

**2/23/10
LUNCH &
LEARN:
MODERN
MINE
RECLAMA-
TION...**

2682

Alaska Legislative Lunch and Learn

Modern Mine Reclamation A Case Study Fort Knox Mine Concurrent Reclamation

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Juneau, Alaska

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FORT KNOX

 **SRK Consulting (US) Inc.**
Engineers and Scientists

Reclamation & Closure

Reclamation and closure of mining projects falls under the jurisdiction of:

- **The Alaska Reclamation Act (Alaska Statute AS 27.19) administered by the Alaska Department of Natural Resources – Division of Mining, Land, and Water Management (11AAC 97) applies to state, federal, municipal and private land and water subject to mining operations.**
- **The Alaska Department of Environmental Conservation [AS 46.03.100(F), 18 AAC 15.090(3), and 18 AAC 60.265];**
- **The U.S. Army Corps of Engineers;**
- **The U.S. Environmental Protection Agency; and**
- **Federal Land Management Agencies**

Design for Closure & Concurrent Reclamation



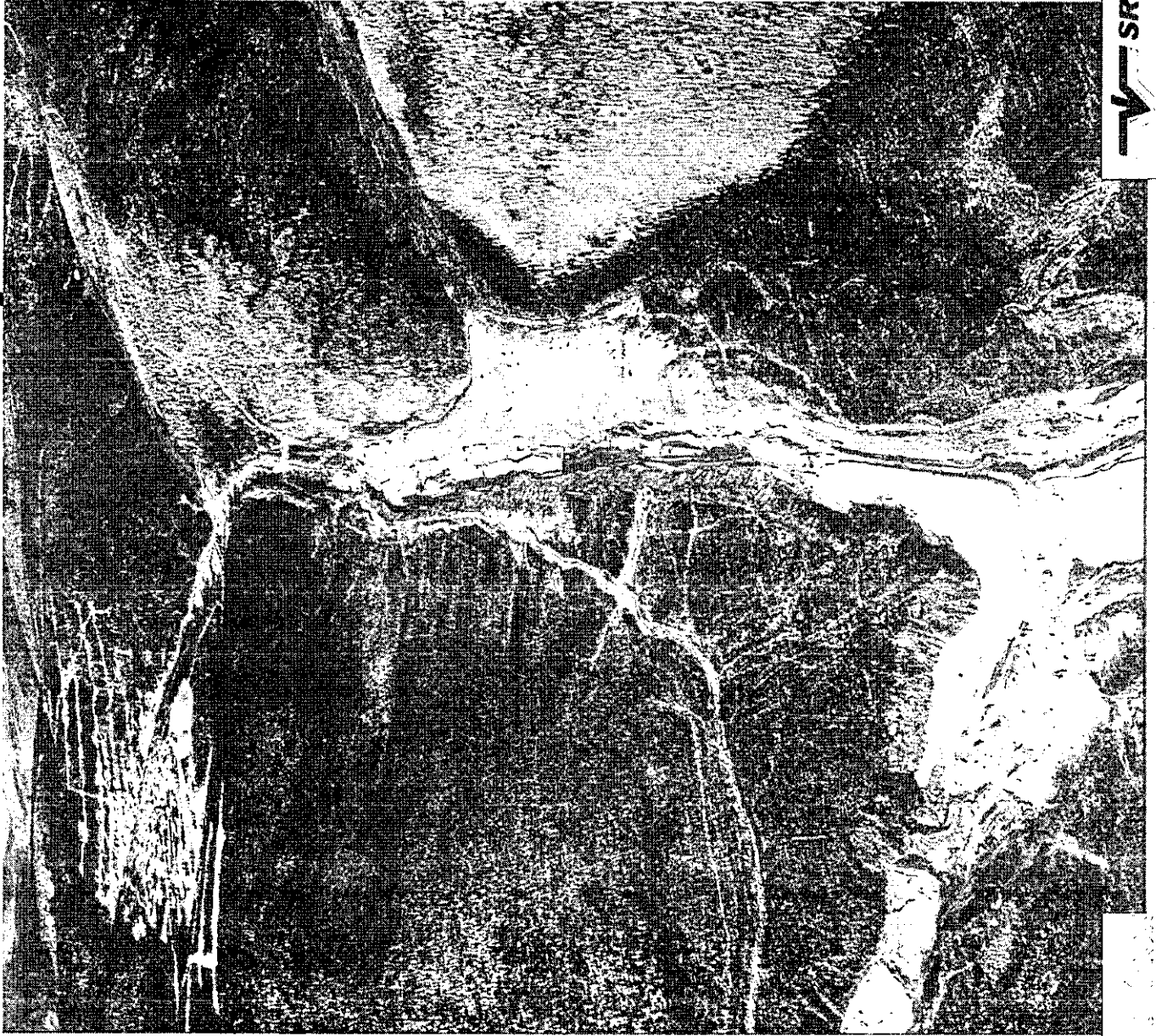
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2008.08.28



SRK Consulting (US) Inc.
Engineers and Scientists

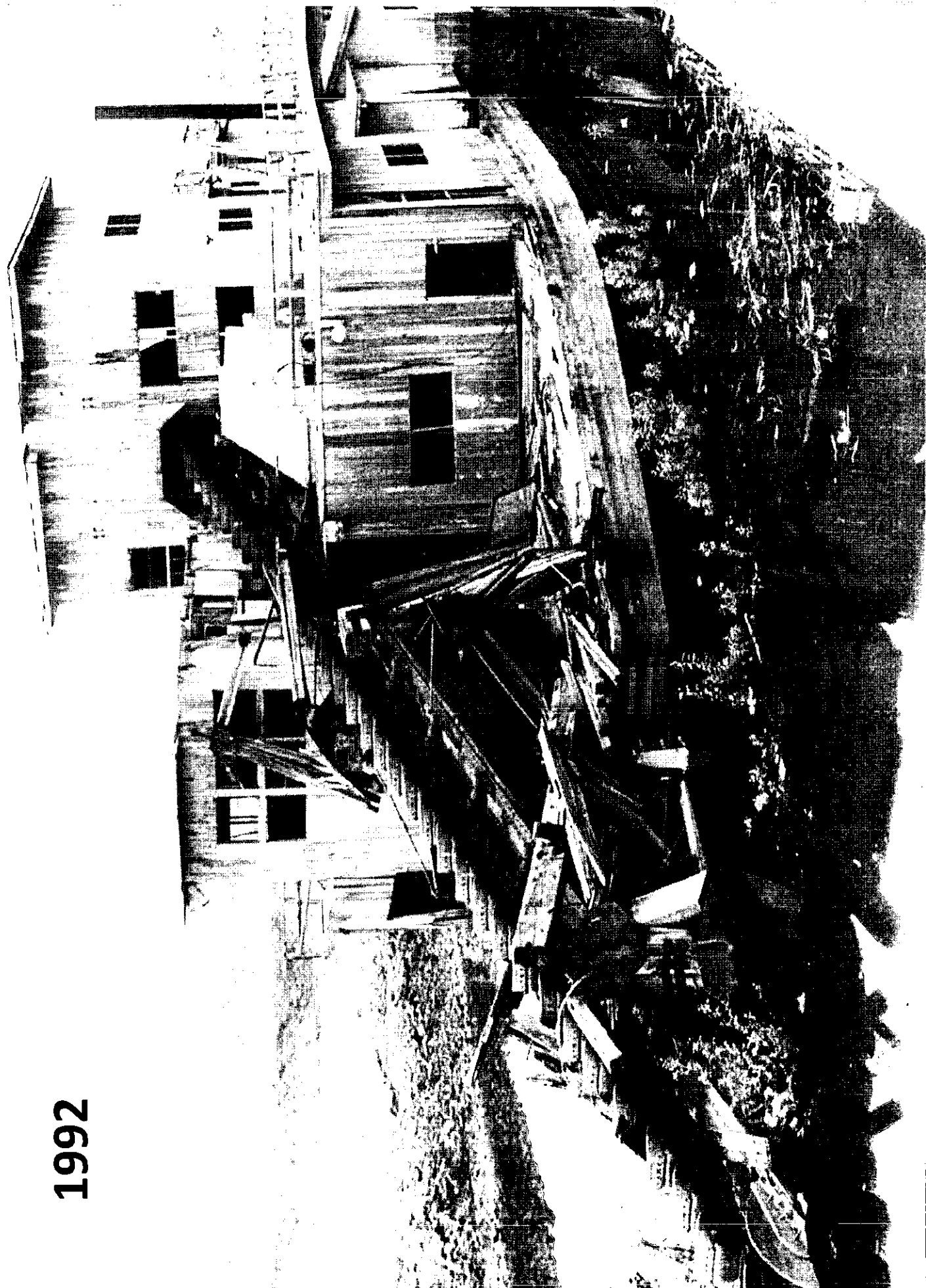
Fish Creek Valley 1992



Initial Site Reconnaissance

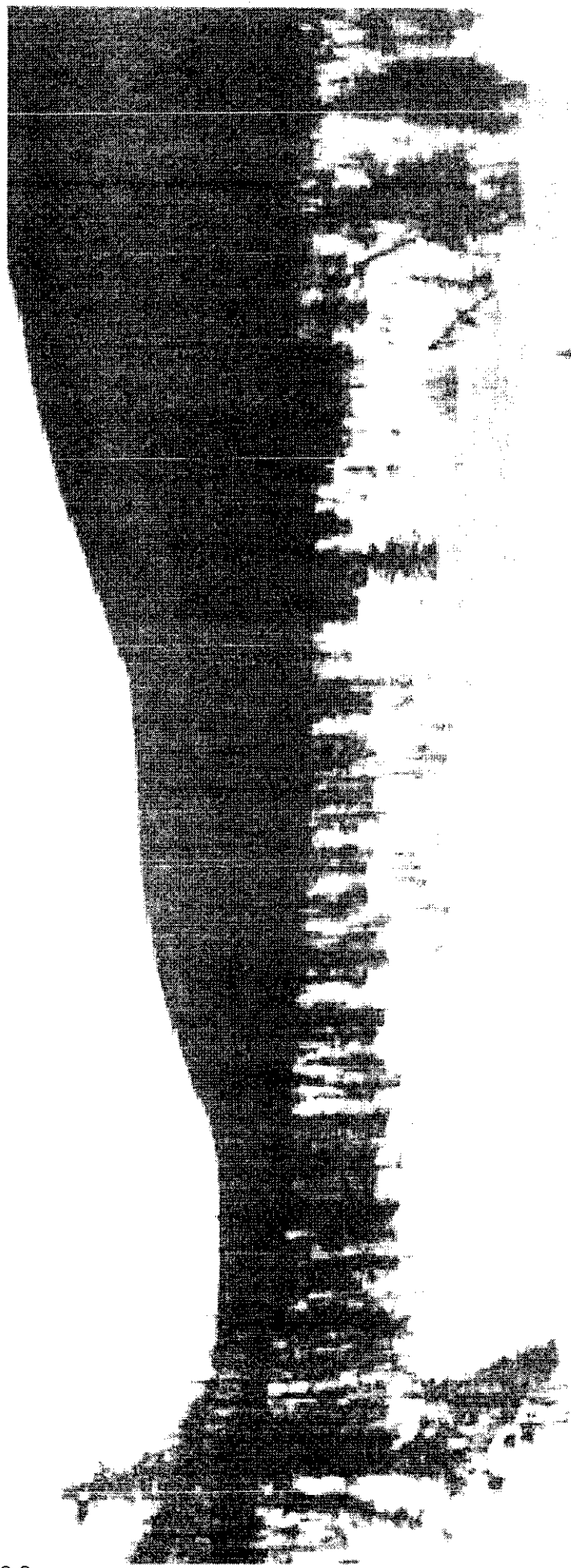
- **Historic Placer Mining Disturbance**
- **Current Placer Mining Activities**
- **Flora and Fauna Survey Results**
- **Existing Aquatic Habitat**
- **Cultural and Historic Artifacts**
- **“Aufeis” areas**
- **Fish Creek Listed as Impaired Waterbody by State and EPA**

1992



1992





Aufeis on Solo Creek

2690

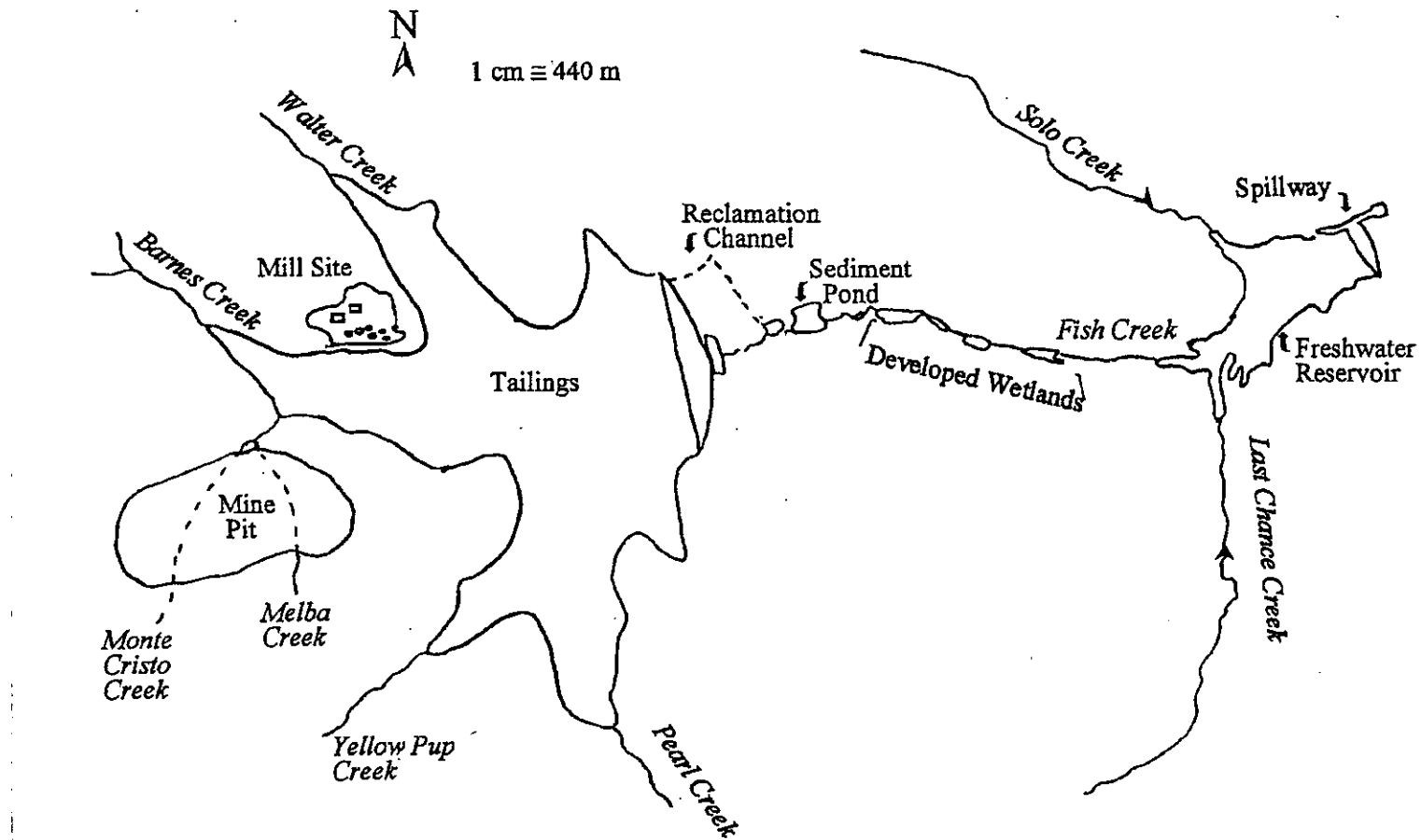
Identified Agencies and Stakeholders

- **Alaska Departments of Natural Resources, Environmental Conservation, Fish and Game**
- **Local Residents and Recreational Users**
- **Northern Alaska Environmental Center, Common Ground, and Sierra Club Legal Defense**

Considerations for the Proposed Reclamation and Closure Plan

- **Consistent with Tanana Basin Area Plan**
- **Assumed reclamation responsibility for previous placer miners disturbance**
- **Include mitigation options for wetlands disturbance**
- **Determine the functional value of existing wetlands and aquatic habitats**

Conceptual Drawing of Developed Wetlands Area



Project Design and Construction Sequencing

- **Incorporated Placer Settling Ponds and Berms into Water Supply Reservoir and Developed Wetlands**
- **Strategic Placement of Large Boulders for Burbot Spawning**
- **Established Best Management Practices (BMPs) that were incorporated into final reclamation**

Stabilize and Reclaim Water Supply Reservoir (WRS) Area

- **Immediate area below WRS Spillway**
- **Solo Creek Dump - Ice rich material excavate from WSR dam**



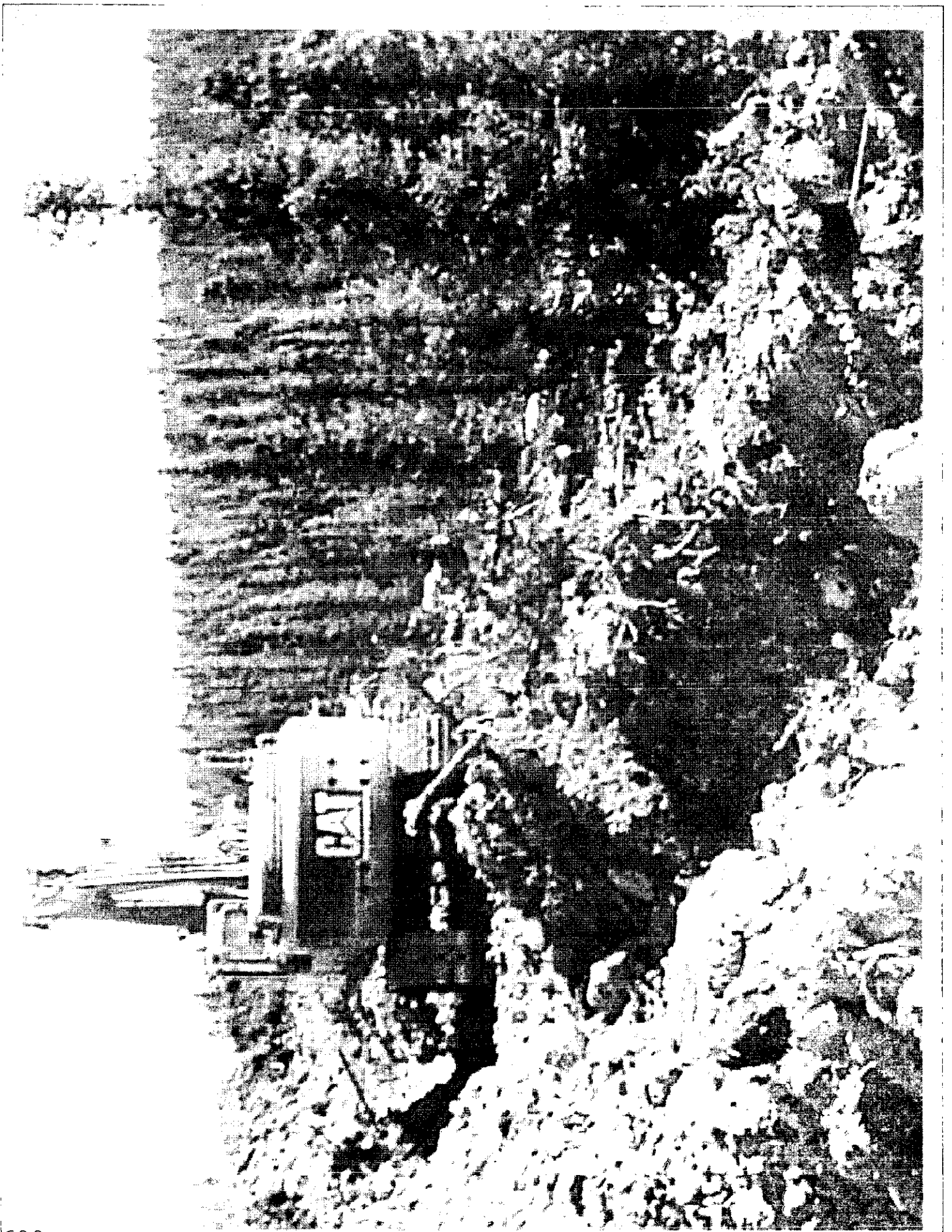
1996

1998



1996

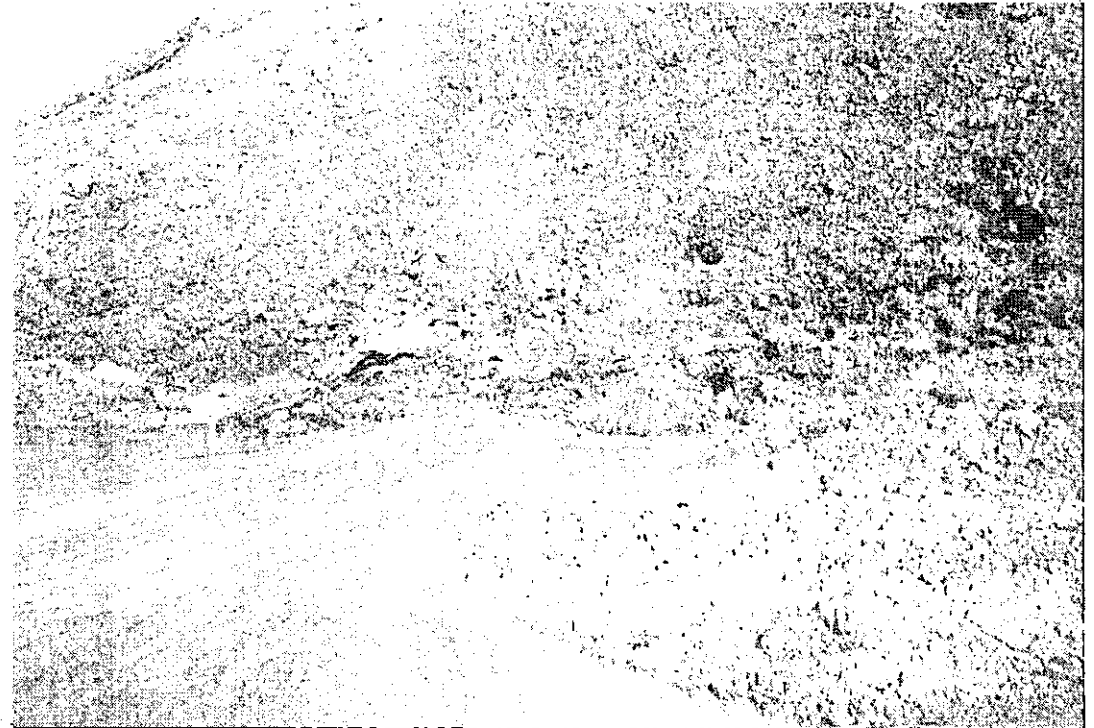
1998





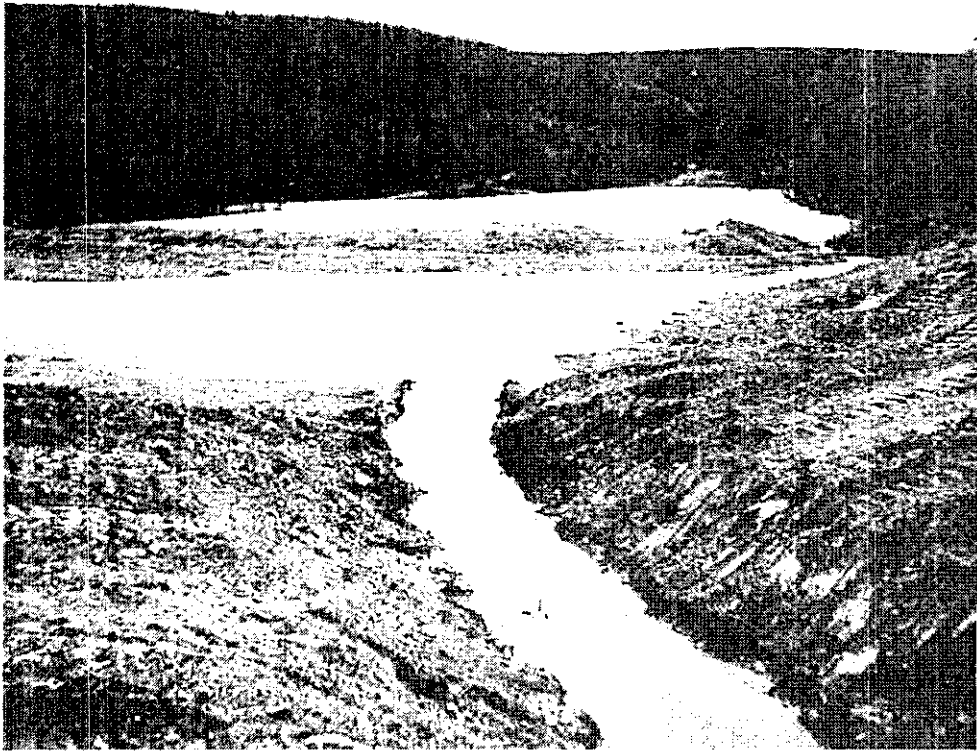
**Solo Creek Dump
Ice rich waste material
from Water Supply
Reservoir Dam Excavation
July 1995**

**Natural revegetation evident
July 1995**



2004

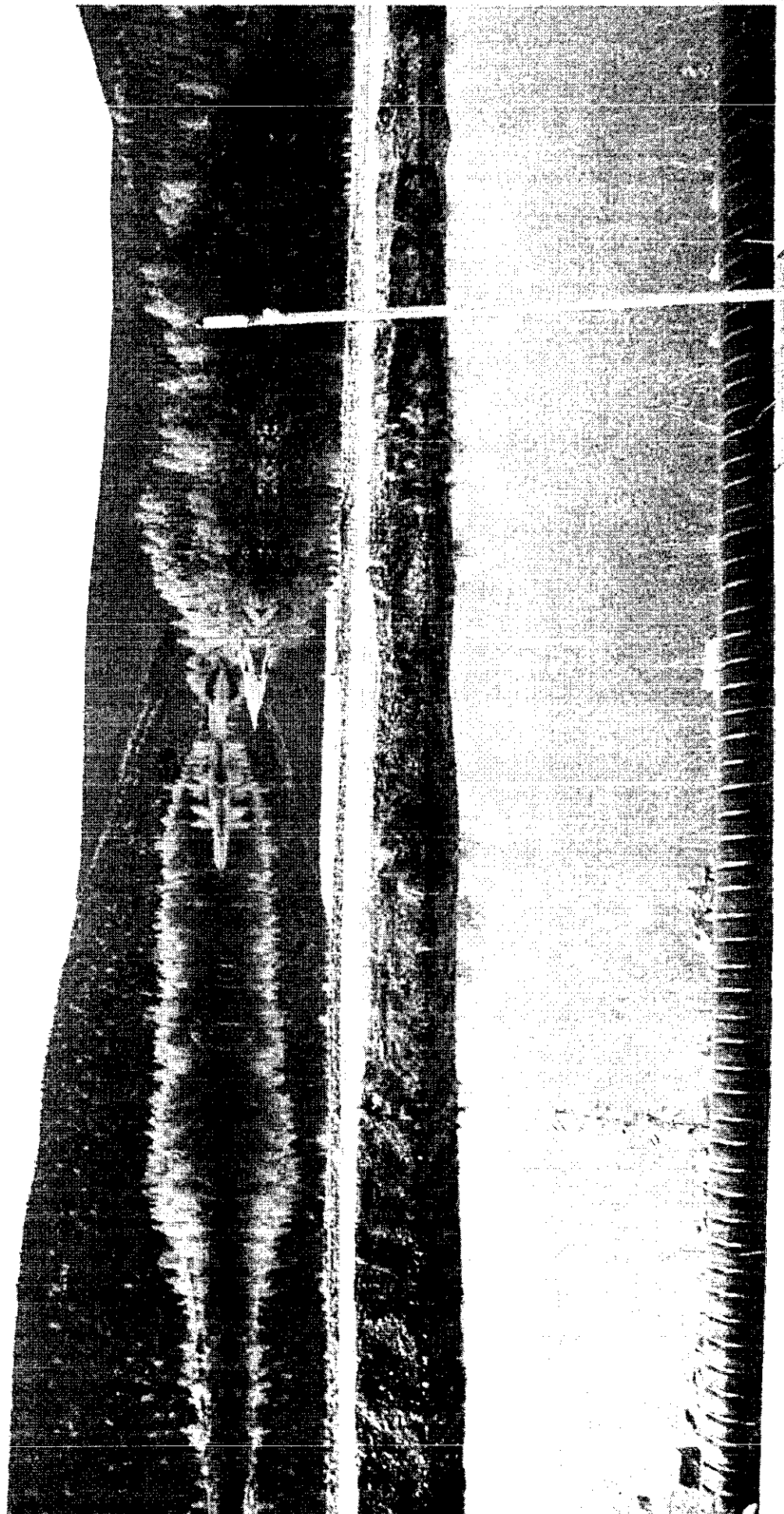


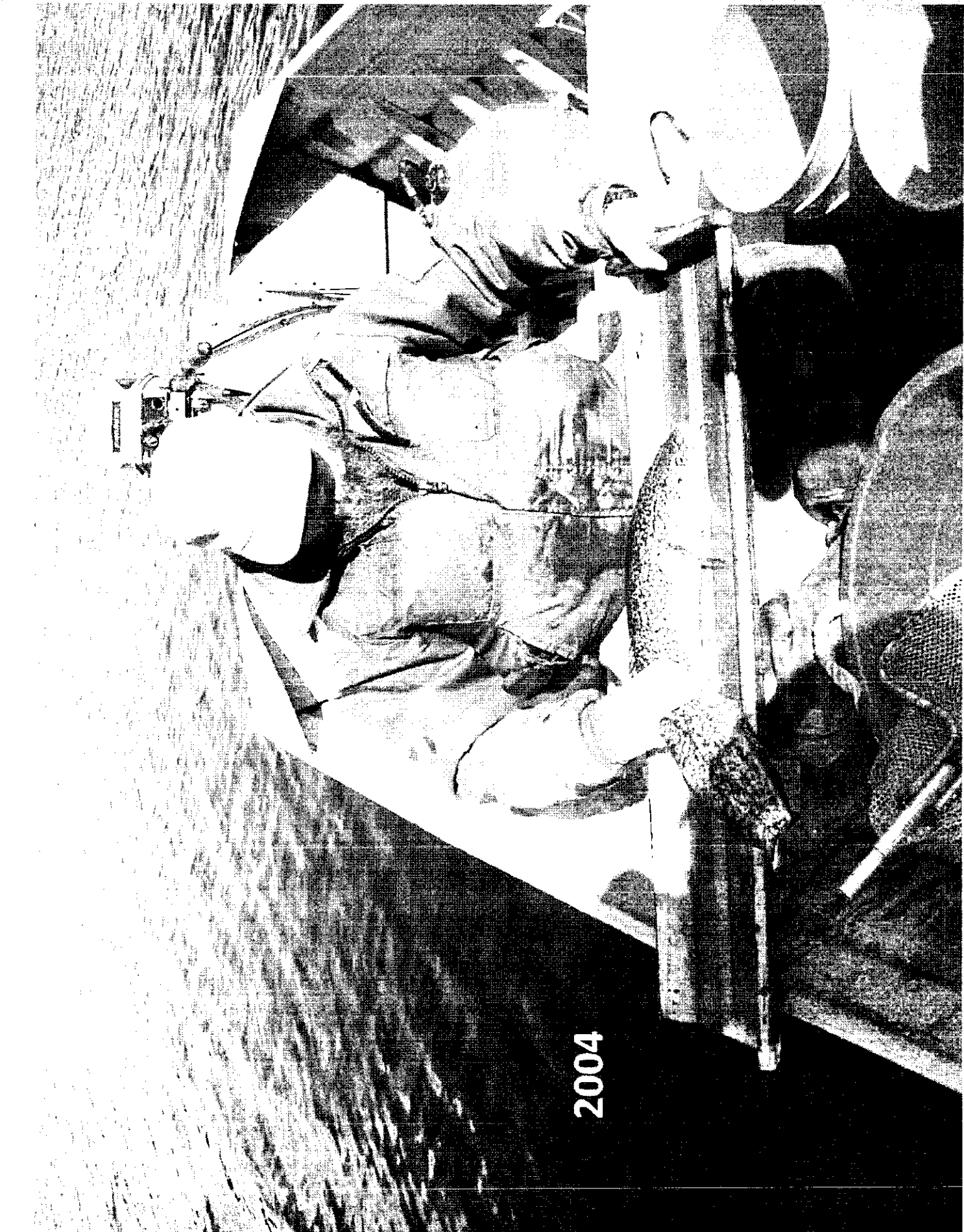


**Established Fish Passage
Channel into Lower Last Chance
Ponds and WSR
1996**

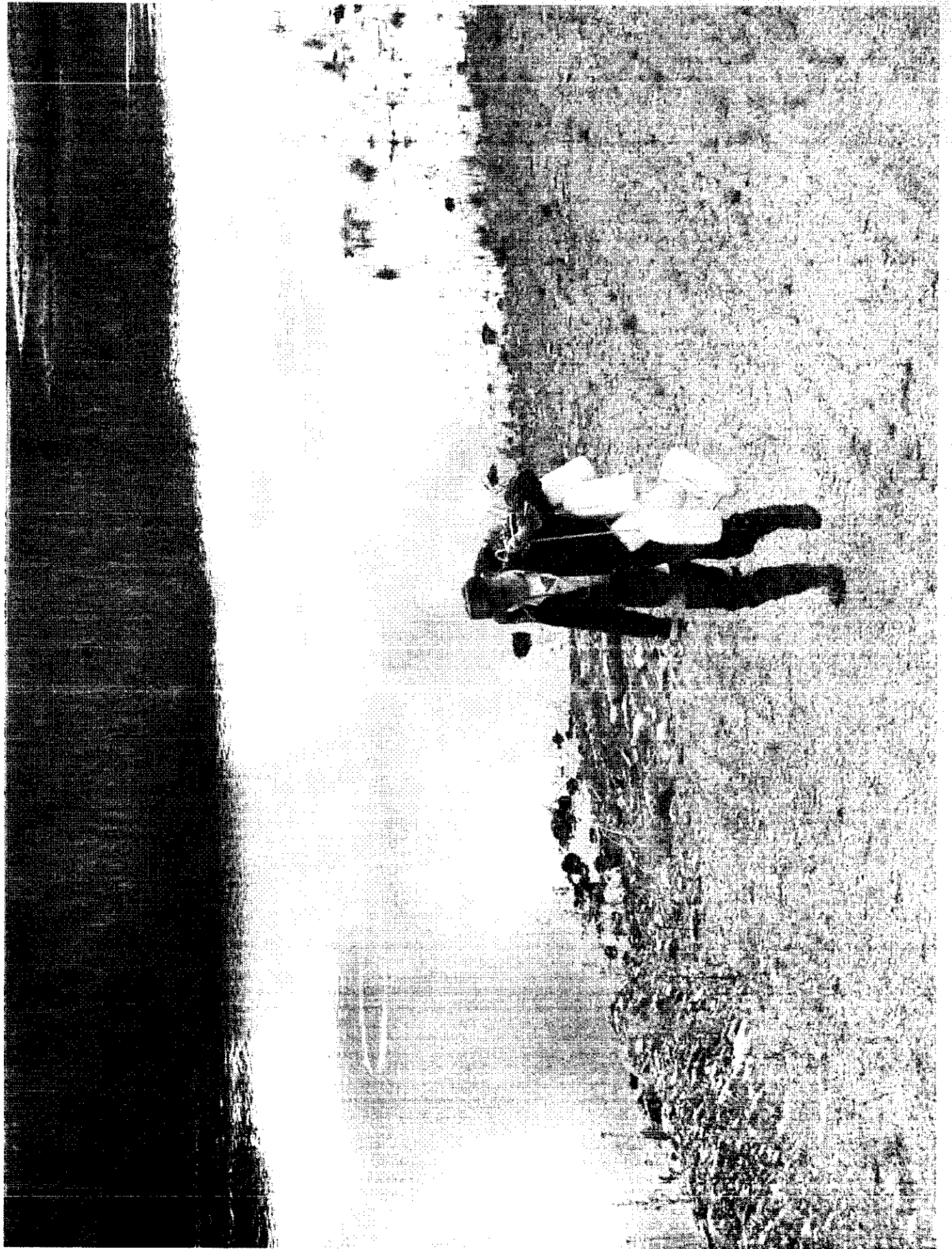
**Additional Fish Passage
Channel along Last Chance
Creek**







2004



Stabilize and Reclaim Area Below Tailing Storage Facility (TSF)

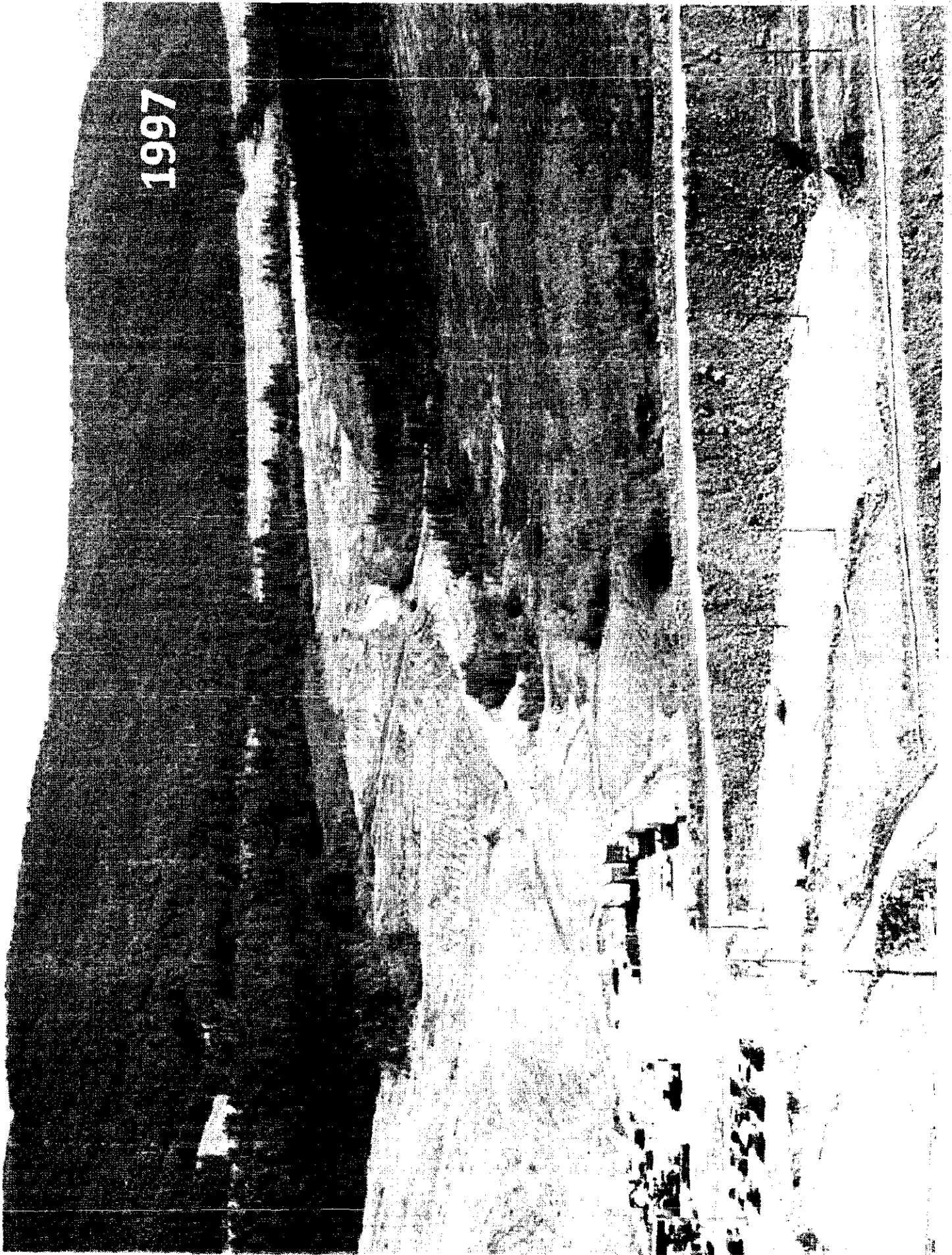
- Immediate area below TSF seepage collection system
- Placer mining disturbance between TSF and WSR (developed riparian and wetlands complex)

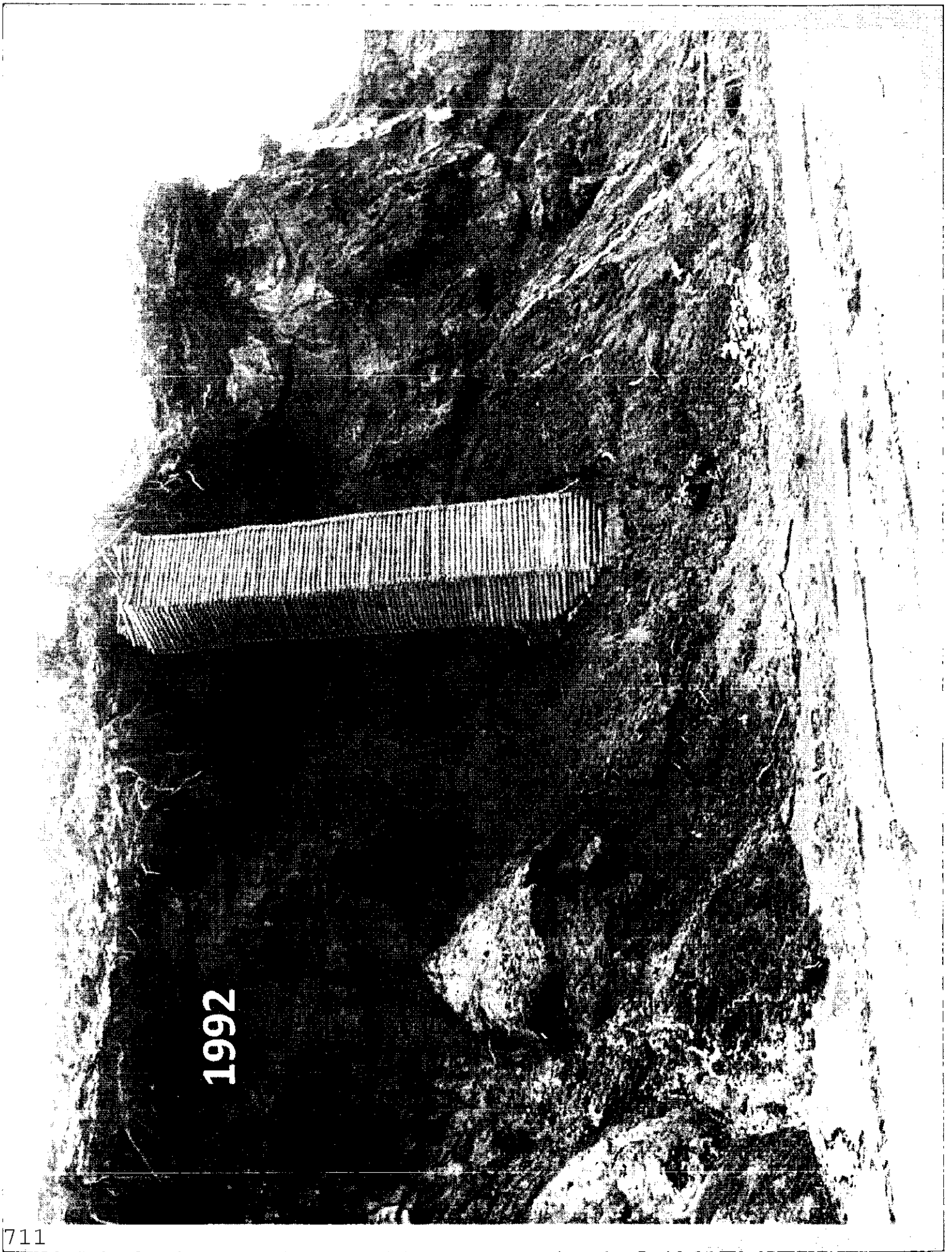


1996

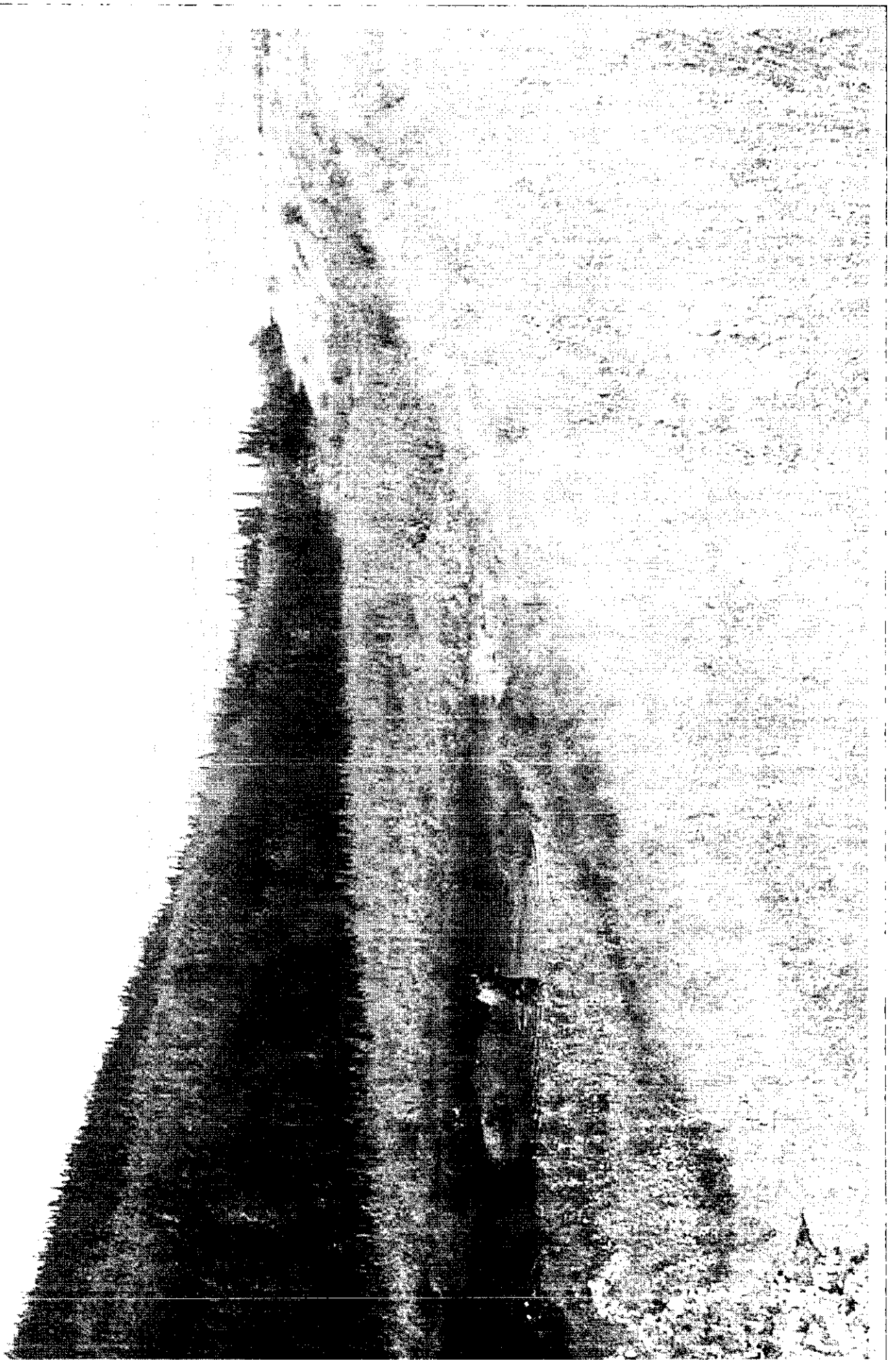


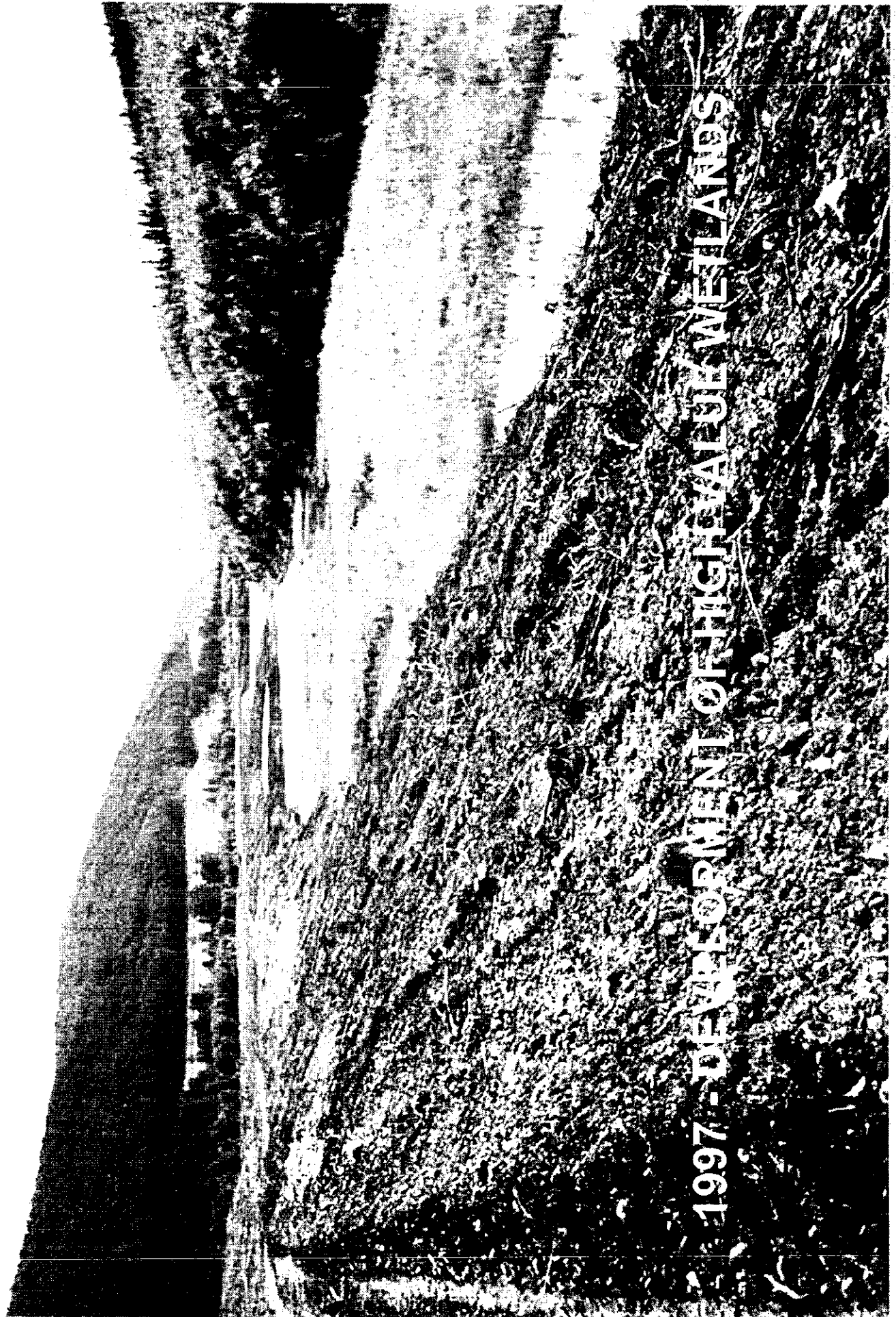
1997





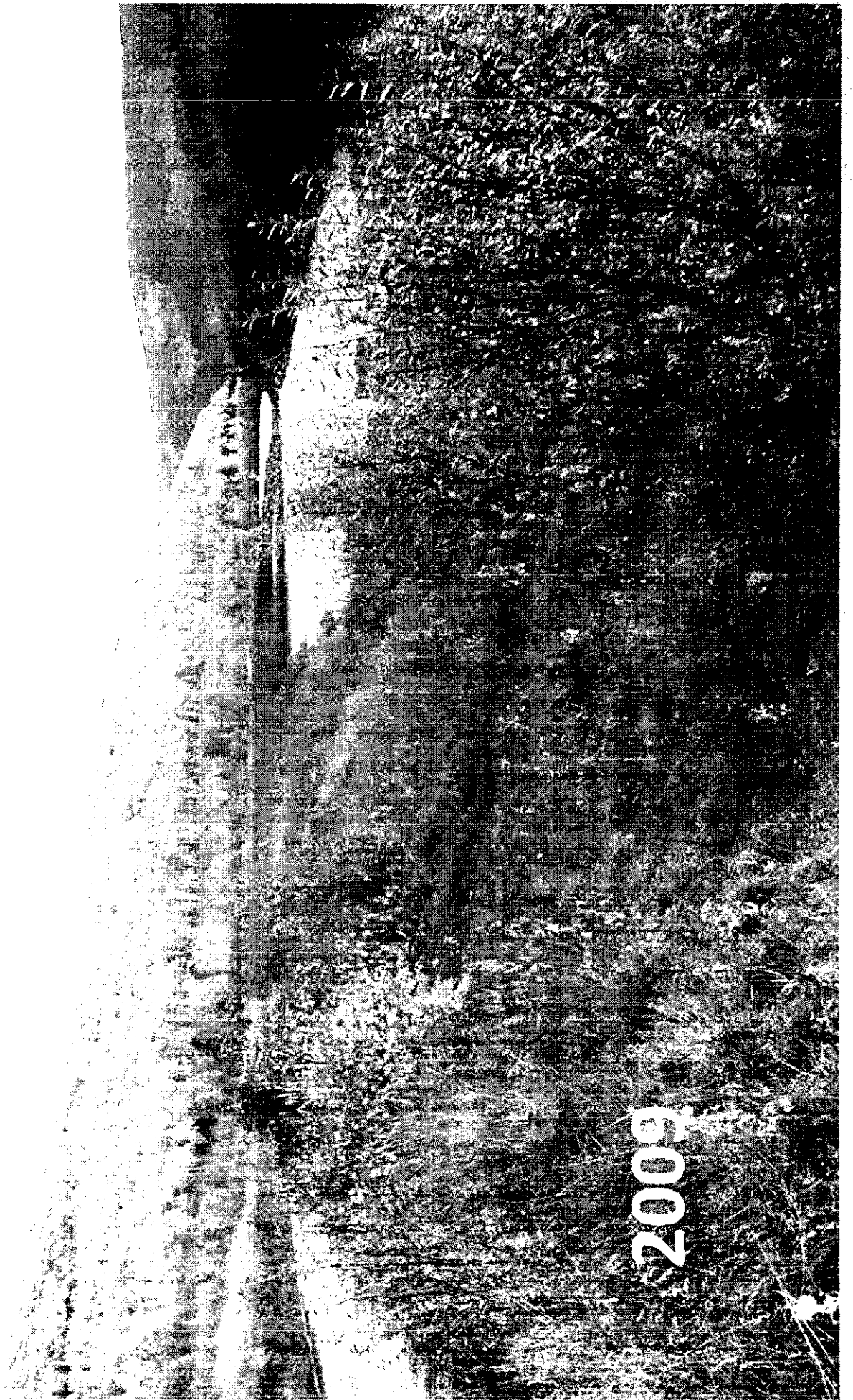
1992





1997 - DEVELOPMENT OF HIGH-VALUE WETLANDS

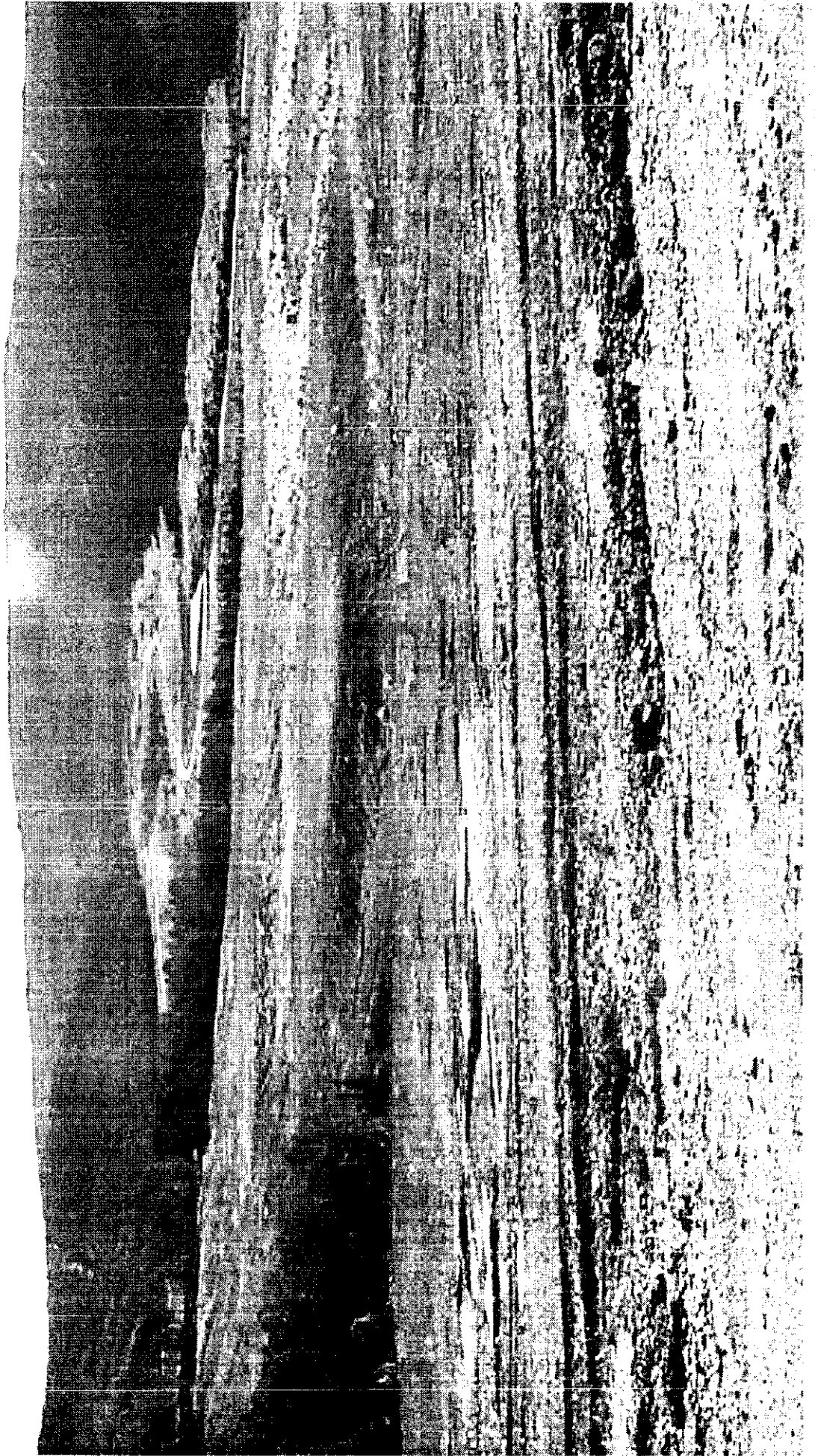




2009

1997 CONCURRENT RECLAMTION

(Re-sloping and Re-vegetation)

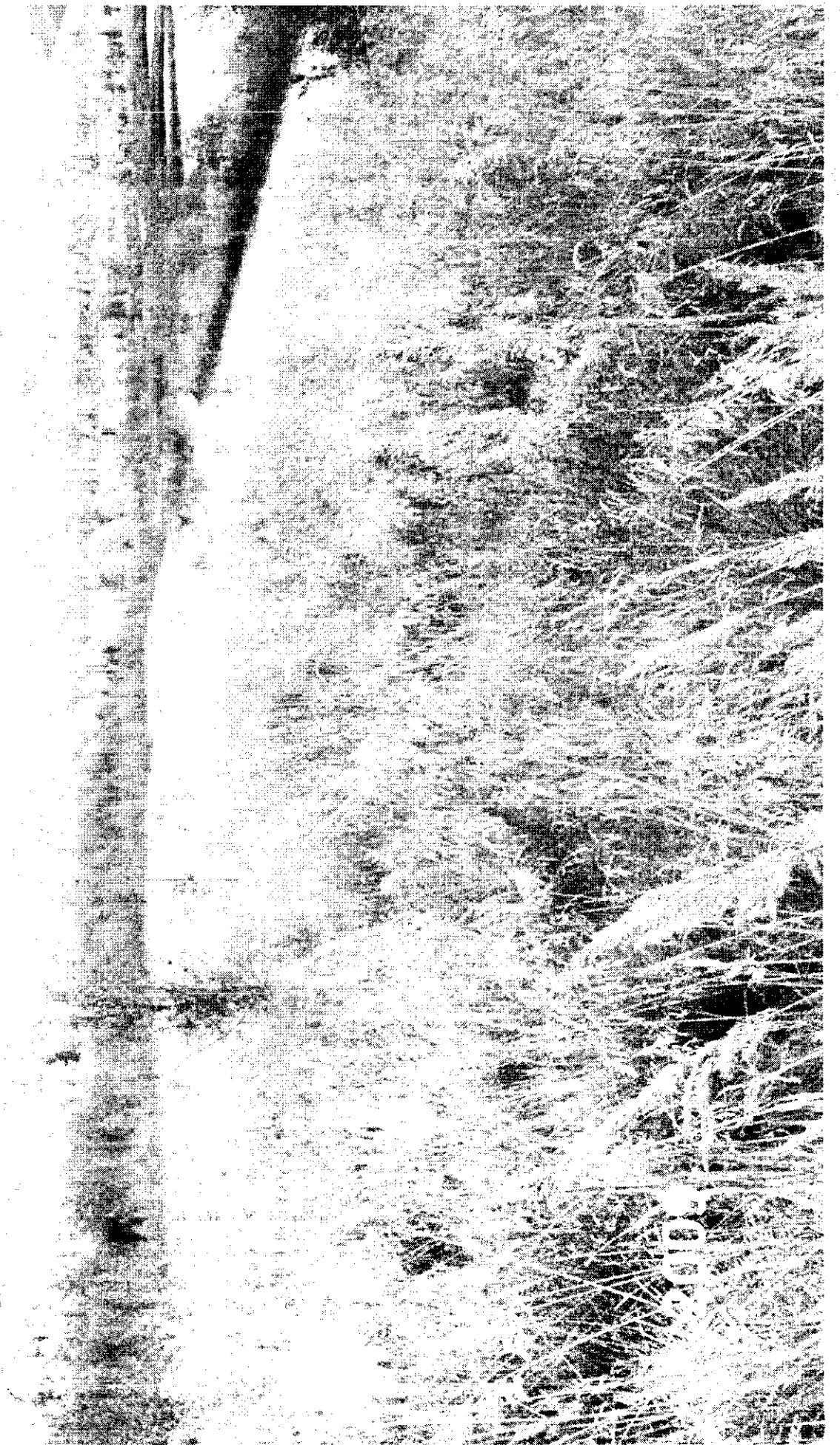


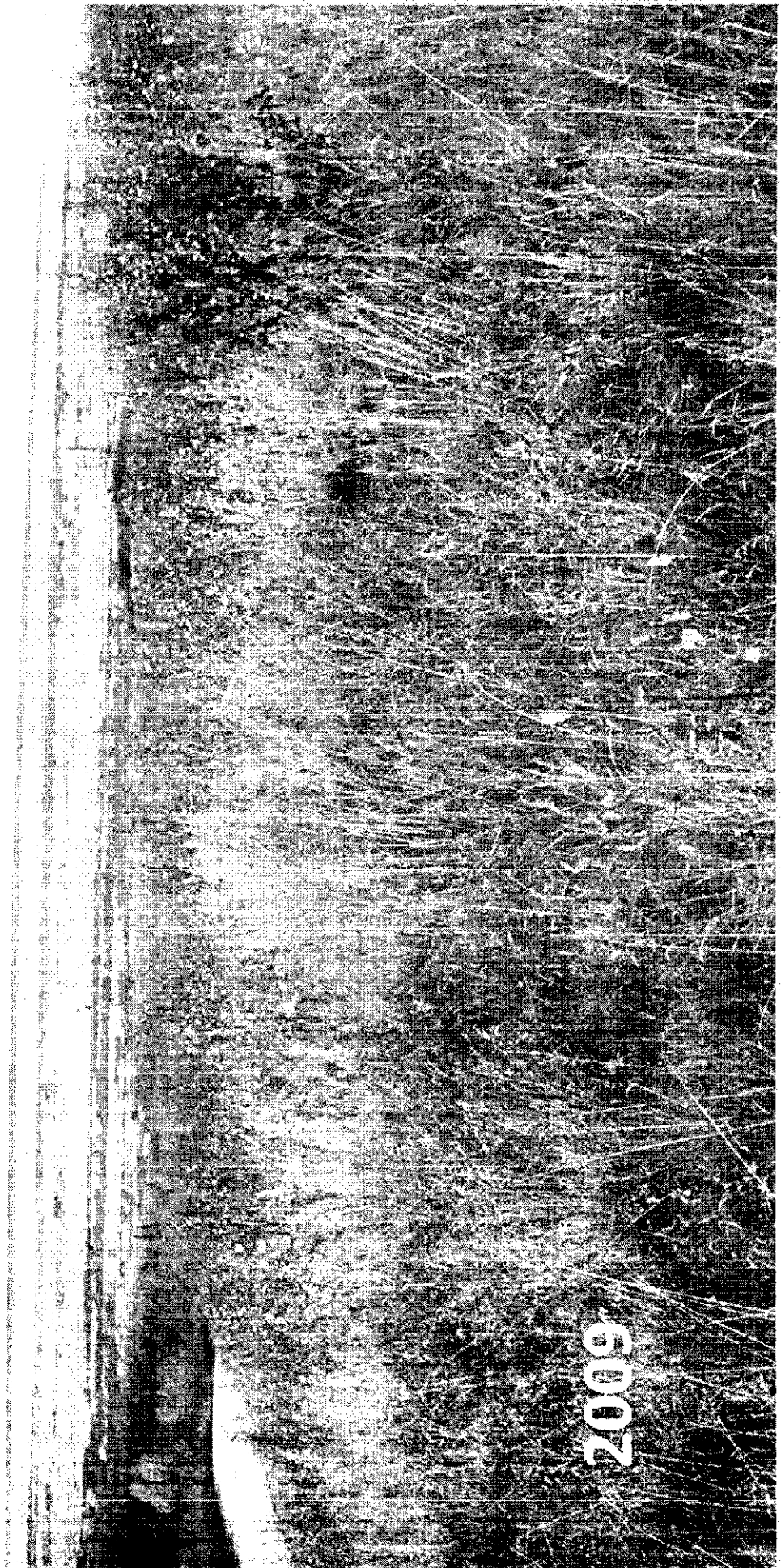


1997

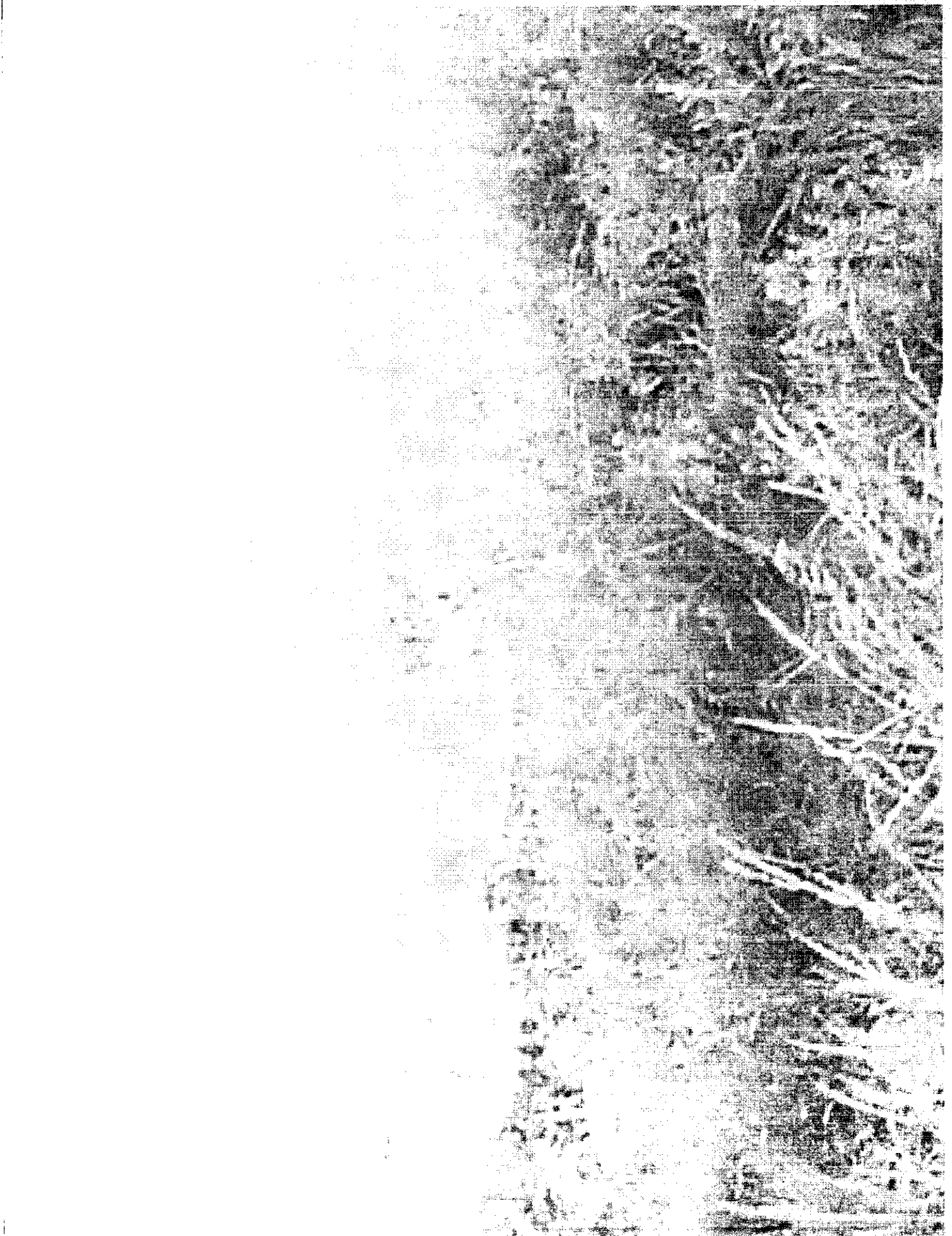
1997

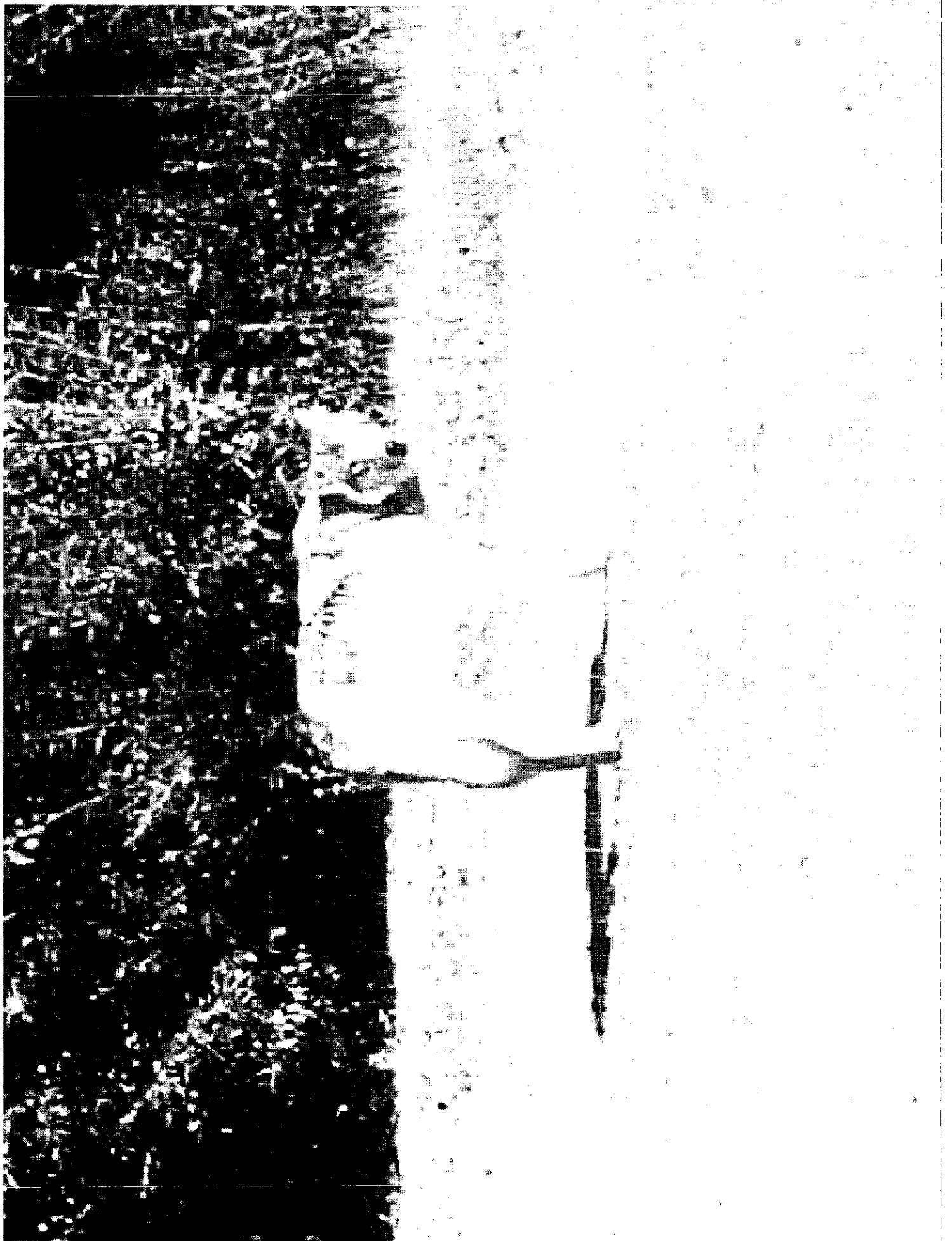






2009





1997



2009







1969

Reclamation Seed Mixes Determined in Cooperation with ADNR's Plant Material Center and On-site Experience

Original Seed Mix 1994

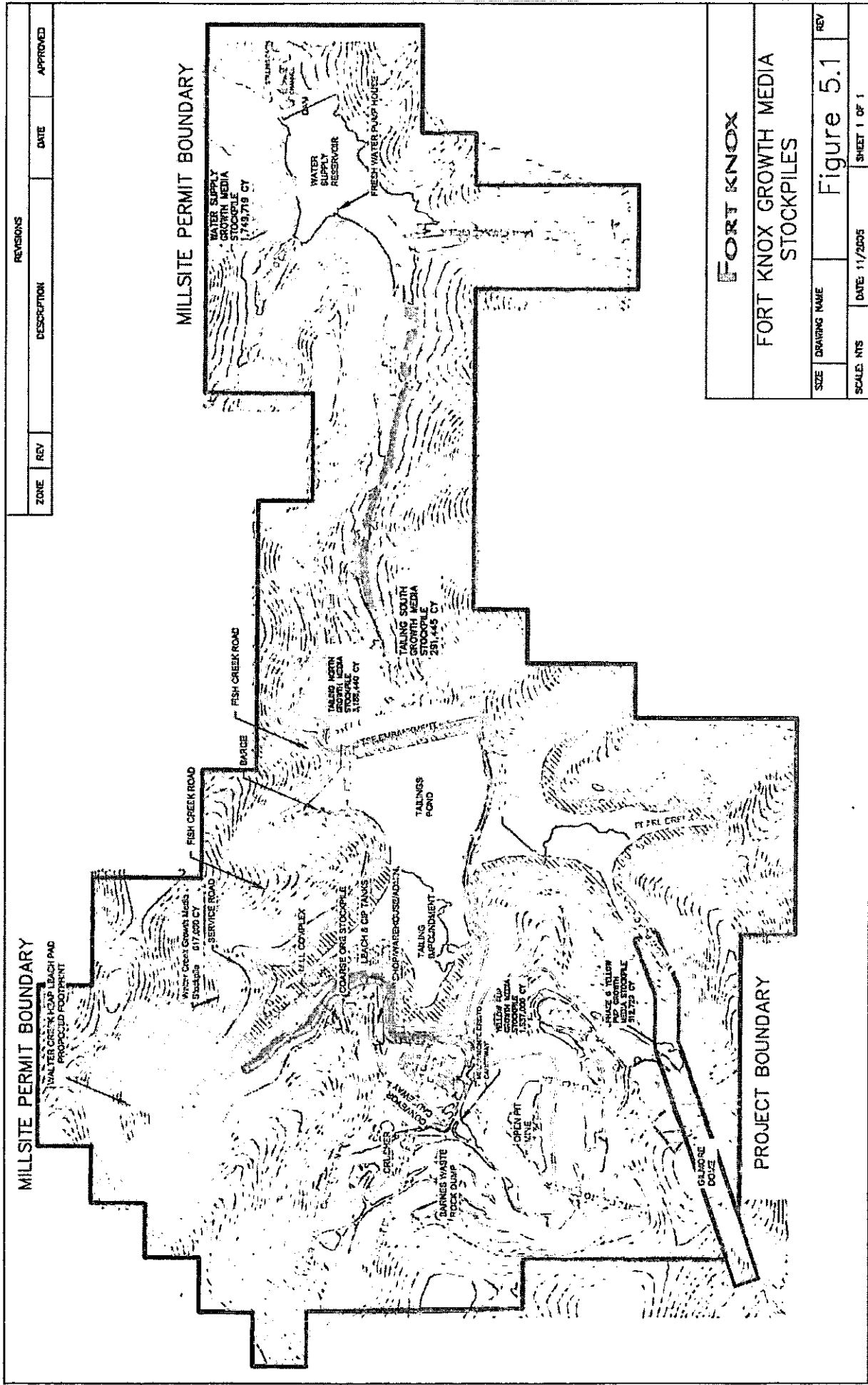
Gruening Alpine Bluegrass	40%
Arctared Red Fescue	30%
Tundra Glaucous Bluegrass	25%
Alyeska Polargrass	5%

Rate 22-33 pounds of pure live seed per acre

Revised Seed Mix 2008

Arctared Red Fescue	50%
Gruening Alpine Bluegrass	20%
Tundra Glaucous Bluegrass	20%
Nortran Tufted Hairgrass	10%

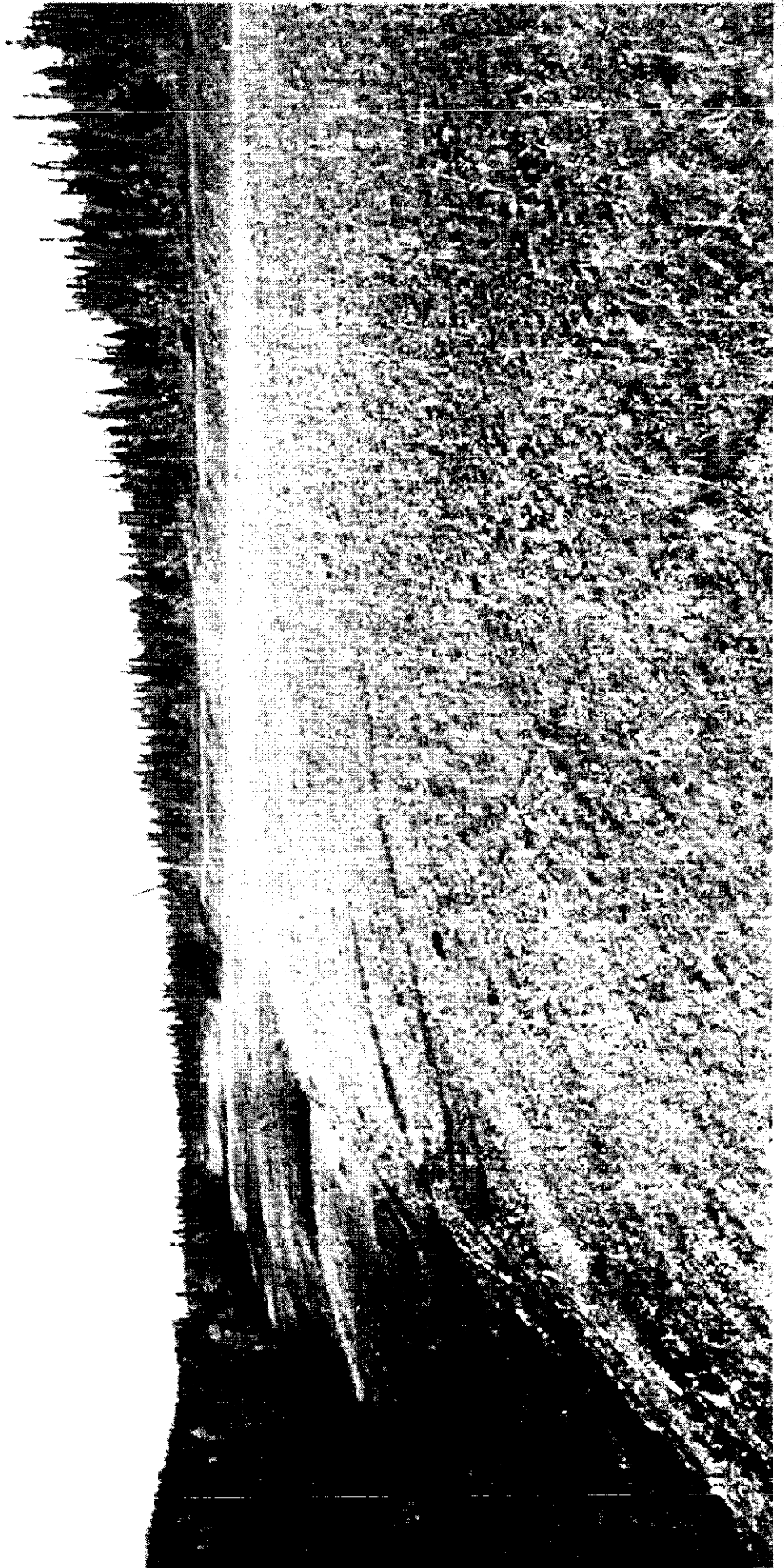
Rate 11-18 pounds of pure live seed per acre



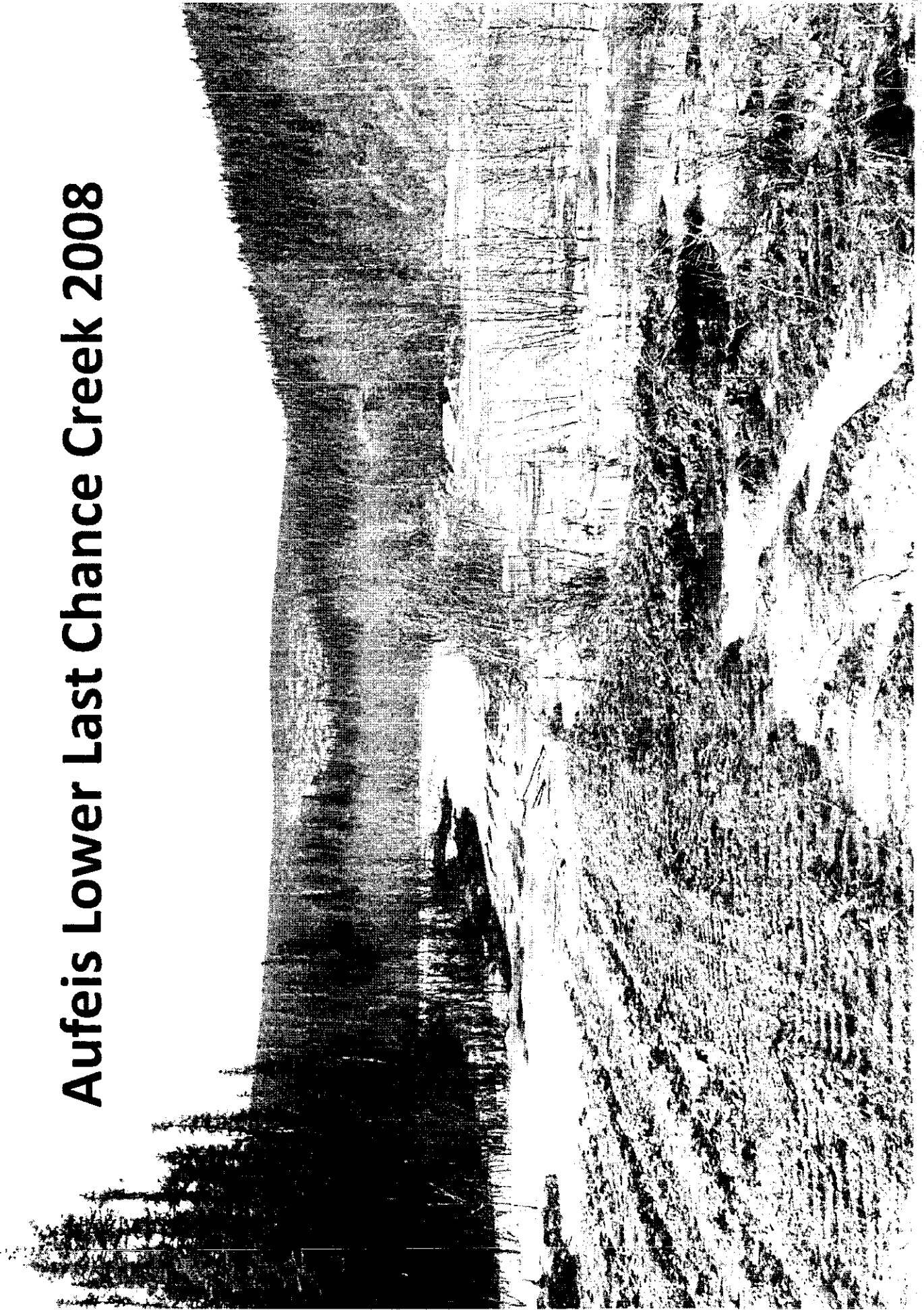
Established Brush Berms During Construction



Reclamation Along Main Access Road 1996

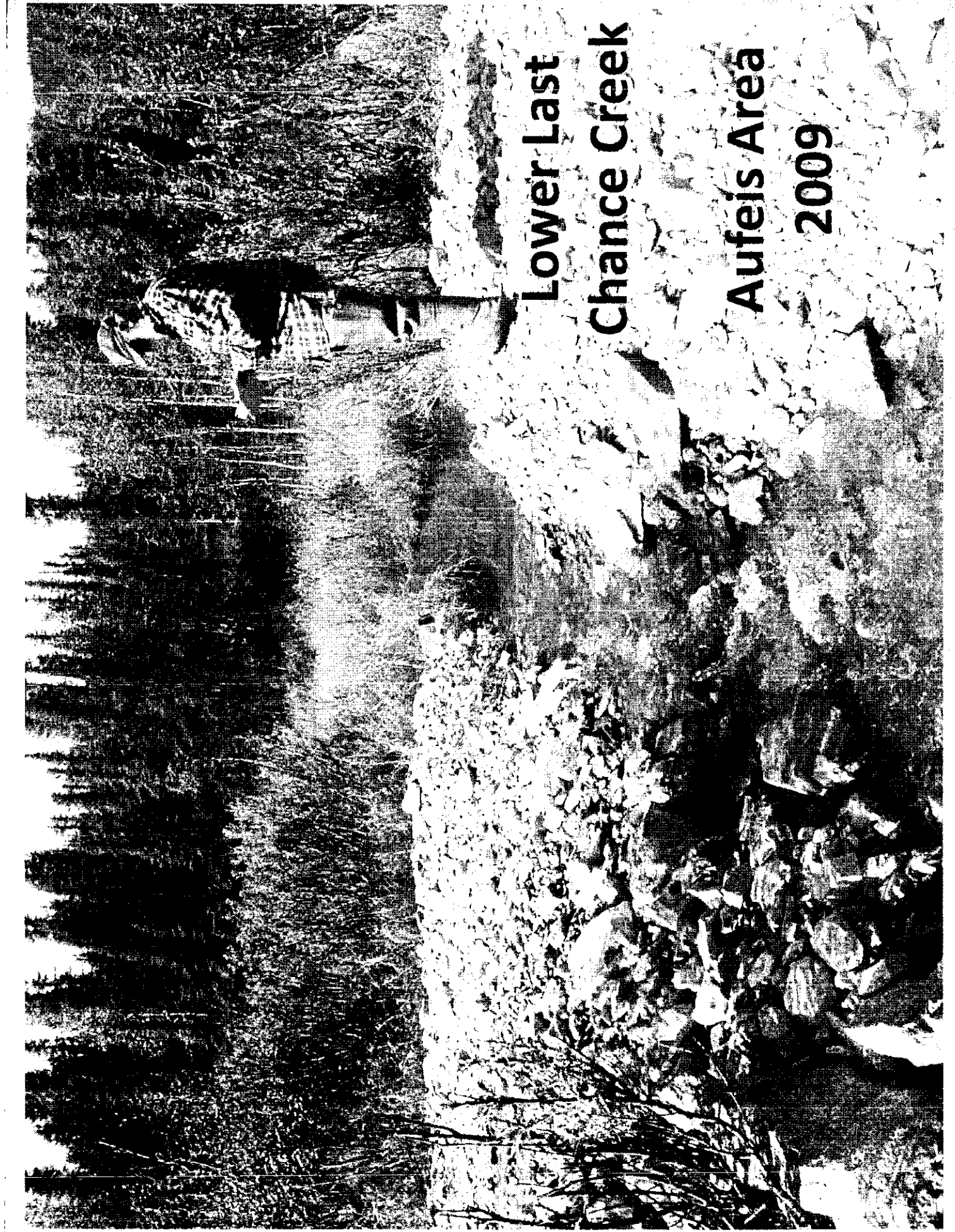


Aufeis Lower Last Chance Creek 2008



Lowermost Channel Creek

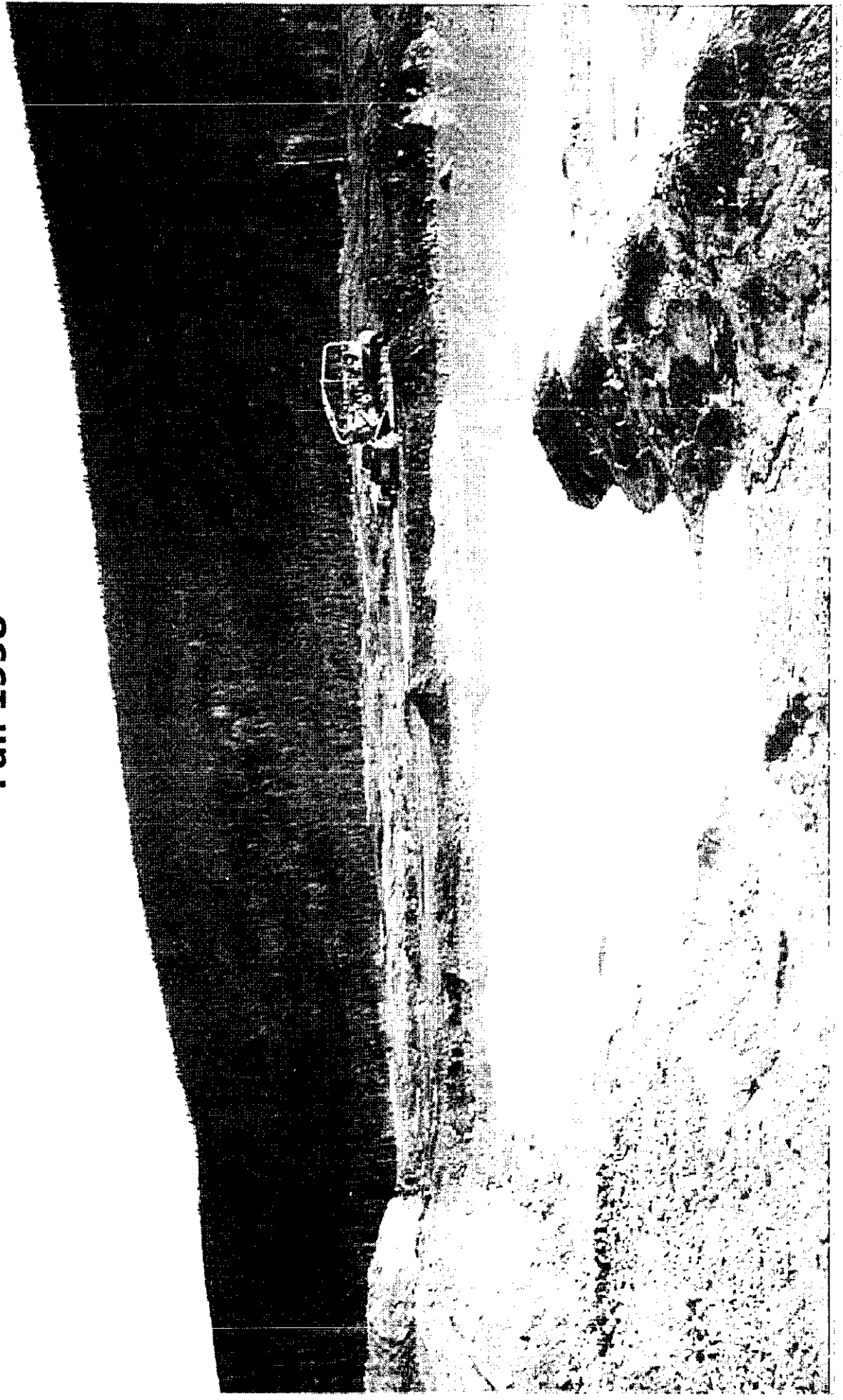
1110



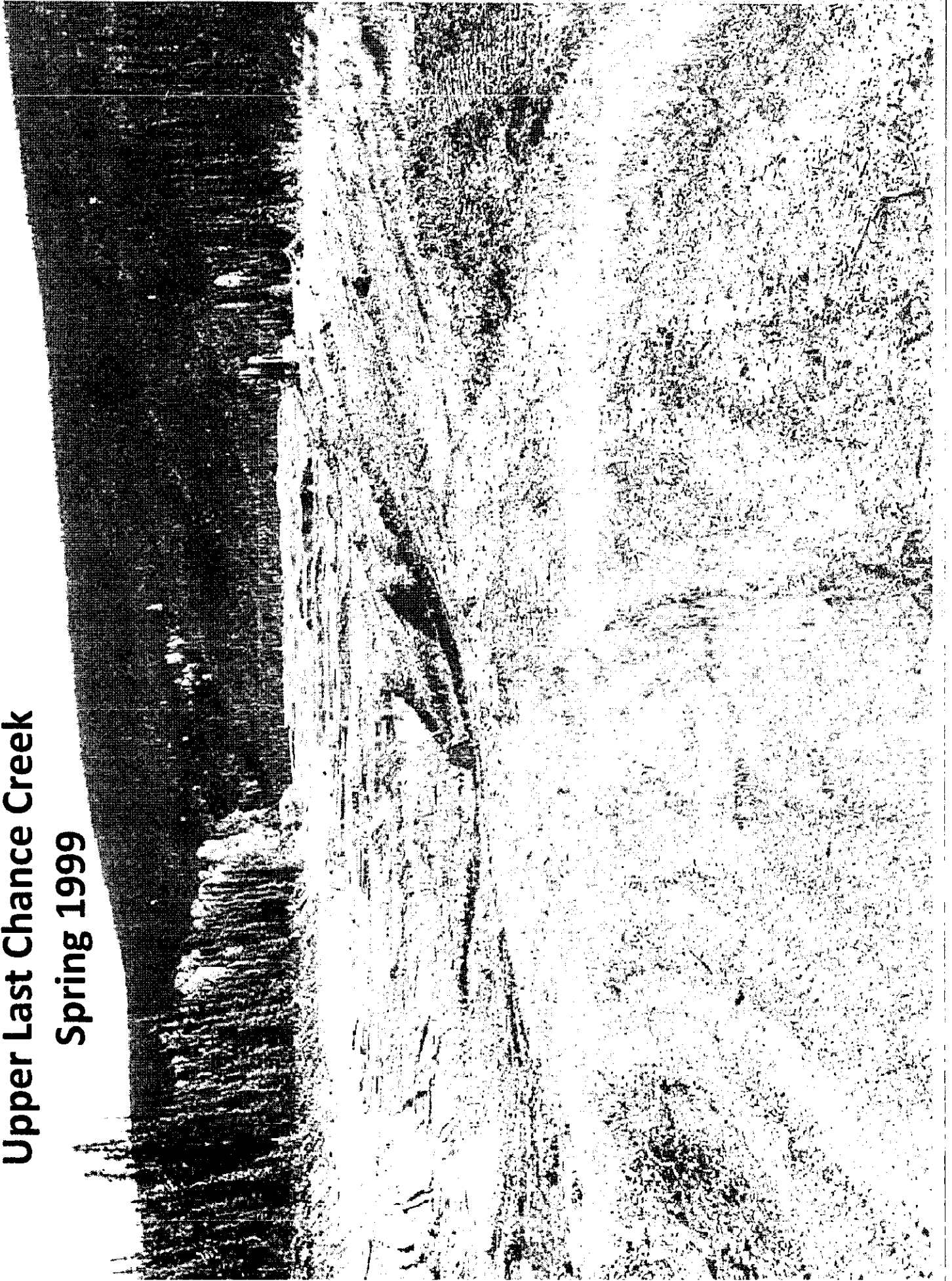
**Lower Last
Chance Creek**

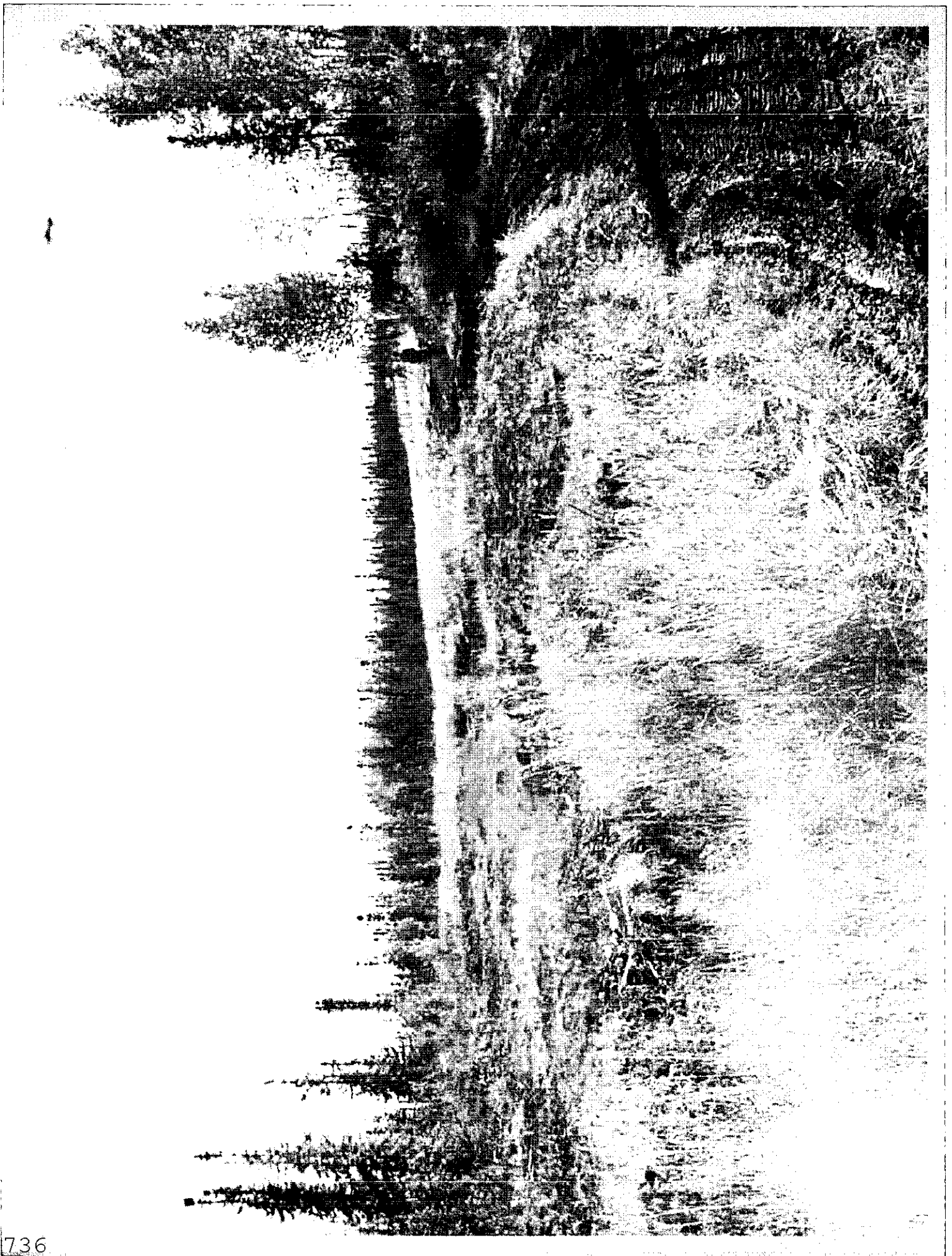
**Aufeis Area
2009**

**Reclamation of Placer Operation on Upper Last Chance Creek
Fall 1998**

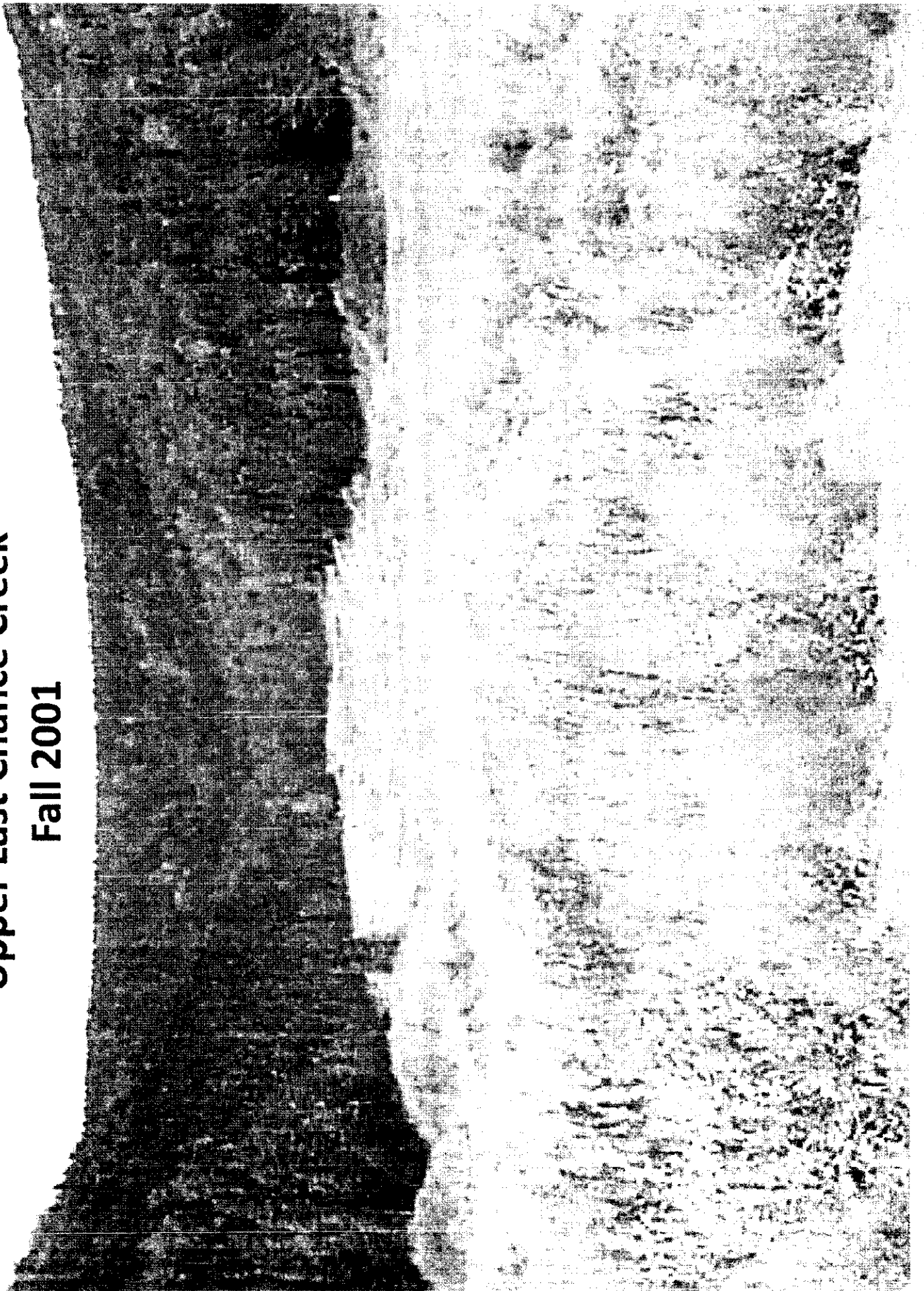


**Upper Last Chance Creek
Spring 1999**





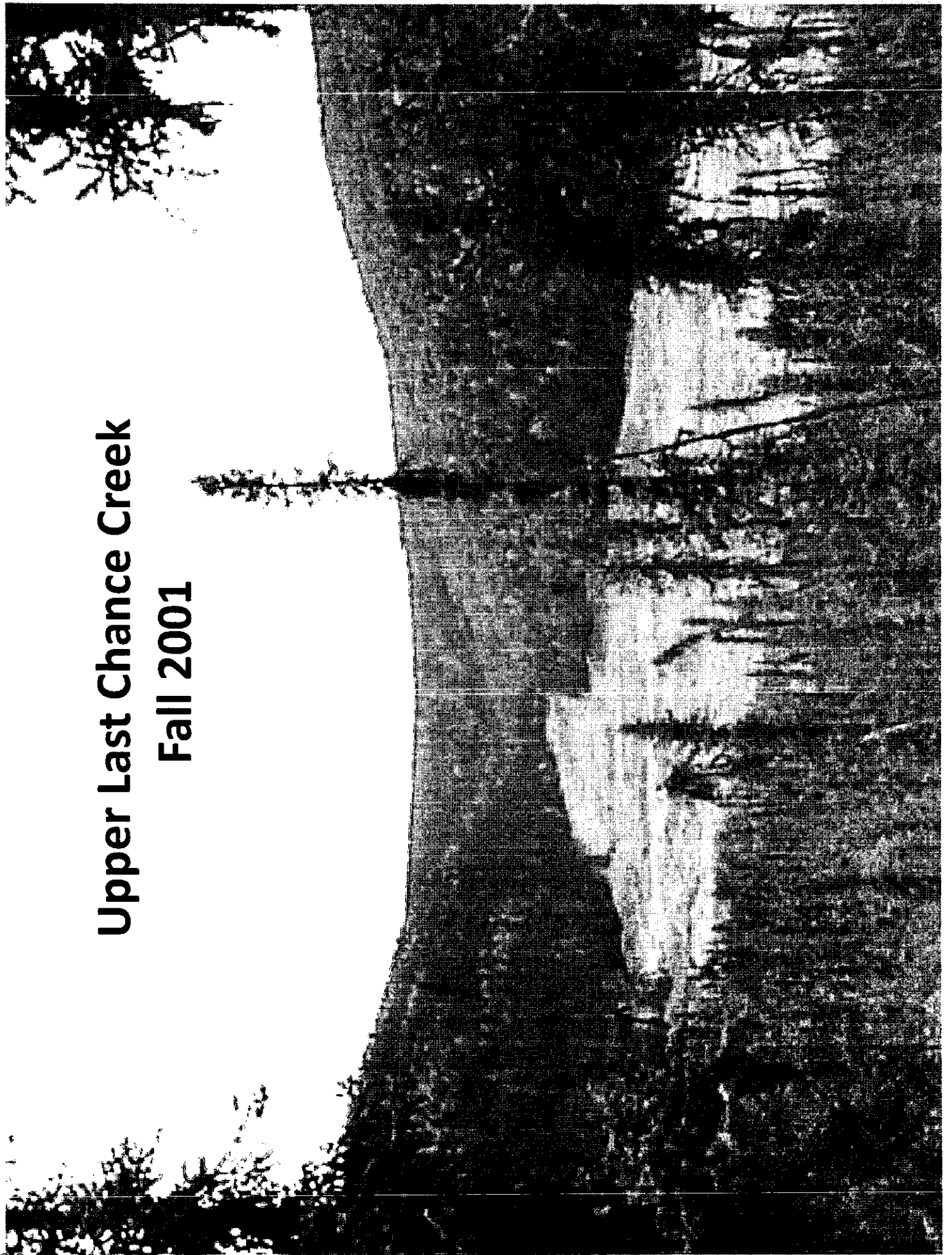
**Upper Last Chance Creek
Fall 2001**



Last Chance Creek Fall 2001

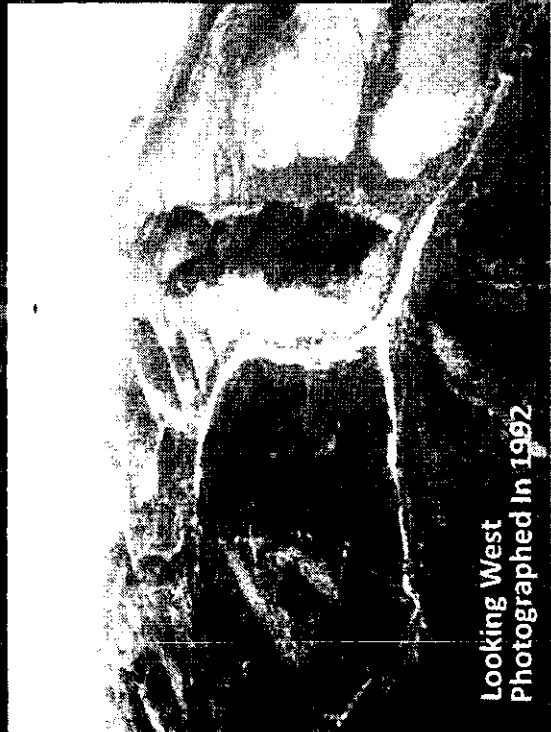


**Upper Last Chance Creek
Fall 2001**





Looking West
Photographed In 1999



Looking West
Photographed In 1992