

Key attributes of ecological production functions

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“Ecosystem Services, Environmental Stressors and Decision Making”

- 2014 Pellston Workshop, SETAC/ESA
- Special Series, *Integrated Environmental Assessment and Management*

1.	Maltby et al.	Ecosystem services, environmental stressors, and decision making: How far have we got? DOI: 10.1002/ieam.1796
2.	Van Wensem et al.	Identifying and assessing the application of ecosystem services approaches in environmental policies and decision making DOI: 10.1002/ieam.1836
3.	Bruins et al.	Using ecological production functions to link ecological processes to ecosystem services DOI: 10.1002/ieam.1842
4.	Munns et al.	Ecosystem services as assessment endpoints for ecological risk assessment DOI: 10.1002/ieam.1835
5.	Moore et al.	Application of ecosystem services in natural resource management decision making DOI: 10.1002/ieam.1838

How are EPFs defined?



- Land cover?
- Biological indicators?
- Dynamic processes?
- Stressors?
- Management actions?

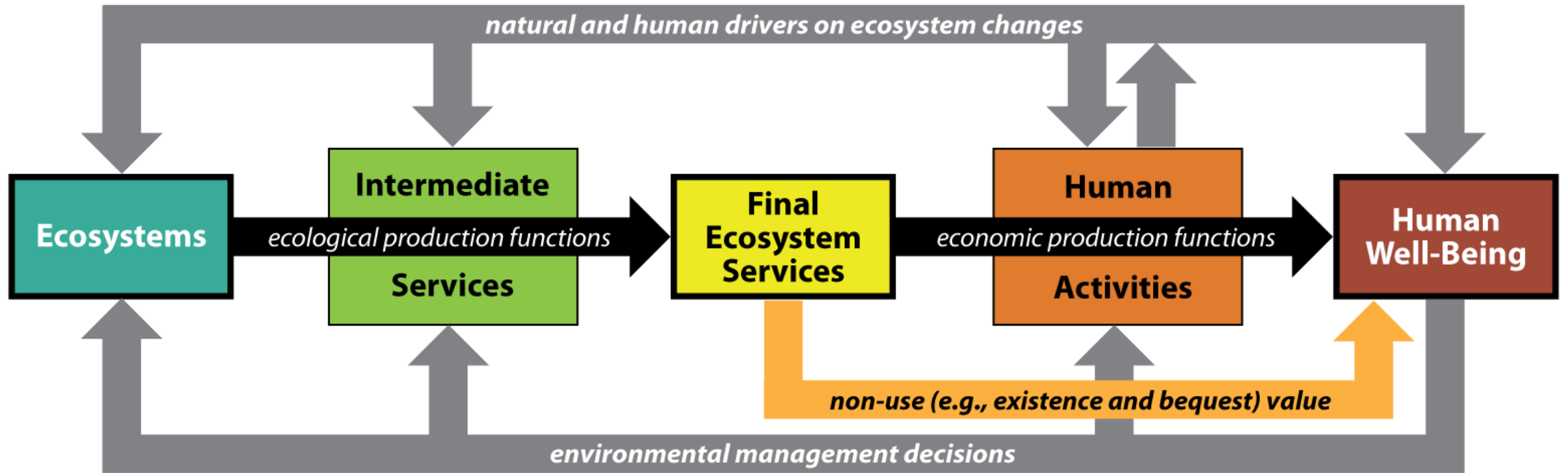
- Intermediate services?
- Final services?

How are EPFs defined?

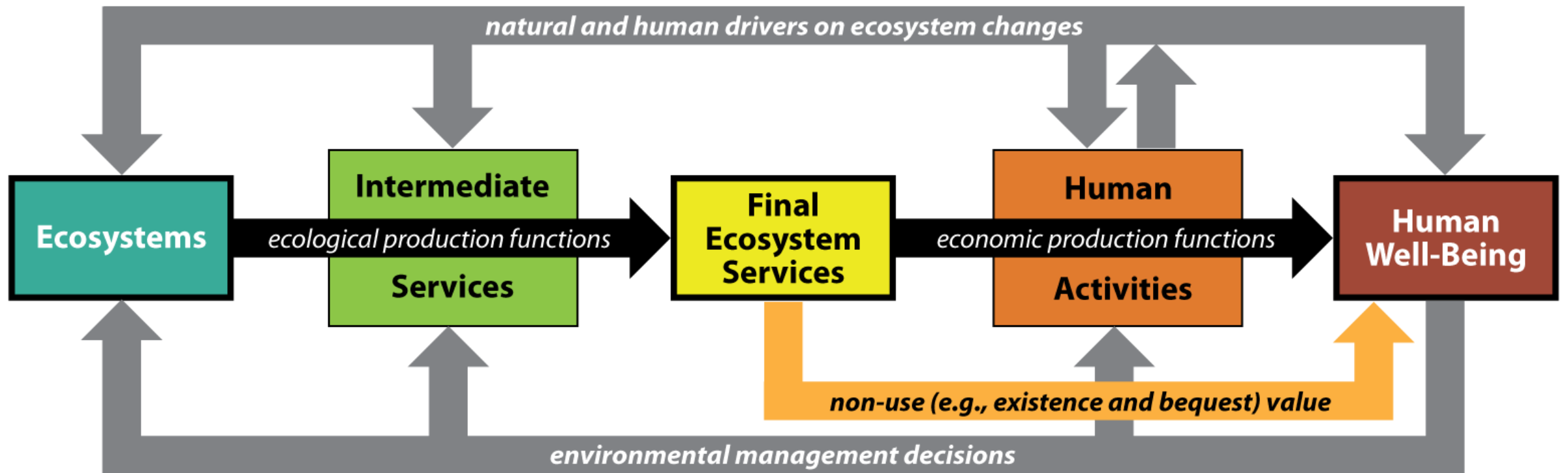


“Usable expressions (i.e., models) of the processes by which ecosystems produce ecosystem services, often including external influences on those processes...”

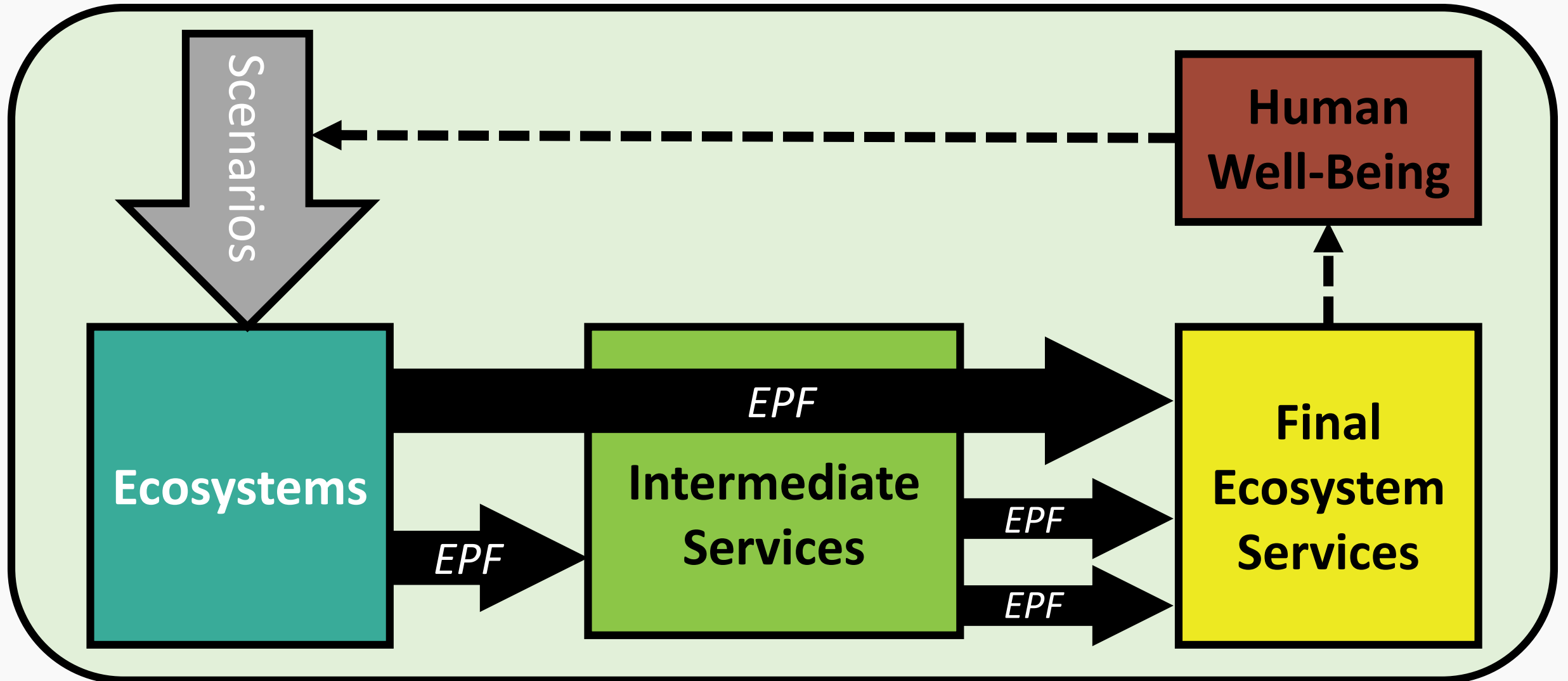
EPFs in an environmental management context



EPFs and decision support systems



EPFs and decision support systems



❖ Nine desired attributes of EPFs



Based on:

- Literature reviews
- Models abstracted in EPA's *EcoService Models Library* (beta version at https://esml.epa.gov/epf_1/public/signup)

❖ Desired attributes of EPFs



1. Estimate indicators of **final ecosystem services**

- Intermediate services useful for management
- Final services amenable to valuation, decision-making

- ❖ Nine desired attributes for EPFs



2. Quantify ecosystem service outcomes

- Qualitative → scoping, mapping
- Quantitative → trade-offs

❖ Nine desired attributes for EPFs



3. Respond to ecosystem **condition**

- EPFs based land-use/land cover alone are limited in application

❖ Nine desired attributes for EPFs



4. Respond to stressors or management scenarios
 - Include variables, processes relevant to actions

❖ Nine desired attributes for EPFs



5. 'Right' level of complexity

- Nonlinearities, feedbacks \leftrightarrow easily understood

❖ Nine desired attributes for EPFs



6. Rely on data with broad coverage

- Can be widely applied
- For example, begin with complex model (high data demands), then simplify

❖ Nine desired attributes for EPFs



7. Shown to perform well

- Functionally validated in relevant settings

❖ Nine desired attributes for EPFs



8. Practical to use

- Moderate computing power and expertise

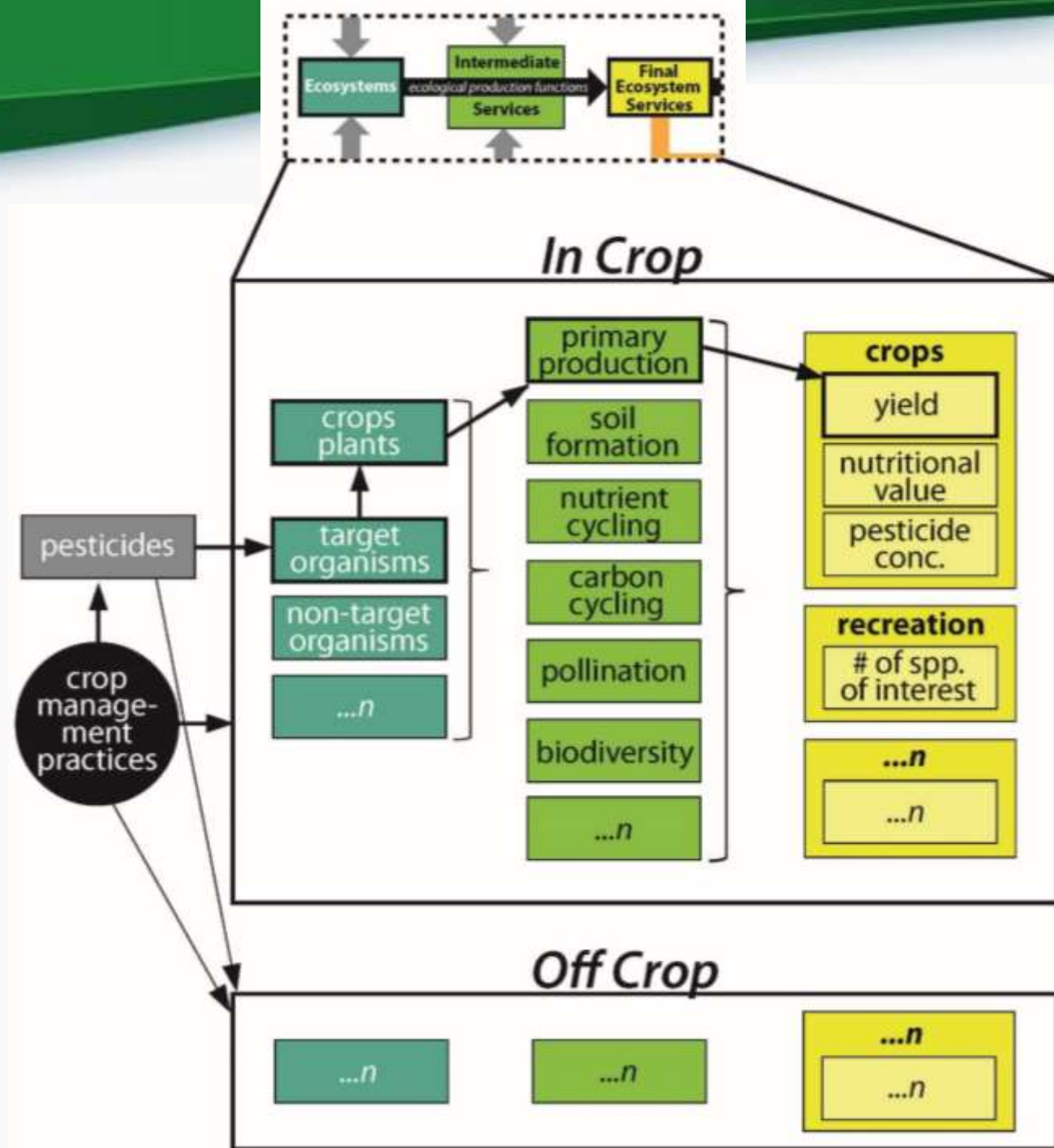
❖ Nine desired attributes for EPFs

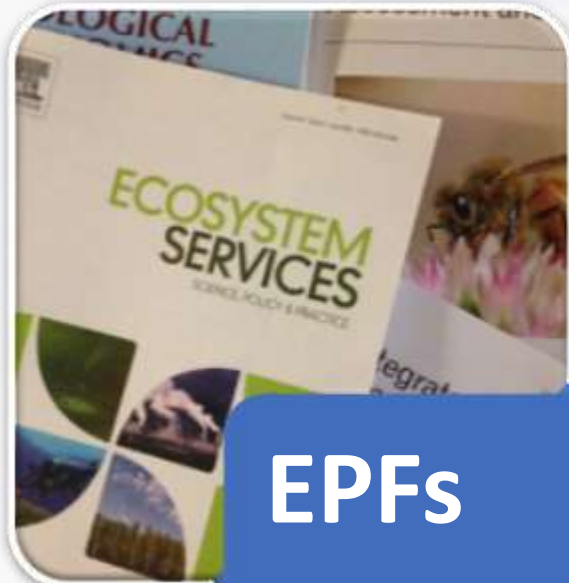


9. Open and transparent

- Well documented, adaptable

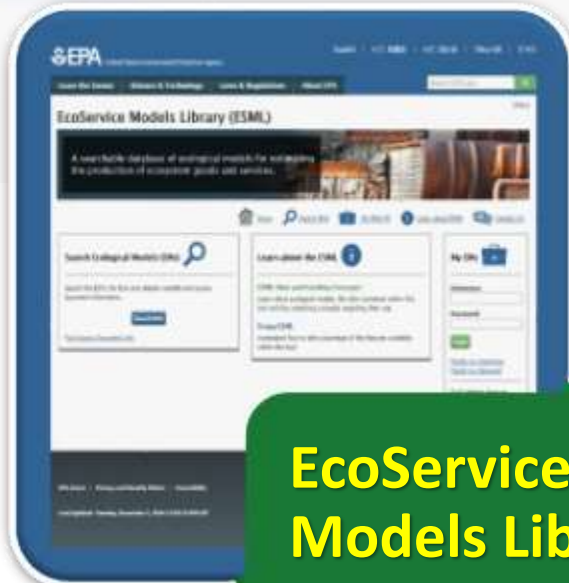
Greater need for EPFs in the assessment of chemicals in environmental management: agricultural pesticides as an example





EPFs

- Ecological literature
- EPA research
- Online tools
- Mapping methods



EcoService Models Library

- Model discovery
- Model analysis
- Ecosystem service classification



Users

- Regulatory impact analysis
- Community assessments
- Decision tool development

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A searchable database of ecological models for estimating the production of ecosystem goods and services.



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