

# CS1 — Lincoln Park Zoo

*Population Biology Software Audit — Volunteer Research Assistant, 2009*

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Category IV — Negentropy in Community Service | Reflections in Science and Education: A Forensic Documentary

William J. Moressi, Ph.D. · [reflectionsinteachingandscience.org](http://reflectionsinteachingandscience.org)

## Overview

Following retirement from Northeastern Illinois University, William J. Moressi volunteered as a research assistant at Lincoln Park Zoo under Dr. Lisa Faust — then a leading population biologist at the zoo, later Vice President of Conservation & Science, and the original developer of PopLink, a demographic modeling program used throughout the zoo and aquarium field for managing endangered species population data. Moressi's work centered on a comparative software audit examining whether PopLink and the older SPARKS studbook program produced consistent results when analyzing identical population data.

## Negentropy Evaluation — Three-Part Test

### Before State (Disorder)

Two competing software systems — SPARKS, the established studbook analysis tool, and PopLink, a newer program intended to eventually succeed it — existed without a documented, systematic comparison of whether they produced consistent demographic outputs from identical source data. This left an open, unresolved question for institutions relying on either program to guide conservation decisions.

### Ordering Agent

Moressi designed and executed a controlled audit: isolating a single, common SPARKS studbook dataset (North American individuals, 1/1/1980–1/1/2005), importing the identical dataset into both SPARKS and PopLink, and constructing a comparative matrix (S–P, SPARKS output minus PopLink output) across mortality probability (Qx) and number-at-risk (NatRisk) metrics across a survey of 21 species.

### After State (Measurable Outcome)

The audit produced a documented, quantified divergence between the two systems at specific life-stage points. Using the White-nosed Coati (*Narica*) as a fully worked example — drawn from a pooled dataset of 108 individuals with partial or full lifespans, 59 recorded deaths by the analysis end date, and a documented wild/captive origin split (43 wild, 64 captive) — at Age 0, PopLink's at-risk population estimate exceeded SPARKS' by roughly 50 individuals per sex (M S–P = –50.105, F S–P = –49.795). Mortality probability (Qx) divergence was most pronounced at the earliest and latest life stages (Age 0: M S–P = 0.064; Age 20: F S–P = –0.101), while the average divergence across the full lifecycle was small (–0.002).

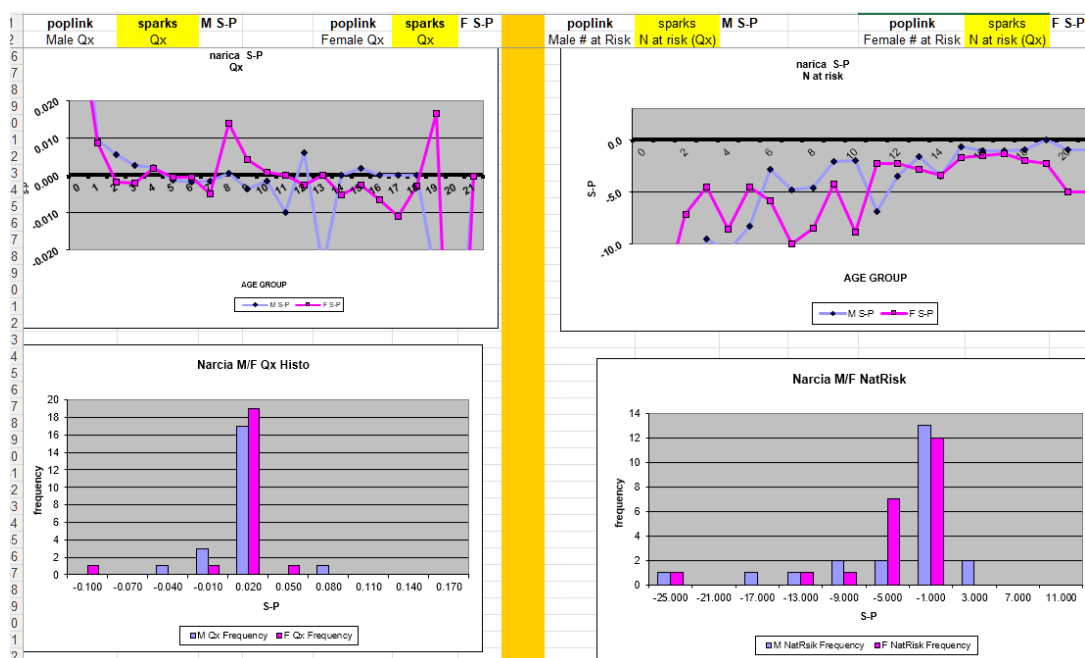


Fig. 1 — Narica (White-nosed Coati) S–P charts: Qx and N-at-risk divergence by age group, with frequency histograms.

DATASET DESCRIPTION (see the Included Individuals tab for a complete list of individuals in the analysis)

|                                                                       | Pooled Data |
|-----------------------------------------------------------------------|-------------|
| # of individuals with partial or full lifespans in analysis           | 108         |
| # of individuals which had died by 1 January 2005 (analysis end date) | 59          |
| # of individuals which had identical birth date and death date        | 2           |
| # of males                                                            | 45          |
| # of females                                                          | 40          |
| # of other sex individuals (unknown, abnormal, hermaphrodite)         | 23          |
| # of wild origin individuals                                          | 43          |
| # of captive origin individuals                                       | 64          |
| # of unknown origin individuals                                       | 1           |
| # of left-truncated individuals                                       | 43          |
| # of right-censored individuals                                       | 49          |

Fig. 2 — Narica dataset description: pooled data composition underlying the analysis.

This same structural pattern — pronounced divergence concentrated at the youngest and oldest age classes, with closer agreement in the middle of the lifespan — recurs in at least two additional species reviewed in the broader survey, Gorilla and Cheetah, both showing large N-at-risk divergence in early age groups and sharp late-age swings where small remaining sample sizes amplify any single-record disagreement between the two systems. Given the variability observed relative to the sample sizes involved, this pattern indicates that a larger dataset would be needed to establish the precision required for firm conclusions about software concordance across the full 21-species survey.

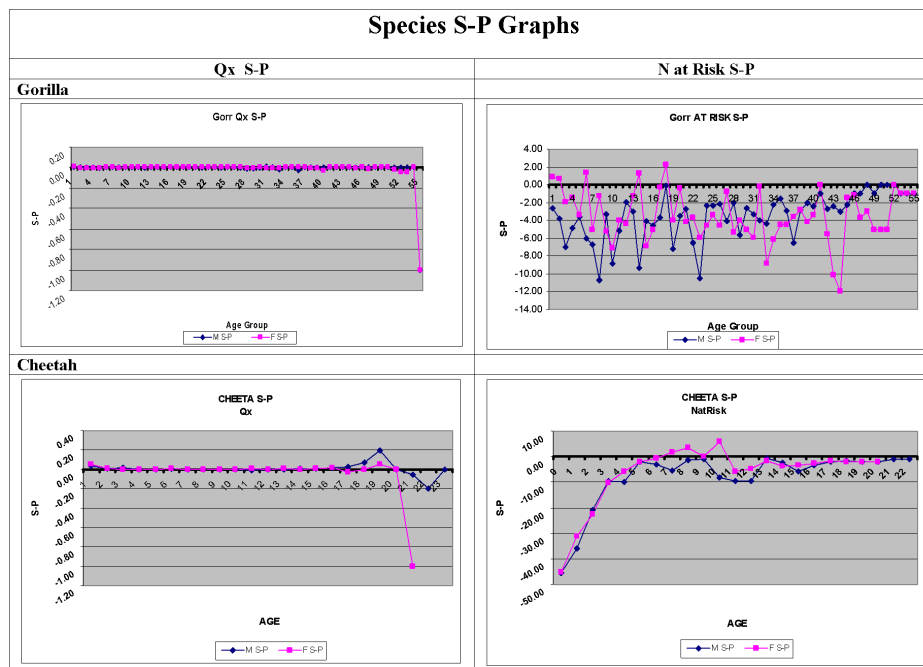


Fig. 3 — Gorilla and Cheetah S-P charts, showing the same early/late age divergence pattern observed in Narica.

## Institutional Context

Moressi's volunteer service at Lincoln Park Zoo was formally recognized in an April 2009 letter from Kevin J. Bell, President and CEO, during National Volunteer Appreciation Week. This letter confirms his standing and tenure as a zoo volunteer; it is presented as evidence of service, not as an endorsement of this specific technical analysis.

## Primary Sources

- Methods documentation describing the SPARKS/PopLink comparative extraction and analysis procedure
- Narica species life table and dataset description (Qx and NatRisk, SPARKS vs. PopLink, by age class)
- Multi-species graphical survey of S-P divergence patterns, including Narica, Gorilla, and Cheetah, prepared under Dr. Lisa Faust
- Letter of recognition, Kevin J. Bell, President and CEO, Lincoln Park Zoo, April 2009