Pits, Politics, and People: 
Understanding the Willamette Valley’s Aggregate Mining Industry and the Role of Enhancement Reclamation in the West

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Crushed rock, sand, and gravel = “aggregates”

Main materials in asphalt and concrete
Current aggregate extraction in the U.S.

~2.3 billion tons in 2015
Got road work?

**United States**

- **89,803 Jobs**
- **10,547 Mines**
- **1,170,730 crushed stone produced (thousand metric tons)**
- **811,864 sand and gravel produced (thousand metric tons)**
- **4,113,962 miles of public roads**

**NSSGA**

[Map showing various locations and statistics related to roadwork and material production in the United States.]
What happens to aggregate sites?
It depends...
Enhancement reclamation

What is *enhancement reclamation*?
What is the status of enhancement reclamation?

In the Willamette Valley, OR?

In the Western US?
Research Questions...
In the beginning

(1) What are *barriers* to enhancement reclamation?

(2) How can enhancement reclamation help alleviate *land use conflicts* in the Willamette Valley?

Understand the industry
Enhancement Reclamation in the Willamette Valley

“CONFLICT CARTOGRAPHY”

Blue = Consensus Meeting Participants
“CONFLICT CARTOGRAPHY”

Blue = Consensus Meeting Participants
Enhancement Reclamation in the Willamette Valley

Interviewees (n=20)

**Aggregate** (n=5): Operators, lobbyists, consultants

**Agriculture** (n=5): Farmers, lobbyists

**Environment** (n=4): Environmental consultants

**Government** (n=6): Aggregate, agriculture, & fisheries agency employees, governor’s office
Data Collection & Analysis

• Semi-structured interviews (n=20; 4 stakeholder groups)
• Average interview ~46 minutes
• Transcribing and coding transcripts (*in vivo* coding)
Enhancement Reclamation in the **Willamette Valley**

**Unexpected Results...**

1. **What are barriers to enhancement reclamation?**
2. **How can enhancement reclamation help alleviate land use conflicts in the Willamette Valley?**
Enhancement Reclamation in the Willamette Valley

ISSUES/BARRIERS

Conflict Situation Issues

SOLUTIONS

Conflict Situation Solutions by Issue

Reclamation Issues

Reclamation Solutions by Issue
Conflict Assessment Framework: The Progress Triangle

A tool to gain a comprehensive and shared understanding of potential or ongoing conflicts.

The Progress Triangle (Walker & Daniels, 2005)
Conflict Assessment Framework: The Progress Triangle

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The Progress Triangle (Walker & Daniels, 2005)
Phase I: Issues

Phase II: Dynamics

Phase III: Future Vision
Enhancement Reclamation in the **Willamette Valley**

### ISSUES/BARRIERS

#### Conflict Situation Issues

- **Knowledge**: 92
- **Time**: 27
- **Economics**: 77
- **Geography**: 49
- **Data & monitoring**: 18
- **Rules & regulations**: 91
- **Access to the issue**: 74
- **Coordination**: 57
- **Decision space**: 40
- **Identity**: 117
- **Us versus them**: 112
- **Power**: 29

### SOLUTIONS

#### Conflict Situation Solutions by Issue

- **Education & outreach**: 36
- **Source aggregate elsewhere**: 25
- **Champions**: 14
- **Communication**: 16
- **Coordination**: 34
- **Authority**: 8
- **Change permitting**: 8
- **Public engagement**: 8
- **Mined deep**: 5
- **Improve relationships**: 2
- **Respect**: 15
- **Compromise**: 11
- **Implemented**: 8

### RECLAMATION

#### Reclamation Issues

- **Geography**: 82
- **Time**: 75
- **Economics**: 67
- **Knowledge**: 66
- **Rules & regulations**: 43
- **Decision space**: 40
- **Coordination**: 26
- **Data & monitoring**: 25
- **Opinions**: 52

#### Reclamation Solutions by Issue

- **Geographic solutions**: 57
- **War wins**: 30
- **Priorities & issues**: 26
- **Champions**: 23
- **Fair payment**: 22
- **Partnerships**: 14
- **Plan ahead**: 4
- **Activity pursue**: 33
- **Communication**: 12
- **Change permitting**: 9
- **Incentive**: 8
- **Industry responsibility**: 8
- **Controlled**: 3
### Phase I: Issues

- **Rules & regulations**
- **Access to the issue**
- **Coordination**
- **Decision space**

### Phase II: Dynamics

- **Permitting; Change**
- **Politics; “One man monkey wrench”**
- **Group & government coordination**
- **“Too many cooks”**

### Phase III: Future Vision

- **Communication; Coordination**
- **Authority**
- **Partnerships; Plan ahead; Actively pursue**

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**Procedure**

- **Rules & regulations**
- **Access to the issue**
- **Coordination**
- **Decision space**

**Substance**

- **Geography**
- **Knowledge**
- **Economics**
- **Time**

**Relationship**

- **Identity**
- **Us versus them**
- **Trust & respect**
- **Opinions**
- **Power**

**Phase II: Dynamics**

- **Finite Valley resources; Pit depth**
- **Land value; Aggregate transportation; Reclamation cost**
- **Conflicting knowledge; Awareness**
- **Pit duration**

**Phase III: Future Vision**

- **Education & outreach; Knowledge**
- **Mine elsewhere**
- **Geographic reclamation; Win-wins; Prioritize pits**
- **Education & outreach; Champions**

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**RECLAMATION SOLUTIONS**

- Improve relationships; Respect
- **Education & outreach; Knowledge**
- **Mine elsewhere**
- **Geographic reclamation; Win-wins; Prioritize pits**
- **Education & outreach; Champions**
Barriers to Enhancement Reclamation: Procedure

Group Partnerships

Government Coordination

“Sometimes the right hand doesn’t know what the left hand is doing.”

“There are too many cooks in the kitchen.”

Coordination

Plan Ahead

It takes a lot of time and planning... But it’s worth it if you do it right.
Enhancement Reclamation in the Willamette Valley

Green & White Rock Products (Corvallis, OR)
“Floodplain sites will always have a high priority because they have three things they can do: they can supply gravel, they can provide habitat for fish, and they’re typically great soils that can grow great vegetables.

So you have this:

*How do you make a choice between those three?*"
The resource trifecta

Aggregate

Environment

Agriculture
Enhancement Reclamation in the Willamette Valley

**Barriers to Enhancement Reclamation: Relationship**

- **Identity & priorities**
  - Entrenched views

- **Naturally adversarial**

- **Long conflict history**

- **Perceptions**
  - “It becomes a **battle of philosophy**. This land should be used for farming, this land should go to rock that builds a strong economy. **Both are right and both are wrong.**”

- **“Us” vs. “them”**

- **Coordination**

- **Trust & respect**
  - “It was a **one-sided deal** in which the farmers got hoodwinked. That’s what OCAPA does, they hoodwink.”

- **Finite resources**
  - “**We have very rich soils** on top of very rich aggregate. Who’s going to win out?”

- **Power**

- **Rules & regulations**

- **The “one man monkey wrench”**
  - “He’s like our nemesis.”

- **The “one man monkey wrench”**

- **The “one man monkey wrench”**
"I think there's going to be more agreement between the farmers and the aggregate folks. I haven't seen what that looks like exactly, but they seem tired of fighting.

What is the status of Enhancement Reclamation (and the conflict situation) in the Willamette Valley?
Enhancement Reclamation in the western U.S.
- State by state
- Regionally
- Four geographic environments:
  1. Urban
  2. Farmland
  3. Non-farmland/“rural”
  4. Aquatic

Enhancement Reclamation in the **Western US**

- As Growth and Demand Increases
  - Need to protect high quality farmland
  - And encourage siting to move toward lower quality and non-farm
  - In proximity to demand if possible

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**Goals of Siting Process Reform**
- Predictability
- Clarity
- Efficiency
- Integration/Coordination of State/Local decisions

**Time/Priority**
- Short Term
- Medium Term
- Long Term

**Aggregate Infrastructure**
- Transportation—modes & cost
- Population Demand
- Diversity of Product Supply
- Recycling

**Future:**
- Adaptive mgmt./learning
- Monitoring
- Data Gathering

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**Responsibility**
- Legislature
- State Agencies
- Local Gov’t
- Industry/Private

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**Agriculture Infrastructure Needs**
- Urban
- Farmland
- Forest/Non-Farmland
- Aquatic

- HVF vs. Non HVF
- Alluvial
- In Streams
- Quarries

**Siting**
- Reclamation
- Demand Mgmt.
- Specifications

**Land Use and Permitting Processes**
- Streamlining Processes
  - “Hard” “Medium” “Easy”
- Alternatives Analysis (Scope?)

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**Four geographic environments:**
1. Urban
2. Farmland
3. Non-farmland/“rural”
4. Aquatic
Enhancement Reclamation in the **Western US**

Enhancement reclamation by region and state

- **Pacific**: 81
- **Mountain**: 47

n = 128
Enhancement reclamation outcomes
Enhancement Reclamation in the **Western US**

Enhancement reclamation by geographic environment

- **Urban**: 68
- **Aquatic**: 78
- **Farmland**: 31
- **Non-farmland**: 40

- **Forest**: 17
- **Grassland**: 5
- **Scrub/Savanna**: 4
- **Steppe**: 9
- **Desert**: 5
What drives enhancement reclamation?
High vs low frequency states

- What makes a high or low frequency state?
  - Number of identified sites
  - Data sources and access

Why?
- Land use competition
  - High-value land
  - Land scarcity
  - Population density

California Central Valley contains 75% of the state’s irrigated land and produces 25% of the US’s food.

The Willamette Valley, OR; fish vs. farms vs. aggregates vs. people
Enhancement Reclamation in the Western US

Where We Live...

Unlike many developed countries, the U.S. keeps growing. We are also moving south and west. But compared with China or India, the nation is a vast

80% of the U.S. population lives in a metropolitan area
Populations of top five shown

The entire state of Wyoming (pop. 509,300) has fewer people than the Harrisburg, Pa., metro area.

Enhancement Reclamation in the Western US

Number of Identified Sites by Geographic Environment and Population

Urban Area

Urban Cluster

Rural

Urban Aquatic Farmland Non-farmland

Enhancement Reclamation in the Western US
High vs low frequency states

- What makes a high or low frequency state?
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Why?
- Land use competition
  - High-value land
  - Land scarcity
  - Population density
- Social norms
  - Networks & knowledge
  - Champions
  - Priorities

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Bingham Copper Mine

La Poudre River Initiative, Fort Collins, CO

The Willamette Valley, OR; fish vs. farms vs. aggregates vs. people

Only 3 of 42 awarded projects were aggregate mines.
The Bingham Copper Mine, UT

- 3,000ft deep
- 1,900 acres
- Hazards:
  - 2016 landslide
- Pollution:
  - Lead, arsenic, sulfur dioxide
- Proposed Superfund site
The “Geography of Amenity”

- If it’s useful, we restore it
- The big three...
  - Conservation
  - Recreation
  - Development

... in the right place
What is the status of enhancement reclamation?
(1) WA, OR, CA, and CO “lead” the west in terms of enhancement reclamation.

(2) Urban and aquatic sites most frequently undergo enhancement reclamation.

(3) Conservation, recreation, and development are the most frequent types of enhancement reclamation.

Drivers:
- Land use competition
- The geography of amenity
A mine is a terrible thing to waste.

Thank you! Questions?