

Stewardship, Science & The Natural Resource Challenge

Gary E. Davis

Visiting Chief Scientist, Ocean Programs

Washington, DC



Today

- ✔ Describe the Structure & Functions of National Park Service Stewardship
- ✔ Explore the Role of Science in Park Stewardship
- ✔ Discuss *The Natural Resource Challenge* and Beyond...?

What Are National Parks?



National Parks are special places saved by the American people so that all may experience our heritage.

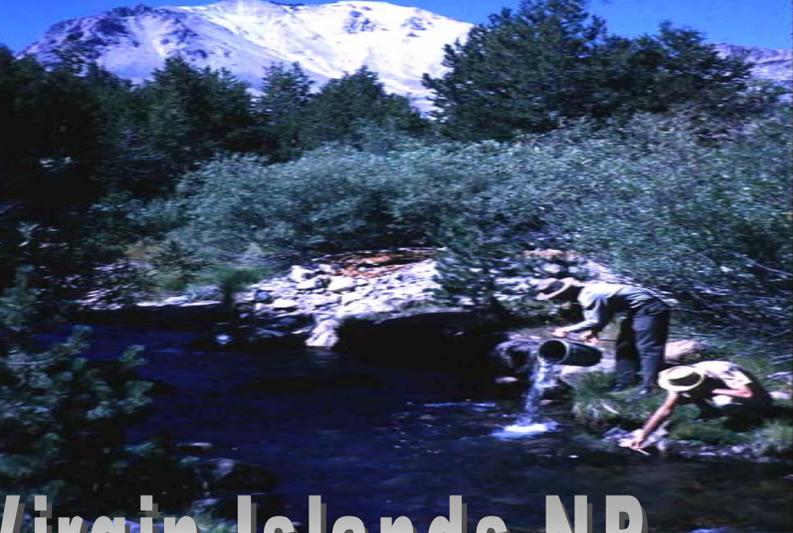


National Park Service Mission

“Promote and regulate the use of ...national parks... to conserve the scenery and the natural and historic objects and wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.”

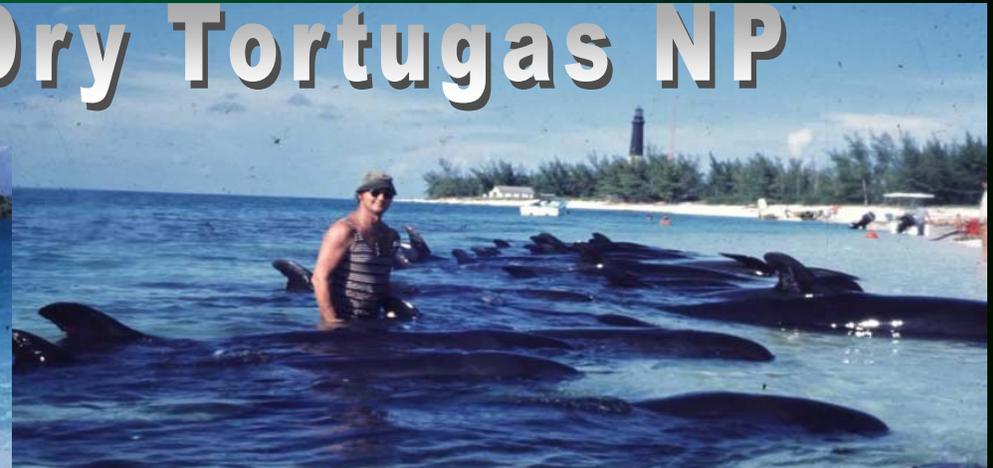
U. S. Congress, 1916

Lassen Volcanic NP



A Personal Odyssey

Dry Tortugas NP



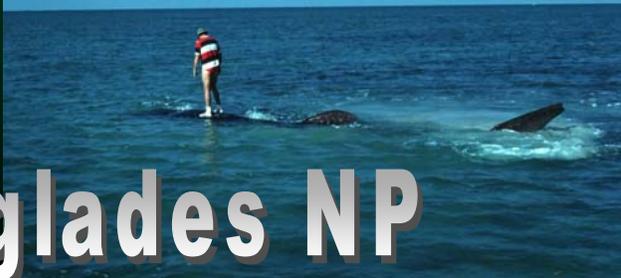
Virgin Islands NP



Channel Islands NP



Biscayne NP



Everglades NP



National Park Service Mission

- ✔ Conserve the parks
- ✔ Provide for their enjoyment
- ✔ Leave them unimpaired for the enjoyment of future generations



Early National Park Managers

Relied on Beliefs



Fires were put out & predators killed to
'save' the parks

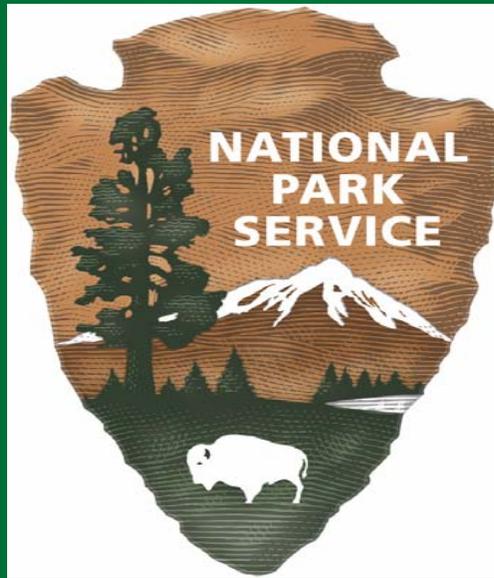




Modern Ecological Knowledge Reveals New Understanding

Today we know that:

- Rare, extreme natural events shape ecosystems, they do not destroy them
- Predators mediate competition and structure ecosystems, they are essential to sustain biodiversity
- Human activities now dominate earth's ecosystems



1963 Leopold Report

Ecology Reintroduced to NPS
Science Should Inform NPS Stewardship



Pillars of the National Park Service Stewardship Program

- ✓ **KNOW** & understand resource conditions
- ✓ **RESTORE** impaired ecosystems
- ✓ **PROTECT** resources & ecosystems, and mitigate threats
- ✓ **CONNECT** people to parks



Stewardship Program Structure: form follows function

- ✓ RESEARCH SCIENCE-USGS, University
- ✓ APPLIED SCIENCE-Resource Management
- ✓ FIELD OPERATIONS-Rangers, Interpreters, & Maintenance



KNOW & UNDERSTAND Field Operations

- ✓ Identify Emergencies
- ✓ Disseminate Information
- ✓ Coordinate Field Actions
- ✓ Manage Emergency Operations



KNOW & UNDERSTAND Research

- ✓ Conduct Inventories
- ✓ Design Monitoring Protocols
- ✓ Analyze Monitoring Results
- ✓ Determine Causes of Abnormal Resource Changes



KNOW & UNDERSTAND Applied Science

- ✓ Monitor Resources
- ✓ Modify & Refine Monitoring Protocols
- ✓ Analyze Monitoring Results
- ✓ Identify Research Needed to Determine Causes of Abnormal Resource Changes



NPS Stewardship Program Structure & Function

	Research Science	Applied Science	Field Operations
KNOW	Design Protocols	Monitor Resources	Observe Conditions
RESTORE	Develop Techniques	Apply Techniques	Explain Needs
PROTECT	Evaluate Efficacy	Mitigate Impacts	Enforce Laws
CONNECT	Test Methods	Diagnose Issues	Describe Effects



Vital Signs Monitoring: Key to Knowledge and Cost-Effective Stewardship

- ✔ Knowledge of resource conditions helps set goals, determine normal conditions & evaluate performance of restoration and protection;
- ✔ Understanding how resources interact helps predict ecosystem behavior and project consequences of intervention or lack of action
- ✔ Knowledge helps connect people to parks



“You would be surprised at the number of years it took me to see clearly what some of the problems were which had to be solved...looking back, I think it was more difficult to see what the problems were than to solve them.”

Charles Darwin



Conservation Is Health Care For The Environment and Ecosystems





Ecology Is Still In The 17th Century Relative To Medicine

William Harvey in 1628 showed that the heart was a pump and that its function was to pump blood to the body through a series of circles-
the circulatory system



A Healthy Ecosystem

- ✔ Has all its parts, no missing species
- ✔ Has no extra parts, alien species
- ✔ Responds normally to perturbation, doesn't collapse
- ✔ Is resilient, e.g., resists alien invasions



The Land Ethic

“A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise.”

Aldo Leopold, 1949
A Sand County Almanac



Consult the Oracle at Delphi



Island Fox



Populations Failing

+Feral Pigs (1840s)

+Shrubs (1870s)

+DDT (1940s)

+Bald Eagles (1950s)

+Golden Eagles (1990s)

+Island Foxes (1990s)



Unintended Consequences Cascade

Through Ecosystems



SEWAGE CRISIS at Cabrillo National Monument, San Diego, California!

- ✔ City sewer pipe broke next to monument tide pools
- ✔ 11 billion gallons treated effluent spilled
- ✔ Monument tide pools closed to visitors February-April 1992
- ✔ 63 days, \$15 million repair
- ✔ Damage to NPS resources?



Monitoring showed surprising effects:



Respite from visitor trampling, with nutrients and sediment from effluent, benefited intertidal ecosystem



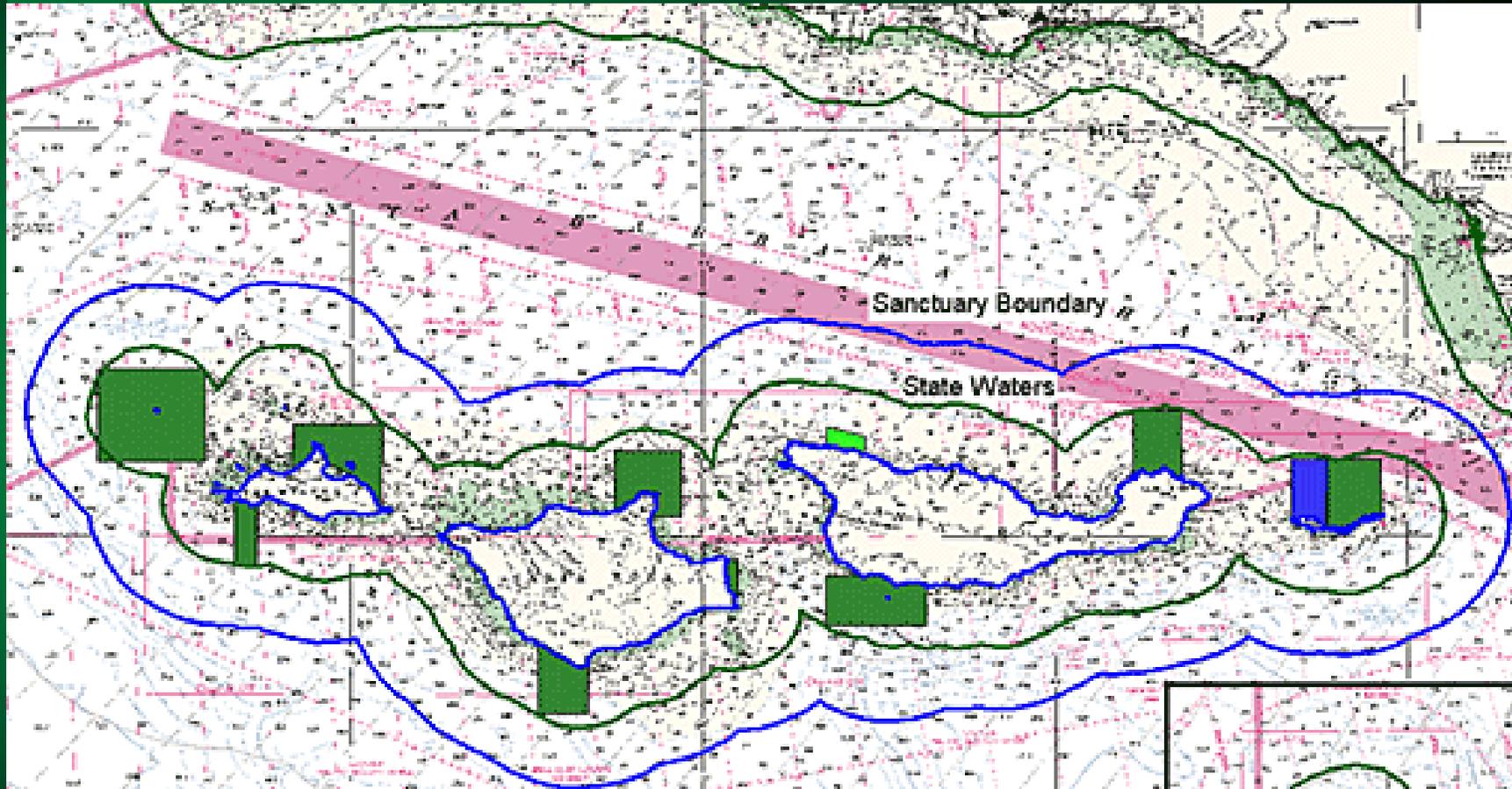
Why No Wilderness in the Ocean?

- ✔ Selected populations exploited to collapse
- ✔ Species at risk—white abalone now endangered
- ✔ Consequences cascade through systems for decades
- ✔ Monitoring defined issues—which led to reserves @ BUIS, CHIS, DRTO, & VIIS

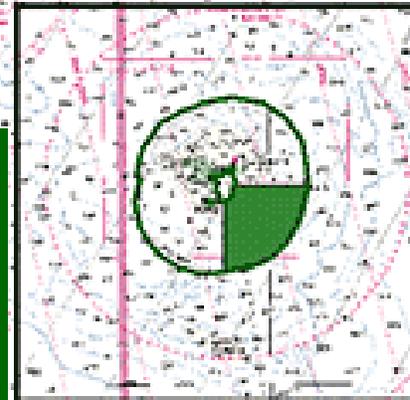


Marine Reserve Network

Ten
Reserves
Free of
Fishing
Effects
(132 nm²)



Channel Islands National
Park & Marine Sanctuary





Monitoring Won't Solve All Environmental Issues

Persistence Is Critical



Press On

Nothing in the world can take the place of
PERSISTENCE

- ✔ Talent will not...
 - Nothing is more common than unsuccessful people with talent
- ✔ Genius will not...
 - Unrewarded genius is almost a proverb
- ✔ Education alone will not...
 - The world is full of educated derelicts

**PERSISTENCE & DETERMINATION
ARE OMNIPOTENT**



Monitoring Will...

- ✓ Facilitate persistence
 - with rewards for partial success
- ✓ Encourage mitigation
 - By giving confidence & reducing uncertainty
- ✓ Provide critical early warnings
- ✓ Reduce cost of restoration
 - By identifying problems when they are small



Biggest Impediments To Vital Signs Monitoring

- ✓ Denial that it's necessary
- ✓ Denial that it's cost effective
- ✓ It's different and requires change in established routines
- ✓ Requires sustained collaboration—investigators, practitioners, agencies
- ✓ Sustained commitment—some would rather fix things than identify more 'problems'

“...there is nothing more difficult...than to initiate a new order of things.”



Niccolo
Machiavelli 1525

A sunset scene with a bright sun in the upper right corner, casting a warm orange and red glow across the sky. In the foreground, the dark silhouettes of the pyramids of Giza are visible against the horizon.

*“Denial is not just a
river in Egypt”*

Dire Straits

Present

Future

Denial

Committment

Anger

Acceptance

Bargain

Test

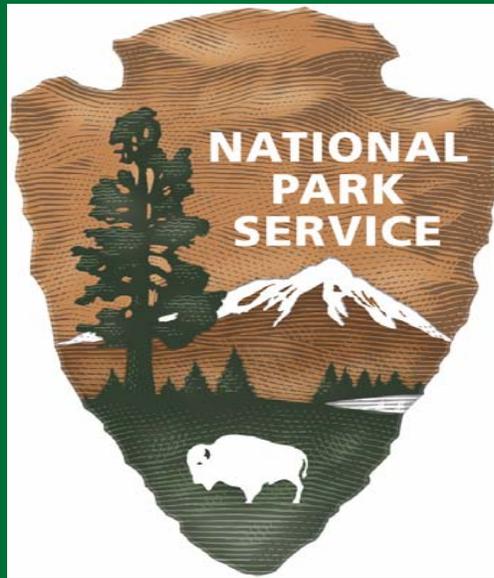
Depression





The Natural Resource Challenge

- ✔ We must know more about parks to protect them
- ✔ We need more information to restore impaired parks
- ✔ We must know more to mitigate threats to parks
- ✔ We must better connect people to parks so they can appreciate and care for parks



The Natural Resource Challenge

- Build Confidence
- Give Every Park Something
- Integrate With Other Park Operations



Build Confidence

- ✓ Analyze experience—*Science & Ecosystem Management in the National Parks* and *Saving Nature in the National Parks*
- ✓ Lay a foundation—synthesize and complete resource inventories
- ✓ Demonstrate efficacy—10 prototype programs in a variety of parks (large, small/ desert, mountain, coral reef/ single, network)



Give Every Park Something

- ✓ 32 Networks of parks with shared features
- ✓ Establish shared, quasi-independent, monitoring program with CEO & Board of Directors
- ✓ Provide technical critical mass (~25% of network needs) initially to foster cooperation and collaboration



Integrate with Park Operations

- ✓ Embed Vital Signs Monitoring in larger stewardship program—Natural Resource Challenge
- ✓ Integrate with Learning Centers, Ecological Restoration Teams, CESUs, etc.
- ✓ Begin with resource inventories
- ✓ Phase in budget increase of \$100 M over 6+ years

The Beginning of a New Era

Ecology Through Time

Science 27 July 2001

Vol. 293 No. 5530



A Shared Natural Heritage

“The time has come to make an inventory of the natural resources that have been handed down to us.”

President Theodore Roosevelt
October 4, 1907



*“Take a stand. Make a difference.
Do what you can with what you
have, where you are.”*

Col. Teddy Roosevelt
San Juan Hill, Cuba
1898