RECLAMATION

Managing Water in the West

Odessa Subarea Special Study – Proposed Economic Analysis

U.S. Department of the Interior
Bureau of Reclamation

Federal Planning Process Steps

Source: Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies (P&Gs)

1. Specify problems and opportunities

2. Inventory, forecast, and analyze water and land conditions

3. Formulate Alternative Plans using the criteria of completeness, effectiveness, efficiency, and acceptability

P & Gs (continued)

4. Evaluate effects of Alternative Plans:

   - National Economic Development (NED): nationally oriented benefit cost analysis (required)
   - Environmental Quality (EQ): nonmonetary effects on natural and cultural resources
   - Regional Economic Development (RED): local economic impact analysis
   - Other Social Effects (OSE): community impacts, health and safety, etc.

P&Gs (continued)

5. Comparison of Alternative Plans:

   – Action alternatives are compared using a “with project” and “without project” analysis

6. Plan Selection:

   – P&Gs require selection of the plan with the greatest net economic benefits consistent with protecting the Nation’s environment (NED Plan), unless the Secretary of the Interior grants an exception.

NED vs RED:

1. National Economic Development (National Perspective):

   - Nationally oriented benefit cost analysis which compares total benefits to total costs (Federal and non-Federal) by alternative.

   - National perspective is required in Federal analyses (costs of federally-funded projects must be justified using NED benefits).

   - NED focuses on impacts to the nation and considers offsetting effects between different areas.

NED vs RED (continued):

2. Regional Economic Development (Local Perspective):

   - Locally oriented economic impact analysis estimates changes in regional economic activity (employment, regional income).

   - Regional perspective is of interest to Federal decision makers to consider both positive and negative effects on the local economy.

   - RED focuses on impacts only to the local area. This analysis ignores offsetting effects from outside the region.

Proposed Economic Analyses:

I. Feasibility Study:

After formulation of alternatives, the effects of the alternatives are evaluated on a "with project" versus "without project" basis.

A. National Economic Development (NED) Analysis: Benefit-Cost Analysis

Benefits (Present value): Agriculture, Fisheries, Recreation, Municipal, Hydropower, Flood Control

Costs (Present Value): Construction and Operating, Maintenance, and Replacement (OM&R)

B. Financial Analysis: Cost Allocation, Agricultural Payment Capacity and Ability to Pay, Repayment

Proposed Economic Analyses (continued)

II. Environmental Impact Statement:

A. Description of the affected environment in relation to population, employment, and income

B. Regional Economic Development (RED) Analysis: estimates changes in regional economic activity by evaluating:
   * Construction and OM&R cost
   * Agriculture
   * Recreation
   * Municipal, industrial water supply

Feasibility Study: NED Agriculture Benefits

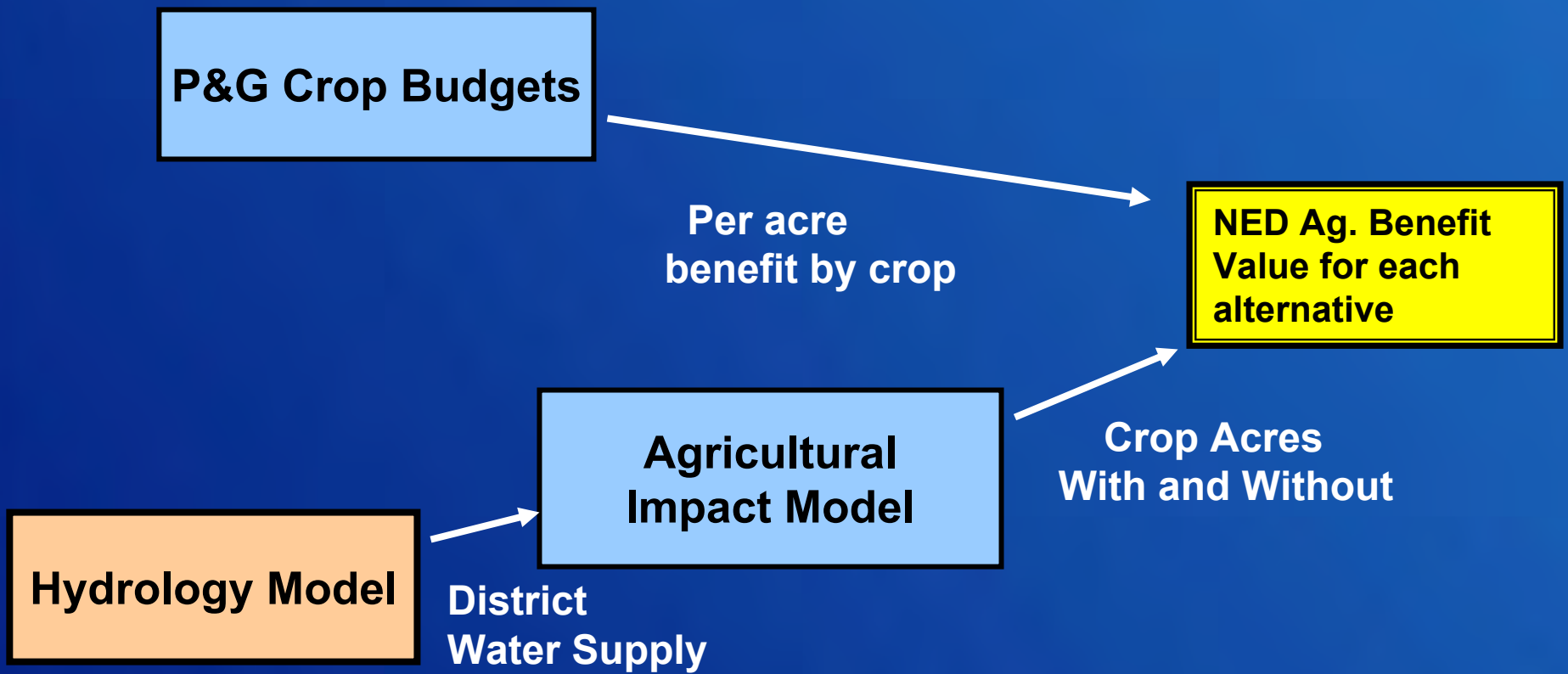
Objective: Identify changes in net farm income resulting from alternative plans.

Methodology:

Step 1: Identify the change in crop acreage with and without the alternative or plan.

Step 2: Use a farm budget analysis to measure the changes in per acre net farm income by crop related to the change in crop acreage.

NED Agricultural Benefits

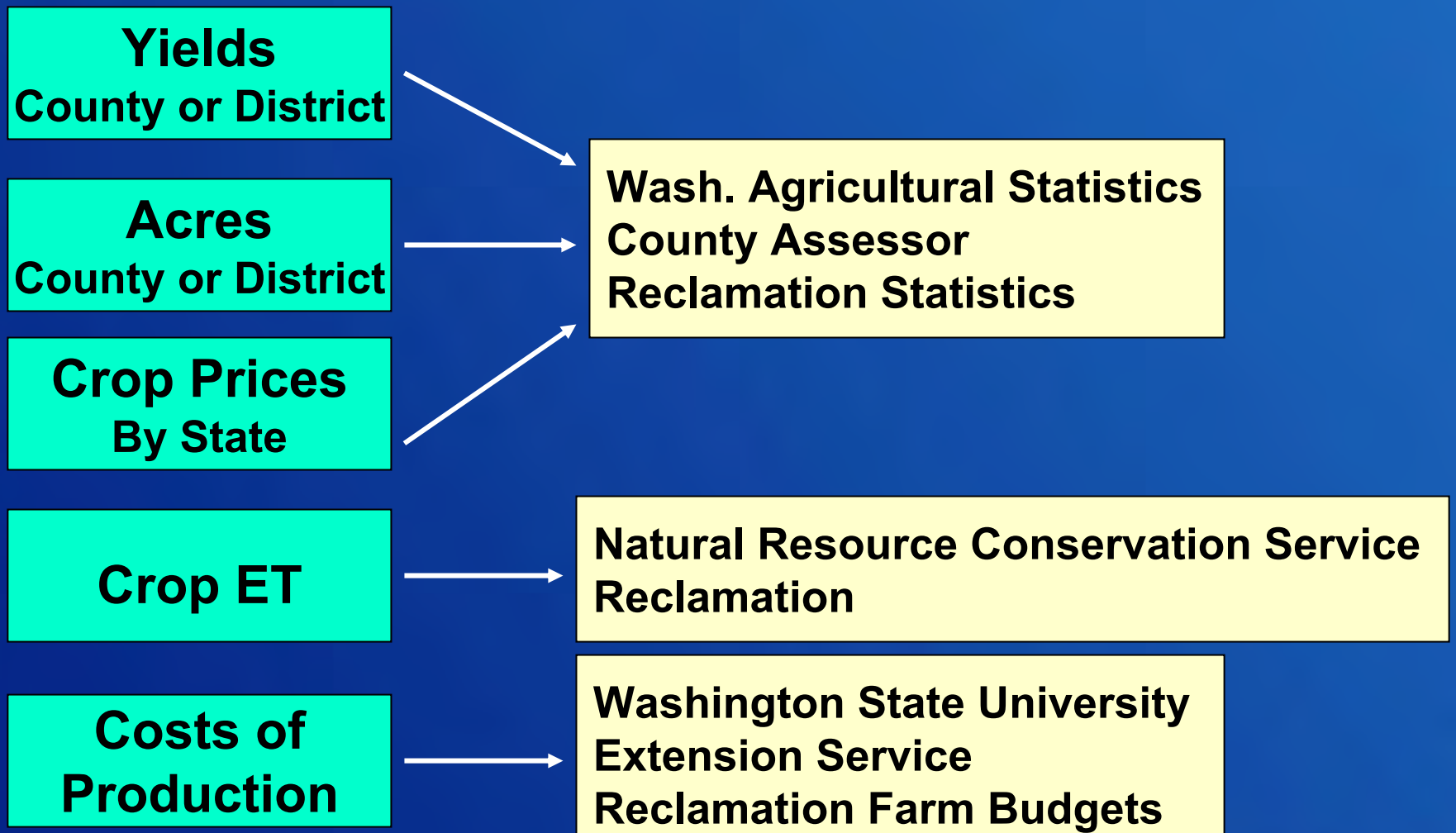


Step 1: Identify the change in crop acreage with and without the alternative or plan.

Methodology: Agricultural Impact Model

- **Provide a baseline description of irrigated agricultural production (acres, yields, production costs, revenue).**
- **Measure changes in crop production (cropping patterns, revenue, etc) based on changes in water supply, institutional constraints, irrigation technology, seasonal changes in water supply from the "with and without" project perspective.**

Agricultural Impact Model Data Sources:



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Step 2: Use a farm budget analysis to measure the changes in per acre net farm income by crop related to the change in crop acreage.

Methodology: Develop crop enterprise budgets using Reclamation's farm budget spreadsheet application, in accordance with the P&Gs.

Farm Budgets Data Sources:

Yields County or District	Wash. Agricultural Statistics County Assessor Reclamation Statistics
Acres County or District	
Crop Prices By State	Washington Agricultural Statistics Service USDA Normalized Prices for some crops, as required by the P&G's
Financial and Labor Inputs	P&G's require specific assumptions
Costs of Production	Washington State University Extension Service

Feasibility Study: NED Fisheries Benefits

- Commercial Fishing Benefits
- Recreational Fishing Benefits
- Tribal Fishing Benefits
- Nonuse Benefits

- Commercial Fishing Benefits

Objective: Estimate commercial fishing profitability.

Methodology:

- **Unit Value: Profitability estimates per fish based on market prices and costs.**
- **Commercial harvest estimates by species based on fish population estimates.**

- Recreational Fishing Benefits

Objective: Estimate recreator value as measured by net willingness to pay (WTP) or consumer surplus (WTP in excess of costs).

Methodology:

- **Unit Value: Recreator fishing values per fish (benefits transfer).**
- **Recreational harvest estimates by species based on fish population estimates.**

- Tribal Fishing Benefits

Valuation Categories: Commercial and recreational (as above), subsistence.

Objective: Subsistence harvest values would be based on net WTP.

Methodology:

- **Unit Value: Market price**
- **Subsistence harvest estimates by species based on fish population estimates.**

- Nonuse Fisheries Benefits

Objective: Estimate nonuse values by fish species as measured by societal net WTP.

Methodology:

- **Unit Value: Nonuse values per fish by species (benefits transfer).**
- **Threatened and Endangered (T&E) fish populations.**

Feasibility Study: NED Recreation Benefits

Objective: Estimate non-fishing recreator value as measured by net WTP.

Proposed Methodology:

- **Unit Value: Recreator values per visit by recreation activity (benefits transfer).**
- **Recreation visitation by activity (method to be determined).**

Feasibility Study: NED Municipal Water Benefits

Objective: Estimate value of municipal water supplies as measured by societal net WTP for associated goods and services.

Methodology: Market value of water or least cost alternative method of providing the municipal water supply.

- Market Value of Water: based on water market purchases
- Least Cost Alternative Water Supply: based on groundwater pumping

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Feasibility Study: NED Hydropower Benefits

Objective: Estimate value of change in hydropower generation as measured by societal net WTP for associated goods and services.

Methodology:

- Unit Value: spot market prices
- Hydropower generation (Bonneville Power Administration's Federal Columbia River Power System (FCRPS) model)

Feasibility Study: NED Flood Control Benefits

Objective: Estimate the value of flood control structures as measured by the change in potential flood damages.

Methodology: Estimate average annual flood damages by alternative (Army Corps of Engineers).

- Flood damages based on inundation maps, depth damage curves, etc.
- Flood frequency probabilities

Feasibility Study: NED Costs

Objective: Estimate present value of costs by alternative.

Methodology:

- **Up-Front Costs: construction, interest during construction**
- **Annual Costs: operation, maintenance, and replacement (OM&R)**

Feasibility Study: Financial Analysis

Objective: Transition from benefit cost perspective of plan selection to the financial viability of a NED plan.

Methodology: Apportion total project financial costs among reimbursable and non-reimbursable purposes served through use of a cost allocation.

- **Step 1: Cost Allocation – A Bridge from Economic to Financial Analysis**
  - **Assign separable costs to a purpose**
  - **Seek an equitable allocation of joint costs**
  - **Define repayment obligation**
    - **Sum of separable and joint costs**

- **Step 2: Repayment of Allocated Project Costs**
  - Reimbursable
    - Irrigation (without interest)
      - Payment capacity = Net farm income minus on-farm investment expenses
      - Ability to pay = Payment capacity minus water distribution and operating costs, plus financial capability of entity
    - Power (with interest)
    - Municipal & Industrial (with interest)
    - Fish and wildlife mitigation (joint cost)
  - Partially reimbursable
    - Recreation
    - Fish and wildlife enhancement
  - Non-reimbursable
    - Flood control
    - Navigation

Environmental Impact Statement: RED Impact Analysis

Objective: Estimate changes in economic activity (employment, regional income) within the locally affected area (Grant, Lincoln, Adams, and Franklin counties)

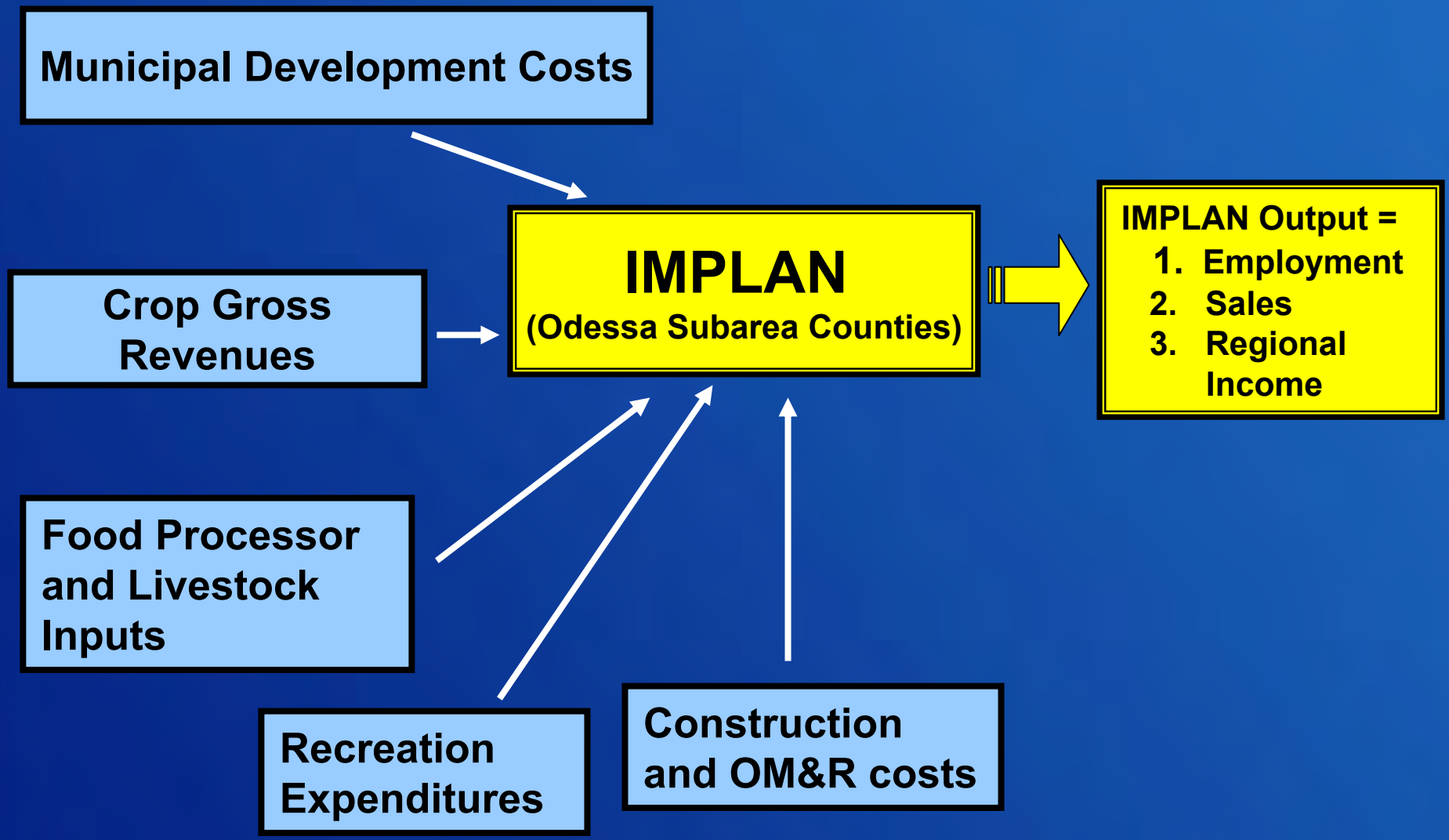
IMPLAN Model "IM"pact analysis for "PLAN"ning

RED Impact Analysis (continued)

Regional Economic Model developed by USDA Forest Service to assist in looking at the "big picture" of regional economics related to land and resource management.

IMPLAN is currently used nationwide for a variety of planning decisions and policy analyses of alternative public resource management and use plans.

Particularly adept as a policy tool for evaluating resource planning alternatives.


Municipal Development Costs
Crop Gross Revenues
IMPLAN
(Odessa Subarea Counties)
IMPLAN Output =
1. Employment
2. Sales
3. Regional Income
Food Processor and Livestock Inputs
Recreation Expenditures
Construction and OM&R costs