

# UTILIZATION OF SUBMERSIBLE CAMERAS IN FISH SCREEN MONITORING AND EVALUATION



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# Monitoring and Evaluation – Why?



# MONITORING AND EVALUATION GOALS

- KEEP THEM OUT - Prevent entrainment into the irrigation ditch system by monitoring for drum seal integrity.
- MOVE THEM OUT - Minimize screen entrainment time and evaluate the safety and effectiveness of the bypass system.

# MONITORING SEAL INTEGRITY AT SCREENS IN OPERATION

- *On most screens, bottom channel seals are re-installed each spring prior to irrigation.*
- The effectiveness of seals can change during the irrigation season.
- We need to monitor seals while they are submerged at fish screens that are in active operation. How?

# FISH SCREENS DRUMS ARE RAISED IN THE FALL AND RE-SET IN THE SPRING



# CONDITIONS CAN PREVENT PROPER EXAMINATION DURING INSTALLATION



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# COMPROMISED FOAM SEAL



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# PROTOTYPE SEAL MONITORING SYSTEM



# UTILIZATION OF THE MULTI-SEA CAM FOR SEAL MONITORING



# **SITUATIONS OBSERVED UTILIZING THE MULTI-SEA CAM**

- **Misaligned or obstructed bypass gates**
- **Damaged or worn bottom and side drum seals**
- **Excess debris or sediment buildup and vegetation growth**
- **Gaps in bottom and side channel seals**

# BYPASS GATES



# SEAL SIDE DETERIORATION



# CHINOOK, VEGETATION AND GAPS



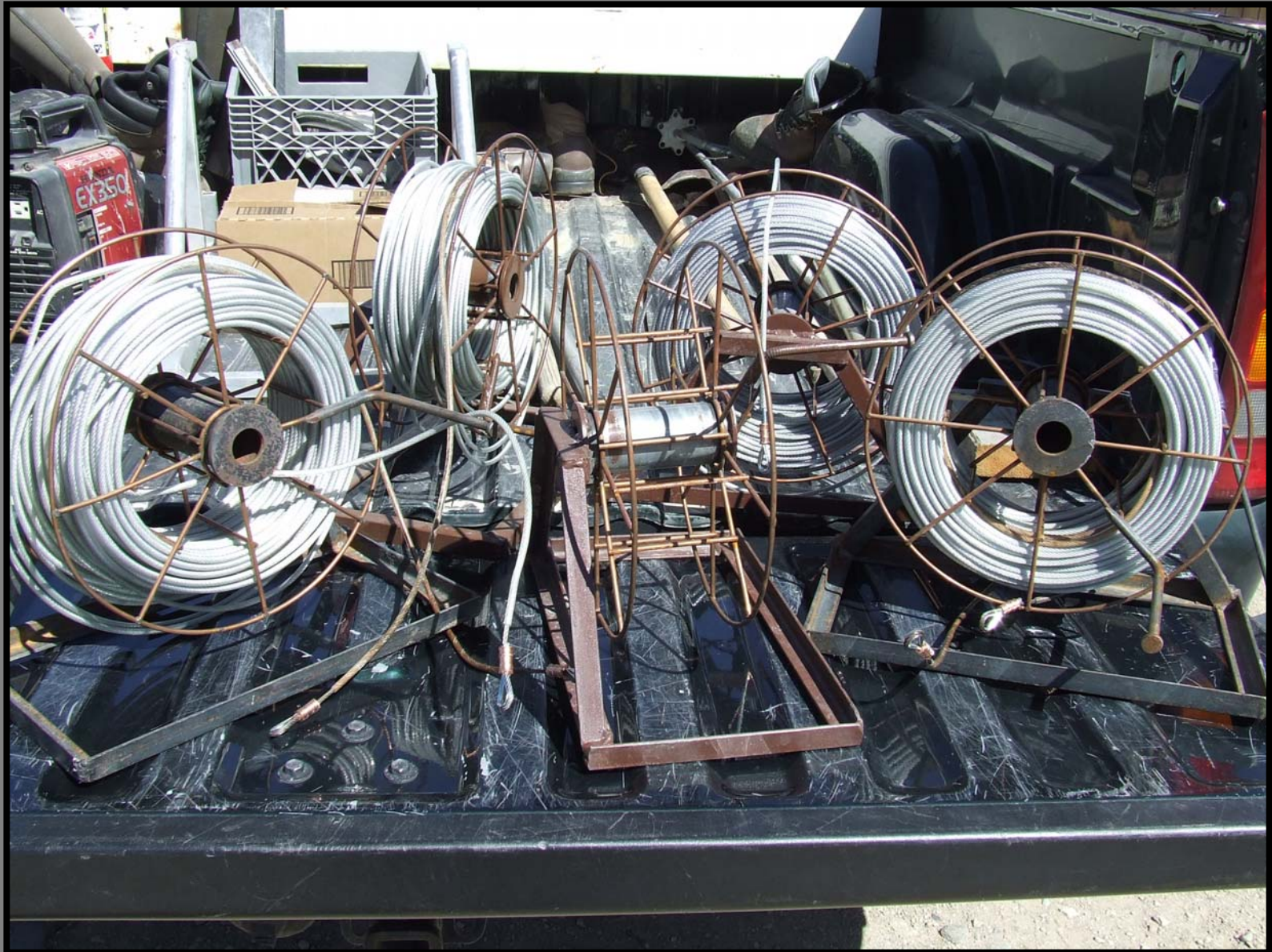
# SCREEN FAILURE



# **BYPASS PIPES AND THE UTILIZATION OF THE CRYSTAL CAM SUBMERSIBLE CAMERA**

- **Even though flow to the bypass outlet appears normal, hazards and obstructions may be present inside the pipe.**
- **As time passes and as ground settling occurs, pipe sections can become misaligned or gaskets displaced.**
- **Unseen accumulations of debris or sediment may be occurring.**

# WIRE ROPE AND SPOOLS



# CUSTOMIZED BYPASS GATE



# THREADED PIPE AND CLEANING HEADS



# PUSH ROD COMPONENTS



# IMPROVED SLED AND CONNECTORS





# CAMERA RUN TOWARD OUTLET



# CAMERA AT L-09 INLET



# **SITUATIONS OBSERVED UTILIZING BYPASS CAMERA**

- **MISALIGNED SECTIONS OF PIPE**
- **DISPLACED GASKETS AT JOINTS**
- **ROOT PENETRATION AT JOINTS**
- **DEBRIS BLOCKAGE WITHIN PIPE**
- **ACCUMULATION OF SEDIMENT WITHIN PIPE**

# MISALIGNED PIPE SECTIONS



# DISPLACED GASKET SEAL



# ROOT PENETRATION AT JOINTS



# ROOT BLOCKAGE REMOVED FROM BYPASS PIPE



# SEDIMENT ACCUMULATION

16/7/08 12:49:42P

0:04:20

# CLEANOUT



23/6/08 11:21:02A

0:16:43

# SURPRISE ENCOUNTER



# INSTALLING FLAP SEALS ON A DRUM



**ADULT CHINOOK SALMON RETURN  
TO HERD CREEK TO COMPLETE  
THEIR LIFE JOURNEY**



# THANKS

- The entire screen shop team -
- Especially **Jim Hardy** and his **Utility Craftsmen** who designed and fabricated much of the equipment -
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