Stillaguamish Estuary Restoration Experiences

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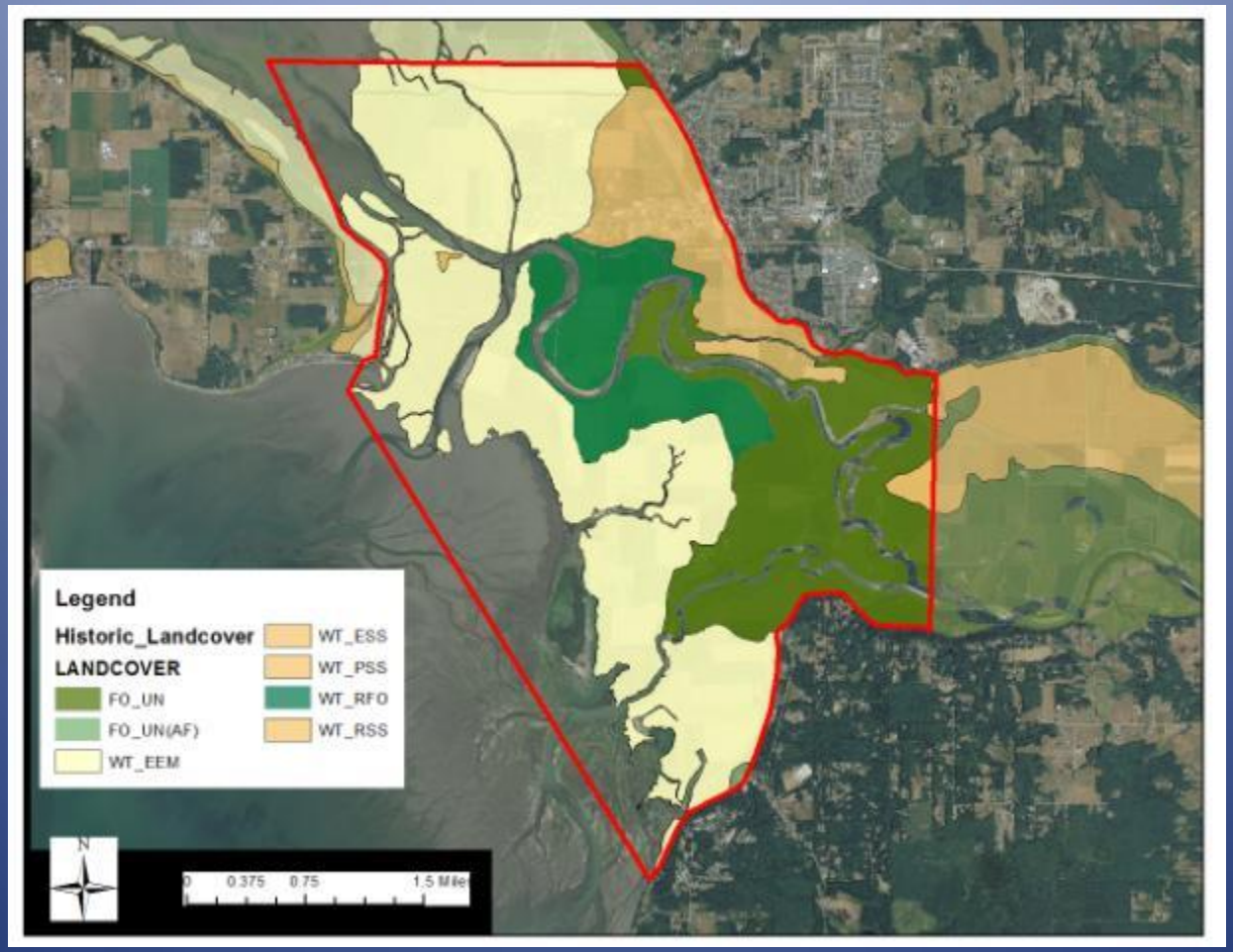
What exactly is the Stillaguamish Estuary?

- The portion of the River Delta that is salty and tidally influenced (from tideflats to the extent of salt influence)
- Tidal freshwater habitats are not salty and so are not part of the estuary. They are however, very important for salmon
- The estuary also includes many other habitats that are not part of the river delta (eelgrass, pocket estuaries, etc)

Historic Extent of the Stillaguamish Estuary from 1856-1940



Current Extent of the Stillaguamish Estuary 2011

(Before PSB Restoration)

PSB Restoration Site

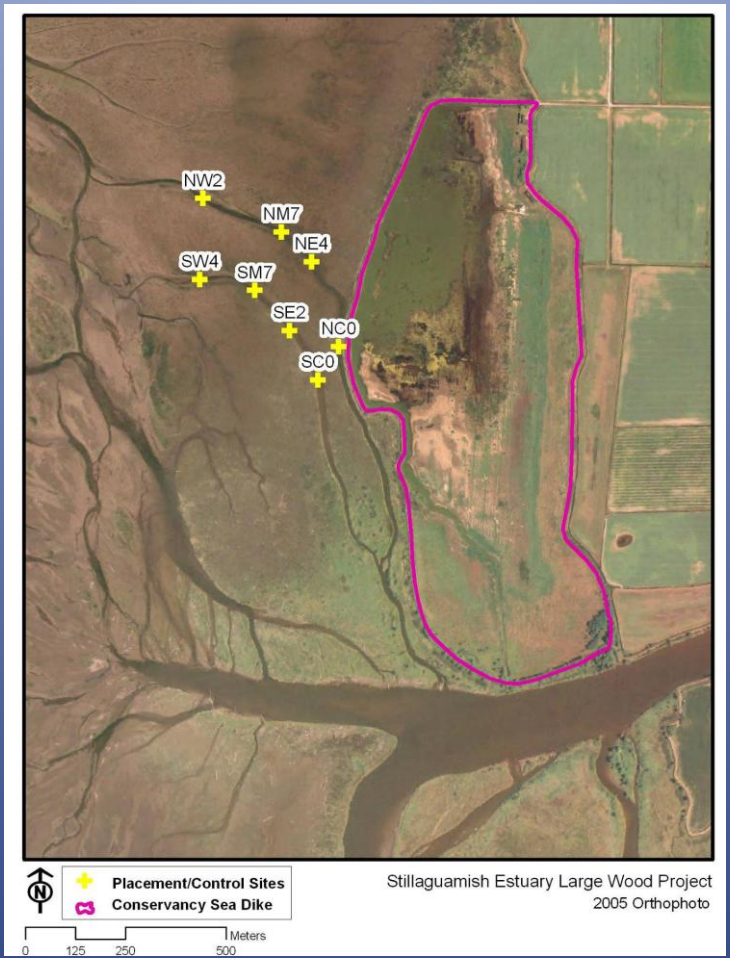
History of LWD efforts in the Stillaguamish

- 2003-TNC proposes Lawn Dart LWD experiment to trap wood with a proposal to NOAA
- NOAA suggests that this approach needed more research to support it
- Stillaguamish tribe attempted the lawn dart approach on their own and were not able to make it work

History of LWD efforts in the Stillaguamish

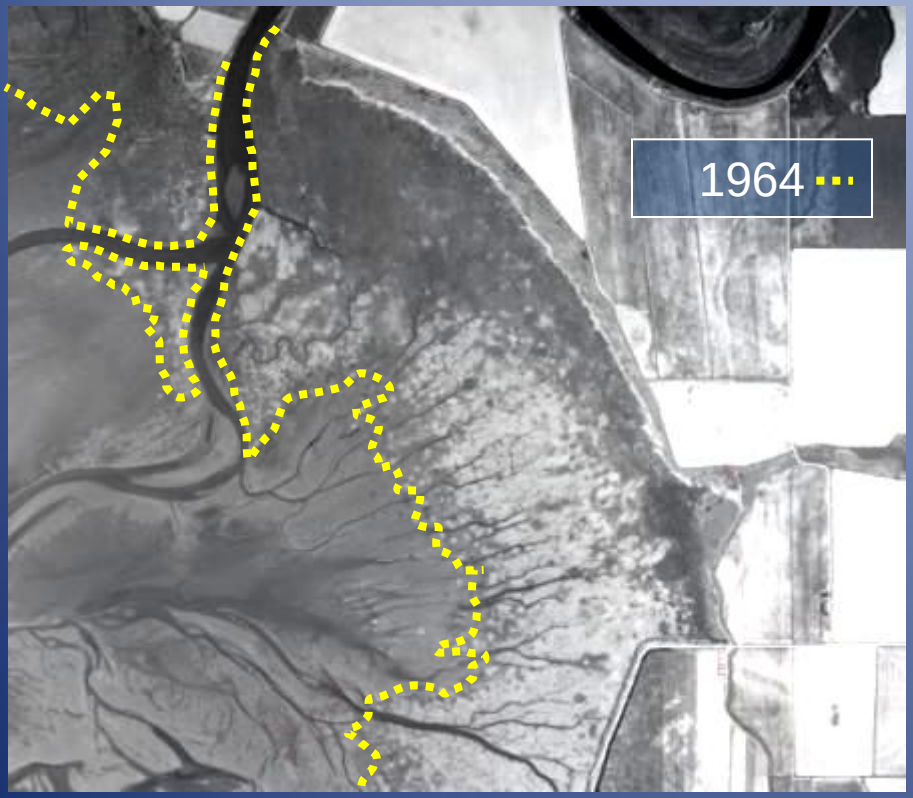
- TNC abandons the lawn dart approach in favor of LWD in channels
- Channel approach to LWD is funded, implemented and monitored
- Conclusions: LWD placement in channels created pool habitat and promoted channel development addressed in monitoring report
  - But this did not address the LWD marsh creation question

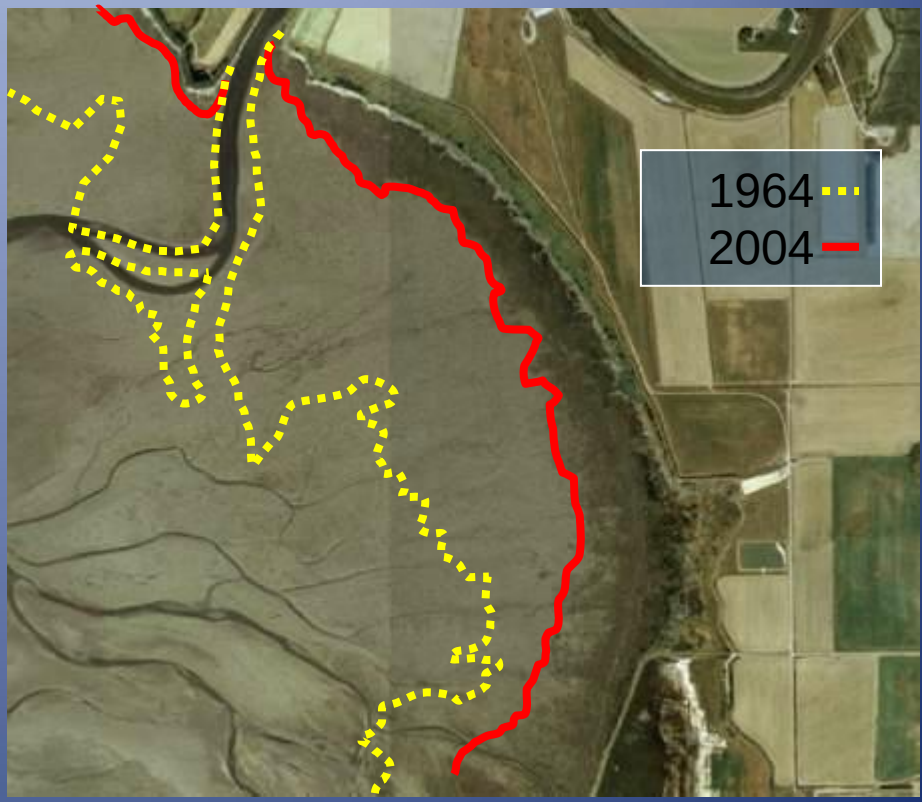
In Channel Log Jams



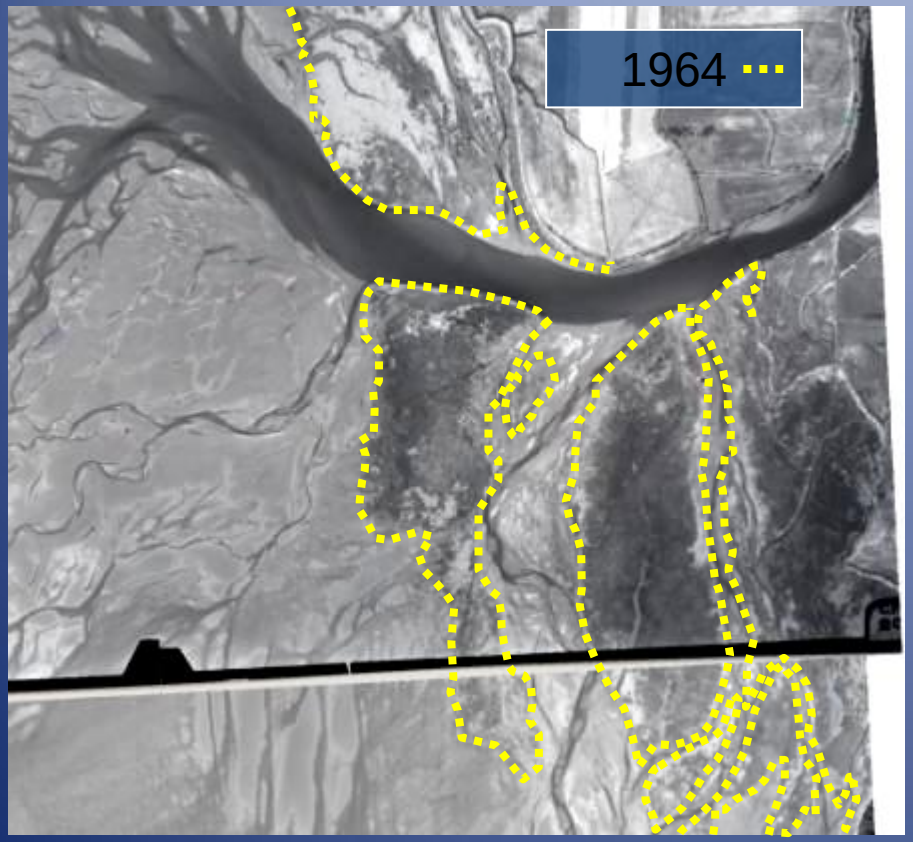
History of LWD efforts in the Stillaguamish

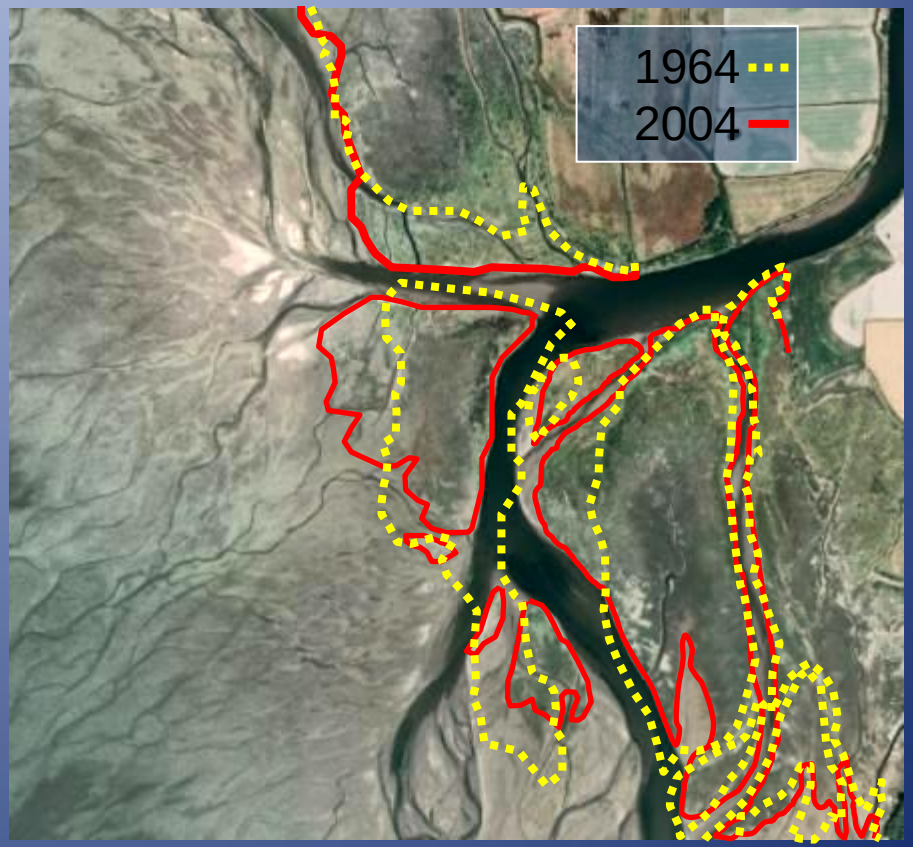
- In addition to monitoring the LWD in-channel effort, TNC conducted monitoring of ephemeral LWD rafts and their ability to build sediment and create stable marsh
  - This monitoring, in contrast, does shed some light on the marsh creation question in the context of natural marsh processes in the north and south portions of the delta





North Stillaguamish estuary

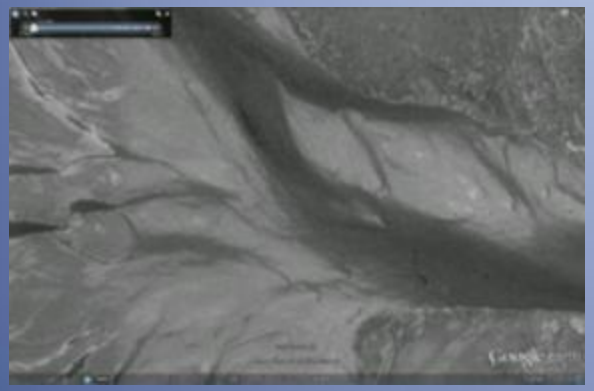




South Stillaguamish estuary

Role of ephemeral log “rafts”

1990



2003

2006

2007

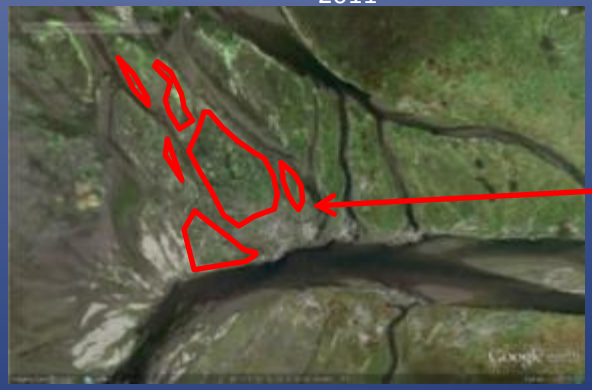
log “raft”
(2x in past decade, dissipates w/in 1 yr, 1x led to accretion)

channel shift

2009

accretion and new marsh

2011



new marsh areas

Conclusions about LWD

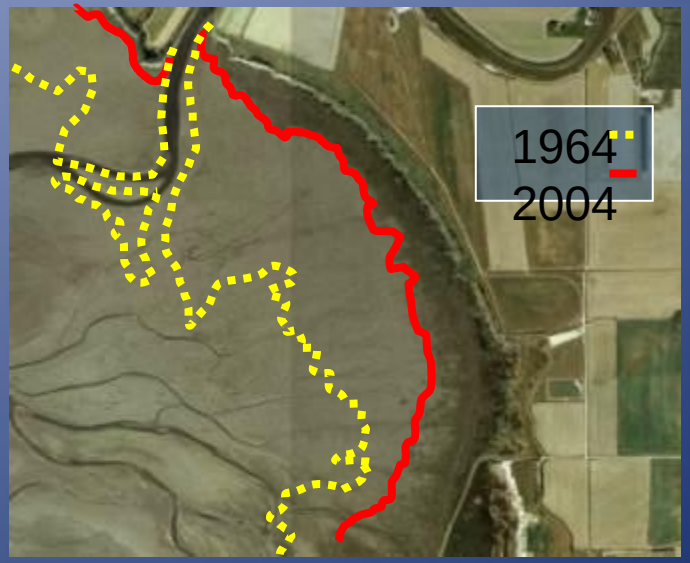
- 10 acre LWD rafts created about 10 acres of marsh under them.
  - The rafts and the marsh under them were stable for 1-2 years
  - The marsh disappeared after the log rafts broke up
  - Rafts did not create any marsh adjacent to them

Conclusions about LWD

- It would likely take thousands of logs, remaining in place for several years to dozens of acres of new wetlands under the best of circumstances
  - This is a far cry from the hundreds of acres of new marsh needed to meet Chinook recovery in the Stillaguamish.
- LWD could provide a buffer against rising seas and increased wave energy the way oyster reefs do elsewhere

Restoration at the Stillaguamish Estuary in Port Susan Bay

- Designed to address sustained marsh loss in the Stillaguamish estuary



Study Area for Restoration Monitoring

Restoration Monitoring

- Control-Reference Site
- Treatment-Restoration Site
- Response areas-Restoration and Adjacent sites
- Before and After measurements of all three sites

Restoration Monitoring

- Process (hydrodynamics and sediment)
- Structure (elevation, channels and vegetation)
- Function (inverts, birds and fish)

Newly flooded Habitat!!

Conclusion

- Any LWD experiment should be postponed until after the effects of the restoration treatment have begun to settle
- It will also take time to evaluate sediment and hydrodynamic monitoring to inform where LWD experiments would have the greatest chance of success at providing a buffer to protect marsh created by restoration

Conclusion

- The economic, social, political and cultural context of land use where restoration occurs is as critical to understand as the physical, ecological and biological context of restoration
- We ultimately need to understand the role our monitoring and learning efforts play in this context
  - Improve the effectiveness of future projects
  - As an enabling condition to promote future projects in the first place

Questions?