**Problem**

**What**
- Problem(s)
  - Birds endangered, Loss of vegetation on island

**When**
- Date
  - January 2008

**Where**
- Physical Location
  - Macquarie Island, South Pacific

**Impact to the Goals**
- Safety
  - None
- Environmental
  - Severe negative impact to island ecosystem
- Material, Labor Cost
  - Remediation required $16,200,000 US

**Analysis**

**Basic Cause-and-Effect**

- The population of non-native feral cats on Macquarie Island had grown out of control and was threatening the native bird populations. It seems like a simple problem. Remove the predator, in this case the cat, and the population of their prey will increase. This is exactly the approach taken by conservationists on the island and the last cats were removed in mid-2000.

**More Detailed Cause Map**

- 1995
  - Solution: Remove cats from island
  - Cats ate seabirds

- 2000-2007
  - Solution: Remediation project $16.2 million US
  - Seabird population was reduced
  - Insufficient cover for some seabirds
  - Insufficient cover for some seabirds

- 1995 to 2000
  - Solution: Remove rabbits, rats and mice at the same time.
  - Rabbits ate vegetation
  - Rabbit, rat, mouse population exploded

**Solutions**

<table>
<thead>
<tr>
<th>No.</th>
<th>Cause</th>
<th>Action Item</th>
<th>Owner</th>
<th>Due Date</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cats ate seabirds</td>
<td>Remove cats from island</td>
<td>Parks &amp; Wildlife Service</td>
<td>Started 1995</td>
<td>Completed 2000</td>
</tr>
<tr>
<td>2</td>
<td>Rabbit, rat, mouse populations exploded</td>
<td>Remove rabbits, rats and mice at the same time.</td>
<td>Parks &amp; Wildlife Service</td>
<td>To start 2010</td>
<td>Completed 2010</td>
</tr>
<tr>
<td>3</td>
<td>Extreme erosion on island</td>
<td>Remediation project $16.2 million US</td>
<td>Parks &amp; Wildlife Service</td>
<td>To start 2011</td>
<td>Completed 2011</td>
</tr>
</tbody>
</table>

**Cause Map**

**Cats & Rabbits**

**An Example of Unintended Consequences**

Applying a solution to solve one problem can inadvertently create an even bigger problem. This is called unintended consequences. A thorough root cause analysis can help prevent this scenario by creating a map of all the causes.

“It seemed like a good idea.”

**More Detailed Cause-and-Effect**

Recently, scientists at the Australian Antarctic Division discovered that removing the cats has resulted in widespread environmental devastation because it allowed the rabbit and rat populations on the island to explode. The ever increasing number of rabbits had eaten significant amounts of the vegetation on the island, leading to major erosion issues. The increase in the number of rats is a threat to the bird population because they feed on young chicks. Obviously, the cats weren’t the only cause that needed to be addressed if the island and its inhabitants were to be preserved.

The rapid increase in rodents was possible because rabbits and rats had no natural predators since they are also non-native to the island. Rats were inadvertently introduced to the island by ships. The cats were purposely bought to the island to protect the human food stores. Rabbits were also deliberately introduced to the island to serve as a food for sailors.

The analysis to the problem needed to be more thorough than identifying a single cause - the cats. To restore the island and its native inhabitants to their natural state, all non-native species need to be removed at the same time.

**Solution 1: Remove cats from island** (started in 1995)

**Evidence:**
- Some seabird populations increased
- Environmental Goal Positive Impact
- Some seabird populations increased
- Environmental Goal Positive Impact
- Some seabird populations increased
- Environmental Goal Positive Impact

**Solution 2: Remove rabbits, rats and mice at the same time.**

**Evidence:**
- Rabbit, rat, mouse population exploded
- Environmental Goal Positive Impact
- Rabbit, rat, mouse population exploded
- Environmental Goal Positive Impact
- Rabbit, rat, mouse population exploded

**Solution 3: Remediation project. $16.2 million US**

**Evidence:**
- Seabird population was reduced
- Environmental Goal Positive Impact
- Seabird population was reduced
- Environmental Goal Positive Impact
- Seabird population was reduced

**Tourist boardwalk at Sandy Bay, north end of Macquarie Island**

*Photos from Tasmania National Parks Association web site*

**Cause Mapping**

**Problem Solving • Incident Investigation • Root Cause Analysis**

**Step 1 Problem**

What's the Problem?

Work Being Done

Conservation program for island

**Step 2 Analysis**

Why did it happen?

Impact to the Goals

Negative Impact

Goal

Positive Impact

Evidence:

40% of vegetation has been lost. Observation.

Early 1990s

**Step 3 Solutions**

What will be done?

Solution 1: Remove cats from island (started in 1995)

Solution 2: Remove rabbits, rats and mice at the same time.

Solution 3: Remediation project. $16.2 million US

**Further Reading**

For a free copy of our Root Cause Analysis Template in Microsoft Excel, used to create this page, visit our web site.