

Nushagak King Salmon Run Reconstruction Model



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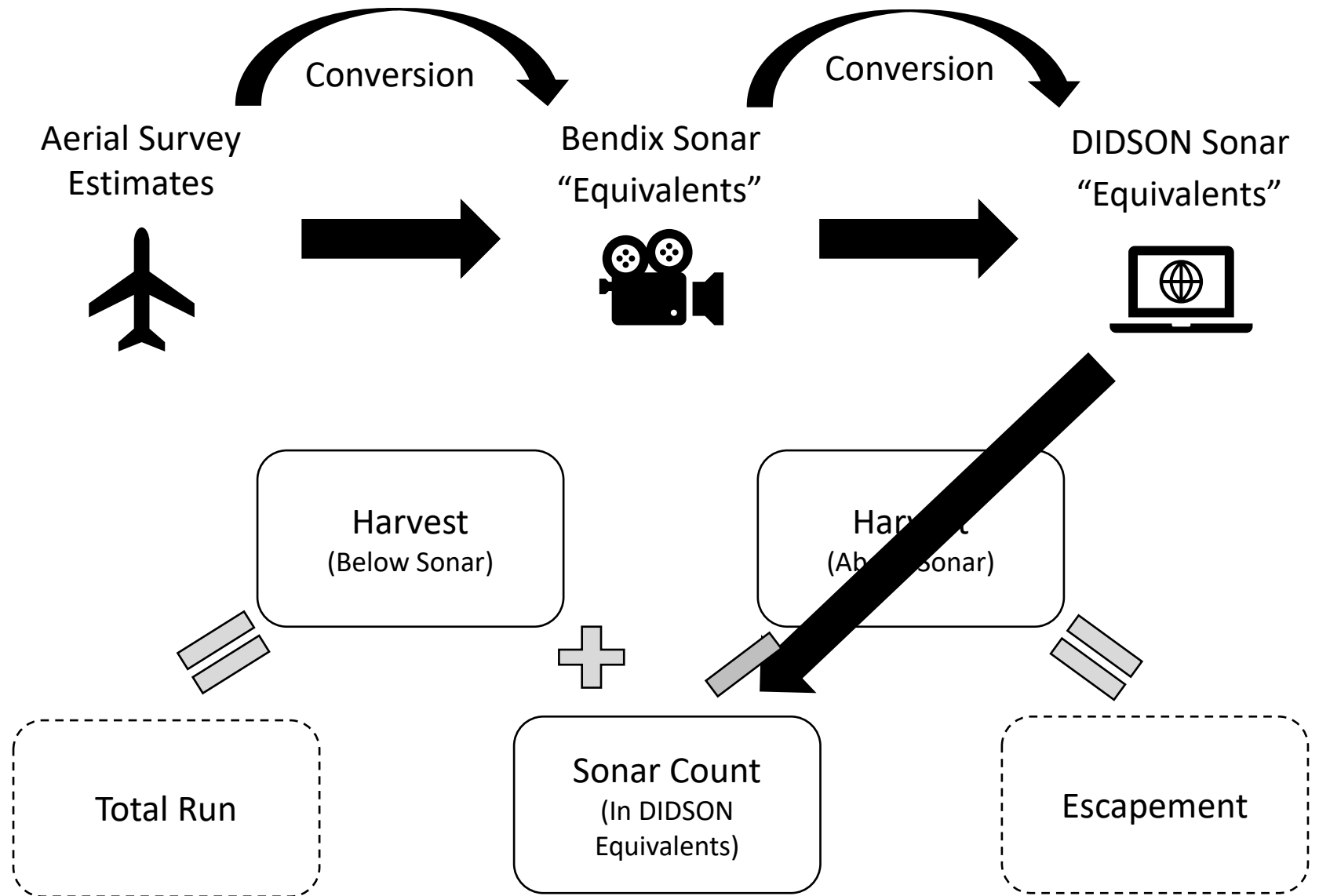
RC 3, Tab 10 - Oral



Overview

- Discuss construction of current set of historical estimates of king escapement and total run.
- Discuss the construction of current escapement goal.
- Present new run reconstruction model and new historical estimates of king escapement and total run.
- Discuss plans going forward.





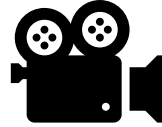
Aerial Survey
Estimates



Conversion



Bendix
"Equivalents"



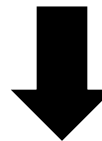
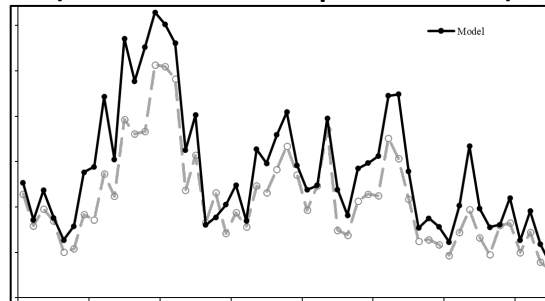
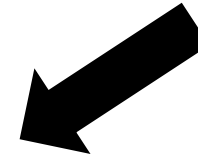
Conversion



DIDSON
"Equivalents"

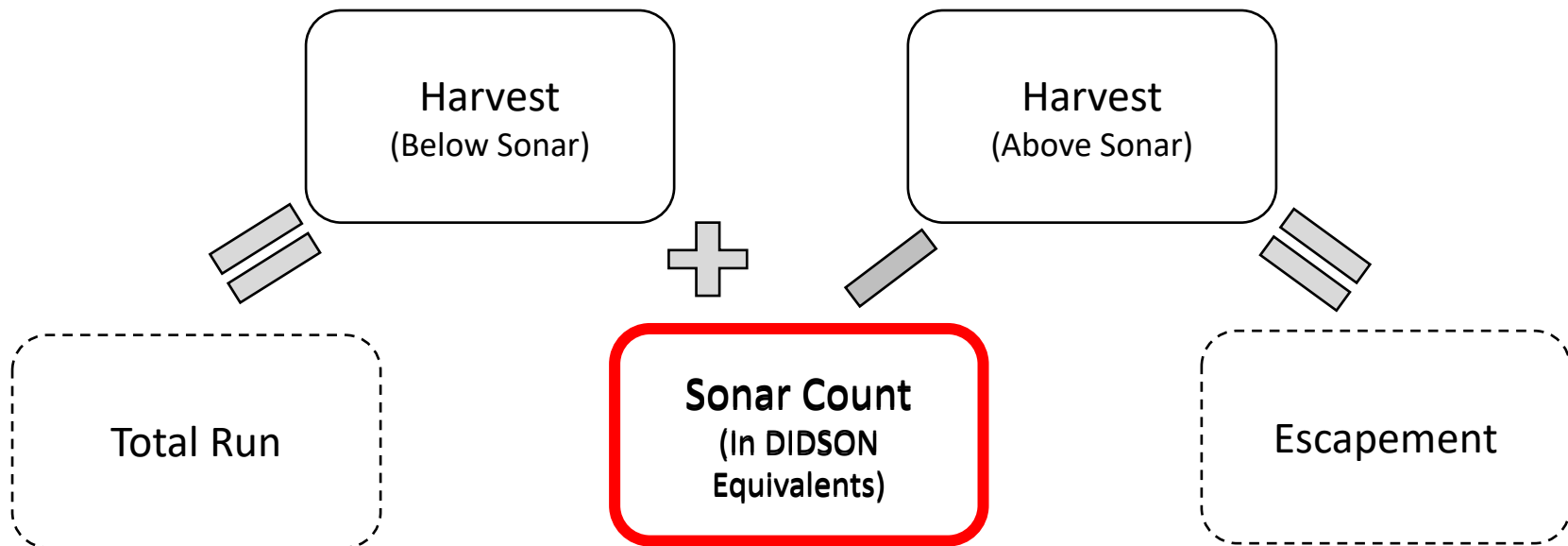


Total Run and Escapement
Estimates
(in DIDSON equivalents)



Escapement Goal (55,000–120,000)





Current Escapement Goal

- Current escapement goal assumes the sonar is accurate.
- Sonar is an unreliable index of abundance.
 - Hydroacoustic Study ('11–'14): 47% – 65%
 - Mark-Recapture ('14 –'16): 76% – 81%
- Conversion of conversion.

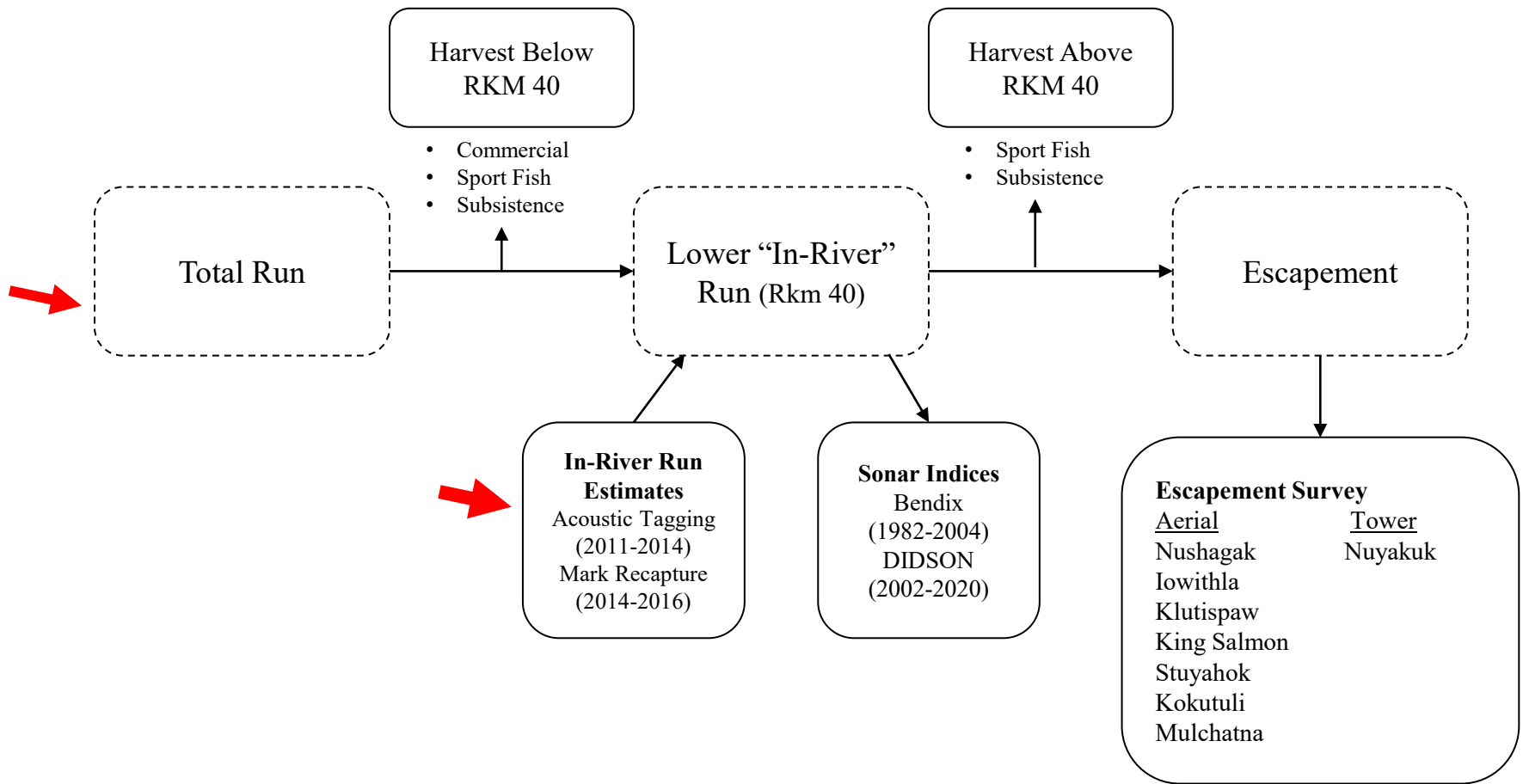


Development of a Run Reconstruction Model

- Maximum likelihood model developed for use in data limited situations.
- Similar models in use within Alaska
 - Kuskokwim River king salmon ~2012
 - Yukon River chum salmon ~2015
 - Susitna king salmon ~ 2020
- Uses all available data, and the error associated with each data source.



Model Diagram



Model Diagram



Model Diagram

Harvest Below
RKM 40

- Commercial
- Sport Fish
- Subsistence

Harvest Above
RKM 40

- Sport Fish
- Subsistence



Model Diagram

Harvest Below
RKM 40

- Commercial
- Sport Fish
- Subsistence

Harvest Above
RKM 40

- Sport Fish
- Subsistence

**In-River Run
Estimates**

Acoustic Tagging
(2011-2014)
Mark Recapture
(2014-2016)

Sonar Indices

Bendix
(1982-2004)
DIDSON
(2002-2020)



Model Diagram

Harvest Below
RKM 40

- Commercial
- Sport Fish
- Subsistence

Harvest Above
RKM 40

- Sport Fish
- Subsistence

**In-River Run
Estimates**

Acoustic Tagging
(2011-2014)
Mark Recapture
(2014-2016)

Sonar Indices

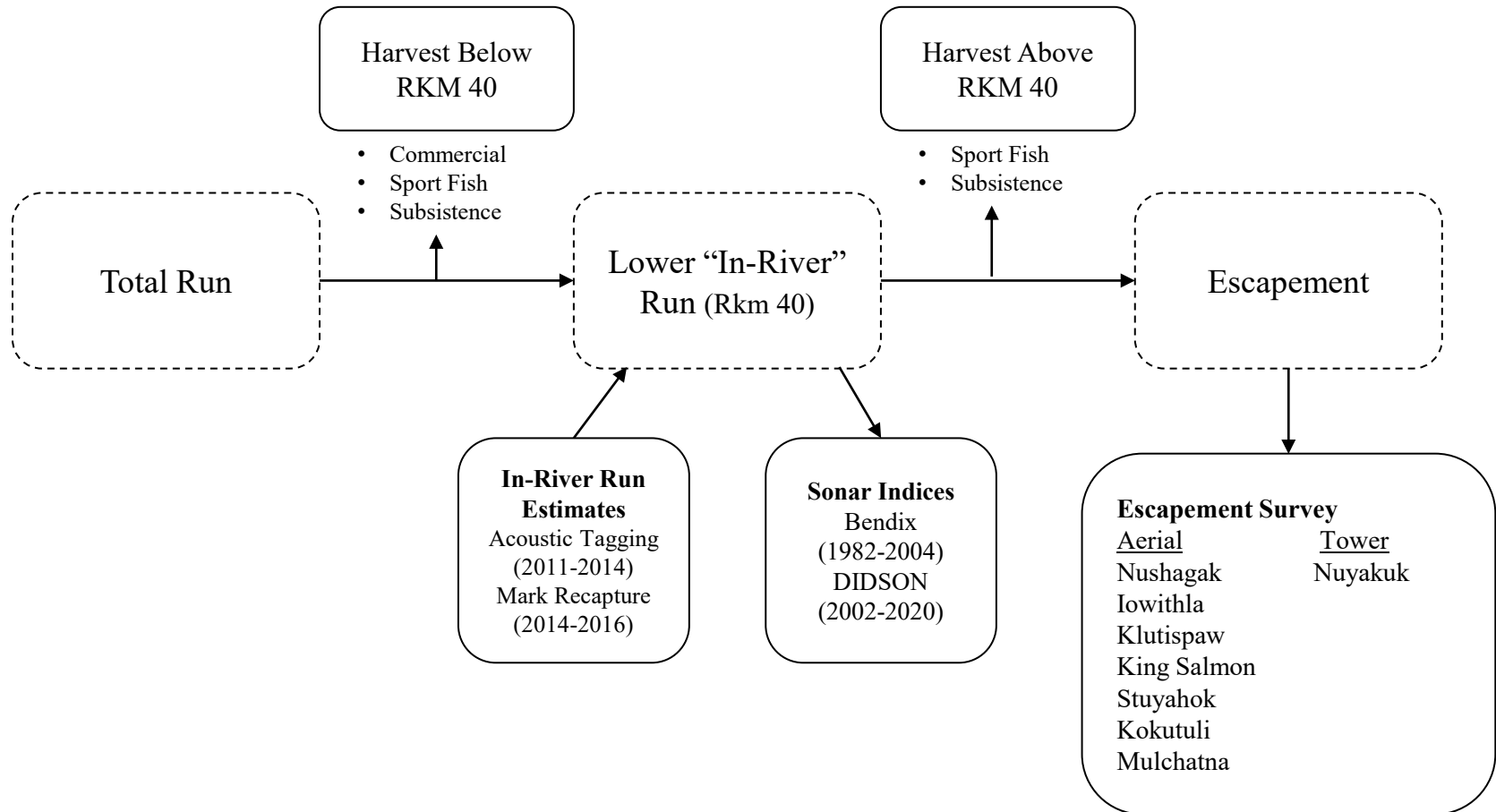
Bendix
(1982-2004)
DIDSON
(2002-2020)

Escapement Survey

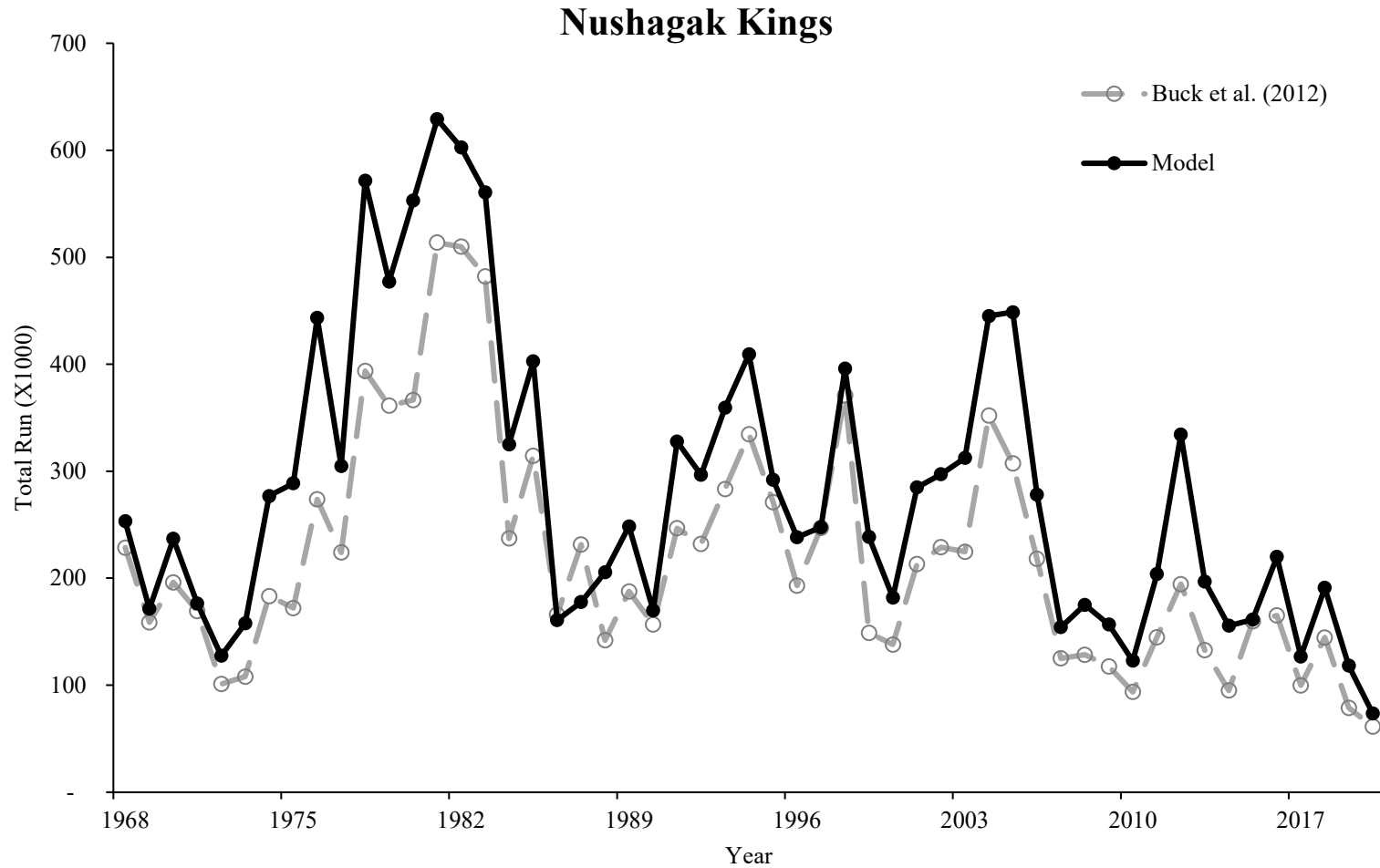
<u>Aerial</u>	<u>Tower</u>
Nushagak	Nuyakuk
Iowithla	
Klutispaw	
King Salmon	
Stuyahok	
Kokutuli	
Mulchatna	



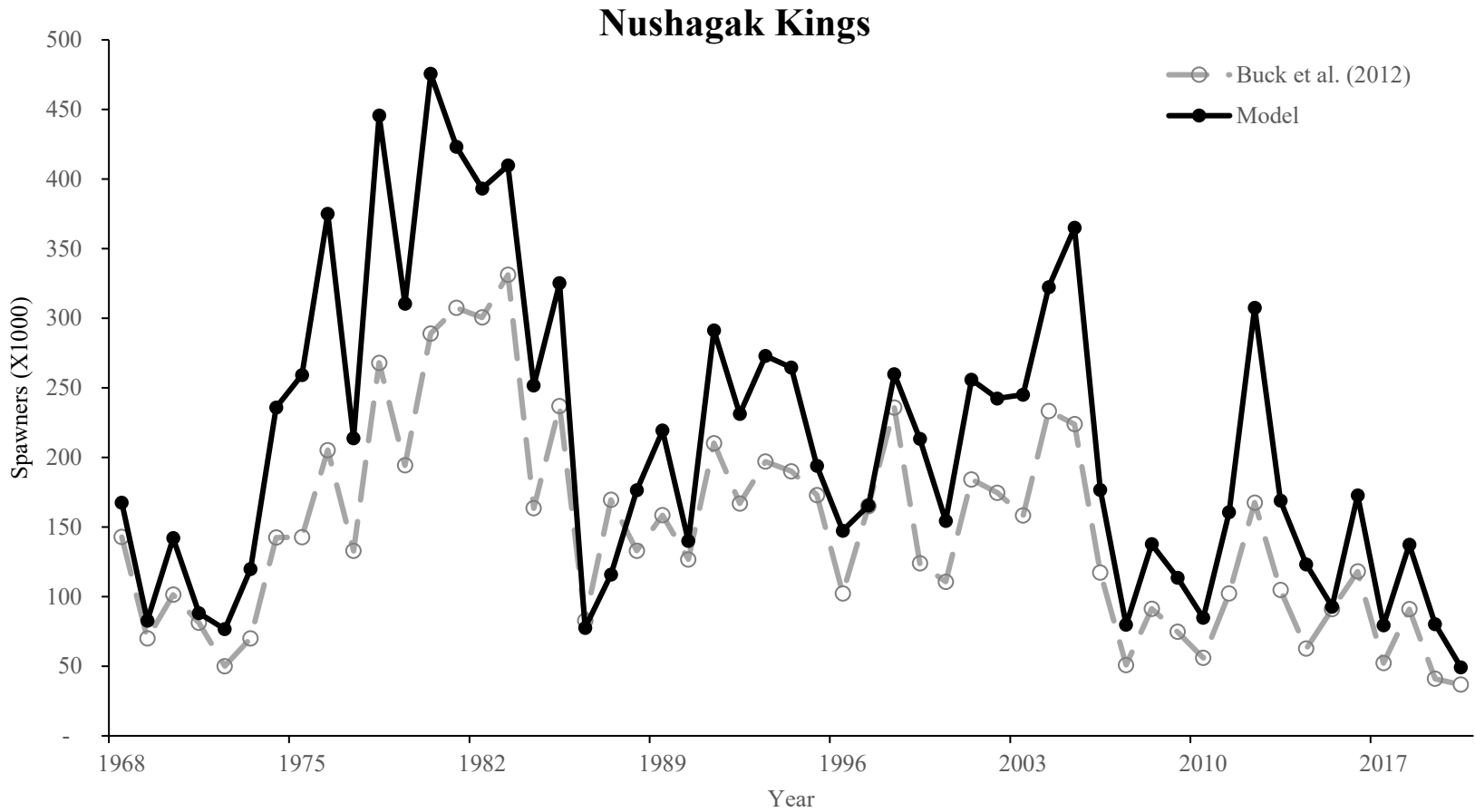
Model Diagram



Comparing Total Run



Comparing Escapement



Conclusions

- Current escapement goal has many assumptions.
- Current methodology does not account for error.
- Sonar project does not accurately measure success against the goal.
- Run reconstruction produces better estimates of total run and escapement.



Model Challenges

- Lack of overlapping long-term monitoring data.
- Differences in the results of the two tagging projects.
- Assumptions about precision of escapement and in-river surveys.
- Currently the best methodology.
- Does not fix our assessment program.



Looking Forward

- Continue secondary assessment.
- Add additional escapement monitoring projects.
- Improve harvest and age class estimates.
- Perform sonar independent total run and escapement estimates (to scale model).
- Provide additional inseason abundance estimates for managers.
- Develop a run reconstruction based escapement goal.



Questions

- What would a run reconstruction-based goal look like?

