Development of a Reliable Population Index for Band-tailed Pigeons

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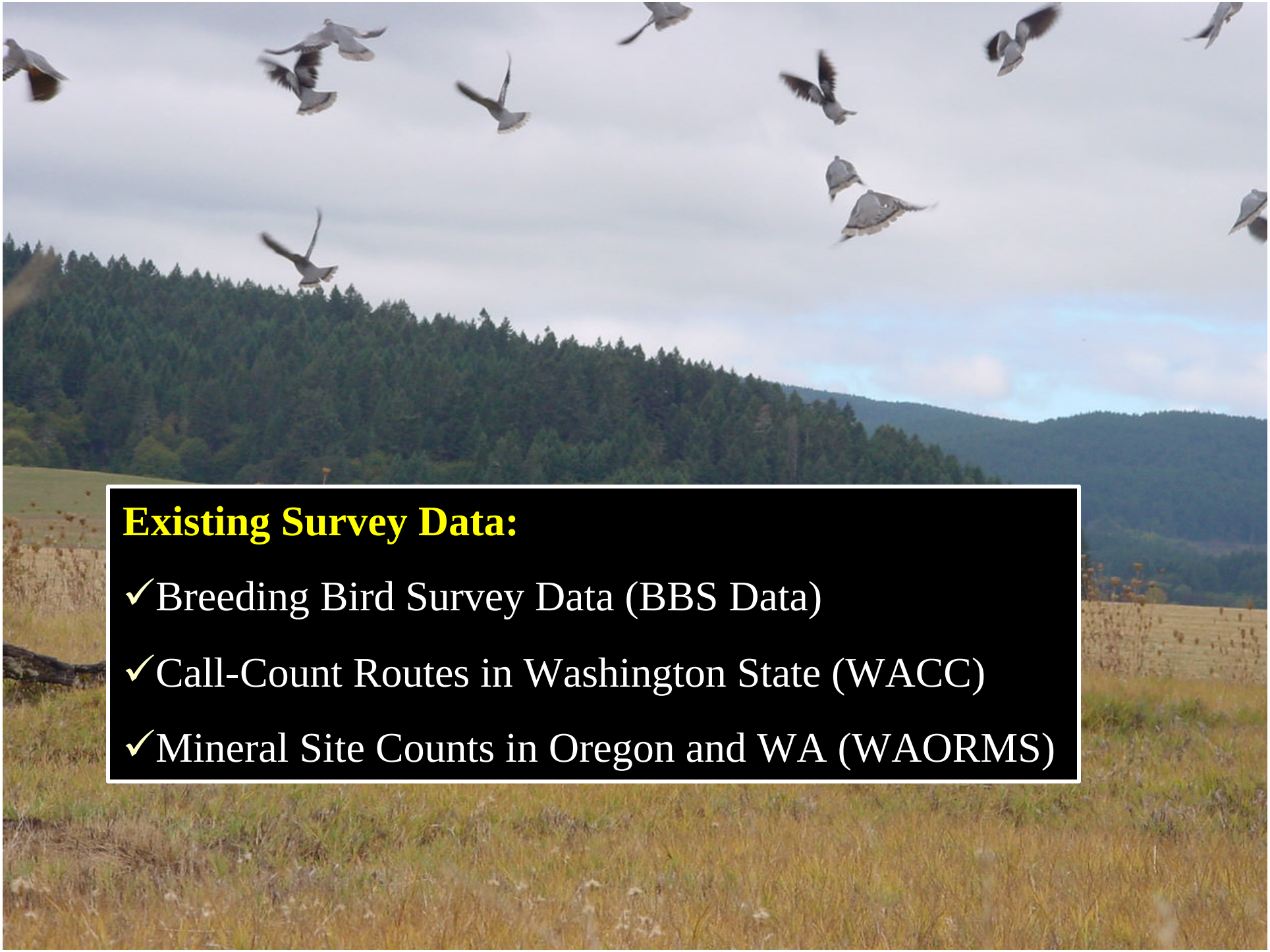
Cooperators:

- **U.S. Fish and Wildlife Service - Webless Migratory Game Bird Program**
- **California Department of Fish and Game**
- **Oregon State University**
- **Oregon Department of Fish and Wildlife**
- **Washington Department of Fish and Wildlife**
- **Canadian Wildlife Service**



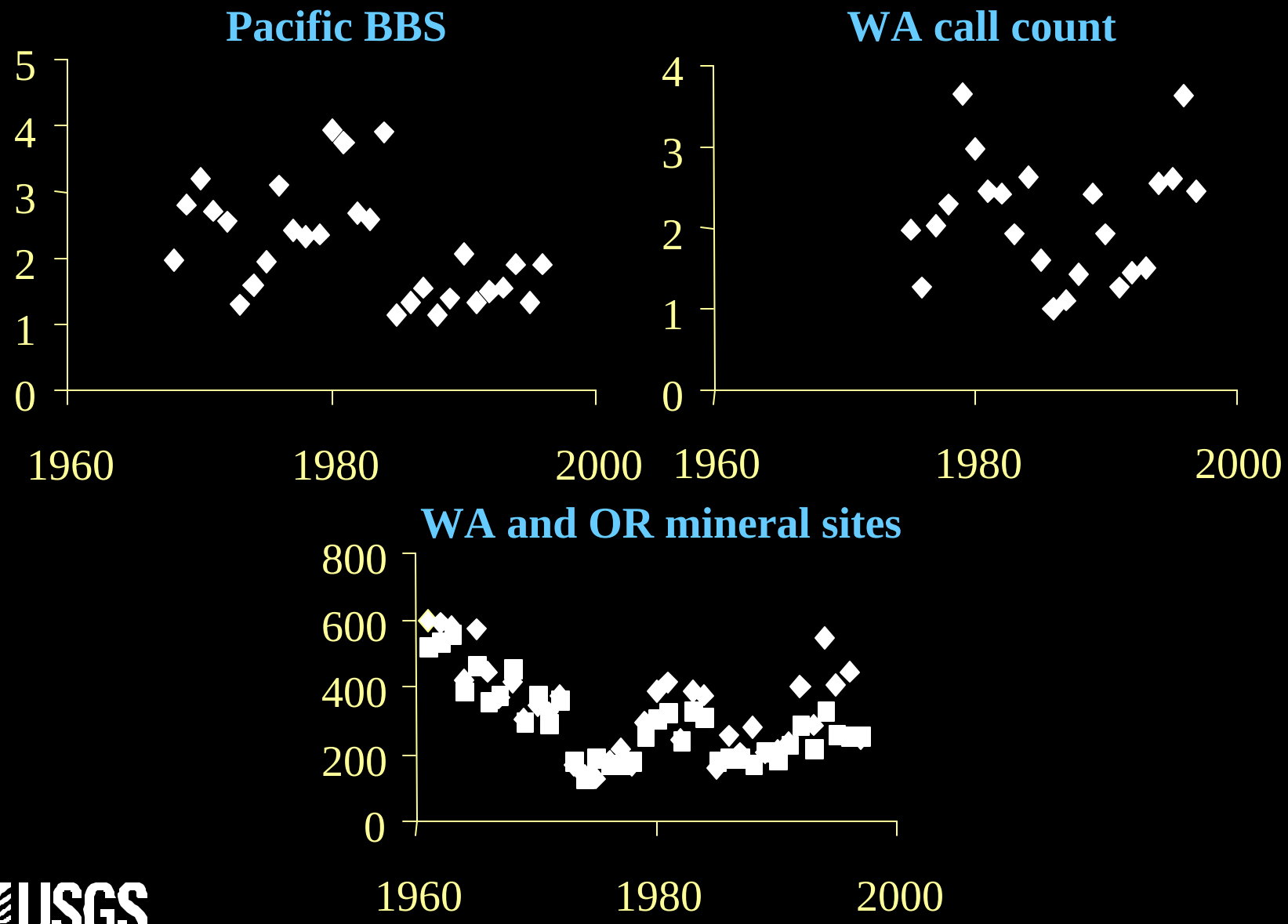
Existing Survey Data:

- ✓Breeding Bird Survey Data (BBS Data)
- ✓Call-Count Routes in Washington State (WACC)
- ✓Mineral Site Counts in Oregon and WA (WAORMS)

Objectives:

- Statistical power analysis of existing survey methods.
- Examine potential means of augmenting existing surveys to yield more powerful estimates of relative abundance of BTP.
- Develop methodology for Pacific Coast mineral site survey.

Historical Surveys:



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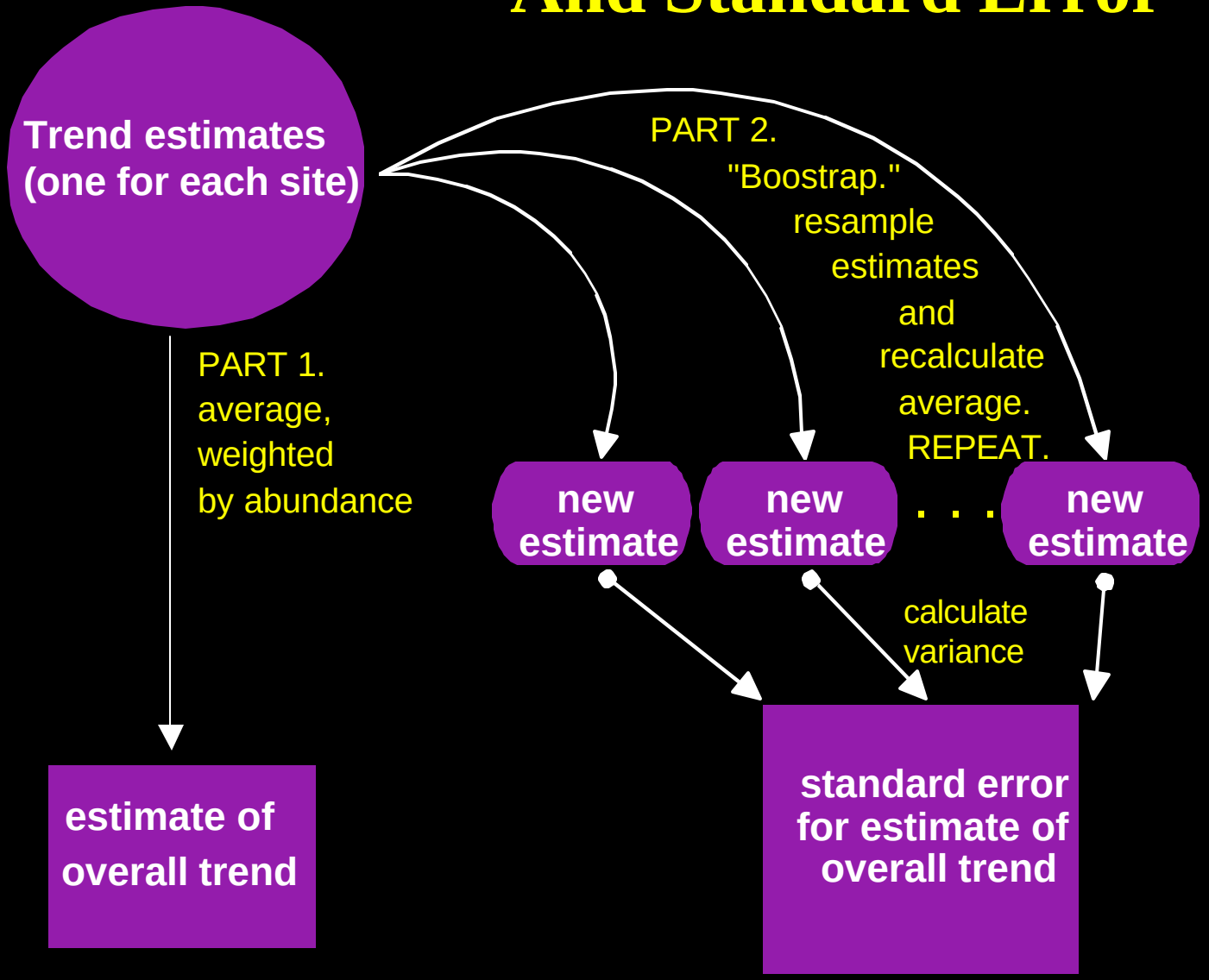
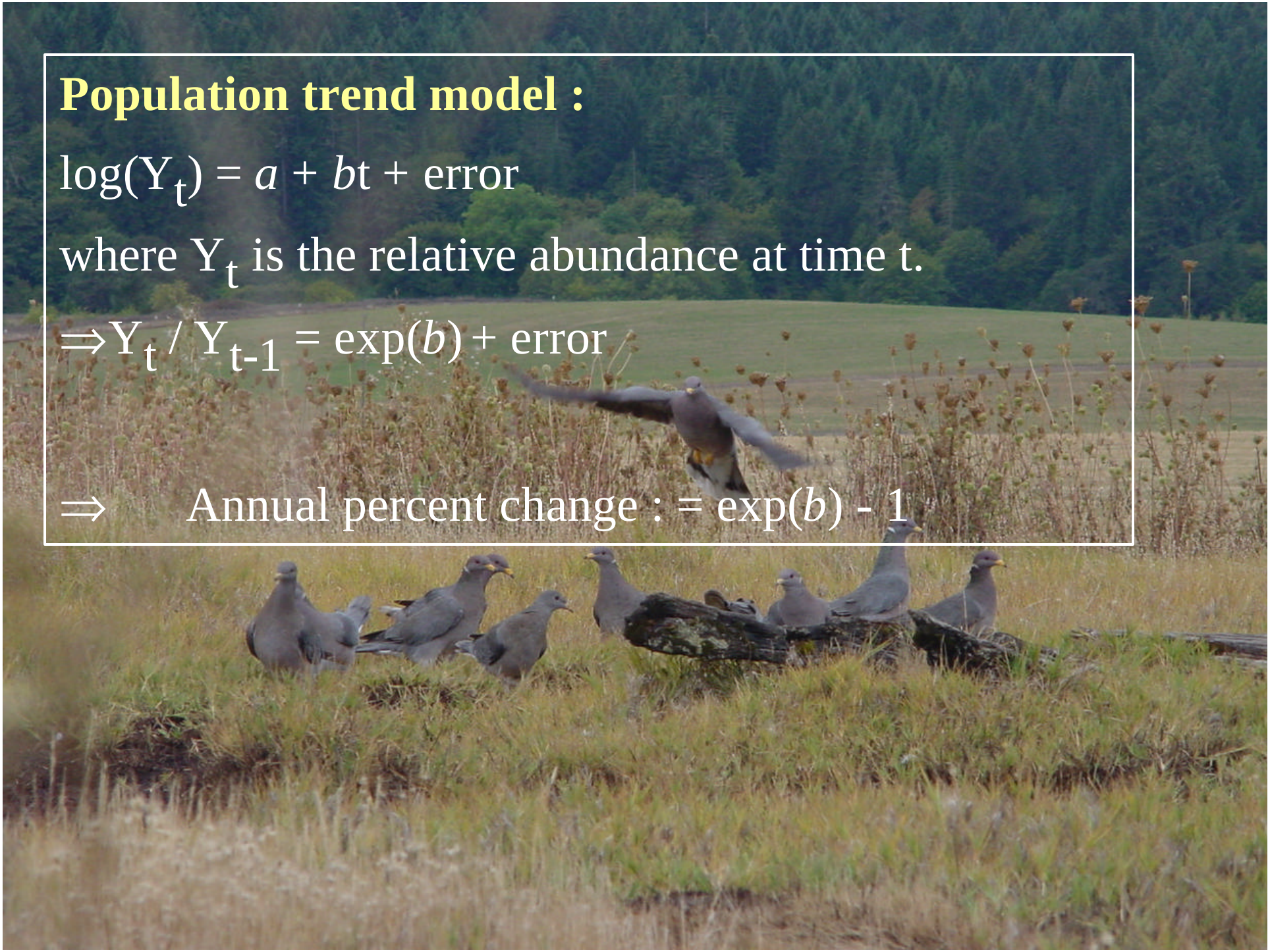
Estimates of Overall Trend And Standard Error





Population trend model :

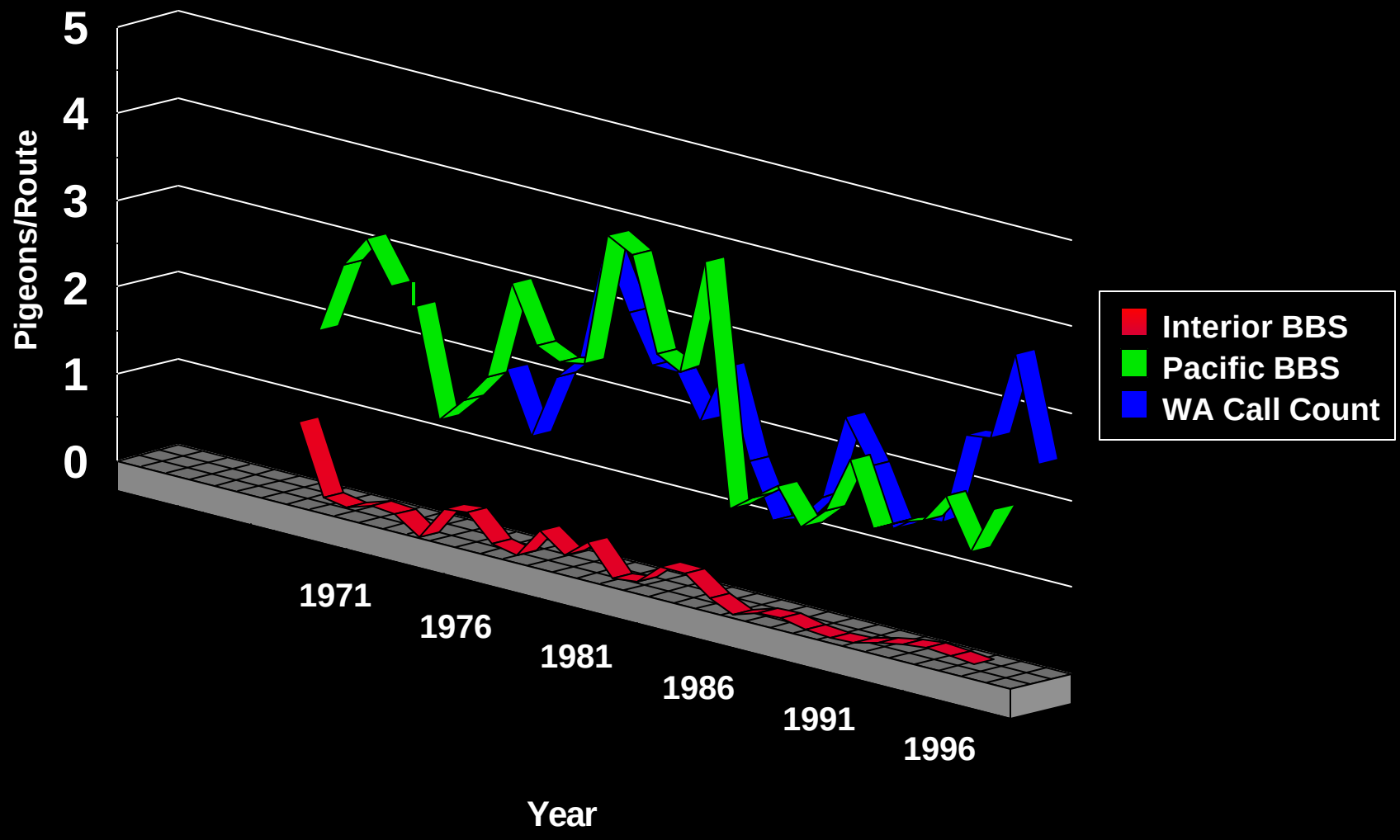
$\log(Y_t) = a + bt + \text{error}$

where Y_t is the relative abundance at time t.

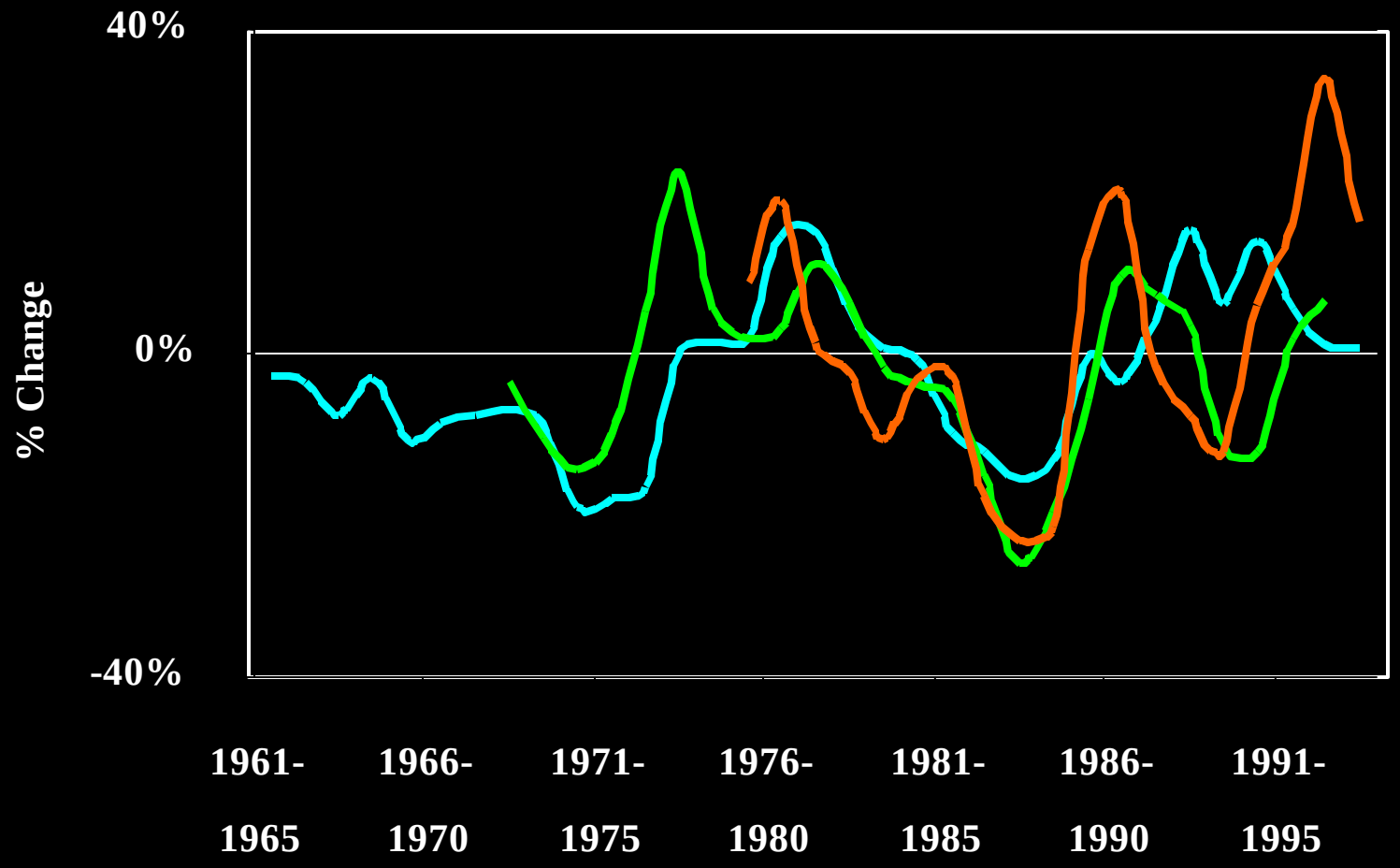
$\Rightarrow Y_t / Y_{t-1} = \exp(b) + \text{error}$

$\Rightarrow$ Annual percent change : $= \exp(b) - 1$

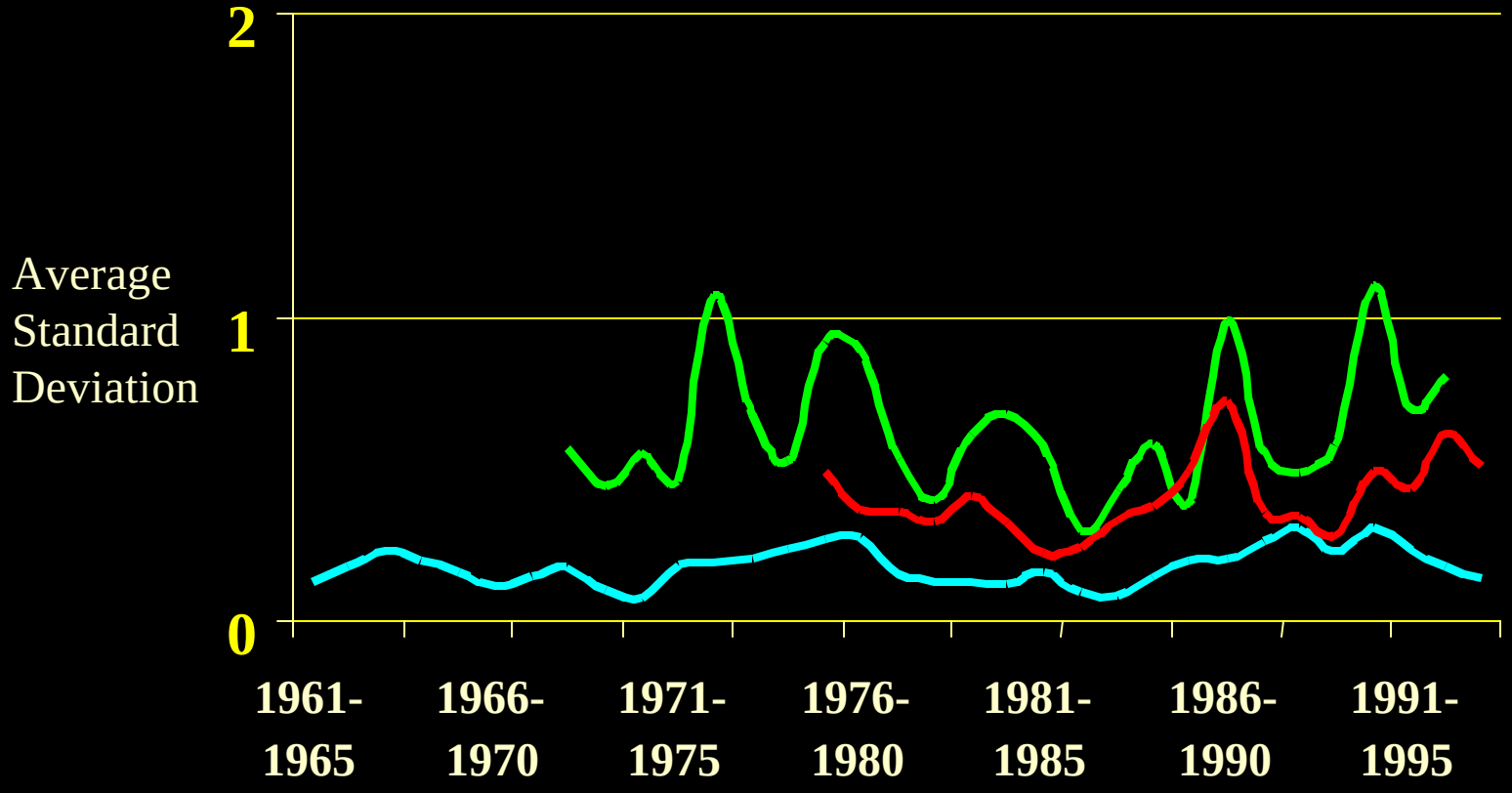
Band-tailed Pigeon Population Indices - Route Data



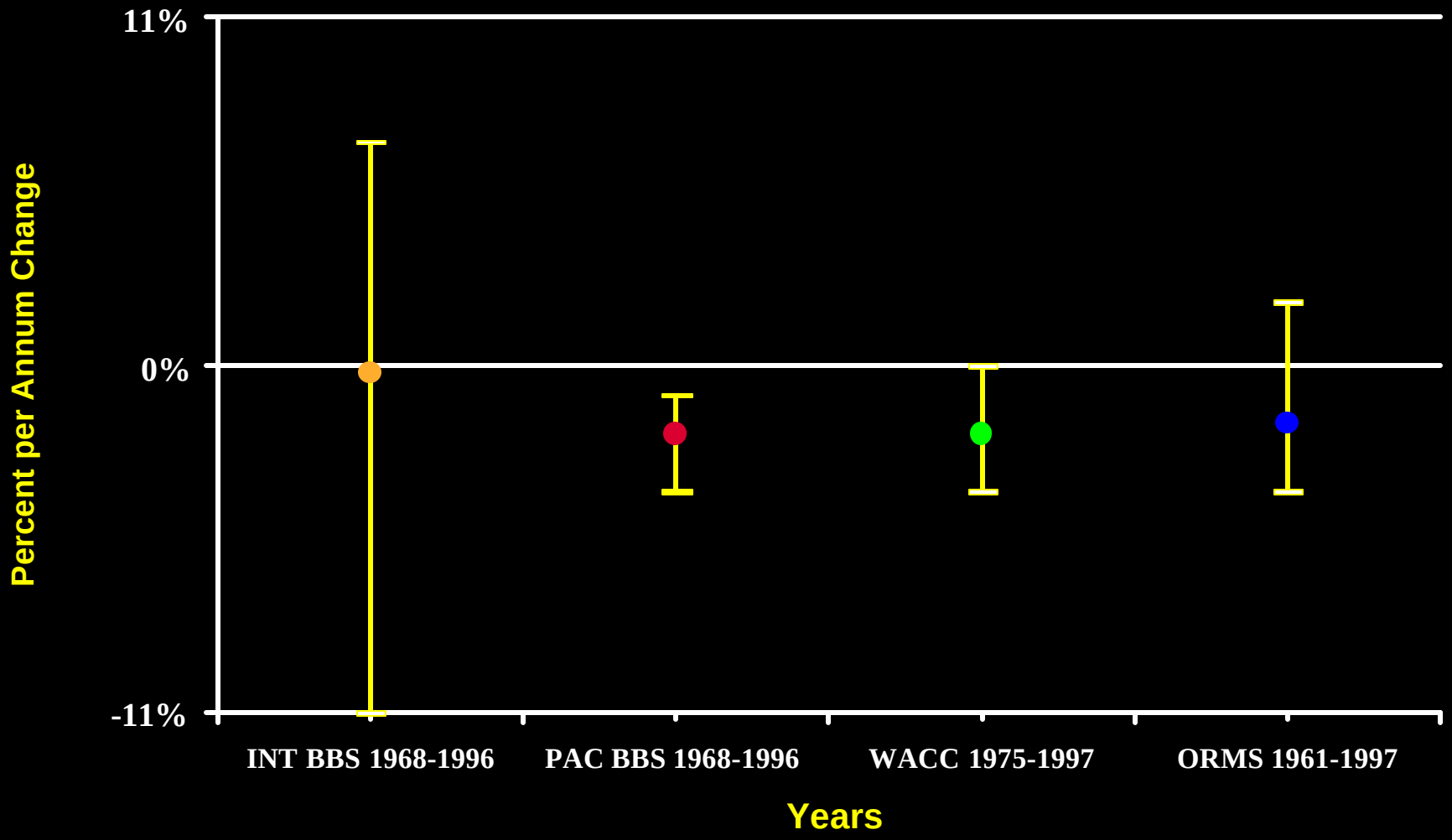
Population Trend Estimates 1961-1995 (5-year intervals)



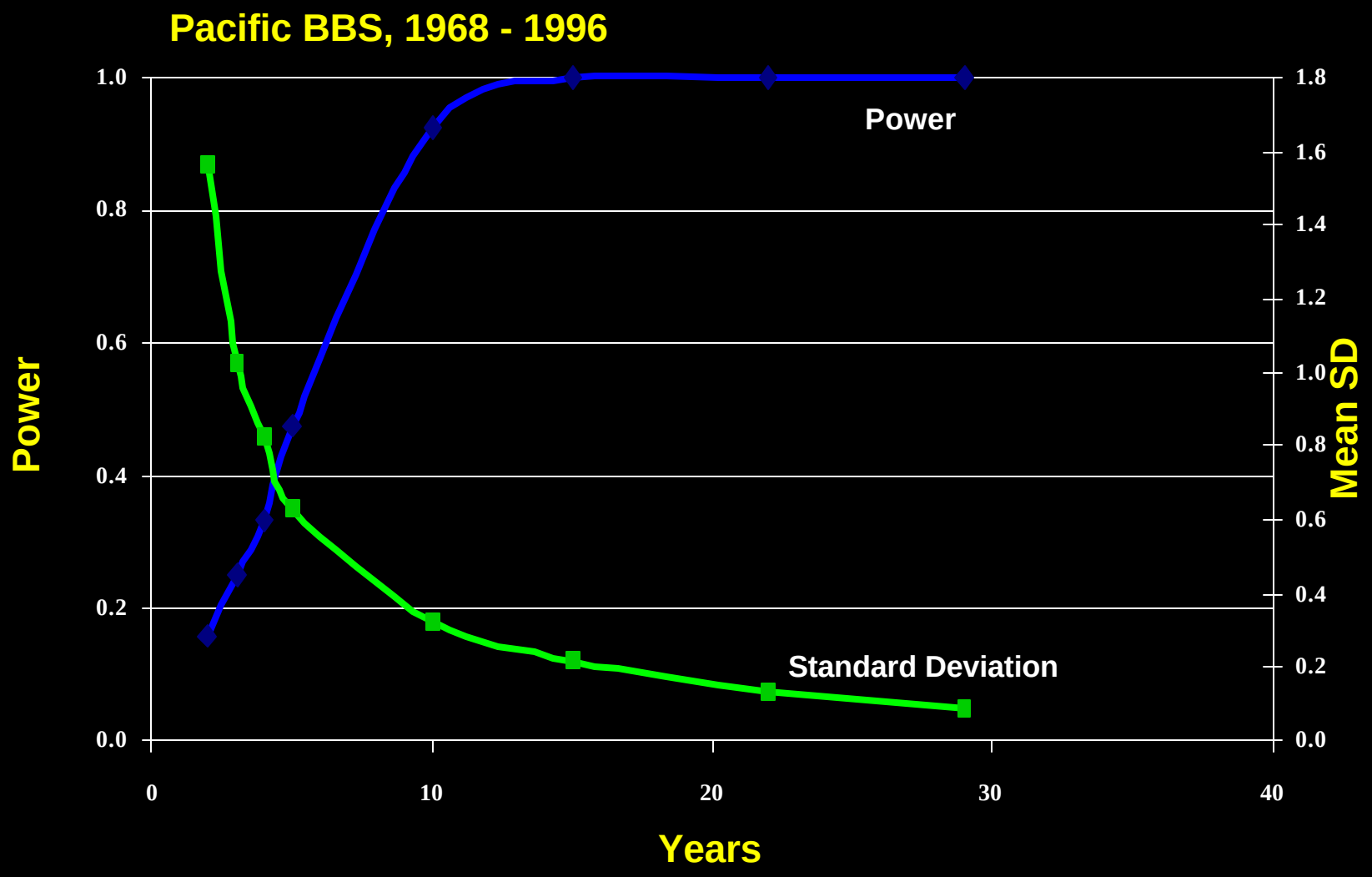
Standard Deviation of Trend Estimates 1961 –1995 (5 year intervals)



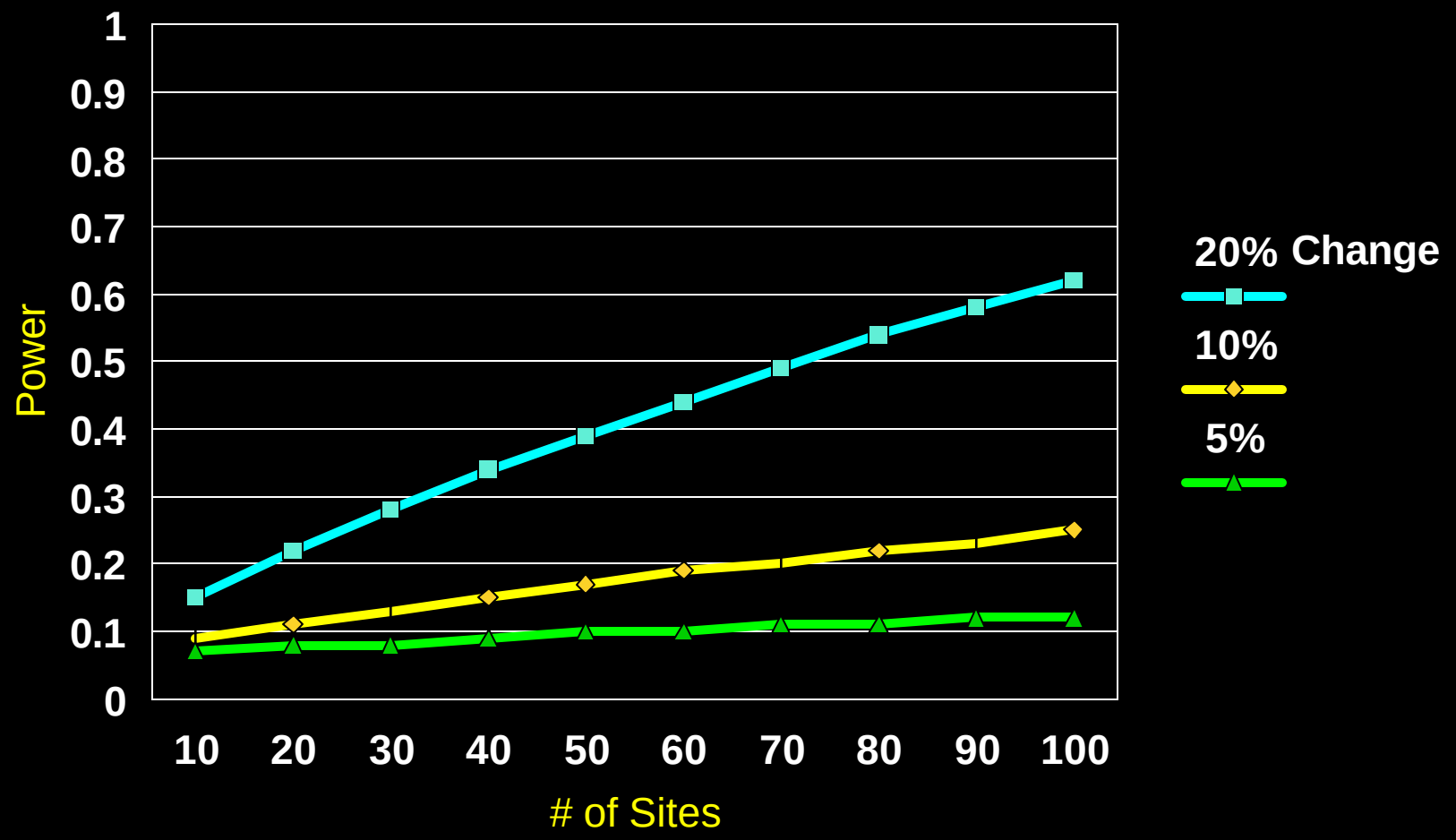
Estimation of Long-Term Trends in Abundance for Band-tailed Pigeons



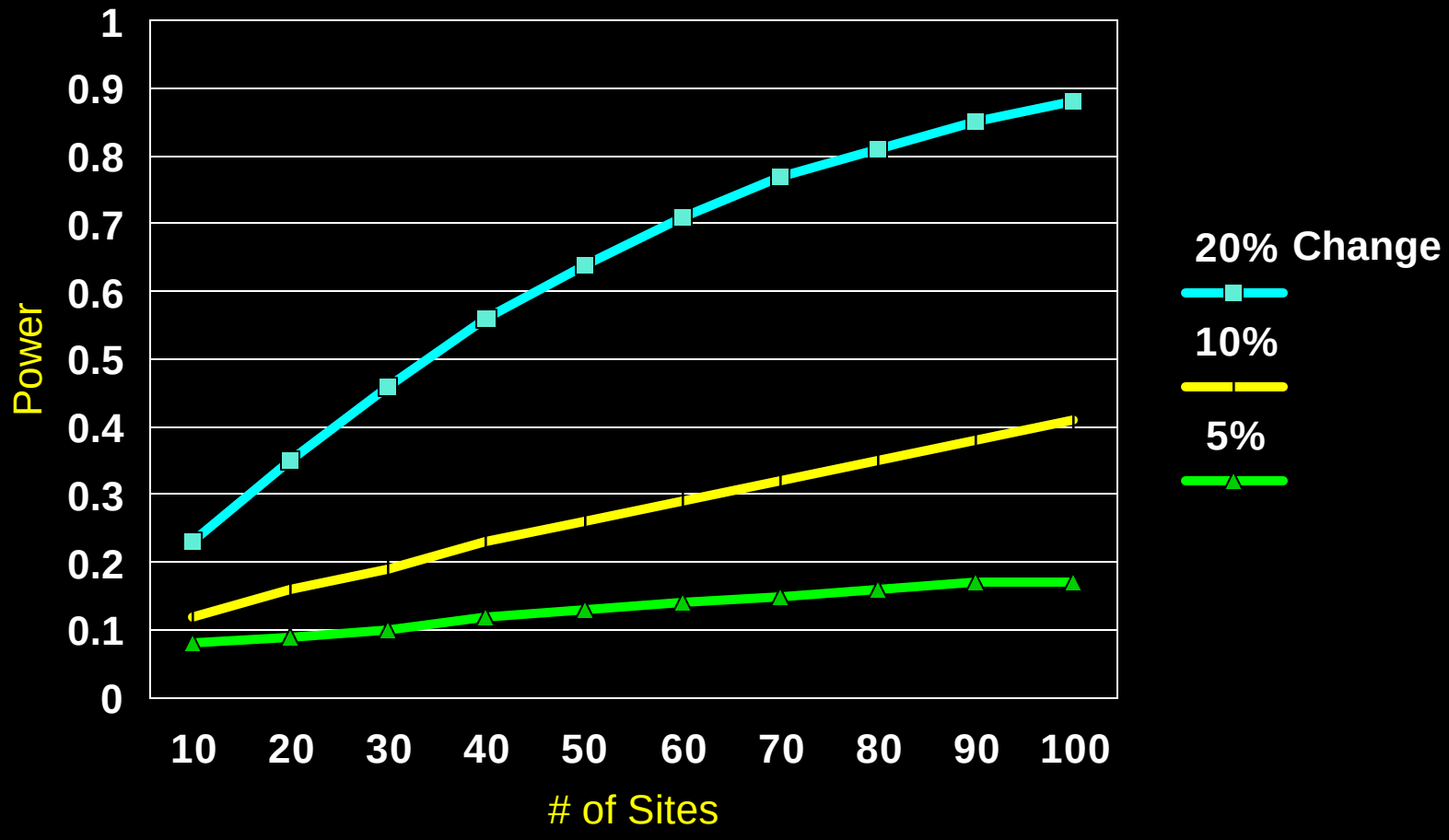
The relationship between power and term duration for Pacific BBS routes.



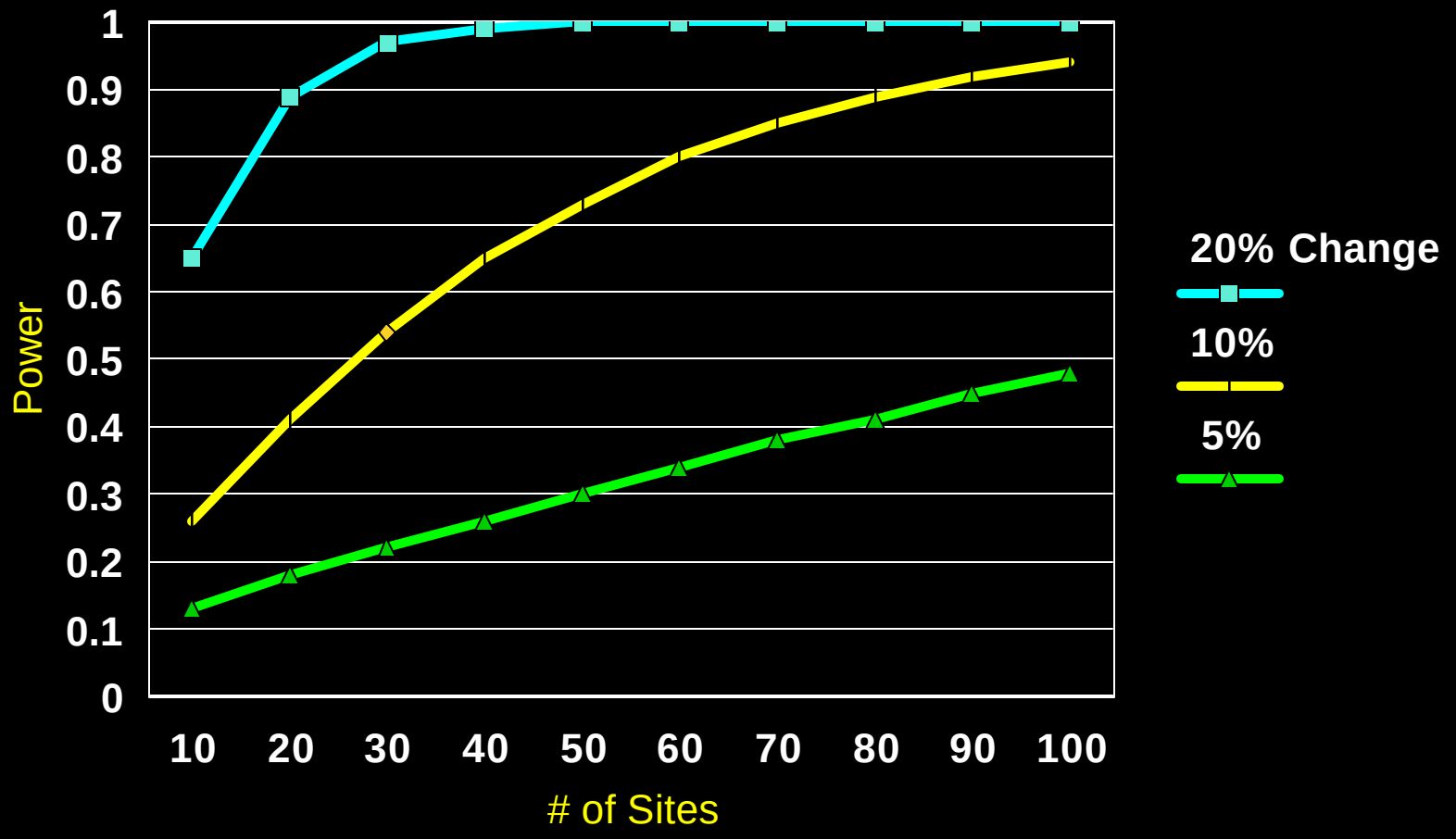
Estimated power for determining 3-year trends in abundance for band-tailed pigeons with the Pacific BBS Survey.



Estimated power for determining 3-year trends in abundance for band-tailed pigeons on Washington call-count routes.



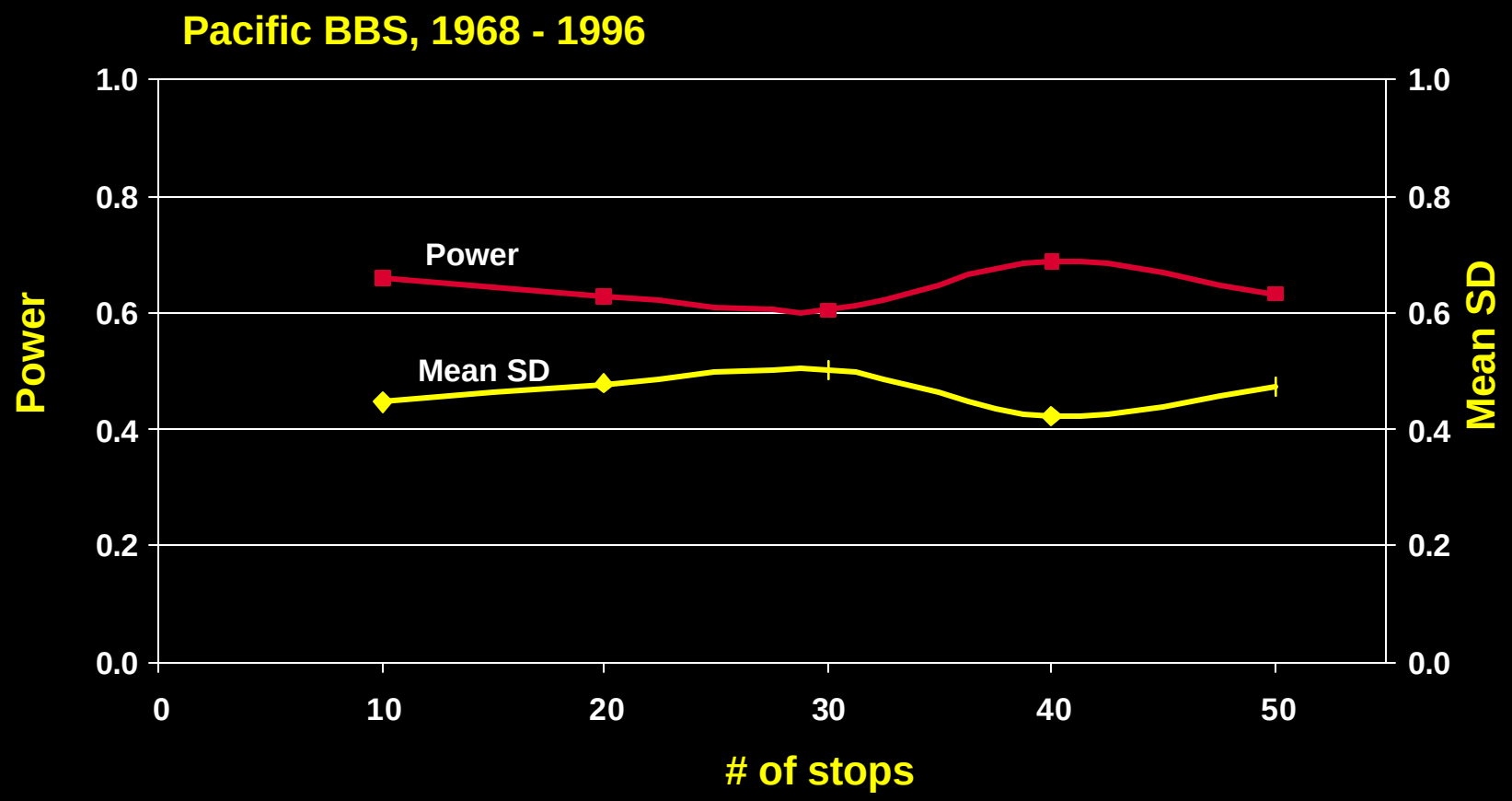
Estimated power for determining 3-year trends in abundance for band-tailed pigeons at Washington and Oregon mineral sites.



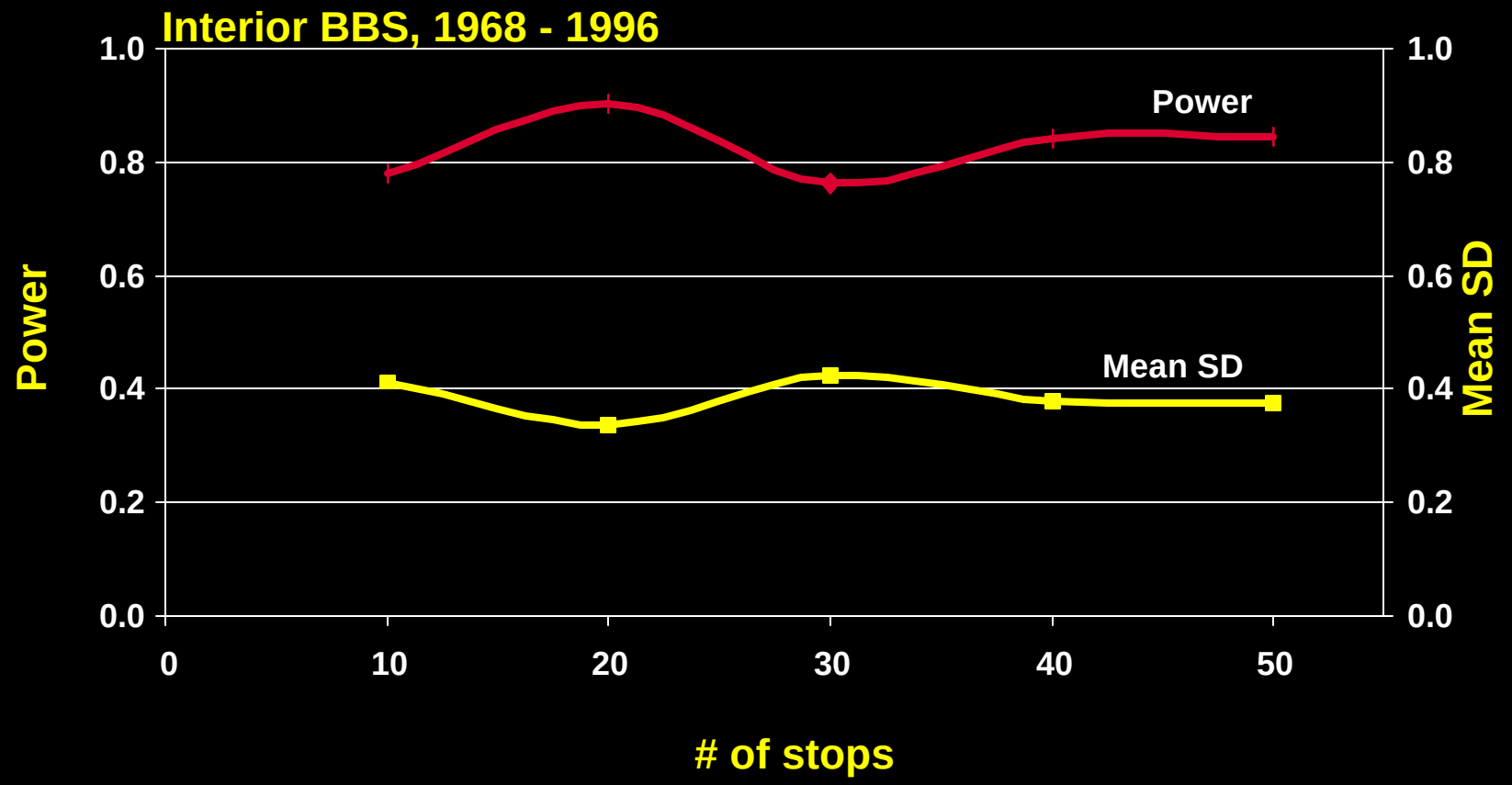
Sample Size:

Survey	# Samples	# producing estimate	% producing estimate
Pacific BBS	271.6	77.8	29%
Interior BBS	138.5	8.1	6%
Washington Call counts	54.5	35.9	66%
Mineral Sites	26.2	24.3	93%

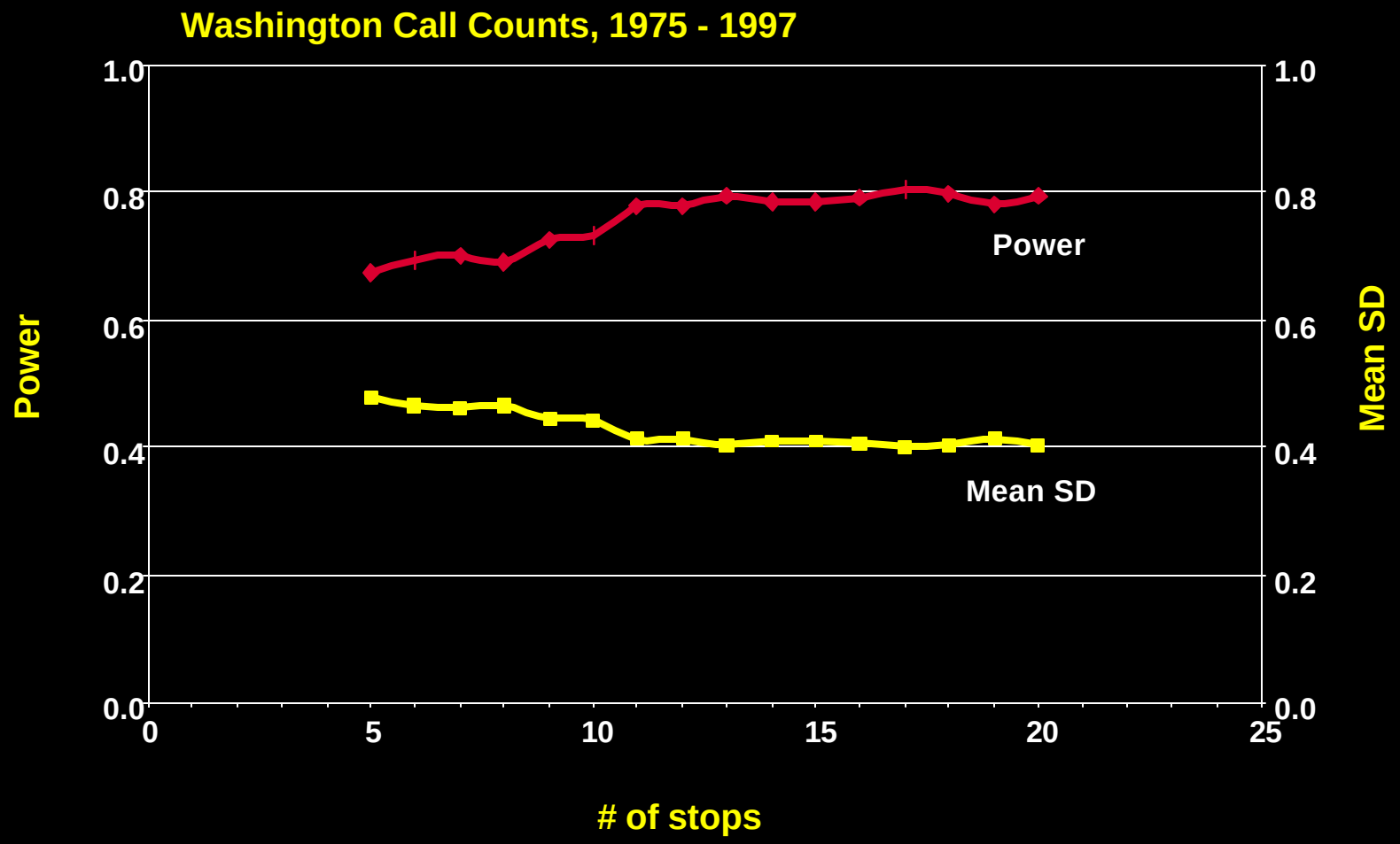
The relationship between power and route length for Pacific BBS surveys



The relationship between power and route length for Interior BBS surveys.



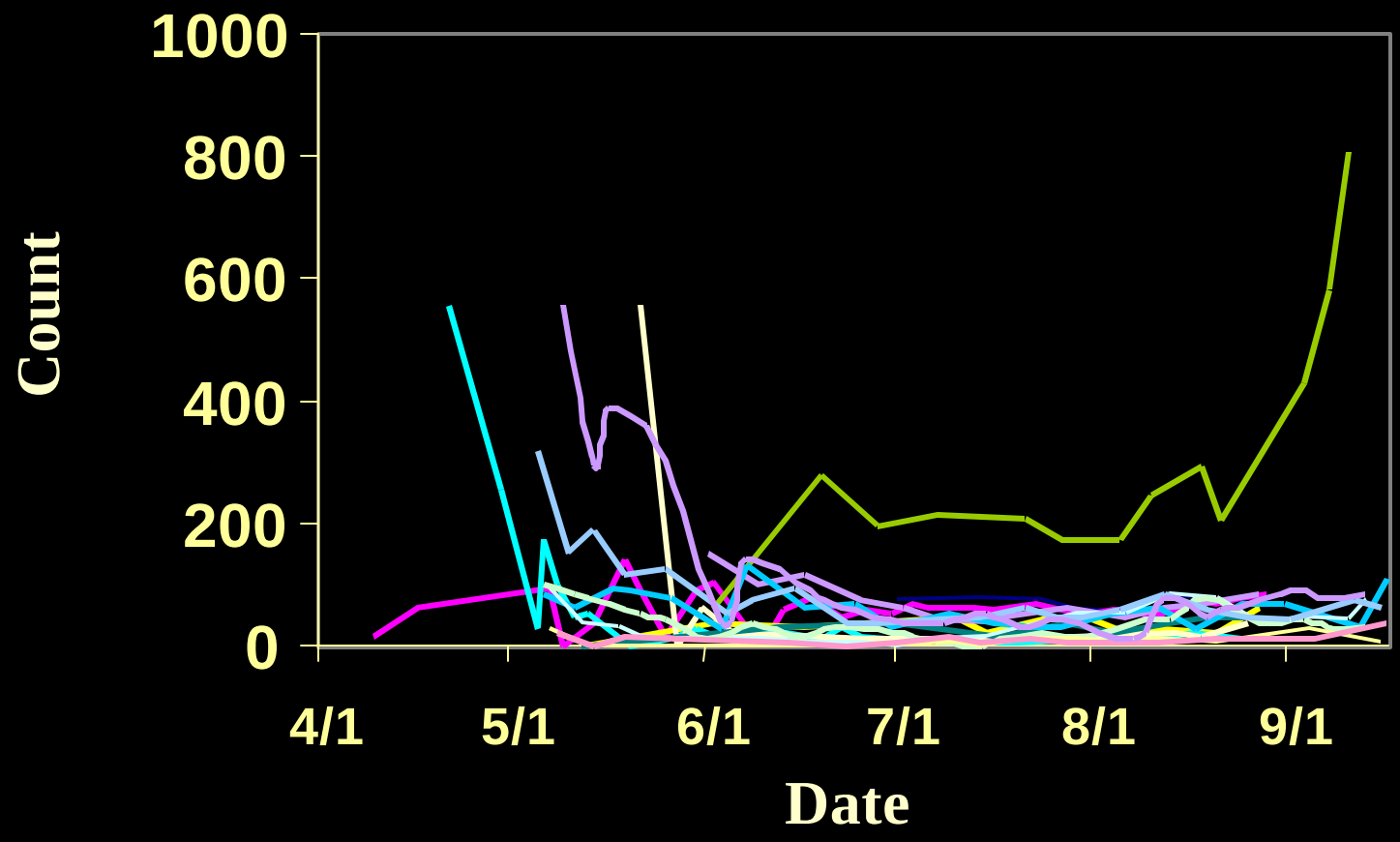
The relationship between power and route length for Washington call-count routes.



Power Table: Estimated probability of detecting a 10% per annum change over a 3-year term at the 0.1 significance level

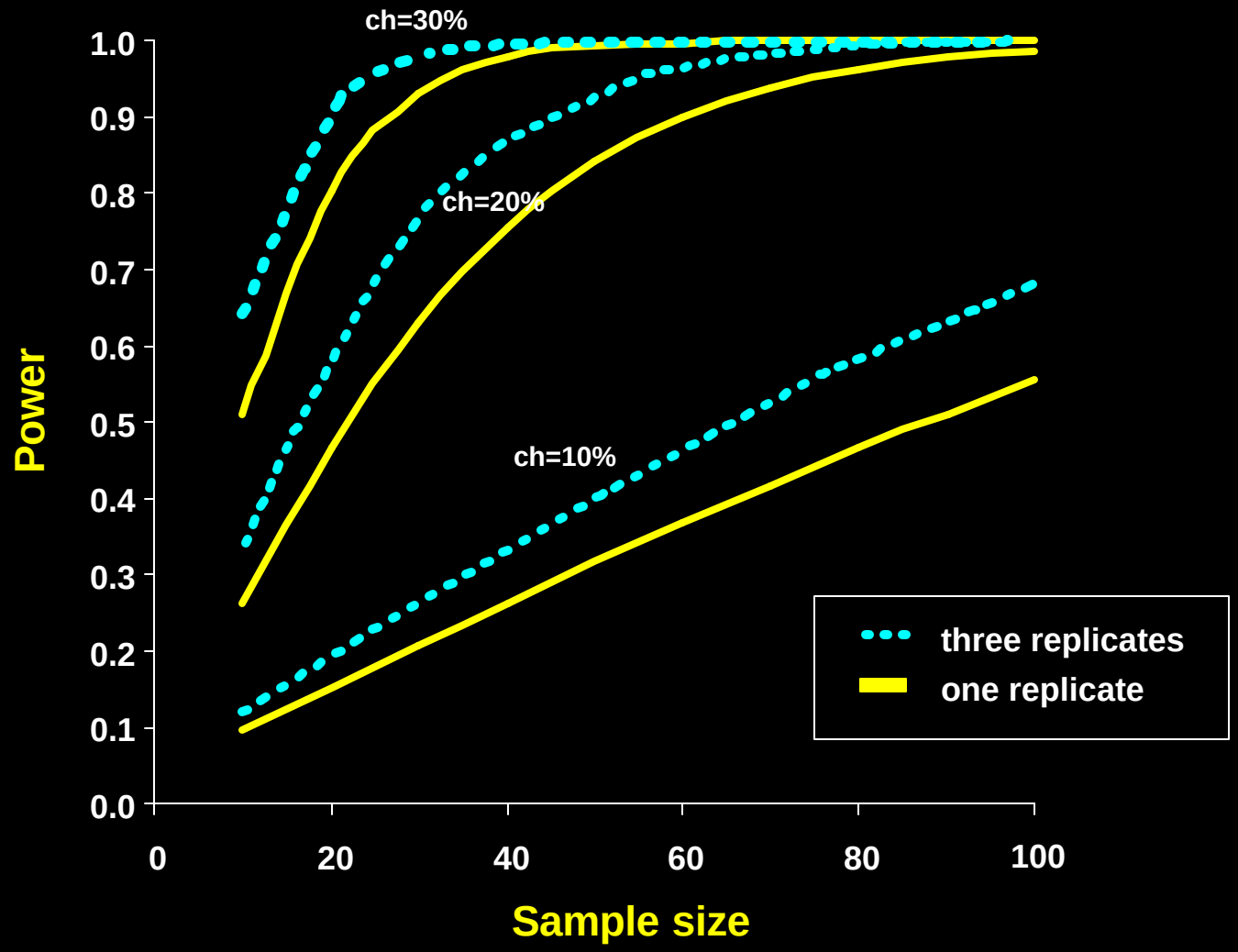
# of Sites	Pacific BBS	WA Call Counts	Mineral Counts
30	0.13	0.19	0.79
50	0.16	0.26	0.94
70	0.19	0.32	0.98
100	0.21	0.41	1.00

Band-tailed pigeons counted at mineral sites in California 1998-1999



July ("10 days) provides the most reliable trend estimates

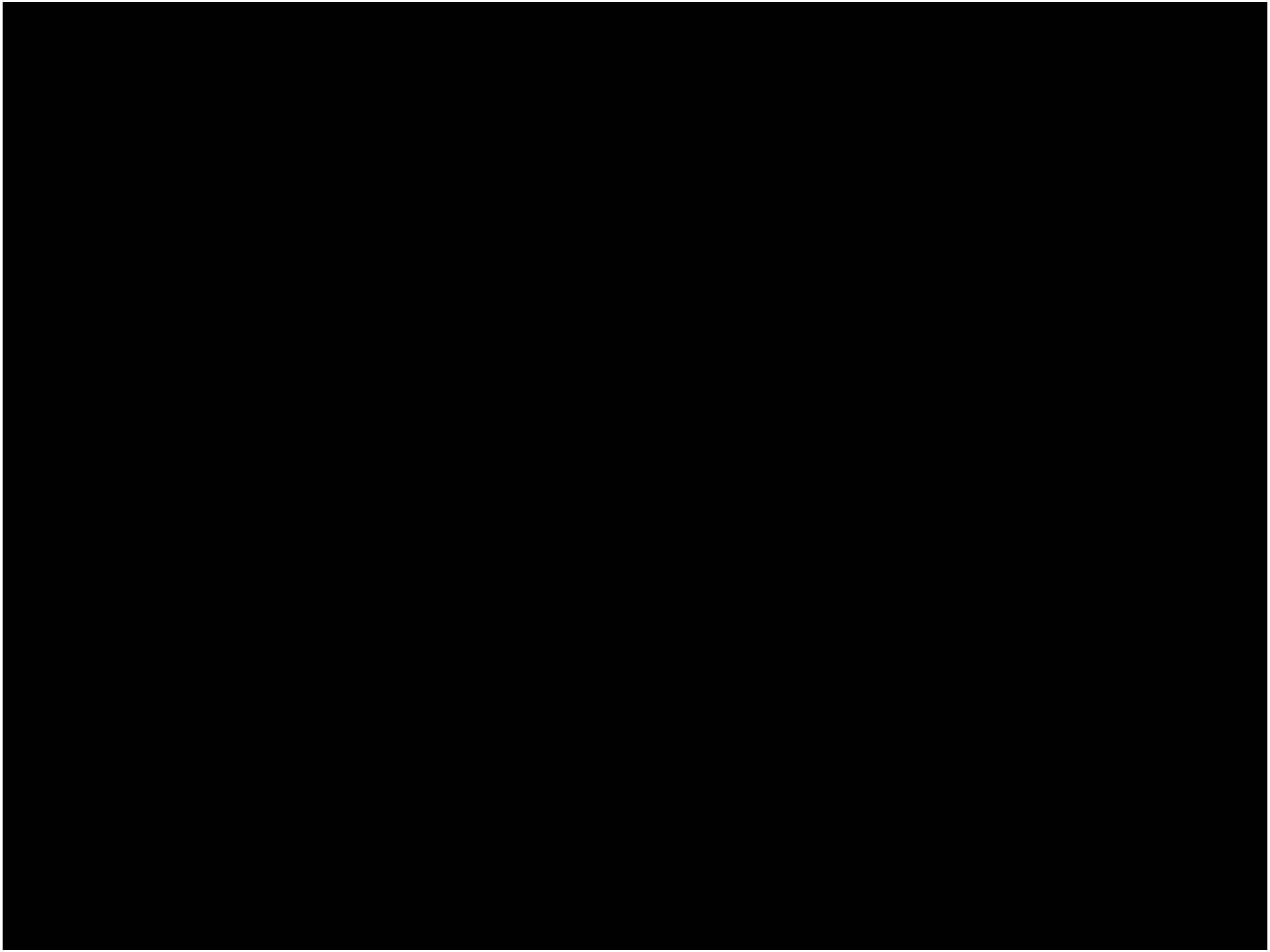
Effects of replication on power for estimating 2-year trends in abundance of band-tailed pigeons at Northern California mineral sites



Management Implications:

✓Mineral site counts offer the greatest potential to detect short term changes in relative abundance of band-tailed pigeons.

✓Replication moderately improves survey power.

✓Mineral site surveys should be conducted in July "10 days.

✓Range-wide survey needed to index relative abundance of Pacific Coast band-tailed pigeons.