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Background

- Increased concern from the Canadian Federal Government and the Government of Ontario regarding water pollution and contamination originating from agriculture sources¹



The 2012 algae bloom in Lake St. Clair and Lake Erie²

- Phosphorus has been identified as the limiting agent for algae growth³
- The problem of non-point sources:
 - Difficult to define of discreet in origin⁴
- The Nutrient Management Act of Ontario: effects of (NMAN) recommendations
- Nitrogen VS. phosphorus fertilizers

Research Question

Is the NMAN fertilizer application rate an effective recommendation for non-point source nutrient management?

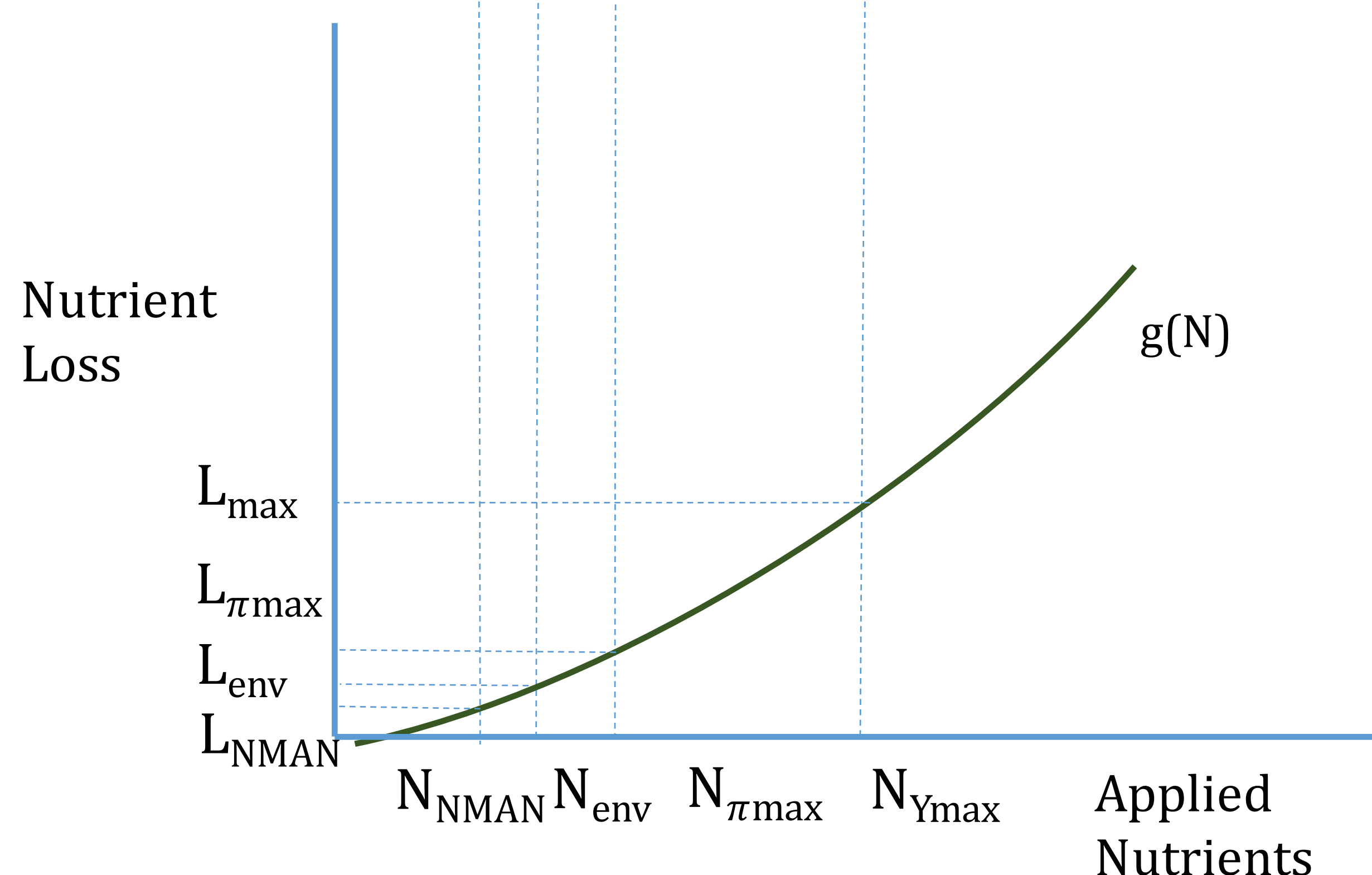
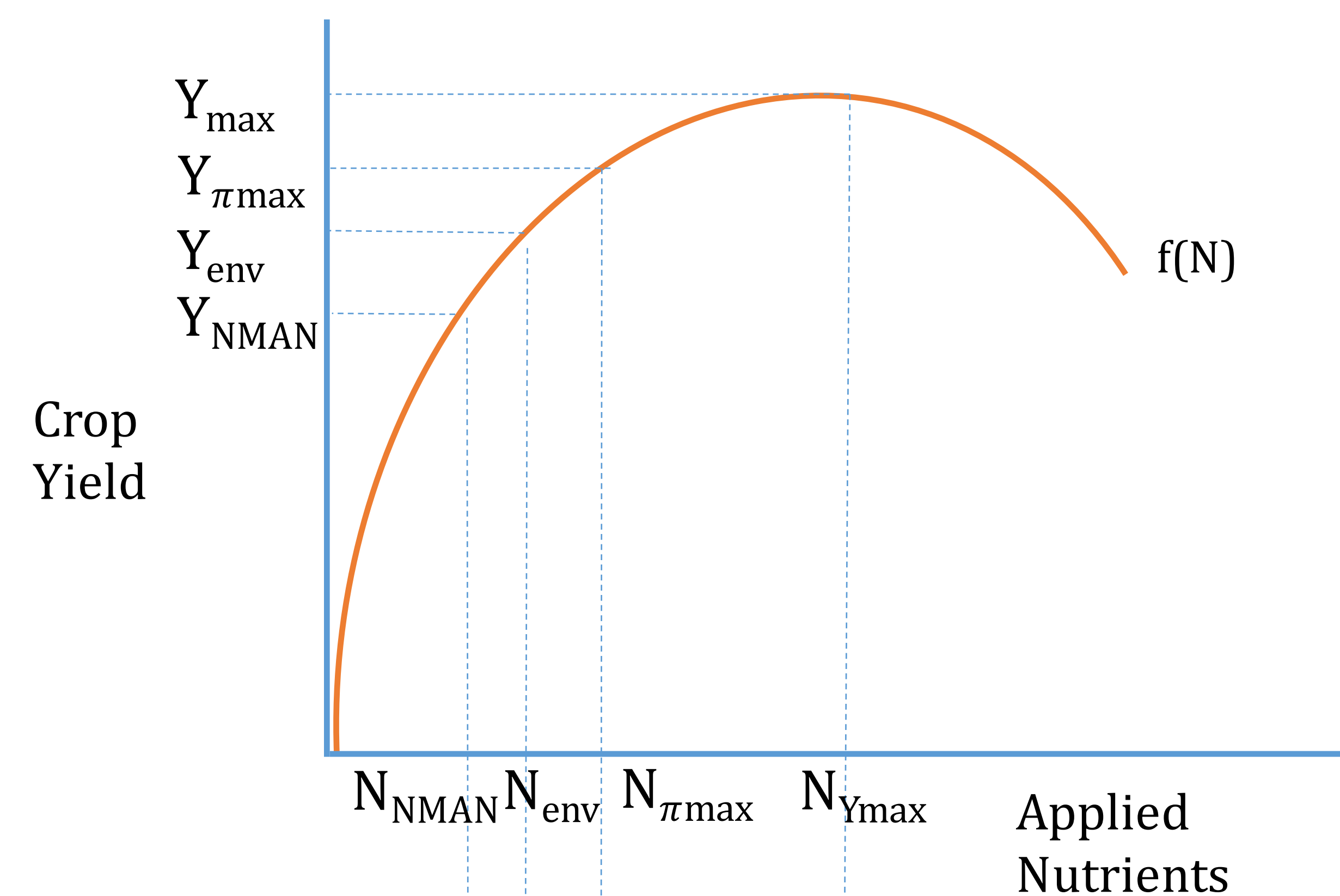
Study Area: Gully Creek Watershed

- Lake Huron, total area 14.3 km²
- Land use: 70% agricultural
- Primary crops: corn, soybeans and winter wheat
- Existing BMPs: conservation tillage, Nutrient Management Plan (NMAN rates), cover cropping and water and sediment control basins

Method

Comparing optimal nutrient (N) rates, through *ex post* profit analysis, where the optimal N rates are:

- A yield response function $f(N)$ can be used to find the yield maximizing nutrient rate (N_{max})
- From the yield response function $f(N)$ and an index of prices, the profit maximizing nutrient rate ($N_{\pi max}$)
- Including a nutrient loss function $g(N)$, then the profit maximizing nutrient rate that accounts for external environmental cost (N_{env})
- NMAN rate (N_{NMAN})



Policy Implications

- Understanding of why farmers are choosing to disadopt NMAN recommendations - changes to the NMAN to increase effectiveness
- Enable policy makers and conservation authorities to better address non-point source phosphorus pollution in the Great Lakes region, while minimizing change in farm profitability

Future Research

- What are the effects of risk - risk averse decision makers; the first stage of research assumes deterministic situations
- How does soil fertility effect the optimal N rates
- What are the effects of uncertainty (i.e. climactic variability)

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