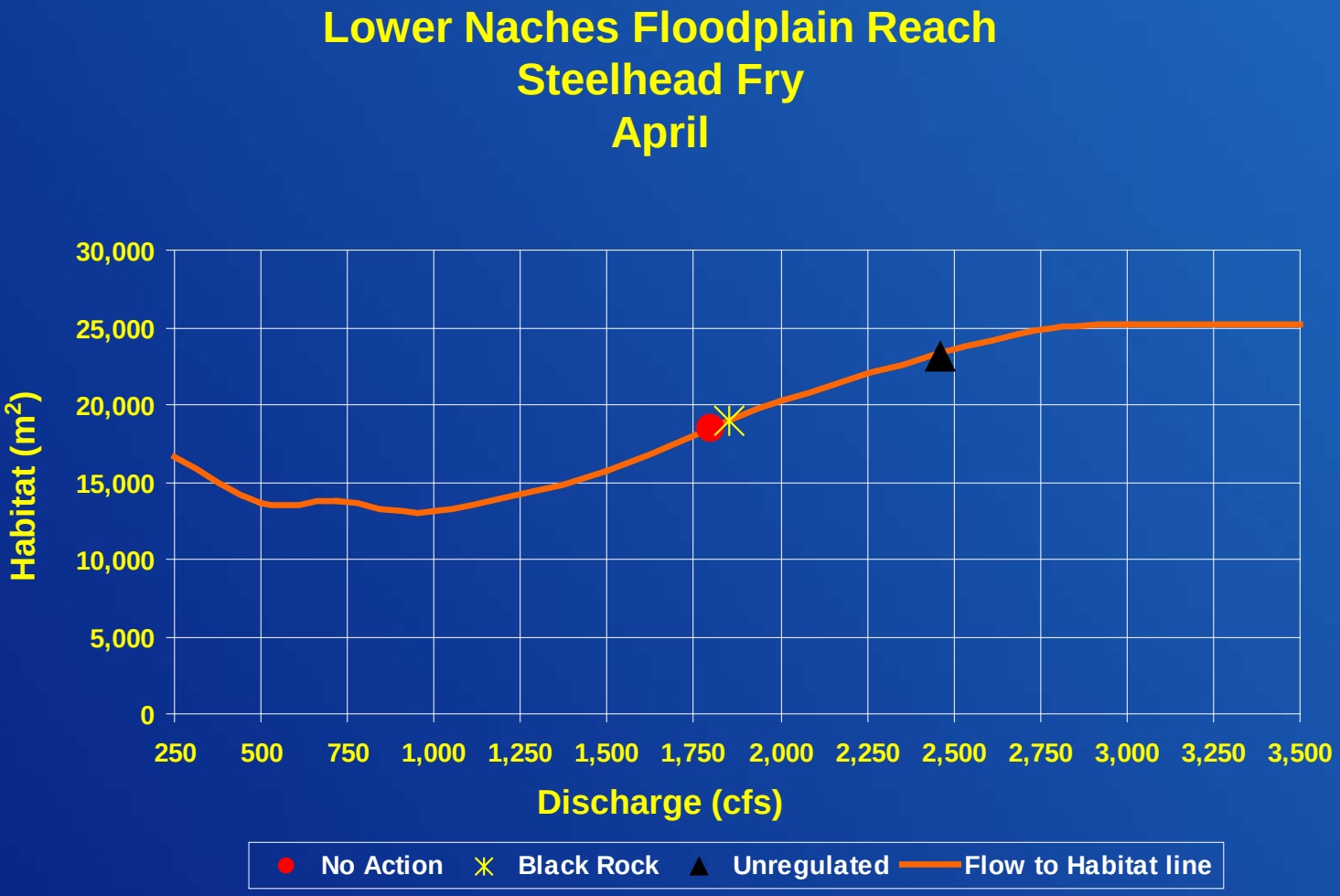
RECLAMATION

Study Results- Habitat



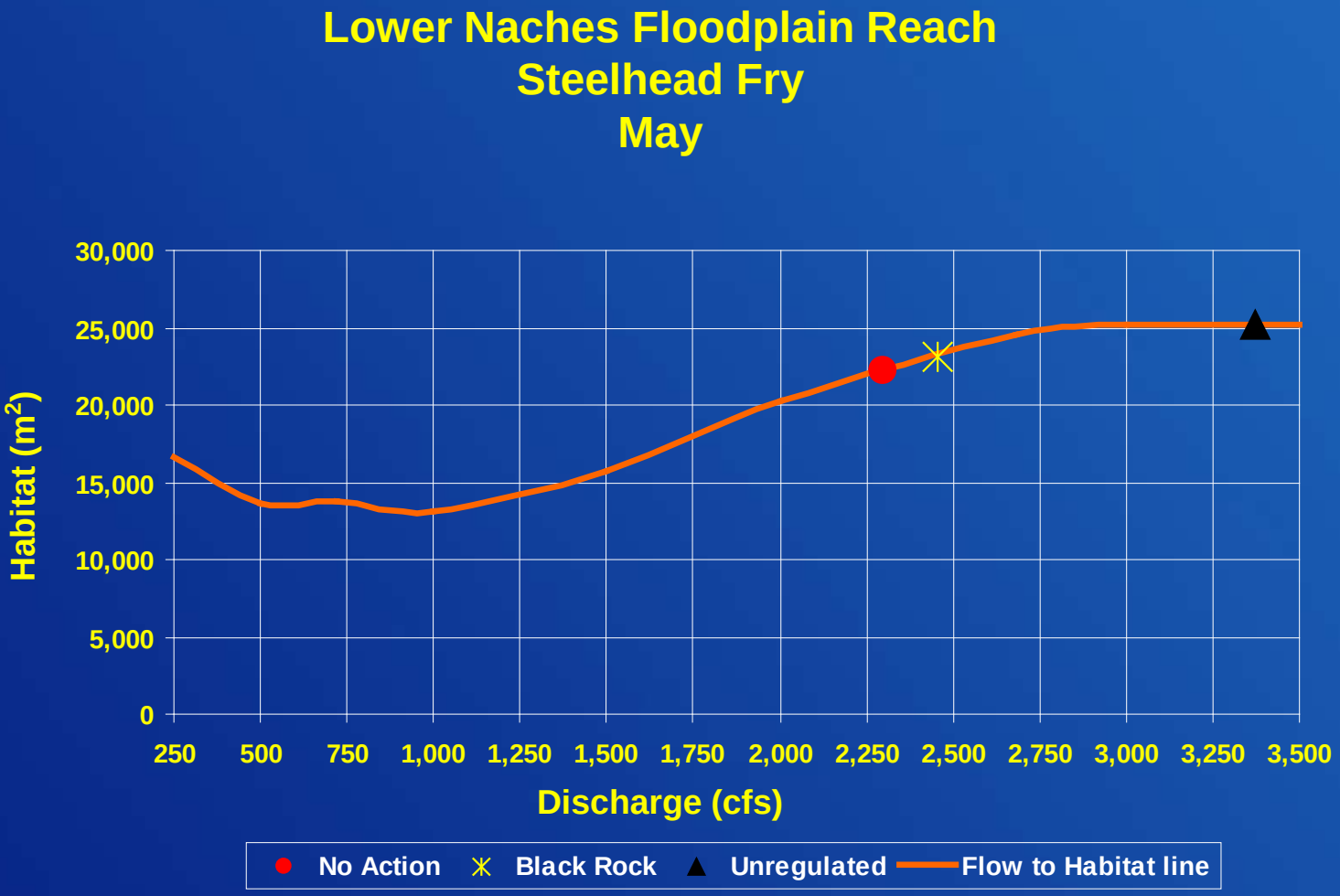
RECLAMATION

Study Results- Habitat



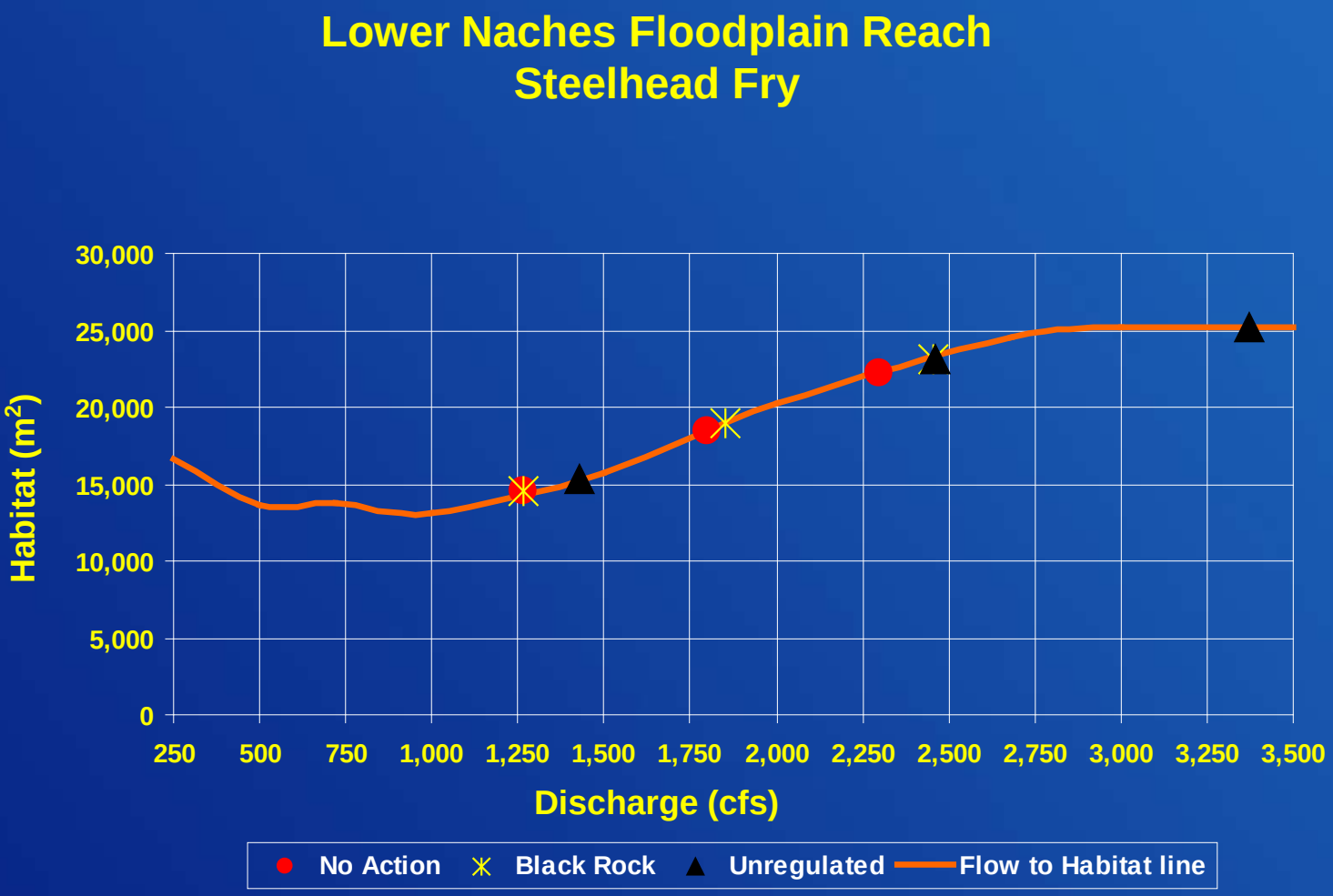
RECLAMATION

Study Results- Habitat



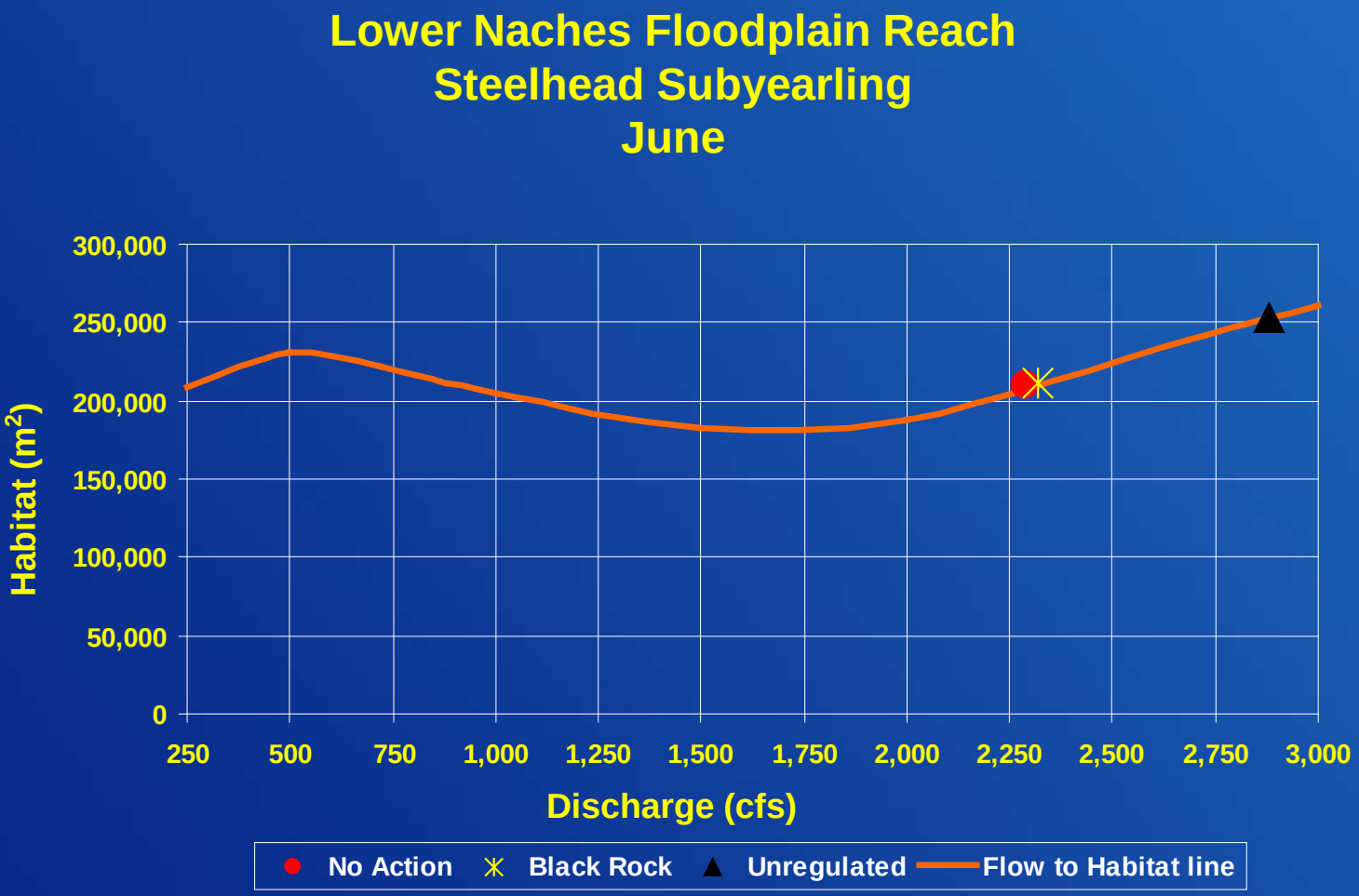
RECLAMATION

Study Results- Habitat



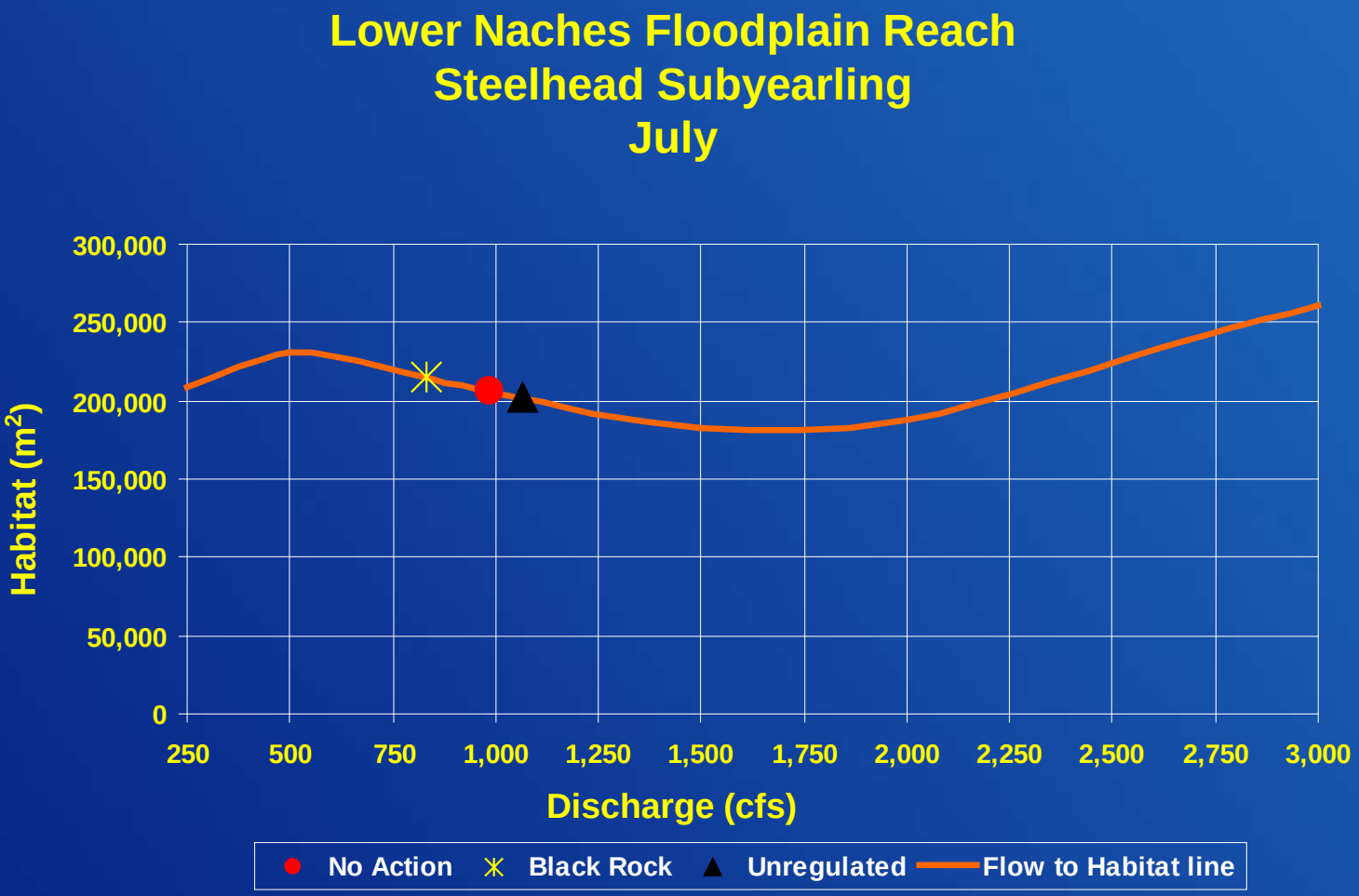
RECLAMATION

Study Results- Habitat



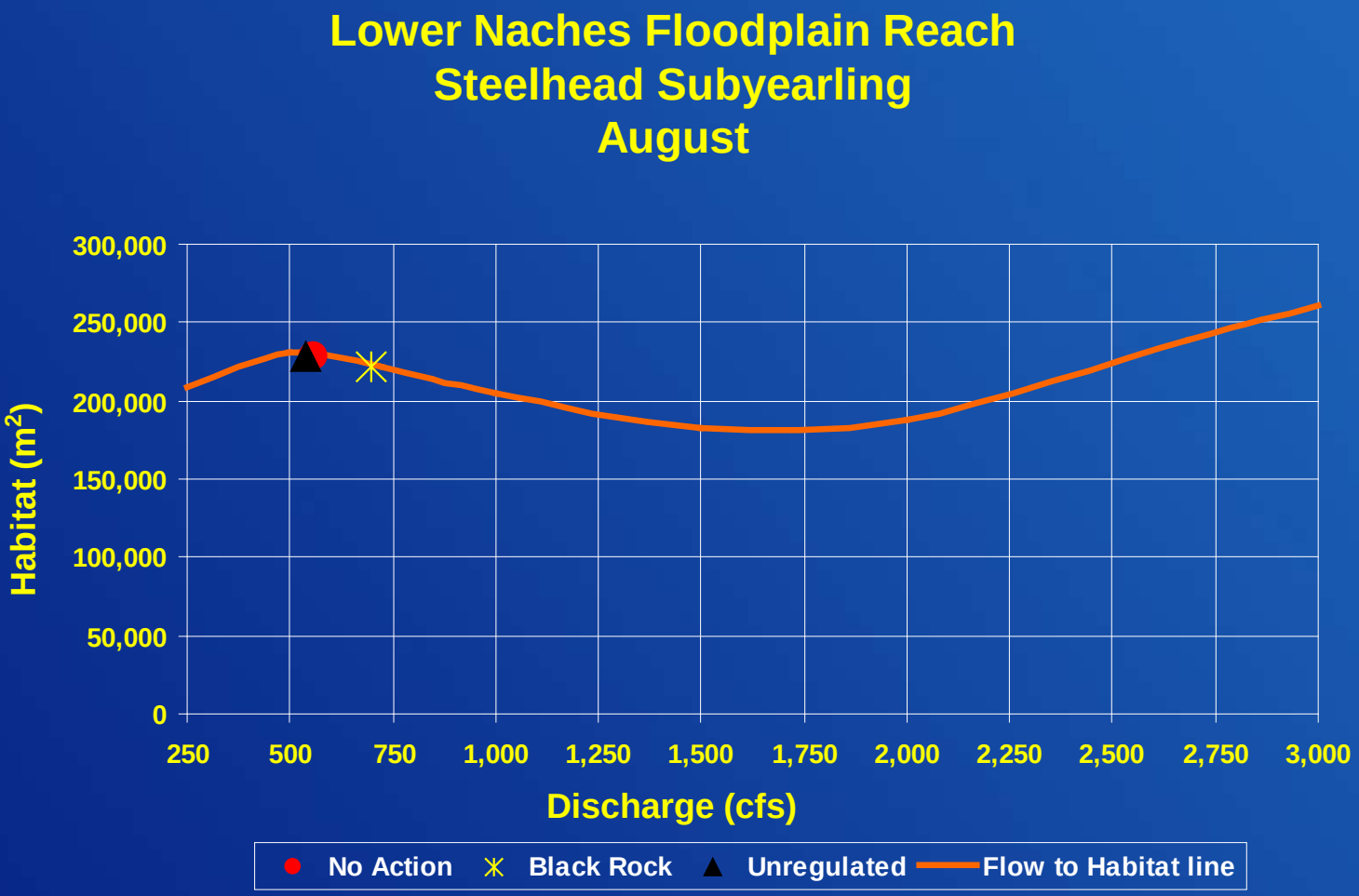
RECLAMATION

Study Results- Habitat



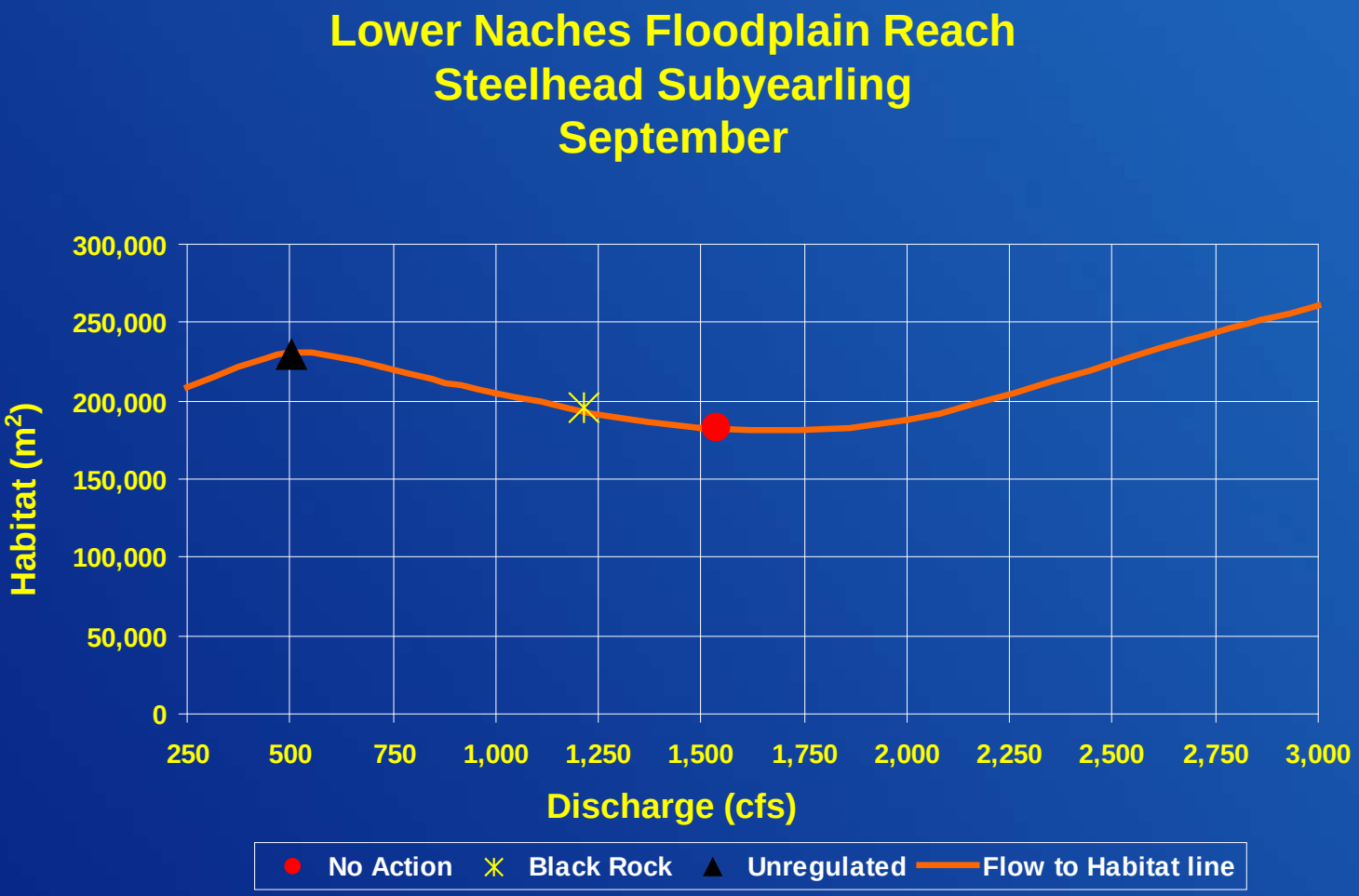
RECLAMATION

Study Results- Habitat



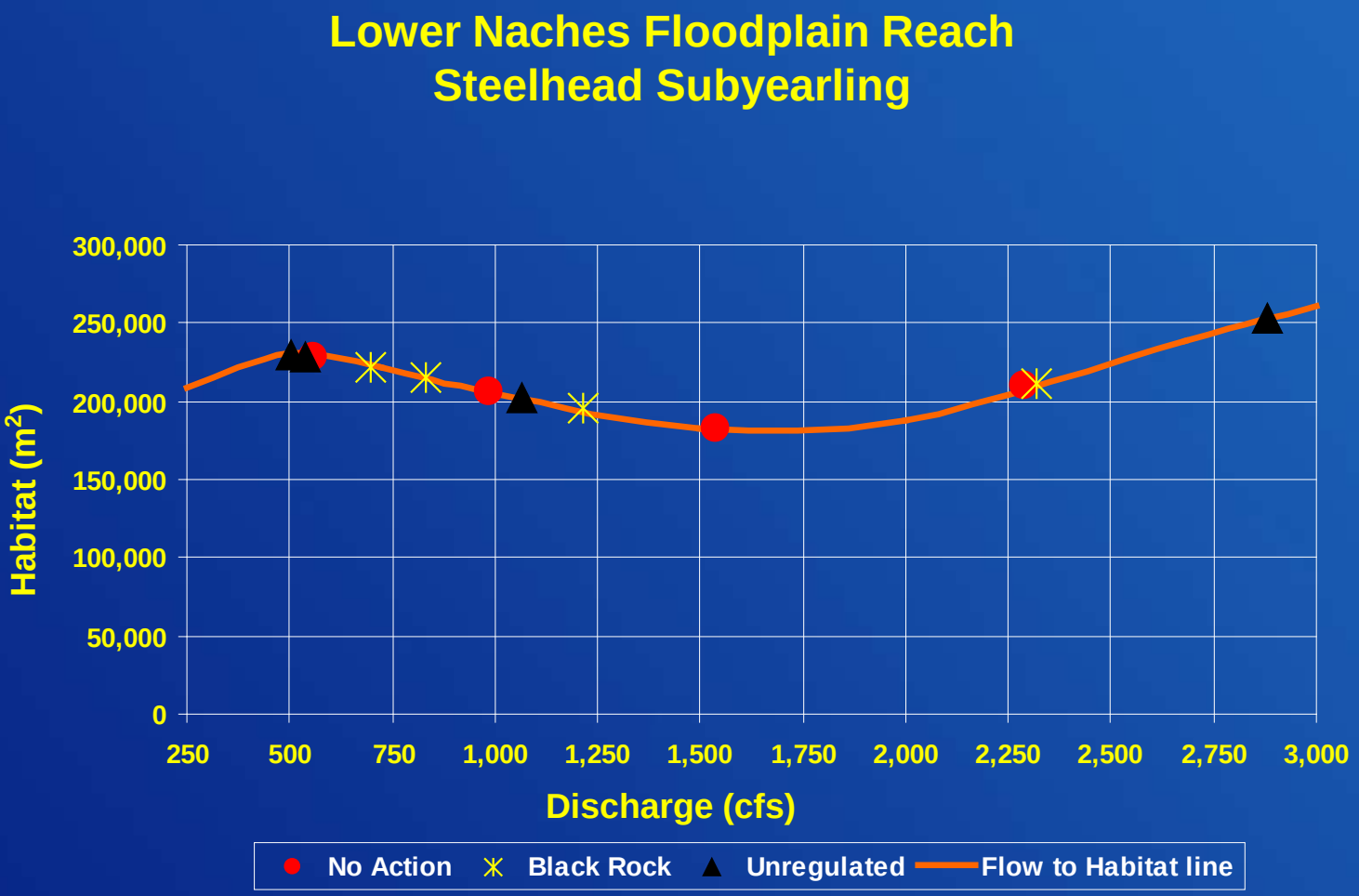
RECLAMATION

Study Results- Habitat



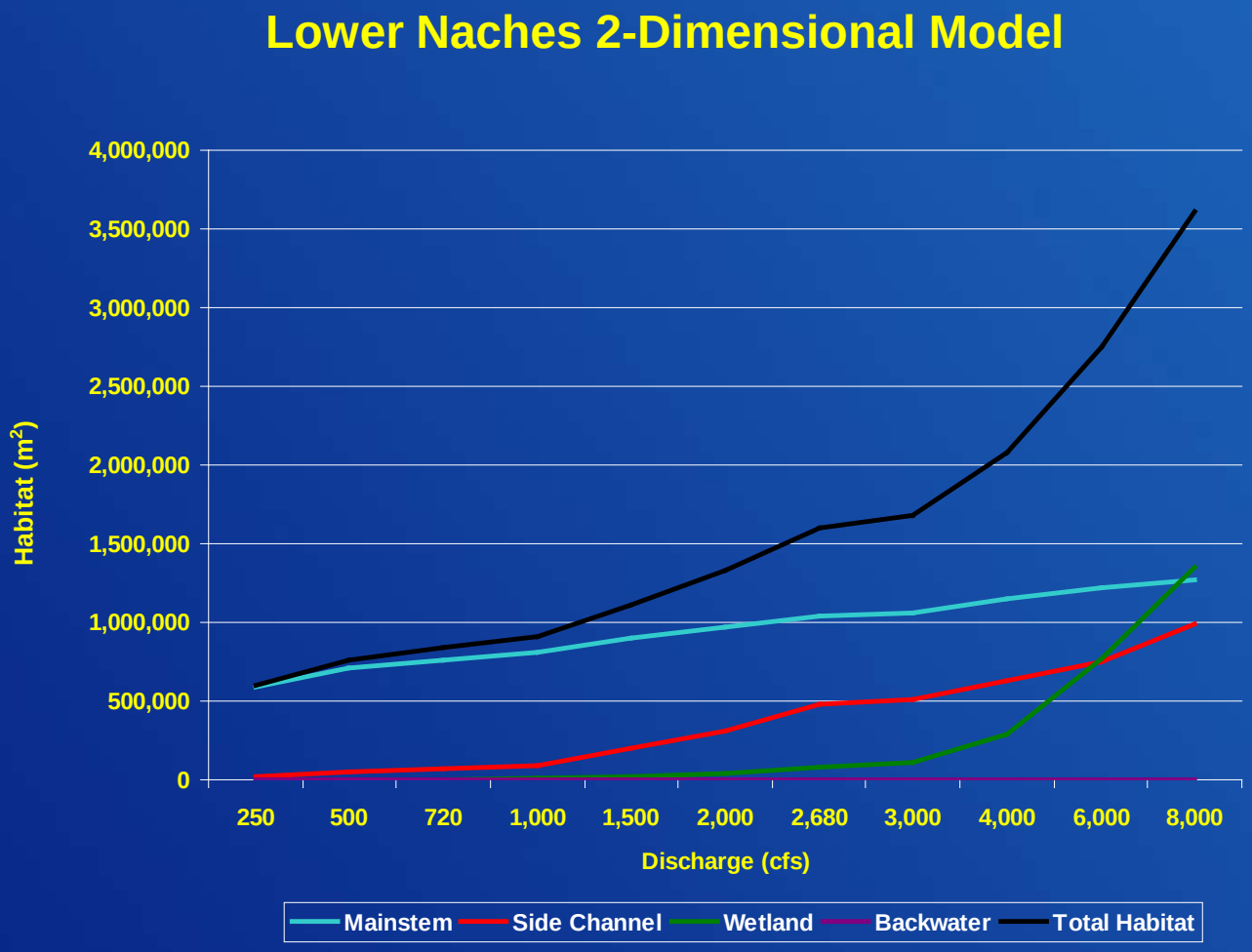
RECLAMATION

Study Results- Habitat



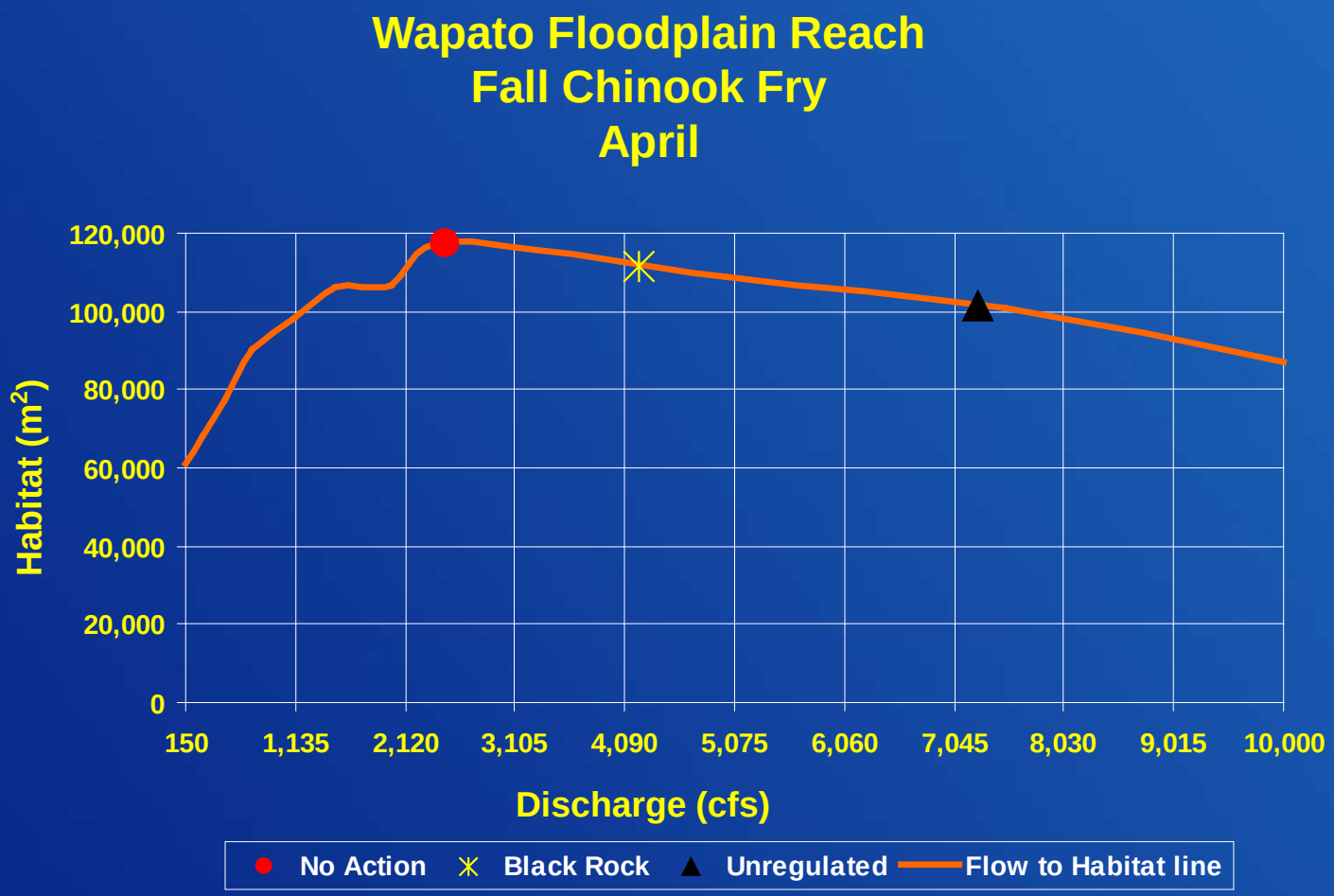
RECLAMATION

Study Results- Habitat



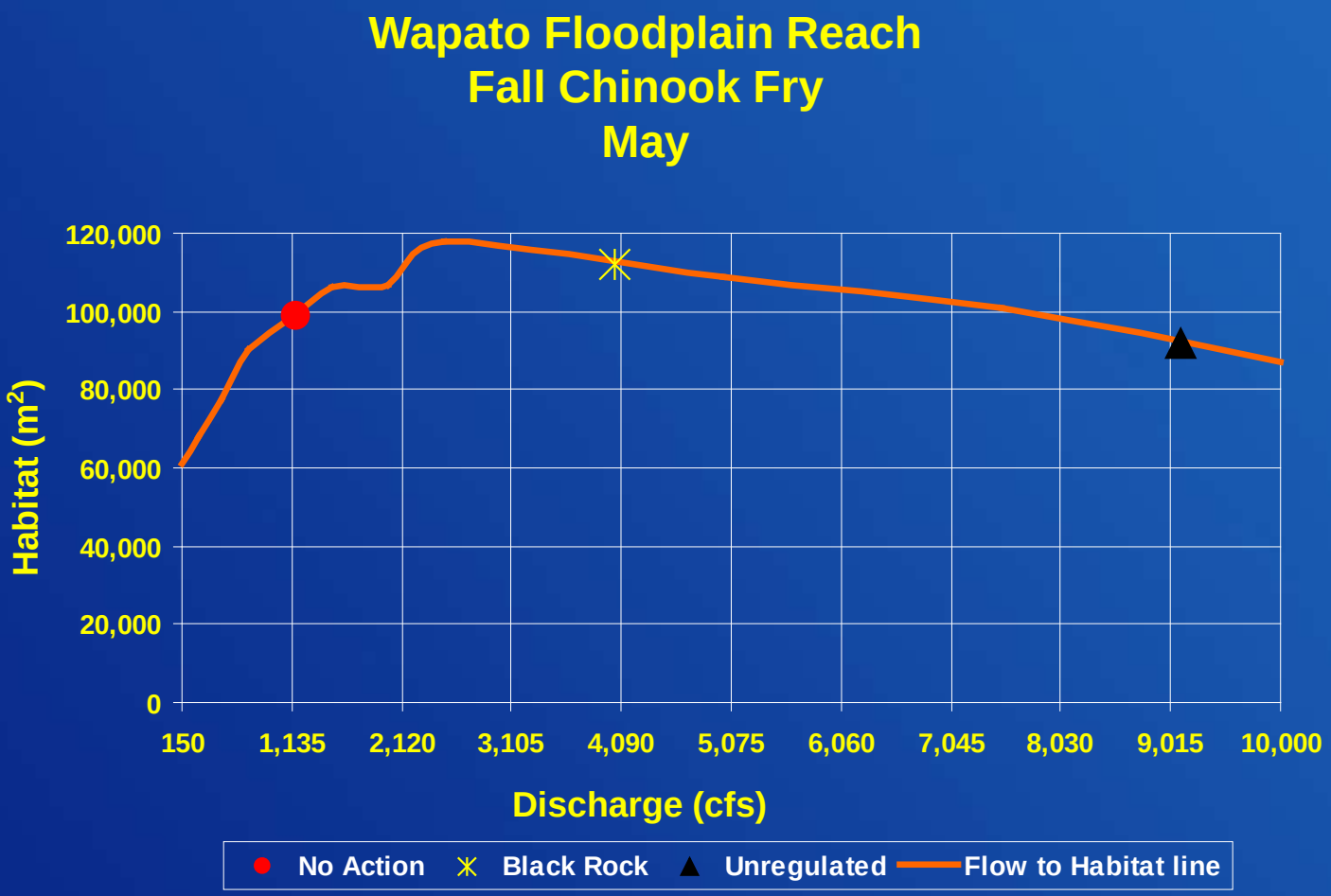
RECLAMATION

Study Results- Habitat



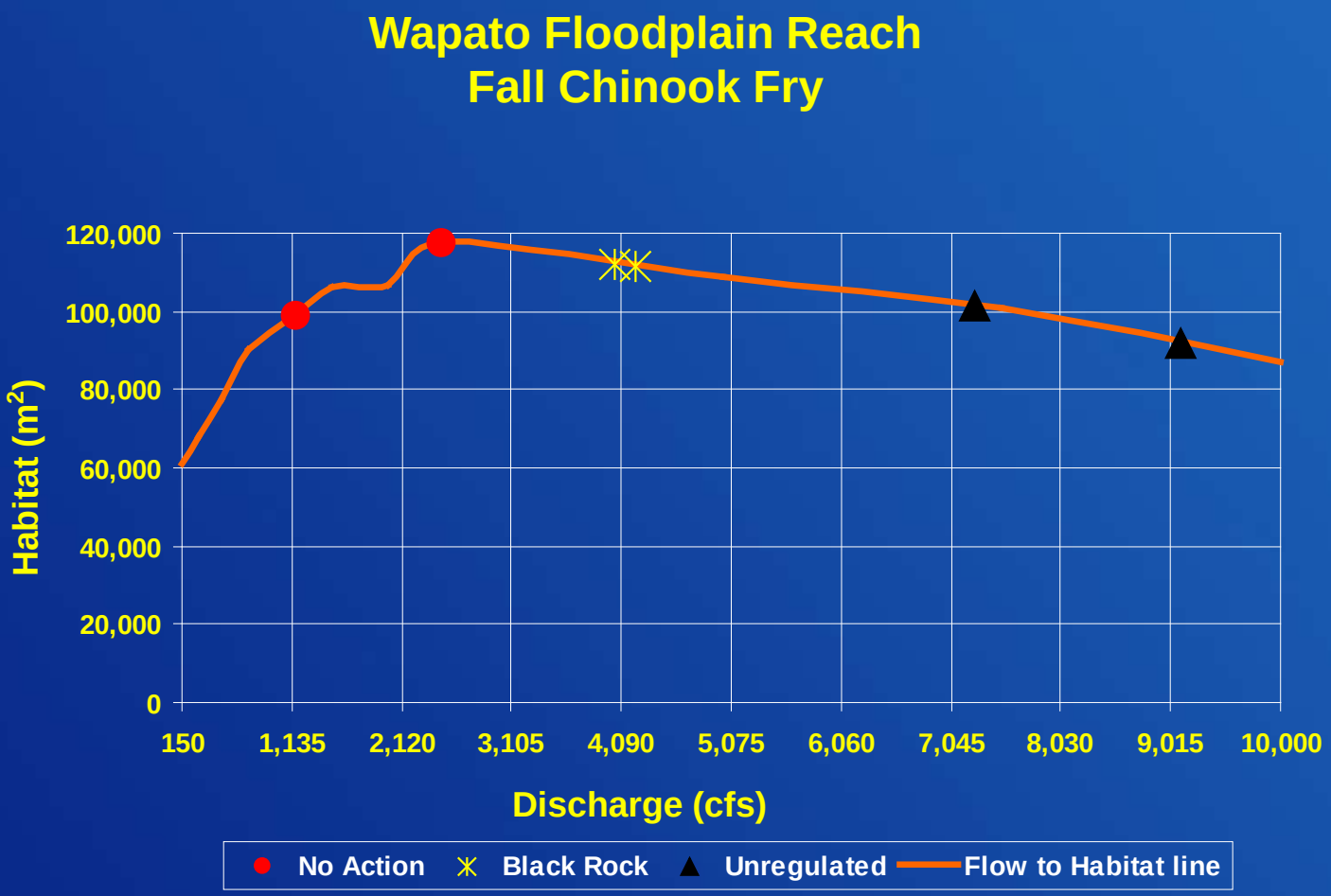
RECLAMATION

Study Results- Habitat



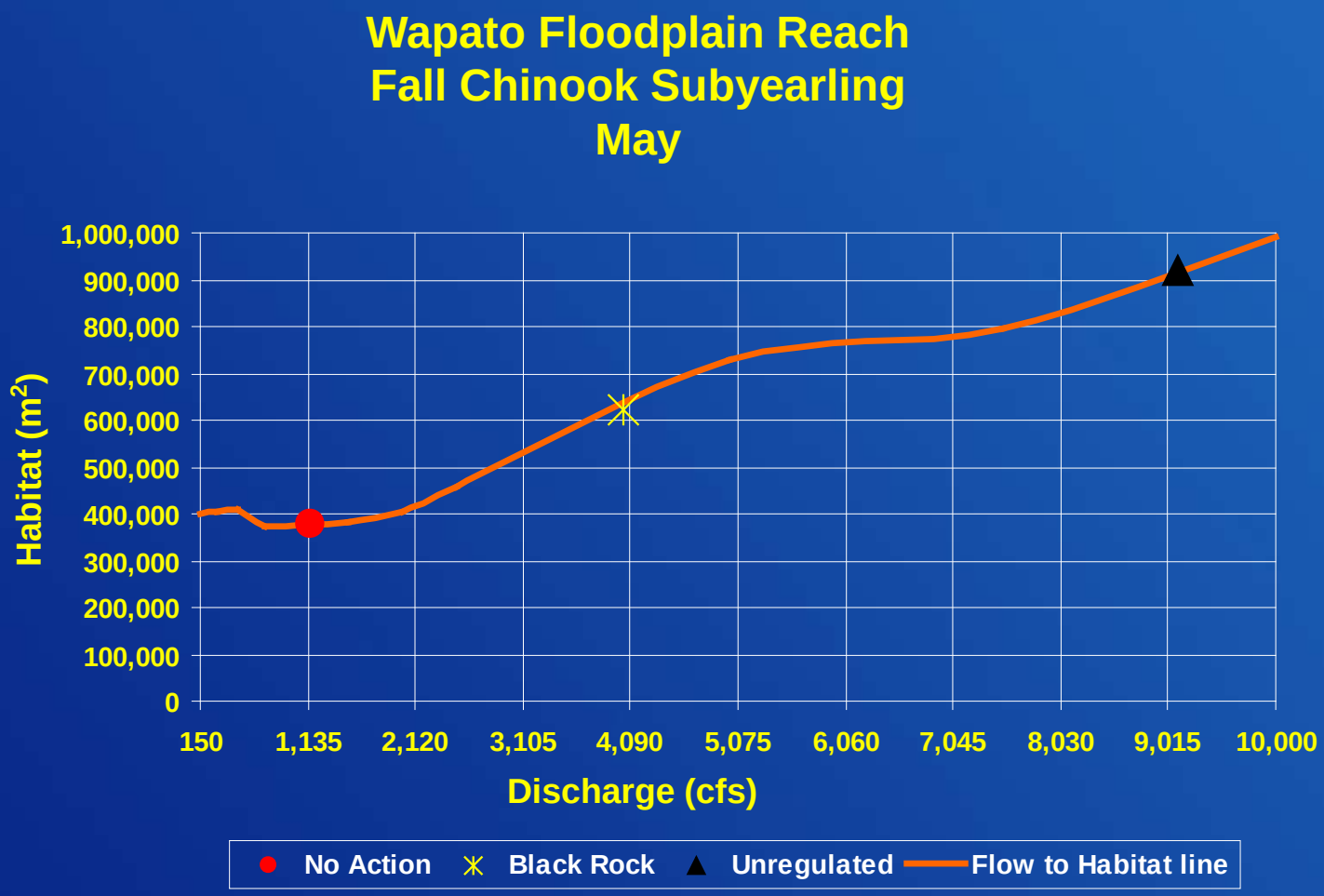
RECLAMATION

Study Results- Habitat



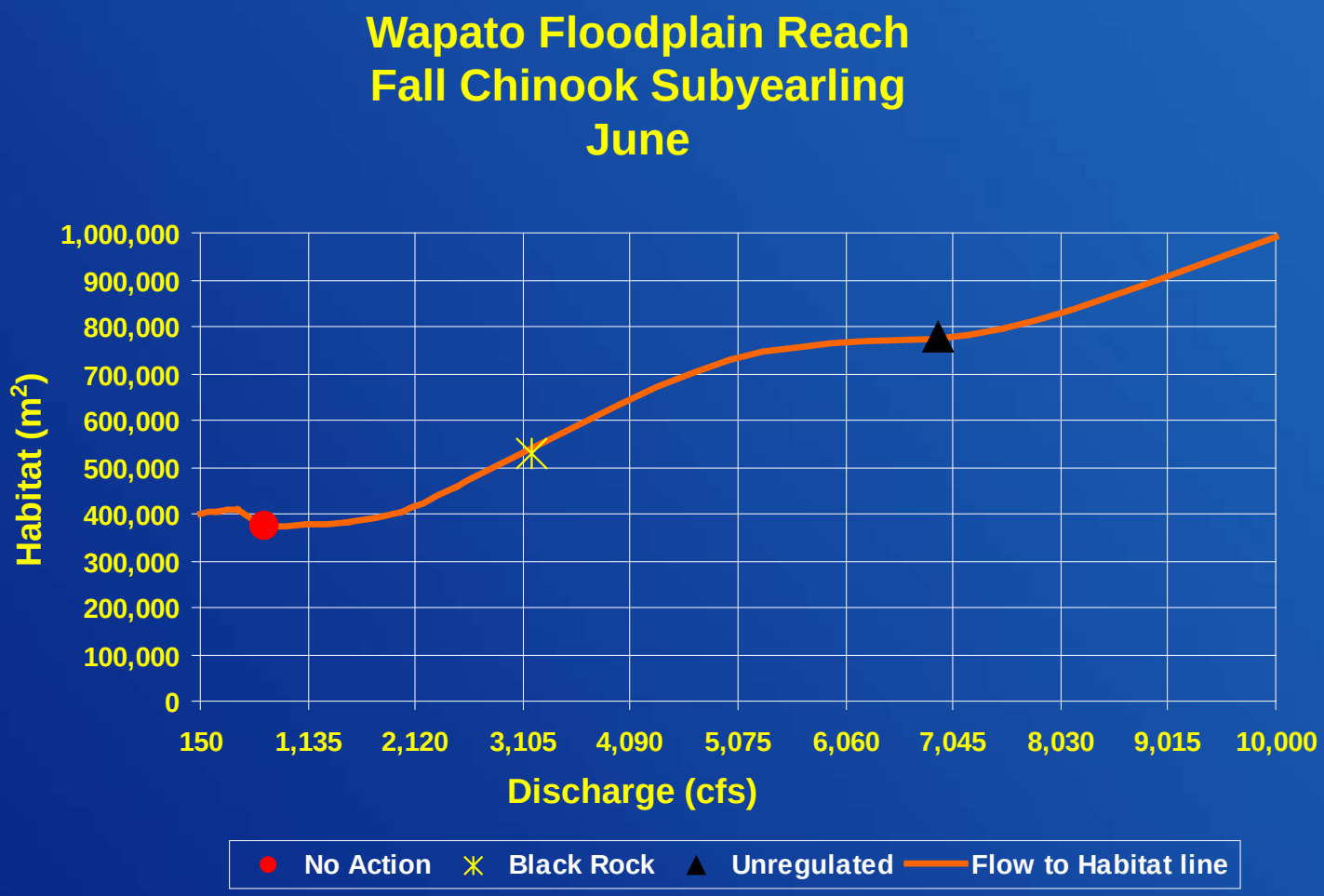
RECLAMATION

Study Results- Habitat



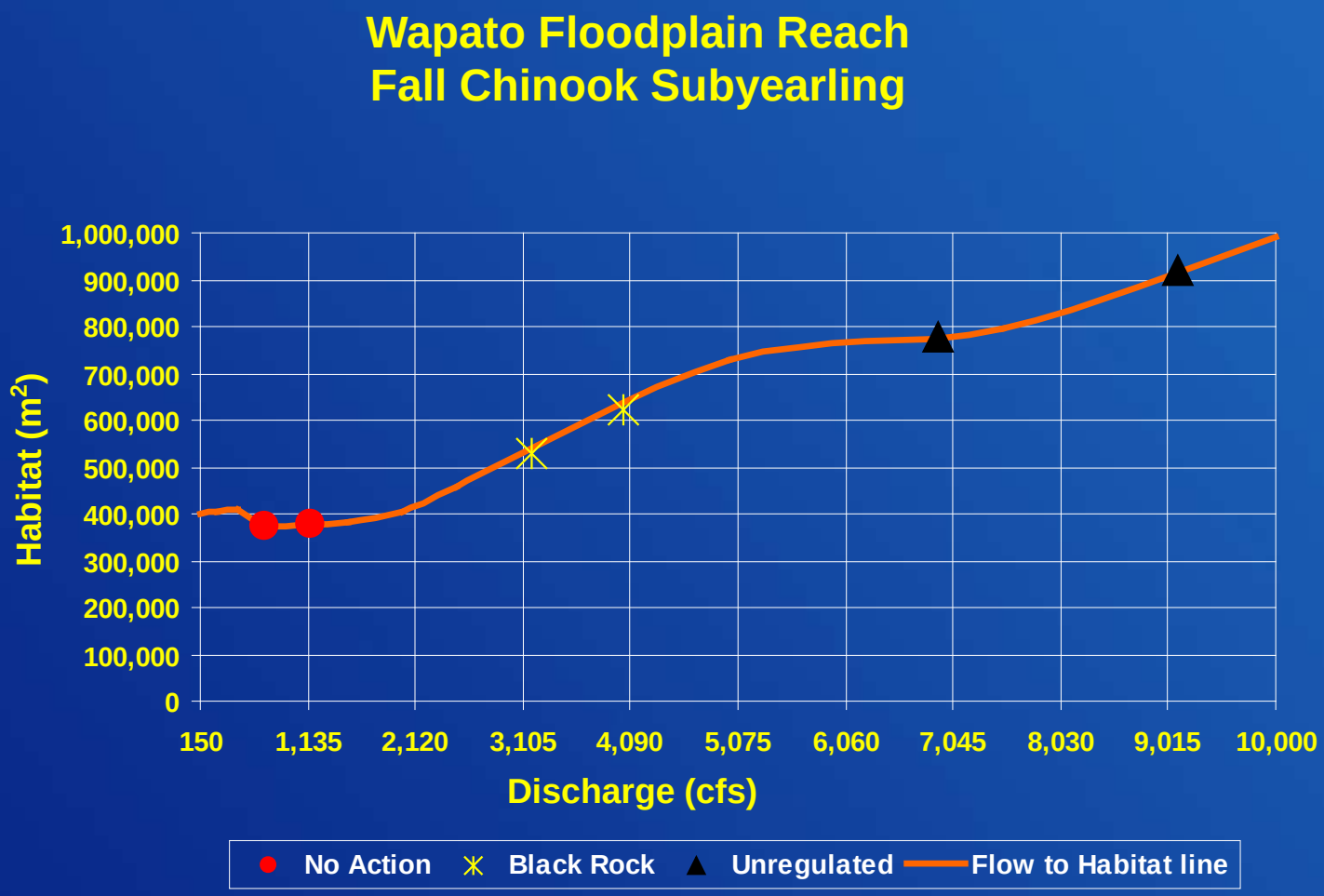
RECLAMATION

Study Results- Habitat



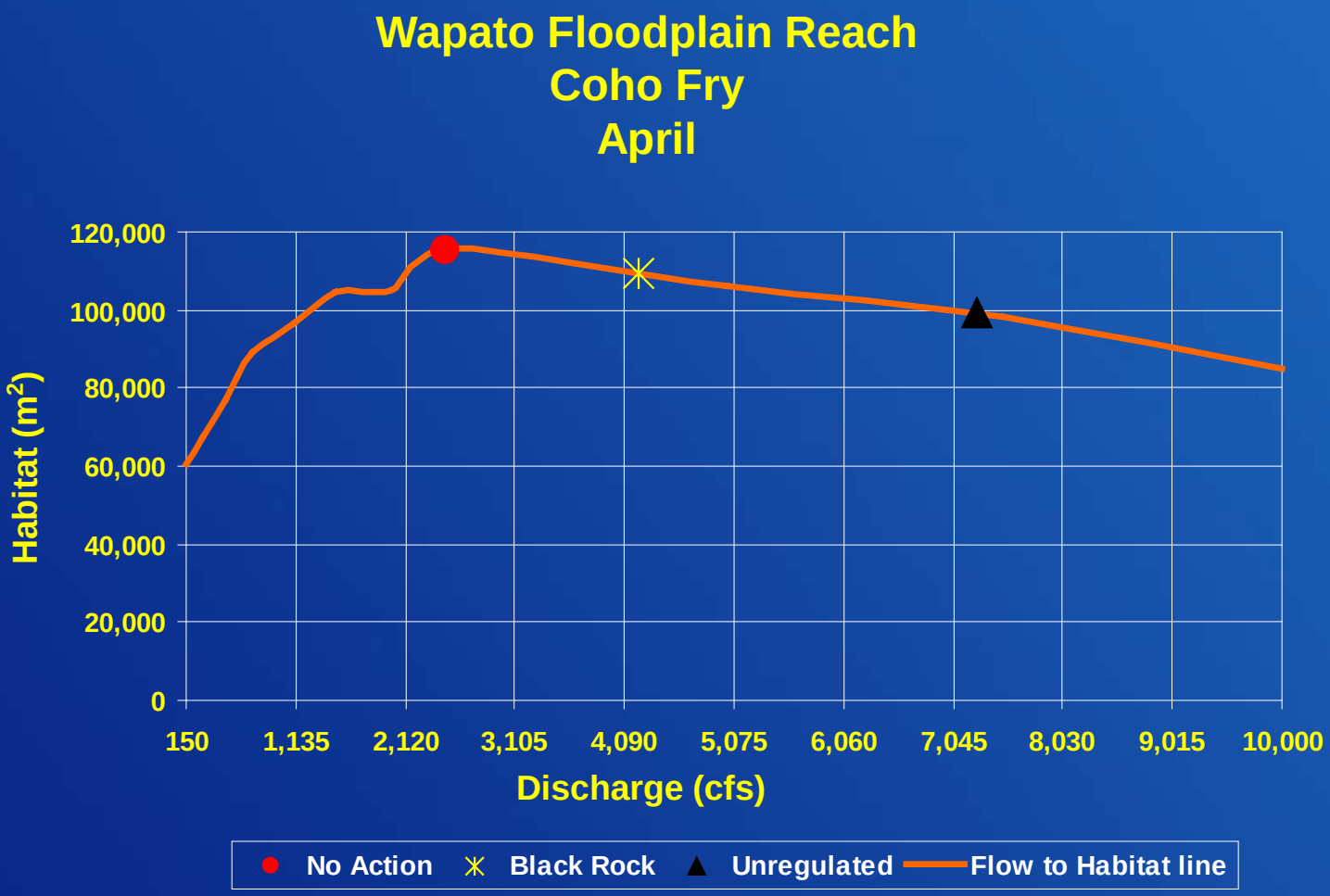
RECLAMATION

Study Results- Habitat



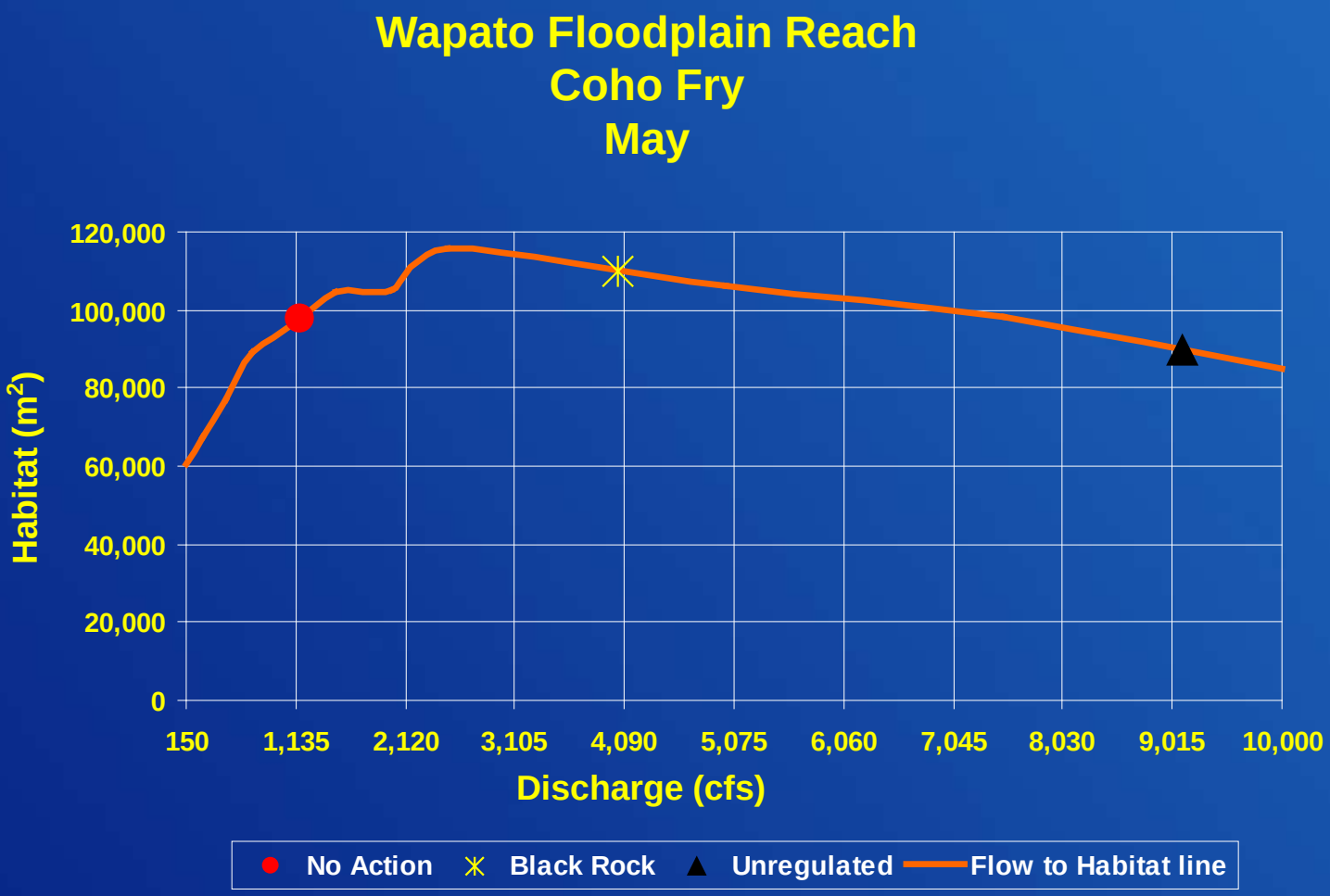
RECLAMATION

Study Results- Habitat



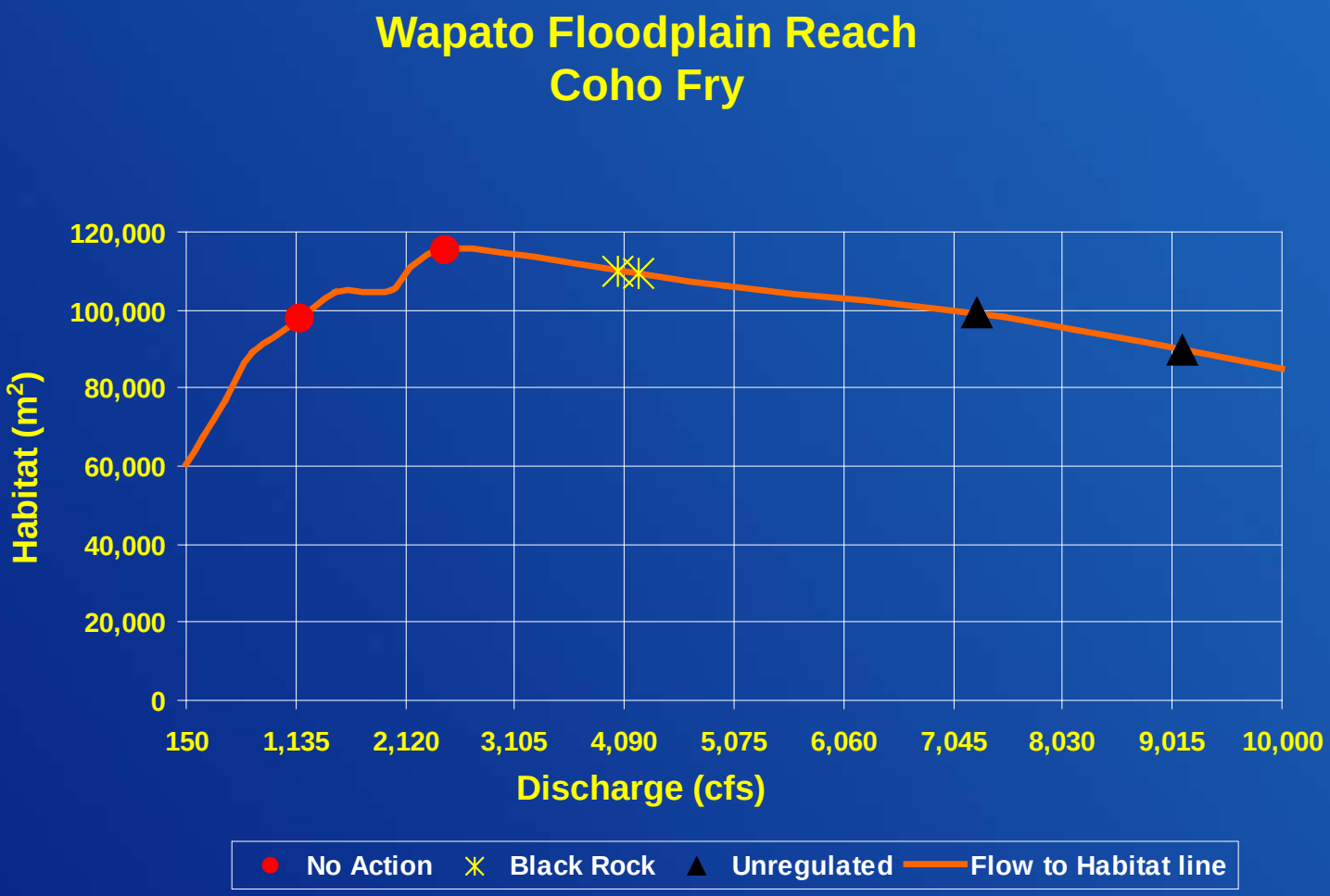
RECLAMATION

Study Results- Habitat



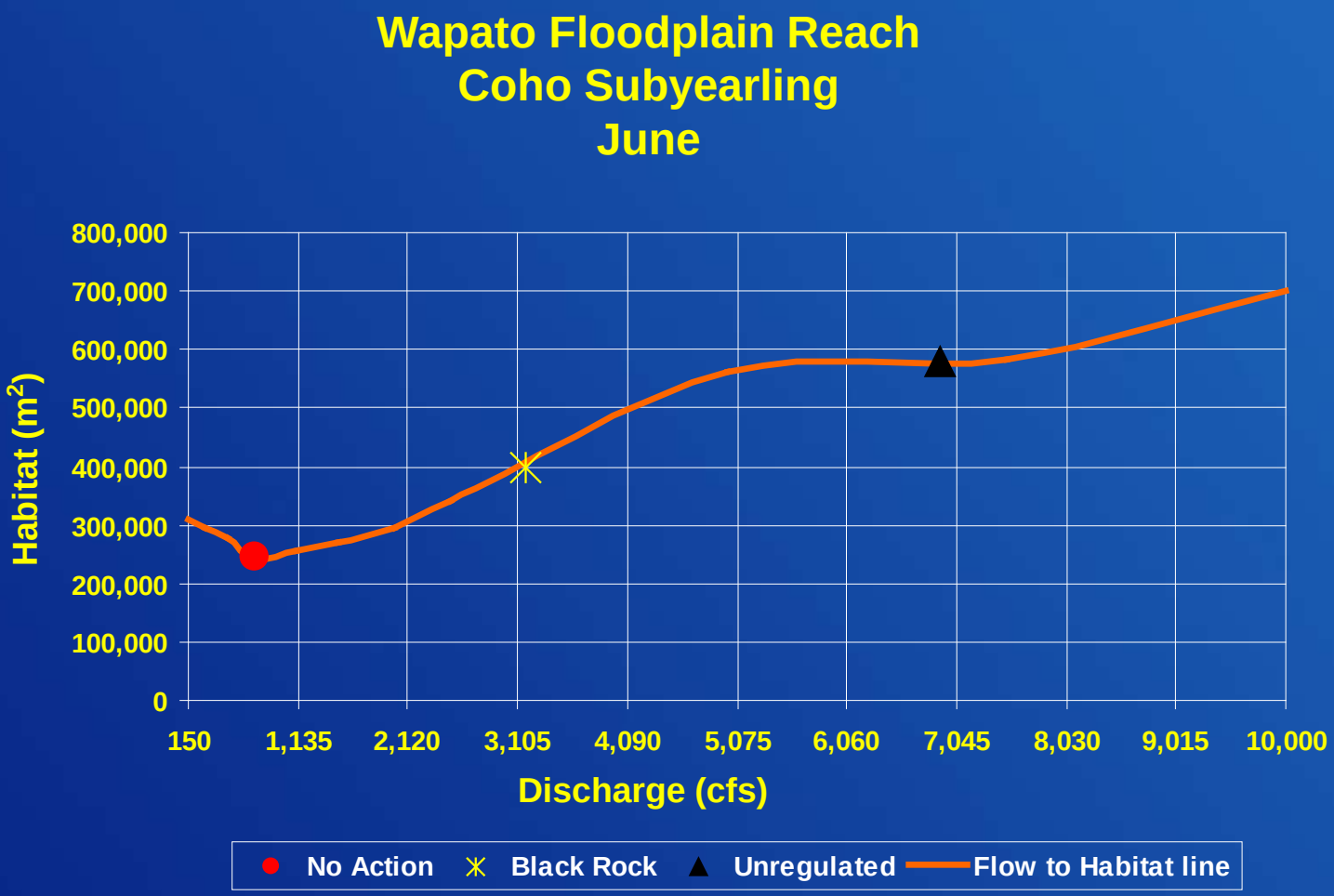
RECLAMATION

Study Results- Habitat



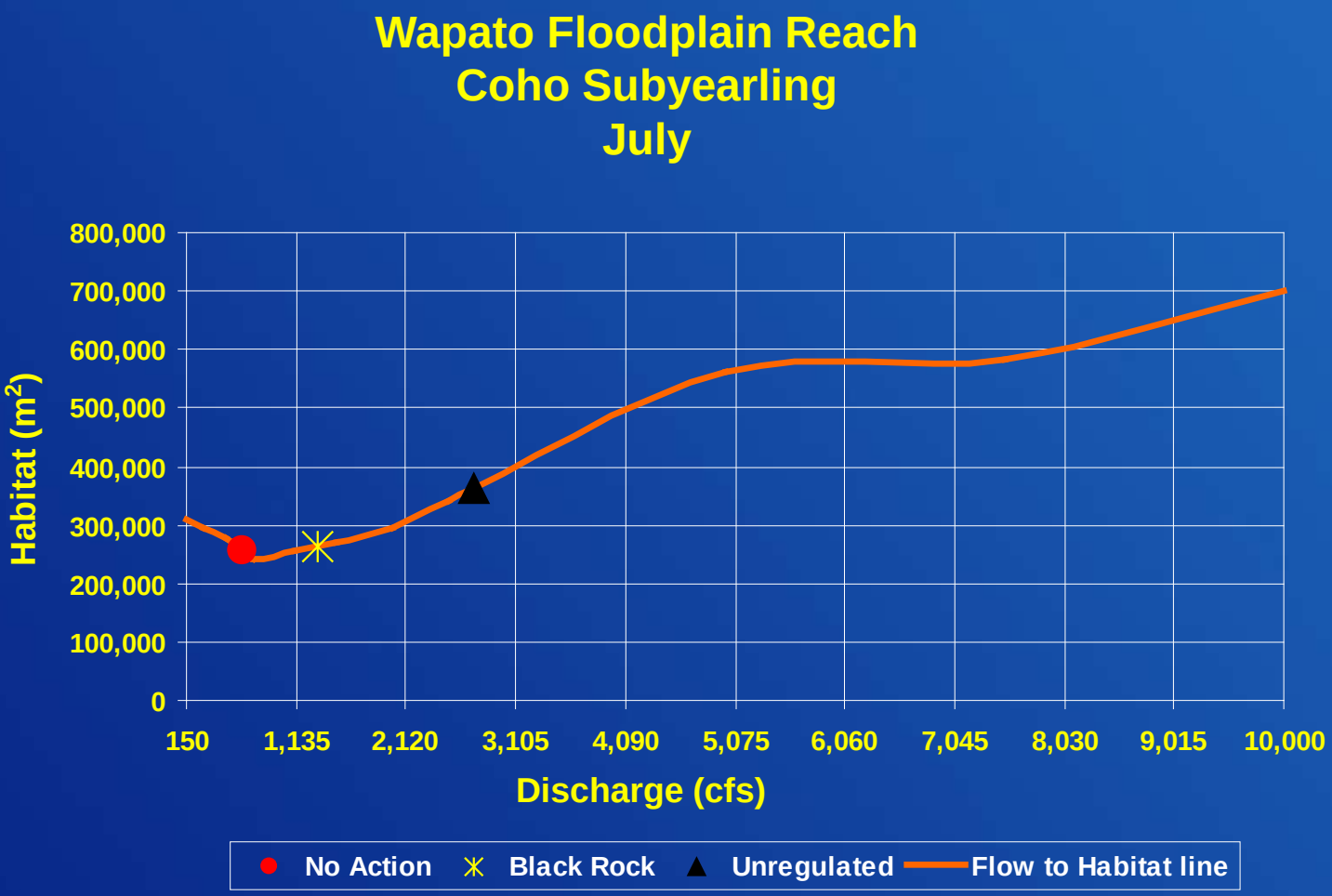
RECLAMATION

Study Results- Habitat



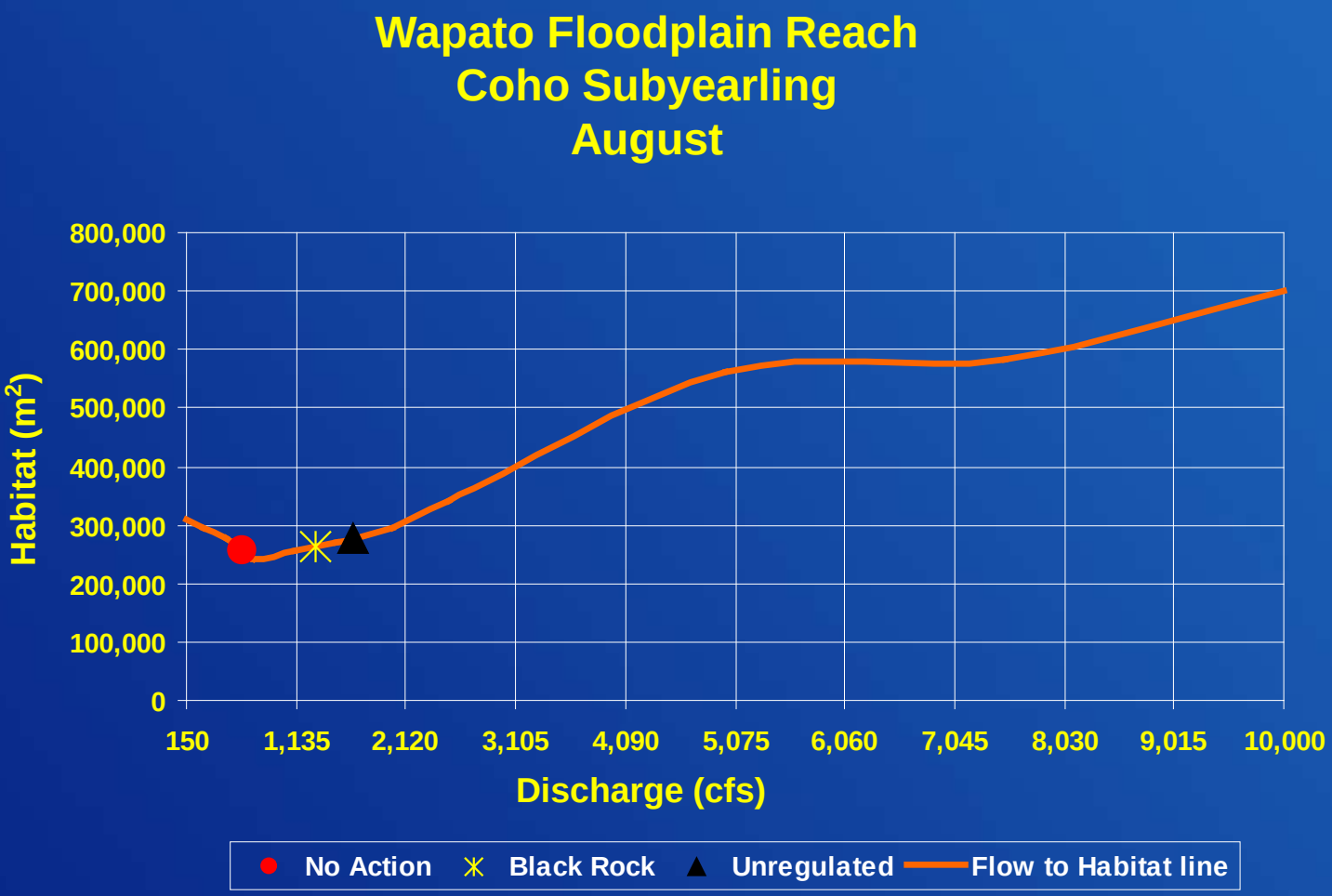
RECLAMATION

Study Results- Habitat



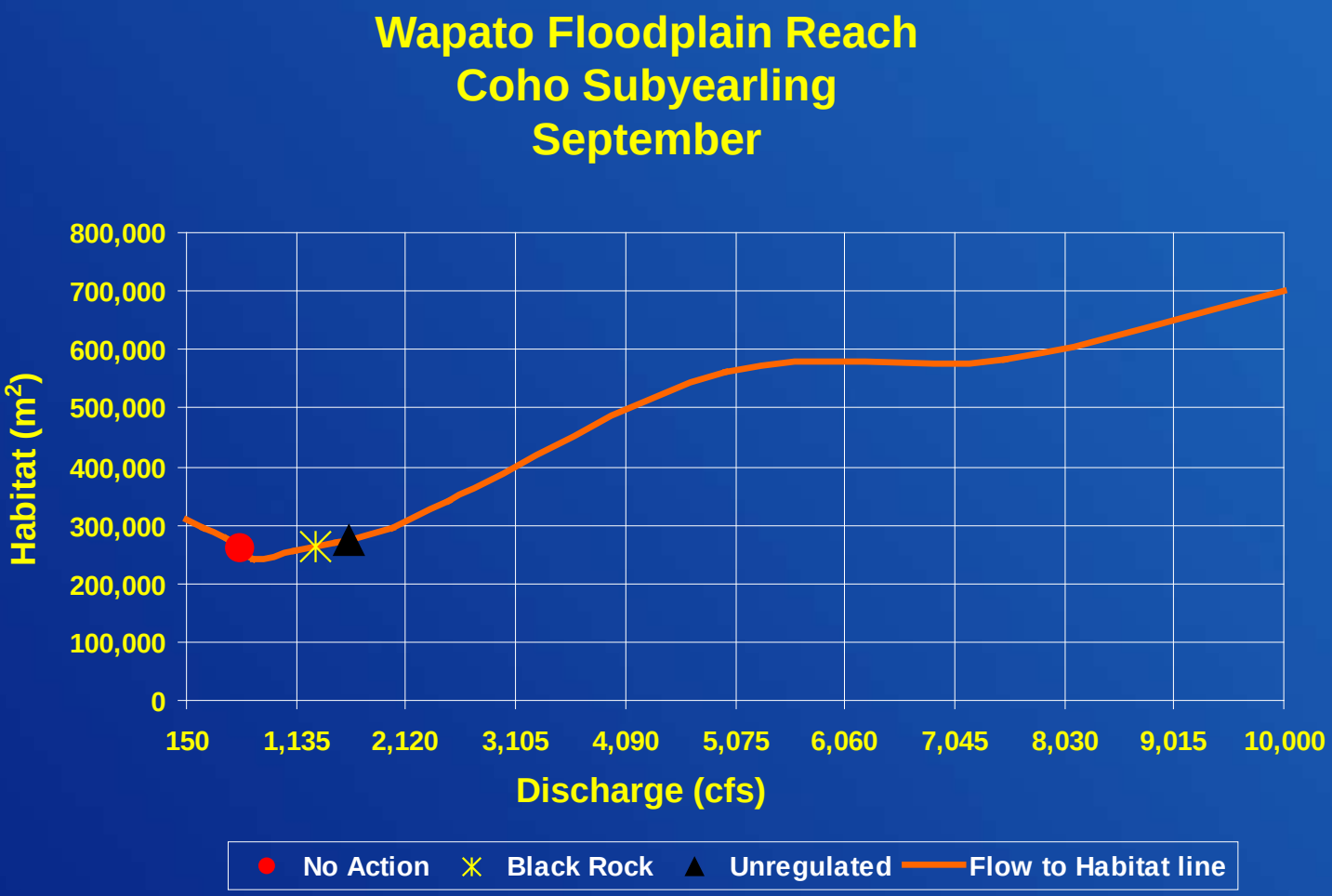
RECLAMATION

Study Results- Habitat



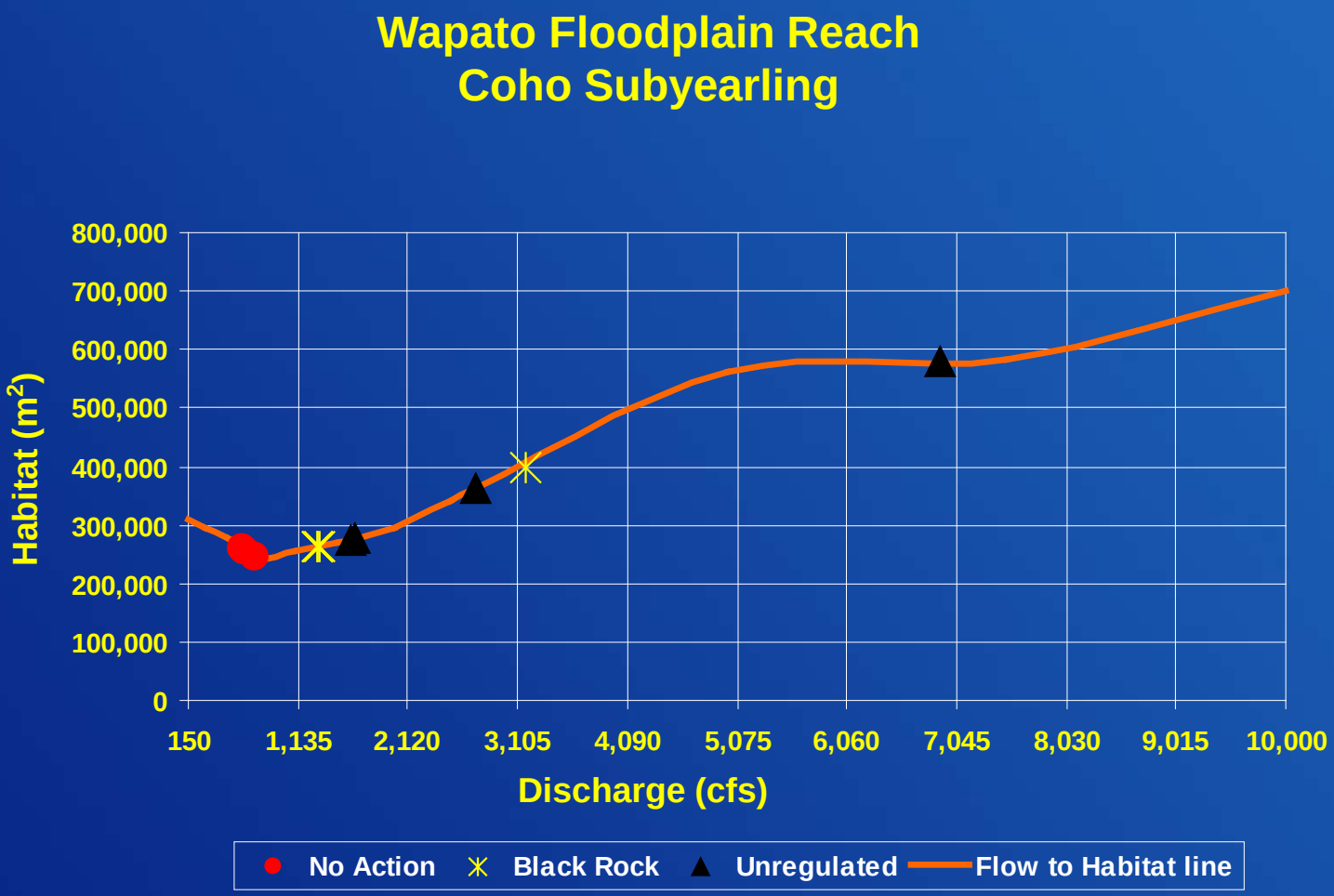
RECLAMATION

Study Results- Habitat



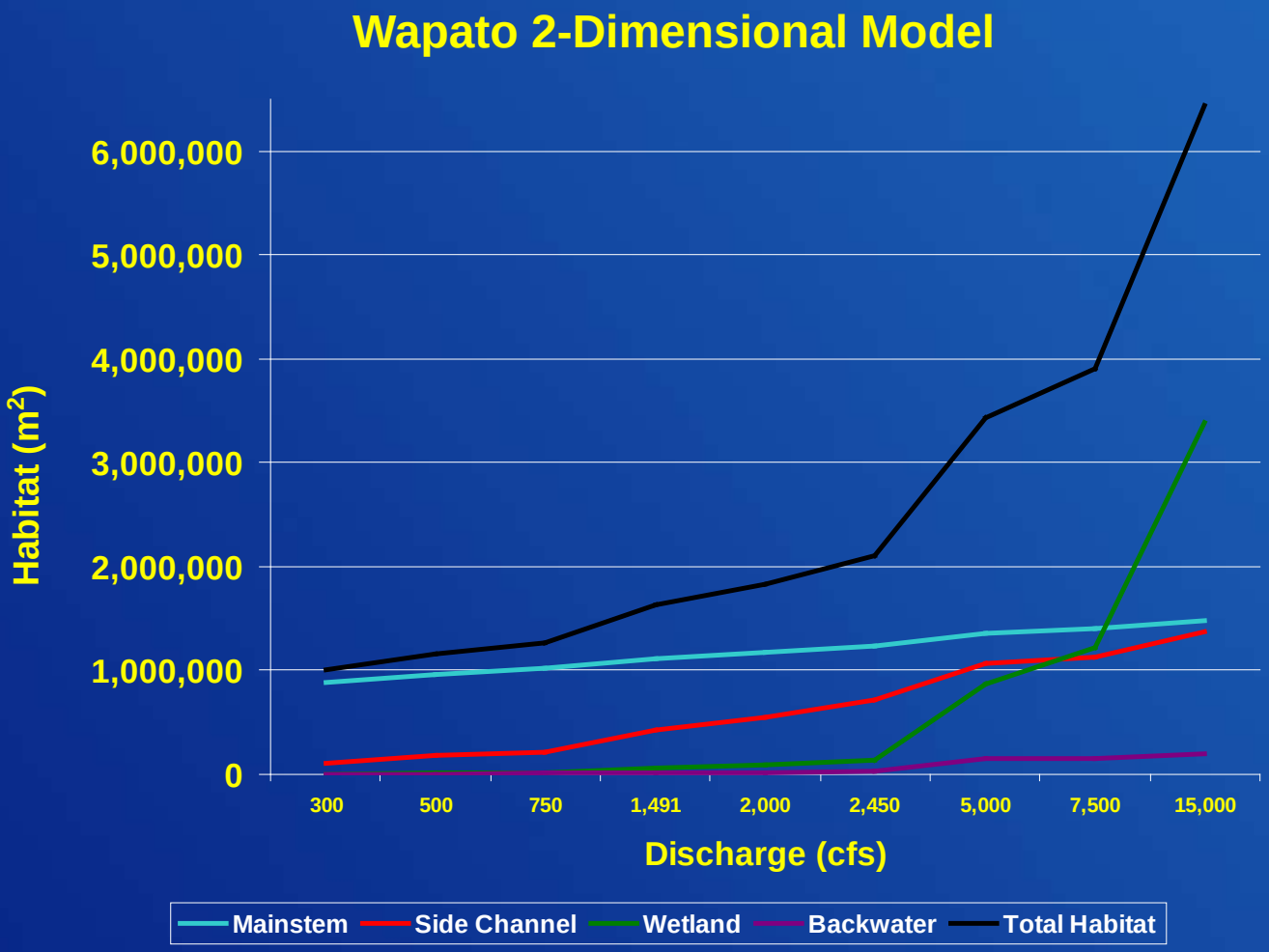
RECLAMATION

Study Results- Habitat



RECLAMATION

Study Results- Habitat



RECLAMATION

RECLAMATION