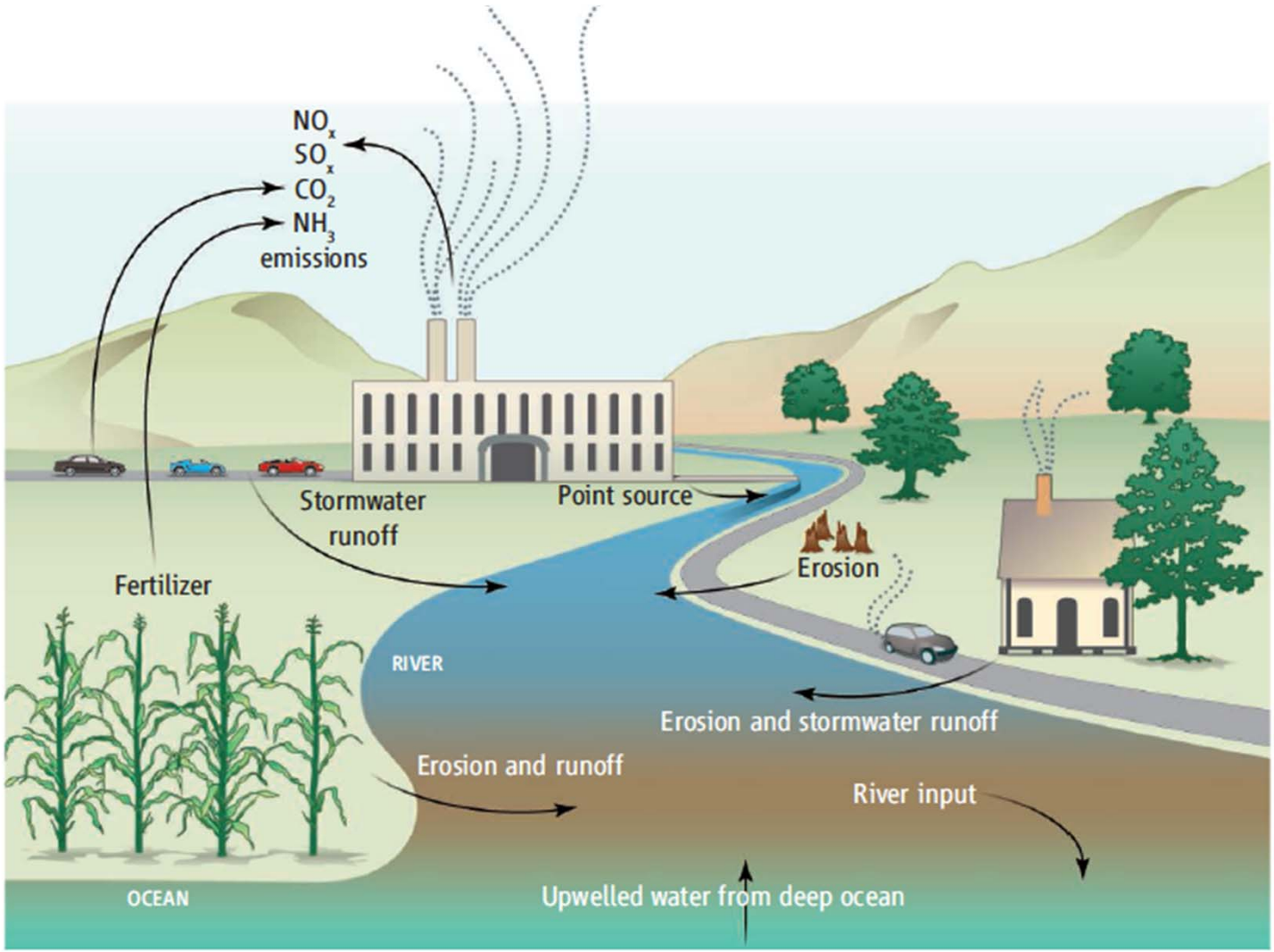
Initial Recommendations for Local Source Reduction

Presented by Hedia Adelsman, Dept. of Ecology



Kelly et al., Science (2011)

Sources of Potential OA-Influencing Inputs

- CO_2 – esp. transit
- NO_x – esp. transit

Atmospheric

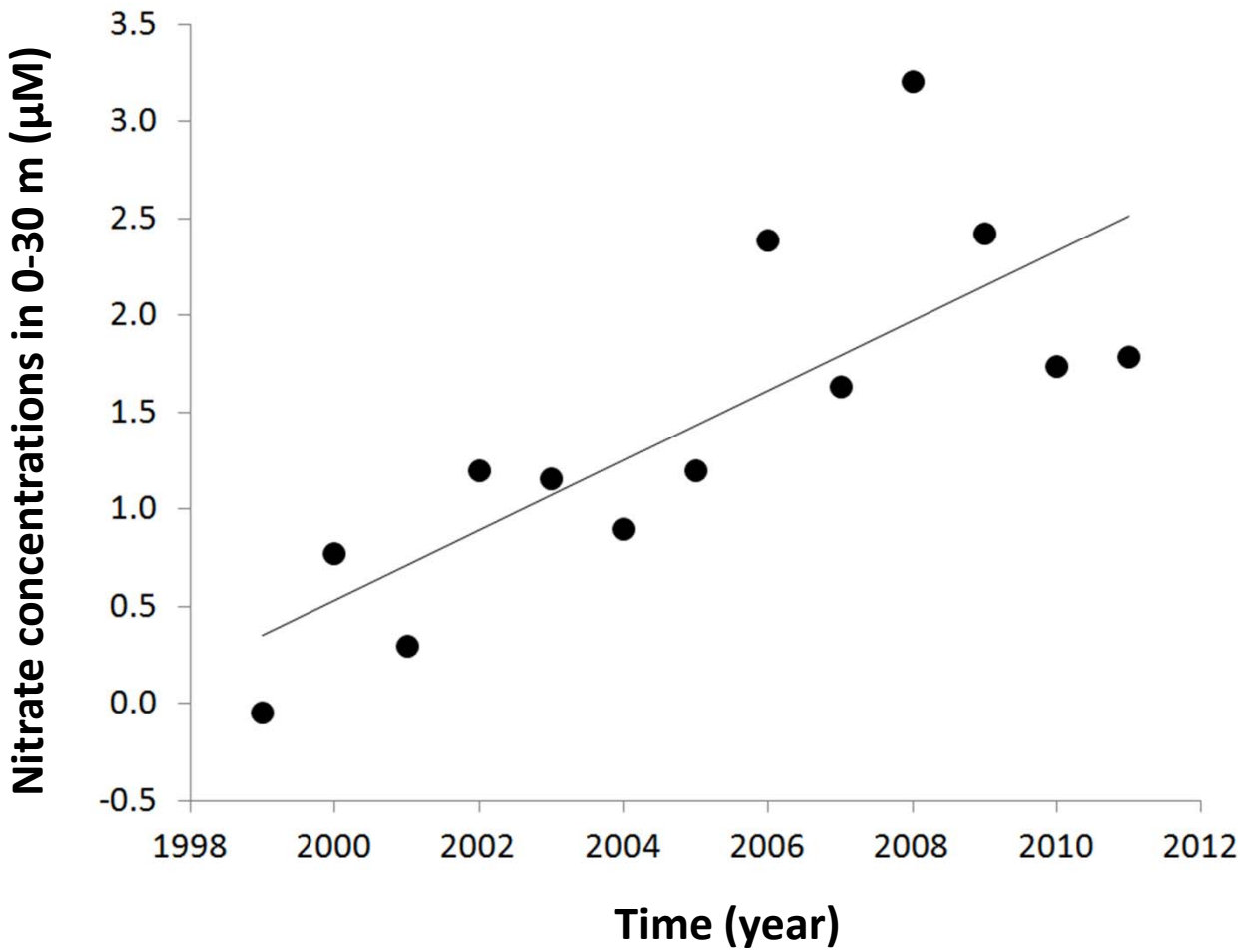
- Dairy Operations
- Crop Agriculture
- Non-Dairy Livestock
- Wastewater Treatment
- Septic Systems
- Residential Fertilizer
- Stormwater
- Increased Erosion

Terrestrial

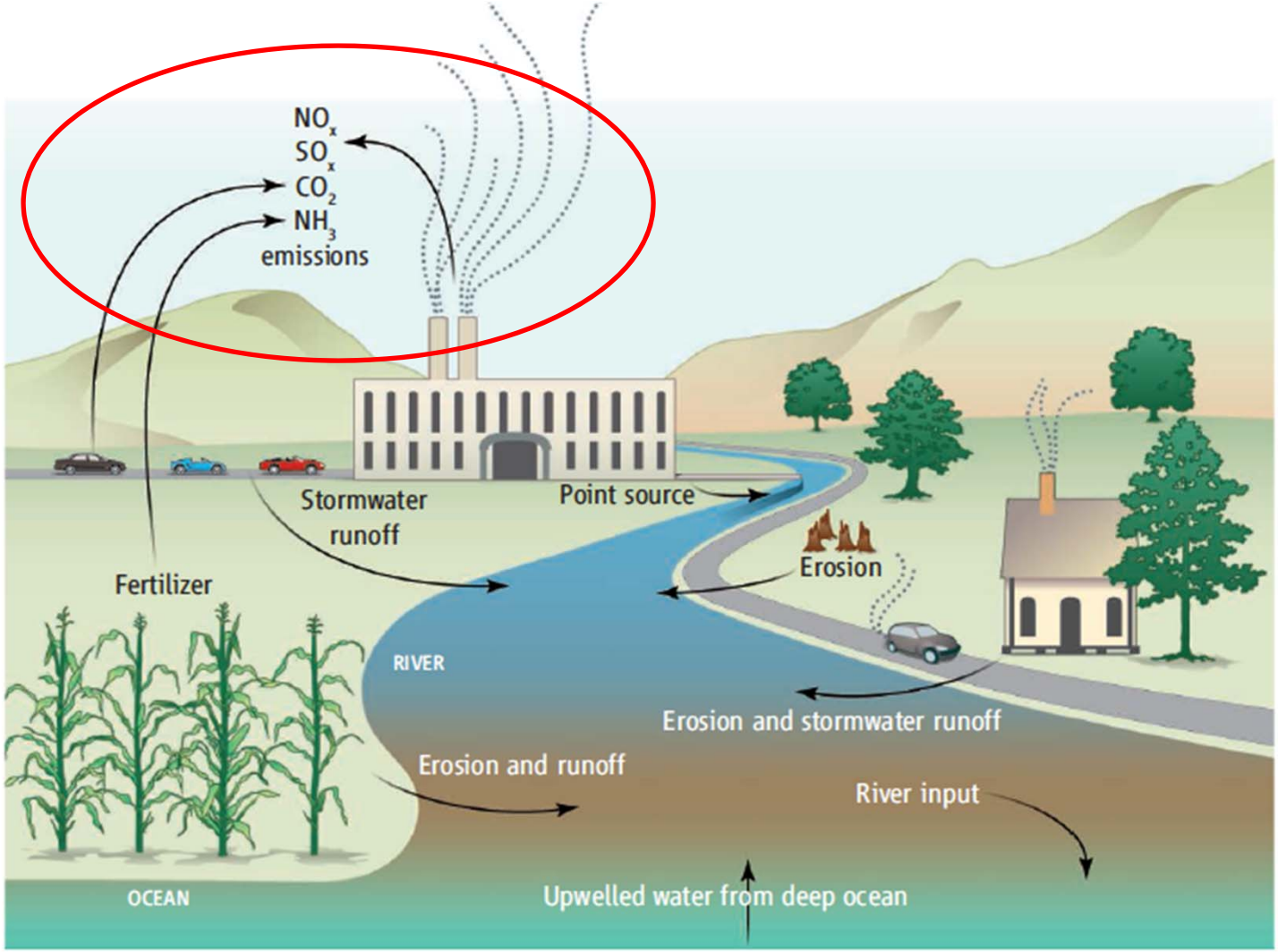
Nitrate is the growth limiting nutrient in marine environment. Annual nitrate changes in Puget Sound have been trending upward. These changes are defined by comparing new data to monthly baseline conditions established for each station using the 1999-2008 period.

Yearly nitrate concentration since 1999

(Puget Sound wide averages at 18 stations sampled monthly)



Initial Recommendations for Local Source Reduction: Atmospheric Inputs



Kelly et al., Science (2011)

Reduce CO_2 & NO_X Emissions

1. Create a first-in-the-nation TMDL for CO_2 and NO_X deposition in impaired waters

2. Adopt pay-as you drive automobile insurance

3. Encourage carbon pricing policies (cap and trade or carbon tax)

4. Integrate greenhouse gas emissions assessment into SEPA, GMA and other related laws

5. Require transit-oriented development to reduce CO_2 and NO_X

6. Adopt more stringent air quality standards where atmospheric deposition of NO_X is substantial

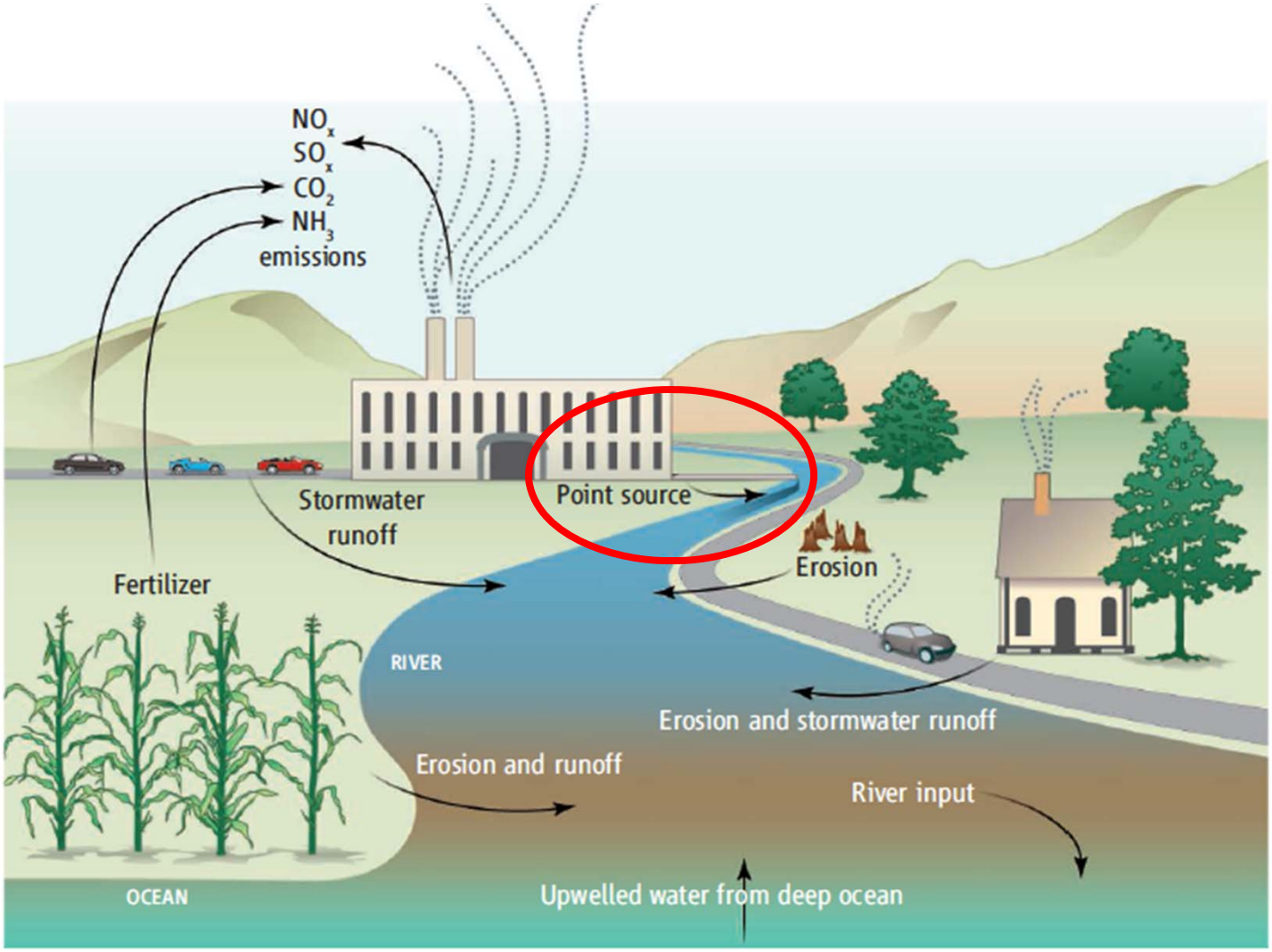
Reduce CO_2 & NO_X Emissions (cont'd)

7. Encourage research into green preservation and building code reform

8. Encourage policies to preserve forests and incentivize forest-friendly development

9. Encourage and facilitate use of California greenhouse-gas offset credits to support local nutrient-reducing projects.

Initial Recommendations for Local Source Reduction: Point Source Pollution



Kelly et al., Science (2011)

Human point and nonpoint sources have increased local nitrogen loads to the Salish Sea. Ongoing projects are evaluating whether or not these contribute to low levels of dissolved oxygen measured in the Salish Sea.

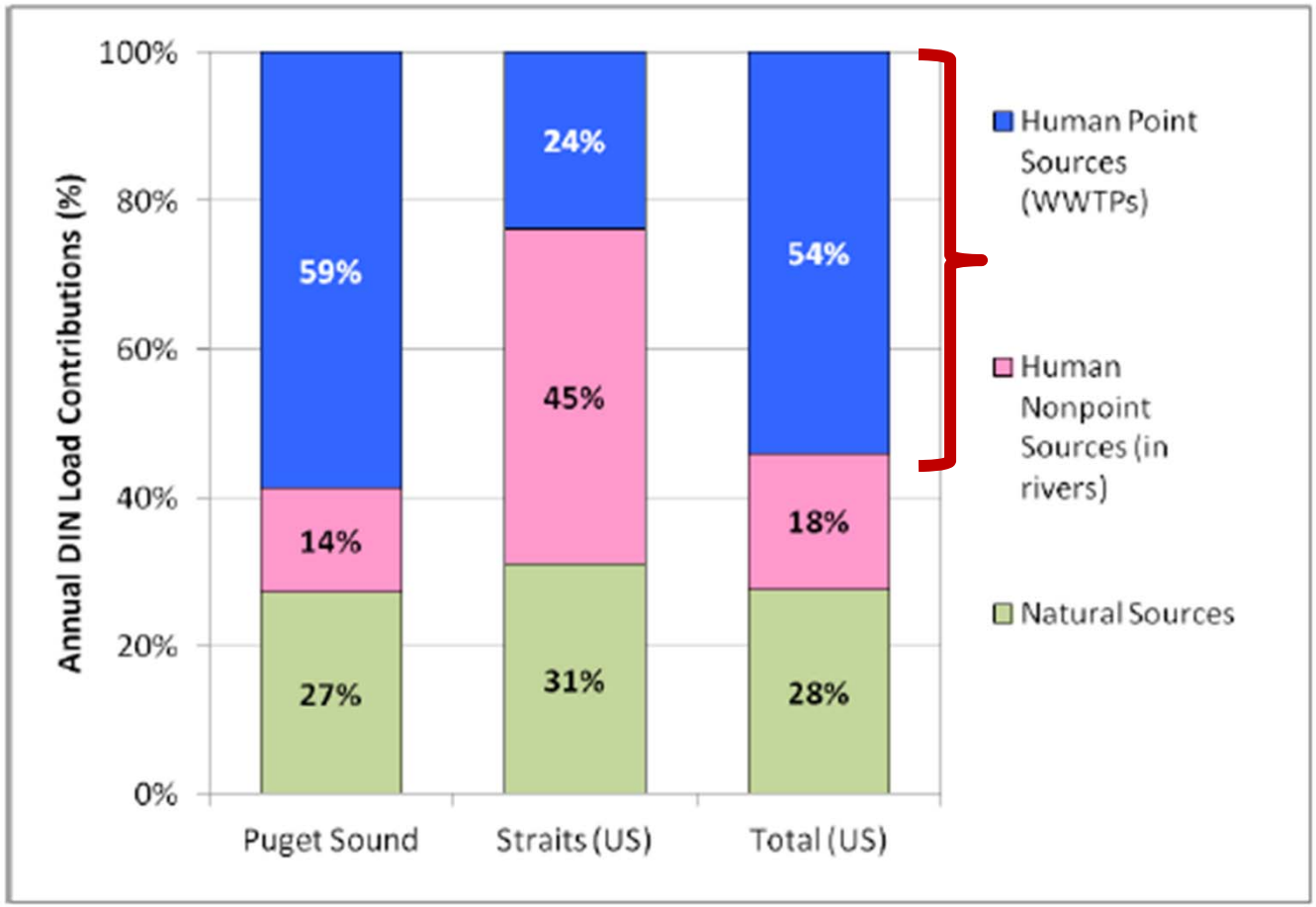


Figure ES-8. Relative contributions of annual dissolved inorganic nitrogen (DIN) load to Puget Sound and the Straits (U.S.) from human point sources (WWTPs), human nonpoint sources (in rivers), and natural sources.

RIVERS

All rivers contribute nitrogen to the Salish Sea.

In general, the largest rivers by flow contribute the largest nitrogen loads.

WASTEWATER TREATMENT PLANTS

The largest population centers contribute the largest loads of nitrogen.

99 municipal treatment facilities (78 WA, 9 Canadian, 5 oil refineries, 4 pulp/paper, & 1 aluminum) in Puget sound

COMBINED LOADS

Highest loads enter the Salish Sea on the east side, where the largest rivers and population centers are.

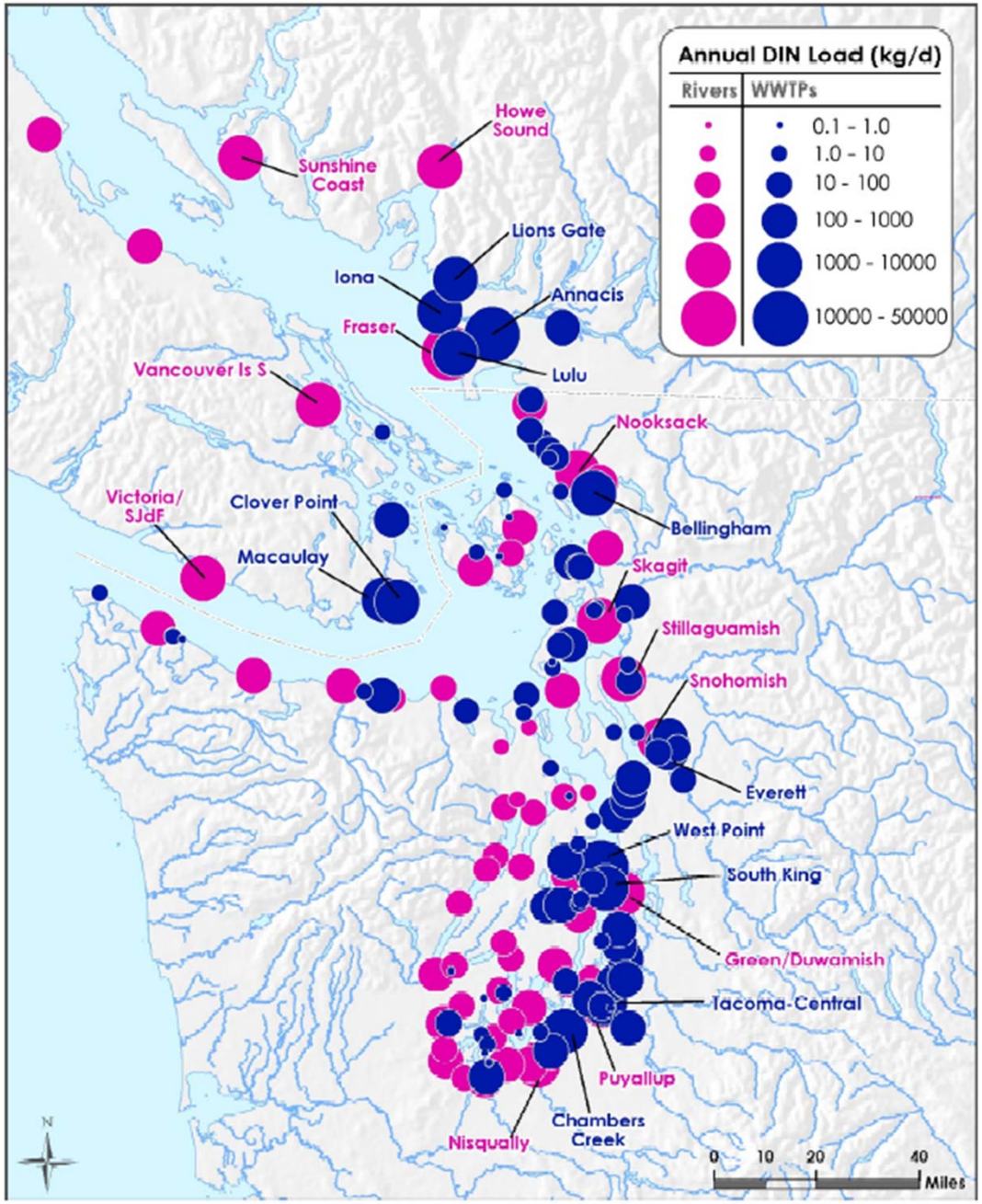
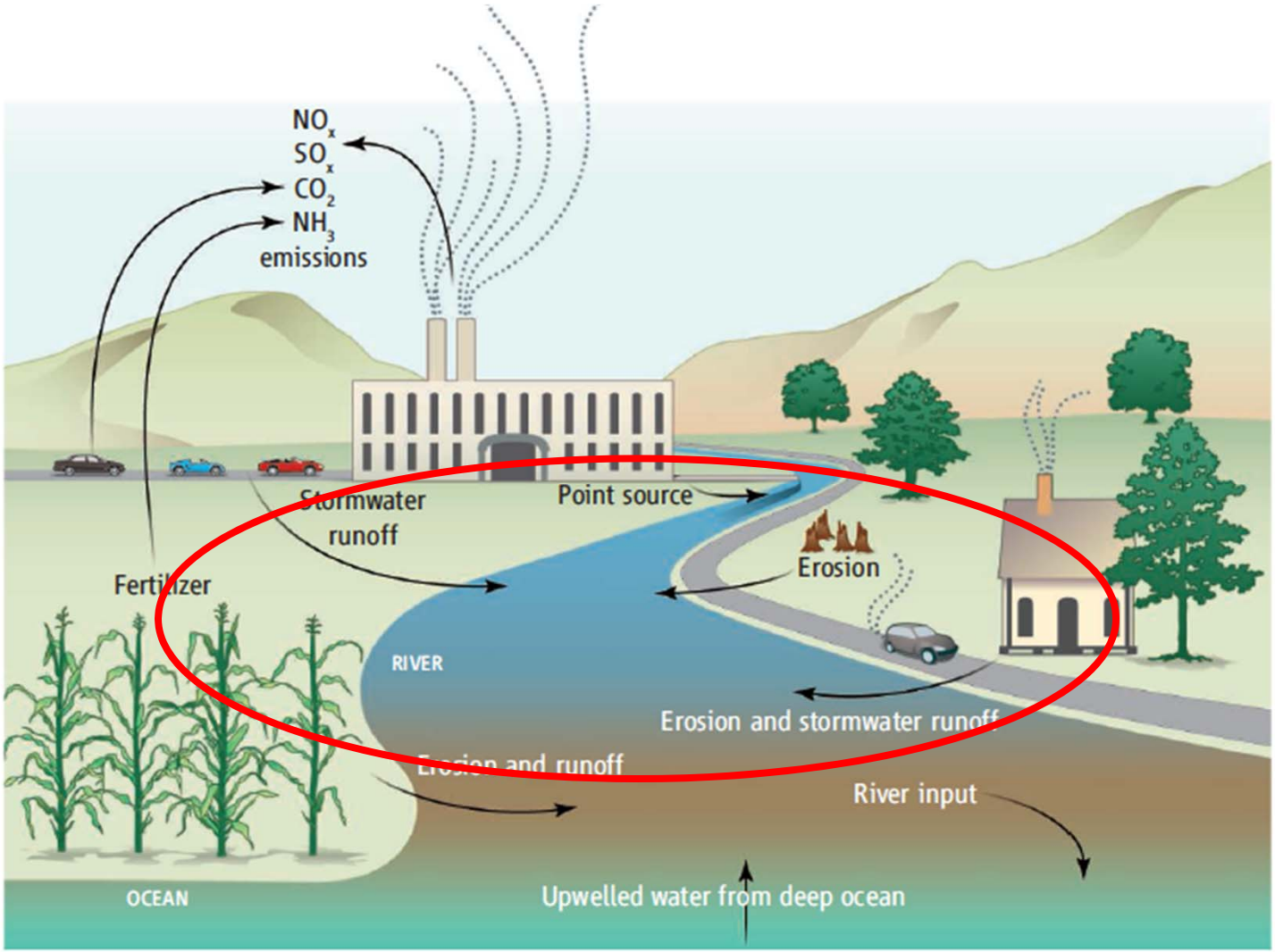


Figure ES-3. Mean annual dissolved inorganic nitrogen (DIN) loads from rivers and WWTPs for 1999 to 2008.

Reduce Allowable Nutrient Limits from Point Sources

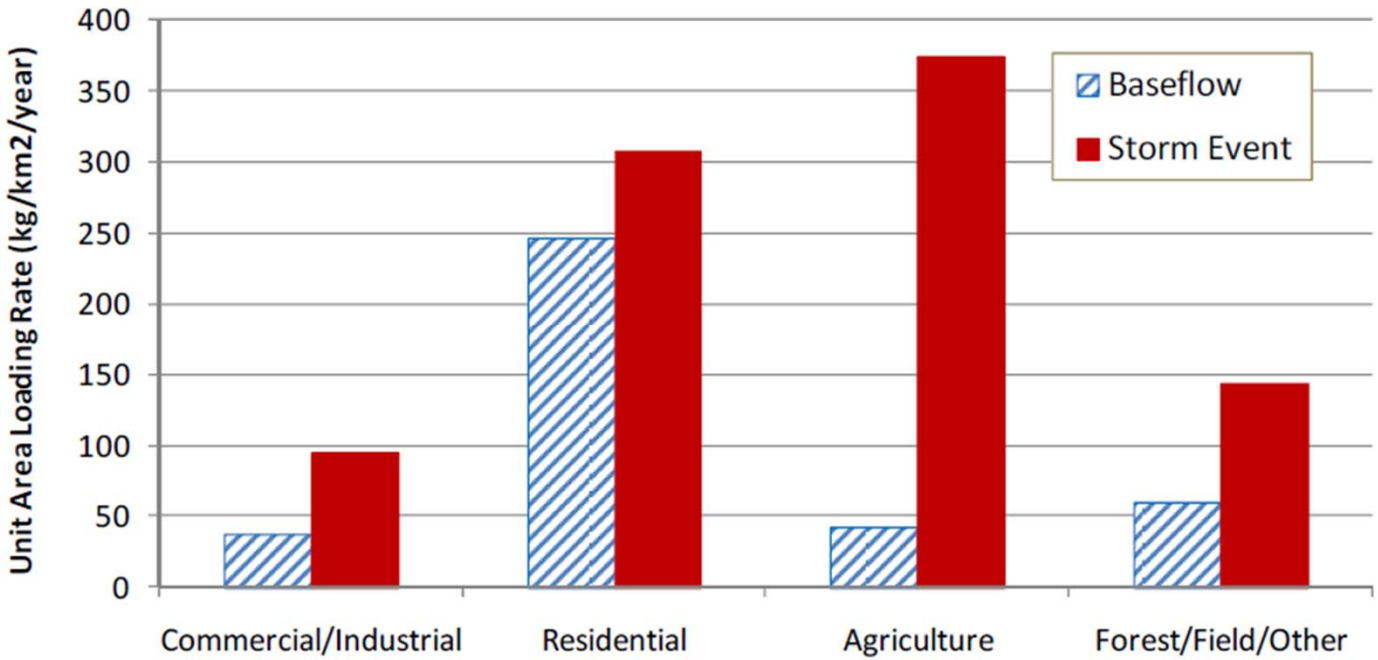
1. Reduce total nitrogen loadings into coastal waters by setting substantive limits in nutrient management plans
2. More stringent effluent limits for nutrients
3. Develop and require stricter limits on nitrogen removal at wastewater treatment facilities
4. Impose a no discharge zone in Puget sound for commercial and recreational vessels, or require enhanced Nitrogen removal
5. Establish a nitrogen trading system that enable municipalities to meet increasingly stringent nitrogen limits (related: encourage use of nutrient credit trading)

Initial Recommendations for Local Source Reduction: Non-point Source



Kelly et al., Science (2011)

Based on monitoring in small streams, we know that runoff from residential and agricultural areas carries higher levels of nitrogen and other pollutants than runoff from natural land covers.



Source: Toxics in Surface Runoff (ECY publication no. 11-03-010)

Reduce Non-point Source Nutrient Loading through Land Use Management

1. Impose zoning restrictions (where reasonable)
2. Set up county- or watershed-based shellfish protection districts
3. Encourage land use zoning for improved nutrient management
4. Reduce runoff from residential fertilizer through zoning-based limits to lawn sizes
5. Reduce erosion by protecting areas subject to erosion from land use development
6. Reduce erosion by ensuring that forest practices are consistent with a baseline level of erosion management

Reduce Non-point Source Nutrient Loading from Septic Systems

1. Develop new technology for on-site septic systems that remove nitrogen and phosphorous

2. Develop and implement on-site sewage system management plans in each Puget Sound county

3. Provide grants to address the biggest individually problematic septic systems

Reduce Non-point Source Nutrient Loading using Voluntary/Incentive-Based Approaches

1. Use voluntary stewardship program
2. Set priority areas for voluntary incentives and regulatory programs
3. Develop water quality best management practices
4. Integrate water quality improvement funding with salmon recovery and other habitat-focused programs
5. Set up incentives for data collection by landowners
6. Provide insurance to growers against marginal yield or revenue losses due to nutrient reduction

Voluntary/Incentive-Based Approaches (cont'd)

7. Increase incentives for bio-digesters and similar technologies
8. Increase the role of the Washington Stormwater Center
9. Encourage and facilitate voluntary, cooperative nutrient-release monitoring
10. Institute nutrient applicator testing and licensing
11. Encourage counties to create clean water utilities (i.e., Island County)
12. Support creative nutrient and emission reduction partnerships

Other Nutrient Reduction Recommendations

1. Increase NPDES permit stringency for municipal stormwater
2. Require nutrient management for crop agriculture
3. Cut nutrient pollution by 50%
4. Review gaps in current laws related to nutrient/fertilizer management on agricultural lands

Discussion

Questions?

Gaps?

Additional recommendations?