Risk to ecological resources on burial waste sites on the Hanford Site, Washington: Remediation and associated restoration will likely increase resource value

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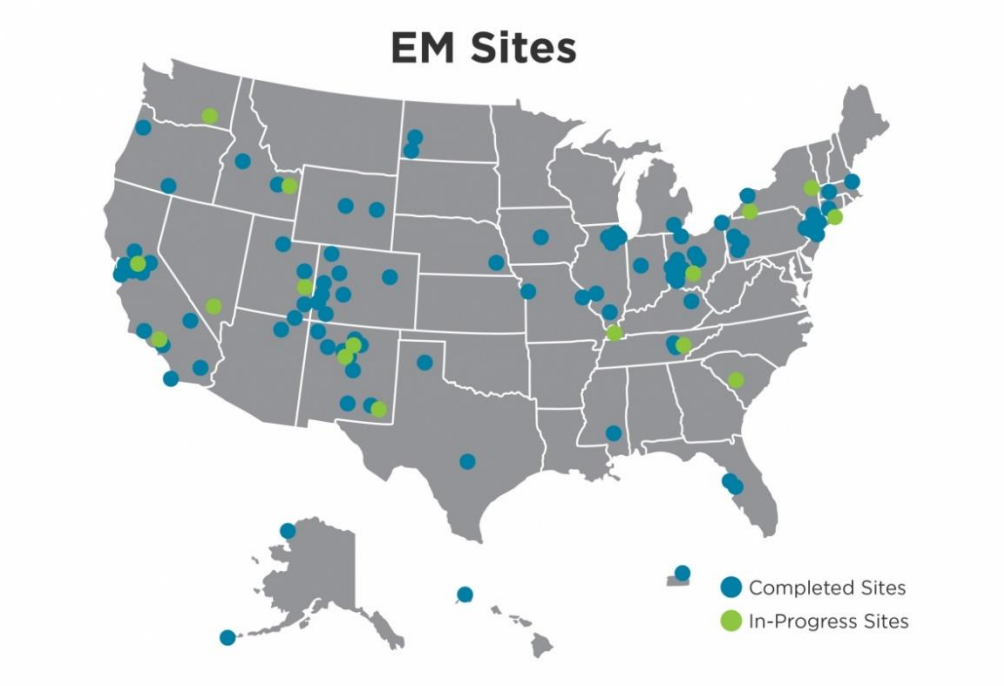
Background:

- U.S. has a large nuclear and chemical waste remediation task remaining from World War II, the Cold War and industrial activities.
- US Department of Energy (DOE) has the largest task
- Hanford Site (WA State) is the most contaminated site
- Cleanup needs to protect humans and the environment
- Many DOE sites have unique and rare ecological resources and habitats

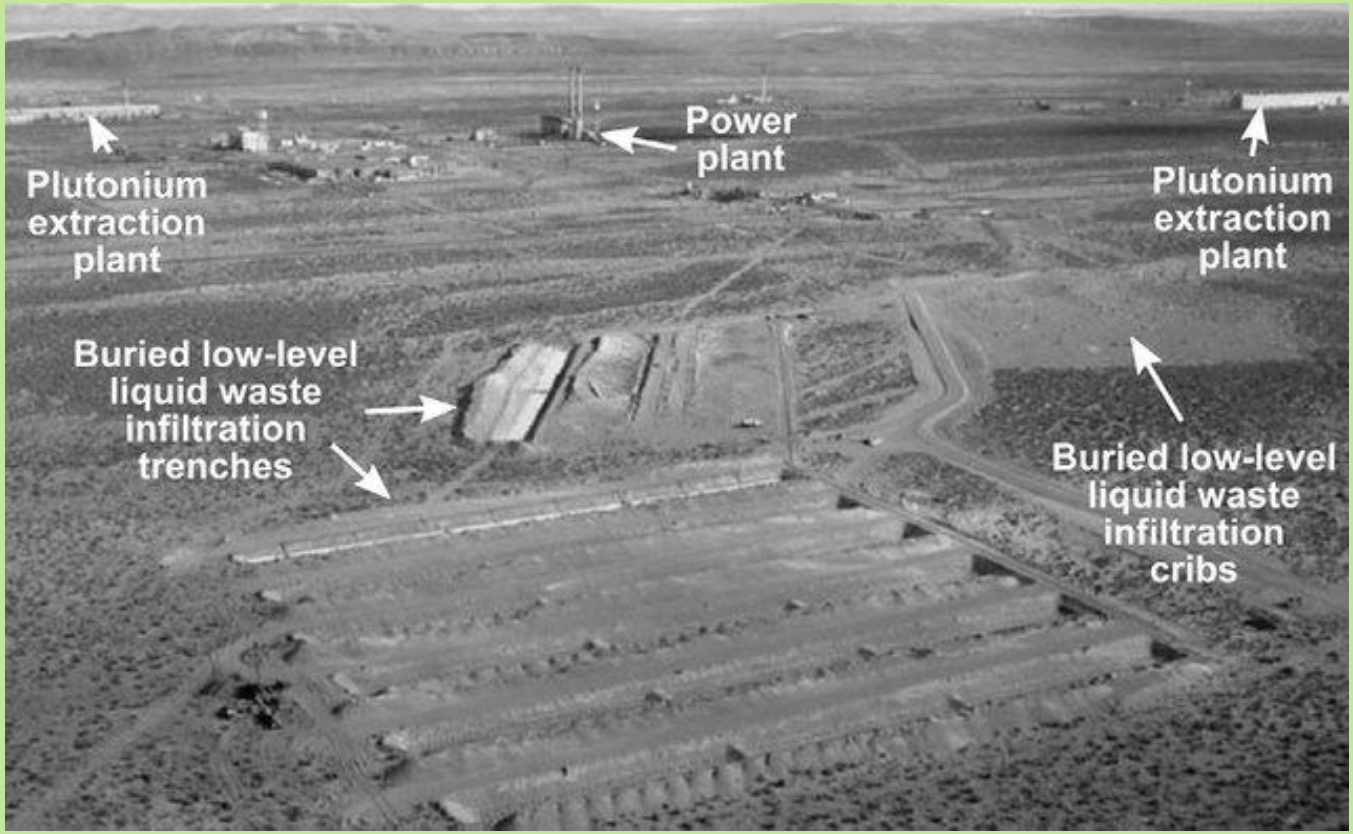


Hanford Site:

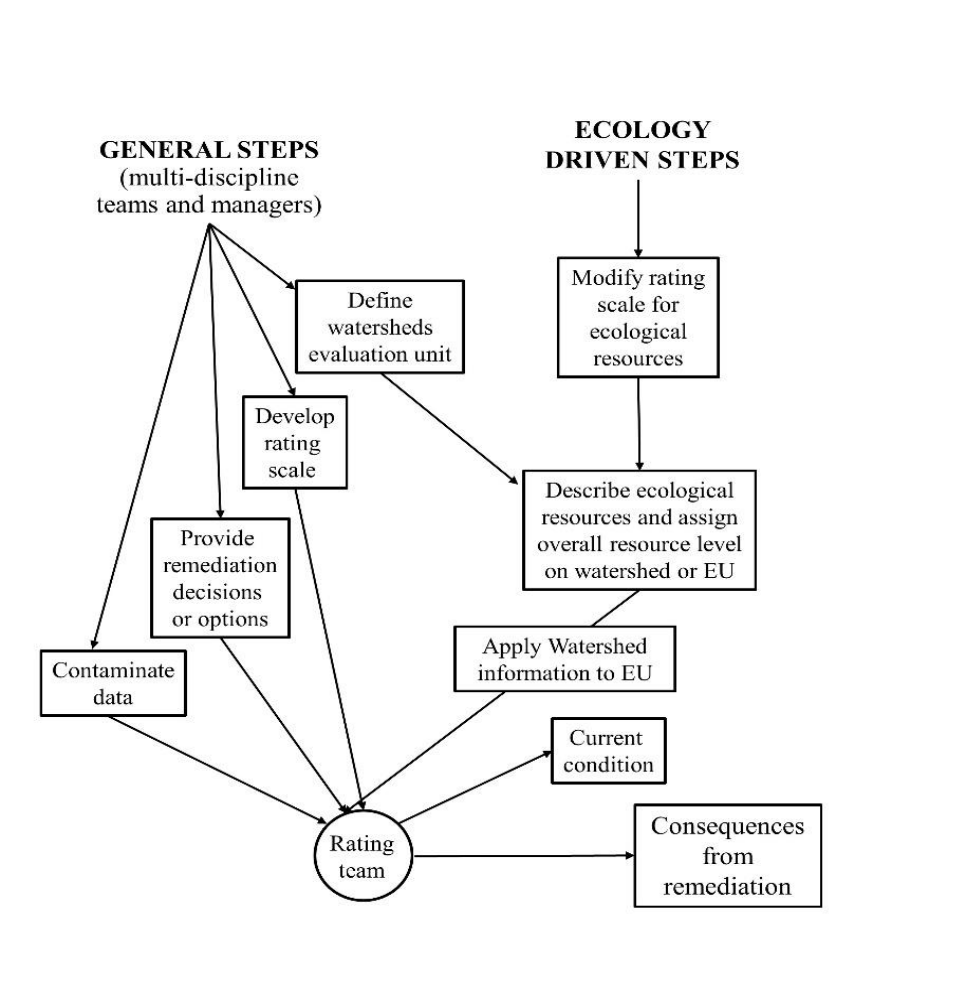
- Longest and most-costly cleanup program projected to (2090).
- Greatest remediation task at Hanford is the burial waste facilities.
- Most cleanup sites are inside the 200 area on the Central Plateau, some are along the Columbia River
- Has important shrub-steppe habitat, Columbia River, and eco-cultural resources

Objectives:

- To examine risk to ecological resources currently, during active cleanup, and potential consequences from cleanup
- To use BC Cribs and Trenches on the Hanford Site as a case study of ecological evaluations.



Methods: The CRESP (CRESP) Risk Methodology



Major Steps in the Evaluation of Risk for Ecological Resources

Bluebunch wheatgrass community

Big Dig for Cr VI

Methods for Ecology:

1. Ecological description
   a. Identify appropriate buffer areas
   b. Identify categories of resources by Level 0-5
   c. Determine whether ecological resources have been inventoried
   d. Conduct field evaluations to examine current conditions
   e. Include listed and invasive species, and determine habitat connectivity.
   f. Summarize percent of each resource level.
2. Determine ecological ratings of risk to ecological resources for facility + buffer

DEFINE RESOURCE LEVEL (DOE 2013)

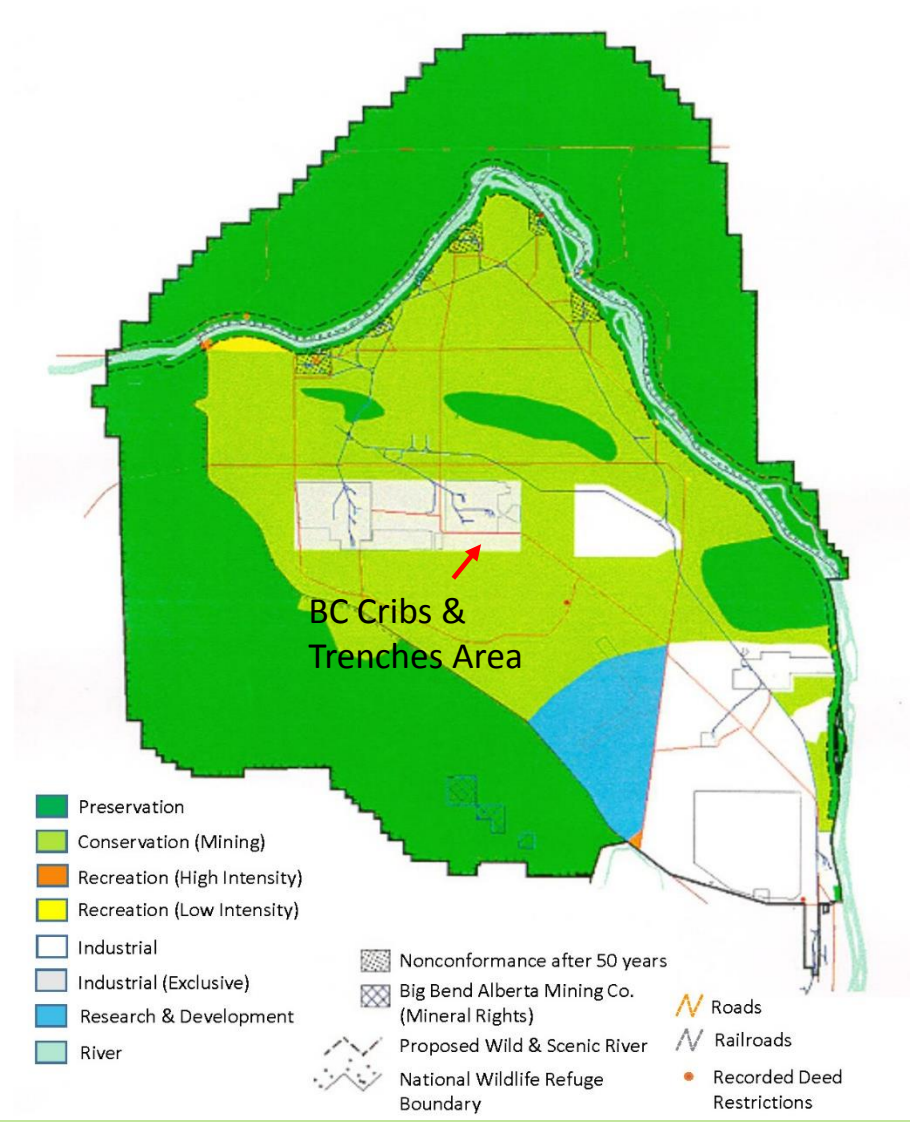
5 = Irreplaceable habitat or federally threatened and endangered species
4 = Essential habitat for state threatened or endangered species
3 = Important habitat for plants, animals, and viable ecosystems
2 = Habitat with high potential for restoration
1 = Industrial developed area
0 = No native plants and animals, generally paved with built facilities

DEFINE RISK RATINGS Non-discernible to Very High (permanent destruction)

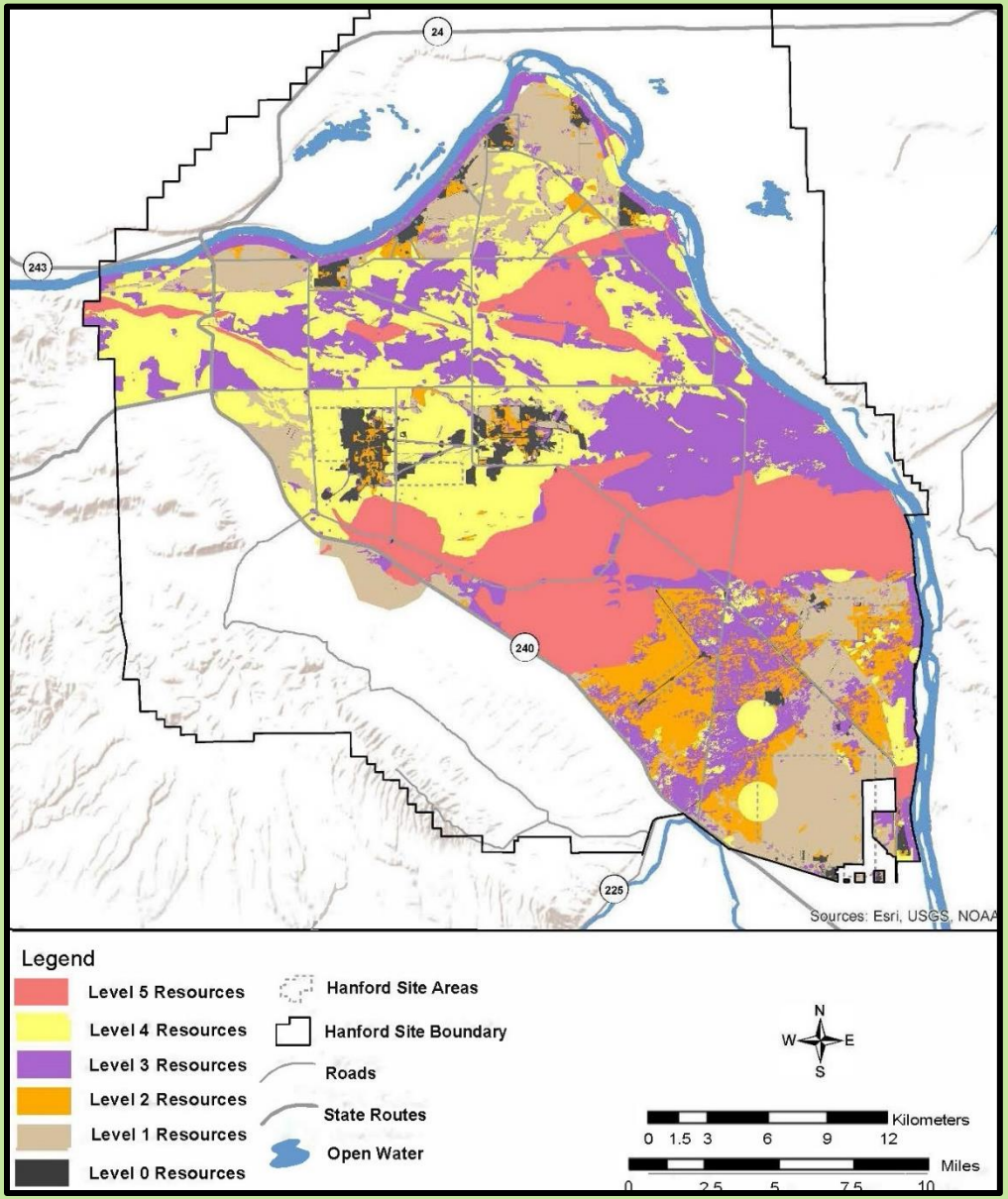
Methods: BC Cribs and Trenches

Description:

- Located south of the 200 East Area (between route 45 and the Army Loop Road)
- Primary contaminants of concern: nitrate, Tc-99, Sr-90, Cs-137 and U-238
- COC located in 26 cribs and trenches, one siphon tank, and a pipeline



Existing Ecological Information



Context: Vegetation Changes

70+ years of
DOE Protection

Cover Type	% Change at Hanford	% Change in Ecoregion*
Bunchgrass steppe	+162%	-58%
Idaho fescue steppe	No change	-72%
Bitterbrush steppe	-1%	-34%
Water	None	None

*Ecoregion = regional area defined by geology, soils, climate vegetation, wildlife, land use

Summary of Field Evaluation:

	BC Cribs and Trenches	Buffer
Area	367 acres	2231 acres
Level 3 resources	11 %	19 %
Level 4 resources	19 %	58 %
Level resources	0 %	0 %

Loggerhead Shrike

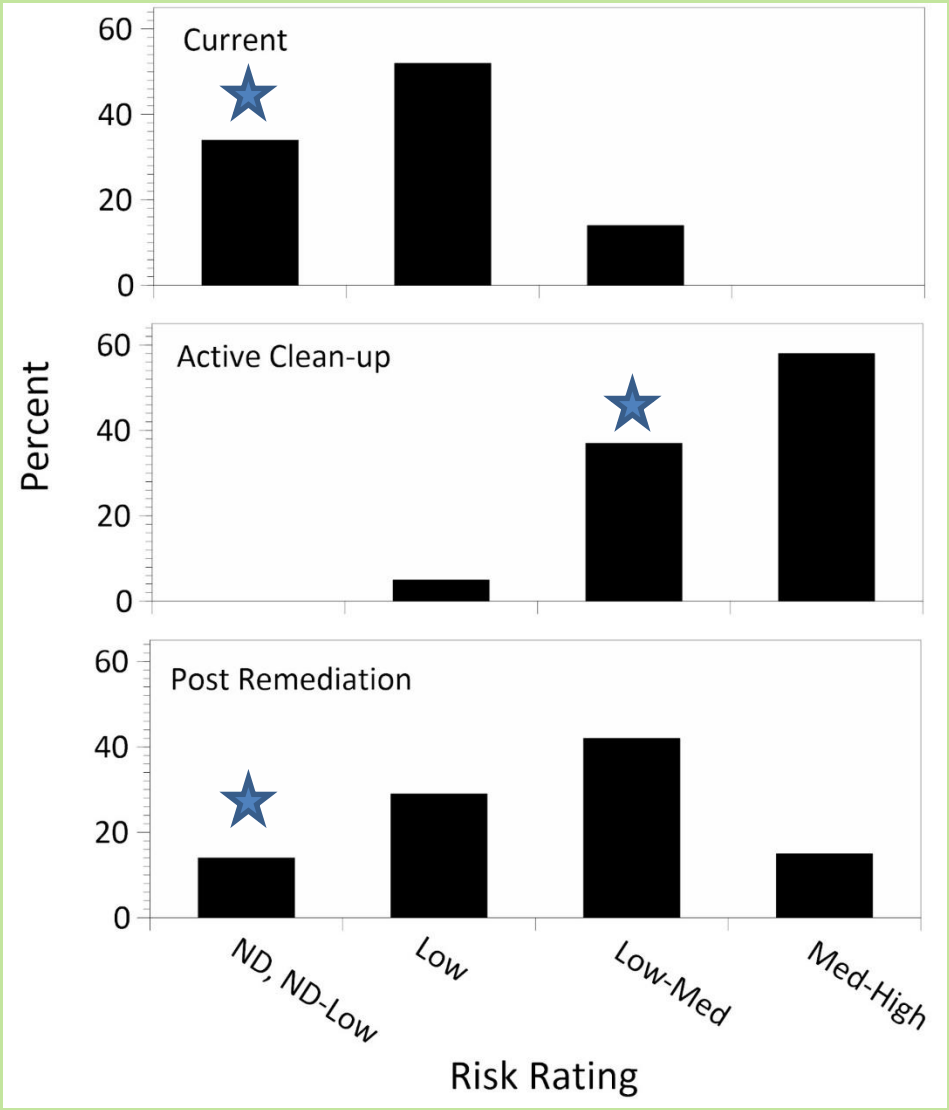
Black-tailed Jackrabbit

Sagebrush

Risk and Impact Ratings for Ecological Resources on BC Cribs and Trenches

Evaluation Period	Potential Risk	Comments
Current	Non-discernible to low	ND to Low in EU because nearly 30% is Level 3 and 4 resources, along with the buffer area. There is the potential for disturbance and invasion of exotic species in both EU and buffer area.
Active cleanup	Low to medium	Depending on remediation option, remediation could result in disturbance and disruption to Level 3 and 4 resources (30% of EU and 77% of buffer), including increases in exotic species and changes in species composition of native species.
Near-term post cleanup	Non-discernible to low	Depending on remediation options, it could be ND, but it may be Low in both EU and buffer areas because of high percent of Level 3 and 4 resources, uncertainty about remediation options, disturbance, and potential for invasion by exotic species, changes in species composition of native species.

Comparison With 20 Other Legacy Sites at Hanford



★ = BC Cribs & Trenches

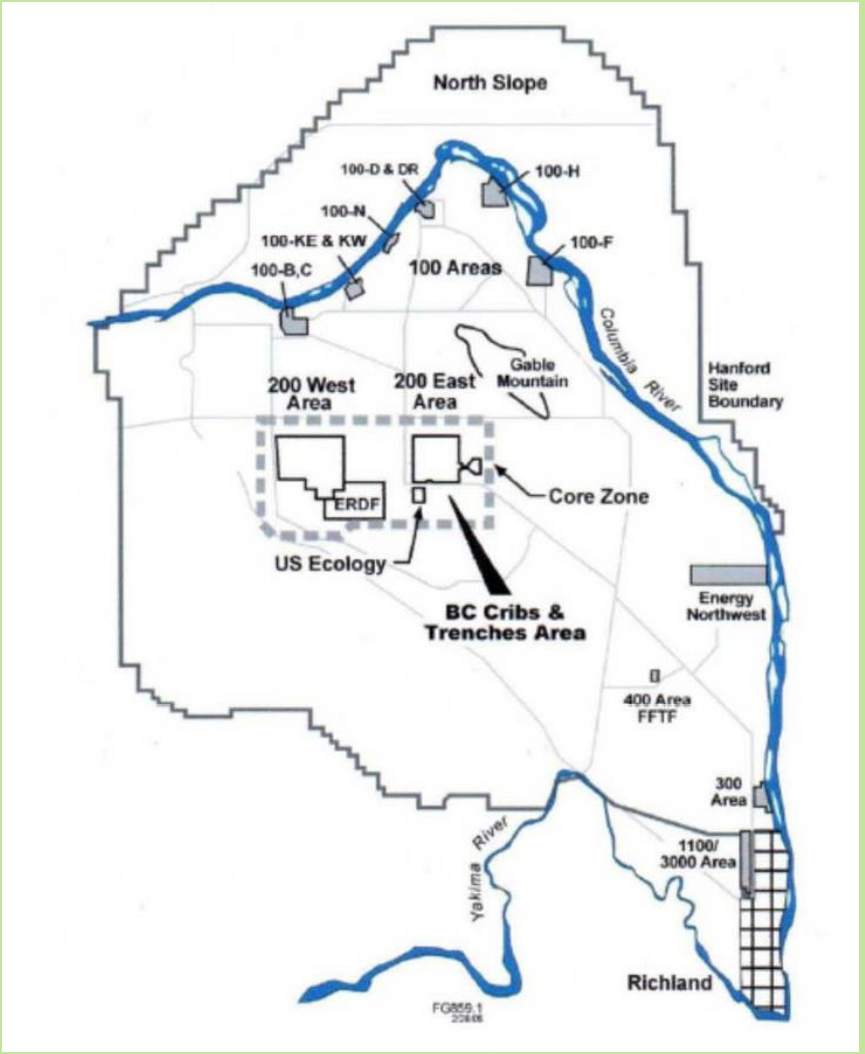
Reasons for the Ratings of BC Cribs and Trenches

- Contains old-growth sagebrush-steppe community
- Has level 4 resources on EU and buffer
- Has nearby level 5 resources
- Is part of large patches of level 5 resources
- Physical disruption can compact soil, disrupt resources, bring in invasive species

Major Issues

- Value of resources
- Potential for disruption
- Potential for invasive species
- Connectivity to high value resources

Loggerhead Shrike



Possible Mitigations

- Reduce traffic and personnel on valuable habitat.
- Avoid disruption of buffers or area with threatened and endangered species.
- Avoid and preserve areas with high connectivity.
- Reduce potential for introduction of invasive species.
- Time activities to non-breeding or migratory season.
- Where possible do remediation of adjacent areas together.
- Leave as many vehicles as possible on site, rather than moving over roads.

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Key References: CRESP Hanford Risk Review 2018

Department of Energy (DOE), DOE/RL 96-32. *Hanford Site biological resources management plan*, Department of Energy, Richland Operations Office. Richland, WA. (2013). Available at: http://www.hanford.gov/files.cfm/DOE-RL-96-32-01.pdf
http://www.cresp.org/reviews-reports/hanford/