United States Department of Agriculture

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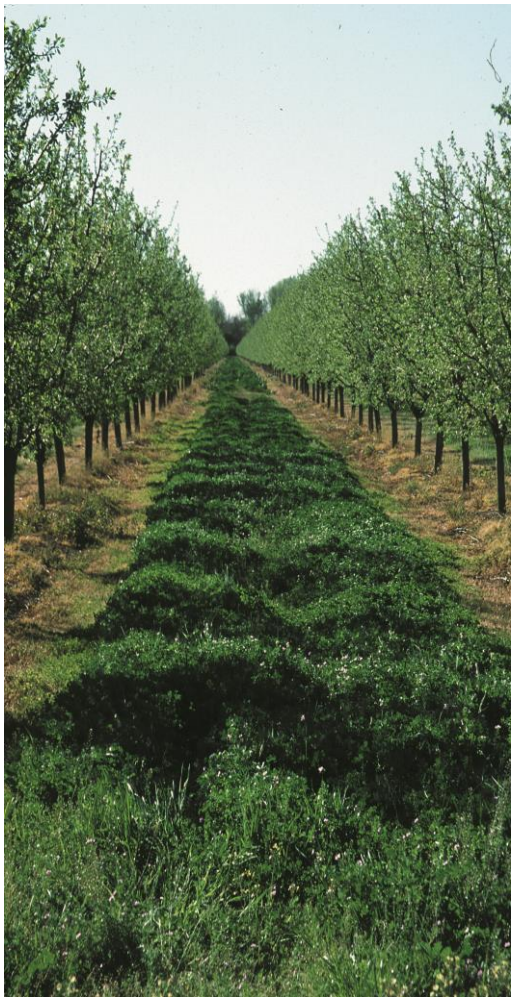

ENVIRONMENTAL QUALITY INCENTIVES PROGRAM

Programmatic Environmental Assessment

December 2014

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1.0 INTRODUCTION

The Environmental Quality Incentives Program (EQIP) is a voluntary program that provides financial and technical assistance to agricultural producers to help them plan and implement conservation practices to address natural resource concerns on agricultural land, nonindustrial private forest land, and Tribal land. The Agricultural Act of 2014 (the 2014 Farm Bill) modified the EQIP program that has been in place since about 2009, so the Natural Resources Conservation Service (NRCS) is publishing an interim final rule to implement those changes.[1]

The National Environmental Policy Act of 1969 (NEPA) requires that Federal agencies prepare Environmental Impact Statements (EIS) for major Federal actions significantly affecting the quality of the human environment. When a proposed Federal action is not likely to result in significant impacts requiring an EIS, but the activity has not been categorically excluded from NEPA, an agency can prepare an Environmental Assessment (EA) to assist them in determining whether there is a need for an EIS.[2] The Council on Environmental Quality (CEQ) has defined "major Federal action" to include activities over which Federal agencies have control. Often, agencies exercise considerable discretion when promulgating a regulation. In the case of the 2014 Farm Bill, Congress has prescribed the program changes that must be made, and there is very little discretion remaining for NRCS to exercise. Those decisions that do remain fall within a category of activities that has been excluded from the requirement to prepare an EIS. Despite this, NRCS has decided to prepare this programmatic EA to review the effects of activities that will occur on the ground when EQIP is implemented following 2014 Farm Bill requirements. This will provide a programmatic analysis to which those site-specific actions may tier, when appropriate, for purposes of complying with NEPA.[3]

CEQ has indicated that because an EA is a concise document, the purpose of which is to determine the need for an EIS, it should not contain long descriptions or detailed data which the agency may have gathered. Rather, it should contain a brief discussion of the need for the proposal, alternatives to the proposal, the environmental impacts of the Proposed Action and

[1] Section 2503 of the Food, Conservation, and Energy Act of 2008 (the 2008 Farm Bill) (Public Law 110-246) re-authorized and amended EQIP (16 U.S.C. 3839aa), created by the Food Security Act of 1985 as amended by the Federal Agriculture Improvement and Reform Act of 1996 (P. L. 104-127, Apri14, 1996) and the Farm Security and Rural Investment Act of 2002 (Public Law 107-171, May 13, 2002). The Commodity Credit Corporation funds EQIP.

[2] See 40 CFR 1501.4, 1508.9; 7 CFR 650.8.

[3] CEQ regulations at 40 CFR 1501.3(b) states that an agency may prepare an EA at any time in order to assist agency planning and decisionmaking.

alternatives, and a list of agencies and persons consulted.[4] In addressing these requirements, this EA also incorporates by reference relevant analysis from the 2009 EQIP Programmatic EA [5] as well as other existing analysis.

2.0 BACKGROUND

2.1 Overview of EQIP under the 2008 Farm Bill

EQIP was initially authorized by the Federal Agriculture Improvement and Reform Act of 1996 (Public Law 104-127, Apri14, 1996). The program promotes the voluntary application of conservation practices that maintain or improve the condition of soil, water, air, and other natural resources. The program assists owners and operators of agricultural and nonindustrial private forest land with identification of natural resource problems and opportunities to improve their condition and provides technical and financial assistance to address natural resource concerns in an environmentally beneficial and cost effective manner. The purposes of EQIP, under the 2008 Farm Bill, were to promote agricultural production, forest management, and environmental quality as compatible goals, and to optimize environmental benefits by—

1. Assisting producers in complying with local, State, and national regulatory requirements concerning—
   (A) soil, water, and air quality,
   (B) wildlife habitat, and
   (C) surface and ground water conservation;

2. Avoiding, to the maximum extent practicable, the need for resource and regulatory programs by assisting producers in protecting soil, water, air, and related natural resources and meeting environmental quality criteria established by Federal, State, Tribal, and local agencies;

3. Providing flexible assistance to producers to install and maintain conservation practices that sustain food and fiber production while—
   (A) enhancing soil, water, and related natural resources, including grazing land, forest land, wetland, and wildlife; and
   (B) conserving energy;

4. Assisting producers to make beneficial, cost effective changes to production systems (including conservation practices related to organic production), grazing management, fuels management, forest management, nutrient management associated with livestock, pest or irrigation management, or other practices on agricultural and forested land; and

[4] See 40 CFR 1508.9(b) and Forty Most Asked Questions Concerning CEQ's NEPA Regulations, 23 March 1981.
[5] http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs143_006910.pdf.

5. Consolidating and streamlining conservation planning and regulatory compliance processes to reduce administrative burdens on producers and the cost of achieving environmental goals.[6]

Information about the types of conservation practices implemented under the 2008 Farm Bill and the effects of those practices are discussed in Section 5.

2.2 Overview of EQIP 2014 Farm Bill Changes

Under the 2014 Farm Bill, EQIP remains a voluntary program providing both technical and financial assistance to agricultural producers and nonindustrial private forest landowners across the Nation. The purposes of EQIP, as amended by the 2014 Farm Bill, are the same as under the 2008 Farm Bill except that developing and improving wildlife habitat was added as a new EQIP purpose with a minimum of 5 percent of funds made available for payments required to benefit wildlife habitat. Additional changes include removing as an EQIP purpose consolidating and streamlining conservation planning and regulatory compliance processes, and eliminating the Agricultural Water Enhancement Program and the stand-alone Wildlife Habitat Incentive Program (WHIP). Table 1 summarizes the EQIP changes made by the 2014 Farm Bill.

Table 1. Selected Statuary Requirements of the Environmental Quality Incentives Program and the 2008 Farm Bill Wildlife Habitat Incentive Program

Program Elements	2008 Farm Bill	2014 Farm Bill
Funding by fiscal year (FY)	FY 2009 - $1,337,000,000 (EQIP) FY 2010 - $1,450,000,000 (EQIP) FY 2011 - $1,588,000,000 (EQIP) FY 2012 - $1,750,000,000 (EQIP) FY 2013 - $1,400,000,000 (EQIP)	FY 2014 - $1,350,000,000 FY 2015 - $1,600,000,000 FY 2016 - $1,650,000,000 FY 2017 - $1,650,000,000 FY 2018 - $1,750,000,000
Purposes	EQIP purposes explicitly included assisting producers in complying with regulatory requirements concerning wildlife habitat; and providing flexible assistance to producers for conservation practices that sustain food and fiber production while enhancing soil, water, and related natural resources, including grazing land, forest land, wetland, and wildlife.	Adds new EQIP purpose of developing and improving wildlife habitat.[7]

[6]This was removed as an EQIP purpose by the 2014 Farm Bill.

[7]At the same time it added this purpose to EQIP, Congress eliminated the WHIP which had been authorized under previous Farm Bills.

	Included as an EQIP purpose consolidating and streamlining conservation planning and regulatory compliance processes to reduce administrative burdens on producers and the cost of achieving environmental goals.	Removes as a purpose consolidating and streamlining conservation planning and regulatory compliance processes to reduce administrative burdens on producers and the cost of achieving environmental goals.
Definitions	National organic program was defined as the national organic program established under the Organic Foods Production Act of 1990.	Removes the term "national organic program" and modifies the definition of "organic system plan" to "an organic plan approved under the national organic program established under the Organic Foods Production Act of 1990…."
Length of Contract	Contract term begins on the date which the contract is entered into and ends one year after all practices have been implemented, but not to exceed 10 years.	Contract under the program will have a term that does not exceed 10 years.
Payments for Forgone Income	Secretary may accord great significance to a practice that promotes (A) residue management; (B) nutrient management; (C) air quality management; (D) invasive species management; (E) pollinator habitat; (F) animal carcass management technology; or (G) pest management.	Secretary may accord great significance to a practice that promotes: (A) soil health; (B) water quality and quantity improvement; (C) nutrient management; (D) pest management; (E) air quality improvement; (F) wildlife habitat development including pollinator habitat; or (G) invasive species management.
Increased Payment for Certain Producers	Provided for increased payments for limited resource, socially disadvantaged, or beginning farmers.	Adds veteran farmer or rancher.
Advance Payments for Certain Producers	Provided for advanced payments of not more than 30 percent for limited resource, socially disadvantaged, or beginning farmers or ranchers.	Provides for advanced payments of not more than 50 percent for limited resource, socially disadvantaged, veteran, or beginning farmers or ranchers. Adds that if funds provided in advance are not expended during the 90-day period beginning on the date of receipt of the funds, the funds will be returned within a reasonable timeframe.
Allocation of Funding	60 percent of funds made available for payments under the program will be	At least 60 percent of funds made available for payments under the

for Livestock	targeted at practices relating to livestock practices.	program will be targeted at practices relating to livestock practices.
Allocation of Funding for Wildlife	No specific provision.	At least 5 percent of the funds made available for payments under the program will be targeted at practices benefitting wildlife habitat.
Wildlife Habitat Incentive Program	WHIP was a separate program authority from EQIP; under WHIP, the Secretary provided financial assistance to owners of private agricultural land, nonindustrial private forest land, and Tribal lands to develop, (1) upland wildlife habitat; (2) wetland wildlife habitat; (3) habitat for threatened and endangered species; (4) fish habitat; and (5) other types of wildlife habitat, as determined by the Secretary, including habitat on pivot corners and other irregular areas.	Incorporates WHIP into EQIP (EQIP-WHIP). The Secretary will provide EQIP payments for conservation practices that support the restoration, development, protection, and improvement of wildlife habitat on eligible land, including: (1) upland wildlife habitat; (2) wetland wildlife habitat; (3) habitat for threatened and endangered species; (4) fish habitat; (5) habitat on pivot corners and other irregular areas of a field; and (6) other types of wildlife habitat, as determined by the Secretary. In determining eligible practices, State technical committees must be consulted at least once each year.
Limitations on Payments	Payments in the aggregate are limited to $300,000 for all EQIP contracts during any 6-year period.	Payments in the aggregate are limited to $450,000 for all EQIP contracts during FY 2014 through 2018.
Payment Limit Waiver	Provided a waiver of the aggregate limitation allowing the Secretary to raise the limit to not more than $450,000 during any 6-year period in cases of projects of special environmental significance.	No authority to exceed the $450,000 aggregate payment limitation.

3.0 PURPOSE AND NEED FOR ACTION

NRCS needs to promulgate regulations to implement EQIP as it has been modified by the 2014 Farm Bill. When these changes are implemented, NRCS must ensure it does so in a manner that achieves the purposes for which EQIP has been authorized.

As stated in the legislation, the purpose of EQIP under the 2014 Farm Bill is to promote agricultural production, forest management, and environmental quality as compatible goals, and to optimize environmental benefits by:

- Assisting producers in complying with local, State, and national regulatory requirements concerning—
    - soil, water, and air quality,
    - wildlife habitat, and
    - surface and ground water conservation;
- Avoiding, to the maximum extent practicable, the need for resource and regulatory programs by assisting producers in protecting soil, water, air, and related natural resources and meeting environmental quality criteria established by Federal, State, Tribal, and local agencies;
- Providing flexible assistance to producers to install and maintain conservation practices that sustain food and fiber production while:
    - enhancing soil, water, and related natural resources, including grazing land, forest land, wetland, and wildlife,
    - developing and improving wildlife habitat, and
    - conserving energy; and
- Assisting producers to make beneficial, cost effective changes to production systems (including conservation practices related to organic production), grazing management, fuels management, forest management, nutrient management associated with livestock, pest or irrigation management, or other practices on agricultural and forested land.

The provisions of WHIP that have been incorporated into EQIP state that the Secretary will provide payments for conservation practices that support the restoration, development, protection, and improvement of wildlife habitat on eligible land, including—

- Upland wildlife habitat;
- Wetland wildlife habitat;
- Habitat for threatened and endangered species;
- Fish habitat;
- Habitat on pivot corners and other irregular areas of a field; and
- Other types of wildlife habitat, as determined by the Secretary.

The provisions also state that the Secretary will consult with relevant State Technical Committees not less often than once a year to assist in determining the practices eligible for payment and targeted for funding which support the habitat goals identified above.

The conservation practices used to identify wildlife benefits associated with the new provisions of EQIP will be those with a primary purpose of developing wildlife habitat and other practices applied to achieve a specific benefit to wildlife habitat. Specifically, out of more than 160 existing conservation practice standards used by NRCS, 16 have wildlife habitat as a primary purpose (see Appendix A) and approximately another 45 standards are often used to benefit wildlife habitat.

4.0 ALTERNATIVES

4.1 Alternative 1: No Action – Continuation of EQIP as implemented under the 2008 Farm Bill.

This No Action alternative involves continuing EQIP as it was implemented under the 2008 Farm Bill. This alternative assumes conservation practices would be funded based on processes used under the 2008 Farm Bill and that as a result, similar conservation practices would be implemented. This alternative provides a baseline against which to compare the effect of the 2014 Farm Bill changes. CEQ NEPA implementing regulations require analysis of a No Action alternative for this purpose.

4.2 Alternative 2: Proposed Action – Implement EQIP as modified by the 2014 Farm Bill.

The Proposed Action alternative incorporates the changes required by the 2014 Farm Bill, including integration of WHIP into EQIP. Under this alternative, NRCS will track implementation of all conservation practices with a primary purpose of benefiting wildlife habitat (see Appendix A) as well as other practices applied to achieve a specific wildlife habitat benefit. This ensures a minimum of 5 percent of EQIP funds made available for payments are used to improve wildlife habitat as is directed by the 2014 Farm Bill. NRCS will also continue to deliver EQIP in conjunction with other program authorities through initiatives such as Working Lands for Wildlife (WLFW), which enable NRCS to more effectively address priority natural resource concerns by delivering systems of practices primarily to the most vulnerable lands within geographic focus areas, and by leveraging partnership opportunities through programs such as the new Regional Conservation Partnership Program (RCPP). To accomplish specific wildlife objectives, landscape initiatives such as WLFW may require the use of conservation practices that are not included among the 16 practices NRCS normally uses to measure wildlife performance. For example, use of the NRCS Prescribed Grazing (528) conservation practice standard is essential in facilitating the development and maintenance of habitat to benefit the lesser prairie-chicken and Gunnison sage-grouse, both listed as threatened under the Endangered Species Act (ESA), and greater sage-grouse, which is a candidate for listing in most of its range and has been proposed for listing for distinct population segments under the ESA. Every plan developed by NRCS under either the Lesser Prairie-Chicken Initiative or the Sage-Grouse Initiative, where grazing will occur, requires the use of Prescribed Grazing. To accommodate situations such as this, the Chief may grant waivers allowing additional conservation practices related to NRCS landscape wildlife initiatives to also be considered in determining whether 5 percent of EQIP funding was used to benefit wildlife.

5.0 EFFECTS OF ALTERNATIVES

5.1 Approach to Impact Analysis

This analysis concentrates on the environmental impacts of conservation practices likely to be implemented under the No Action and Proposed Action alternatives and the resource concerns and land uses in which the public historically has been most interested—cropland soil quality, fish and wildlife habitat, forest land conservation, grazing land conservation, irrigation efficiency, water quality, and wetlands. Program and conservation practice impacts described in the January 2009 EQIP Programmatic EA[8] are incorporated by reference and updated as appropriate in this document. This EA also incorporates by reference the findings of the RCA Appraisal: Soil and Water Resources Conservation Act,[9] and the Conservation Effects Assessment Project (CEAP) findings described in a series of CEAP cropland, wildlife, wetlands, and grazing lands assessment reports.[10]

There are over 160 conservation practice standards in the NRCS National Handbook of Conservation Practices (NHCP).[11] In many cases, the same conservation practice may be used on more than one type of agricultural operation. Table 2 provides examples of conservation practices that might be used by EQIP participants on cropland, rangeland, pastureland, and forest lands.

Table 2: Examples of NRCS Conservation Practices and Applicability by Land Use

Practice Name	Code	Crop	Pasture	Range	Forest
Brush Management	314		X	X	X
Conservation Crop Rotation	328	X			
Residue & Tillage Management, No-Till/Strip Till/ Direct Seed	329	X			
Prescribed Burning	338		X	X	X
Cover Crop	340	X			
Critical Area Planting	342	X	X	X	X
Residue & Tillage Management, Reduced Till	345	X			
Windbreak/Shelterbelt	380/650	X	X	X	

[8] http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs143_006910.pdf.

[9] "RCA Appraisal: Soil and Water Resources Conservation Act," USDA, 2011. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1044939.pdf.

[10] See http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/nra/ceap/ for a description of CEAP and links to related studies and reports. See also Appendix D.

[11] For information on specific conservation practices approved for use at the national level. http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/cp/ncps/.

Practice Name	Code	Crop	Pasture	Range	Forest
Establishment/Renovation					
Fuel Break	383		X	X	X
Woody Residue Treatment	384				X
Field Border	386	X			
Riparian Herbaceous Cover/Forest Buffer	390/391	X	X	X	
Filter Strip	393	X			
Firebreak	394		X	X	X
Stream Habitat Improvement & Management	395	X	X	X	X
Irrigation Water Management	449	X	X		
Forage Harvest Management	511		X		
Forage and Biomass Planting	512		X		
Prescribed Grazing	528		X	X	X
Range Planting	550			X	
Tree/Shrub Establishment	612				X
Restoration/Mgmt of Rare & Declining Habitats	643	X	X	X	X
Wetland Wildlife Habitat Management	644	X	X	X	X
Upland Wildlife Habitat Management	645	X	X	X	X
Early Successional Habitat Development/Mgmt	647	X	X	X	X
Road/Trail/Landing Closure and Treatment	654				X
Forest Trails & Landings	655				X
Tree/Shrub Pruning	660				X
Alley Cropping	311	X	X		
Mulching	484	X			
Watering Facility	614	X	X	X	X
Forest Stand Improvement	666				X

This EA analyzes potential environmental impacts at a broad program scale, identifying the qualitative effects that are a reasonably foreseeable result of each alternative. These qualitative assessments are based on a review of the best available scientific studies and methodological approaches, as well as professional judgment. NRCS has developed network effects diagrams to illustrate the chain of expected direct, indirect, and cumulative effects of applying each conservation practice according to the standard for the land use on which it is intended to be

applied and the other practices to be considered in conjunction. Copies of the network effects diagrams are available on the NRCS Web site[12] as well as in Appendix M. The methodologies used to develop the network effects diagrams and determine the effects of NRCS conservation programs are described in Appendix B.

5.2 Environmental Considerations in NRCS Conservation Program Delivery

In addition to this programmatic review, NRCS undertakes environmental review at subsequent stages of program implementation consistent with NEPA requirements, other requirements for protection of the environment, and NRCS regulations. This additional review includes conducting an onsite environmental evaluation (EE) and documenting the results on an EE worksheet before funding is provided to eligible recipients. The EE assesses the effects of conservation alternatives and provides information for the Responsible Federal Official (RFO) to determine the need for consultation or to develop additional EAs or EIS's consistent with NEPA, other requirements for environmental protection, and NRCS regulations.

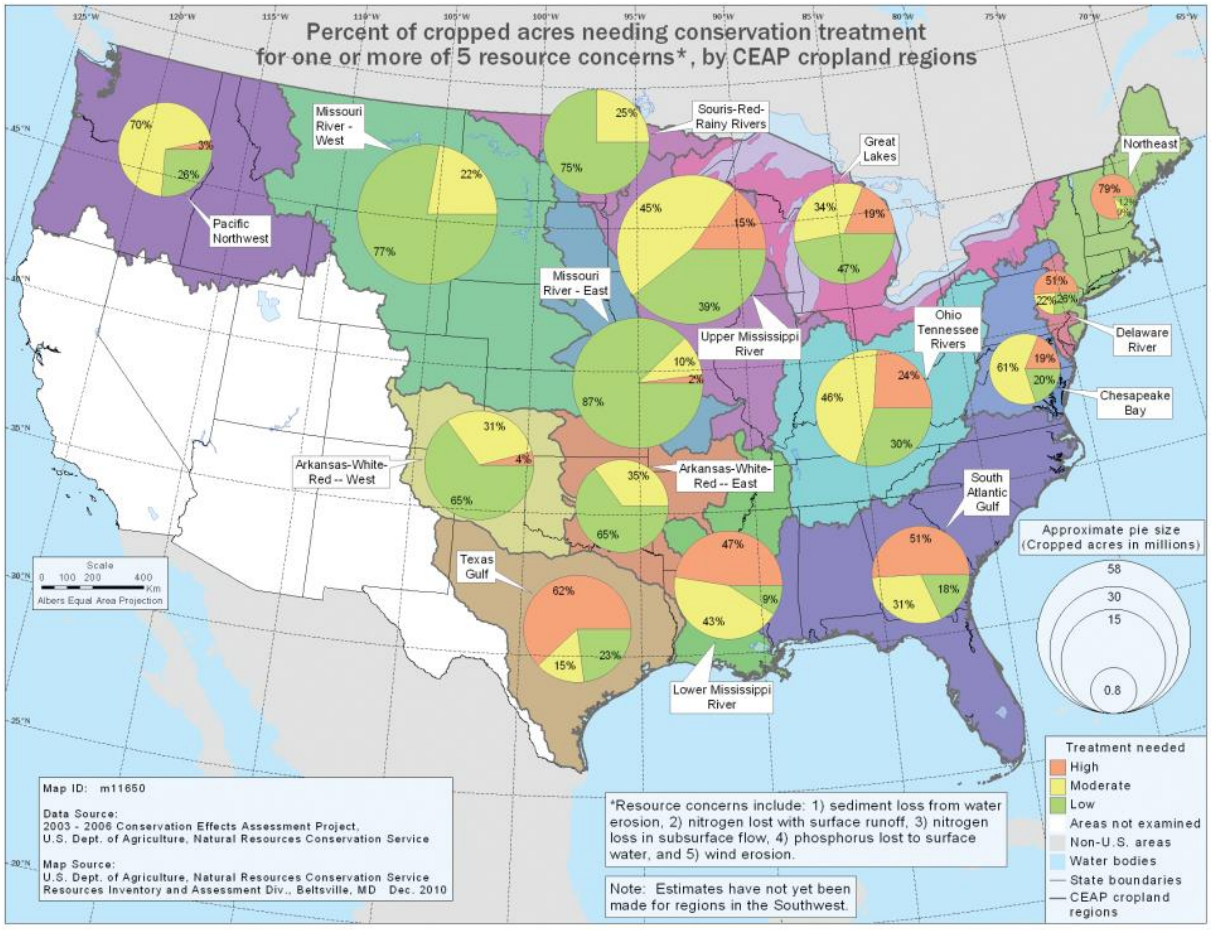
In situations where a single conservation practice may result in increased risk to the condition of another resource, additional conservation practices are integrated into the conservation plan to avoid creating new resource concerns. The EE process helps to ensure that all potential impacts to natural resources are identified and appropriate alternatives and practices are available to the program participant. Appendix C describes the development of NRCS conservation practice standards and how environmental considerations, including compliance with NEPA, ESA, and National Historic Preservation Act (NHPA), are integrated into NRCS conservation planning and program delivery.

5.3 Conservation Treatment Needs and Predicted Conservation Practices

CEAP regional watershed studies looked at application of conservation practices across acres by level of vulnerability. The vulnerability metric is a combination of the natural physical conditions associated with the particular field (such as soil type and potential for erosion) and the management applied to the field (i.e., presence of conservation practices). The resultant matrix pinpoints which areas need additional treatment. Figure 1 shows available CEAP regional results according to conservation treatment needs. The numbers in each circle show the percentage of cropland acres that fall within each treatment category. Acres that require extra attention are represented by orange; acres that have low treatment needs are represented by green; and acres with moderate treatment needs are in yellow.

[12]Practice Network Effect Diagrams are available at http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/cp/ncps/?cid=nrcs143_026849.

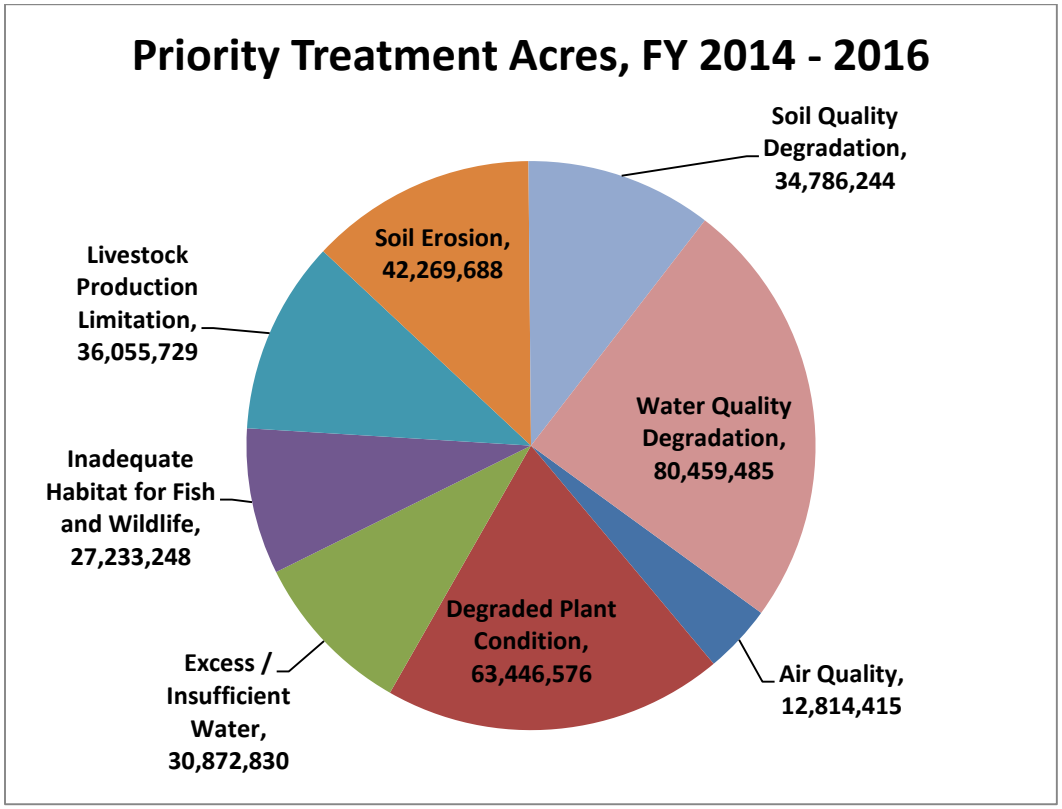
Figure 1: Conservation Treatment Needs[13]



In addition, in FY 2013, as part of its FY 2014 State Resource Assessment (SRA), NRCS asked its State Conservationists to estimate for eight resource concerns, the number of acres they expect to treat from FY 2014 to FY 2016—soil erosion, soil quality degradation, excess/ insufficient water, water quality degradation, degraded plant condition, inadequate habitat for fish and wildlife, livestock production limitation, and air quality impacts. These are referred to as "Priority Treatment Acres." State Conservationists were not asked to identify these resource concerns by land use, and more than one resource concern may have been identified for the same acreage. Figure 2 provides an indication about which resource concerns may be addressed through EQIP and other USDA conservation programs over the first 3 years of the 2014 Farm Bill regardless of which EQIP programmatic alternative is selected.

[13]RCA Appraisal, 2011.

Figure 2: Priority Treatment Acres, FY 2014-2016



Priority Treatment Acres were estimated by States using a variety of methods. States estimated the acres they expected to treat by resource concern but were not asked to consider land use.

Based on the results, it appears that nationally, State Conservationists will likely fund conservation practices that address water quality degradation, degraded plant condition, soil erosion, and livestock production limitations most often through FY 2016.

Knowing the resource concerns that are likely to be addressed enables NRCS to predict more broadly which conservation practices are likely to be used and the types of effects that are likely to result. Therefore, as an additional part of the FY 2014 SRA, State Conservationists were asked to estimate which conservation practices they were most likely to use to treat what resource concerns on previously identified acres. Appendix D identifies the methodology used to identify the top practices by resource concern, and Appendix E identifies the top five practices by resource concern that the NRCS SRA indicates are likely to be implemented under EQIP through new contracts obligated in FY 2014. While these resource concerns do not align directly with the grouping of resource concerns used in the discussion below, there is considerable overlap among them.

5.4 Environmental Effects of Alternatives

The discussion of the No Action alternative below describes how EQIP conservation practices under the 2008 Farm Bill affected the environment and projects future effects if EQIP continues unchanged without WHIP. The discussion of the Proposed Action, under which EQIP would be implemented according to the requirements of the 2014 Farm Bill including incorporation of a new WHIP, focuses on the likely differences in practices used and impacts to the quality of the human environment as compared to the No Action alternative.

Although EQIP specifically addresses resource concerns on working farms and ranches, on nonindustrial private forest land, and Tribal lands, implementation of the program creates benefits that extend well beyond the land on which EQIP is used. Conservation practices funded through EQIP accrue environmental benefits including improved grazing lands, improved air quality, enhanced fish and wildlife habitat, sustainable plant and soil conditions, improved water quality and quantity, reduced soil erosion, and energy conservation that provide important ancillary economic and social benefits. Such impacts are considered in the network effects diagrams that illustrate the direct, indirect, and cumulative effects of NRCS conservation practices (see Appendix M) and are also considered in the Conservation Practice Physical Effects (CPPE) assessments and CEAP studies described in Appendix B and discussed below.

5.4.1 Alternative 1*:* No Action – Continuation of EQIP as Implemented Under the 2008 Farm Bill.

The No Action alternative assumes EQIP would continue to be implemented as it was under the 2008 Farm Bill, and as a result, conservation practices similar to those funded under the 2008 Farm Bill EQIP program would continue to be funded into the future. In addition, this alternative assumes EQIP funding would be available in amounts ranging from $1.2 billion to $1.75 billion as was the case under the 2008 Farm Bill.

The following reviews the conservation practices implemented under EQIP during the 2008 Farm Bill, and the types of effects resulting from those practices, as well as the effects that would be anticipated from a continuation of the same program provisions.

From FY 2009 to 2013, between nearly 12 to 20 million acres were treated under EQIP each year.[14] The following sections discuss the EQIP conservation practices used under the 2008 Farm Bill to achieve improvements in soils, with a focus on cropland soil quality; fish and wildlife habitat; forest land conservation; grazing land conservation; water quantity with a focus on irrigation efficiency; water quality; and wetlands.[15] Note that there is some overlap between these groupings because some practices address multiple resource concerns. Land unit acres shown below are counted each time a practice is applied on that land unit in the fiscal year;

[14]RCA Viewer, 2008 Farm Bill Data; http://www.nrcs.usda.gov/Internet/NRCS_RCA/reports/fb08_cp_eqip.html.

[15]Any practices not included in one of these groups are included in an All Other category.

therefore, land unit acres may be counted multiple times across practices, practice groupings, and fiscal years.

SOILS

The 2009 EQIP Programmatic EA describes typical problems related to soils, such as prime and unique agricultural lands and forest lands, soil quality, and erosion. This EA incorporates by reference pages 27 to 34 of the 2009 EQIP Programmatic EA which characterize prime and unique agricultural lands and forest lands, and pages 36 and 37, which characterize soil resources. The section below provides additional information and describes the past and predicted future impacts of EQIP when implemented according to 2008 Farm Bill rules.

Cropland Soil Quality

Between 1982 and 2010, there was a 41 percent decline in soil erosion on cropland.[16] Although the rate of decrease in soil erosion slowed since 1997, the general downward trend in sheet and rill erosion and wind erosion continued through 2010, though the reduction from 2007 to 2010 was not statistically significant from zero.[17] (See figures 3 and 4 for the changes in estimated sheet and rill erosion rates from 1982 to 2010.) During that period, EQIP was an important tool available to provide farmers with technical and financial assistance to help reduce soil erosion and improve soil quality.

[16] U.S. Department of Agriculture. 2013. Summary Report: 2010 National Resources Inventory, Natural Resources Conservation Service, Washington, D.C., and Center for Survey Statistics and Methodology, Iowa State University, Ames, Iowa, page 7. (http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1167354.pdf.)

[17] Ibid.

Figure 3: Estimated Sheet and Rill Erosion Rates on Cropland, 1982

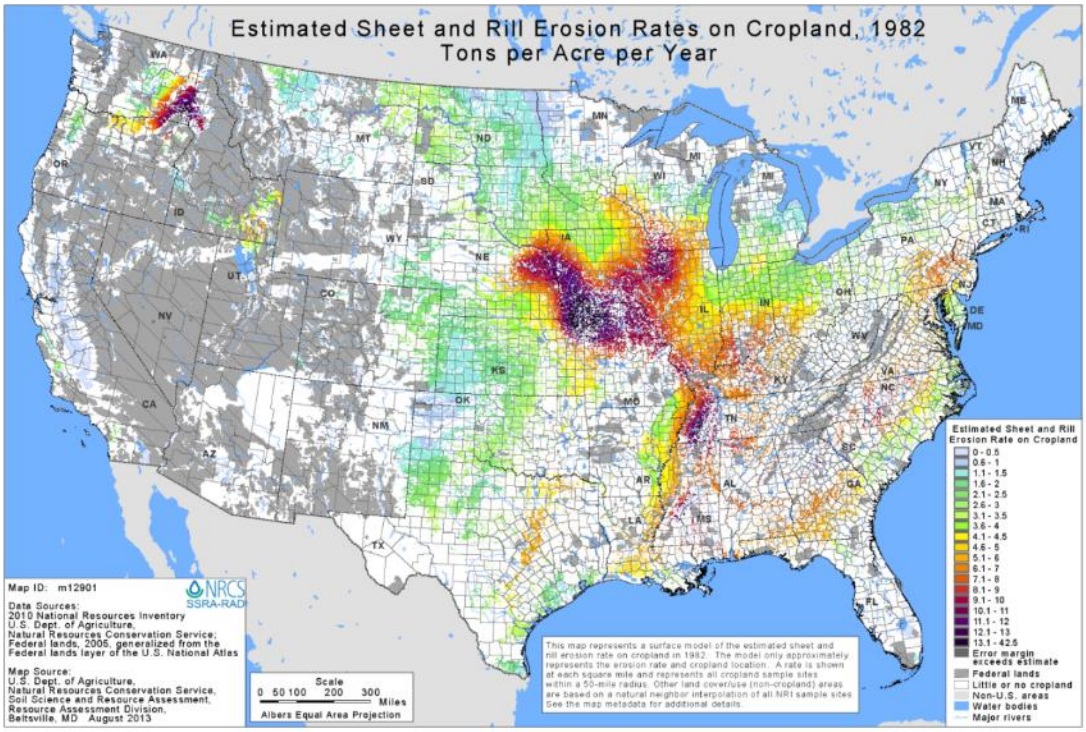
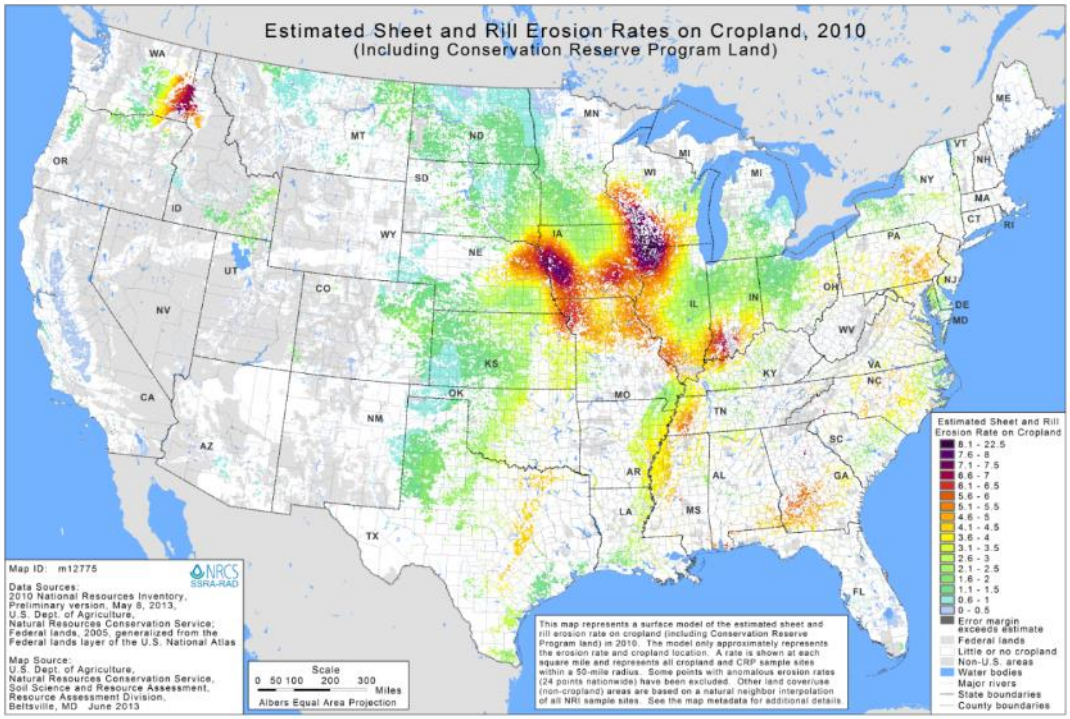


Figure 4: Estimated Sheet and Rill Erosion Rates on Cropland, 2010



Conservation Practices Related to Improving Cropland Soil Quality, Including Erosion Reduction

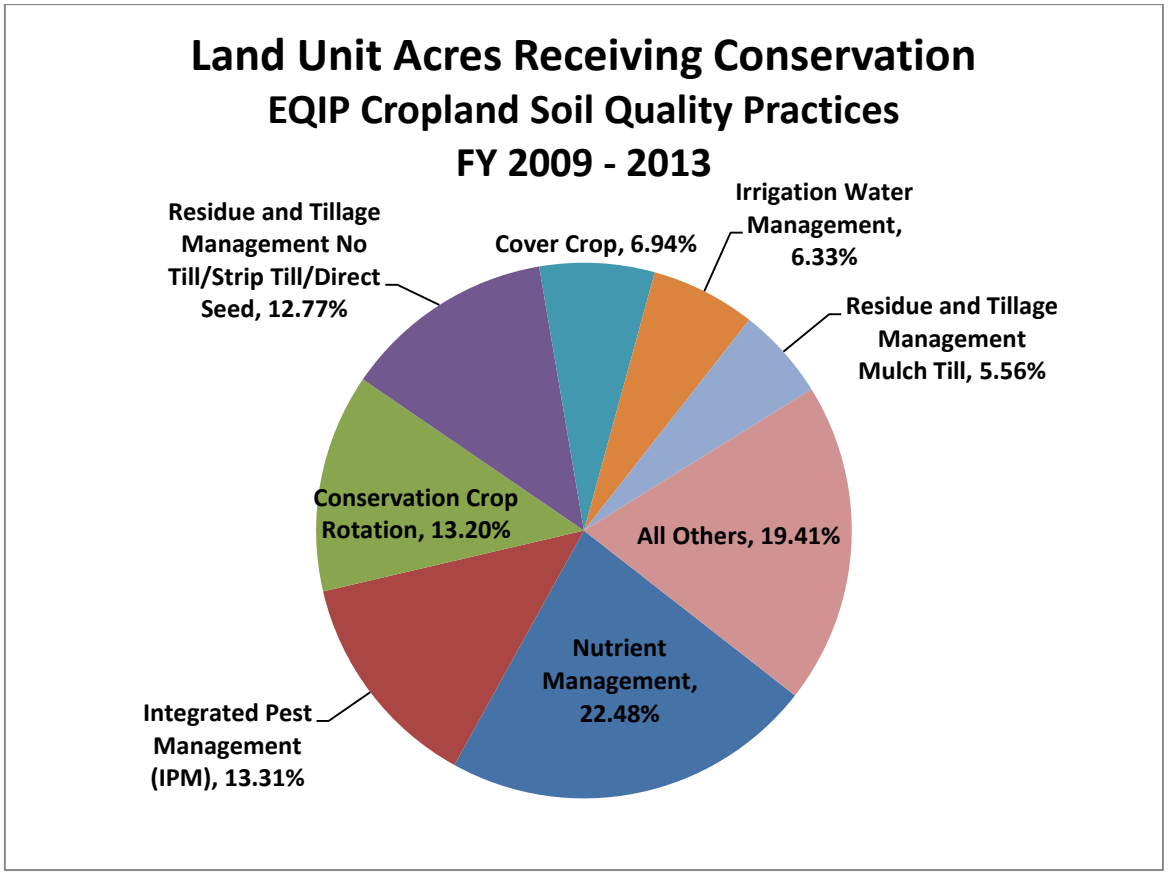
Figure 5 identifies the most frequent conservation practices applied through EQIP to improve cropland soil quality. Each year of the 2008 Farm Bill, an average of nearly 7 million acres of cropland and hayland out of 13.9 million acres under EQIP contract were treated with one or more soil quality improvement practices.

The six components of soil quality management are enhancing organic matter, avoiding excessive tillage and erosion, managing pests and nutrients efficiently, preventing soil compaction, keeping the ground covered, and diversifying cropping systems. Consistent with this, seven conservation practices that directly align with these components—Nutrient Management, Integrated Pest Management (IPM), Residue and Tillage Management (No-till, Strip-till or Direct Seeding) (Residue Management), Conservation Crop Rotation (CCR), Irrigation Water Management (IWM), Residue and Tillage Management (Mulch-till), and Conservation Cover—were used on about 80 percent of cropland acres treated under EQIP to address soil quality concerns from FY 2009 to 2013. Approximately 30 other conservation practices make up the remaining 30 percent of cropland soil quality treatments applied through EQIP over the course of the 2008 Farm Bill.[18] (See Appendix F.) Many of the same conservation practices used to improve soil quality are also used to reduce soil erosion.

Four of the conservation practices identified in figure 5—Residue and Tillage Management (No-till); Cover Crop; Nutrient Management; and Conservation Crop Rotation—are among the top five practices that State Conservationists said they would likely implement within their State to address soil quality concerns from FY 2014 to 2016. Because there is a clear need to continue to address soil quality concerns, it is likely similar practices would continue to be installed in the future if EQIP were to continue to be implemented as it was under the 2008 Farm Bill, though the number of practices implemented might change based on the amount of available funding. NRCS initiatives to improve soil quality would likely continue, as well, but EQIP practices implemented as part of those initiatives are included in the information in figure 5.

[18]As previously indicated, more than one conservation practice may be applied on the same land unit or across multiple years, so there is some double-counting included. See also http://www.nrcs.usda.gov/Internet/NRCS_RCA/reports/fb08_cp_eqip.html.

Figure 5: EQIP 2008 Farm Bill Soil Quality Improvement Practices



*Only practices representing a significant portion of the total for the period are included in the above chart. Practices not included are summed into the All Other category. Note that only practices applied on cropland or hayland are included.

All CEAP regional assessments completed, thus far, indicate that soil conservation practices on cropland reduce losses of sediment, nitrogen, and phosphorous from cropland fields.[19] In some areas, treatment of soil erosion alone can exacerbate the nitrogen leaching problem by re-routing surface runoff to subsurface flow pathways, but suites of practices that include nutrient management and other conservation practices as required by the particular site conditions, as well as soil erosion control practices, can simultaneously address soil erosion and nutrient losses by wind, in runoff, and through leaching. Recognizing this, NRCS often implements conservation practices in "systems" of associated practices to mitigate such unintended consequences. Table 3 summarizes the results of findings related to NRCS conservation practice effects on reducing cropland losses of sediment as of 2006.[20]

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[19]See River Basin Cropland Modeling Study Reports for the Upper Mississippi River Basin, Ohio-Tennessee River Basin, Missouri River Basin, Arkansas-White-Red Basin, Lower Mississippi River Basin, Great Lakes Region, and Chesapeake Bay.
http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/technical/nra/ceap/na/?cid=nrcs143_014144.

[20]CEAP results related to nitrogen and phosphorous loadings are discussed in "Water Quality."

Table 3: Summary of CEAP River Basin Cropland Modeling Study Report Findings for Sediment Losses

	Sediment Losses	
	Wind	**Runoff**
CEAP STUDY	*% reduction in losses*	
Upper Mississippi River Basin (Aug 2012)	**64**	**61**
Ohio-Tennessee River Basin (Jan 2012)	*n/a*	**52**
Missouri River Basin (Aug 2012)	**58**	**73**
Arkansas-White-Red Basin (March 2013)	**31**	**61**
Lower Mississippi River Basin (Aug 2013)	*n/a*	**27**
Great Lakes Region (Sept 2011)	**44**	**47**
Chesapeake Bay (Mar 2011)	*n/a*	**55**

Based on the results of CEAP studies thus far, by 2006 the greatest reduction in sediment losses from the land had generally occurred in the Missouri River and Arkansas-White-Red Basin. The least reductions were obtained in the Lower Mississippi River Basin.

These and other NRCS soil quality practices, as illustrated in the network effects diagrams associated with each practice and further supported by the results of CEAP studies, improve soil quality by applying the right amount of pesticides and nutrients at the right time, reducing erosion, and increasing soil organic matter through improved residue management and use of conservation cover crops. See Appendix F for a list of NRCS soil quality practices implemented during the 2008 Farm Bill and Appendix M for the network effects diagrams.

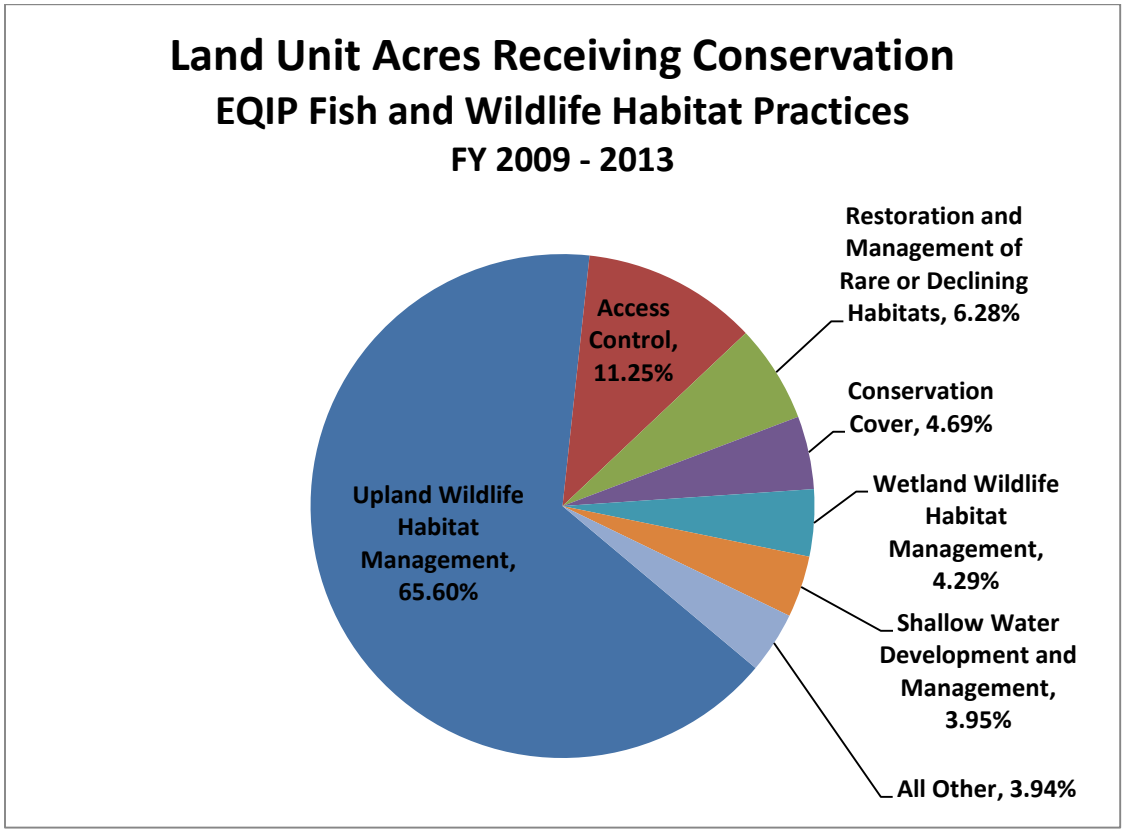
Fish and Wildlife Habitat

The 2009 EQIP Programmatic EA describes typical issues related to fish and wildlife resources. This EA incorporates by reference pages 61 to 65 of the 2009 EQIP Programmatic EA which characterizes biological resources including fish and wildlife habitat. The section below provides additional information and describes the past and predicted future impacts of EQIP when implemented according to 2008 Farm Bill rules.

Conservation Practices Related to Improving Fish and Wildlife Habitat

Figure 6 identifies the top practices used through EQIP to improve Fish and Wildlife Habitat. Farmland, ranch land, and forest land can all provide habitat for fish and wildlife and other biological resources and through EQIP, NRCS can provide technical and financial assistance when a client wants to conserve, maintain, and improve this habitat. While every practice and management action taken on the land has some effect on biological resources, approximately 16 conservation practices have as their primary purpose the improvement of fish and wildlife habitat.

Figure 6: EQIP 2008 Farm Bill Fish and Wildlife Habitat Improvement Practices



*Only practices representing a significant portion of the total for the period are included in the above chart. Practices not included are summed into the All Other category. Note that only practices applied on cropland or hayland are included.

Of these, six practices—Upland Wildlife Habitat Management, Access Control, Restoration and Management of Rare or Declining Habitat, Conservation Cover, Wetland Wildlife Habitat Management, and Shallow Water Development and Management—made up about 96 percent of the conservation practices used to improve fish and wildlife habitat on EQIP-treated acres from 2009 through 2013. Approximately 10 other conservation practices make up the remaining 4 percent of fish and wildlife habitat improvement treatments applied through EQIP over the course of the 2008 Farm Bill.[21] (See Appendix G.)

Two of the conservation practices identified in figure 6—Upland Wildlife Habitat Management and Shallow Water Development and Management—are among the top five practices that State Conservationists said they would likely implement within their State to address fish and wildlife habitat concerns from FY 2014 to 2016. These two practices were applied to about 70 percent of the acres on which fish and wildlife habitat concerns were addressed. Because there is a clear need to continue to address habitat needs, it is likely these and other similar practices would

[21]See http://www.nrcs.usda.gov/Internet/NRCS_RCA/reports/fb08_cp_eqip.html. See also, Appendix G for a list of the 16 conservation practices with the primary purpose of benefiting wildlife.

continue to be installed in the future if EQIP were to continue to be implemented as it was under the 2008 Farm Bill, though the number of fish and wildlife practices implemented might change based on the amount of available funding. NRCS WLFW initiatives would likely continue, but practices implemented through EQIP as part of those initiatives are included in the practice information above.

A 2007 compilation of studies entitled "Fish and Wildlife Response to Farm Bill Conservation Practices," included studies that found:

- Cropland conservation practices targeted at reducing soil erosion will reduce sediment delivery and run-off of agricultural pollutants, thereby resulting in positive effects on aquatic systems and species. (Brady) The author noted that such practices may also benefit terrestrial wildlife populations when properly planned, but may have little or no benefits without this planning due to the importance of providing appropriate plant communities and habitat elements within agricultural landscapes. NRCS incorporates the use of wildlife habitat evaluations or appraisals into its application of conservation practices intended to benefit wildlife.
- The complexities of effects on fish and macroinvertebrates leave many questions unanswered; there is insufficient data from evaluation of completed aquatic restoration projects to be able to make broad findings. For example, while snagging and clearing is generally considered detrimental to aquatic fauna because of the important role large wood plays in providing habitat and carbon, removal of some material may prevent bank erosion and failure, thus reducing suspended sediment loads and benefiting aquatic habitat. Similarly, stream crossing, bank protection, and exclusions improve water quality, and therefore, should benefit aquatic fauna; however, existing studies focus primarily on cool water species and documentation remains a significant gap. (Knight and Boyer)
- Linear practices such as filter strips, grassed waterways, buffers, contour strips, riparian strips, and windbreaks and shelterbelts that are used primarily in croplands for water and soil conservation can provide some wildlife benefits, particularly as compared with having the areas in row crops. However, the small area and high edge-interior ratios of these practices limited the benefits and landscape influences need additional study. (Clark and Reeder)

Conservation practices designed to control soil erosion, such as no-till or cover crops, provide better environments for microorganisms, invertebrates, small mammals, and birds. Practices aimed at improving water quality benefit aquatic species.[22] Fostering ecological habitats suitable for particular species can restore endangered ones.

[22]Haufler, J.B., editor. Fish and Wildlife Benefits of Farm Bill Conservation Programs: 2000-2005 update. The Wildlife Society Technical Review 05-2.

NRCS conservation practices designed to improve wildlife habitat, as illustrated in the network effects diagrams associated with each practice and further supported by the results of CEAP studies, provide wildlife benefits by specifically keeping both habitat requirements and agricultural production in mind while addressing conservation opportunities on cropland and grazing land. However, there is potential for adverse impacts to terrestrial species to occur, particularly in the short term, as a result of implementing certain other conservation practices such as Recreation Area Improvement, Land Clearing, Access Control, and Fence.[23] Similarly, certain conservation practices have more potential than others to have adverse impacts on aquatic species, particularly in the short run, such as Dam, Diversion; Diversion; Dike; and Spring Development. However, NRCS policies require that plans minimize adverse effects before providing technical and financial assistance (7 CFR 650.3(b)(4)) and avoid adverse effects on species of concern by recommending alternatives that avoid or minimize adverse impacts. NRCS also consults with U.S. Fish and Wildlife Service (USFWS) experts as necessary to avoid harm to any species that is protected under the ESA or is a candidate for listing. In fact, the NRCS commitment to wildlife habitat conservation is demonstrated by its WLFW Initiatives which uses multiple existing program authorities to restore habitat with the goal of avoiding the need for future regulation. Overall, conservation practices implemented through EQIP and other NRCS programs have been shown to produce important benefits for wildlife habitats. See Appendix G for a list of NRCS fish and wildlife habitat practices implemented during the 2008 Farm Bill and Appendix M for the network effects diagrams.

Forest land

The 2009 EQIP Programmatic EA discusses typical problems related to the natural resources associated with forest lands. This EA incorporates by reference page 77 of the 2009 EQIP Programmatic EA which characterizes private forest land ownership and pages 122 through 124 which describe the effects of commonly-used NRCS forestry practices. In addition, this EA incorporates by reference pages 36 - 38 of the 2011 RCA Appraisal which describes the state of forest health in the United States**,** indicating that much of this forest land is in need of treatment to reduce the risk of disease, pests, and wildfires, in particular. The section below provides additional information and describes the past and predicted future impacts of EQIP on forest land when implemented according to 2008 Farm Bill rules.

Conservation Practices Related to Forestland Conservation

Figure 7 below identifies the top EQIP practices used under the 2008 Farm Bill for Forest Land Conservation. The goals of these practices are primarily to restore and protect forest health and improve fish and wildlife habitat, and they include activities such as tree planting; forest stand improvement; thinning; prescribed burning; and controlling invasive plants. Of the 21

[23]Comer, P., D. Diamond, S. Sowa, K. Goodin, D. Purcell, D. Butler, E. Cook, C. Hamilton, G. Hammerson, L. Master, T. Nigh, M. Ormes, D. True, and B. White. 2007. Using NatureServe Information to Assess Farm Bill Practice Effects on At-risk Species and Habitats. Report to the Natural Resource Conservation Service, Washington, D.C. 53pp. plus appendices at pp. 15, 20.

conservation practices used to improve forest land, 5 practices—Forest Stand Improvement, Tree/Shrub Establishment, Tree/Shrub Site Preparation, Brush Management, and Woody Residue Treatment—made up more than 72 percent of the forest land conservation practices used from FY 2009 to 2013. (See Appendix H.)

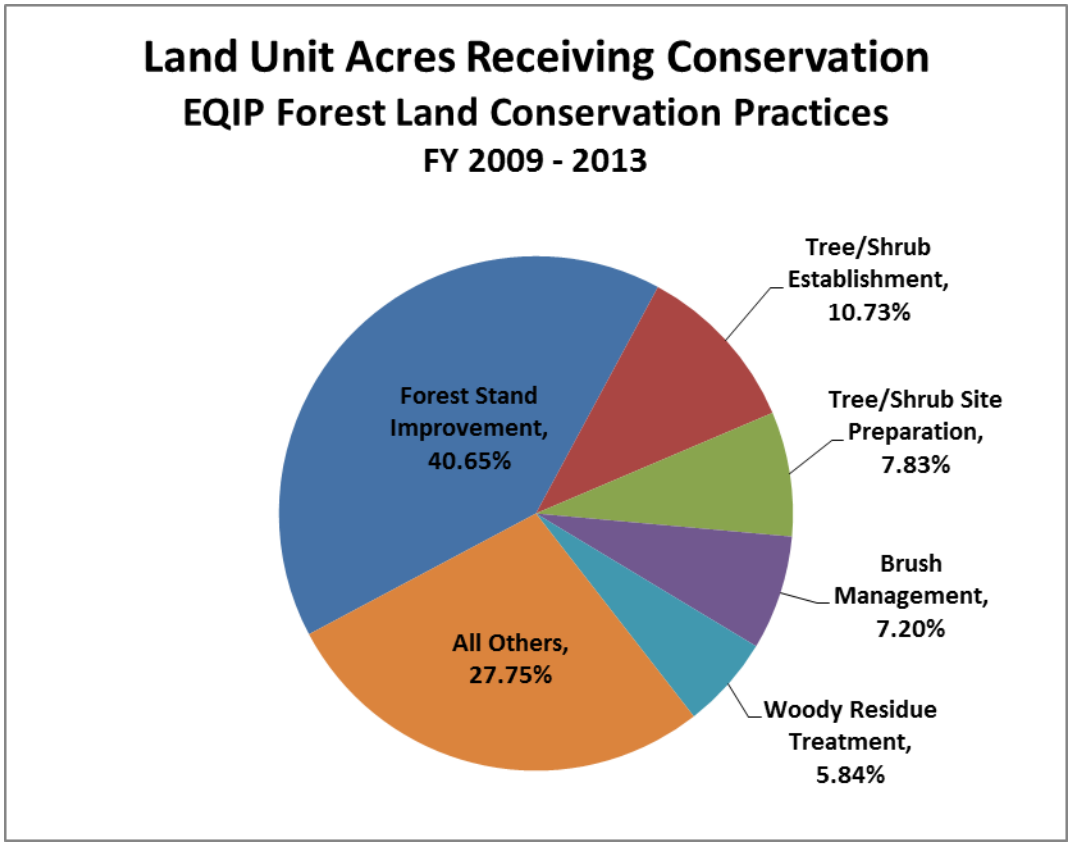
Forest land is a land use on which various types of natural resource concerns may exist; State Conservationists were asked what conservation practices they expect to use to address natural resource concerns without regard to the type of land use on which those concerns exist. Because the same resource concerns exist on forest lands now as under the 2008 Farm Bill, it is likely the same practices will continue to be used on forest lands under the 2014 Farm Bill, though in different numbers based on the amount of available funding.

NRCS conservation practices used on private forest land benefit forest health, water quality, and fish and wildlife habitat, decrease soil erosion, reduce invasive species, and enhance carbon sequestration. See Appendix M for the network effects diagrams illustrating the effects expected from implementing those practices consistent with NRCS conservation practice standards and Appendix H for a list of NRCS forest land practices implemented during the 2008 Farm Bill. It is likely that if the program were to continue being implemented in the future as it has in the past, similar forestry practices will be implemented and similar beneficial effects will result. There is potential for some short-term adverse impacts to occur as a result of conservation practices used on forest land, particularly as a result of implementing certain practices such as Prescribed Burning, Firebreak, or Forest Trails and Landings. Such effects are expected to be minimal as a result of NRCS policies that require plans minimize adverse effects when providing technical and financial assistance.[24]

NRCS expects that if EQIP were to continue to be implemented as it was under the 2008 Farm Bill, the same types of forestry practices would also continue to be implemented and the same types of forest health and other environmental benefits would result. As a result of improved forest heath, forests will become better able to resist diseases and pests and to withstand wildfires.

[24]See 7 CFR 650.3(b)(4).

Figure 7: EQIP 2008 Farm Bill Forest Land Conservation Practices



*Only practices representing a significant portion of the total for the period are included in the above chart. Practices not included are summed into the All Other category. Note that only practices applied on cropland or hayland are included.

Grazing Lands

The 2009 EQIP Programmatic EA discusses typical problems related to the natural resources associated with grazing lands. This EA incorporates by reference the section on page 68 of the 2009 EQIP Programmatic EA titled "Benefits of Farm Bill Grassland Conservation Practices to Wildlife," and pages 120 – 122 which summarize the types of grazing land conservation practices used and their effects.

The 2011 RCA Appraisal indicates that "During the 25-year period 1982 to 2007, the acreage of U.S. grazing lands declined gradually until 2002 and then stabilized…; rangeland acreage declined by about 2 percent; pastureland acreage by 9 percent; and grazed forest land acreage by 15 percent."[25] Additional information regarding the conversion of grazing lands to other uses is described on pages 6 and 7 of the 2011 RCA Appraisal and is incorporated by reference. The section below provides additional information and describes the past and predicted future impacts of EQIP when implemented according to 2008 Farm Bill rules.

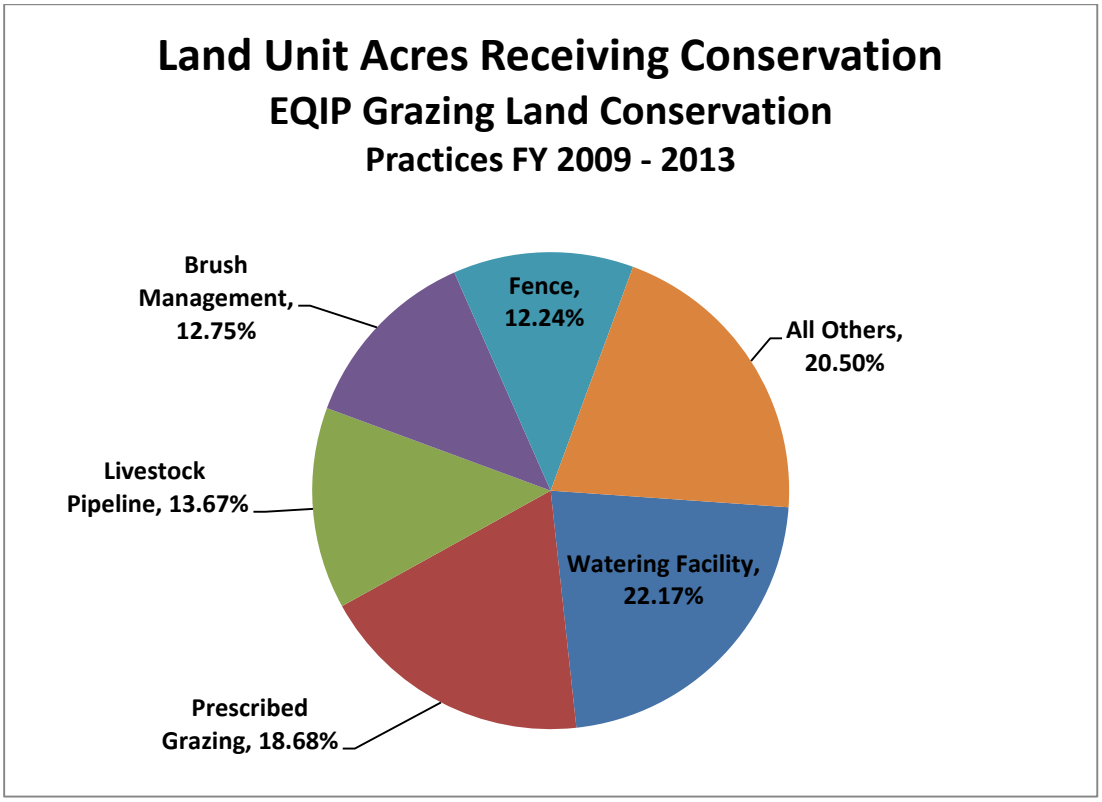
Conservation Practices Related to Grazing Land Conservation

Figure 8 identifies the top EQIP practices used under the 2008 Farm Bill for Grazing Land Conservation. NRCS is committed to conserving and enhancing private grazing land resources. This includes conservation practices that conserve and improve wildlife habitat on private grazing land; conserve and improve fish habitat and aquatic systems through grazing land conservation treatment; protect and improve water quality; improve the dependability and consistency of water supplies; and identify and manage weed, noxious weed, and brush encroachment problems. Of the 29 conservation practices used to improve grazing land, 5 of those practices—Watering Facility, Prescribed Grazing, Livestock Pipeline, Brush Management, and Fence—made up nearly 80 percent of the grazing land conservation practices used from FY 2009 to 2013. (See Appendix I.)

As is the case with forest land, grazing land is a land use on which various types of natural resource concerns may exist. State Conservationists were asked what conservation practices they expect to use to address natural resource concerns without regard to the type of land use on which those concerns exist. Because the same types of resource concerns generally exist on grazing lands now as under the 2008 Farm Bill, it is likely the same practices will continue to be used on grazing lands under the 2014 Farm Bill, though perhaps in different numbers based on the amount of available funding.

[25] 2011 RCA Appraisal p. 6.

Figure 8: EQIP 2008 Farm Bill Grazing Land Conservation Practices



*Only practices representing a significant portion of the total for the period are included in the above chart. Practices not included are summed into the All Other category. Note that only practices applied on cropland or hayland are included.

The NRCS CEAP included a rangeland component that reviewed scientific literature related to seven core NRCS conservation practices: prescribed grazing, prescribed burning, brush management, range planting, riparian herbaceous cover, upland wildlife habitat management, and herbaceous weed control. These analyses collectively indicate that NRCS investments in conservation programs are sound. Below is an excerpt of some of the CEAP findings made with respect to two of the most-funded practices reviewed.[26]

Prescribed Grazing

- Stocking rate, as well as appropriate temporal and spatial animal distribution, is the key management variable that influences numerous conservation outcomes.

[26]For information on the conservation practices themselves and the effects of the remaining five of seven conservation practices reviewed, see USDA NRCS, Conservation Benefits of Rangeland Practices: Assessment, Recommendations, and Knowledge Gaps, Briske, D.D., editor. (2011), Executive Summary: The Next Generation of Conservation Practice Standards, pages 12 and 14, http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1045792.pdf.

- Assumptions regarding livestock distribution and preferences for specific sites and conditions are valid, especially with respect to water distribution, steep topography, and high-elevation sites.
- The preponderance of experimental evidence indicates that all systems of grazing are similarly constrained by stocking rate and weather; thus, effective management is more important than the specific system of grazing.
- Hydrological responses of soils to grazing largely parallel those of other ecological variables in that stocking rate is the most important management variable.
- Grazing management recommendations should not be developed exclusively from individual plant responses without partial verification in communities or ecosystems.

Brush Management

- Brush management is often critical for the maintenance of grassland and savanna ecosystems and the plants and animals that characterize them.
- Positive grass response varies widely across ecological sites, but most often occurs within 2 years post-treatment and peaks about 5 years post-treatment.
- Retreatment interval varies greatly with woody plant species and ecoregion.
- Overgeneralization of brush control recommendations across ecoregions has limited the success of this conservation practices.
- Deep soil water may increase following brush removal, but it is highly dependent on soil and climate conditions.
- Increased stream flow has only been documented for small watersheds receiving winter rainfall.
- Wildlife habitat is species specific and different species and functional groups respond differently to brush management; a clearer criterion of wildlife benefits, including nongame species, and a greater recognition of the potential to adversely affect nontarget species are required.
- Returns on improved livestock production are typically insufficient to economically justify brush management, but benefits to nonmarket ecosystem services are increasingly recognized.

These and other NRCS grazing land practices, as illustrated in the network effects diagrams associated with each practice and further supported by the results of CEAP studies, generally improve grazing land health and the health of natural resources associated with those grazing lands, such as plant communities, wildlife habitat, and soil erosion. (See Appendix I for a list of NRCS grazing land practices implemented during the 2008 Farm Bill and Appendix M for the network effects diagrams.) It is possible for some adverse impacts to occur as a result of conservation practices used on grazing lands, particularly as a result of implementing certain practices such as Brush Management, Prescribed Burning, or Access Road. Such effects are

expected to be minimal as a result of NRCS policies that require plans minimize adverse effects when providing technical and financial assistance.

Water Quantity

This EA incorporates by reference pages 42 and 43 of the 2009 EQIP Programmatic EA, which characterizes the use of ground and surface water for irrigation purposes, and page 46 which recognizes the transport of pathogens through irrigation water. In addition, this EA incorporates by reference the discussion of water supply on pages 80 through 82 of the 2011 RCA Appraisal. The section below provides additional information and describes the past and predicted future impacts of EQIP when implemented according to 2008 Farm Bill rules.

Conservation Practices Related to Improving Irrigation Efficiency

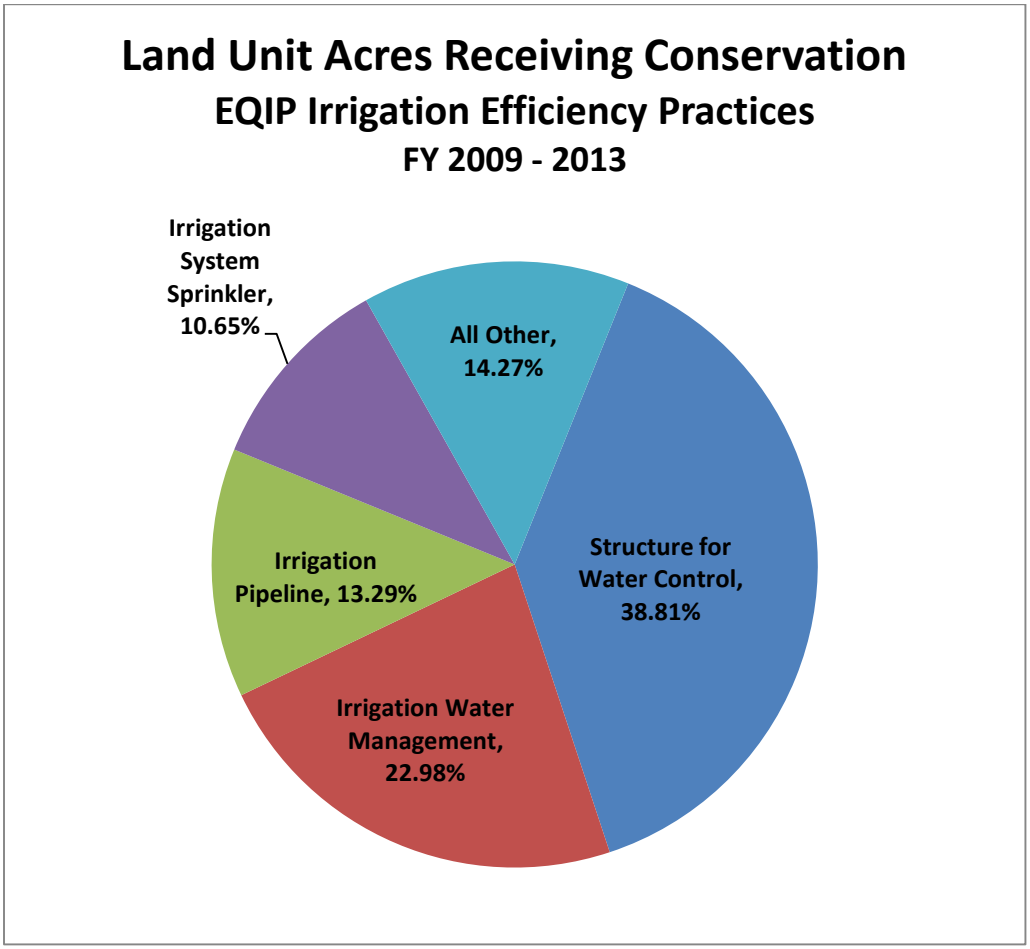
Figure 9 below identifies the top EQIP practices used under the 2008 Farm Bill for improving irrigation efficiency. The goal of these practices is to assist in properly designing, installing, and maintaining irrigation systems to ensure uniform and efficient distribution of water, thereby conserving water and protecting water resources. Of the 14 conservation practices used to improve irrigation efficiency, 4 of those practices—Water Control Structure, Irrigation Water Management, Irrigation Pipeline, and Sprinkler Irrigation System—made up more than 85 percent of the conservation practices used from FY 2009 to 2013 to improve irrigation efficiency. (See Appendix J.)

Four of the conservation practices identified in Figure 9—Irrigation Pipeline, Irrigation Water Management, Water Control Structure, and Sprinkler Irrigation System—are among the top five practices that State Conservationists said they would likely implement within their States to address excess or insufficient water concerns from FY 2014 to 2016. These four practices were applied to nearly 86 percent of the acres on which excessive or insufficient water concerns were addressed. Because there is a clear need to continue to address water quantity concerns, it is likely these and other similar practices would continue to be installed in the future if EQIP were to continue to be implemented as it was under the 2008 Farm Bill, though the number of practices implemented might change based on the amount of available funding.

A conservation practice will only be funded through EQIP when it addresses an identified resource concern. Therefore, conservation practices supporting use of irrigation water will only be funded through EQIP to improve irrigation efficiency and save water; not to initiate new irrigation where none previously existed. As stated in the 2011 RCA, "[p]otential exists to reduce water application while sustaining yields through implementation of improved technologies and practices that increase water efficiency and productivity."[27] That potential, however, varies widely from basin to basin according to the 2011 RCA.

[27] 2011 RCA, p. 88.

Figure 9: EQIP 2008 Farm Bill Irrigation Efficiency Practices



*Only practices representing a significant portion of the total for the period are included in the above chart. Practices not included are summed into the All Other category. In addition, note that pumping plant (CPS 533) installation is only counted when applied on cropland or hay land.

These and other NRCS irrigation water practices, as illustrated in the network effects diagrams associated with each practice and further supported by the results of CEAP studies, generally improve the efficient use of water and its availability for other uses. (See Appendix J for a list of NRCS irrigation efficiency practices implemented during the 2008 Farm Bill and Appendix M for the network effects diagrams.) There may be some minor short-term adverse impacts to soil erosion during installation of some irrigation equipment, but those effects normally will be minimal. There will be an overall water savings. Other potential adverse impacts may occur depending on the site conditions, such as impacts to migratory birds when artificial wetlands are reduced. These types of impacts are dependent on things such as the type of new irrigation system installed, the type of system used previously, and whether the source of irrigation water will change. These site-specific effects are assessed during the NRCS EE process and adverse effects are avoided or minimized consistent with NRCS policy. (See 7 CFR 650.3(b)(4).)

Water Quality

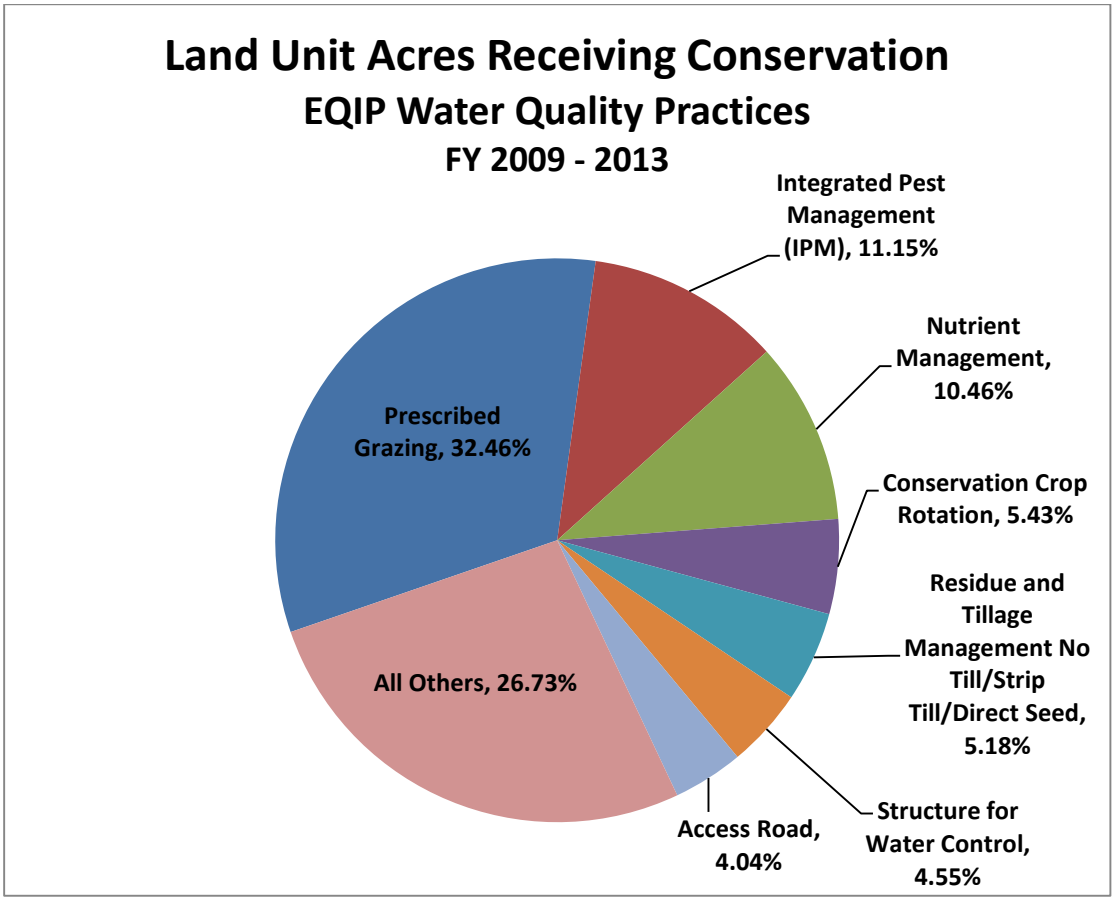
This EA incorporates by reference pages 45 and 46 of the 2009 EQIP Programmatic EA, which characterize water quality issues related to agriculture, and the discussion on page 48 regarding the beneficial impacts of EQIP conservation practices to water quality. The section below provides additional information and describes the past and predicted future impacts of EQIP when implemented according to 2008 Farm Bill rules.

Conservation Practices Related to Water Quality Improvements

Figure 10 identifies the top EQIP practices used under the 2008 Farm Bill to make water quality improvements. Water quality is an indicator of the health of our environment and reflects what occurs on the land. The primary water quality issues from agriculture are sediment, nutrients, pesticides, pathogens, and in some parts of the country, salinity and temperature. Using conservation practices to improve land in an environmentally sound manner will result in better water quality for drinking, recreation, wildlife, fisheries, and industry. Of the 56 conservation practices with water quality improvement as a purpose, seven of those practices – Prescribed Grazing, Integrated Pest Management, Nutrient Management, No-Till or Strip-Till Residue Management, Conservation Crop Rotation, Water Control Structure, and Access Road – made up nearly 75 percent of the water quality practices used from FY 2009 to 2013. (See Appendix K.)

Two of the conservation practices identified in Figure 10—Integrated Pest Management and Nutrient Management—are among the top five practices that State Conservationists said they would likely implement within their States to address water quality concerns from FY 2014 to 2016. These two practices were applied to nearly 22 percent of the acres on which water quality concerns were addressed. There are many conservation practices that can be used to improve water quality depending on the type of land use and where in the landscape the problem exists relative to streams and groundwater infiltration. Because there is a clear need to continue to address water quality concerns, it is likely the same types of conservation practices would be installed in the future if EQIP were implemented as it was under the 2008 Farm Bill, though the number of practices implemented might change based on the amount of available funding. This also includes an assumption that EQIP practices funded under initiatives similar to those implemented under the 2008 Farm Bill would continue to be implemented, as the EQIP practices implemented through initiatives are included in the information below and in Appendix K.

Figure 10: EQIP 2008 Farm Bill Water Quality Practices



*Only practices representing a significant portion of the total for the period are included in the above chart. Practices not included are summed into the All Other category. Note that only practices applied on cropland or hayland are included.

The water quality improvement practices, as illustrated in the network effects diagrams associated with each practice and further supported by the results of CEAP studies, work to improve water quality by reducing sediment, nitrogen, and phosphorous. Based on the results of CEAP studies thus far, by 2006 the greatest reduction in nitrogen and phosphorous losses from the land had generally occurred in the Missouri River and Arkansas-White-Red Basin. The least reductions were obtained in the Lower Mississippi River Basin.

Table 4: Summary of CEAP River Basin Cropland Modeling Study Report Findings for Nitrogen and Phosphorous

	Nitrogen Losses			Phosphorous Losses	
	Wind	**Runoff**	**Leaching**	**Wind**	**Runoff**
CEAP STUDY	*% reduction in losses*				
Upper Mississippi River Basin (Aug 2012)	*n/a*	**45**	**9**	*n/a*	**44**
Ohio-Tennessee River Basin (Jan 2012)	*n/a*	**35**	**11**	*n/a*	**33**
Missouri River Basin (Aug 2012)	**46**	**58**	**45**	**58**	**59**
Arkansas-White-Red Basin (March 2013)	**27**	**51**	**57**	**40**	**57**
Lower Mississippi River Basin (Aug 2013)	*n/a*	**26**	**5**	*n/a*	**39**
Great Lakes Region (Sept 2011)	*n/a*	**43**	**30**	*n/a*	**39**
Chesapeake Bay (Mar 2011)	*n/a*	**42**	**31**	*n/a*	**41**

See Appendix K for a list of conservation practices used to improve water quality during the 2008 Farm Bill and Appendix M for the associated network effects diagrams.

Wetlands

This EA incorporates by reference pages 40 through 45 of the 2009 EQIP Programmatic EA, which characterizes wetland impacts related to agriculture. The section below provides additional information and describes the past and predicted future impacts of EQIP when implemented according to 2008 Farm Bill rules.

Overall wetland acreage continues to decline in the United States. However, according to the most recent (2011) report from the USFWS on the "Status and Trends of Wetlands in the Conterminous United States 2004-2009,"[28] the difference in the national estimates of wetland acreage between 2004 and 2009 was not statistically significant. "Certain types of wetland exhibited declines while others increased in area."[29] Wetland acreage declined by an estimated 62,300 acres between 2004 and 2009. However, wetland reestablishment efforts have contributed to an overall decline in the net rate of wetland loss, particularly on agricultural lands.[30]

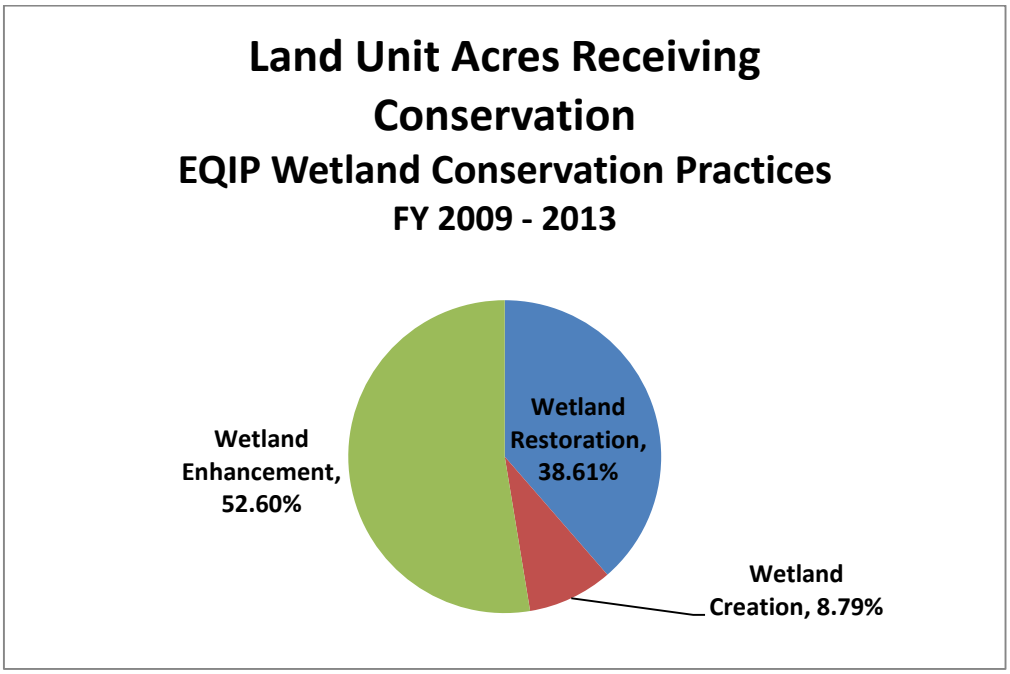
According to the report, between 2004 and 2009, 489,600 acres previously classified as nonwetland, were reclassified as wetland. These increases were attributed in part to wetland reestablishment and creation on agricultural lands enrolled in conservation programs such as the Wetlands Reserve Program, a program that focuses on wetland restoration and has greater potential wetland benefits than EQIP.

[28]U.S. Fish and Wildlife Service, Report on the Status and Trends of Wetlands in the Conterminous United States 2004-2009.
[29]Ibid., p. 16.
[30]Ibid., p. 72.

Conservation Practices Related to Wetlands

Figure 11 identifies the top EQIP practices used under the 2008 Farm Bill for Wetland Conservation. Healthy wetland ecosystems function to modulate drought and floods, provide wildlife habitat, filter pollutants, retain sediment, store carbon, and cycle nutrients. The goal of the wetland conservation practices is to restore, enhance and protect the quality and quantity of wetlands. Of the three wetland conservation practices available for EQIP funding, Wetland Enhancement was applied on more than half the acres treated for wetland-related concerns followed by Wetland Restoration on nearly 40 percent, and Wetland Creation on nearly 9 percent of wetland acres treated under EQIP from FY 2009 to 2013. (See Appendix L.)

Figure 11: EQIP 2008 Farm Bill Wetland Practices



State Conservationists were not asked to document which practices they would be most likely to use for wetland conservation during the 2014 Farm Bill as those practices were expected to be captured among practices used to address water quality or wildlife habitat resource concerns. However, the same practices used during the 2008 Farm Bill for wetland conservation will continue to be used to address wetland concerns in EQIP under the 2014 Farm Bill, though perhaps in different numbers based on the amount of available funding.

The Wetland Enhancement, Restoration, and Creation practices, as illustrated in the network effects diagrams associated with each practice and further supported by the results of CEAP studies that indicate NRCS wetland restoration and enhancement conservation practices do improve ecosystem services, such as improved water quality, floodwater retention, and wildlife

habitat.[31] Additional studies are underway and may provide opportunities to further maximize wetland benefits, including those obtained under EQIP. See Appendix L for the wetland conservation practices and Appendix M for the associated network effects diagrams.

Energy

Since enactment of the 2009 Farm Bill, NRCS has added energy conservation as a resource concern and developed and revised some conservation practice standards to assist agricultural producers in energy conservation. The following describes the use of energy in the agricultural sector and NRCS energy conservation activities under EQIP.

Agricultural operations have varied needs for energy resources for such things as lighting, refrigeration, ventilation, water heating, space heating, crop and feed storage and drying, milk harvesting, waste handling, cultivation, and irrigation. Sources of energy include electricity to do such things as power fans and pump waste or water, and fossil fuel combusted onsite to heat buildings and water, operate vehicles and other production equipment among other uses. Nearly one-third of energy used for U.S. agriculture is to produce synthetic fertilizers.

Electricity used by agricultural operations and others is produced by various methods, including hydropower, natural gas, coal, oil, nuclear, geothermal, solar, and wind. Nearly 15 percent of electricity generated in the United States is from renewable resources; a little more than half of this share is from "conventional" hydropower. Of the total energy consumed in America, about 40 percent is used to generate electricity. Therefore, electricity consumption is an important portion of the environmental footprint, including agriculture's environmental footprint. All forms of electricity generation have some level of environmental impact. Most of the electricity in the United States is generated using fossil fuels such as coal, natural gas, and oil. Construction, operation, and maintenance of transmission lines needed to deliver energy from points of generation to points of use also impact the environment. Increased demand for electricity increases the need for transmission lines.

Diesel fuel is typically used by agricultural operations to power vehicles and equipment, but gasoline, propane, ethanol, or combinations of these may also be used. Combustion of fossil fuels produces air pollutants or precursors to the formation of air pollutants, which affect human health, visibility, and climate.

About 3 percent of energy sources required to meet the needs of agricultural landowners is derived from renewable resources, a figure smaller than that of the general public. The only ways to improve the energy efficiency of an agricultural operation are to reduce energy needs, meet energy needs with renewable resources, or a combination of both. NRCS has focused on energy efficiency because those efforts generally yield the fastest, least costly results.

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[31]See, for example, the 2011 journal supplement by the Ecological Society of America titled, *"Conservation of Wetlands in Agricultural Landscapes of the United States,"* which includes 10 papers summarizing the effects of conservation practices and programs on agricultural wetlands in seven geographic regions of the United States.

Conservation Practices Related to Energy Improvements

Technical and financial assistance under EQIP helps agricultural producers to improve efficiencies to reduce their overall energy consumption. NRCS has developed three conservation practices specifically to assist agricultural producers improve energy efficiencies – Lighting System Improvement, Farmstead Energy Improvement, and Building Envelope Improvement. These practices address a wide range of equipment and structures that determine energy requirements. Use of these practices typically results in improved energy efficiency through:

- Changes in operating methods to reduce equipment annual hours of use;
- Changes to improve equipment efficiency to reduce electricity or fuel consumption without appreciable change to annual hours of use; or
- Combinations of a and b.

In addition, other conservation practices such as Combustion System Improvement may result in energy savings, and conservation practices such as Pumping Plant may result in an overall energy savings when less efficient pumps are replaced. Other conservation practices such as Mulching, Residue and Tillage Management, Tree/Shrub Establishment, and Waste Recycling also address energy as a resource concern, and the resulting savings may occur as a result of any of the above approaches. A few of the practice standards also allow for integration of renewable energy components such as photovoltaic cells.

NRCS conservation practices designed to improve energy efficiency should not produce negative environmental impacts when implemented according to NRCS policy and regulations. Short-term impacts that may occur include an increase in the disposal of used building materials or equipment. A small fraction of these outdated materials may contain hazardous waste, such as asbestos, Freon, PCBs, or mercury, but the practice standards require all waste to be disposed of properly, in accordance with Federal, State, and local regulations, making unacceptable adverse impacts unlikely to occur.

The long-term effects of implementing energy conservation practices include:

- Reduction of onsite consumption of liquid or solid fuels (diesel, propane, biomass, etc.). This will reduce associated air emissions and other waste products (ash).
- Reduction of onsite consumption of purchased (grid) electricity. This will reduce offsite operation of electricity generation equipment and associated air emissions, production of spent nuclear fuels, extraction of fossil-fuel resources, and related impacts.
- Reduction of onsite consumption of electricity sufficient that electricity produced by an onsite system (e.g., photovoltaic, wind turbines, anaerobic digesters) may in some cases be delivered to the grid for use elsewhere.[32]

[32]Note the Farmstead Energy Improvement practice does not support installation of onsite electricity generation equipment, nor does NRCS currently fund grid-tied electricity projects of any kind. NRCS does fund anaerobic

In some cases, one energy source may replace another, such as when biomass energy sources (poultry litter, wood, etc.) or electric devices replace fossil fuels (propane, heating oil, etc.). Particulate emissions could increase based on relative equipment efficiencies and fuel sources. However, in all such cases of "fuel-switching" a net energy reduction (based on comparable units) must be demonstrated if EQIP funding is to be provided. Site-specific impacts would be analyzed in the EE and necessary mitigating measures to reduce adverse effects would be planned.

As NRCS continues to promote agricultural energy conservation, the environmental impacts related to on-farm energy consumption by EQIP program participants are expected to decrease. The table below shows the increase in participation in NRCS' On-farm Energy Initiative over the last several years as well as the increase in the number of energy conserving practices used.

Table 5: Energy-Conserving Practices

Fiscal Year	2011	2012	2013
Number of Farmstead Energy Improvement Contracts	83	338	1,061
Number of energy conserving practices adopted	78	1,063	2,297

The number of energy conserving practices adopted, however, includes a total of 240 Conservation Activity Plans for agricultural energy management studies in FY 2012 and 1,098 in FY 2013. These plans do not reliably produce a conservation effect, though a portion of them no doubt are implemented. Even discounting such plans, there has been an increase in participation in energy-conserving conservation practices since the inception of the On-farm Energy Initiative.

NRCS expects that if EQIP were to continue to be implemented as it was under the 2008 Farm Bill, the same types of energy conservation practices would also continue to be implemented, but the number implemented is likely to increase as more agricultural producers learn about opportunities to increase the energy efficiency of their operations. This also includes an assumption that EQIP practices funded under initiatives similar to those carried out under the 2008 Farm Bill would also continue, though the number of practices implemented may change based on the amount of available funding.

Cumulative Effects

Many of the conservation practices implemented under EQIP can also be implemented through other NRCS conservation programs, such as the new RCPP. The RCPP encourages partners to join in efforts with producers to increase the restoration and sustainable use of soil, water,

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digesters to control and enhance capture of methane. That methane can be used to produce electricity but the agricultural landowner must secure other funds to install the equipment required to produce, use, and/or distribute electricity.

wildlife, and related natural resources on regional or watershed scales and makes available $100 million per year from 2014 to 2018 to be used according to the rules of EQIP, the Conservation Stewardship Program (CSP), Agricultural Conservation Easement Program (ACEP), and the Healthy Forests Reserve Program (HFRP); and in certain areas the Watershed Operations and Flood Prevention Program. In addition, 7 percent of EQIP, CSP, ACEP, and HFRP funds each year must be set aside for RCPP projects. It is unknown what types of proposals partners will make, but the conservation practices implemented are likely to be the same as those implemented under the 2008 Farm Bill with some changes in location and number due to the RCPP projects that ultimately are selected.

NRCS landscape initiatives are also illustrative of the cumulative effects of NRCS programs because they focus EQIP and other NRCS program authorities to address specific natural resource concerns in a particular geographic area. In the case of the Mississippi River Basin Initiative (MRBI), program resources were focused in Arkansas, Kentucky, Illinois, Indiana, Iowa, Louisiana, Minnesota, Mississippi, Missouri, Ohio, South Dakota, Tennessee, and Wisconsin to address nutrient loading in priority small watersheds within the Mississippi River Basin where they will do the most good. This emphasis is likely to continue under the 2014 Farm Bill.

In the Chesapeake Bay Watershed, EQIP practices have been implemented through initiatives that use EQIP in conjunction with other NRCS conservation programs to reduce nutrients and sediment to improve water quality and habitat for fish and wildlife. Similarly, NRCS used EQIP to promote practices to address water quantity and quality concerns through initiatives in the Ogallala Aquifer, combating declining water tables affecting eight States including Colorado, South Dakota, Nebraska, Wyoming, Kansas, Oklahoma, New Mexico, and Texas. EQIP also promoted practices through the WLFW Initiative to reduce the threats to the habitat of ESA candidates such as sage-grouse and lesser prairie-chicken and to provide critical habitat for migratory birds. As with MRBI, these additional initiatives are likely to continue under the 2014 Farm Bill.

There will be indirect effects associated with application of conservation activities. For example, activities associated with reducing soil erosion on cropland have indirect effects that include decreased sediment and turbidity in surface waters, improved aquatic habitat, improved air quality, improved crop productivity, and often improved energy efficiency. Similar impacts result from improved management of livestock and vegetation on pasture and range lands. Activities applied on forest land may indirectly improve water quantity and quality, improve air quality, and restore or enhance wildlife habitat. Wildlife activities may indirectly improve air and water quality and often result in the creation of potential recreational opportunities.

While the effects of the conservation activities will vary depending on the local ecosystem, landscape position, methods of installation, and scope or magnitude of the activity, it is possible to describe the general types of impacts that will occur. Based on the results identified on the network effects diagrams and CEAP studies, there is every reason to expect that under EQIP, soil erosion will decrease; soil, air, and water quality will improve; water will be used more efficiently; plant conditions will improve; needs will be met for domestic animals and wildlife; and energy will be used more efficiently.

Some negative impacts may also occur, since certain practices applied to benefit one resource concern may have adverse impacts on others. For example, conservation tillage applied without a nutrient management plan may improve soil erosion but may simply re-route where excess nutrients end up. Applying suites of conservation practices that consider the impact on all resource concerns is key to resolving such incongruities.

Under this No Action alternative, the effects of EQIP would continue during the 2014 Farm Bill, though the cumulative beneficial fish and wildlife effects going forward would not be as pronounced for wildlife as was the case under the 2008 Farm Bill. This is because the 2014 Farm Bill removed authority for a stand-alone WHIP, a program authorized for funding at $85 million annually. As a result of the reduced funding, there likely would be fewer cumulative projects benefitting fish and wildlife. As a result, the effects of EQIP are likely to be the same, with important environmental benefits resulting and no major adverse impacts anticipated.

5.4.2 Alternative 2: Proposed Action – Implement EQIP as modified by the 2014 Farm Bill.

This alternative incorporates the changes required by the 2014 Farm Bill, including integration of the provisions of WHIP into EQIP. It assumes similar conservation practices would be implemented as under Alternative 1 because the same set of resource concerns would be addressed, though the emphasis given to certain resource concerns may change over time as a result of the addition of the WHIP provisions into EQIP, NRCS landscape initiatives, and proposals that are funded under RCPP. This alternative assumes funding will range from $1.35 to $1.75 billion over the course of the 2014 Farm Bill, which cumulatively exceeds the amount authorized over the course of the 2008 Farm Bill by $475 million. If Congress had funded a separate WHIP at $85 million per year over the 5 years of the 2014 Farm Bill, it would have amounted to $425 million. [33]

[33] Under the 2008 Farm Bill, $85 million was authorized each year specifically for fish and wildlife habitat improvements under the stand-alone WHIP.

Under this alternative, NRCS will track implementation of the 16 conservation practices with wildlife habitat as a primary purpose[34] and all other practices applied to achieve a specific wildlife habitat benefit. Examples of standards with a primary wildlife focus include:

- Early Successional Habitat Development/Management—used for early successional species such as the Golden Winged Warbler or New England Cottontail. This practice standard includes planting and vegetation management.
- Wetland Restoration—used to develop habitat for the variety of wetland-dependent species, from amphibians to migratory waterbirds. This practice standard includes structural, grading, planting, and water management.
- Stream Habitat Improvement and Management—used for many aquatic species, including salmon. This practice standard includes in-stream work such as building redds, pools and riffles, establishing woody debris, and vegetation management.
- Upland Wildlife Habitat Management—used in a system of practices for a wide variety of terrestrial species. Often, NRCS adds this conservation practice to a conservation plan to ensure other practices (e.g., fence) are wildlife-friendly.

Out of more than 160 existing conservation practice standards, about 45 standards are often used to benefit wildlife in addition to the 16 practices that have wildlife habitat as a primary purpose. For example, reducing sedimentation often improves aquatic habitat, and pasture and hay land planting, fencing, and ponds can be used to provide upland wildlife habitat benefits. Under this alternative, NRCS would continue to address natural resource concerns using EQIP not only on an operation-by-operation basis but also through its initiatives and through the new RCPP. Landscape initiatives such as WLFW may require the use of conservation practices that are not included among the 16 NRCS practices with a primary wildlife benefit purpose. For example, use of the NRCS Prescribed Grazing (528) conservation practice standard is essential in facilitating the development and maintenance of habitat to benefit the lesser prairie-chicken, listed as threatened under the ESA, and greater sage-grouse, which is a candidate for listing in most of its range and has been proposed for listing for distinct population segments. Every plan developed by NRCS under either the Lesser Prairie-Chicken Initiative or the Sage-Grouse Initiative, where grazing will occur, requires the use of Prescribed Grazing. To accommodate situations such as this, NRCS will include additional conservation practices, such as those related to NRCS landscape wildlife initiatives, in determining whether 5 percent of EQIP funding was used to benefit wildlife.

Table 6 identifies the amount of EQIP funding required to be spent on fish and wildlife habitat improvement each year based on amounts authorized by the 2014 Farm Bill. It is important to note, however, that the 2014 Farm Bill requires the 5 percent to be calculated on the funds made

[34] See Appendix A which identifies the 16 conservation practices traditionally used to provide a conservative estimate of NRCS wildlife performance. It does not capture many other conservation practices that can also be applied in a manner that benefits wildlife.

available for payments. Because amounts obligated to program contracts will be less than the total authorized funding amounts, expenditures for wildlife habitat will be less than the 5 percent shown in table 6, as well.

Table 6: 2014 Farm Bill EQIP Authorized Funding and Associated Wildlife Habitat Improvement Funding

Fiscal Year	Authorized Funding	5% Minimum For Wildlife Habitat
2014	$1,350,000,000	$67,500,000.00
2015	$1,600,000,000	$80,000,000.00
2016	$1,650,000,000	$82,500,000.00
2017	$1,650,000,000	$82,500,000.00
2018	$1,750,000,000	$87,500,000.00
TOTAL	**$8,000,000,000**	**$400,000,000.00**

Table 7 shows the percentage of EQIP contract funding obligated just to the 16 conservation practices with wildlife as the primary purpose as compared to the percentage obligated to the Working Lands for Wildlife and other initiatives benefiting wildlife in addition to the 16 primary wildlife practices. The percentage did not change for FY 2009 because the initiatives did not begin until FY 2010, but in FY 2010 the percentage increases from 5.40 percent to 6.82 percent when initiatives are included; in FY 2011 it increases from 3.46 percent to 5.75 percent; in FY 2012 it increases from 3.23 percent to 5.54 percent and in FY 2013 it increases from 2.85 percent to 4.83 percent.

Table 7: 2008 Farm Bill EQIP Funding for 16 Primary Wildlife Habitat Improvement Practices and Working Land for Wildlife Initiatives Funding[3]

Contract Fiscal Year	Total EQIP Financial Assistance (FA) Obligated	EQIP FA Obligated to 16 Wildlife Practices[1]	Percentage EQIP FA Obligated to 16 Wildlife Practices	EQIP FA Obligated to All Practices in Wildlife Initiatives[2] Minus FA Obligated to 16 Wildlife Practices[1]	Percentage EQIP FA Obligated to Improve Fish and Wildlife Habitat
2009	$731,099,111.51	$17,720,576.64	2.42%	n/a	2.42%
2010	$839,485,842.30	$45,342,769.45	5.40%	$11,868,832.96	6.82%
2011	$871,588,982.59	$30,191,297.48	3.46%	$19,940,000.91	5.75%
2012	$990,752,307.66	$31,977,382.69	3.23%	$22,937,266.71	5.54%
2013	$989,650,092.09	$28,242,923.56	2.85%	$19,588,267.76	4.83%
TOTAL	**$4,422,576,336.15**	**$153,474,949.82**	**3.47%**	**$74,334,368.34**	**5.15%**

[1] Selected Wildlife Practices include Practice Codes 327, 390, 391, 395, 396, 422, 472, 580, 643, 644, 645, 646, 647, 657, 658, and 659.

[2] EQIP Wildlife Initiatives for Contract Fiscal Years (CFY) 2010-2013 include: Sage Grouse Initiative, Lesser Prairie Chicken Initiative, and Migratory Bird Habitat Initiative. CFY 2013 also includes the New England Cottontail Initiative.

[3] Source: NRCS Protracts 10-02-2009 for 2009, NRCS Protracts 10-01-2010 for 2010, NRCS Protracts 10-01-2011 for 2011, NRCS Protracts 10-02-2012 for 2012, NRCS Protracts 10-25-2013 for 2013.

Many of the wildlife initiatives begun during the 2008 Farm Bill are likely to continue under the 2014 Farm Bill and new initiatives to benefit wildlife are also likely to be added. Based on historical expenditures of wildlife-related practices in both WHIP and EQIP, the fact that demand from past WHIP agricultural participants will shift to EQIP demand, and with emphasis to prioritize funding applications that address wildlife resource concerns, NRCS anticipates that the actual funding associated with developing wildlife habitat through EQIP will exceed the 5 percent national target.

The addition of the WHIP provisions to EQIP was the change with the most potential to impact the environment, but the conservation practices used to make fish and wildlife habitat improvements will be the same as those previously used and the NRCS policies requiring avoidance or mitigation of adverse impacts will remain the same. Though there may be somewhat of an increase in the amount of EQIP spending for wildlife habitat improvement under the 2014 Farm Bill as compared to the 2008 Farm Bill, overall the effects of the Proposed Action, both alone and cumulatively, are likely to be similar to the effects of the No Action alternative with important environmental benefits resulting and no major adverse impacts anticipated.

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- Effects of Conservation Practices on Aquatic Habitats and Fauna by and Scott S. Knight and Katheryn L. Boyer
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APPENDICES

Appendix A: NRCS Conservation Practices Used to Measure Wildlife Habitat Improvements

Practice Name	Practice Code
Conservation Cover	327
Riparian Herbaceous Cover	390
Riparian Forest Buffer	391
Stream Habitat Improvement and Management	395
Aquatic Organism Passage	396
Hedgerow Planting	422
Access Control	472
Streambank and Shoreline Protection	580
Restoration and Management of Rare or Declining Habitats	643
Wetland Wildlife Habitat Management	644
Upland Wildlife Habitat Management	645
Shallow Water Development and Management	646
Early Successional Habitat Development/Management	647
Wetland Restoration	657
Wetland Creation	658
Wetland Enhancement	659

Appendix B: NRCS Methodologies to Estimate Conservation Effects

NRCS uses three main mechanisms to evaluate conservation effects of its recommended activities. They are: Network Effects Diagrams, Conservation Practice Physical Effects (CPPE) documents, and the Conservation Effects Assessment Project (CEAP). Each is discussed below.

Conservation Network Effects Diagrams

To assist in the analysis of environmental impacts of its conservation practices, NRCS has developed Network Effects Diagrams depicting the chain of natural resource effects resulting from the application of each conservation practice. Each of the diagrams first identifies the typical setting to which the practice is applied. This includes identification of the predominating land use and the environmental resource concerns that trigger use of the conservation practice. The diagrams then identify conservation practices typically used to mitigate or address the resource concerns. A network effects diagram for each of the NRCS conservation practice standards is included in Appendix M and can also be viewed on the National Handbook of Conservation Practices (NHCP) Web site in the last column at: http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/cp/ncps/?cid=nrcs143_026849.

Following identification of the conservation practice, the diagrams identify the physical activities that are carried out to implement the practice. From there, the diagrams depict the occurrence of the direct, indirect, and cumulative effects of the practice. Effects are qualified with a plus or a minus which qualitatively denotes an increase ("+") or decrease ("-") in the effect. Pluses and minuses do not equate to good and bad or positive and negative. Impacts are characterized in this manner due to the fact that site-specific conditions can influence the degree or intensity of the potential environmental impact. Only the general effects that are considered the most important from a national perspective are illustrated.

Additional information on the process used to develop the Network Effects Diagrams is available in the NRCS Watershed Science Institute Report CED-WSSI-2002-2, "Analyzing Effects of Conservation Practices – A Prototypical Method for Complying with National Environmental Policy Act (NEPA) Requirements for Farm Bill Implementation."[35]

Conservation Practice Physical Effects

The CPPE documents, found in the Field Office Technical Guide – Section V and the NHCP, display in subjective terms the physical effects conservation practices have on natural resources.

[35]This document is included in the NRCS National Environmental Compliance Handbook and is available at http://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=29897.wba.

Technical specialists document in the CPPE the practice effects based on their experience and available technical information.

When creating the CPPE, the question is presented, "When this practice is installed according to NRCS practice standards and fully functional, what effect will it have on the various resource concerns?" The answer is in the form of a rating that represents the practice's effect on the resource concern and the magnitude of the effect.

The following terms define "Effect" values:

- No effect—The conservation practice being evaluated has no discernible effect on the resource concern identified;
- Worsening—The conservation practice deteriorates the condition of the resource; and
- Improvement—The conservation practice improves the condition of the resource.

The following terms express the magnitude of the effects:

- Slight—Some effect (positive or negative) of the practice on the resource, but not enough to influence the decision to select the practice to solve the problem;
- Moderate—A measurable effect (positive or negative) of the practice on the resource; and
- Substantial—An extensive measurable effect (positive or negative) of the practice on the resource.

National technical specialists with responsibility for a given conservation practice establish CPPE values for each conservation practice. The effects listed in the National CPPE represent general conditions nationwide. For example, the national agronomist has determined that generally, the implementation of Residue and Tillage Management, No Till/Strip Till/Direct Seed (329) will extensively reduce the sheet and rill erosion problem because of increased surface cover and decreased soil disturbance. Therefore, a value is entered as "Substantial Improvement" to the Soil Erosion—Sheet and Rill Erosion resource concern. However, the implementation of 329 may cause a slight increase in soluble nitrate nitrogen infiltration depending on the time and method of application, rainfall, nutrient form, organic matter, soil texture, and depth to water table, and therefore, a value is entered as "Moderate Worsening" to the Water Quality Degradation—Nutrients in Groundwater resource concern.

Since data on the CPPE are national in scope, State-level offices are encouraged to review and localize the information as necessary to reflect those effects expected to occur under local conditions. Each State will review and, if needed, edit the values in the National CPPE based on local knowledge and experience to reflect typical conditions in their State. States use an interdisciplinary group to refine existing entries to ensure proper consideration of all effects to all of the resource concerns. If a State modifies the national CPPE, the State will provide a description of the local conditions and a depiction of the typical practice installation to justify the

change. A well-written description of the typical practice installation will aid the planner when it comes time to conduct site-specific analysis. Expanding on the example discussed below, assume the national agronomist determined that, in general, the implementation of Residue Management, Seasonal (344) results in a "Slight to Moderate Reduction" in the Soil Erosion – Wind problem. However, a State agronomist observes that with the Implementation of Residue Management, Seasonal (344) the reduction of wind erosion is extensive because the critical wind erosion period occurs when the soil is covered with residue or crop. The State agronomist will change the value to "Substantial Improvement" in the Soil Erosion – Wind resource concern, with a statement explaining the rationale for deeming the practice to have an Extensive rather than a Slight to Moderate reduction in the wind erosion resource concern.

The CPPE database and effects values are also incorporated into the ranking process NRCS uses to evaluate the relative environmental benefit associated with Environmental Quality Incentives Program (EQIP) applications. The Farm Bill requires that NRCS evaluate EQIP applications based in part on "how effectively and comprehensively the project addresses the designated resource concern." (Section 1240C (16 USC 3839aa—3), Evaluation of Applications.) Generally, NRCS relies upon the CPPE database to identify environmental effects of practices proposed in EQIP applications and derives a cost-effectiveness score based upon the CPPE value, anticipated environmental benefits over the lifespan of the practice, and average cost of implementing the practice. This cost-effectiveness score is added to the overall environmental score resulting from the process of ranking each application.

Conservation Effects Assessment Project

In addition to developing the network effects diagrams described above, following the 2002 Farm Bill, NRCS initiated an extensive effort to assess environmental impacts from implemented conservation practices. The resultant CEAP uses literature reviews, modeling, farmer surveys, watershed assessments, and regional studies in collaboration with partners in universities, agencies, and conservation organizations to conduct this assessment. It relies, in part, on the statistical framework developed for the National Resources Inventories (NRIs). Since the early 1980s, the NRIs have provided statistically reliable nationwide information on status and trends in soil erosion and land use. Besides estimates of acres in cropland, pastureland, rangeland, and forests, the surveys also classify land with prime farmland conditions and wetland characteristics. The CEAP cropland assessments use NRI points to collect additional information, through surveys with farmers, to evaluate how conservation practices may affect such trends and to connect other resource concerns into the modeling framework. The CEAP grazing lands, wetlands, and wildlife assessments are developing ways to use the NRI as a basis for modeling regional estimates as well.

Regional studies show that existing conservation practices on cultivated cropland have reduced sediment, nitrogen, phosphorus, and pesticide losses and increased soil carbon content at the

basin scale. Smaller-scale analyses of watersheds across the country have helped refine CEAP models and incorporate additional elements into the framework. Other ongoing CEAP components are evaluating the environmental impacts of conservation practices on wildlife habitats, wetland ecosystem services and restoration, and grazing lands. Studies have so far shown positive benefits for those resources.[1]

CEAP cropland assessments show that voluntary, incentives-based conservation approaches are achieving measurable results. Further opportunities exist to reduce soil erosion and nutrient losses from cultivate cropland. Targeting enhances effectiveness and efficiency of conservation program funding and technical assistance. Plus, comprehensive conservation planning that includes a combination of erosion-control and nutrient management practices is essential. Conservation planning should account for regional variation in pressing resource concerns. For example, in the Chesapeake Bay, Great Lakes regions, and Upper-Mississippi River Basin, the most significant issue is the loss of nitrogen through leaching. In the Ohio-Tennessee Basin, loss of phosphorous causes the most damage. In the Missouri Basin, wind erosion is the largest culprit.

Estimating the direct and indirect impacts of such practices is a complicated task. CEAP is the latest and most complex development toward that goal and is a continuing effort. The CEAP modeling framework allows researchers to account for variable topographical and soil characteristics as well as for the effects of weather and climate. The impact of each practice at each site is modeled through mathematical formulas based on empirical observations. Since the underlying data points are statistically distributed, results can be extended beyond the sample. Still, CEAP models currently do not have the capacity to assess the impacts on all different natural resource concerns. They focus on nutrients and pesticides in water, sediment losses, and changes in soil organic carbon, primarily on cropland. Projects within the other CEAP components—wildlife, wetlands, and grazing lands—are underway to extend the use of the models. In addition, CEAP modeling is the basis for development of decision tools that can be used in policy decisionmaking at the national or regional level, as well as in conservation planning at the farm or field level.

Additional CEAP Resources:
CEAP National Assessments

- Cropland (reports for individual regions are available on this page)- http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/technical/nra/ceap/?&cid=nrcs143_014144

[1] For specific details see the NRCS Web site on CEAP: http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/nra/ceap

- Grazing Lands—http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/technical/nra/ceap/?&cid=nrcs143_014159
- Wetlands—http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/technical/nra/ceap/?&cid=nrcs143_014155
- Wildlife—http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/nra/ceap/?&cid=nrcs143_014151
- CEAP Watershed Assessments—http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/technical/nra/ceap/?&cid=nrcs143_014156
- CEAP Dynamic Bibliographies—http://www.nal.usda.gov/wqic/Bibliographies/dynamic-bibliographies.shtml

Appendix C: Integration of Environmental Considerations into NRCS Planning and Program Delivery

From soil erosion prevention, to wetland restoration, to water quality improvements, to wildlife and energy conservation efforts, the intent of NRCS conservation activities has been to improve the quality of the environment for future generations by mitigating the effects of agricultural production on our Nation's natural resources using the best available science-based information and technologies.

State and local conservationists, as well as members of the public, play a pivotal role in accomplishing this mission. In each State there is a State Technical Committee comprised of representatives from Federal, State, local, and Tribal governments, as well as representatives of organizations knowledgeable about conservation and agricultural production issues, and other interested individuals. This Committee provides the NRCS State Conservationist with advice and recommendations on the implementation of NRCS-administered conservation programs. Local, as well as State-wide priorities are considered so that when a local NRCS conservationist is developing a conservation plan, they are able to address natural resource concerns not only of national or State interest, but also those of most importance locally. Conservation plans can be designed to address environmental resource concerns on private, non-Federal, or Tribal government lands, or a combination. NRCS conservationists help individuals and communities take a comprehensive approach to planning the proper use and protection of natural resources on these lands through a nine-step planning process described in the NRCS National Planning Procedures Handbook. (See http://directives.sc.egov.usda.gov/RollupViewer.aspx?hid=32437.)

As part of this conservation planning effort, individual environmental reviews called environmental evaluations (EE) are completed which inform the conservation planning effort and assist the agency's compliance with NRCS regulations implementing National Environmental Policy Act (NEPA). The EEs are a concurrent part of the planning process in which the potential long- and short-term impacts of an action are briefly evaluated and alternative actions explored. The EEs and conservation plans are developed to assist the landowner in making decisions and implementing the conservation practices identified in the conservation plan.

Conservation plans include practices that meet NRCS conservation practice standards and specifications as documented in the Field Office Technical Guide (FOTG) and the National Handbook of Conservation Practices (NHCP). These conservation practices are developed through a multi-disciplinary science-based process, including the opportunity for public comment, in order to minimize and mitigate the risk of unintended consequences. NRCS practice standards are established at a national level and set the minimum level of acceptable

quality for planning, designing, installing, operating, and maintaining conservation practices. At a minimum, each conservation practice standard includes the definition and purposes of the practice, conditions in which the conservation practice applies, and the criteria supporting each purpose. (See NRCS conservation practices at: http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/cp/ncps/?cid=nrcs143_026849.)

When a conservation practice standard is developed or revised, NRCS publishes a notice in the Federal Register of the availability of the standard for review and comment for a period of not less than 30 days from the date of publication. Standards from the NHCP and interim standards are used and implemented by States, as needed, and may be modified to include additional requirements to meet State or local needs. Because of wide variations in site conditions such as soils, climate, and topography, States can revise these national standards and develop specifications to add special provisions or provide additional details in the conservation practice standards. State laws and local ordinances or regulations may also dictate more stringent criteria; in no case, however, can States use standards that are lower than national standards. Only practices that meet NRCS standards and specifications are eligible for funding through NRCS programs.

Standards for conservation practices are detailed in Section IV of the local FOTG.[36] Conservation practice standards, planning criteria, and local resource data are maintained in the FOTG to provide detailed information for planners to plan and design practices in a manner consistent with local conditions and resource concerns. Commonly, suites of conservation practices are planned and installed together as part of a conservation management system designed to enhance soil, water, and related natural resources for sustainable use. Conservation practice standards and State-specific conservation practice specifications include considerations that, when combined with the considerations identified during the EE process, are designed to minimize potentially adverse impacts to affected resources.

Typical effects of implementing conservation practices are summarized in each State's Conservation Practice Physical Effects, contained in Section V of the FOTG. This collection of resource-based planning, design, and implementation documents provides NRCS employees and other users with the necessary information, modified for local conditions, to develop alternative approaches to addressing natural resource problems.

When an action has been proposed, the conservation planner conducts the EE and documents the results on the EE worksheet. The proposed action is evaluated against a No Action alternative and other alternatives being considered to address identified resource concerns to determine and quantify, to the extent feasible, impacts upon soil, water, air, plant, animal, and certain human

[36]See http://efotg.sc.egov.usda.gov/ to access the FOTG for an NRCS office.

and energy resources. The planner also considers and evaluates the Proposed Action and alternatives with respect to special environmental concerns identified by related laws, regulations, Executive Orders, and agency policies. Where adverse impacts or extraordinary circumstances are present, the planner identifies ways in which the alternative can be modified to avoid or minimize these effects.[37] Required permits or consultations with other agencies are also identified.

The results of the EE are shared with the landowner, who then identifies the alternative and conservation practices they are willing to implement, if any. NRCS may then provide financial assistance or offer to purchase an easement if there are no significant adverse effects, funds are available, program-specific requirements are met, and the landowner is willing to follow NRCS conservation practice standards and specifications and other program requirements. The NRCS Responsible Federal Official (RFO) reviews the results of the EE to ensure any necessary consultation has been carried out and to determine whether NRCS NEPA analysis is sufficient, before Federal funding is provided. (See Figure 1.)

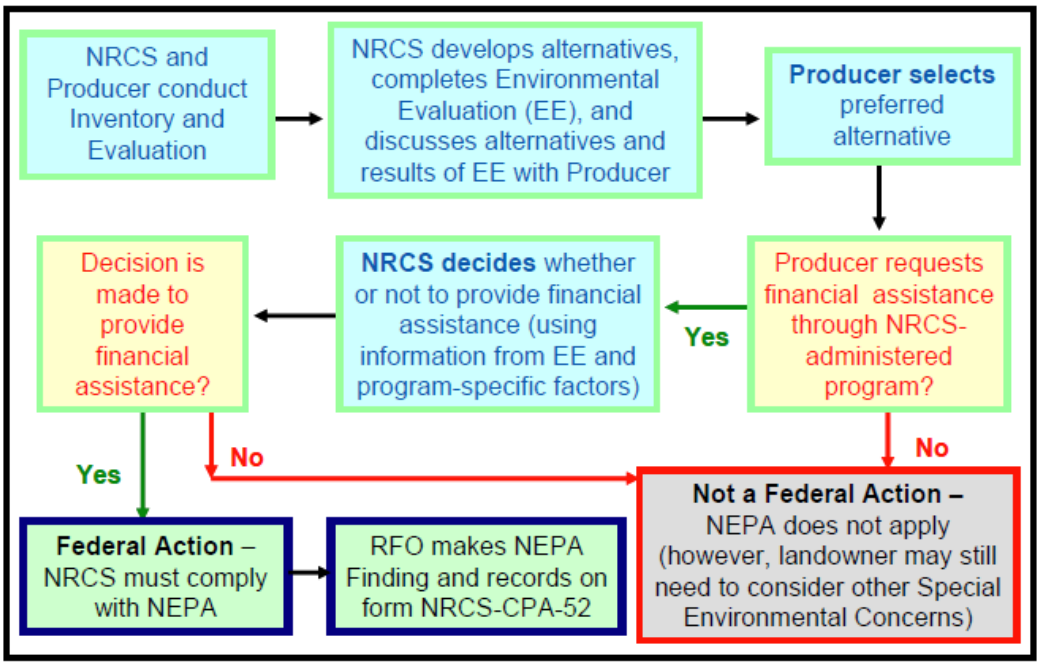


Figure 1 - NEPA and the NRCS Process

This process is followed for all NRCS Farm Bill conservation programs. The effects of the practices may vary somewhat depending on the local ecosystem(s), methods of practice installation, and presence of special resource concerns in a particular State, such as the presence of a coastal zone, endangered or threatened species, historic or cultural resources, and the like. While effects on these resources may be described in general terms at the national level, they

[37]See NRCS General Manual Title 190 Part 410.3B.

must be addressed at the State and local level. This is particularly true for endangered and threatened species, historic preservation, historic and cultural resources, essential fish habitat, and other resources that are protected by special authorities that require consultation. NRCS will consult on a State or site-specific level, as needed and appropriate, to ensure the Environmental Quality Incentives Program (EQIP) program actions do not adversely affect special resources of concern. NRCS will also implement practices in a manner that is consistent with the NRCS policy to avoid, minimize, or otherwise mitigate adverse effects to the extent feasible.

For example, to ensure compliance with the Endangered Species Act, State Conservationists will invite representatives of the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS), as applicable, to all State Technical Committee meetings and encourage their involvement in the development of program criteria within the State. NRCS will also conduct additional programmatic consultations with USFWS and NFMS at the State level, as needed, to ensure that EQIP implementation is not likely to adversely affect species listed as endangered or threatened or species proposed for listing as endangered or threatened or designated or proposed critical habitat. Such consultation will also be used to identify ways the EQIP program might further the conservation of protected species and identify situations in which no site-specific consultation would be needed.[38] Site-specific consultation will also be conducted as needed to avoid adversely affecting any protected species or habitat.

To ensure compliance with the National Historic Preservation Act and associated authorities, NRCS State offices will follow the procedures outlined in the Advisory Council on Historic Preservation's (ACHP) regulations (36 CFR part 800) or, in accordance with NRCS' alternate procedures (nationwide Programmatic Agreement), invite State Historic Preservation Officers (SHPO's) and federally recognized Tribes (or their designated Tribal Historic Preservation Officers) to enter into consultation agreements that highlight and focus review and consultation on those resources and locations that are of special concern to these parties. In addition, if no State-level agreements are developed with the SHPO's or Tribes, and if other consulting parties are identified, they will be afforded, as appropriate, an opportunity to advise the NRCS State Office during project-specific planning about their historic and cultural resource concerns so that they may be taken into account in accordance with the ACHP regulations. Similar processes will be followed, as needed and appropriate, to address other special requirements for the protection of the environment.

[38]In addition to situations in which NRCS determines there is no effect on protected species or habitat, site-specific consultation should not be needed when NRCS and USFWS or National Oceanic and Atmospheric Administration Fisheries agree a category of Proposed Actions is not likely to adversely affect a protected species or habitat and NRCS obtains written concurrence based on that agreement.

Appendix D: NRCS State Resource Assessment Methodology for Determining Top Conservation Practices by Natural Resource Concern

States were asked to assign up to three resource concerns to each conservation practice that they expected to contract in fiscal year (FY) 2014. Many practices can be used to treat multiple resource concerns; States selected resource concerns based on their natural resource needs and priorities. States were also asked to estimate the percent of time that these practices would be used to treat each resource concern.

Cover Crop (340) → **RC1 – Soil Quality Degradation (40%)**
RC2 – Water Quality Degradation (35%)
RC3 – Soil Erosion (25%)

States then estimated the number of times they expected to contract each practice in FY 2014. Those estimates were prorated by resource concern.

Cover Crop – 100 instances → **Soil Quality Degradation: 40 instances**
Water Quality Degradation: 35 instances
Soil Erosion: 25 instances

Prorated practice counts were used to compute the "top 5" practices by resource concern across all programs, for individual programs, and for selected States. Prorated practice counts were also used to compute the "top 20" practices identified in the FY 2014 State Resource Assessment.

Appendix E: Top Five EQIP Practices by Resource Concern (FY 2014 NRCS State Resource Assessment)

Air Quality

372	Combustion System Improvement
340	Cover Crop
590	Nutrient Management
380	Windbreak/Shelterbelt Establishment
533	Pumping Plant

Degraded Plant Condition

314	Brush Management
382	Fence
666	Forest Stand Improvement
528	Prescribed Grazing
614	Watering Facility

Excess Water/Insufficient Water

430	Irrigation Pipeline
449	Irrigation Water Management
587	Structure for Water Control
516	Livestock Pipeline
442	Sprinkler System

Inadequate Habitat for Fish and Wildlife

314	Brush Management
646	Shallow Water Development and Management
666	Forest Stand Improvement
338	Prescribed Burning
645	Upland Wildlife Habitat Management

Inefficient Energy

374	Farmstead Energy Improvement
122	Agricultural Energy Mgmt - Component 2 - Headquarters Plan Development
798	Seasonal High Tunnel
372	Combustion System Improvement
533	Pumping Plant

Livestock Production Limitation

614	Watering Facility
382	Fence
516	Livestock Pipeline
528	Prescribed Grazing
512	Forage and Biomass Planting

Soil Erosion

340	Cover Crop
342	Critical Area Planting
329	Residue and Tillage Management, No-Till
561	Heavy Use Area Protection
410	Grade Stabilization Structure

Soil Quality Degradation

340	Cover Crop
590	Nutrient Management
329	Residue and Tillage Management, No-Till
328	Conservation Crop Rotation
512	Forage and Biomass Planting

Water Quality Degradation

590	Nutrient Management
561	Heavy Use Area Protection
382	Fence
340	Cover Crop
595	Integrated Pest Management

Appendix F: NRCS Soil Quality Practices Implemented During 2008 Farm Bill

Practice Name	Practice Code	2009 Acres	2009 Count	2010 Acres	2010 Count	2011 Acres	2011 Count	2012 Acres	2012 Count	2013 Acres	2013 Count
Alley Cropping	311	251	24	127	15	117	18	89	12	84	10
Deep Tillage	324	13,804	197	27,438	393	20,876	306	36,104	777	35,252	773
Conservation Cover	327	28,488	751	26,637	741	61,110	841	32,401	1,112	43,907	1,016
Conservation Crop Rotation	328	860,732	18,691	896,214	19,037	889,585	18,747	986,962	19,846	930,632	21,931
Residue and Tillage Management No Till/Strip Till/Direct Seed	329	1,012,819	18,186	1,031,731	18,604	890,033	16,263	812,222	14,407	669,943	14,070
Contour Farming	330	26,231	635	27,574	715	43,365	901	48,436	936	43,781	1,164
Contour Orchard and Other Perennial Crops	331	428	49	488	43	357	49	784	73	848	69
Contour Buffer Strips	332	891	22	1,111	41	817	30	672	28	428	14
Cover Crop	340	312,551	8,756	417,606	9,837	477,292	11,910	542,125	13,656	648,983	18,058
Critical Area Planting	342	113,662	1,638	121,912	1,883	127,617	2,197	141,750	2,302	130,387	2,236
Residue Management Seasonal	344	217,807	2,596	149,656	1,737	114,100	1,822	103,347	1,673	152,113	2,780
Residue and Tillage Management Mulch Till	345	488,658	7,254	424,109	6,270	351,706	5,397	344,653	6,199	313,288	5,365
Residue and Tillage Management Ridge Till	346	8,945	109	8,165	173	7,344	156	5,788	144	3,978	103
Diversion	362	18,737	281	18,331	228	17,973	312	16,964	331	16,829	278
Windbreak/Shelterbelt Establishment	380	30,849	376	24,195	420	25,018	464	27,814	500	24,315	404
Silvopasture Establishment	381	118	4								
Field Border	386	22,629	573	19,225	494	16,600	498	16,448	453	15,506	323
Riparian Forest Buffer	391	679	24	1,490	28	2,210	61	1,755	68	1,835	66
Grade Stabilization Structure	410	83,133	1,537	72,440	1,521	78,269	1,559	76,844	1,535	69,417	1,498
Grassed Waterway	412	118,843	1,861	103,691	1,922	118,638	2,010	112,097	1,919	91,568	1,440
Irrigation Water Management	449	498,548	8,333	445,751	7,652	378,740	6,682	438,973	7,658	426,006	8,242
Lined Waterway or Outlet	468	2,949	77	3,221	84	3,954	110	3,204	120	4,417	103
Mulching	484	15,337	398	23,929	665	23,538	797	30,566	1,020	37,131	1,109
Forage and Biomass Planting	512	127,474	3,301	138,623	3,756	98,989	2,602	112,987	2,765	146,559	2,556
Row Arrangement	557	2,032	51	3,076	130	3,421	109	10,532	140	6,779	191
Stripcropping	585	3,876	138	3,885	95	3,680	105	1,795	86	1,772	68
Cross Wind Ridges	588	3,715	54	2,588	18	4,492	64			276	3
Cross Wind Trap Strips	589C	260	1								
Nutrient Management	590	1,796,738	46,404	1,728,336	43,686	1,502,867	38,752	1,474,970	40,602	1,269,517	37,208
Integrated Pest Management (IPM)	595	1,069,064	26,381	977,508	25,263	988,999	24,797	877,627	21,025	689,442	16,821
Terrace	600	277,482	3,355	196,992	2,513	247,262	3,116	231,751	2,861	177,518	2,303
Herbaceous Wind Barriers	603	1,660	12	3,482	50	1,041	22	347	13	359	14
Subsurface Drain	606	34,364	543	51,085	803	38,916	718	44,003	802	39,460	671
Toxic Salt Reduction	610	20,886	231	14,567	257	25,571	160	18,926	249	20,914	186
Underground Outlet	620	182,672	2,743	158,267	2,580	175,700	3,028	184,445	3,062	148,930	2,516
Water and Sediment Control Basin	638	79,321	1,281	80,182	1,312	78,019	1,410	78,917	1,413	70,472	1,246
Windbreak/Shelterbelt Renovation	650	3,885	46	3,466	63	3,482	75	7,756	91	8,275	85
Total		**7,480,519**	**156,913**	**7,207,099**	**153,029**	**6,821,697**	**146,088**	**6,824,057**	**147,878**	**6,240,919**	**144,920**

Appendix G: NRCS Fish and Wildlife Habitat Practices Implemented During 2008 Farm Bill

Practice Name	Practice Code	2009 Acres	2009 Count	2010 Acres	2010 Count	2011 Acres	2011 Count	2012 Acres	2012 Count	2013 Acres	2013 Count
Conservation Cover	327	285,405	1,070	45,030	973	76,353	1,091	77,389	1,671	67,477	1,409
Riparian Herbaceous Cover	390	2,379	53	3,386	39	1,417	58	4,343	64	1,249	30
Riparian Forest Buffer	391	8,764	265	15,778	233	6,500	268	6,041	268	7,100	248
Stream Habitat Improvement and Management	395	5,435	21	5,547	59	2,460	37	2,904	52	9,603	70
Aquatic Organism Passage	396	945	9	437	21	692	10	8,268	18	2,619	20
Hedgerow Planting	422	2,475	81	3,411	126	3,537	151	6,692	178	5,412	187
Access Control	472	206,355	2,099	242,789	2,765	336,295	2,961	197,518	3,481	339,778	2,985
Streambank and Shoreline Protection	580	49,440	403	38,091	378	18,772	314	16,306	313	42,761	381
Restoration and Management of Rare or Declining Habitats	643	124,777	410	43,147	470	341,016	429	101,857	594	127,849	695
Wetland Wildlife Habitat Management	644	418,253	392	17,083	227	22,552	277	29,887	824	17,183	233
Upland Wildlife Habitat Management	645	1,324,198	6,142	1,904,852	4,674	959,328	5,730	2,208,170	7,322	1,319,236	3,929
Shallow Water Development and Management	646	11,156	172	7,567	118	199,005	3,232	88,627	1,865	158,211	2,844
Early Successional Habitat Development/Management	647	17,882	408	14,988	350	33,745	559	39,049	565	46,753	671
Wetland Restoration	657	579	15	834	16	980	11	5,176	42	3,278	63
Wetland Creation	658	1,786	8	82	2	174	4	334	19	95	11
Wetland Enhancement	659	6,023	24	236	8	1,685	22	3,799	22	3,033	12
Total		**2,465,853**	**11,572**	**2,343,255**	**10,459**	**2,004,511**	**15,154**	**2,796,359**	**17,298**	**2,151,637**	**13,788**

Appendix H: NRCS Forest Land Practices Implemented During 2008 Farm Bill

Practice Name	Practice Code	2009 Acres	2009 Count	2010 Acres	2010 Count	2011 Acres	2011 Count	2012 Acres	2012 Count	2013 Acres	2013 Count
Brush Management	314	73,772	144	44,817	195	369,308	293	144,972	831	410,147	1,526
Herbaceous Weed Control	315					9,837	60	22,728	222	47,135	385
Prescribed Burning	338	75,494	731	88,576	1,023	103,460	1,067	81,535	967	118,248	1,393
Multi-Story Cropping	379					38	1	2	1	283	1
Fuel Break	383	1,890	16	7,803	32	33,330	93	33,310	107	50,202	116
Woody Residue Treatment	384	31,832	357	81,470	600	128,502	770	321,829	928	282,662	919
Riparian Forest Buffer	391	1,550	42	6,437	41	1,449	41	1,327	45	1,973	49
Firebreak	394	47,062	539	85,848	825	77,627	749	62,690	708	77,224	980
Stream Habitat Improvement and Management	395	34	3	145	2	207	3	952	8	2,016	18
Prescribed Forestry	409	54,519	963	27,919	379	6,443	152	7,732	73	4,657	25
Access Control	472	26,252	555	91,019	1,077	48,079	997	61,487	1,148	79,019	974
Tree/Shrub Site Preparation	490	107,445	1,353	131,154	1,598	106,321	1,566	238,186	1,670	552,348	2,486
Integrated Pest Management (IPM)	595	145,015	899	292,468	813	111,250	944	127,716	625	60,795	318
Tree/Shrub Establishment	612	225,025	1,517	189,544	1,968	246,453	2,230	227,946	2,018	666,492	2,907
Restoration and Management of Rare or Declining Habitats	643	45,266	196	16,965	249	13,203	231	25,097	327	30,132	494
Upland Wildlife Habitat Management	645	79,595	1,008	104,874	875	109,012	1,128	280,700	1,339	94,300	965
Early Successional Habitat Development/Management	647	12,259	126	10,659	119	29,146	224	31,642	261	36,747	279
Road/Trail/Landing Closure and Treatment	654	125	1	353	3	2,563	3	899	2	394,916	13
Forest Trails and Landings	655	102,263	203	52,655	337	38,264	327	41,321	345	43,461	240
Tree/Shrub Pruning	660	12,246	184	25,570	226	23,931	278	65,428	331	113,907	344
Forest Stand Improvement	666	803,256	3,172	1,678,694	5,081	971,772	5,642	1,085,493	5,579	1,352,302	4,866
Total		**1,844,900**	**12,009**	**2,936,970**	**15,443**	**2,430,193**	**16,799**	**2,862,992**	**17,535**	**4,418,966**	**19,298**

Appendix I: NRCS Grazing Land Practices Implemented During 2008 Farm Bill

Practice Name	Practice Code	2009 Acres	2009 Count	2010 Acres	2010 Count	2011 Acres	2011 Count	2012 Acres	2012 Count	2013 Acres	2013 Count
Brush Management	314	3,357,572	7,972	3,965,990	8,156	4,137,330	8,399	3,814,497	8,434	3,469,120	7,859
Herbaceous Weed Control	315					11,082	209	180,405	1,763	379,155	3,114
Channel Bank Vegetation	322	1,294	6	1,166	20	1,113	11	1,765	19	126	3
Prescribed Burning	338	147,377	597	137,827	673	135,842	645	121,088	441	88,422	329
Critical Area Planting	342	136,811	1,257	132,123	1,450	153,079	1,407	160,615	1,521	124,445	1,348
Pond	378	420,184	1,716	383,932	1,468	320,554	1,616	201,126	1,321	230,080	1,349
Windbreak/Shelterbelt Establishment	380	56,920	221	46,156	293	57,786	305	45,308	277	22,836	192
Silvopasture Establishment	381	115	5	364	5	471	16	1,333	8	43	3
Fence	382	3,363,364	15,911	3,846,880	15,850	3,550,874	15,041	3,449,837	14,570	3,775,913	12,654
Forage Harvest Management	511	12,772	402	16,063	619	26,226	907	33,957	1,267	34,042	1,164
Forage and Biomass Planting	512	323,529	8,450	289,005	7,650	236,567	6,939	242,212	6,689	257,242	8,056
Livestock Pipeline	516	4,121,268	10,023	4,426,155	9,851	3,822,622	9,613	3,761,736	9,694	3,958,741	8,954
Prescribed Grazing	528	4,967,066	24,950	4,403,352	24,850	5,247,348	25,603	6,623,234	26,718	6,213,806	23,953
Pumping Plant	533	1,634,221	1,249	2,272,703	1,732	1,357,259	1,736	1,847,162	1,899	2,344,126	2,037
Grazing Land Mechanical Treatment	548	50,558	126	31,338	315	27,914	173	15,867	87	11,529	52
Range Planting	550	344,494	804	363,377	932	291,892	713	277,493	750	351,948	703
Access Road	560	154,426	260	103,166	272	153,134	279	190,032	302	220,638	248
Heavy Use Area Protection	561	129,597	3,376	222,455	3,707	244,731	4,022	248,325	3,794	393,781	3,828
Animal Trails and Walkways	575	28,057	281	17,420	331	14,946	368	21,500	362	9,512	224
Streambank and Shoreline Protection	580	24,094	180	25,808	153	13,612	122	10,316	138	15,881	132
Channel Bed Stabilization	584	80	3	5,636	14	282	5	2,831	16	13,900	12
Nutrient Management	590	284,745	8,355	227,055	7,130	261,522	7,048	213,653	7,015	163,454	5,006
Integrated Pest Management (IPM)	595	1,170,369	7,592	1,212,061	6,697	843,081	6,572	699,475	5,457	582,170	3,599
Toxic Salt Reduction	610	58,779	6	83	3	72	2	20	1	305	6
Watering Facility	614	6,471,650	12,148	7,134,225	11,876	6,064,196	11,597	5,888,517	11,944	7,022,483	10,582
Waste Recycling	633	24,256	1,070	23,911	1,173	23,802	819	21,783	899	14,790	640
Water and Sediment Control Basin	638	14,649	124	9,016	124	47,718	105	5,771	110	4,765	87
Water Well	642	999,508	1,643	1,450,547	1,769	858,837	1,603	822,175	1,644	1,419,935	1,775
Windbreak/Shelterbelt Renovation	650	189	5	831	17	1,890	16	3,374	26	3,048	32
Total		**28,297,944**	**108,732**	**30,748,646**	**107,130**	**27,905,782**	**105,891**	**28,905,407**	**107,166**	**31,126,237**	**97,941**

Appendix J: NRCS Irrigation Efficiency Practices Implemented During 2008 Farm Bill

Practice Name	Practice Code	2009 Acres	2009 Count	2010 Acres	2010 Count	2011 Acres	2011 Count	2012 Acres	2012 Count	2013 Acres	2013 Count
Irrigation Canal or Lateral	320	3,653	26	79	1	90	3	119	1	301	3
Irrigation Field Ditch	388	1,529	25	972	28	4,445	9	1,160	21	1,499	18
Irrigation Ditch Lining	428	23,933	242	4,826	169	5,138	201	3,568	153	5,703	161
Irrigation Pipeline	430	309,072	4,024	275,837	4,123	226,118	3,567	296,432	3,528	226,555	3,536
Irrigation Reservoir	436	10,937	153	13,951	177	11,631	151	7,463	128	11,323	157
Irrigation System Microirrigation	441	57,695	1,327	40,822	1,110	54,624	1,394	55,828	1,550	69,279	1,557
Irrigation System Sprinkler	442	255,117	3,125	244,904	3,237	195,330	2,809	196,117	2,734	177,944	2,537
Irrigation System Surface and Subsurface	443	46,008	960	34,619	913	25,880	654	23,137	615	30,822	791
Irrigation System Tailwater Recovery	447	6,775	96	3,217	78	3,119	71	5,111	79	2,591	48
Irrigation Water Management	449	559,417	8,892	460,127	8,105	393,883	7,052	457,607	8,071	435,640	8,623
Irrigation Land Leveling	464	85,936	1,694	62,155	1,329	65,825	1,210	63,189	1,311	66,455	1,373
Pumping Plant	533	74,294	827	85,137	1,068	67,498	893	68,153	874	61,384	854
Structure for Water Control	587	534,518	2,741	368,189	2,750	746,880	2,421	757,933	2,661	1,487,972	3,061
Toxic Salt Reduction	610	79,665	237	14,736	266	25,644	162	18,946	250	21,299	194
Total		**2,048,549**	**24,369**	**1,609,571**	**23,354**	**1,826,106**	**20,597**	**1,954,762**	**21,976**	**2,598,766**	**22,913**

Appendix K: NRCS Water Quality Practices Implemented During 2008 Farm Bill

Practice Name	Practice Code	2009 Acres	2009 Count	2010 Acres	2010 Count	2011 Acres	2011 Count	2012 Acres	2012 Count	2013 Acres	2013 Count
Alley Cropping	311	251	24	127	15	124	19	89	12	84	10
Waste Storage Facility	313	39,195	1,490	36,882	1,254	28,425	1,288	31,259	1,292	22,328	1103
Animal Mortality Facility	316	2,401	157	4,527	211	3,315	185	3,316	199	3,753	210
Composting Facility	317	3,644	179	5,610	273	3,996	207	4,811	271	3,173	213
Channel Bank Vegetation	322	1,505	15	1,883	42	2,220	59	2,491	42	338	34
Conservation Cover	327	285,405	1,070	45,030	973	76,353	1,091	77,389	1,671	67,477	1409
Conservation Crop Rotation	328	867,381	18,827	902,265	19,151	896,116	18,898	1,047,819	20,048	940,510	22178
Residue and Tillage Management No Till/Strip Till/Direct Seed	329	1,016,336	18,253	1,034,562	18,649	895,143	16,321	816,367	14,463	675,038	14140
Contour Farming	330	27,316	667	27,633	719	43,810	907	48,639	942	44,072	1182
Contour Orchard and Other Perennial Crops	331	428	49	489	44	357	49	784	73	848	69
Contour Buffer Strips	332	1,009	23	1,111	41	817	30	745	29	428	14
Cover Crop	340	319,330	8,859	425,256	10,075	491,180	12,299	555,483	14,222	675,047	18667
Critical Area Planting	342	270,901	3,402	297,394	3,963	346,980	4,178	339,773	4,468	388,249	4188
Residue and Tillage Management Mulch Till	345	489,057	7,272	425,771	6,322	352,130	5,417	345,238	6,219	314,155	5400
Residue and Tillage Management Ridge Till	346	8,945	109	8,165	173	7,344	156	5,980	151	3,978	103
Sediment Basin	350	8,636	190	8,044	157	16,137	103	4,077	92	3,757	91
Water Well Decommissioning	351	34,560	340	44,139	296	33,197	234	123,093	237	36,348	213
Waste Treatment Lagoon	359	2,651	95	1,670	72	287	20	332	13	254	12
Waste Facility Closure	360	2,441	151	3,430	166	1,939	126	1,846	146	2,009	143
Diversion	362	88,925	631	93,598	594	69,826	563	122,609	634	29,934	501
Windbreak/Shelterbelt Establishment	380	94,421	942	80,512	1,105	91,498	1,194	87,552	1,378	55,580	1035
Riparian Herbaceous Cover	390	2,379	53	3,386	39	1,417	58	4,343	64	1,249	30
Riparian Forest Buffer	391	8,764	265	15,778	233	6,500	268	6,041	268	7,100	248
Filter Strip	393	14,499	377	15,345	335	13,468	323	12,034	330	8,482	231
Stream Habitat Improvement and Management	395	5,435	21	5,547	59	2,460	37	2,904	52	9,603	70
Grade Stabilization Structure	410	226,058	2,353	194,056	2,241	343,060	2,271	579,066	2,226	235,886	2074
Grassed Waterway	412	126,308	2,113	112,073	2,165	127,812	2,205	120,596	2,167	96,957	1621
Irrigation System Microirrigation	441	57,695	1,327	40,822	1,110	54,624	1,394	55,828	1,550	69,279	1557
Irrigation System Tailwater Recovery	447	6,775	96	3,217	78	3,119	71	5,111	79	2,591	48
Irrigation Water Management	449	559,417	8,892	460,127	8,105	393,883	7,052	457,607	8,071	435,640	8623
Access Control	472	206,355	2,099	242,789	2,765	336,295	2,961	197,518	3,481	339,778	2985
Mulching	484	114,500	691	42,972	959	38,201	1,104	53,565	1,397	61,218	1668
Prescribed Grazing	528	5,046,759	26,726	4,473,610	26,573	5,300,778	27,298	6,706,850	28,499	6,272,684	25606
Drainage Water Management	554	1,592	50	1,058	79	2,627	115	5,923	162	17,163	301
Roof Runoff Structure	558	16,224	488	12,153	509	7,199	495	9,491	601	7,513	591

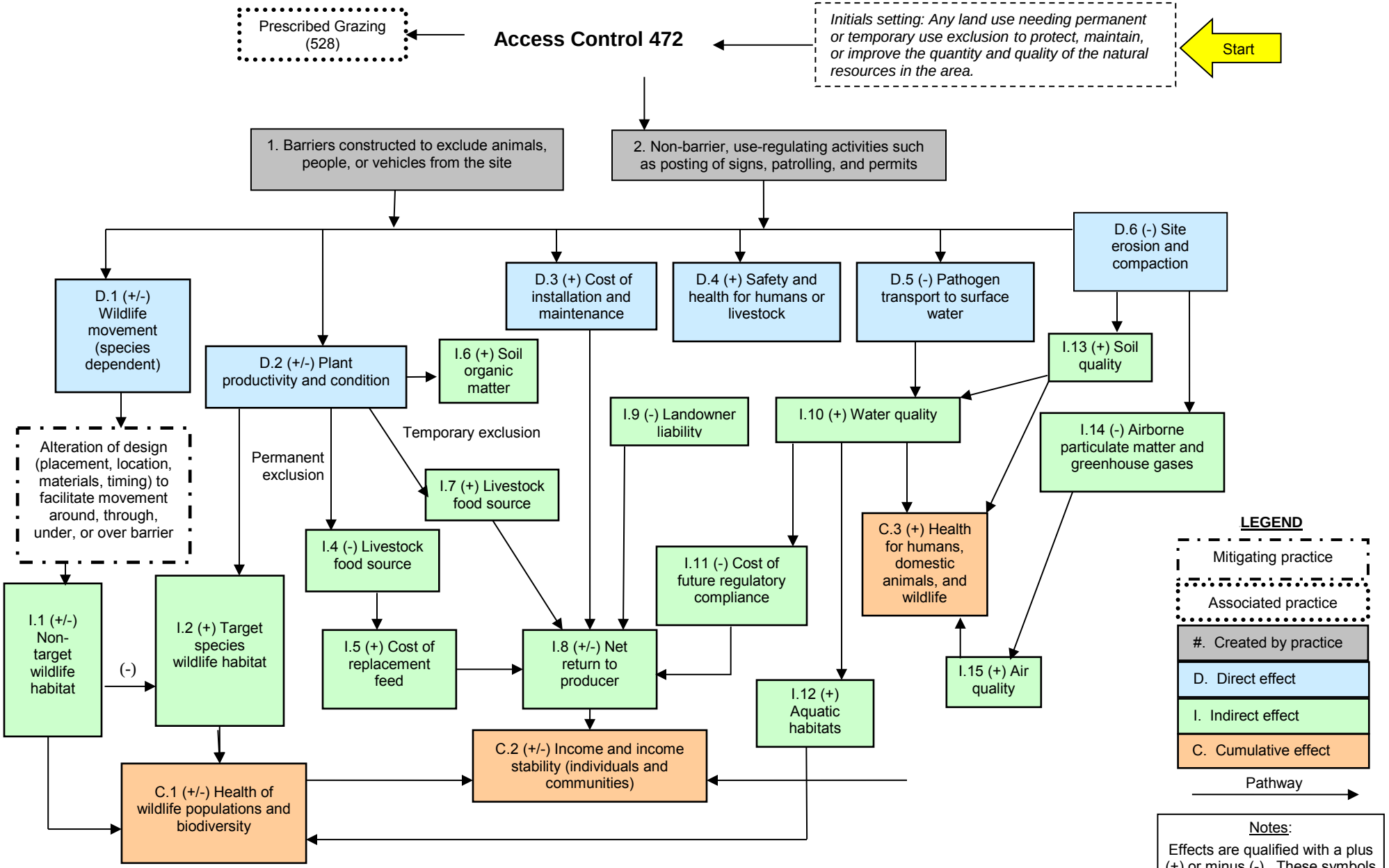
Practice Name	Practice Code	2009 Acres	2009 Count	2010 Acres	2010 Count	2011 Acres	2011 Count	2012 Acres	2012 Count	2013 Acres	2013 Count
Access Road	560	207,034	764	196,544	763	576,586	758	929,575	917	1,552,423	760
Heavy Use Area Protection	561	315,721	4,497	253,580	5,376	268,699	5,286	287,000	5,195	440,437	5188
Stream Crossing	578	198,983	643	118,326	670	549,229	767	403,997	824	565,235	650
Streambank and Shoreline Protection	580	49,440	403	38,091	378	18,772	314	16,306	313	42,761	381
Stripcropping	585	3,876	138	3,885	95	3,680	105	1,795	86	1,772	68
Structure for Water Control	587	534,518	2,741	368,189	2,750	746,880	2,421	757,933	2,661	1,487,972	3061
Nutrient Management	590	2,090,645	54,977	1,962,545	51,017	1,770,287	46,038	1,694,341	47,837	1,438,482	42421
Integrated Pest Management (IPM)	595	2,380,488	35,156	2,296,617	32,959	1,906,347	32,473	1,650,077	27,344	1,315,587	20879
Terrace	600	279,210	3,392	198,219	2,557	248,998	3,157	233,670	2,889	180,749	2325
Toxic Salt Reduction	610	79,665	237	14,736	266	25,644	162	18,946	250	21,299	194
Tree/Shrub Establishment	612	282,666	2,168	213,759	2,694	276,310	2,890	263,078	2,692	709,973	3652
Waste Treatment	629	199	16	254	29	691	46	1,951	108	2,132	128
Waste Recycling	633	166,892	5,183	162,037	4,788	129,697	3,992	138,649	4,716	94,395	3244
Waste Transfer	634	41,896	959	45,033	1,006	41,751	952	40,979	993	29,631	813
Vegetated Treatment Area	635	2,556	104	1,190	113	1,637	88	2,538	135	3,473	132
Water and Sediment Control Basin	638	94,478	1,427	91,764	1,470	126,887	1,550	85,245	1,556	75,450	1349
Windbreak/Shelterbelt Renovation	650	6,142	125	5,458	167	8,132	268	17,257	428	15,379	352
Constructed Wetland	656	4	1	34	1	37	2	26	2		
Wetland Restoration	657	579	15	834	16	980	11	5,176	42	3,278	63
Wetland Creation	658	1,786	8	82	2	174	4	334	19	95	11
Wetland Enhancement	659	6,023	24	236	8	1,685	22	3,799	22	3,033	12
Total		**16,700,304**	**221,274**	**15,042,440**	**216,670**	**16,695,740**	**210,302**	**18,389,239**	**214,578**	**18,816,056**	**202251**

Appendix L: NRCS Wetland Practices Implemented During 2008 Farm Bill

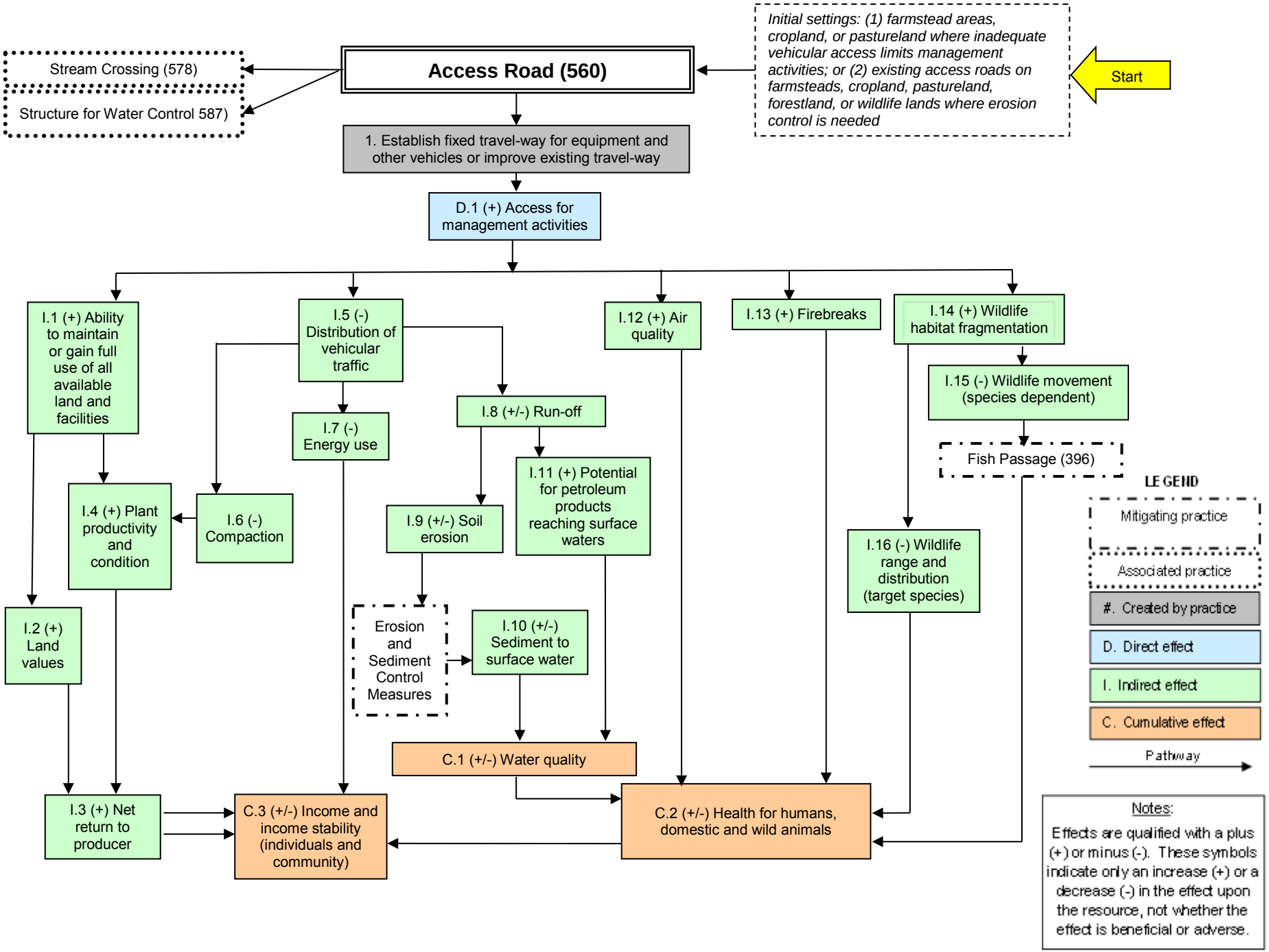
Practice Name	Practice Code	2009 Acres	2009 Count	2010 Acres	2010 Count	2011 Acres	2011 Count	2012 Acres	2012 Count	2013 Acres	2013 Count
Wetland Restoration	657	579	15	834	16	980	11	5,176	42	3,278	63
Wetland Creation	658	1,786	8	82	2	174	4	334	19	95	11
Wetland Enhancement	659	6,023	24	236	8	1,685	22	3,799	22	3,033	12
Total		**8,387**	**47**	**1,152**	**26**	**2,839**	**37**	**9,308**	**83**	**6,406**	**86**

Appendix M: Network Effects Diagrams

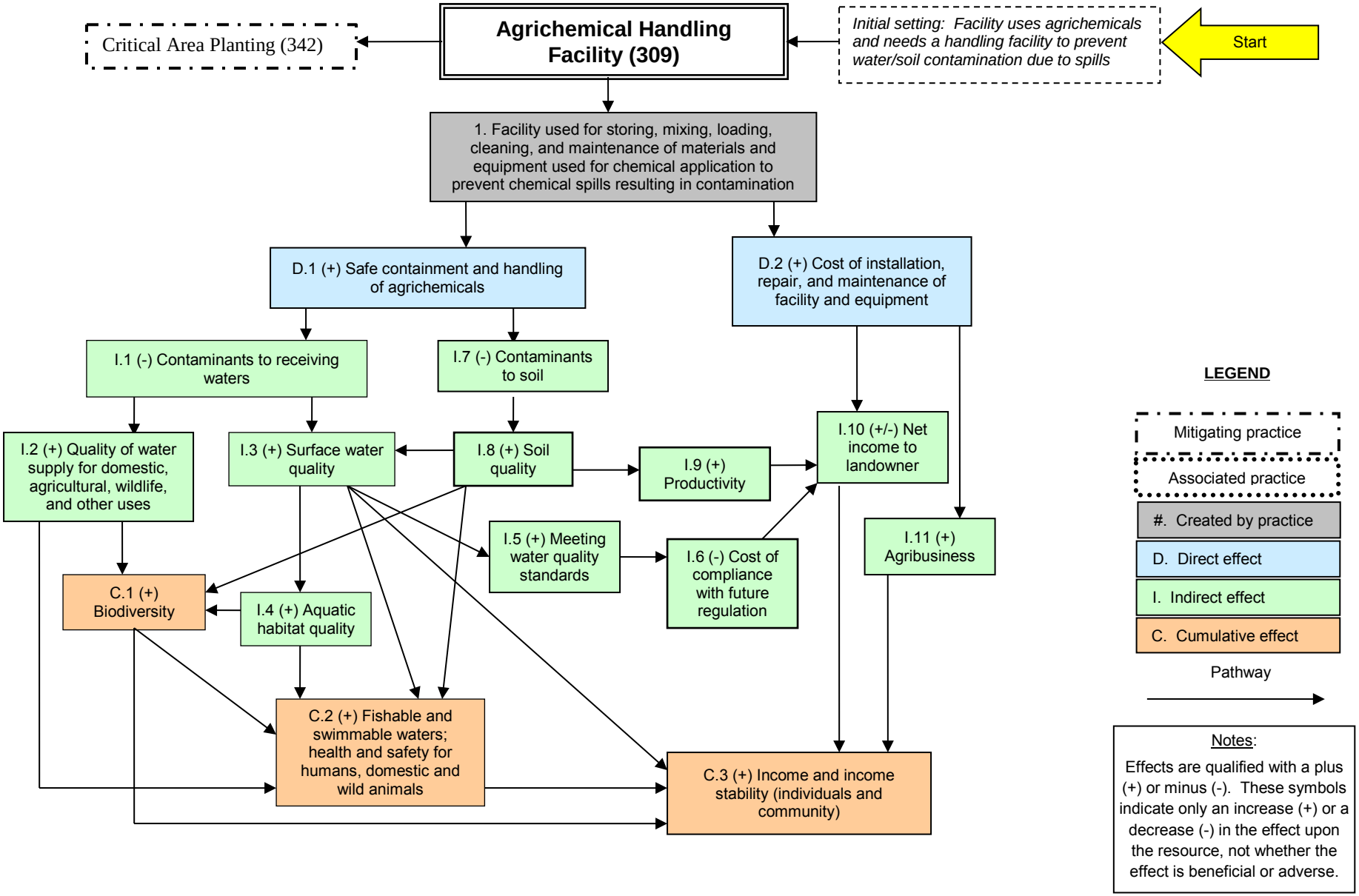
There are approximately 160 NRCS conservation practice standards, and a network effects diagram has been created for each. The following are copies of the network effects diagrams in alphabetical order by conservation practice name.

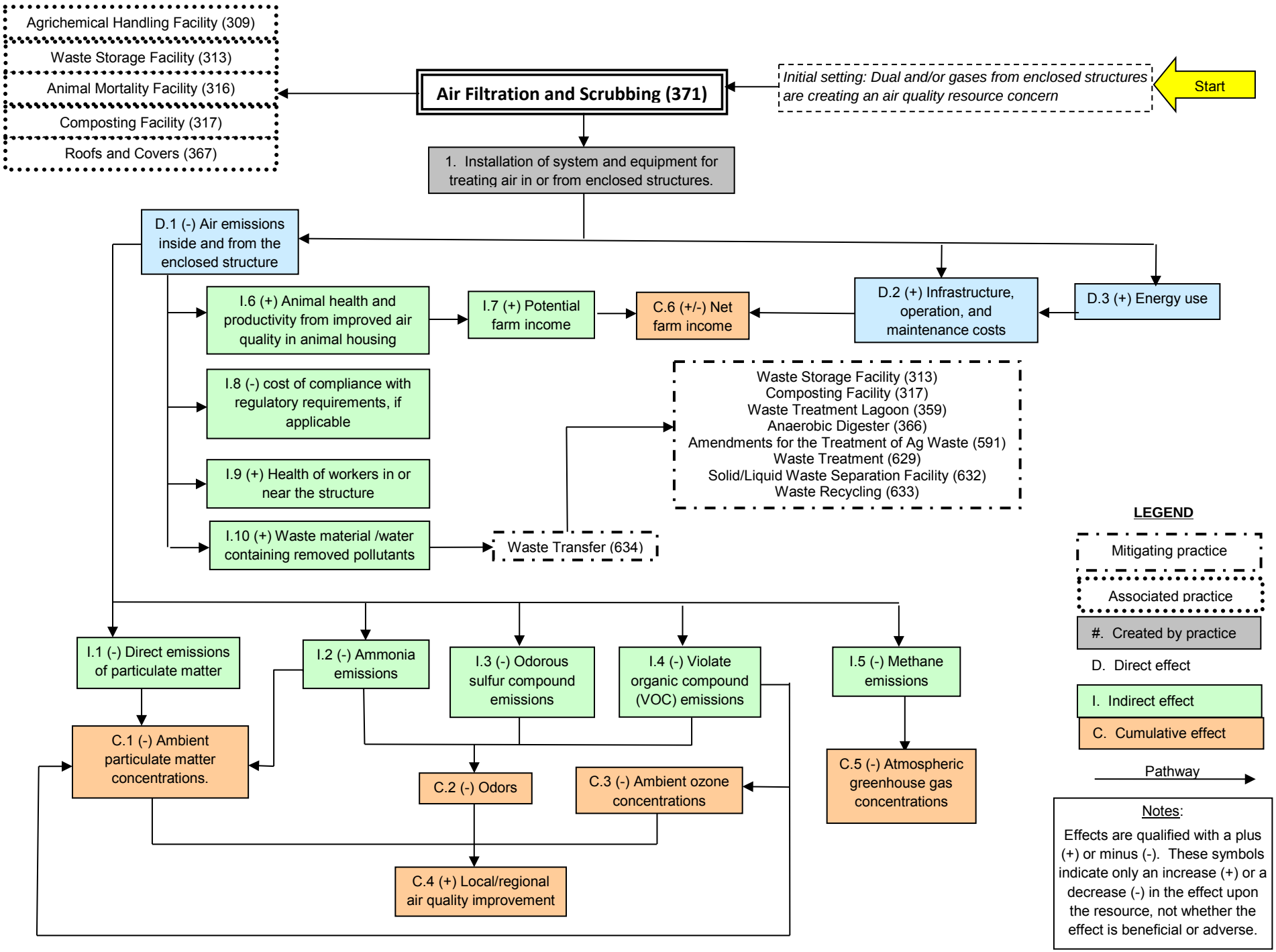


Network Diagram 1

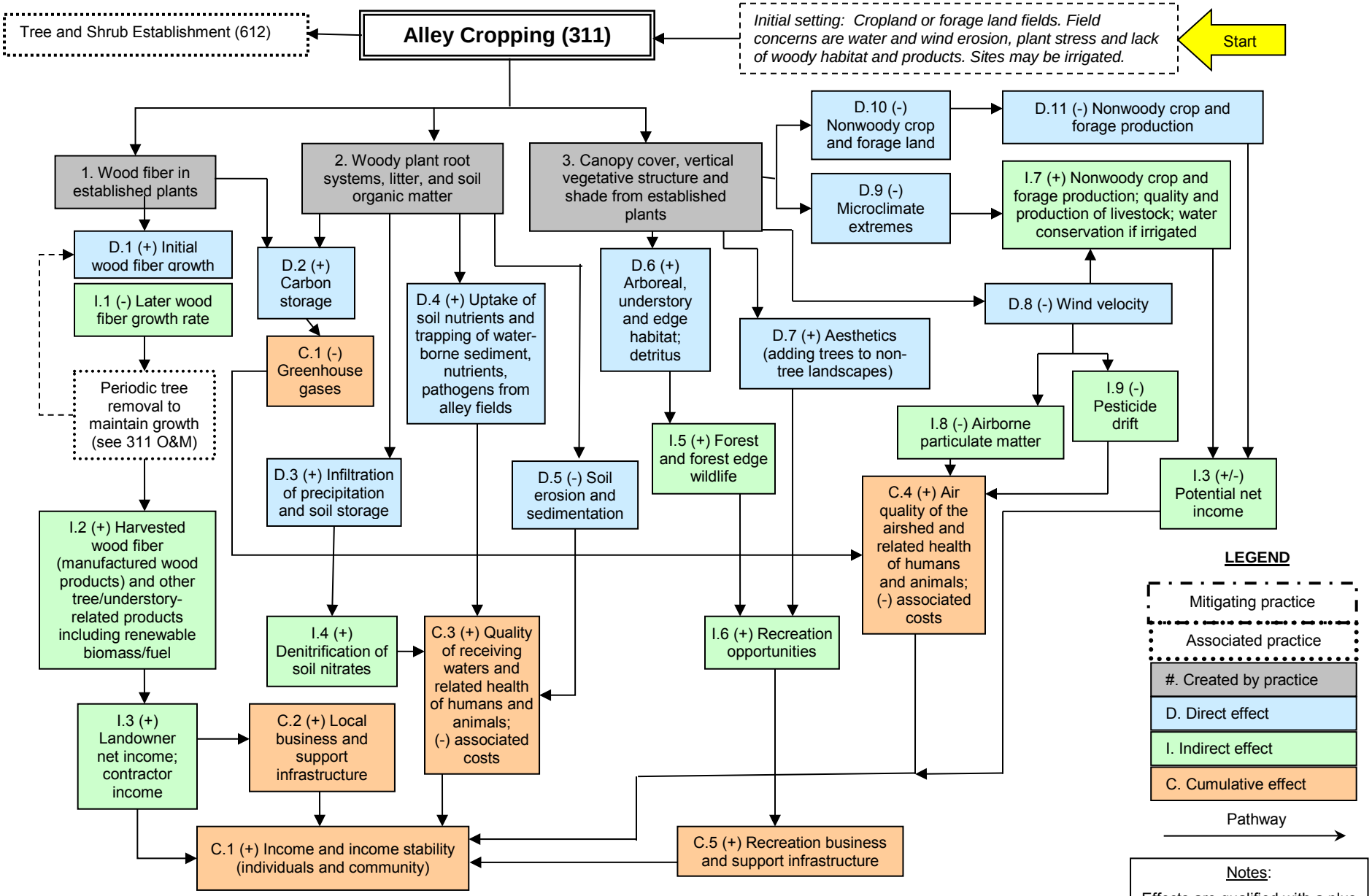


Network Diagram 2


Critical Area Planting (342)
Agrichemical Handling Facility (309)
Initial setting: Facility uses agrichemicals and needs a handling facility to prevent water/soil contamination due to spills
Start
1. Facility used for storing, mixing, loading, cleaning, and maintenance of materials and equipment used for chemical application to prevent chemical spills resulting in contamination
D.1 (+) Safe containment and handling of agrichemicals
D.2 (+) Cost of installation, repair, and maintenance of facility and equipment
I.1 (-) Contaminants to receiving waters
I.7 (-) Contaminants to soil
I.2 (+) Quality of water supply for domestic, agricultural, wildlife, and other uses
I.3 (+) Surface water quality
I.8 (+) Soil quality
I.9 (+) Productivity
I.10 (+/-) Net income to landowner
I.5 (+) Meeting water quality standards
I.6 (-) Cost of compliance with future regulation
I.11 (+) Agribusiness
C.1 (+) Biodiversity
I.4 (+) Aquatic habitat quality
C.2 (+) Fishable and swimmable waters; health and safety for humans, domestic and wild animals
C.3 (+) Income and income stability (individuals and community)
LEGEND
Mitigating practice
Associated practice
#. Created by practice
D. Direct effect
I. Indirect effect
C. Cumulative effect
Pathway
Notes:
Effects are qualified with a plus (+) or minus (-). These symbols indicate only an increase (+) or a decrease (-) in the effect upon the resource, not whether the effect is beneficial or adverse.



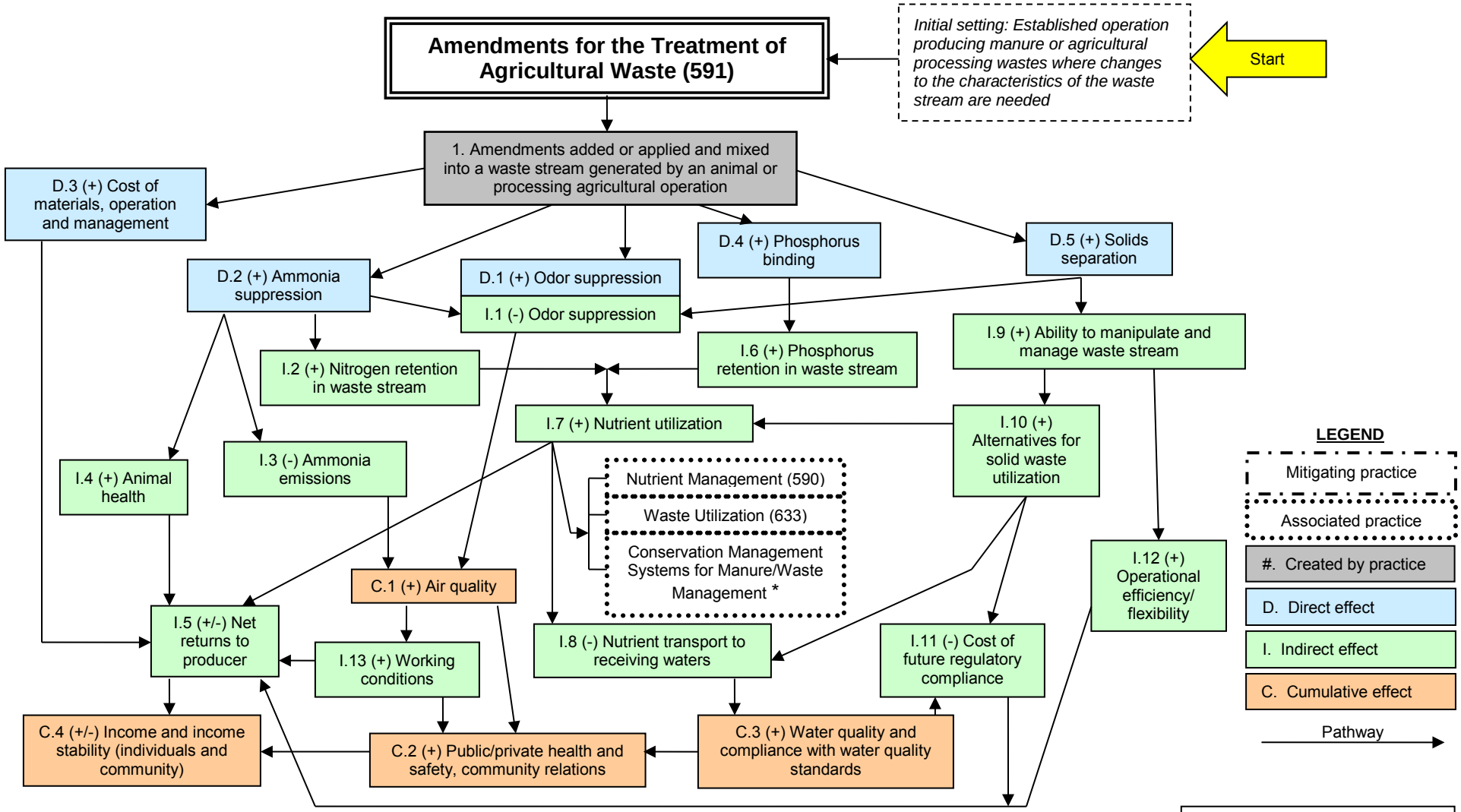
Network Diagram 4



Notes:

Effects are qualified with a plus (+) or minus (-). These symbols indicate only an increase (+) or a decrease (-) in the effect upon the resource, not whether the effect is beneficial or adverse.

Network Diagram 5



Notes:

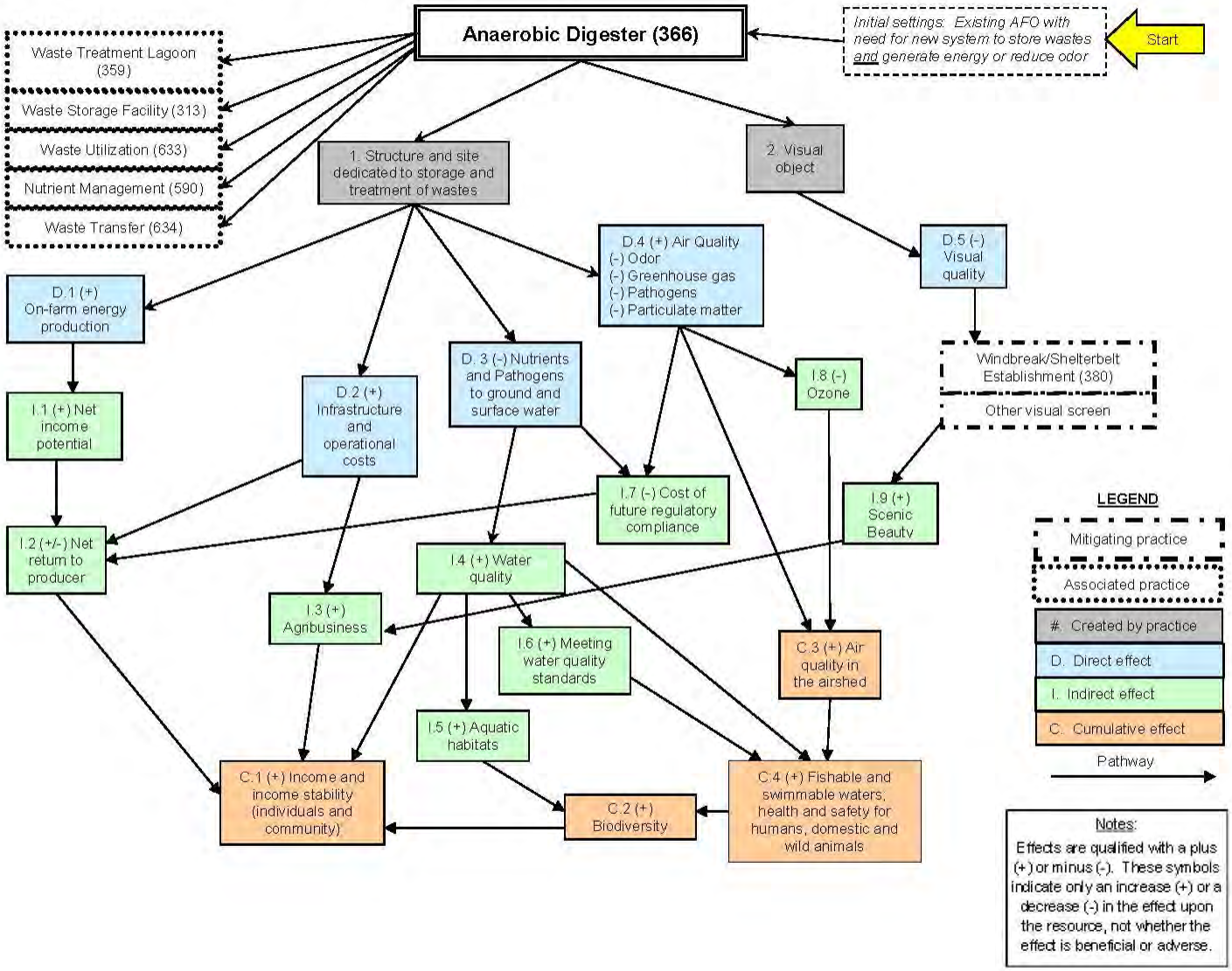
Effects are qualified with a plus (+) or minus (-). These symbols indicate only an increase (+) or a decrease (-) in the effect upon the resource, not whether the effect is beneficial or adverse.

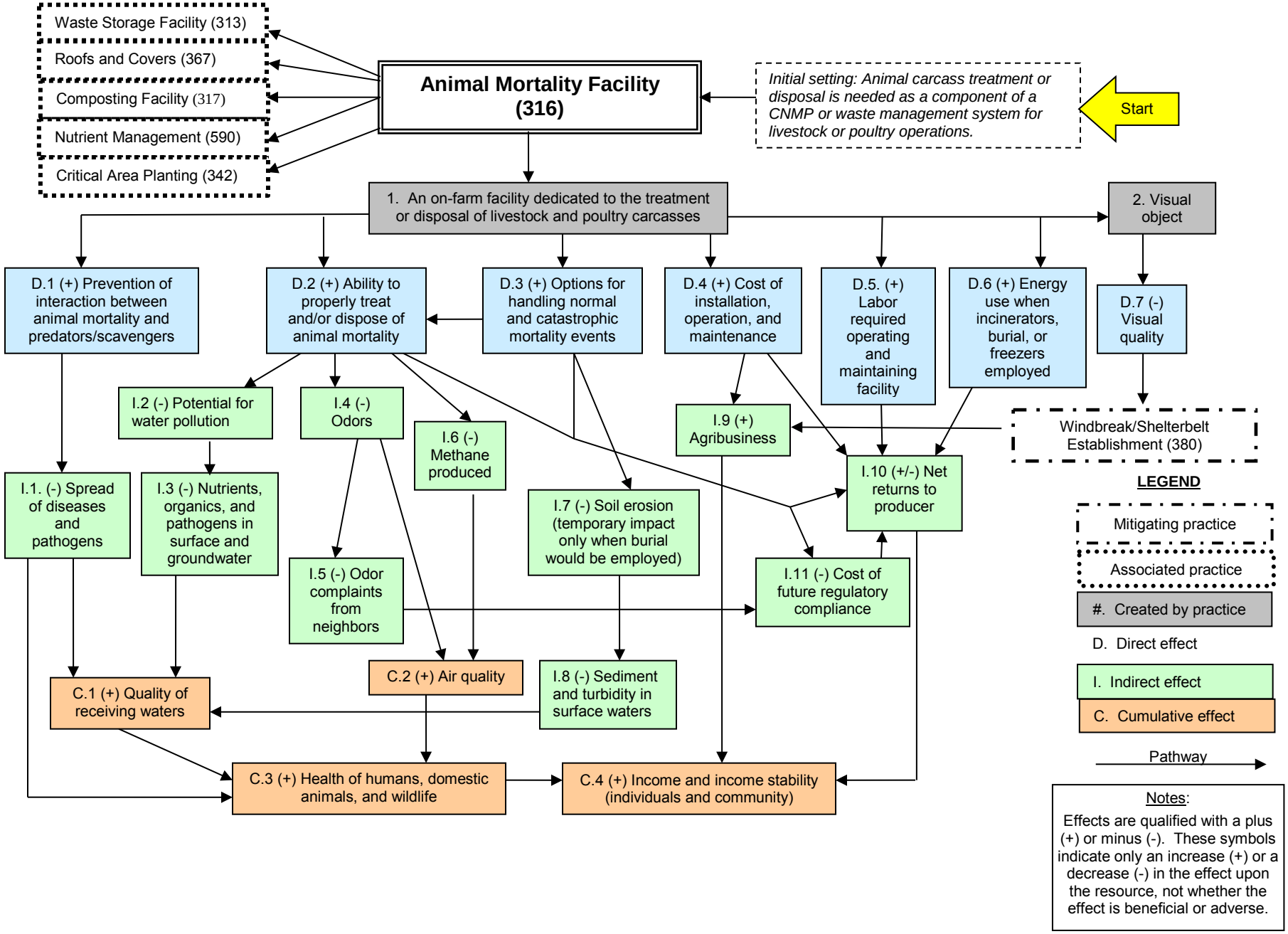
*** Various practices for management and/or treatment of manure/wastes.**

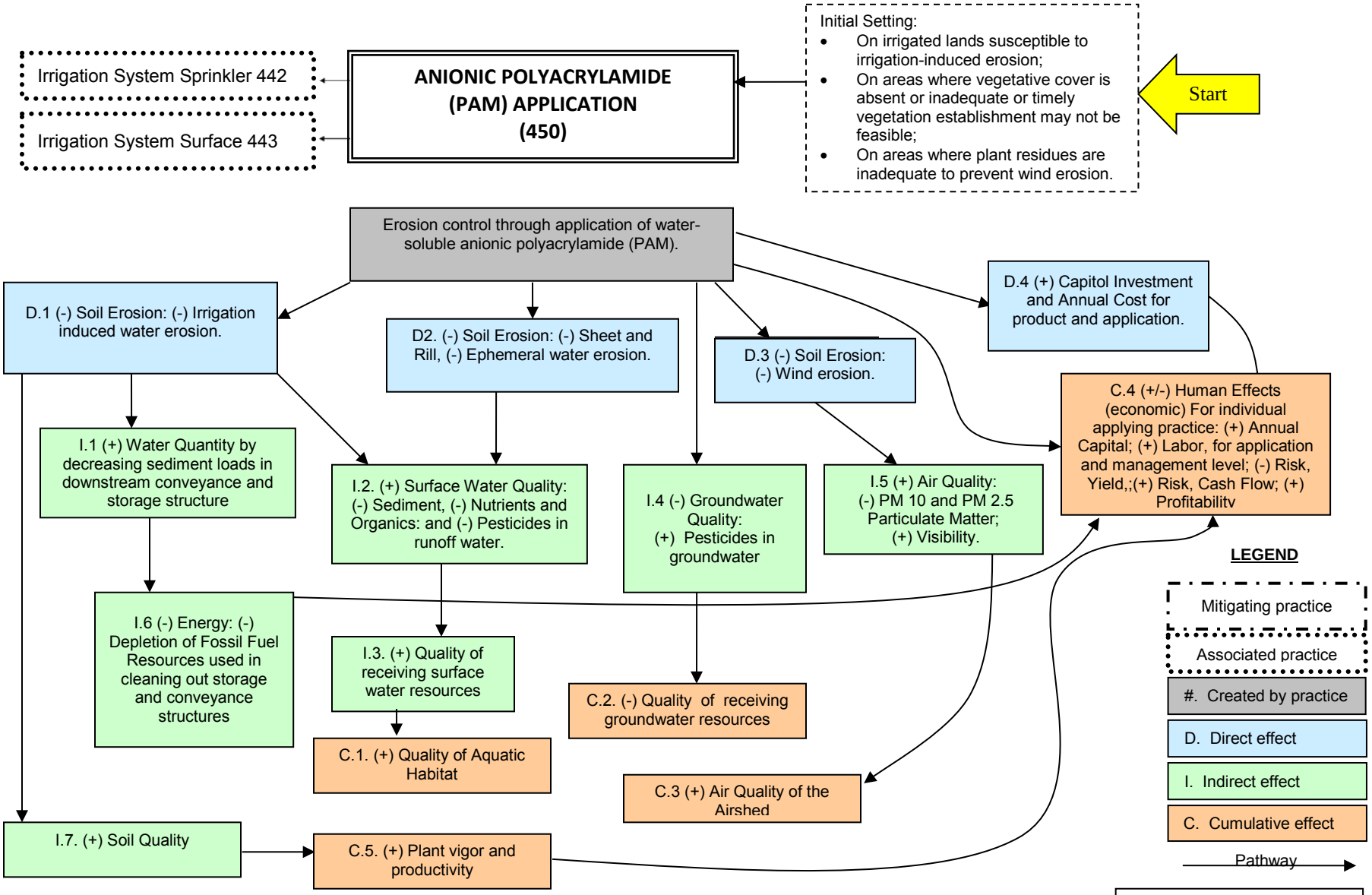
Network Diagram 6

NRCS CONSERVATION PRACTICE EFFECTS - NETWORK DIAGRAM

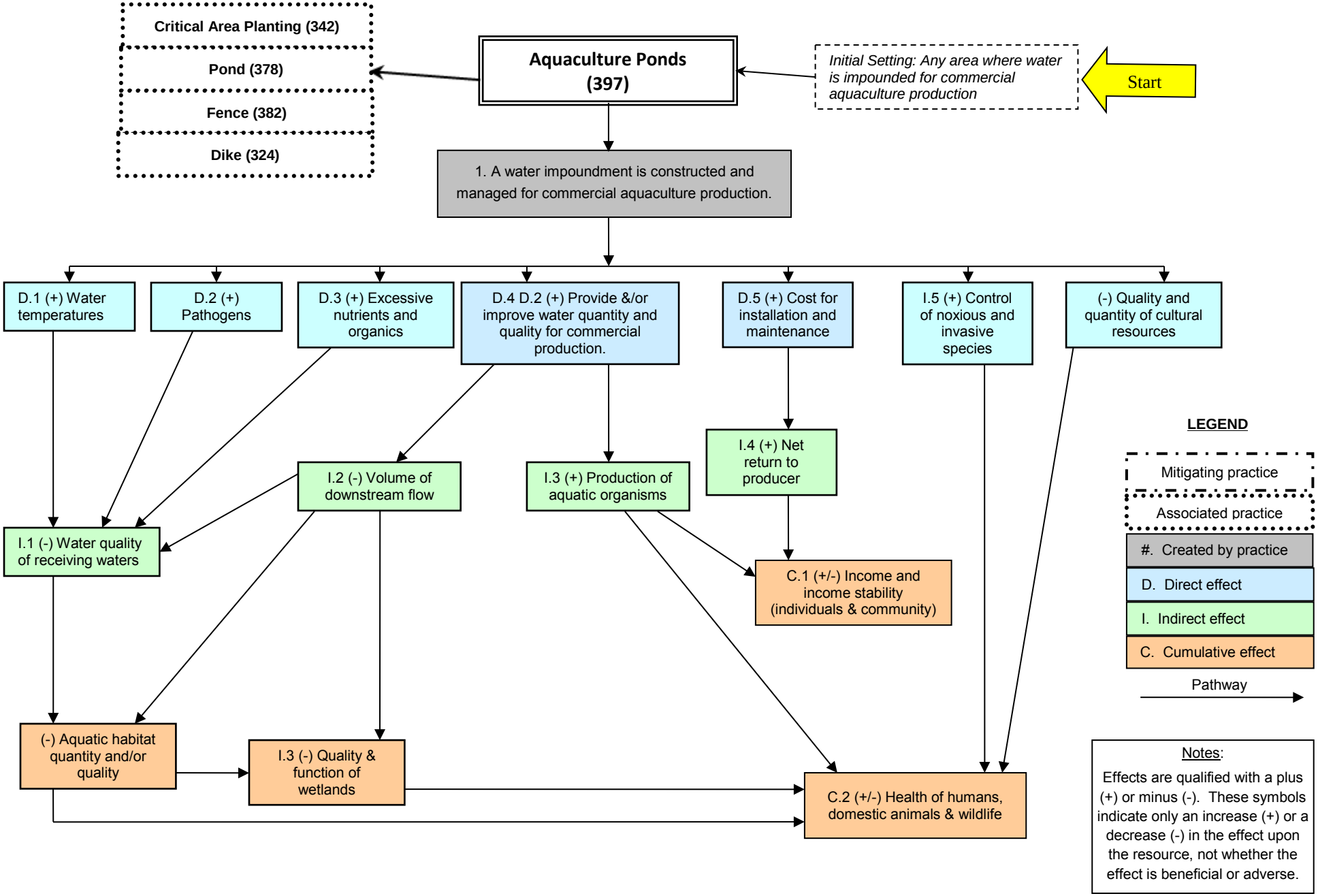
March 2014

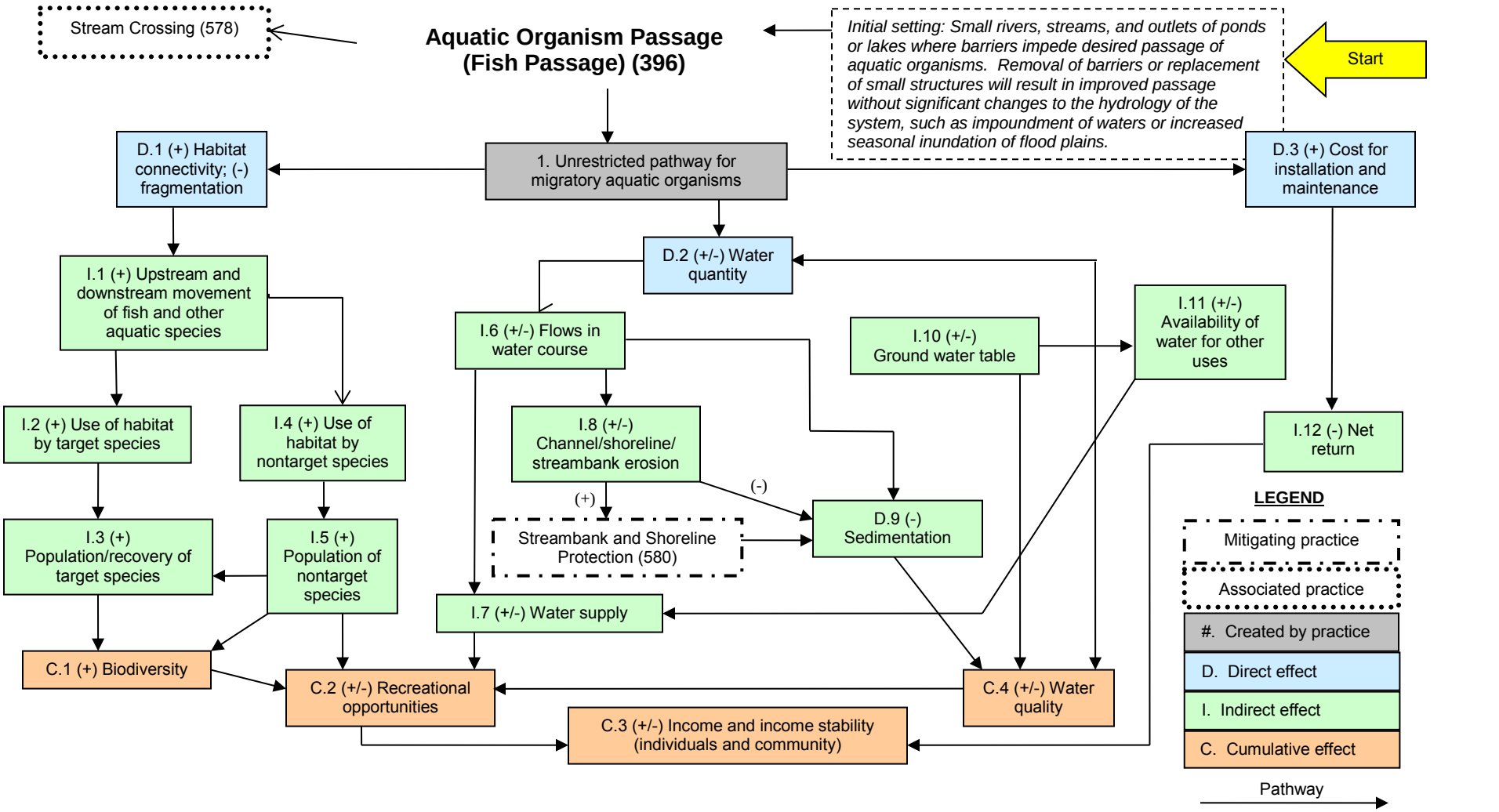



Waste Storage Facility (313)
Roofs and Covers (367)
Composting Facility (317)
Nutrient Management (590)
Critical Area Planting (342)
Animal Mortality Facility (316)
Initial setting: Animal carcass treatment or disposal is needed as a component of a CNMP or waste management system for livestock or poultry operations.
Start
1. An on-farm facility dedicated to the treatment or disposal of livestock and poultry carcasses
2. Visual object
D.1 (+) Prevention of interaction between animal mortality and predators/scavengers
D.2 (+) Ability to properly treat and/or dispose of animal mortality
D.3 (+) Options for handling normal and catastrophic mortality events
D.4 (+) Cost of installation, operation, and maintenance
D.5. (+) Labor required operating and maintaining facility
D.6 (+) Energy use when incinerators, burial, or freezers employed
D.7 (-) Visual quality
I.2 (-) Potential for water pollution
I.4 (-) Odors
I.6 (-) Methane produced
I.9 (+) Agribusiness
Windbreak/Shelterbelt Establishment (380)
I.10 (+/-) Net returns to producer
I.1. (-) Spread of diseases and pathogens
I.3 (-) Nutrients, organics, and pathogens in surface and groundwater
I.7 (-) Soil erosion (temporary impact only when burial would be employed)
I.5 (-) Odor complaints from neighbors
I.11 (-) Cost of future regulatory compliance
C.2 (+) Air quality
I.8 (-) Sediment and turbidity in surface waters
C.1 (+) Quality of receiving waters
C.3 (+) Health of humans, domestic animals, and wildlife
C.4 (+) Income and income stability (individuals and community)
LEGEND
Mitigating practice
Associated practice
#. Created by practice
D. Direct effect
I. Indirect effect
C. Cumulative effect
Pathway
Notes:
Effects are qualified with a plus (+) or minus (-). These symbols indicate only an increase (+) or a decrease (-) in the effect upon the resource, not whether the effect is beneficial or adverse.



Network Diagram 9

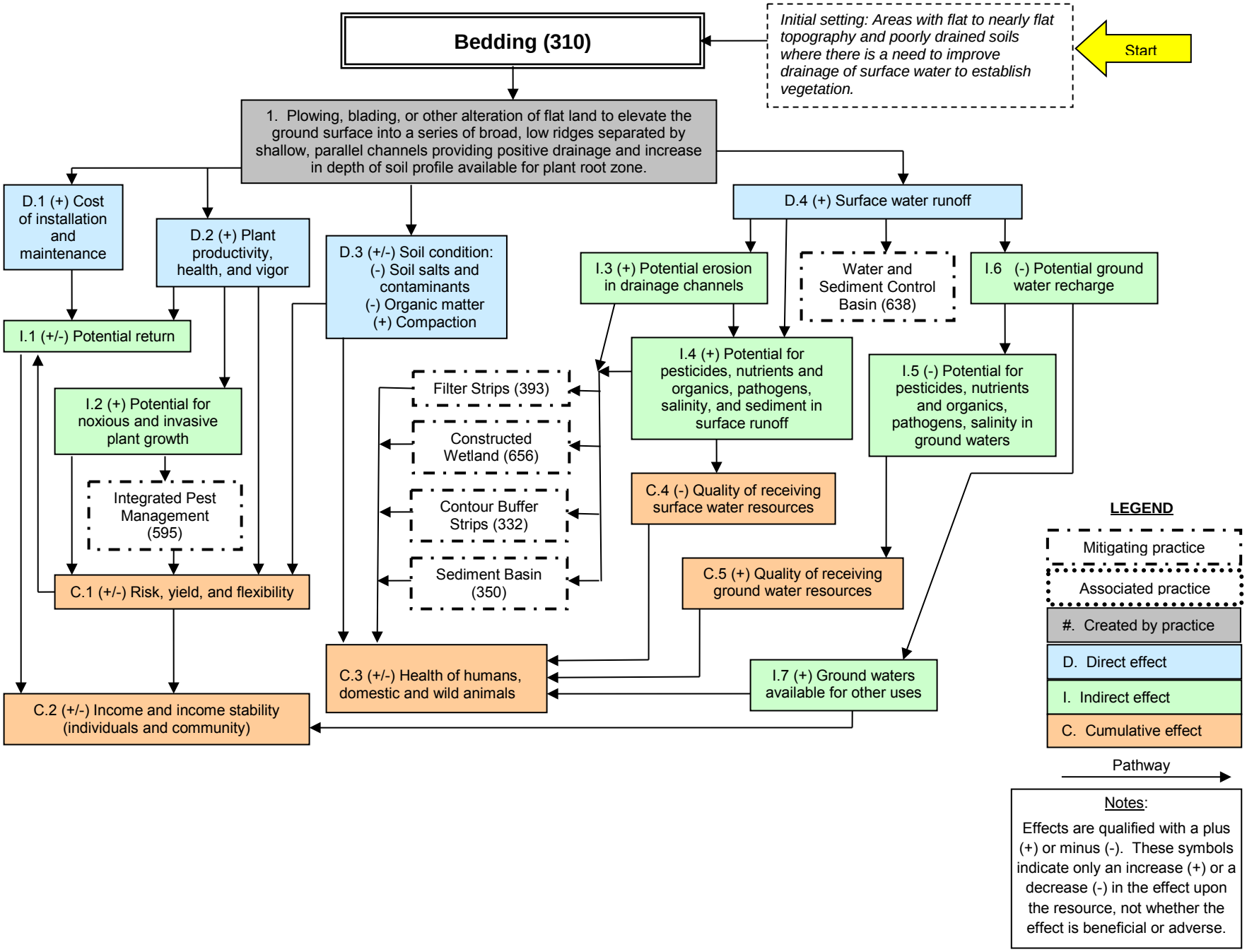

Critical Area Planting (342)
Pond (378)
Fence (382)
Dike (324)
Aquaculture Ponds (397)
Initial Setting: Any area where water is impounded for commercial aquaculture production
Start
1. A water impoundment is constructed and managed for commercial aquaculture production.
D.1 (+) Water temperatures
D.2 (+) Pathogens
D.3 (+) Excessive nutrients and organics
D.4 D.2 (+) Provide &/or improve water quantity and quality for commercial production.
D.5 (+) Cost for installation and maintenance
I.5 (+) Control of noxious and invasive species
(-) Quality and quantity of cultural resources
I.4 (+) Net return to producer
I.2 (-) Volume of downstream flow
I.3 (+) Production of aquatic organisms
I.1 (-) Water quality of receiving waters
C.1 (+/-) Income and income stability (individuals & community)
(-) Aquatic habitat quantity and/or quality
I.3 (-) Quality & function of wetlands
C.2 (+/-) Health of humans, domestic animals & wildlife
LEGEND
Mitigating practice
Associated practice
#. Created by practice
D. Direct effect
I. Indirect effect
C. Cumulative effect
Pathway
Notes:
Effects are qualified with a plus (+) or minus (-). These symbols indicate only an increase (+) or a decrease (-) in the effect upon the resource, not whether the effect is beneficial or adverse.



Notes:

Effects are qualified with a plus (+) or minus (-). These symbols indicate only an increase (+) or a decrease (-) in the effect upon the resource, not whether the effect is beneficial or adverse.

The scope of the practice implementation and resulting effects are limited to those described in the "initial setting."
Projects involving larger river systems, impoundment of waters, increased seasonal inundation of flood plains, or any other changes to the hydrologic system may need to be evaluated in a site-specific EA.


Bedding (310)
Initial setting: Areas with flat to nearly flat topography and poorly drained soils where there is a need to improve drainage of surface water to establish vegetation.
Start
1. Plowing, blading, or other alteration of flat land to elevate the ground surface into a series of broad, low ridges separated by shallow, parallel channels providing positive drainage and increase in depth of soil profile available for plant root zone.
D.1 (+) Cost of installation and maintenance
D.2 (+) Plant productivity, health, and vigor
D.3 (+/-) Soil condition: (-) Soil salts and contaminants (-) Organic matter (+) Compaction
D.4 (+) Surface water runoff
I.1 (+/-) Potential return
I.2 (+) Potential for noxious and invasive plant growth
Integrated Pest Management (595)
C.1 (+/-) Risk, yield, and flexibility
C.2 (+/-) Income and income stability (individuals and community)
Filter Strips (393)
Constructed Wetland (656)
Contour Buffer Strips (332)
Sediment Basin (350)
C.3 (+/-) Health of humans, domestic and wild animals
I.3 (+) Potential erosion in drainage channels
Water and Sediment Control Basin (638)
I.6 (-) Potential ground water recharge
I.4 (+) Potential for pesticides, nutrients and organics, pathogens, salinity, and sediment in surface runoff
I.5 (-) Potential for pesticides, nutrients and organics, pathogens, salinity in ground waters
C.4 (-) Quality of receiving surface water resources
C.5 (+) Quality of receiving ground water resources
I.7 (+) Ground waters available for other uses
LEGEND
Mitigating practice
Associated practice
#. Created by practice
D. Direct effect
I. Indirect effect
C. Cumulative effect
Pathway
Notes:
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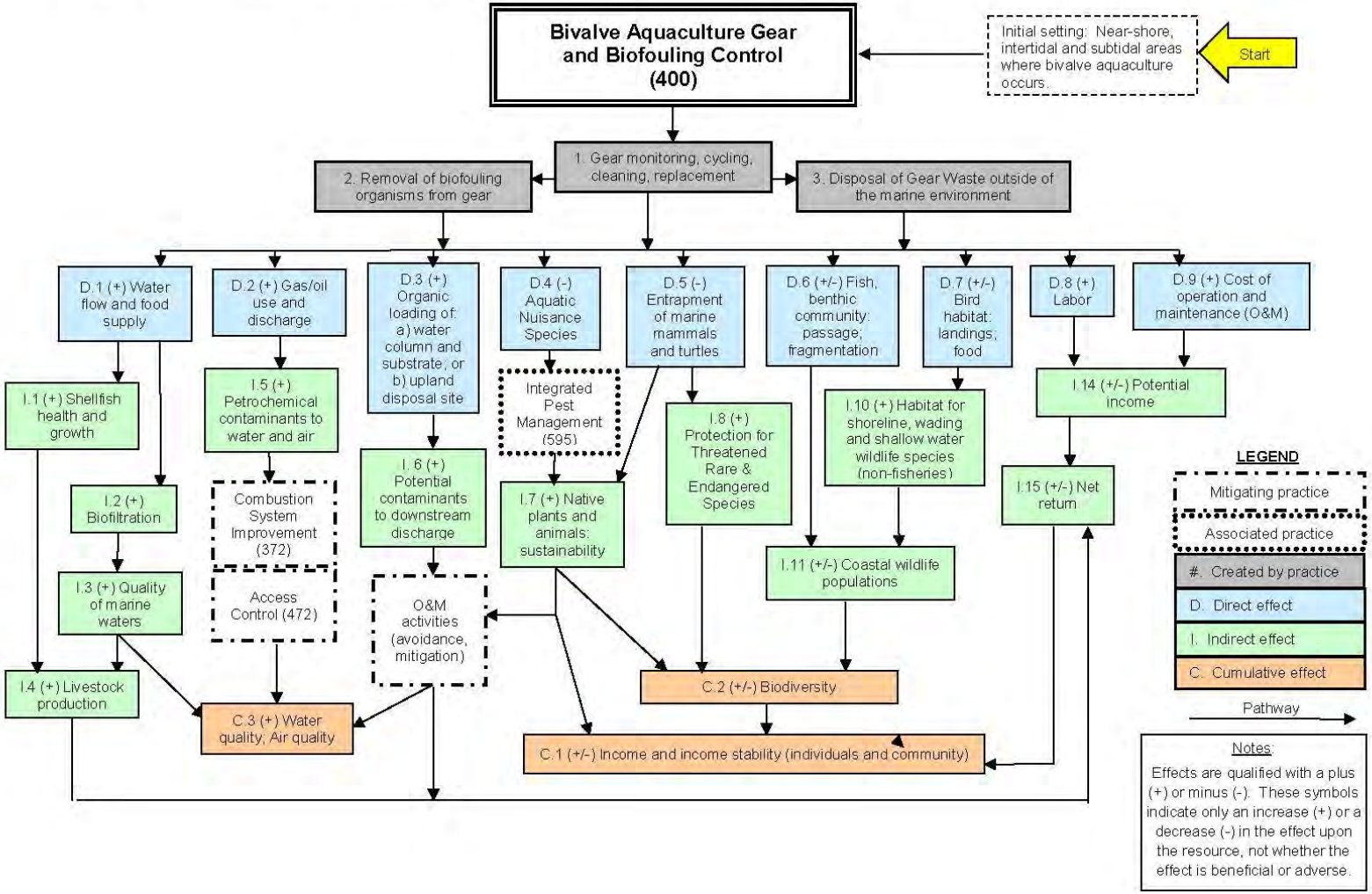
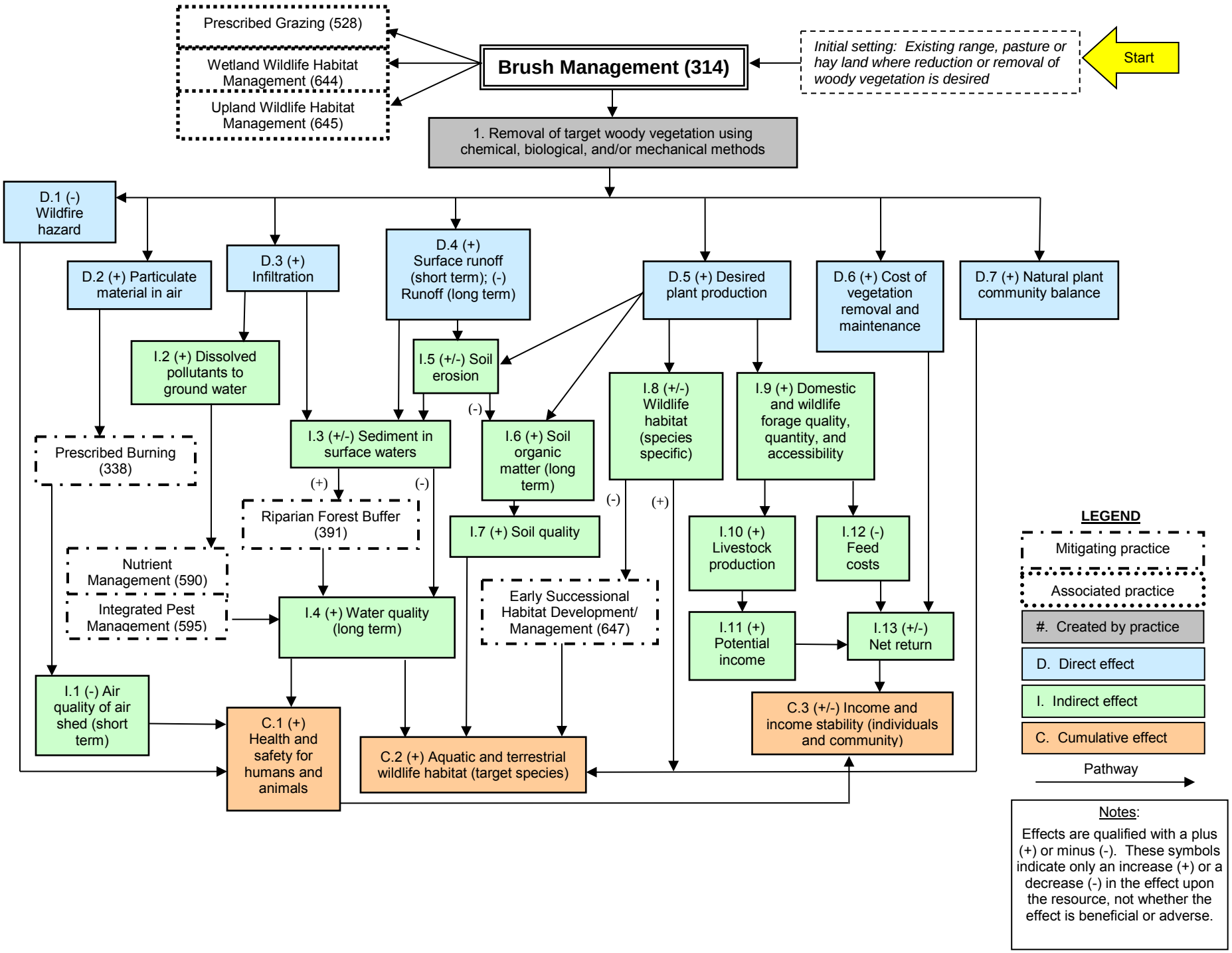
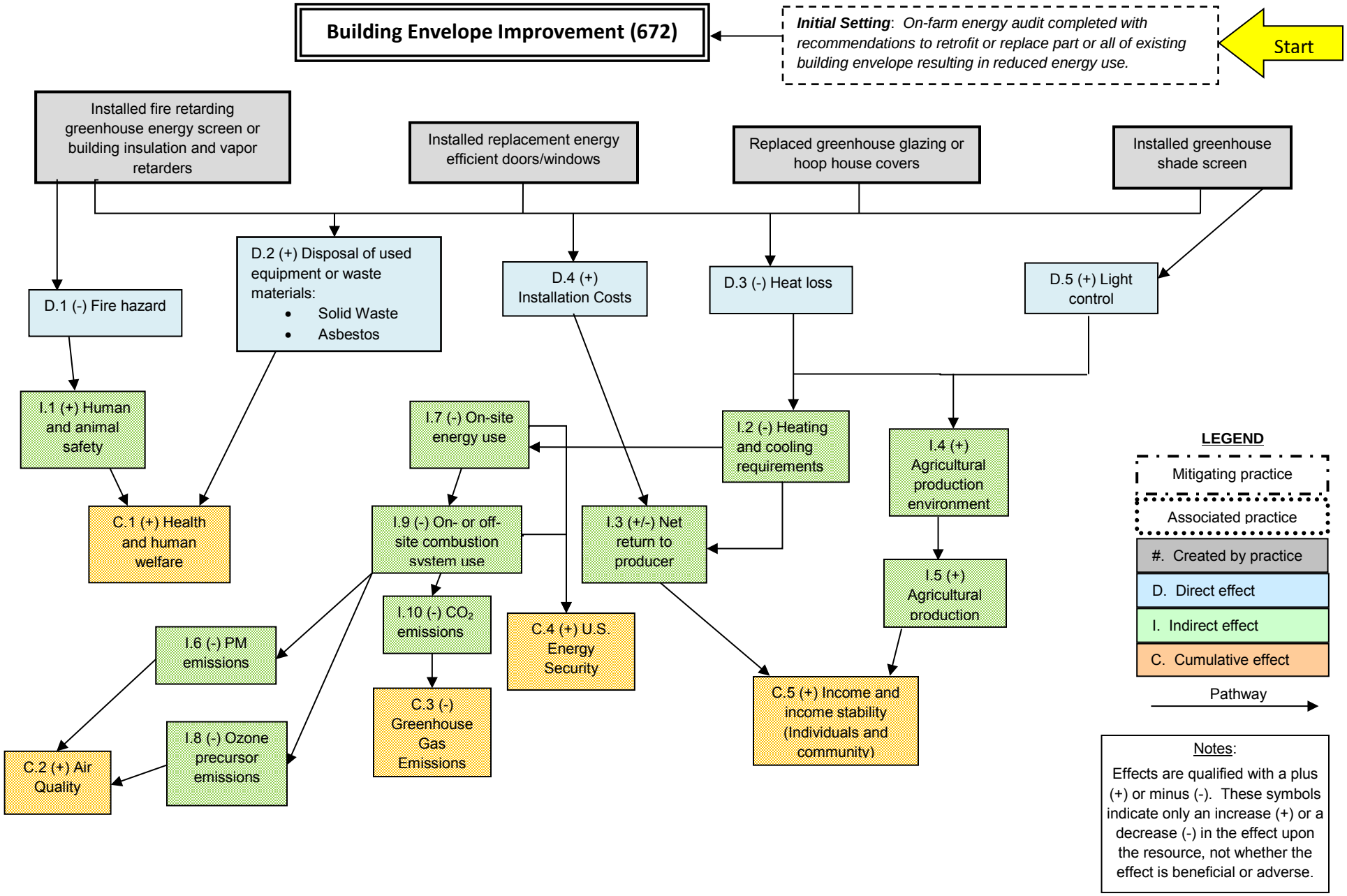
NRCS CONSERVATION PRACTICE EFFECTS - NETWORK DIAGRAM

March 2014





Network Diagram 14


Building Envelope Improvement (672)
Initial Setting: On-farm energy audit completed with recommendations to retrofit or replace part or all of existing building envelope resulting in reduced energy use.
Start
Installed fire retarding greenhouse energy screen or building insulation and vapor retarders
Installed replacement energy efficient doors/windows
Replaced greenhouse glazing or hoop house covers
Installed greenhouse shade screen
D.1 (-) Fire hazard
D.2 (+) Disposal of used equipment or waste materials:
• Solid Waste
• Asbestos
D.4 (+) Installation Costs
D.3 (-) Heat loss
D.5 (+) Light control
I.1 (+) Human and animal safety
I.7 (-) On-site energy use
I.2 (-) Heating and cooling requirements
I.4 (+) Agricultural production environment
C.1 (+) Health and human welfare
I.9 (-) On- or off-site combustion system use
I.3 (+/-) Net return to producer
I.5 (+) Agricultural production
I.10 (-) CO_2 emissions
C.4 (+) U.S. Energy Security
I.6 (-) PM emissions
C.3 (-) Greenhouse Gas Emissions
C.5 (+) Income and income stability (Individuals and community)
I.8 (-) Ozone precursor emissions
C.2 (+) Air Quality
LEGEND
Mitigating practice
Associated practice
#. Created by practice
D. Direct effect
I. Indirect effect
C. Cumulative effect
Pathway
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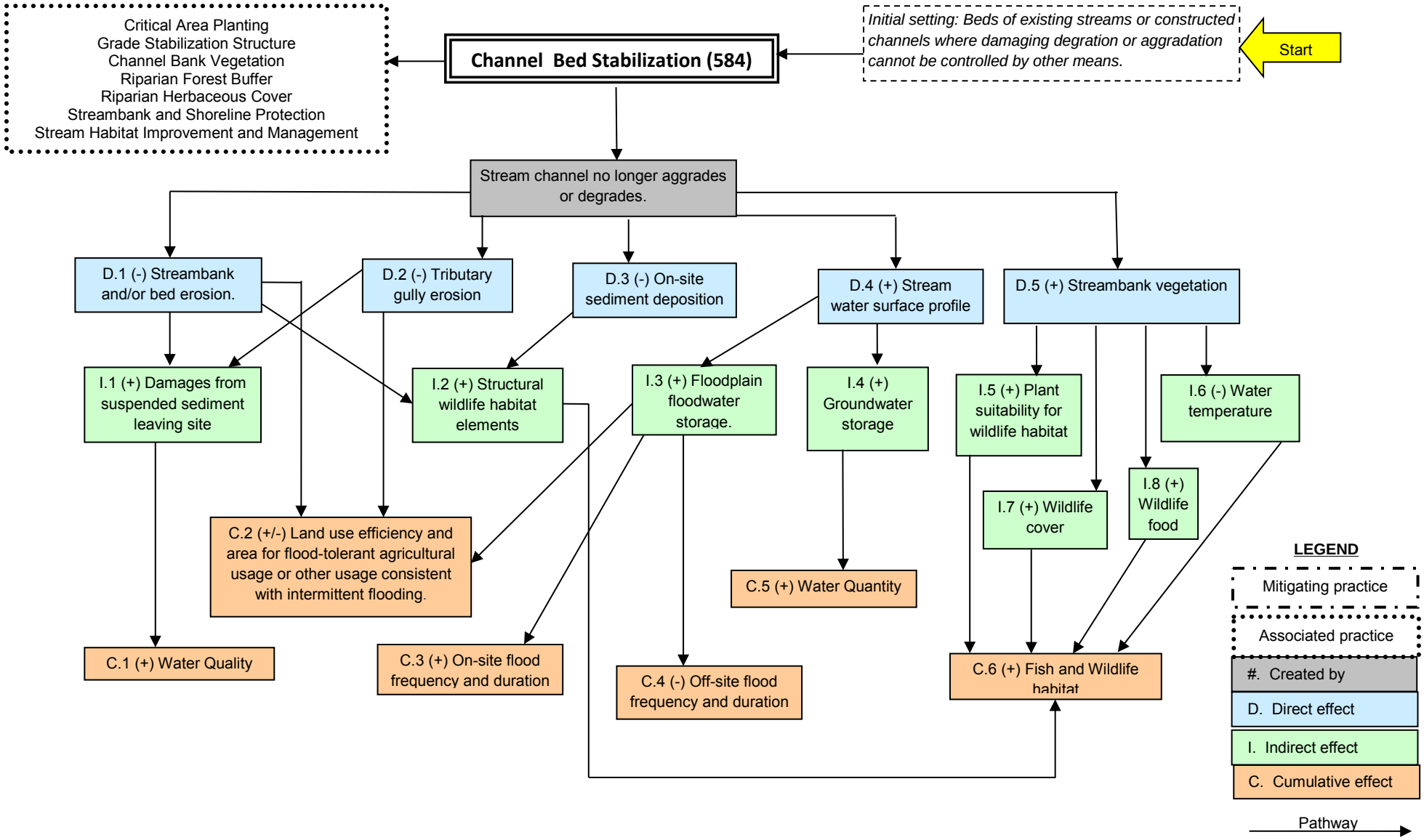

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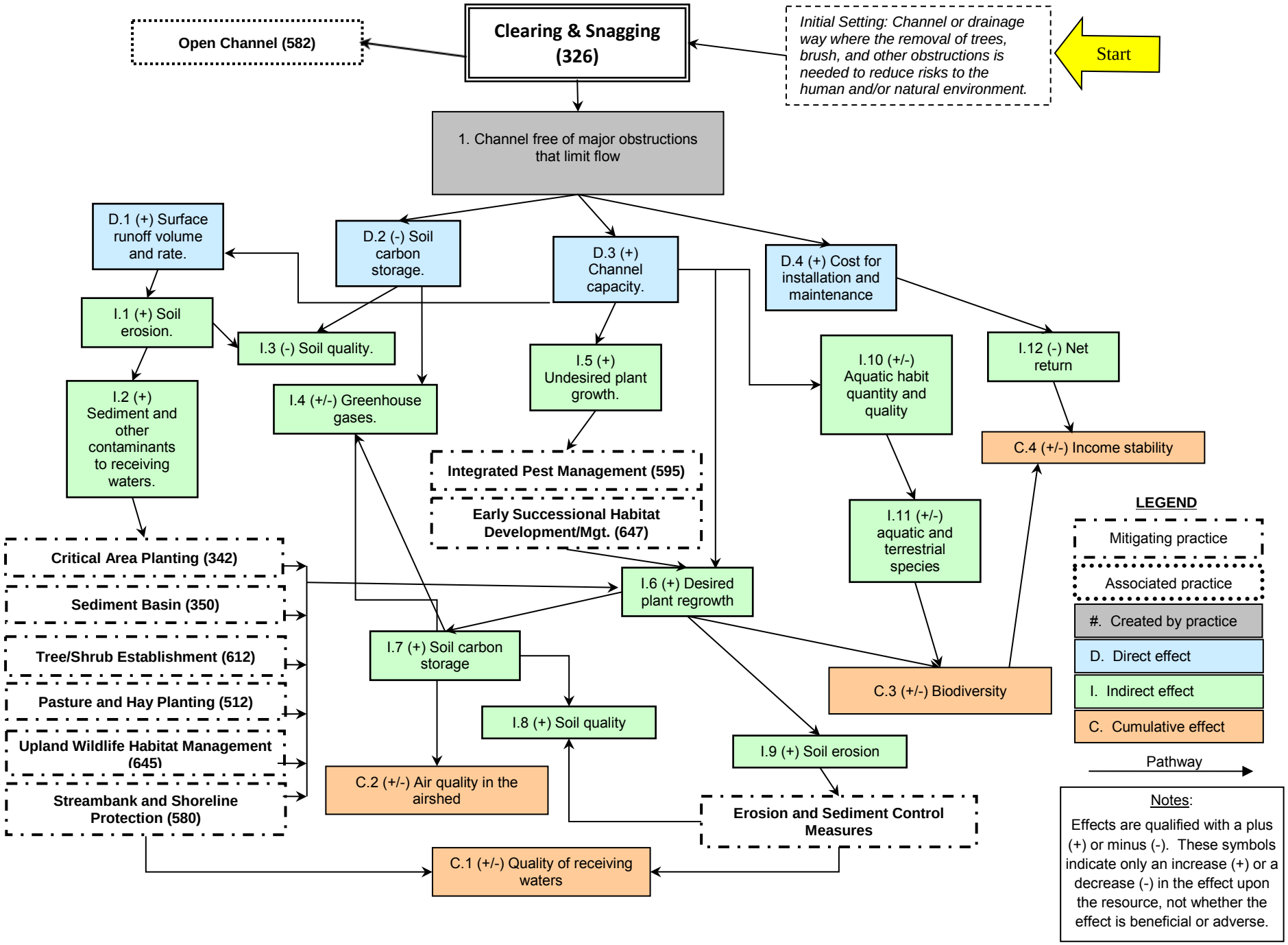
Network Diagram 16


Clearing & Snagging (326)
Open Channel (582)
Initial Setting: Channel or drainage way where the removal of trees, brush, and other obstructions is needed to reduce risks to the human and/or natural environment.
Start
1. Channel free of major obstructions that limit flow
D.1 (+) Surface runoff volume and rate.
D.2 (-) Soil carbon storage.
D.3 (+) Channel capacity.
D.4 (+) Cost for installation and maintenance
I.1 (+) Soil erosion.
I.3 (-) Soil quality.
I.5 (+) Undesired plant growth.
I.10 (+/-) Aquatic habit quantity and quality
I.12 (-) Net return
I.2 (+) Sediment and other contaminants to receiving waters.
I.4 (+/-) Greenhouse gases.
C.4 (+/-) Income stability
Integrated Pest Management (595)
Early Successional Habitat Development/Mgt. (647)
I.11 (+/-) aquatic and terrestrial species
Critical Area Planting (342)
Sediment Basin (350)
Tree/Shrub Establishment (612)
Pasture and Hay Planting (512)
Upland Wildlife Habitat Management (645)
Streambank and Shoreline Protection (580)
I.6 (+) Desired plant regrowth
I.7 (+) Soil carbon storage
C.3 (+/-) Biodiversity
I.8 (+) Soil quality
I.9 (+) Soil erosion
C.2 (+/-) Air quality in the airshed
Erosion and Sediment Control Measures
C.1 (+/-) Quality of receiving waters
LEGEND
Mitigating practice
Associated practice
#. Created by practice
D. Direct effect
I. Indirect effect
C. Cumulative effect
Pathway
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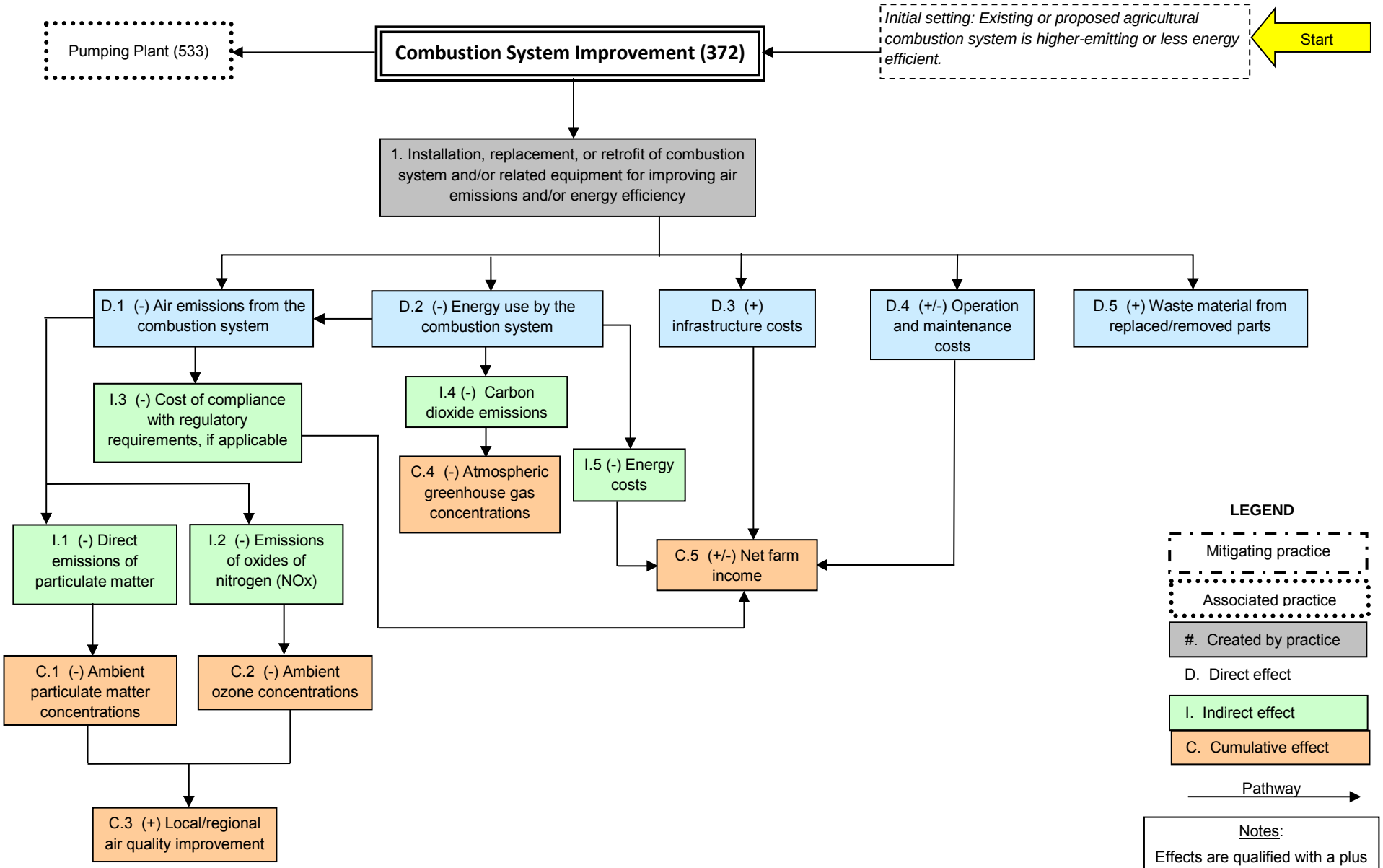

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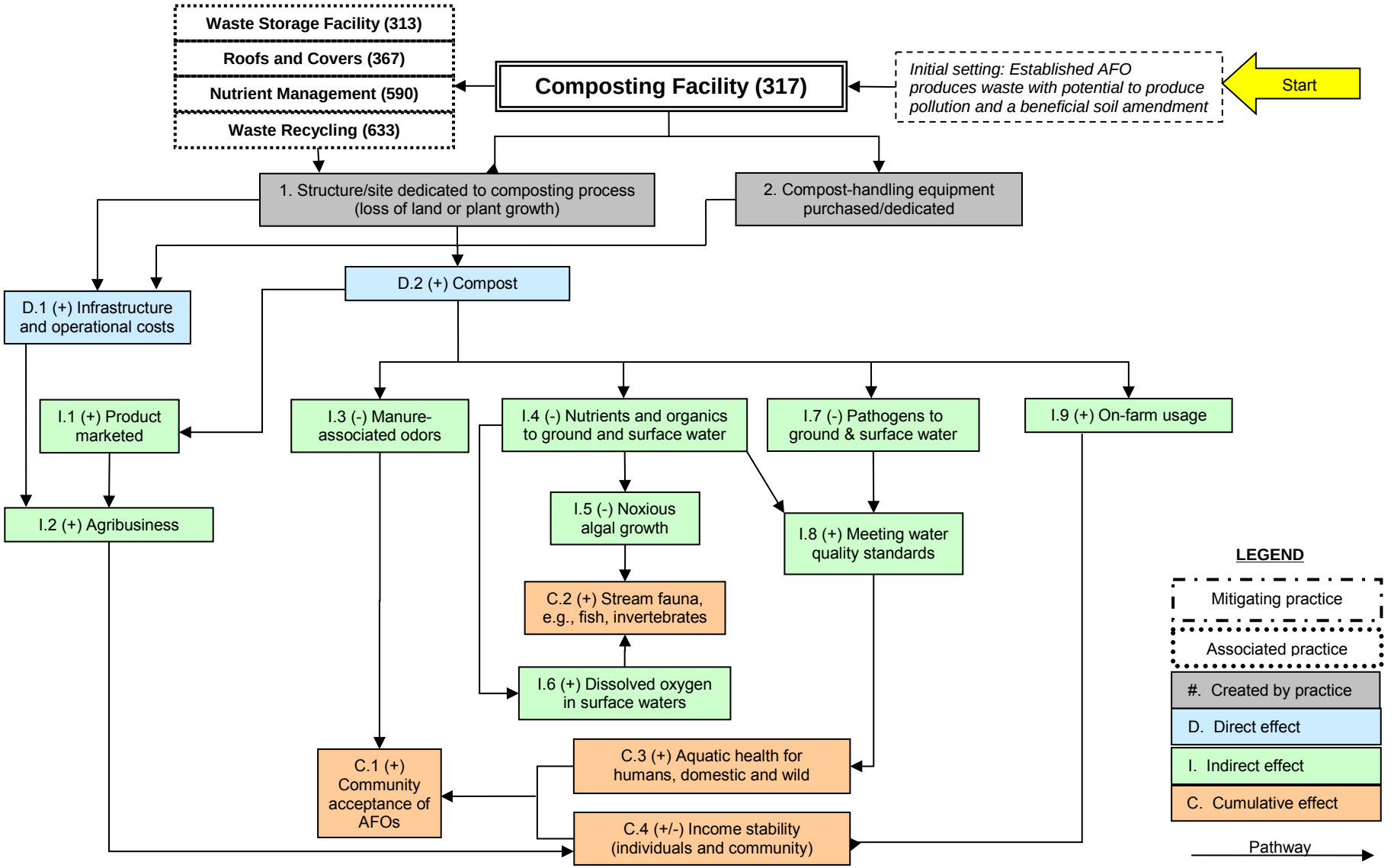

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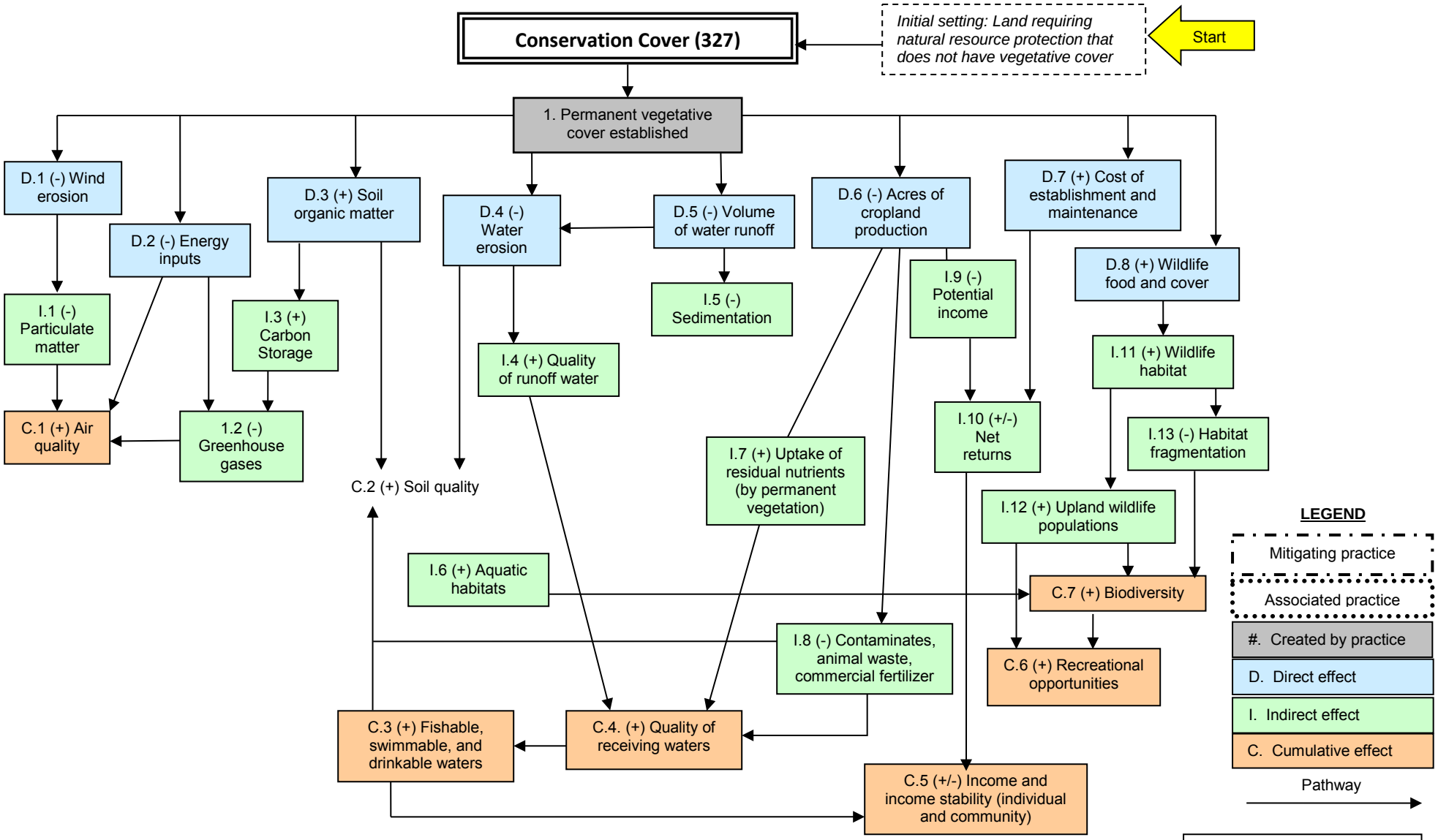

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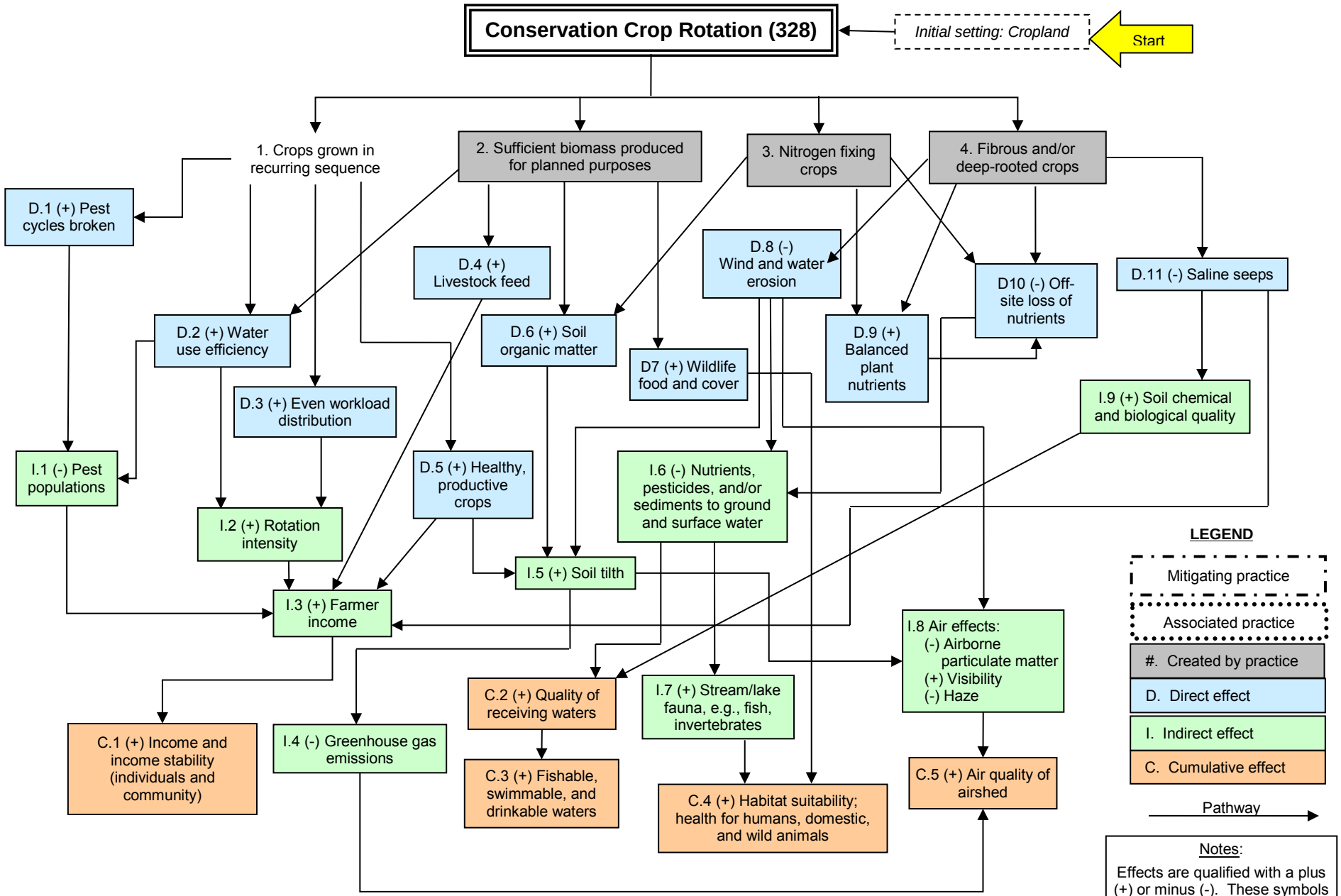
Conservation Crop Rotation (328)
Initial setting: Cropland
Start
1. Crops grown in recurring sequence
2. Sufficient biomass produced for planned purposes
3. Nitrogen fixing crops
4. Fibrous and/or deep-rooted crops
D.1 (+) Pest cycles broken
D.2 (+) Water use efficiency
D.3 (+) Even workload distribution
D.4 (+) Livestock feed
D.5 (+) Healthy, productive crops
D.6 (+) Soil organic matter
D7 (+) Wildlife food and cover
D.8 (-) Wind and water erosion
D.9 (+) Balanced plant nutrients
D10 (-) Off-site loss of nutrients
D.11 (-) Saline seeps
I.1 (-) Pest populations
I.2 (+) Rotation intensity
I.3 (+) Farmer income
I.4 (-) Greenhouse gas emissions
I.5 (+) Soil tilth
I.6 (-) Nutrients, pesticides, and/or sediments to ground and surface water
I.7 (+) Stream/lake fauna, e.g., fish, invertebrates
I.8 Air effects: (-) Airborne particulate matter (+) Visibility (-) Haze
I.9 (+) Soil chemical and biological quality
C.1 (+) Income and income stability (individuals and community)
C.2 (+) Quality of receiving waters
C.3 (+) Fishable, swimmable, and drinkable waters
C.4 (+) Habitat suitability; health for humans, domestic, and wild animals
C.5 (+) Air quality of airshed
LEGEND
Mitigating practice
Associated practice
#. Created by practice
D. Direct effect
I. Indirect effect
C. Cumulative effect
Pathway
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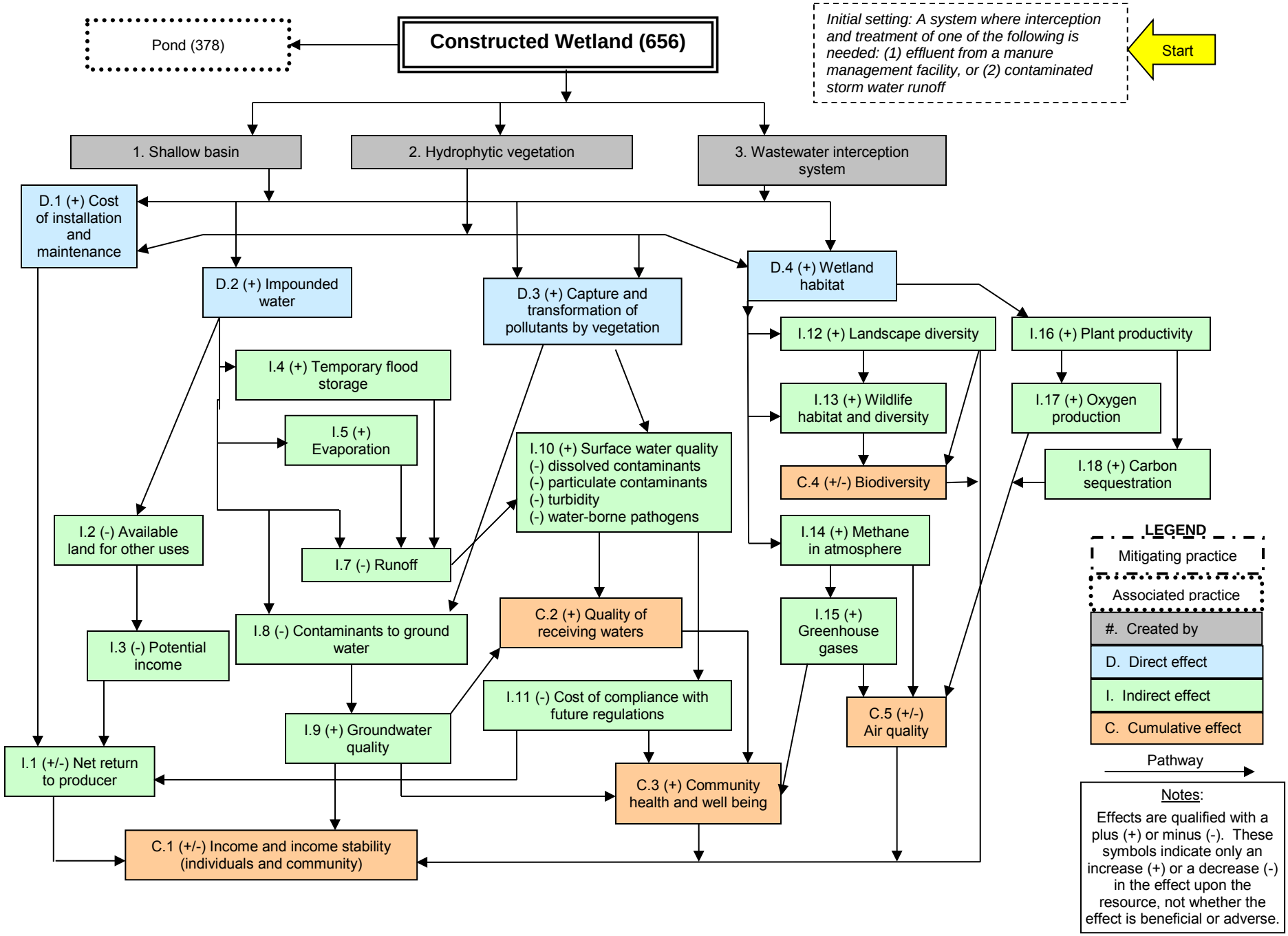
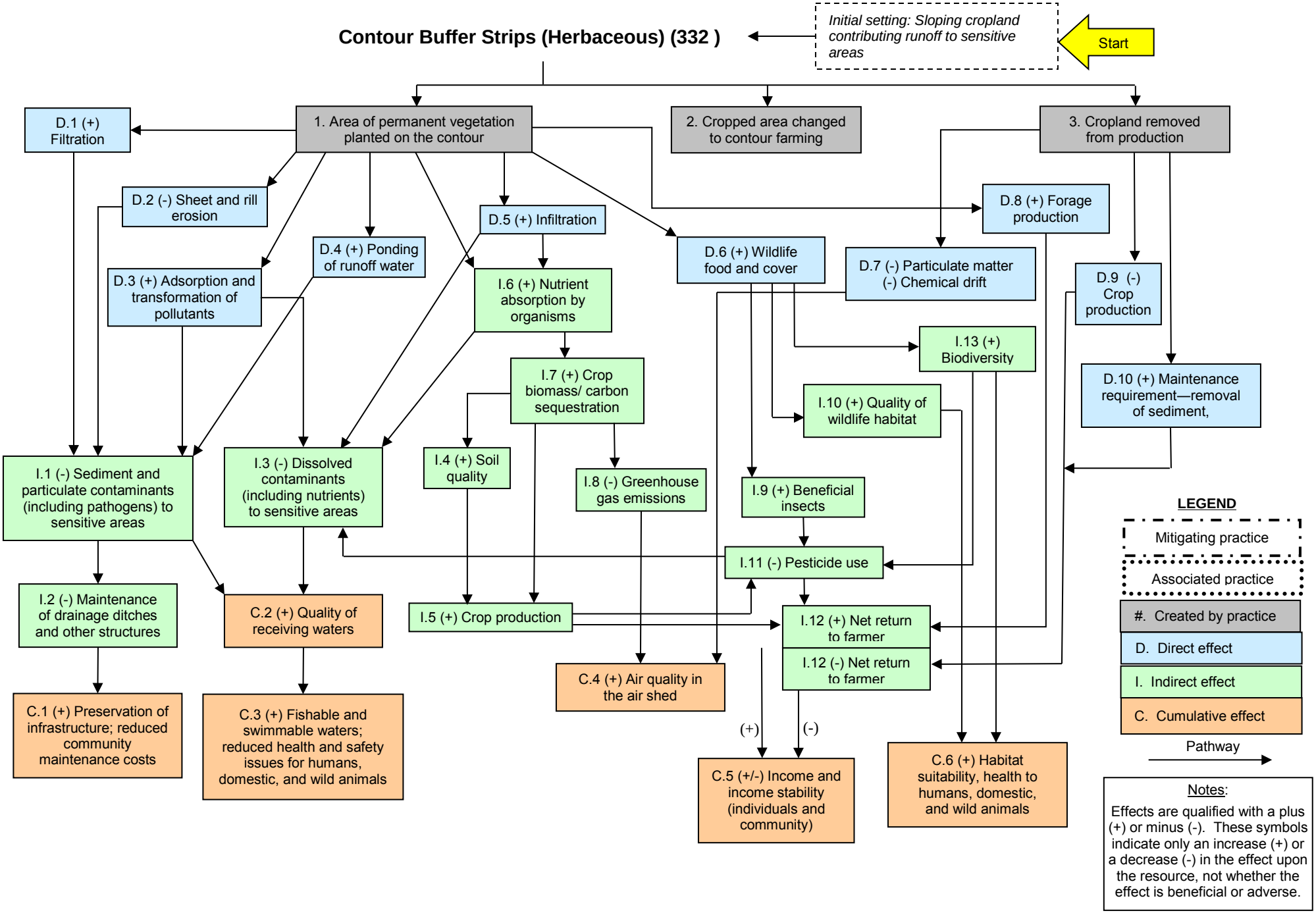


Network Diagram 22


Contour Buffer Strips (Herbaceous) (332)
Initial setting: Sloping cropland contributing runoff to sensitive areas
Start
1. Area of permanent vegetation planted on the contour
2. Cropped area changed to contour farming
3. Cropland removed from production
D.1 (+) Filtration
D.2 (-) Sheet and rill erosion
D.3 (+) Adsorption and transformation of pollutants
D.4 (+) Ponding of runoff water
D.5 (+) Infiltration
D.6 (+) Wildlife food and cover
D.7 (-) Particulate matter (-) Chemical drift
D.8 (+) Forage production
D.9 (-) Crop production
D.10 (+) Maintenance requirement—removal of sediment,
I.1 (-) Sediment and particulate contaminants (including pathogens) to sensitive areas
I.2 (-) Maintenance of drainage ditches and other structures
I.3 (-) Dissolved contaminants (including nutrients) to sensitive areas
I.4 (+) Soil quality
I.5 (+) Crop production
I.6 (+) Nutrient absorption by organisms
I.7 (+) Crop biomass/ carbon sequestration
I.8 (-) Greenhouse gas emissions
I.9 (+) Beneficial insects
I.10 (+) Quality of wildlife habitat
I.11 (-) Pesticide use
I.12 (+) Net return to farmer
I.12 (-) Net return to farmer
I.13 (+) Biodiversity
C.1 (+) Preservation of infrastructure; reduced community maintenance costs
C.2 (+) Quality of receiving waters
C.3 (+) Fishable and swimmable waters; reduced health and safety issues for humans, domestic, and wild animals
C.4 (+) Air quality in the air shed
C.5 (+/-) Income and income stability (individuals and community)
C.6 (+) Habitat suitability, health to humans, domestic, and wild animals
(+)
(-)
LEGEND
Mitigating practice
Associated practice
#. Created by practice
D. Direct effect
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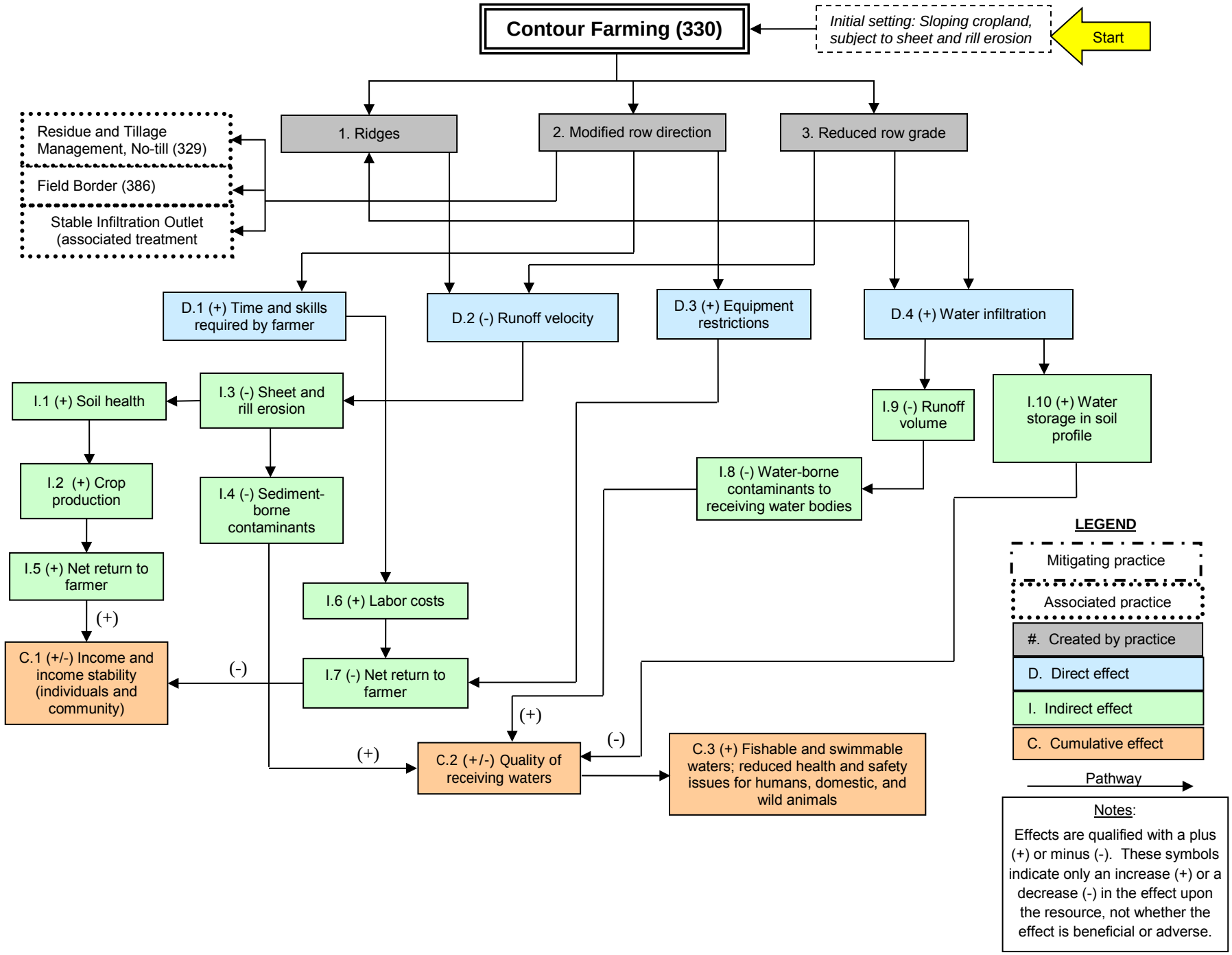
Contour Farming (330)
Initial setting: Sloping cropland, subject to sheet and rill erosion
Start
Residue and Tillage Management, No-till (329)
Field Border (386)
Stable Infiltration Outlet (associated treatment
1. Ridges
2. Modified row direction
3. Reduced row grade
D.1 (+) Time and skills required by farmer
D.2 (-) Runoff velocity
D.3 (+) Equipment restrictions
D.4 (+) Water infiltration
I.1 (+) Soil health
I.3 (-) Sheet and rill erosion
I.9 (-) Runoff volume
I.10 (+) Water storage in soil profile
I.2 (+) Crop production
I.4 (-) Sediment-borne contaminants
I.8 (-) Water-borne contaminants to receiving water bodies
I.5 (+) Net return to farmer
I.6 (+) Labor costs
(+)
C.1 (+/-) Income and income stability (individuals and community)
(-)
I.7 (-) Net return to farmer
(+)
(-)
(+)
C.2 (+/-) Quality of receiving waters
C.3 (+) Fishable and swimmable waters; reduced health and safety issues for humans, domestic, and wild animals
LEGEND
Mitigating practice
Associated practice
#. Created by practice
D. Direct effect
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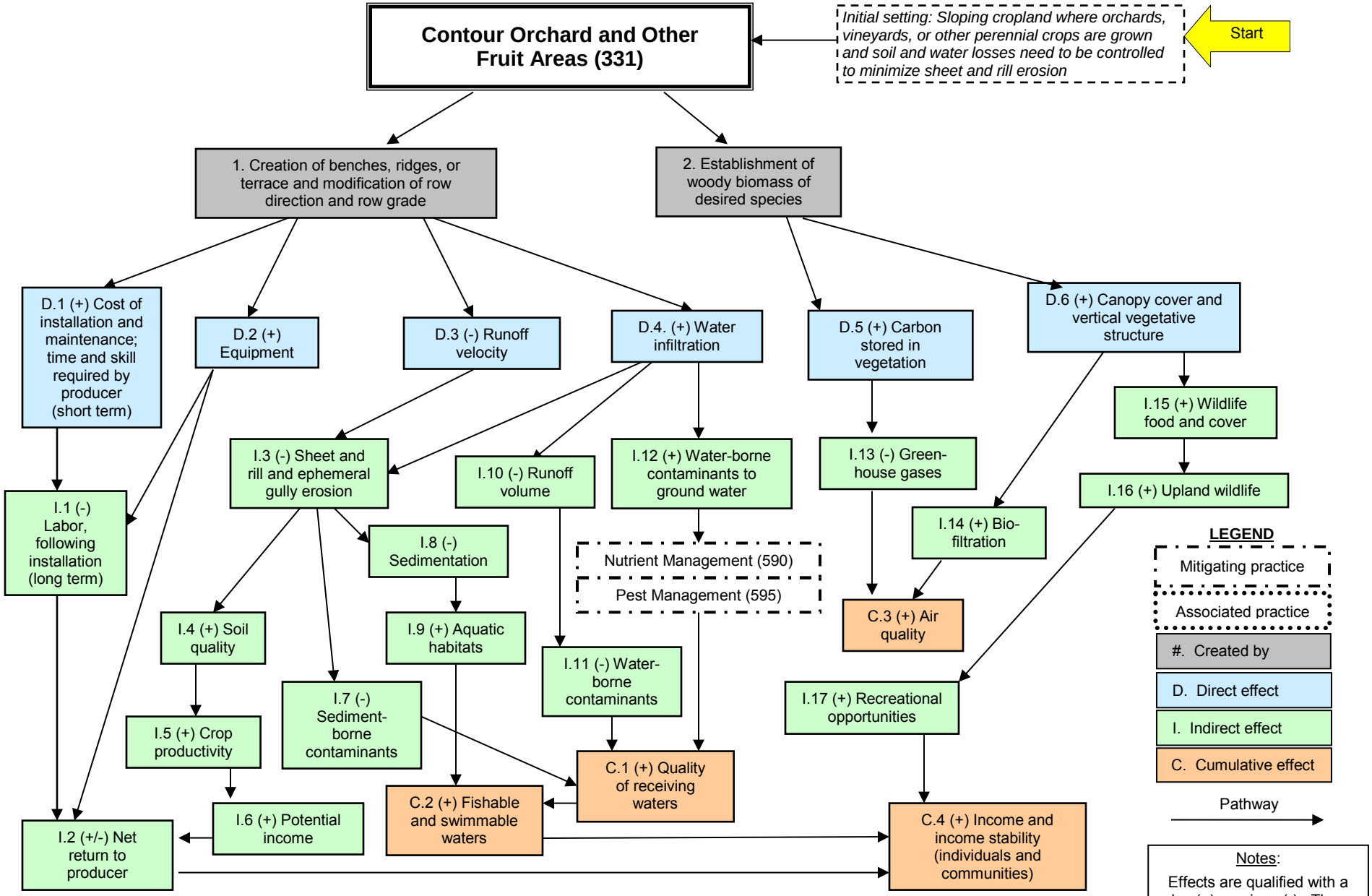

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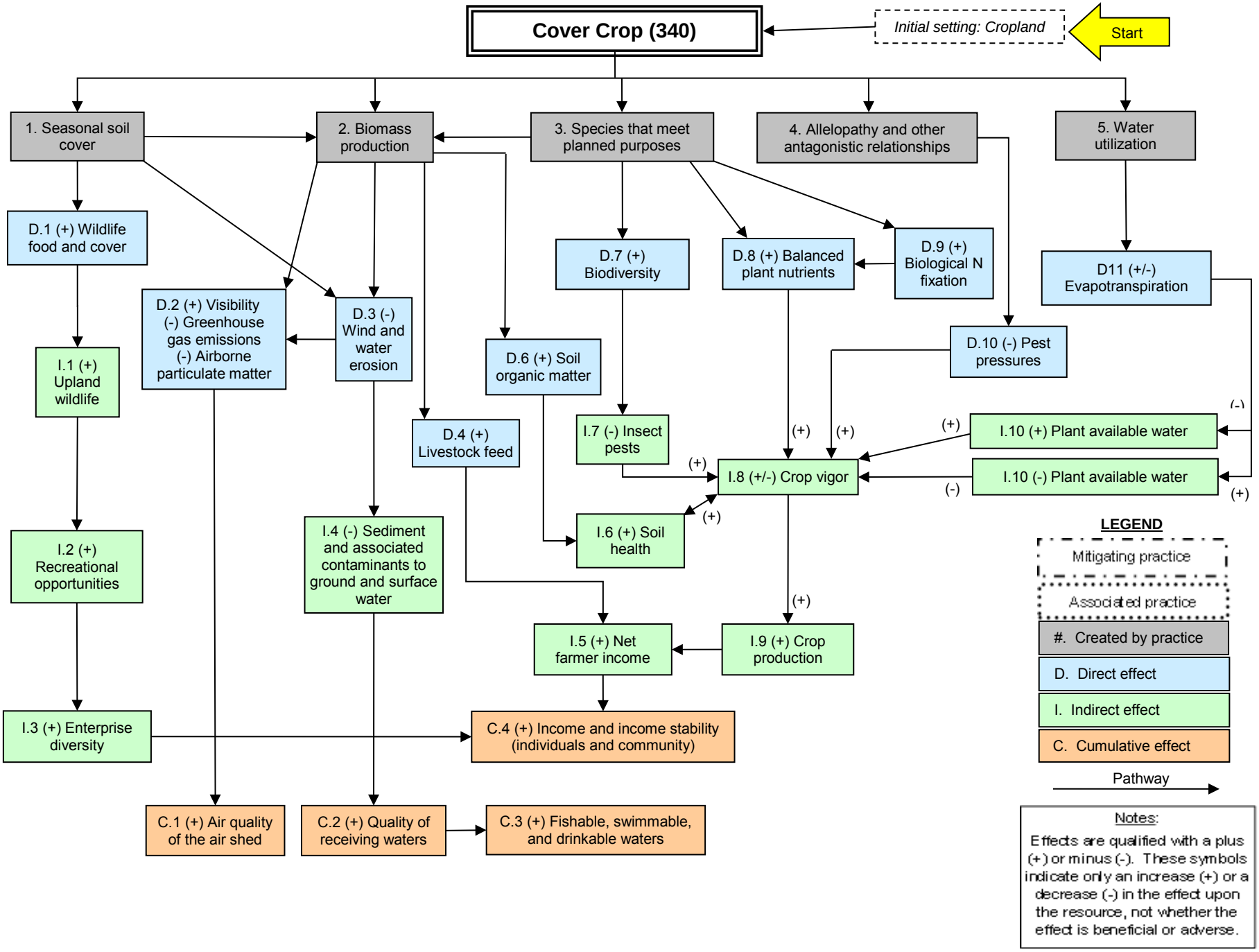
Cover Crop (340)
Initial setting: Cropland
Start
1. Seasonal soil cover
2. Biomass production
3. Species that meet planned purposes
4. Allelopathy and other antagonistic relationships
5. Water utilization
D.1 (+) Wildlife food and cover
D.2 (+) Visibility (-) Greenhouse gas emissions (-) Airborne particulate matter
D.3 (-) Wind and water erosion
D.4 (+) Livestock feed
D.6 (+) Soil organic matter
D.7 (+) Biodiversity
D.8 (+) Balanced plant nutrients
D.9 (+) Biological N fixation
D.10 (-) Pest pressures
D11 (+/-) Evapotranspiration
I.1 (+) Upland wildlife
I.2 (+) Recreational opportunities
I.3 (+) Enterprise diversity
I.4 (-) Sediment and associated contaminants to ground and surface water
I.5 (+) Net farmer income
I.6 (+) Soil health
I.7 (-) Insect pests
I.8 (+/-) Crop vigor
I.9 (+) Crop production
I.10 (+) Plant available water
I.10 (-) Plant available water
C.1 (+) Air quality of the air shed
C.2 (+) Quality of receiving waters
C.3 (+) Fishable, swimmable, and drinkable waters
C.4 (+) Income and income stability (individuals and community)
LEGEND
Mitigating practice
Associated practice
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D. Direct effect
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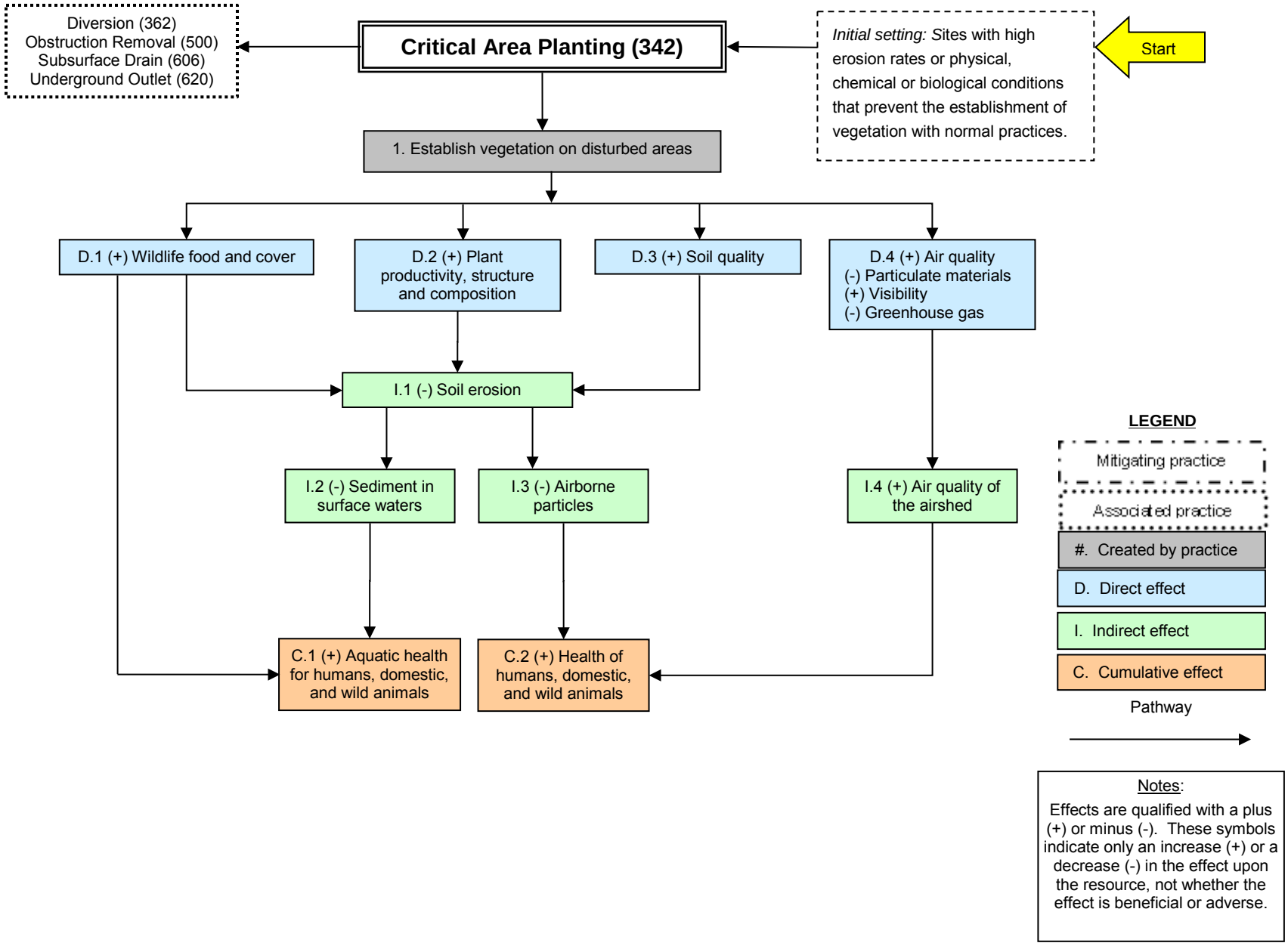

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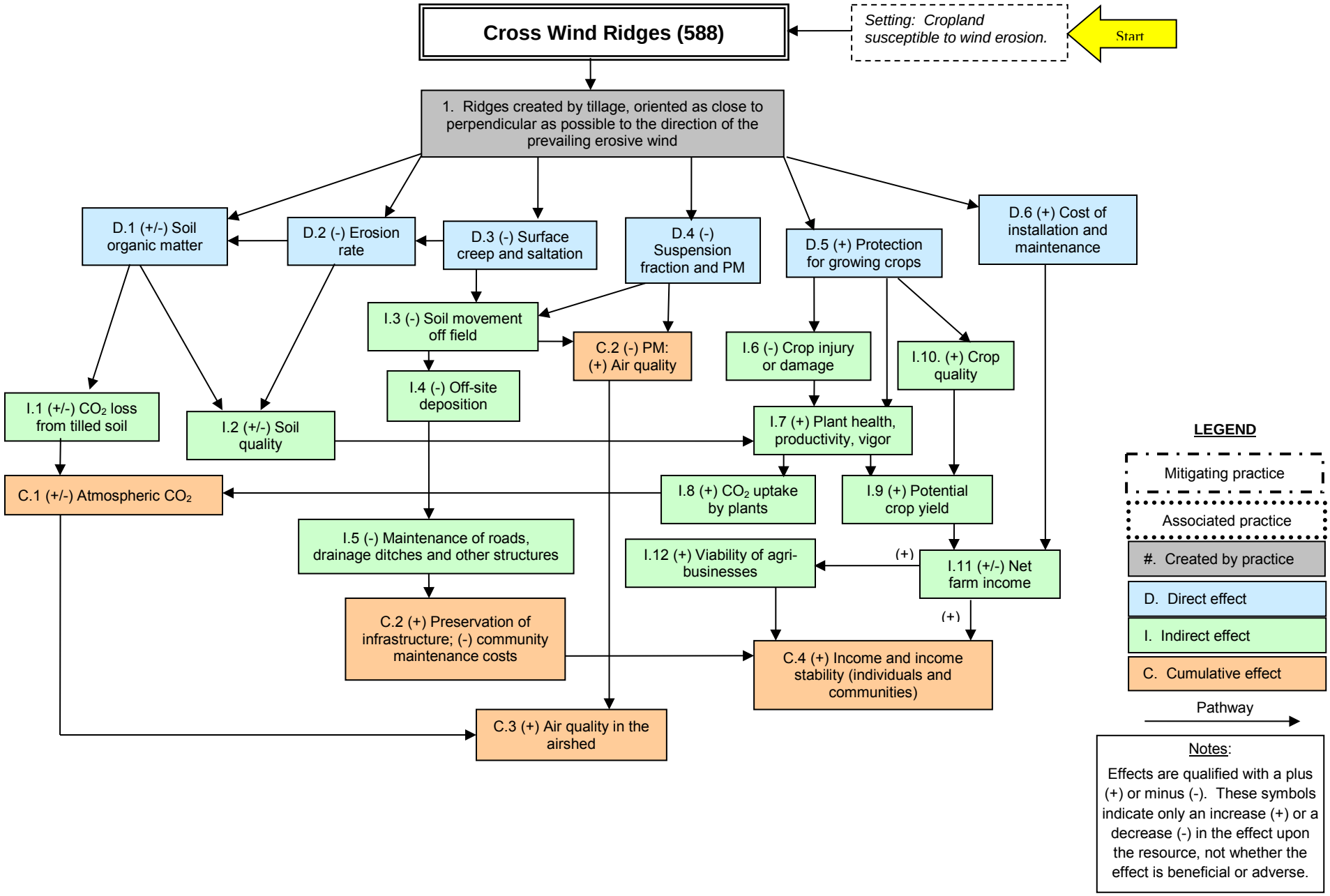

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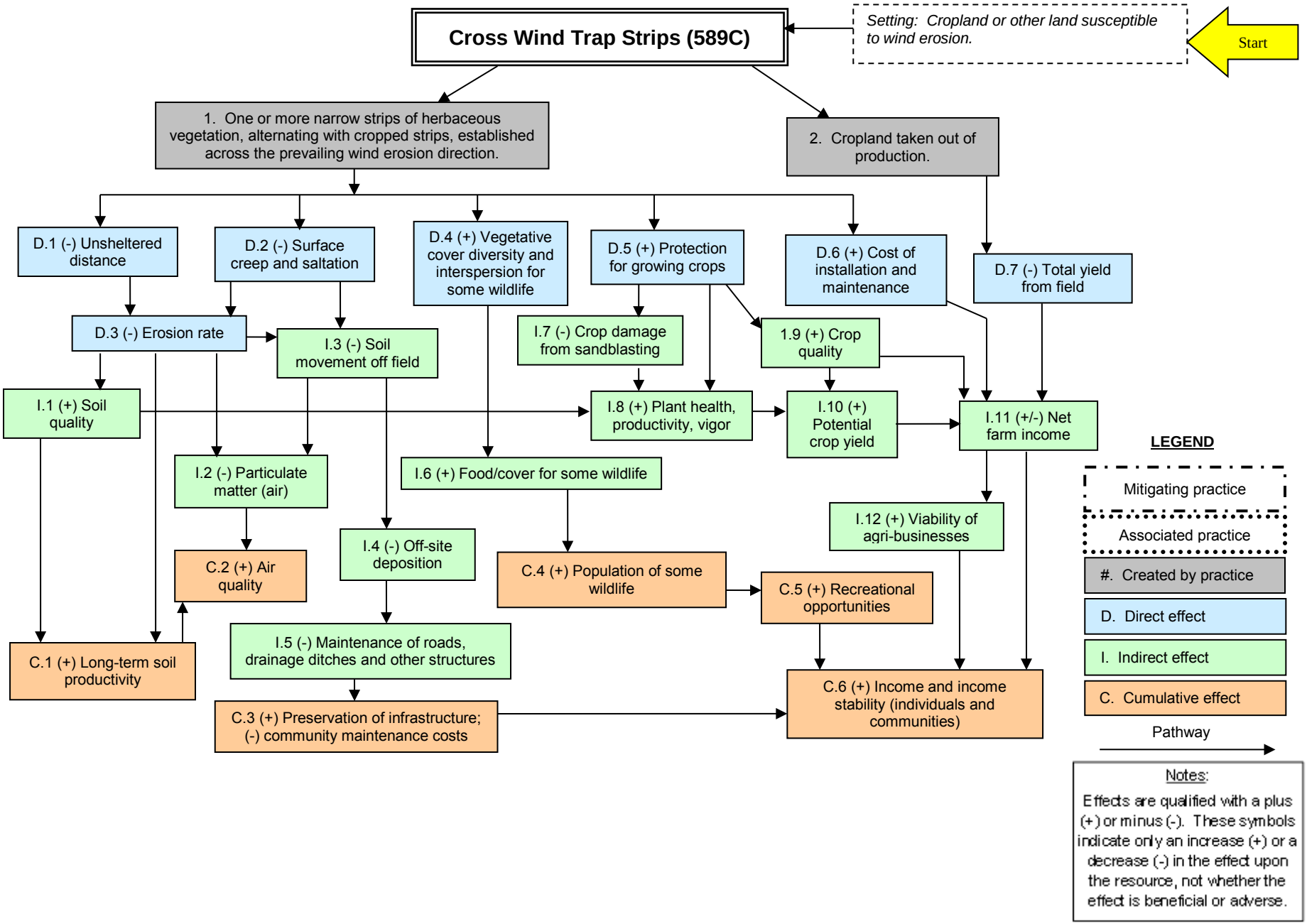
Cross Wind Trap Strips (589C)
Setting: Cropland or other land susceptible to wind erosion.
Start
1. One or more narrow strips of herbaceous vegetation, alternating with cropped strips, established across the prevailing wind erosion direction.
2. Cropland taken out of production.
D.1 (-) Unsheltered distance
D.2 (-) Surface creep and saltation
D.4 (+) Vegetative cover diversity and interspersion for some wildlife
D.5 (+) Protection for growing crops
D.6 (+) Cost of installation and maintenance
D.7 (-) Total yield from field
D.3 (-) Erosion rate
I.3 (-) Soil movement off field
I.7 (-) Crop damage from sandblasting
1.9 (+) Crop quality
I.1 (+) Soil quality
I.8 (+) Plant health, productivity, vigor
I.10 (+) Potential crop yield
I.11 (+/-) Net farm income
I.2 (-) Particulate matter (air)
I.6 (+) Food/cover for some wildlife
I.12 (+) Viability of agri-businesses
I.4 (-) Off-site deposition
C.2 (+) Air quality
C.4 (+) Population of some wildlife
C.5 (+) Recreational opportunities
I.5 (-) Maintenance of roads, drainage ditches and other structures
C.1 (+) Long-term soil productivity
C.3 (+) Preservation of infrastructure; (-) community maintenance costs
C.6 (+) Income and income stability (individuals and communities)
LEGEND
Mitigating practice
Associated practice
#. Created by practice
D. Direct effect
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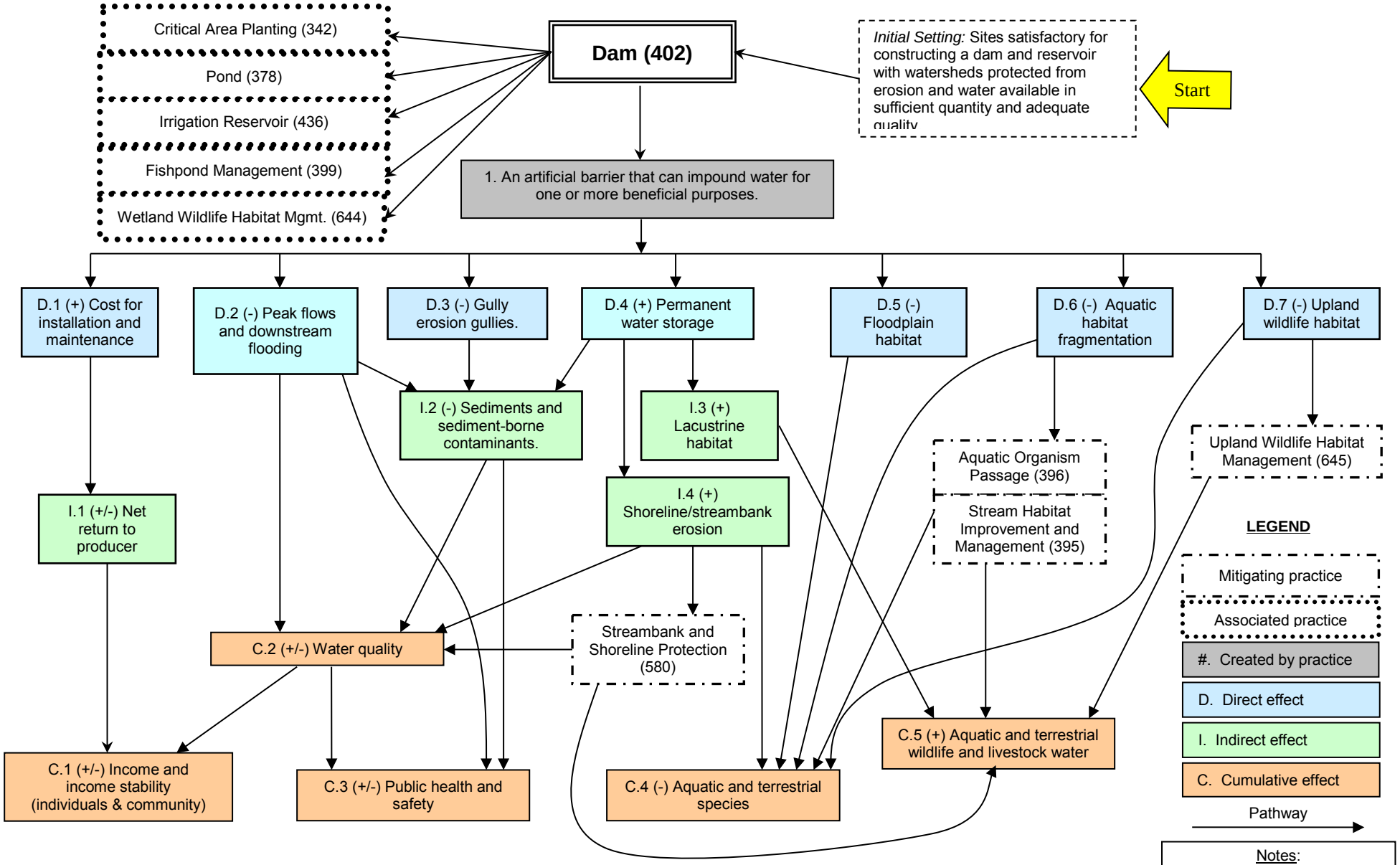

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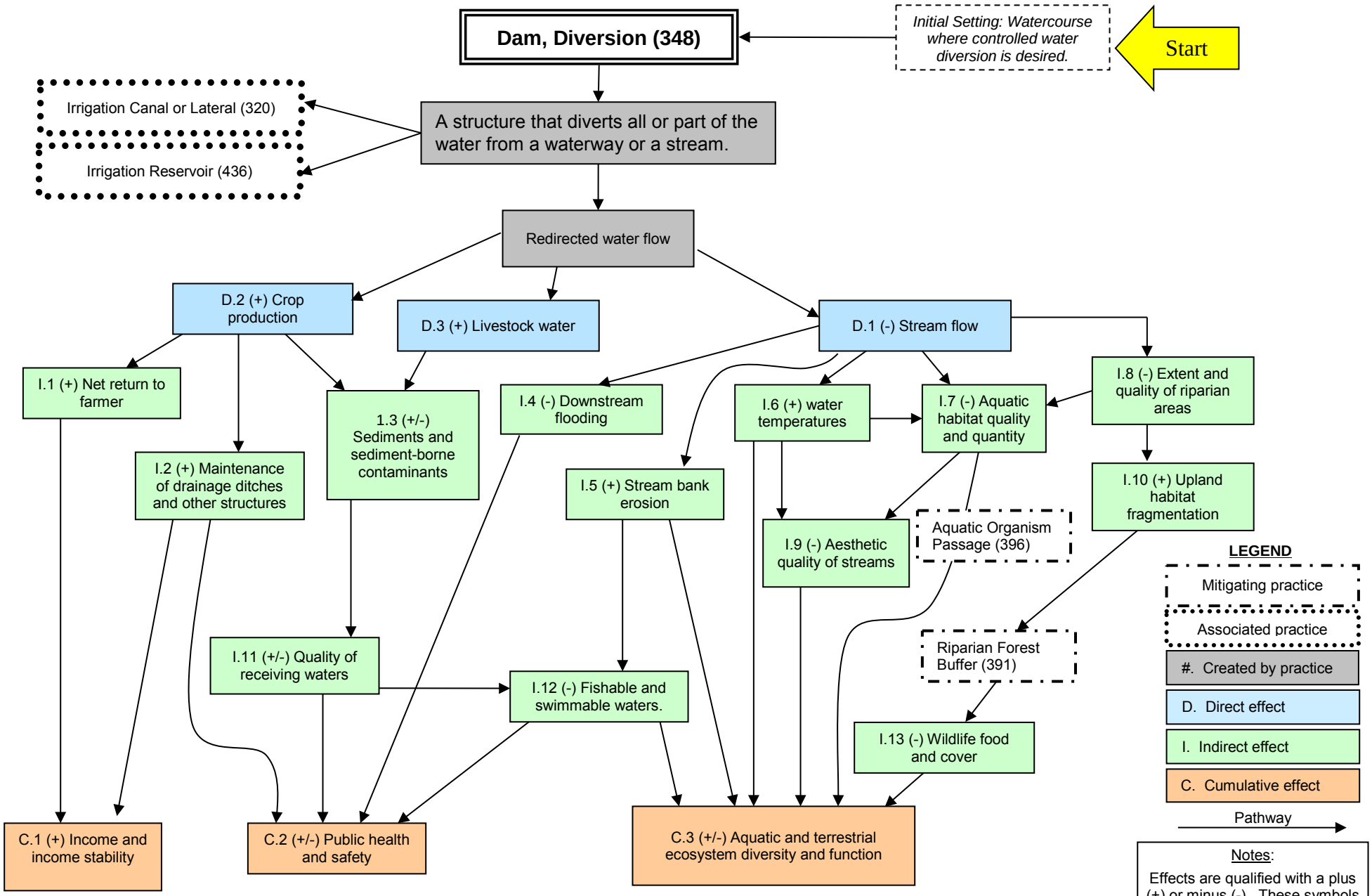
Dam, Diversion (348)
Initial Setting: Watercourse where controlled water diversion is desired.
Start
Irrigation Canal or Lateral (320)
Irrigation Reservoir (436)
A structure that diverts all or part of the water from a waterway or a stream.
Redirected water flow
D.2 (+) Crop production
D.3 (+) Livestock water
D.1 (-) Stream flow
I.1 (+) Net return to farmer
I.2 (+) Maintenance of drainage ditches and other structures
1.3 (+/-) Sediments and sediment-borne contaminants
I.4 (-) Downstream flooding
I.5 (+) Stream bank erosion
I.6 (+) water temperatures
I.7 (-) Aquatic habitat quality and quantity
I.8 (-) Extent and quality of riparian areas
I.9 (-) Aesthetic quality of streams
Aquatic Organism Passage (396)
I.10 (+) Upland habitat fragmentation
Riparian Forest Buffer (391)
I.11 (+/-) Quality of receiving waters
I.12 (-) Fishable and swimmable waters.
I.13 (-) Wildlife food and cover
C.1 (+) Income and income stability
C.2 (+/-) Public health and safety
C.3 (+/-) Aquatic and terrestrial ecosystem diversity and function
LEGEND
Mitigating practice
Associated practice
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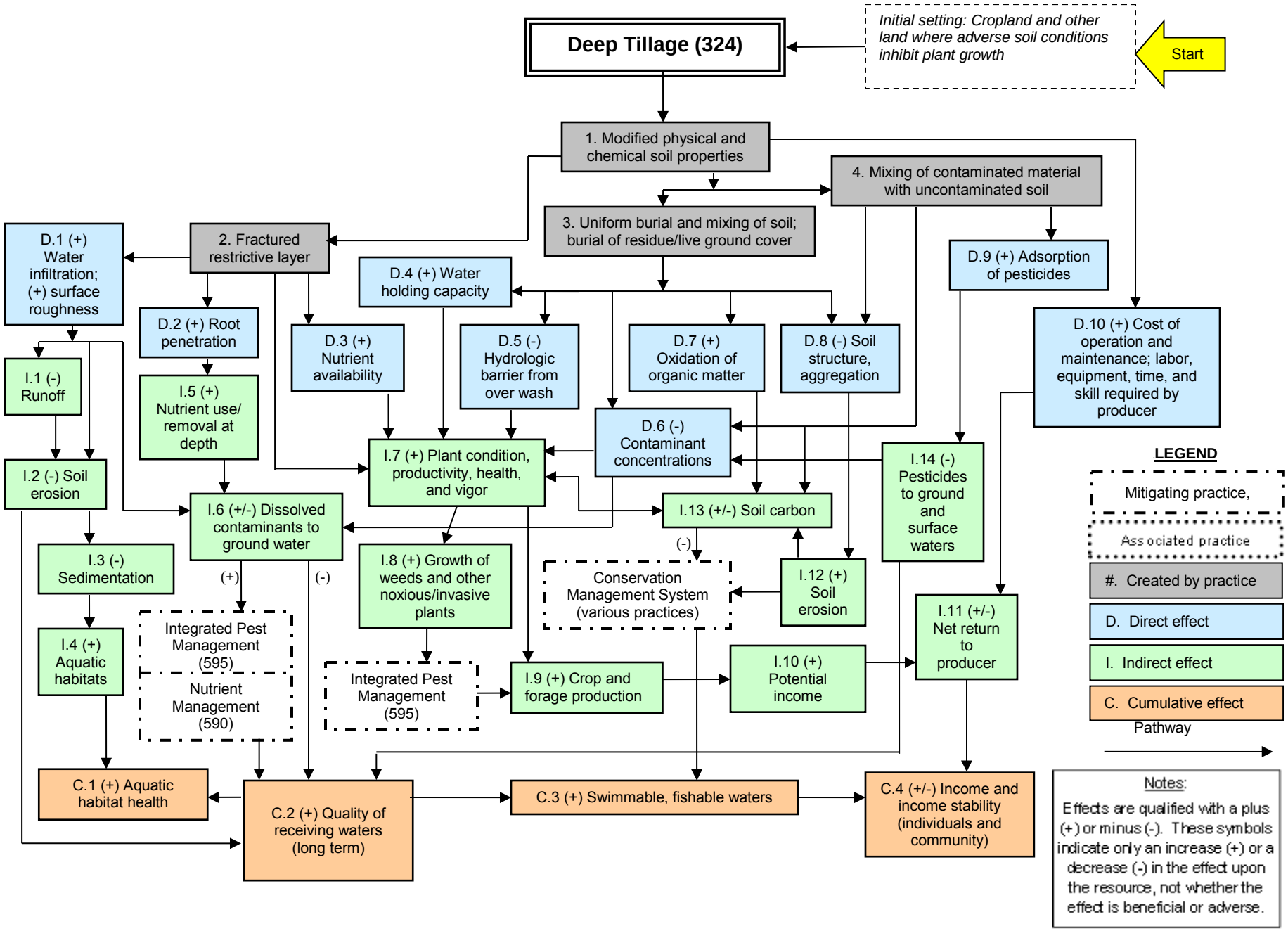
Deep Tillage (324)
Initial setting: Cropland and other land where adverse soil conditions inhibit plant growth
Start
1. Modified physical and chemical soil properties
4. Mixing of contaminated material with uncontaminated soil
3. Uniform burial and mixing of soil; burial of residue/live ground cover
2. Fractured restrictive layer
D.1 (+) Water infiltration; (+) surface roughness
D.2 (+) Root penetration
D.3 (+) Nutrient availability
D.4 (+) Water holding capacity
D.5 (-) Hydrologic barrier from over wash
D.6 (-) Contaminant concentrations
D.7 (+) Oxidation of organic matter
D.8 (-) Soil structure, aggregation
D.9 (+) Adsorption of pesticides
D.10 (+) Cost of operation and maintenance; labor, equipment, time, and skill required by producer
I.1 (-) Runoff
I.2 (-) Soil erosion
I.3 (-) Sedimentation
I.4 (+) Aquatic habitats
I.5 (+) Nutrient use/ removal at depth
I.6 (+/-) Dissolved contaminants to ground water
I.7 (+) Plant condition, productivity, health, and vigor
I.8 (+) Growth of weeds and other noxious/invasive plants
I.9 (+) Crop and forage production
I.10 (+) Potential income
I.11 (+/-) Net return to producer
I.12 (+) Soil erosion
I.13 (+/-) Soil carbon
I.14 (-) Pesticides to ground and surface waters
(+)
(-)
(-)
Integrated Pest Management (595)
Nutrient Management (590)
Integrated Pest Management (595)
Conservation Management System (various practices)
C.1 (+) Aquatic habitat health
C.2 (+) Quality of receiving waters (long term)
C.3 (+) Swimmable, fishable waters
C.4 (+/-) Income and income stability (individuals and community)
LEGEND
Mitigating practice,
Associated practice
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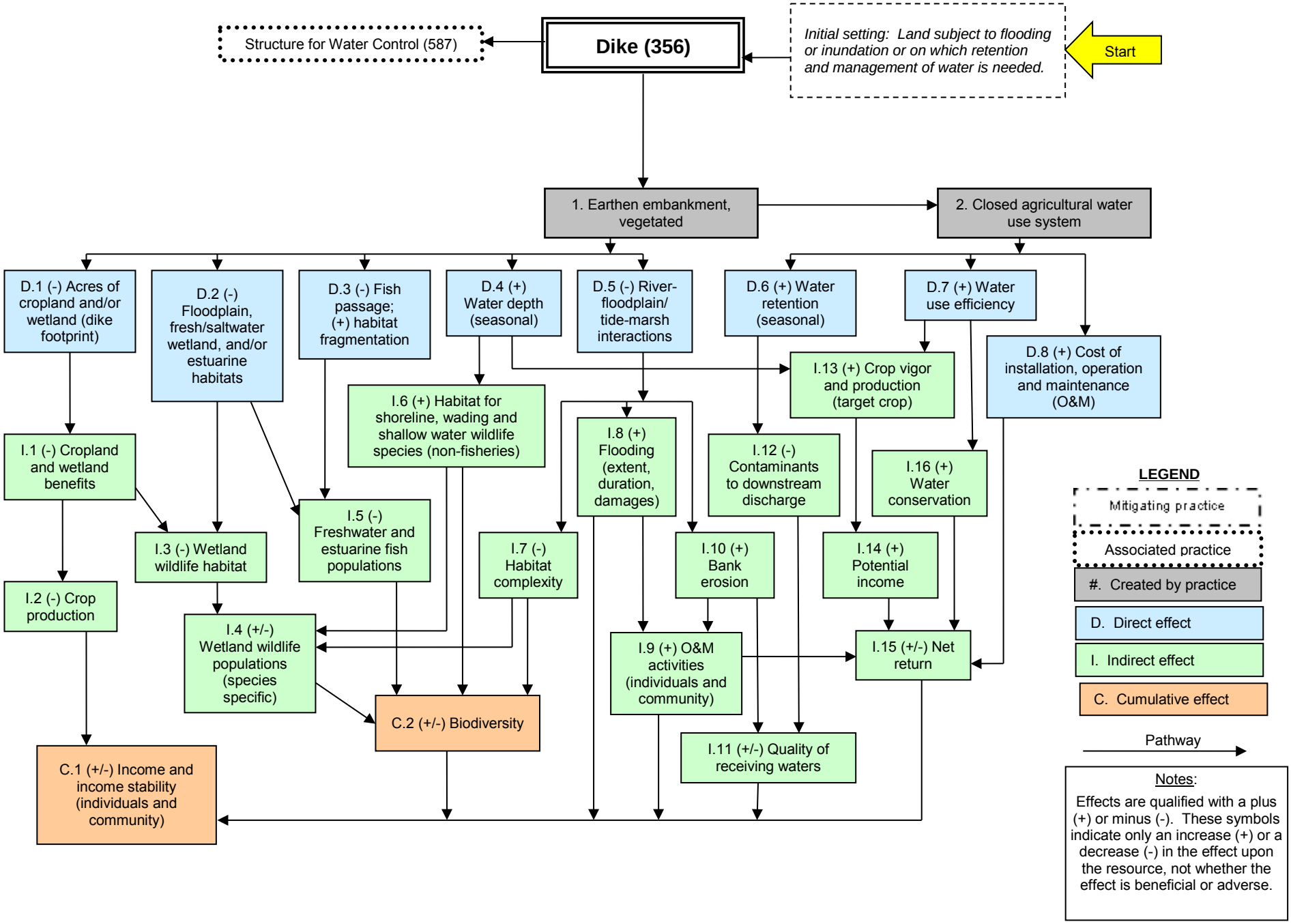
Structure for Water Control (587)
Dike (356)
Initial setting: Land subject to flooding or inundation or on which retention and management of water is needed.
Start
1. Earthen embankment, vegetated
2. Closed agricultural water use system
D.1 (-) Acres of cropland and/or wetland (dike footprint)
D.2 (-) Floodplain, fresh/saltwater wetland, and/or estuarine habitats
D.3 (-) Fish passage; (+) habitat fragmentation
D.4 (+) Water depth (seasonal)
D.5 (-) River-floodplain/ tide-marsh interactions
D.6 (+) Water retention (seasonal)
D.7 (+) Water use efficiency
D.8 (+) Cost of installation, operation and maintenance (O&M)
I.1 (-) Cropland and wetland benefits
I.2 (-) Crop production
I.3 (-) Wetland wildlife habitat
I.4 (+/-) Wetland wildlife populations (species specific)
I.5 (-) Freshwater and estuarine fish populations
I.6 (+) Habitat for shoreline, wading and shallow water wildlife species (non-fisheries)
I.7 (-) Habitat complexity
I.8 (+) Flooding (extent, duration, damages)
I.9 (+) O&M activities (individuals and community)
I.10 (+) Bank erosion
I.11 (+/-) Quality of receiving waters
I.12 (-) Contaminants to downstream discharge
I.13 (+) Crop vigor and production (target crop)
I.14 (+) Potential income
I.15 (+/-) Net return
I.16 (+) Water conservation
C.1 (+/-) Income and income stability (individuals and community)
C.2 (+/-) Biodiversity
LEGEND
Mitigating practice
Associated practice
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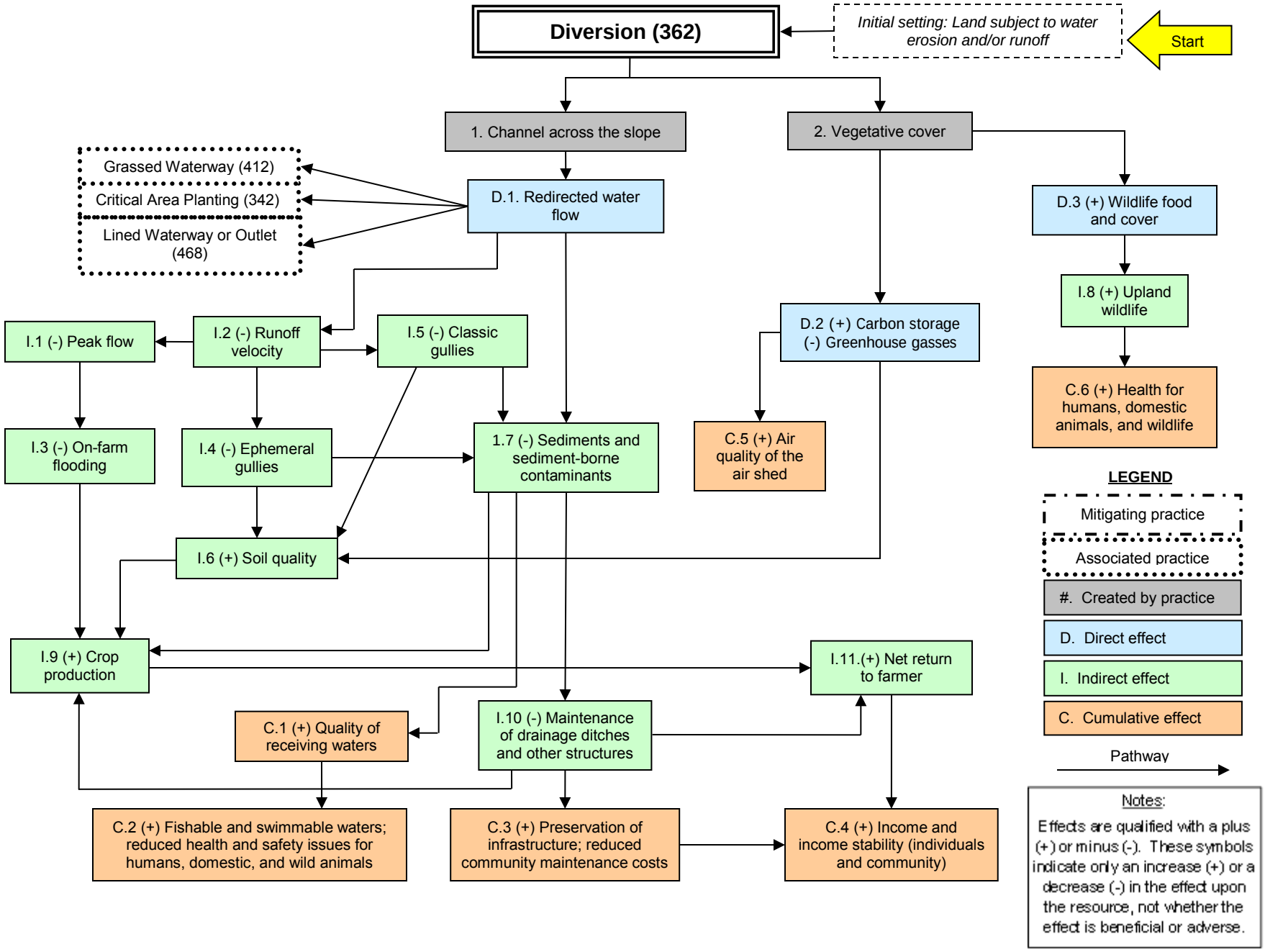
Diversion (362)
Initial setting: Land subject to water erosion and/or runoff
Start
1. Channel across the slope
2. Vegetative cover
Grassed Waterway (412)
Critical Area Planting (342)
Lined Waterway or Outlet (468)
D.1. Redirected water flow
D.3 (+) Wildlife food and cover
I.8 (+) Upland wildlife
C.6 (+) Health for humans, domestic animals, and wildlife
I.1 (-) Peak flow
I.2 (-) Runoff velocity
I.5 (-) Classic gullies
D.2 (+) Carbon storage (-) Greenhouse gasses
I.3 (-) On-farm flooding
I.4 (-) Ephemeral gullies
1.7 (-) Sediments and sediment-borne contaminants
C.5 (+) Air quality of the air shed
I.6 (+) Soil quality
I.9 (+) Crop production
I.11.(+) Net return to farmer
C.1 (+) Quality of receiving waters
I.10 (-) Maintenance of drainage ditches and other structures
C.2 (+) Fishable and swimmable waters; reduced health and safety issues for humans, domestic, and wild animals
C.3 (+) Preservation of infrastructure; reduced community maintenance costs
C.4 (+) Income and income stability (individuals and community)
LEGEND
Mitigating practice
Associated practice
#. Created by practice
D. Direct effect
I. Indirect effect
C. Cumulative effect
Pathway
Notes:
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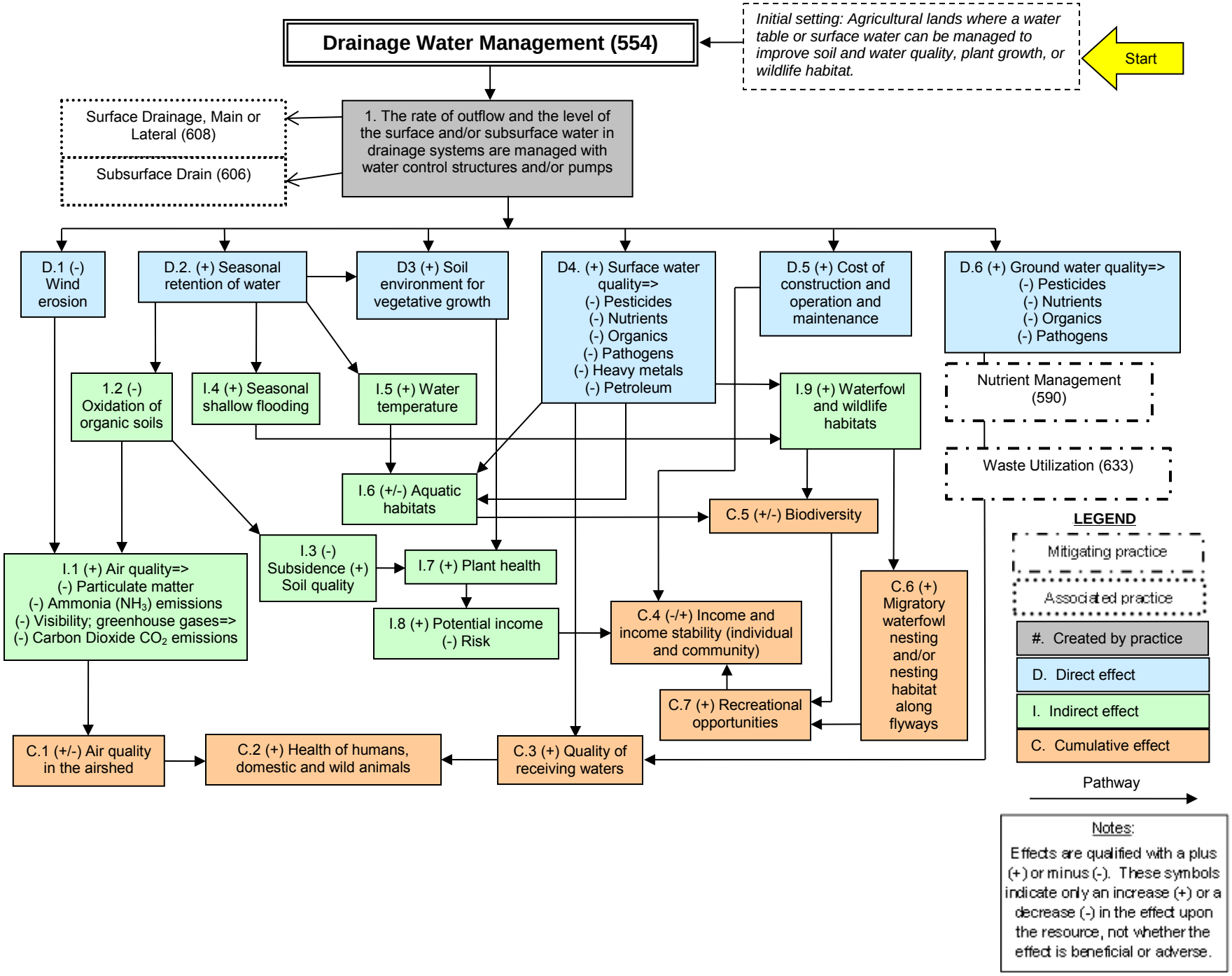
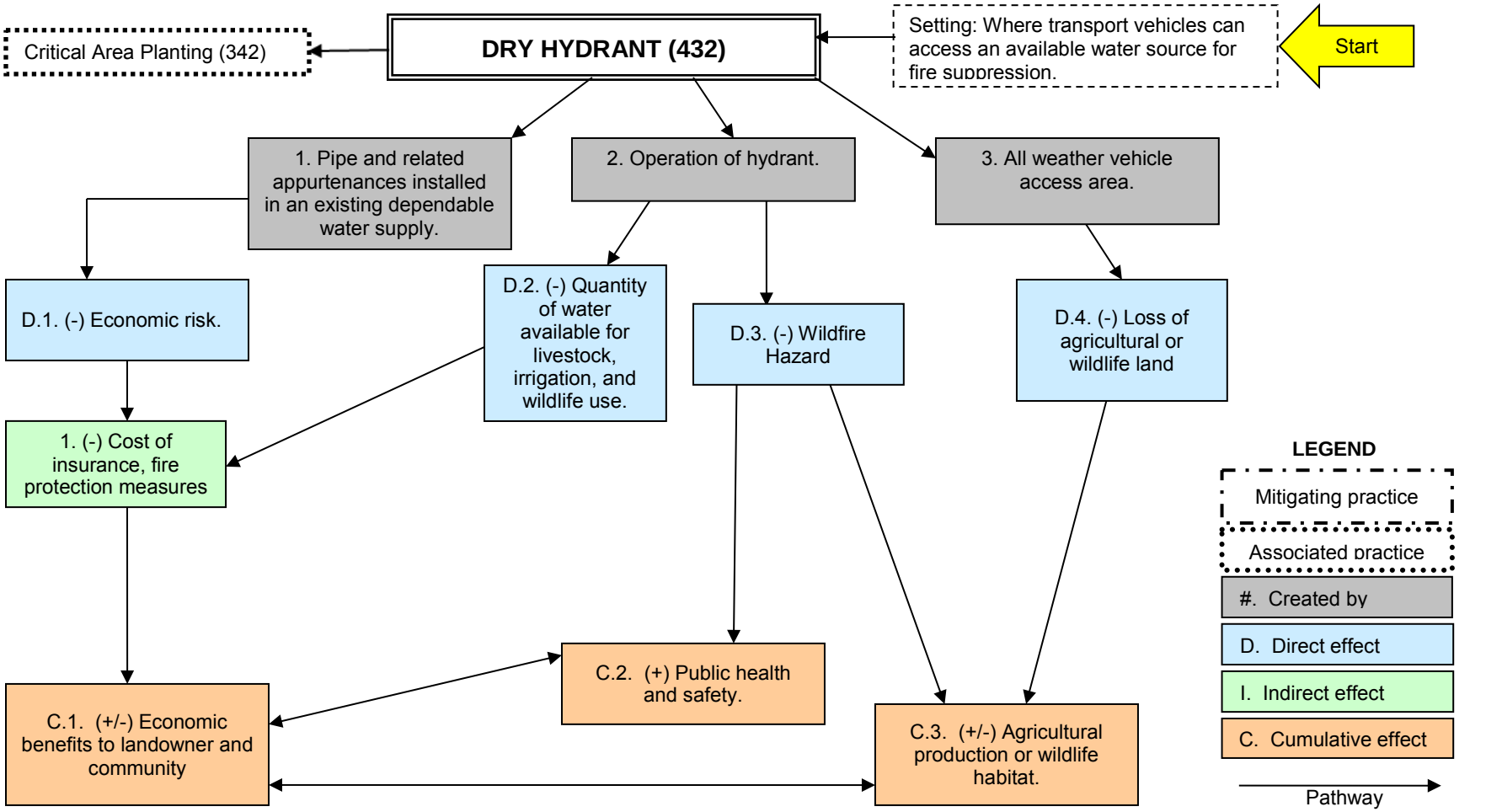


Network Diagram 35



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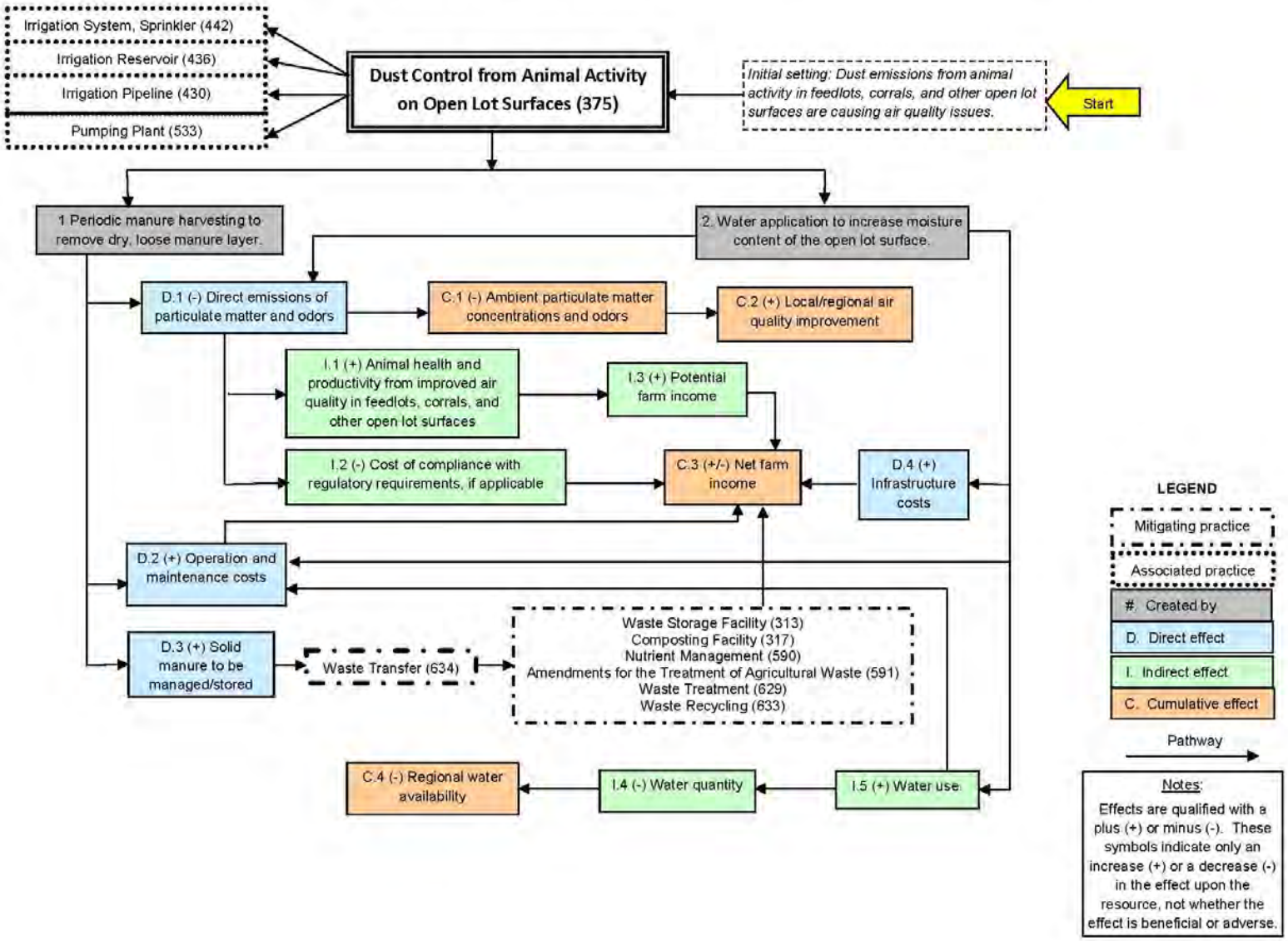
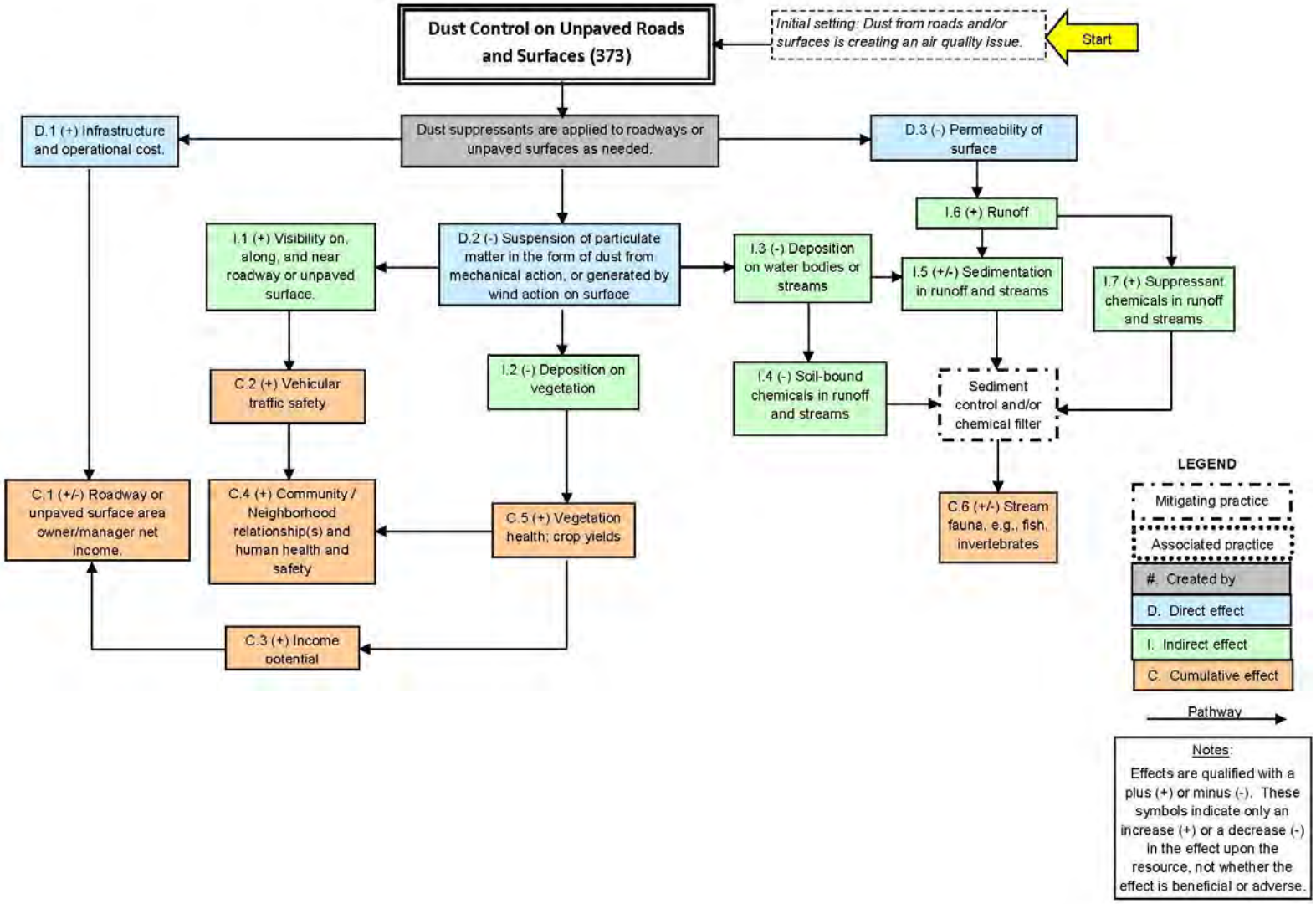
NRCS CONSERVATION PRACTICE EFFECTS - NETWORK DIAGRAM

March 2014



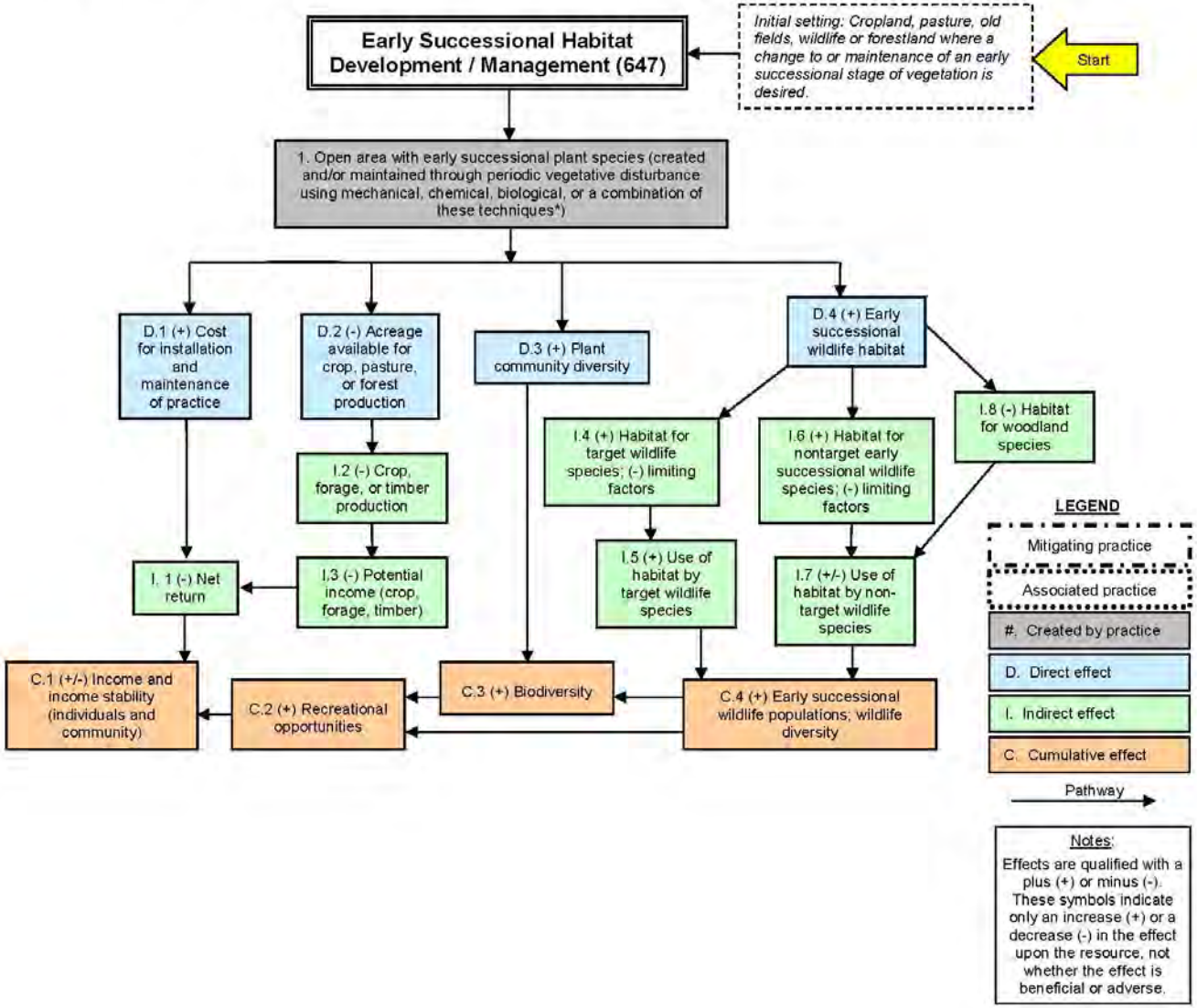
NRCS CONSERVATION PRACTICE EFFECTS - NETWORK DIAGRAM

March 2014



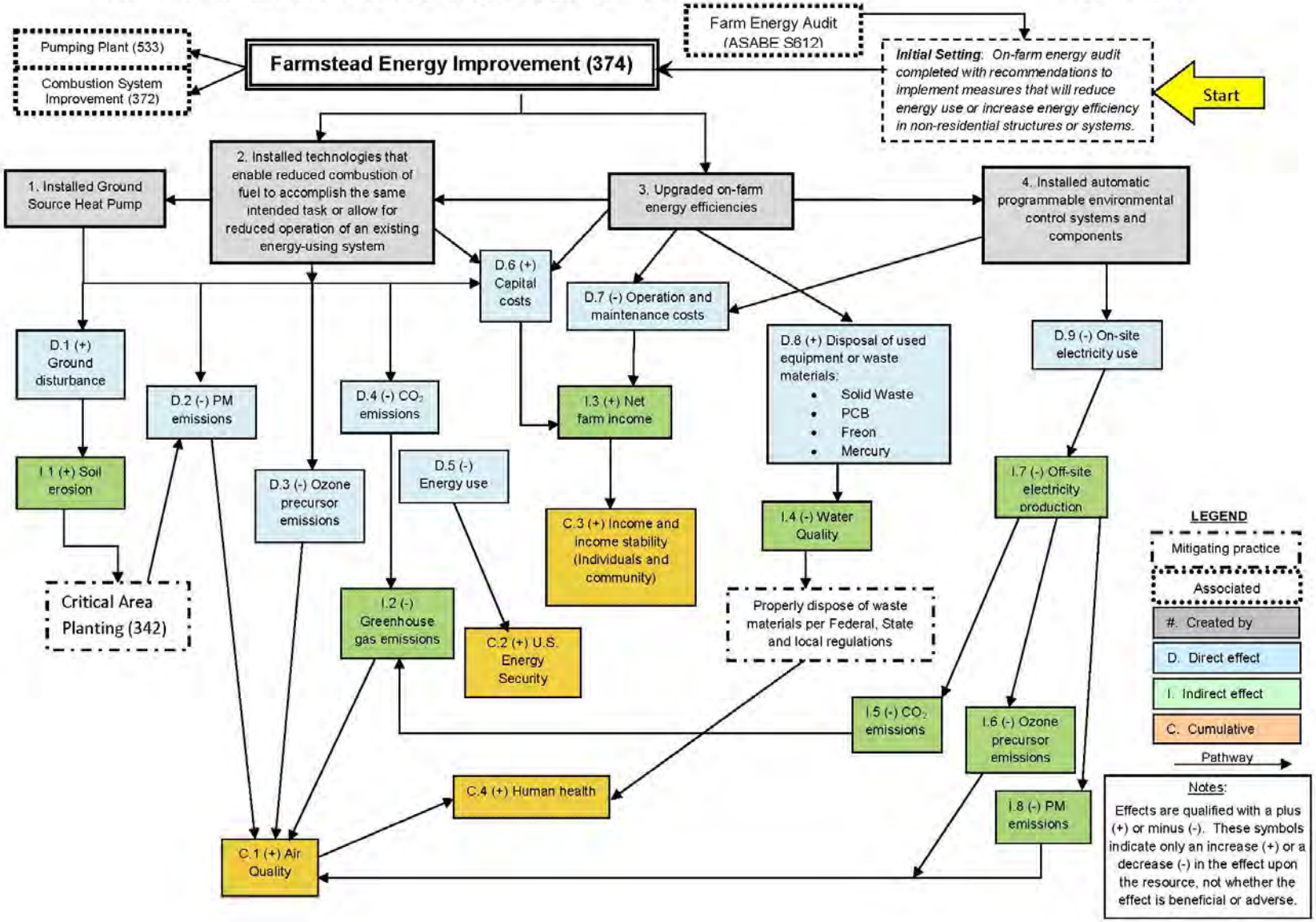
NRCS CONSERVATION PRACTICE EFFECTS - NETWORK DIAGRAM

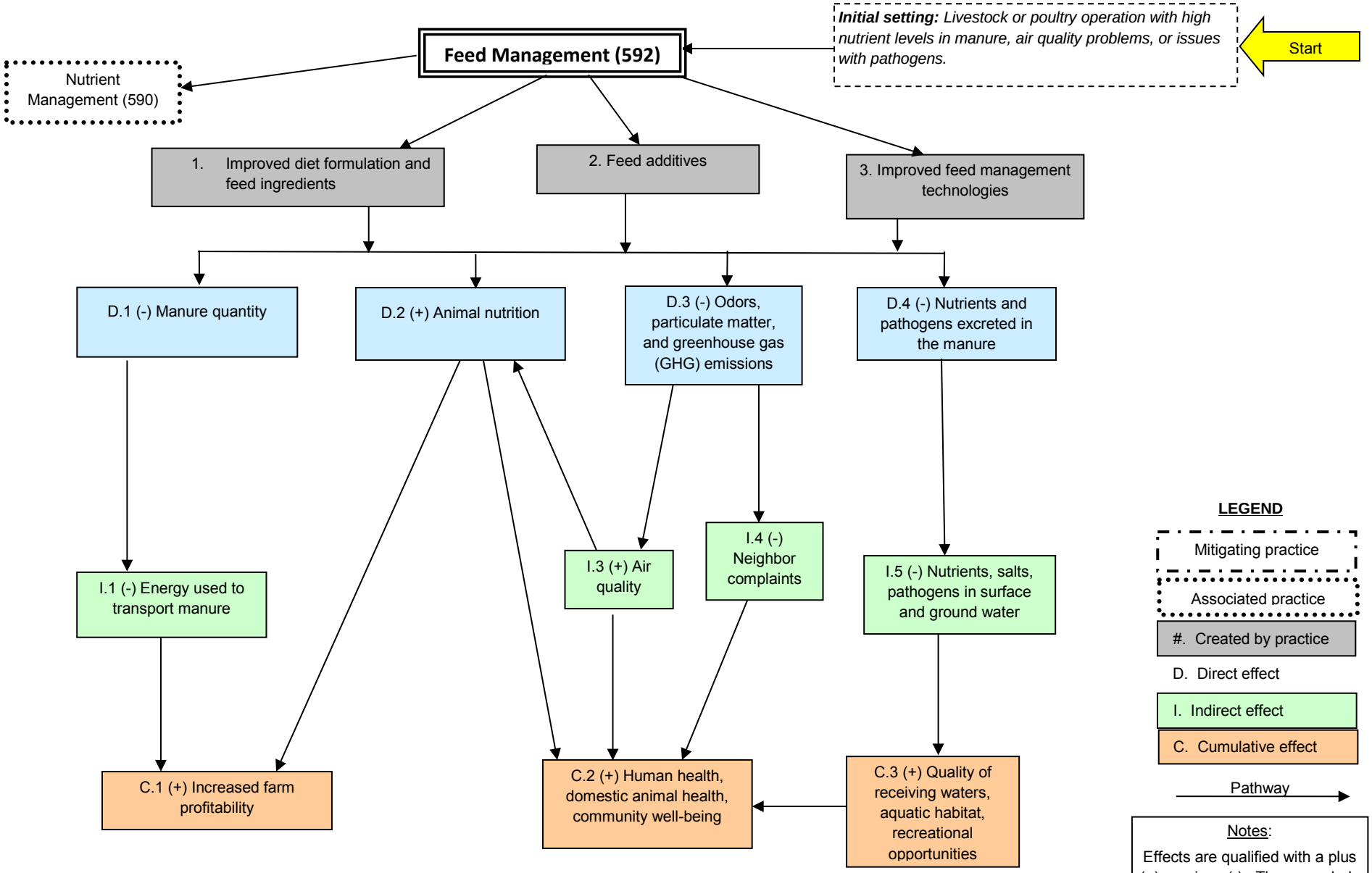
March 2014



NRCS CONSERVATION PRACTICE EFFECTS - NETWORK DIAGRAM

March 2014





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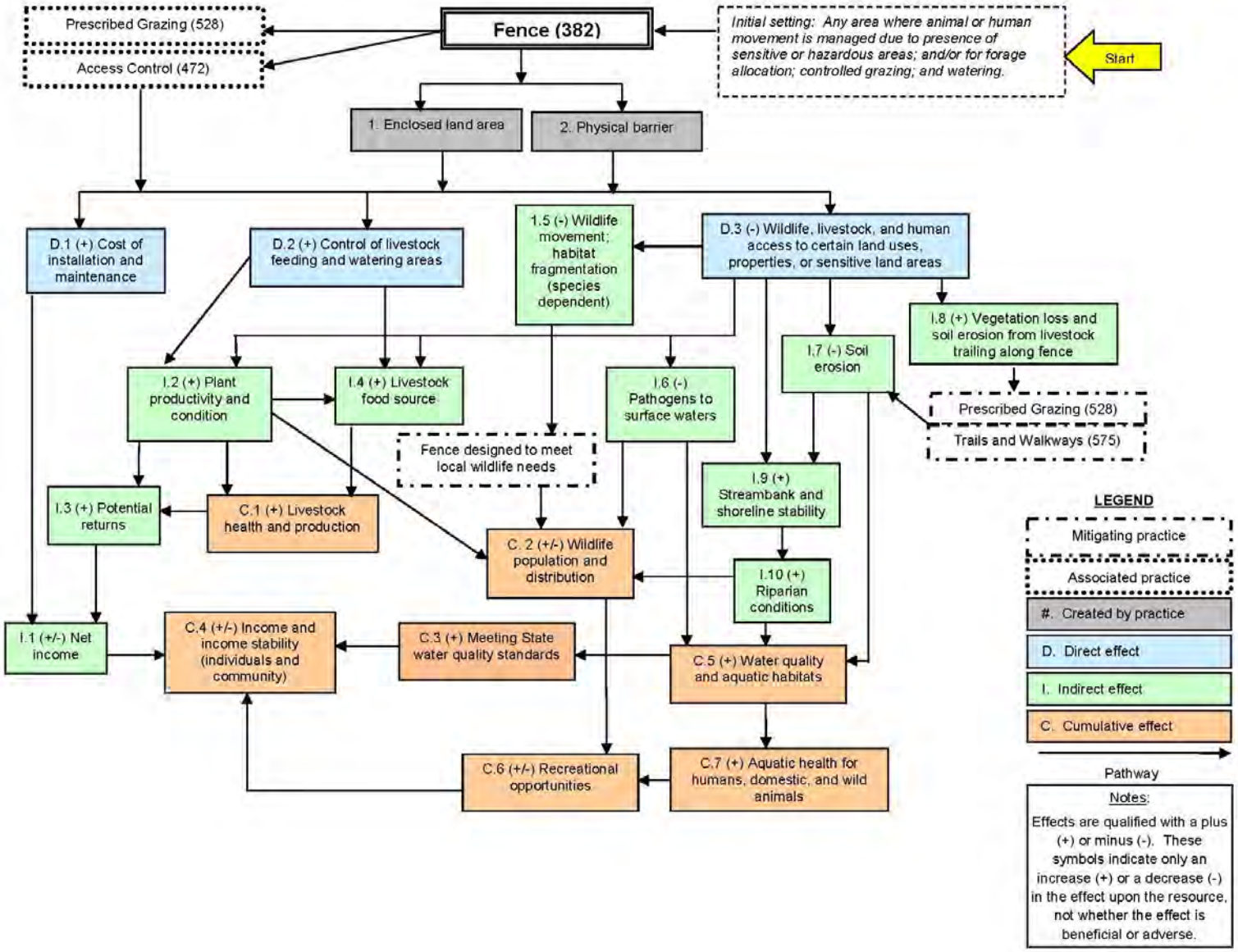
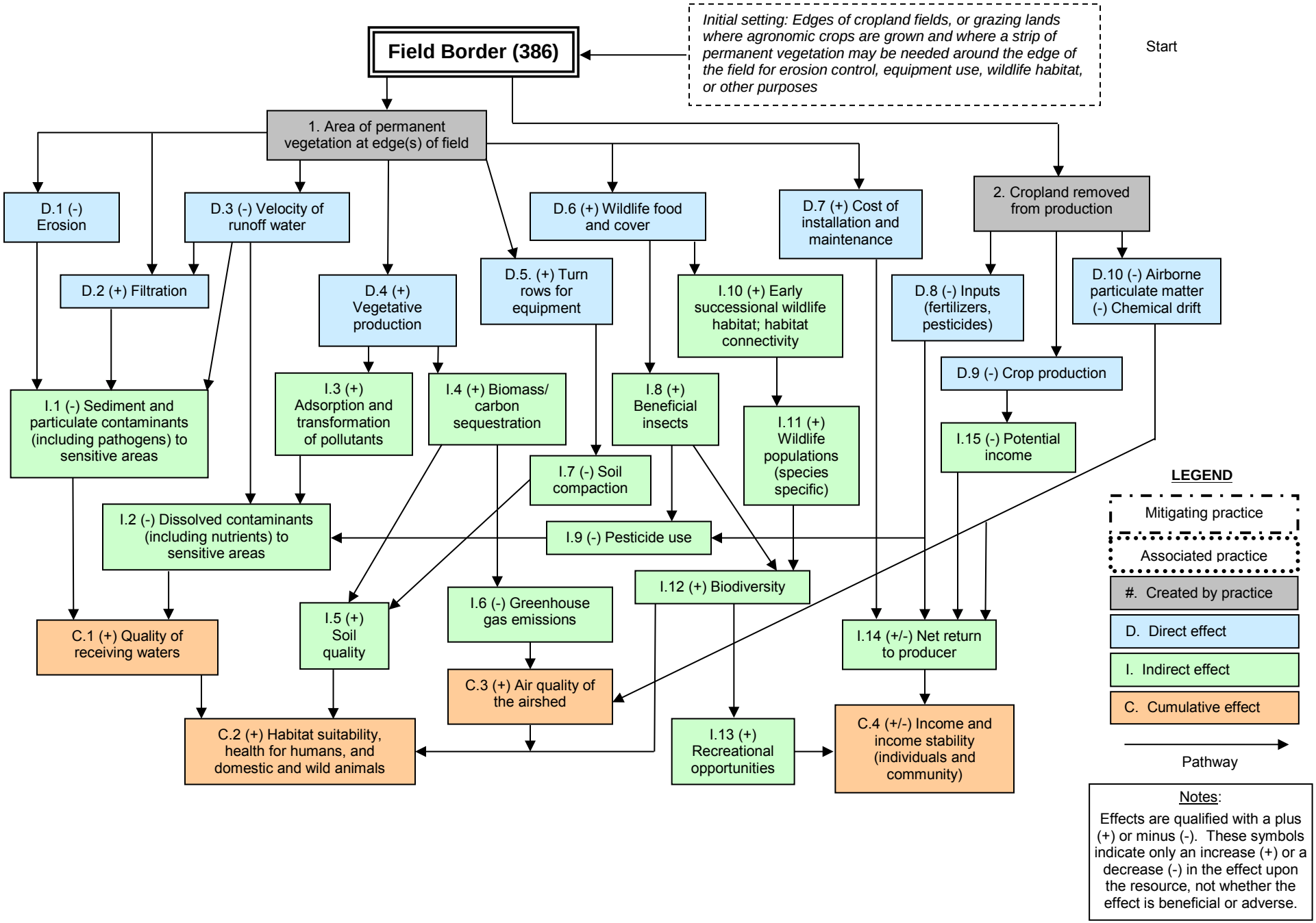
NRCS CONSERVATION PRACTICE EFFECTS - NETWORK DIAGRAM

May 2014




Field Border (386)
Initial setting: Edges of cropland fields, or grazing lands where agronomic crops are grown and where a strip of permanent vegetation may be needed around the edge of the field for erosion control, equipment use, wildlife habitat, or other purposes
Start
1. Area of permanent vegetation at edge(s) of field
2. Cropland removed from production
D.1 (-) Erosion
D.2 (+) Filtration
D.3 (-) Velocity of runoff water
D.4 (+) Vegetative production
D.5. (+) Turn rows for equipment
D.6 (+) Wildlife food and cover
D.7 (+) Cost of installation and maintenance
D.8 (-) Inputs (fertilizers, pesticides)
D.9 (-) Crop production
D.10 (-) Airborne particulate matter (-) Chemical drift
I.1 (-) Sediment and particulate contaminants (including pathogens) to sensitive areas
I.2 (-) Dissolved contaminants (including nutrients) to sensitive areas
I.3 (+) Adsorption and transformation of pollutants
I.4 (+) Biomass/ carbon sequestration
I.5 (+) Soil quality
I.6 (-) Greenhouse gas emissions
I.7 (-) Soil compaction
I.8 (+) Beneficial insects
I.9 (-) Pesticide use
I.10 (+) Early successional wildlife habitat; habitat connectivity
I.11 (+) Wildlife populations (species specific)
I.12 (+) Biodiversity
I.13 (+) Recreational opportunities
I.14 (+/-) Net return to producer
I.15 (-) Potential income
C.1 (+) Quality of receiving waters
C.2 (+) Habitat suitability, health for humans, and domestic and wild animals
C.3 (+) Air quality of the airshed
C.4 (+/-) Income and income stability (individuals and community)
LEGEND
Mitigating practice
Associated practice
#. Created by practice
D. Direct effect
I. Indirect effect
C. Cumulative effect
Pathway
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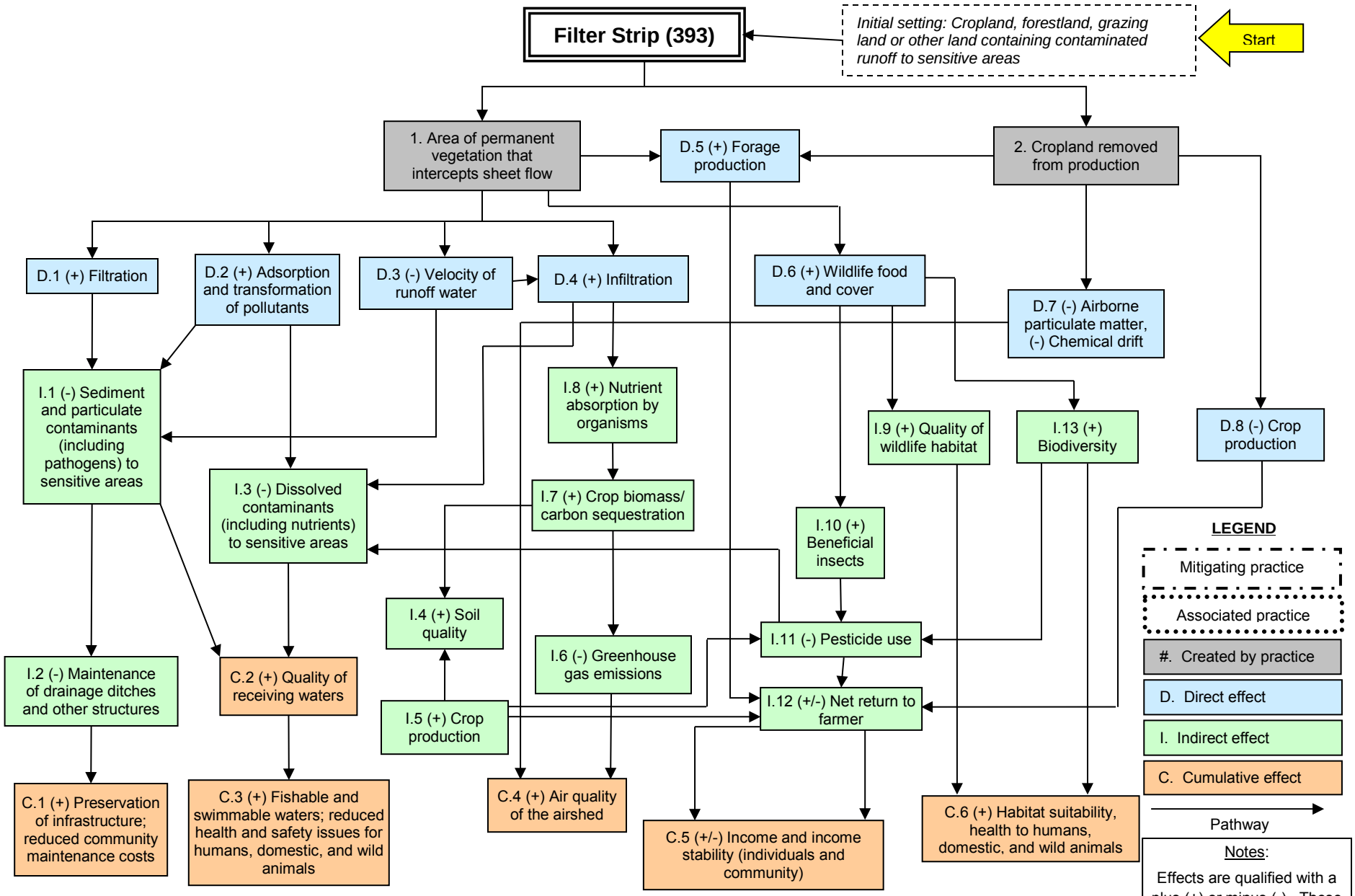
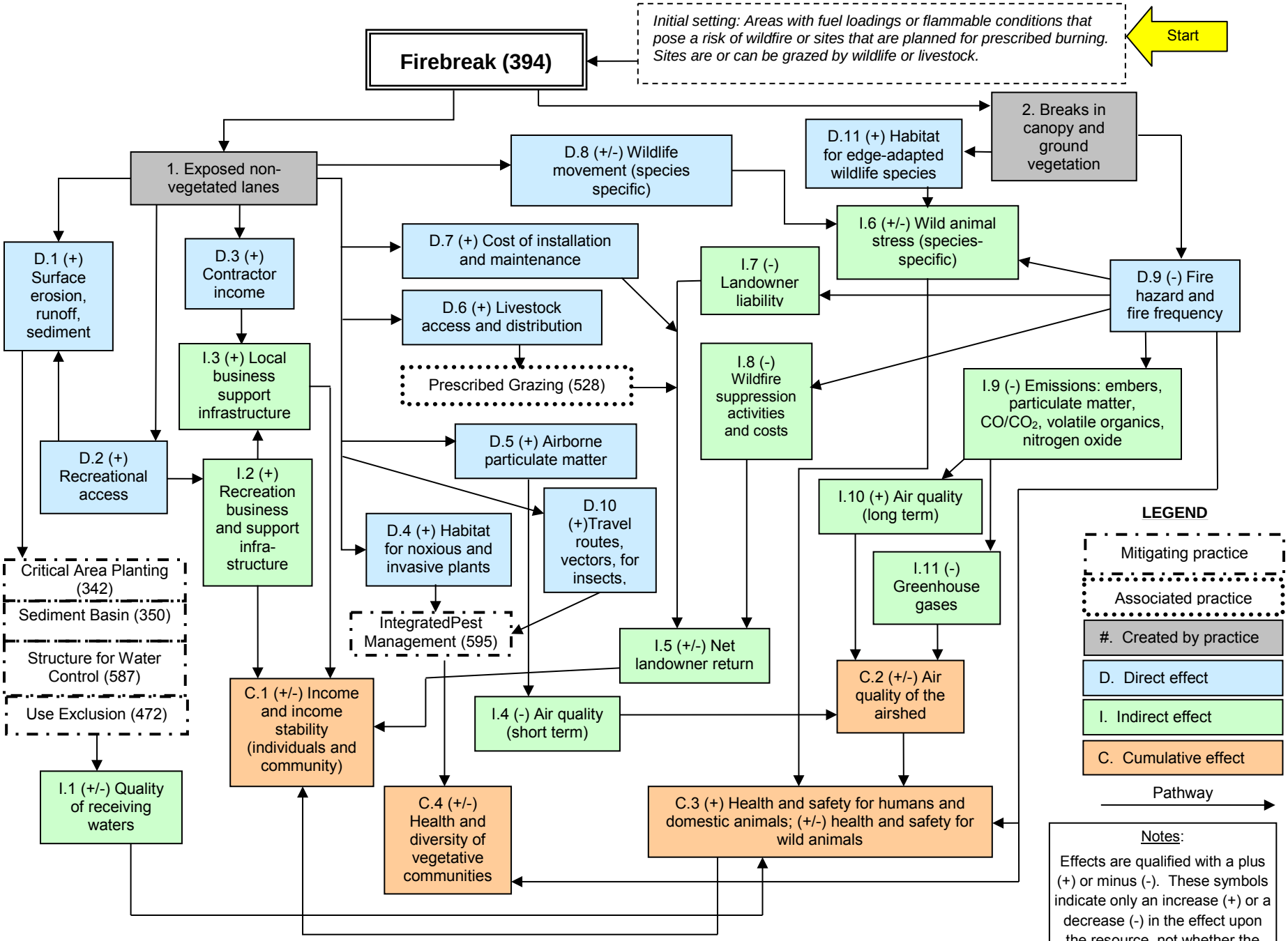


Network Diagram 44


Firebreak (394)
Initial setting: Areas with fuel loadings or flammable conditions that pose a risk of wildfire or sites that are planned for prescribed burning. Sites are or can be grazed by wildlife or livestock.
Start
1. Exposed non-vegetated lanes
2. Breaks in canopy and ground vegetation
D.1 (+) Surface erosion, runoff, sediment
D.2 (+) Recreational access
D.3 (+) Contractor income
D.4 (+) Habitat for noxious and invasive plants
D.5 (+) Airborne particulate matter
D.6 (+) Livestock access and distribution
D.7 (+) Cost of installation and maintenance
D.8 (+/-) Wildlife movement (species specific)
D.9 (-) Fire hazard and fire frequency
D.10 (+)Travel routes, vectors, for insects,
D.11 (+) Habitat for edge-adapted wildlife species
I.1 (+/-) Quality of receiving waters
I.2 (+) Recreation business and support infra-structure
I.3 (+) Local business support infrastructure
I.4 (-) Air quality (short term)
I.5 (+/-) Net landowner return
I.6 (+/-) Wild animal stress (species-specific)
I.7 (-) Landowner liability
I.8 (-) Wildfire suppression activities and costs
I.9 (-) Emissions: embers, particulate matter, CO/CO2, volatile organics, nitrogen oxide
I.10 (+) Air quality (long term)
I.11 (-) Greenhouse gases
C.1 (+/-) Income and income stability (individuals and community)
C.2 (+/-) Air quality of the airshed
C.3 (+) Health and safety for humans and domestic animals; (+/-) health and safety for wild animals
C.4 (+/-) Health and diversity of vegetative communities
Critical Area Planting (342)
Sediment Basin (350)
Structure for Water Control (587)
Use Exclusion (472)
Prescribed Grazing (528)
IntegratedPest Management (595)
LEGEND
Mitigating practice
Associated practice
#. Created by practice
D. Direct effect
I. Indirect effect
C. Cumulative effect
Pathway
Notes:
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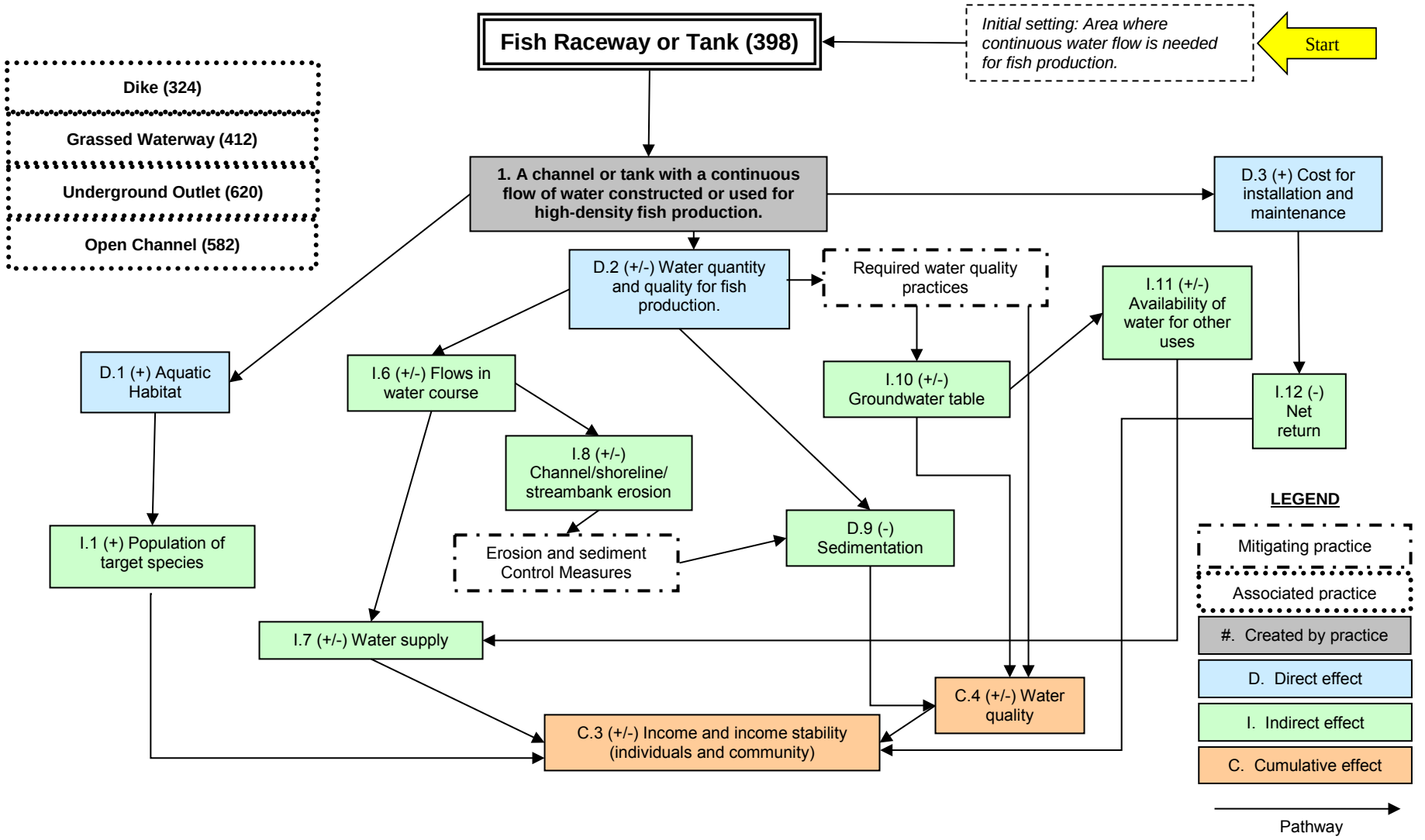

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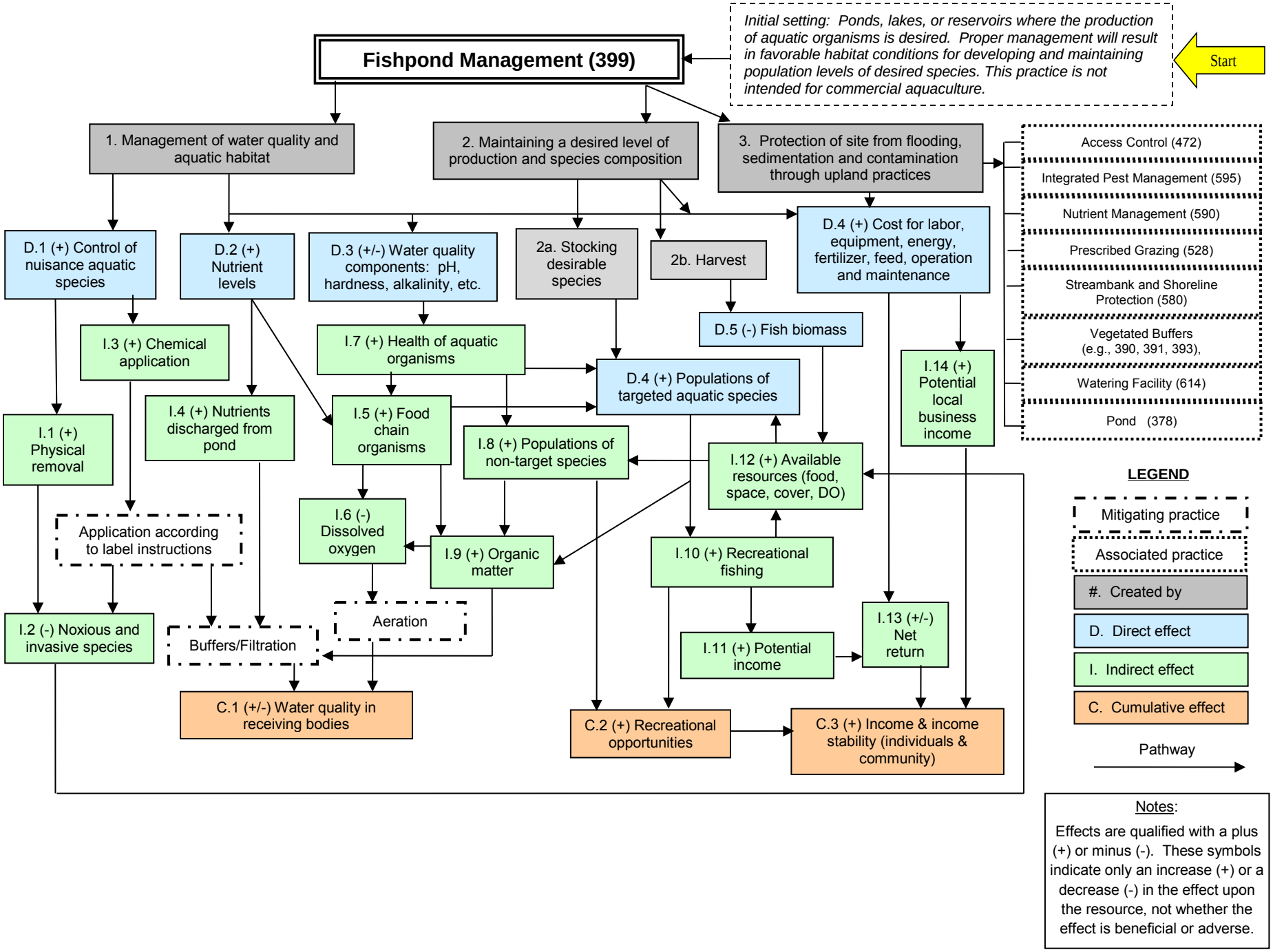

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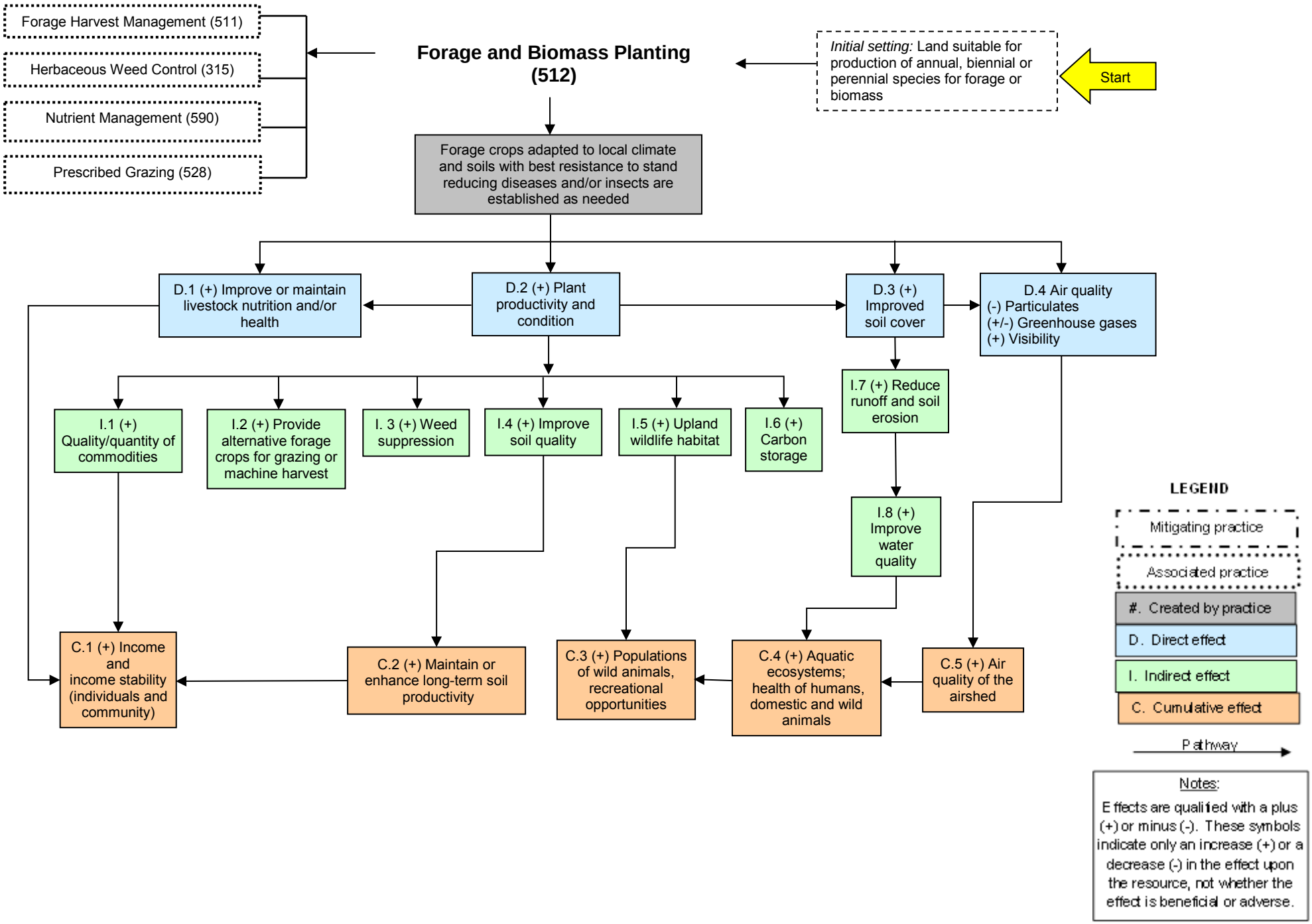
Forage Harvest Management (511)
Herbaceous Weed Control (315)
Nutrient Management (590)
Prescribed Grazing (528)
Forage and Biomass Planting (512)
Initial setting: Land suitable for production of annual, biennial or perennial species for forage or biomass
Start
Forage crops adapted to local climate and soils with best resistance to stand reducing diseases and/or insects are established as needed
D.1 (+) Improve or maintain livestock nutrition and/or health
D.2 (+) Plant productivity and condition
D.3 (+) Improved soil cover
D.4 Air quality
(-) Particulates
(+/-) Greenhouse gases
(+) Visibility
I.1 (+) Quality/quantity of commodities
I.2 (+) Provide alternative forage crops for grazing or machine harvest
I. 3 (+) Weed suppression
I.4 (+) Improve soil quality
I.5 (+) Upland wildlife habitat
I.6 (+) Carbon storage
I.7 (+) Reduce runoff and soil erosion
I.8 (+) Improve water quality
C.1 (+) Income and income stability (individuals and community)
C.2 (+) Maintain or enhance long-term soil productivity
C.3 (+) Populations of wild animals, recreational opportunities
C.4 (+) Aquatic ecosystems; health of humans, domestic and wild animals
C.5 (+) Air quality of the airshed
LEGEND
Mitigating practice
Associated practice
#. Created by practice
D. Direct effect
I. Indirect effect
C. Cumulative effect
Pathway
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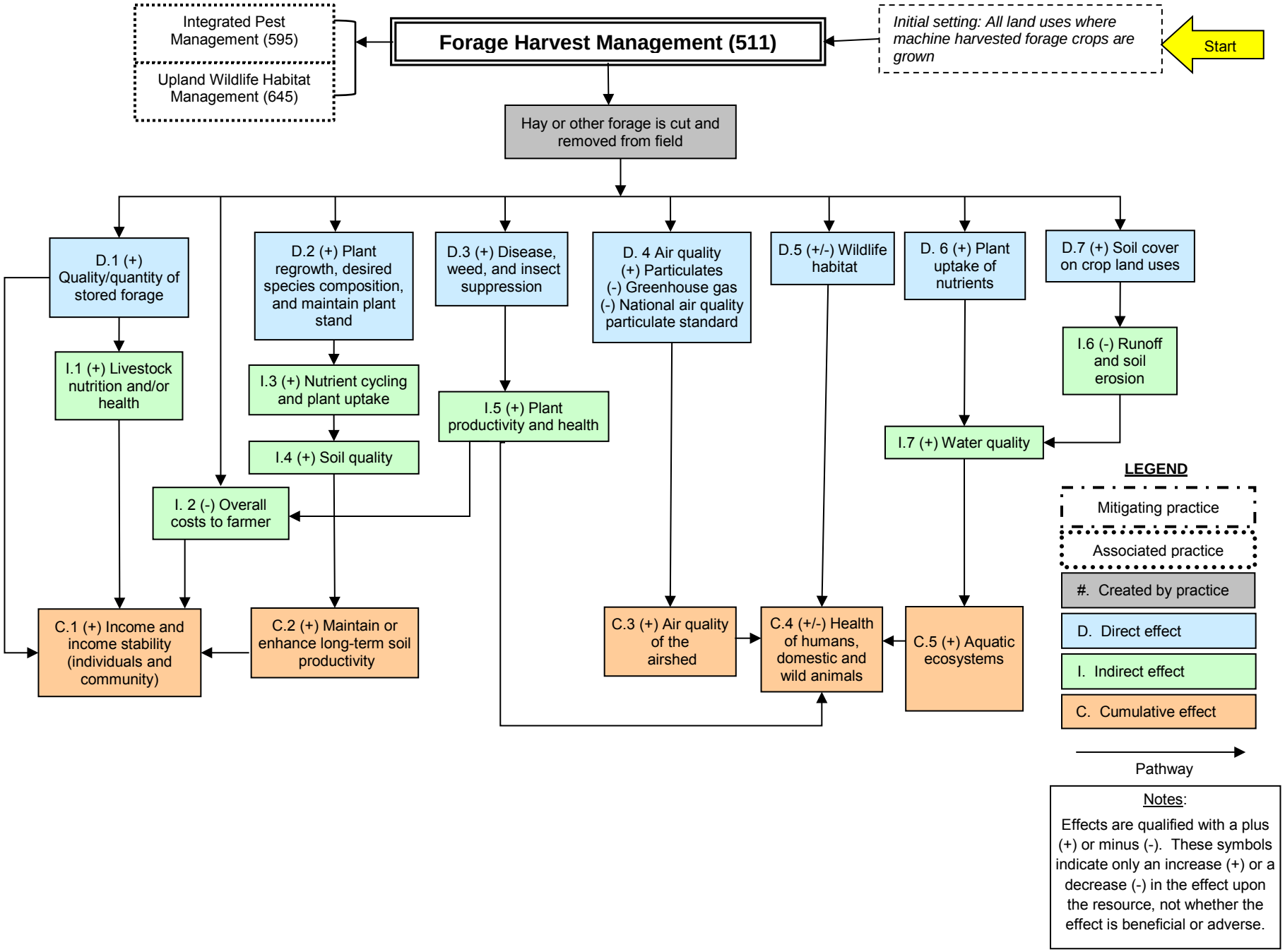
Integrated Pest Management (595)
Upland Wildlife Habitat Management (645)
Forage Harvest Management (511)
Initial setting: All land uses where machine harvested forage crops are grown
Start
Hay or other forage is cut and removed from field
D.1 (+) Quality/quantity of stored forage
D.2 (+) Plant regrowth, desired species composition, and maintain plant stand
D.3 (+) Disease, weed, and insect suppression
D. 4 Air quality (+) Particulates (-) Greenhouse gas (-) National air quality particulate standard
D.5 (+/-) Wildlife habitat
D. 6 (+) Plant uptake of nutrients
D.7 (+) Soil cover on crop land uses
I.1 (+) Livestock nutrition and/or health
I.3 (+) Nutrient cycling and plant uptake
I.5 (+) Plant productivity and health
I.6 (-) Runoff and soil erosion
I.4 (+) Soil quality
I.7 (+) Water quality
I. 2 (-) Overall costs to farmer
C.1 (+) Income and income stability (individuals and community)
C.2 (+) Maintain or enhance long-term soil productivity
C.3 (+) Air quality of the airshed
C.4 (+/-) Health of humans, domestic and wild animals
C.5 (+) Aquatic ecosystems
LEGEND
Mitigating practice
Associated practice
#. Created by practice
D. Direct effect
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Pathway
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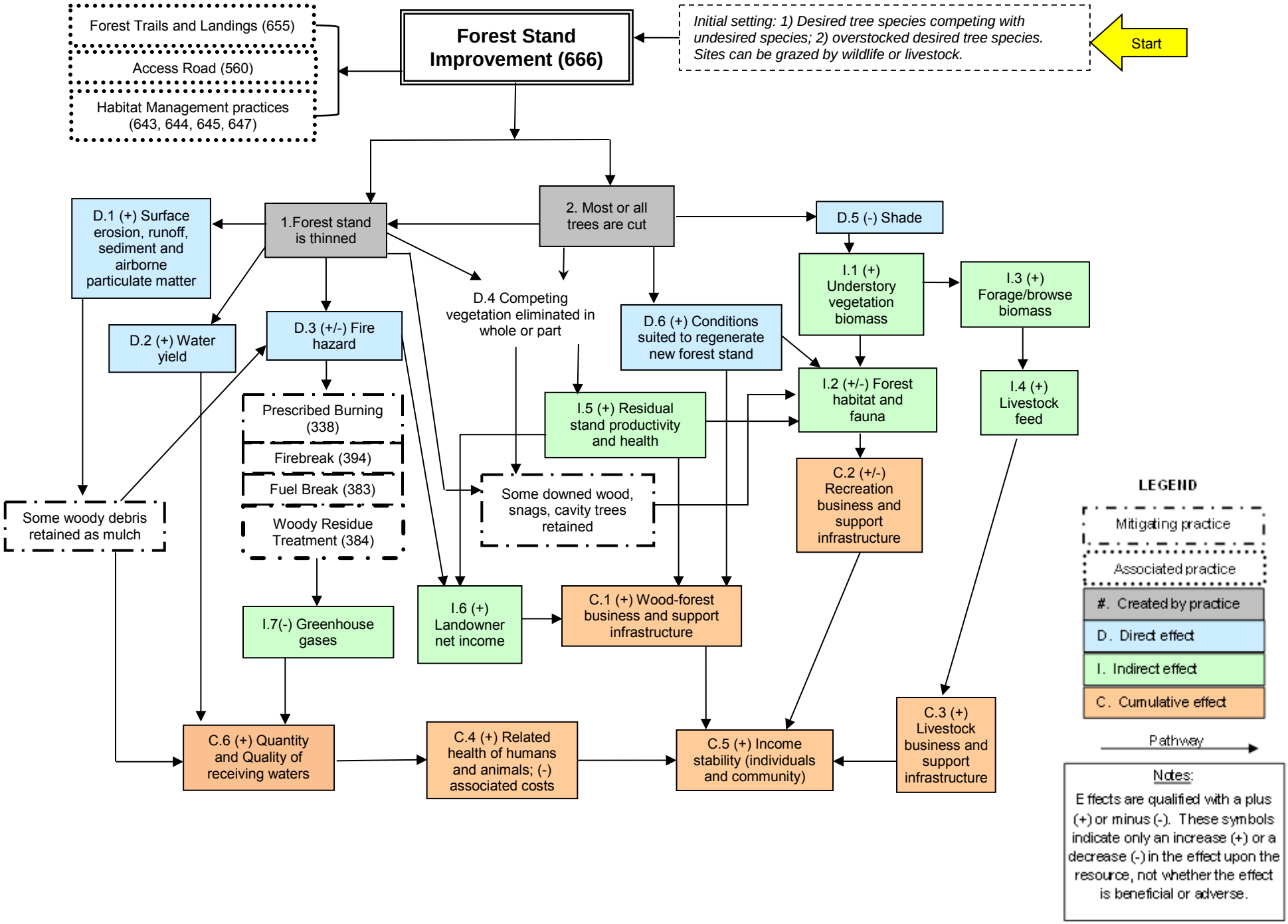
Forest Trails and Landings (655)
Access Road (560)
Habitat Management practices (643, 644, 645, 647)
Forest Stand Improvement (666)
Initial setting: 1) Desired tree species competing with undesired species; 2) overstocked desired tree species. Sites can be grazed by wildlife or livestock.
Start
D.1 (+) Surface erosion, runoff, sediment and airborne particulate matter
1.Forest stand is thinned
2. Most or all trees are cut
D.5 (-) Shade
I.1 (+) Understory vegetation biomass
I.3 (+) Forage/browse biomass
D.4 Competing vegetation eliminated in whole or part
D.6 (+) Conditions suited to regenerate new forest stand
D.2 (+) Water yield
D.3 (+/-) Fire hazard
I.2 (+/-) Forest habitat and fauna
I.4 (+) Livestock feed
Prescribed Burning (338)
Firebreak (394)
Fuel Break (383)
Woody Residue Treatment (384)
I.5 (+) Residual stand productivity and health
Some downed wood, snags, cavity trees retained
C.2 (+/-) Recreation business and support infrastructure
Some woody debris retained as mulch
I.7(-) Greenhouse gases
I.6 (+) Landowner net income
C.1 (+) Wood-forest business and support infrastructure
C.6 (+) Quantity and Quality of receiving waters
C.4 (+) Related health of humans and animals; (-) associated costs
C.5 (+) Income stability (individuals and community)
C.3 (+) Livestock business and support infrastructure
LEGEND
Mitigating practice
Associated practice
#. Created by practice
D. Direct effect
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Pathway
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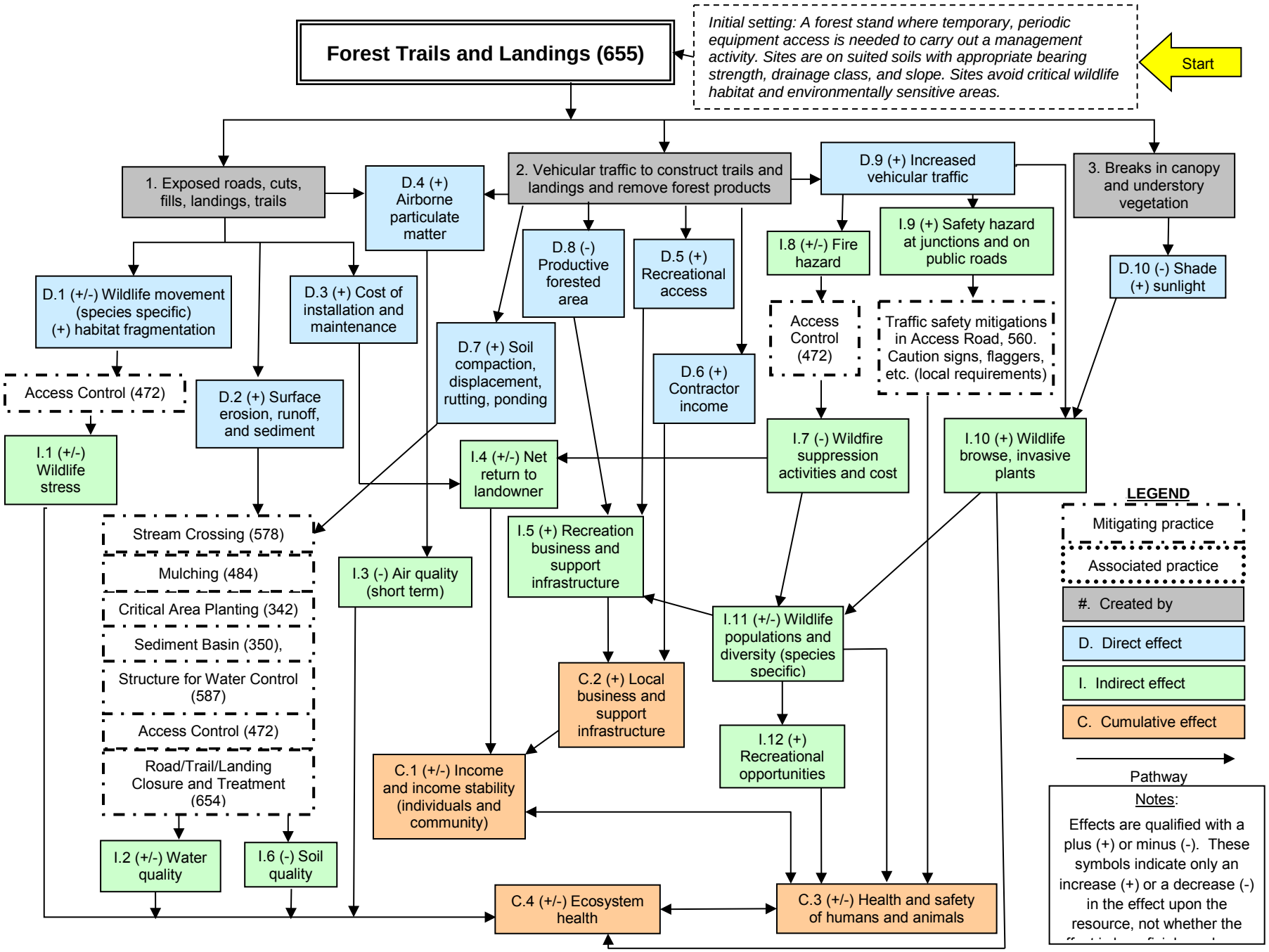
Forest Trails and Landings (655)
Initial setting: A forest stand where temporary, periodic equipment access is needed to carry out a management activity. Sites are on suited soils with appropriate bearing strength, drainage class, and slope. Sites avoid critical wildlife habitat and environmentally sensitive areas.
Start
1. Exposed roads, cuts, fills, landings, trails
2. Vehicular traffic to construct trails and landings and remove forest products
3. Breaks in canopy and understory vegetation
D.4 (+) Airborne particulate matter
D.9 (+) Increased vehicular traffic
D.8 (-) Productive forested area
D.5 (+) Recreational access
I.8 (+/-) Fire hazard
I.9 (+) Safety hazard at junctions and on public roads
D.10 (-) Shade (+) sunlight
D.1 (+/-) Wildlife movement (species specific) (+) habitat fragmentation
D.3 (+) Cost of installation and maintenance
D.7 (+) Soil compaction, displacement, rutting, ponding
Access Control (472)
Traffic safety mitigations in Access Road, 560. Caution signs, flaggers, etc. (local requirements)
D.6 (+) Contractor income
Access Control (472)
D.2 (+) Surface erosion, runoff, and sediment
I.7 (-) Wildfire suppression activities and cost
I.10 (+) Wildlife browse, invasive plants
I.1 (+/-) Wildlife stress
I.4 (+/-) Net return to landowner
Stream Crossing (578)
I.5 (+) Recreation business and support infrastructure
Mulching (484)
I.3 (-) Air quality (short term)
Critical Area Planting (342)
I.11 (+/-) Wildlife populations and diversity (species specific)
Sediment Basin (350),
Structure for Water Control (587)
C.2 (+) Local business and support infrastructure
Access Control (472)
I.12 (+) Recreational opportunities
Road/Trail/Landing Closure and Treatment (654)
C.1 (+/-) Income and income stability (individuals and community)
I.2 (+/-) Water quality
I.6 (-) Soil quality
C.4 (+/-) Ecosystem health
C.3 (+/-) Health and safety of humans and animals
LEGEND
Mitigating practice
Associated practice
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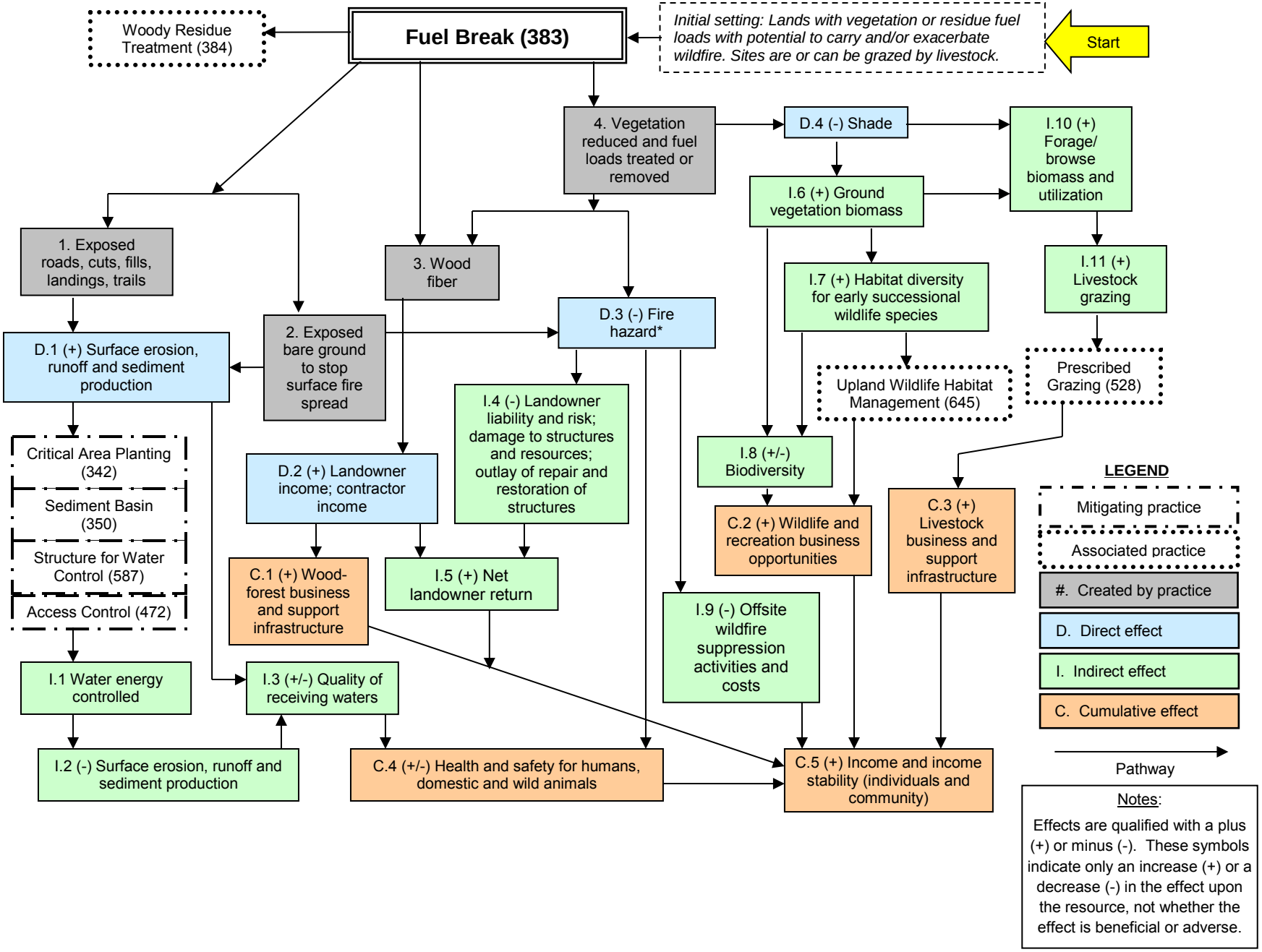
Fuel Break (383)
Woody Residue Treatment (384)
Initial setting: Lands with vegetation or residue fuel loads with potential to carry and/or exacerbate wildfire. Sites are or can be grazed by livestock.
Start
4. Vegetation reduced and fuel loads treated or removed
D.4 (-) Shade
I.10 (+) Forage/ browse biomass and utilization
I.6 (+) Ground vegetation biomass
1. Exposed roads, cuts, fills, landings, trails
3. Wood fiber
I.7 (+) Habitat diversity for early successional wildlife species
I.11 (+) Livestock grazing
D.3 (-) Fire hazard*
2. Exposed bare ground to stop surface fire spread
D.1 (+) Surface erosion, runoff and sediment production
Upland Wildlife Habitat Management (645)
Prescribed Grazing (528)
I.4 (-) Landowner liability and risk; damage to structures and resources; outlay of repair and restoration of structures
Critical Area Planting (342)
Sediment Basin (350)
Structure for Water Control (587)
Access Control (472)
D.2 (+) Landowner income; contractor income
I.8 (+/-) Biodiversity
C.2 (+) Wildlife and recreation business opportunities
C.3 (+) Livestock business and support infrastructure
C.1 (+) Wood-forest business and support infrastructure
I.5 (+) Net landowner return
I.9 (-) Offsite wildfire suppression activities and costs
I.1 Water energy controlled
I.3 (+/-) Quality of receiving waters
I.2 (-) Surface erosion, runoff and sediment production
C.4 (+/-) Health and safety for humans, domestic and wild animals
C.5 (+) Income and income stability (individuals and community)
LEGEND
Mitigating practice
Associated practice
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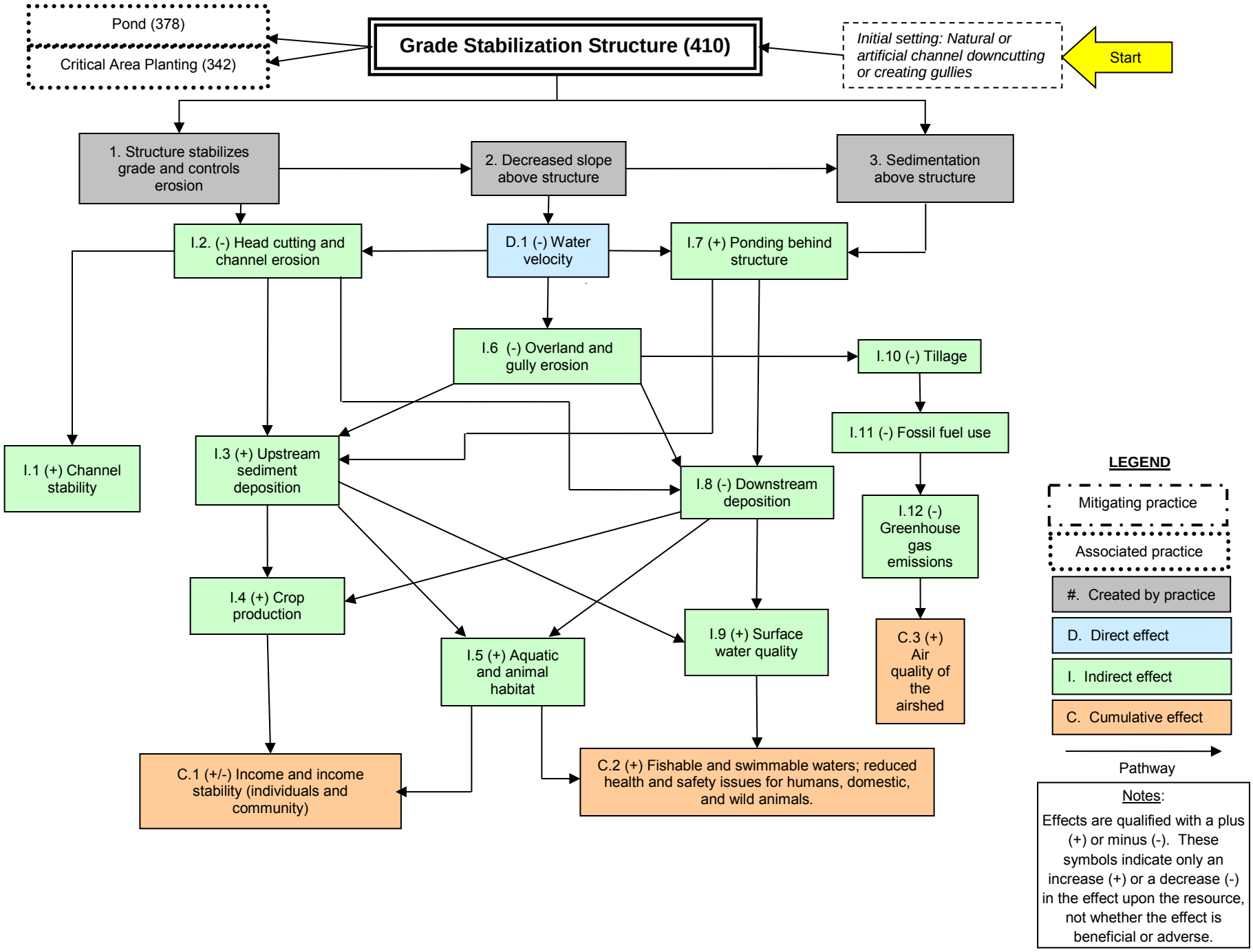
Pond (378)
Critical Area Planting (342)
Grade Stabilization Structure (410)
Initial setting: Natural or artificial channel downcutting or creating gullies
Start
1. Structure stabilizes grade and controls erosion
2. Decreased slope above structure
3. Sedimentation above structure
I.2. (-) Head cutting and channel erosion
D.1 (-) Water velocity
I.7 (+) Ponding behind structure
I.6 (-) Overland and gully erosion
I.10 (-) Tillage
I.11 (-) Fossil fuel use
I.1 (+) Channel stability
I.3 (+) Upstream sediment deposition
I.8 (-) Downstream deposition
I.12 (-) Greenhouse gas emissions
I.4 (+) Crop production
I.9 (+) Surface water quality
I.5 (+) Aquatic and animal habitat
C.3 (+) Air quality of the airshed
C.1 (+/-) Income and income stability (individuals and community)
C.2 (+) Fishable and swimmable waters; reduced health and safety issues for humans, domestic, and wild animals.
LEGEND
Mitigating practice
Associated practice
#. Created by practice
D. Direct effect
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Pathway
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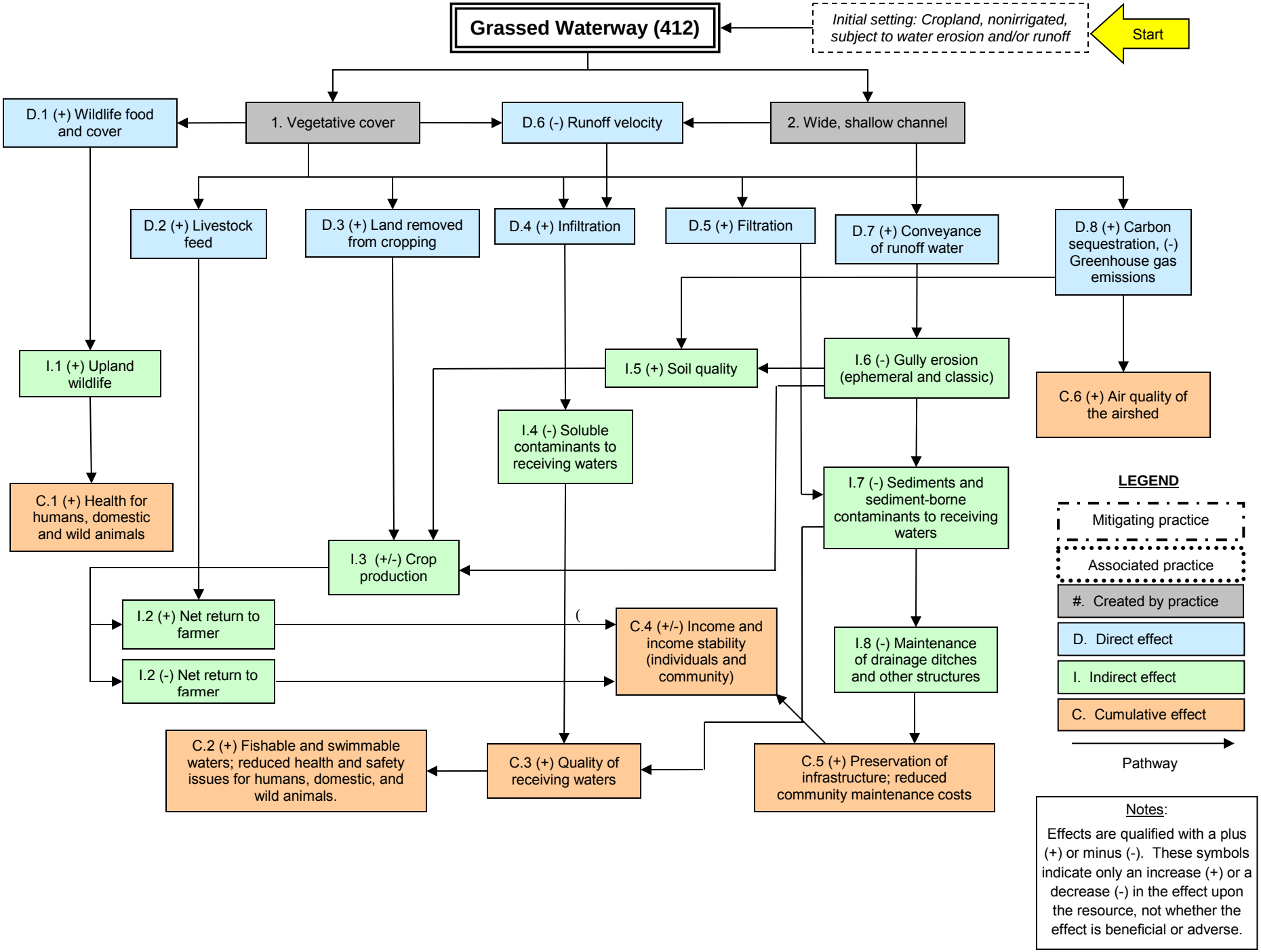

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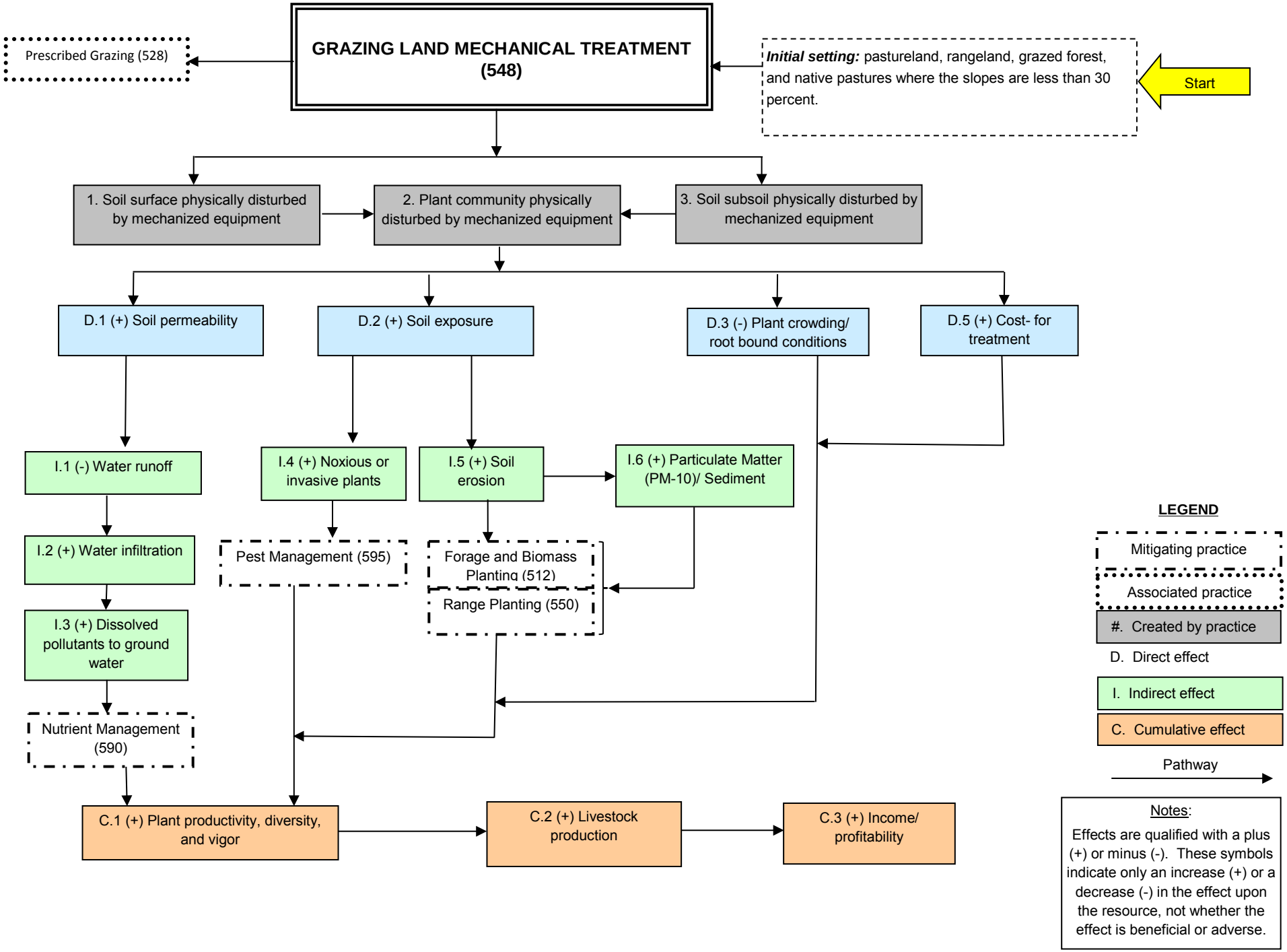
GRAZING LAND MECHANICAL TREATMENT (548)
Prescribed Grazing (528)
Initial setting: pastureland, rangeland, grazed forest, and native pastures where the slopes are less than 30 percent.
Start
1. Soil surface physically disturbed by mechanized equipment
2. Plant community physically disturbed by mechanized equipment
3. Soil subsoil physically disturbed by mechanized equipment
D.1 (+) Soil permeability
D.2 (+) Soil exposure
D.3 (-) Plant crowding/ root bound conditions
D.5 (+) Cost- for treatment
I.1 (-) Water runoff
I.2 (+) Water infiltration
I.3 (+) Dissolved pollutants to ground water
I.4 (+) Noxious or invasive plants
I.5 (+) Soil erosion
I.6 (+) Particulate Matter (PM-10)/ Sediment
Pest Management (595)
Forage and Biomass Planting (512)
Range Planting (550)
Nutrient Management (590)
C.1 (+) Plant productivity, diversity, and vigor
C.2 (+) Livestock production
C.3 (+) Income/ profitability
LEGEND
Mitigating practice
Associated practice
#. Created by practice
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C. Cumulative effect
Pathway
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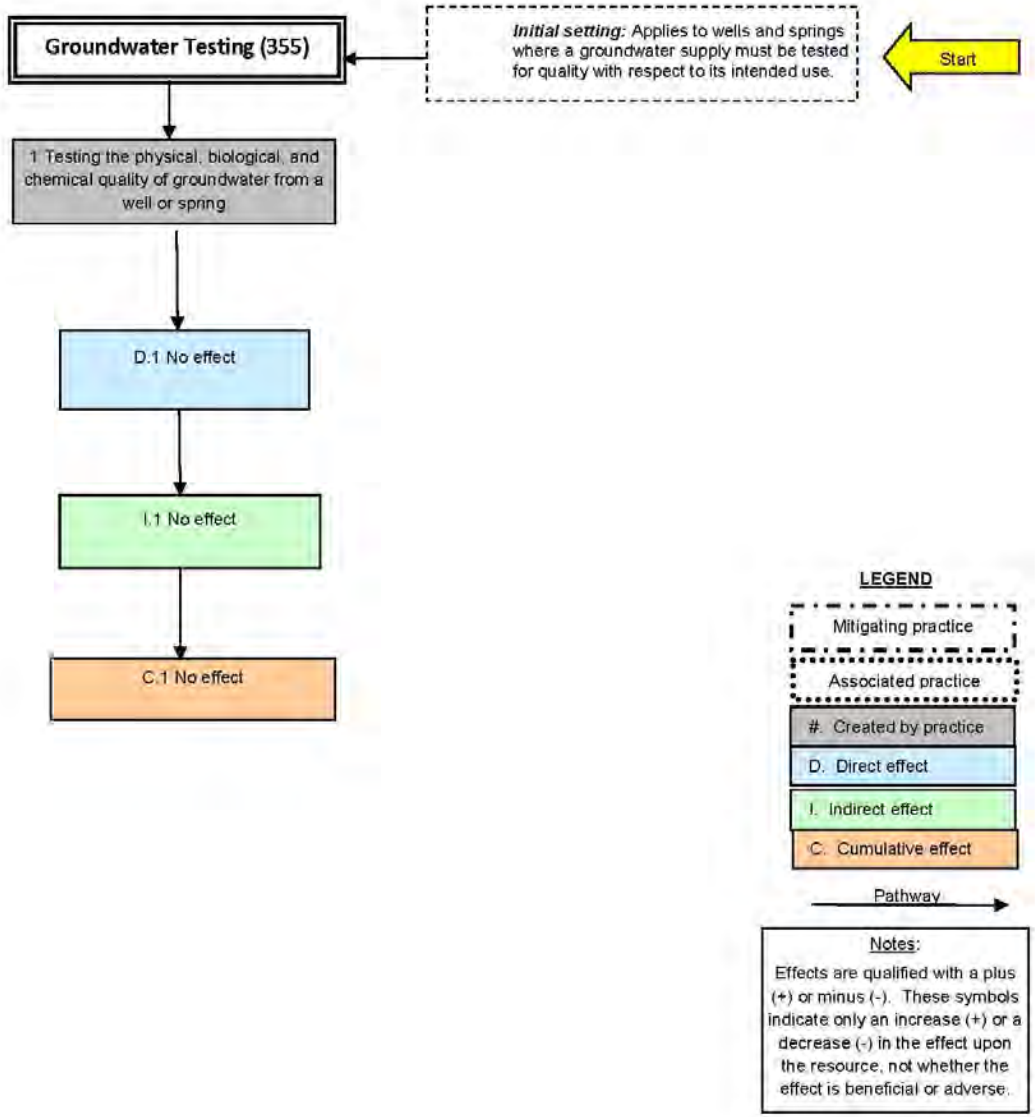
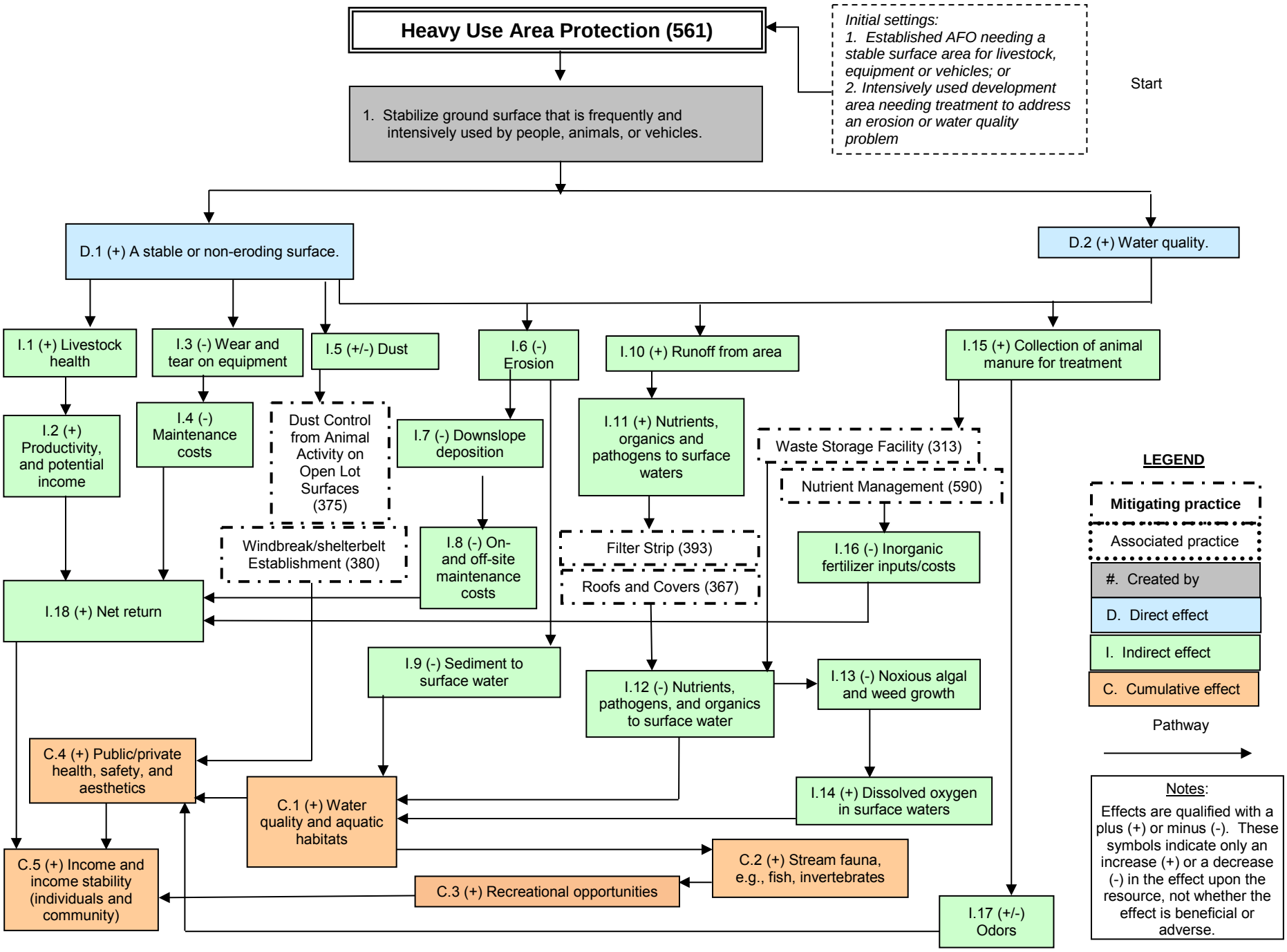
NRCS CONSERVATION PRACTICE EFFECTS- NETWORK DIAGRAM

March 2014




Heavy Use Area Protection (561)
Initial settings:
1. Established AFO needing a stable surface area for livestock, equipment or vehicles; or
2. Intensively used development area needing treatment to address an erosion or water quality problem
Start
1. Stabilize ground surface that is frequently and intensively used by people, animals, or vehicles.
D.1 (+) A stable or non-eroding surface.
D.2 (+) Water quality.
I.1 (+) Livestock health
I.3 (-) Wear and tear on equipment
I.5 (+/-) Dust
I.6 (-) Erosion
I.10 (+) Runoff from area
I.15 (+) Collection of animal manure for treatment
I.2 (+) Productivity, and potential income
I.4 (-) Maintenance costs
Dust Control from Animal Activity on Open Lot Surfaces (375)
I.7 (-) Downslope deposition
I.11 (+) Nutrients, organics and pathogens to surface waters
Waste Storage Facility (313)
Nutrient Management (590)
Windbreak/shelterbelt Establishment (380)
I.8 (-) On- and off-site maintenance costs
Filter Strip (393)
Roofs and Covers (367)
I.16 (-) Inorganic fertilizer inputs/costs
I.18 (+) Net return
I.9 (-) Sediment to surface water
I.12 (-) Nutrients, pathogens, and organics to surface water
I.13 (-) Noxious algal and weed growth
C.4 (+) Public/private health, safety, and aesthetics
C.1 (+) Water quality and aquatic habitats
I.14 (+) Dissolved oxygen in surface waters
C.5 (+) Income and income stability (individuals and community)
C.2 (+) Stream fauna, e.g., fish, invertebrates
C.3 (+) Recreational opportunities
I.17 (+/-) Odors
LEGEND
Mitigating practice
Associated practice
#. Created by
D. Direct effect
I. Indirect effect
C. Cumulative effect
Pathway
Notes:
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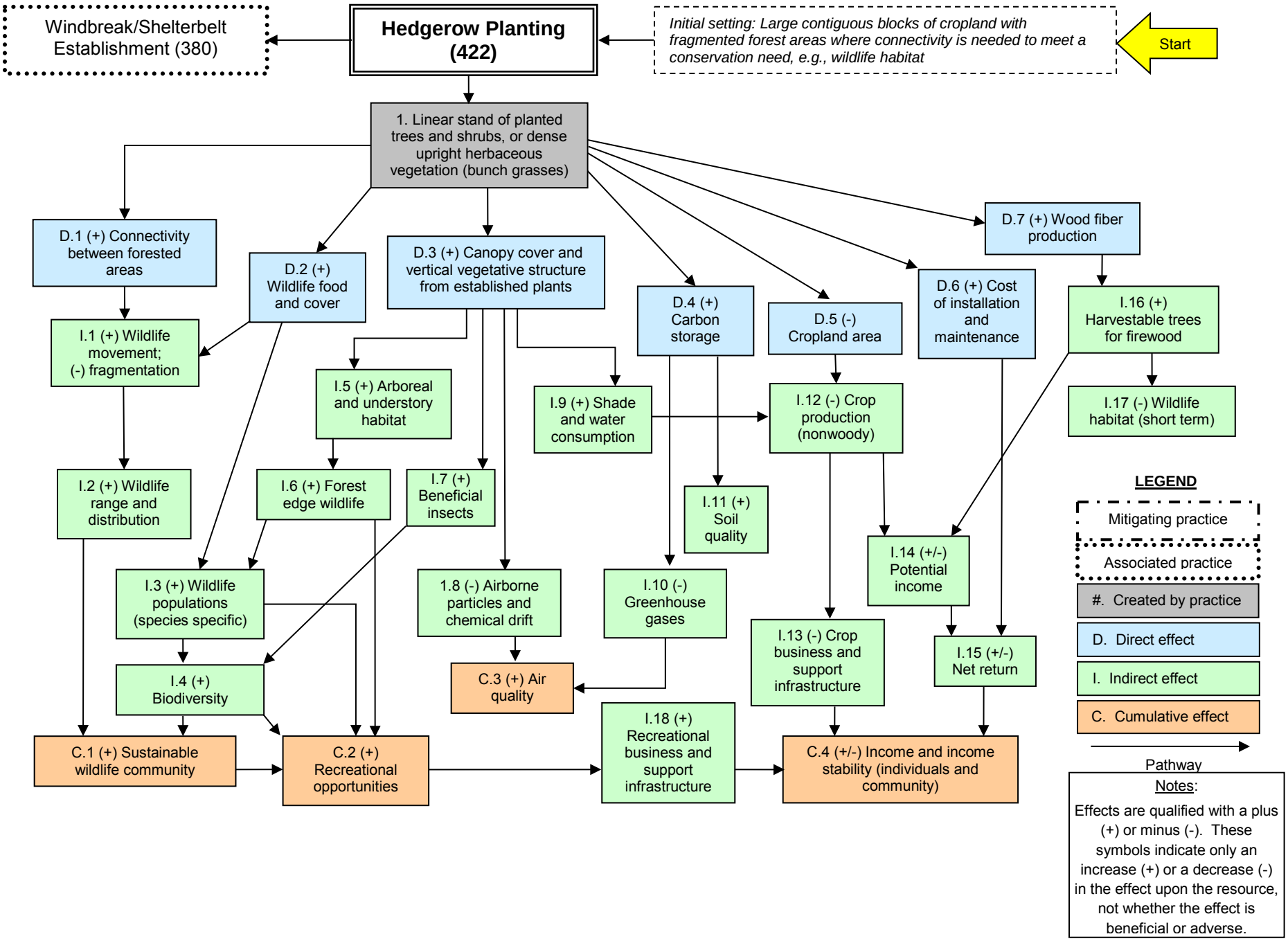
Windbreak/Shelterbelt Establishment (380)
Hedgerow Planting (422)
Initial setting: Large contiguous blocks of cropland with fragmented forest areas where connectivity is needed to meet a conservation need, e.g., wildlife habitat
Start
1. Linear stand of planted trees and shrubs, or dense upright herbaceous vegetation (bunch grasses)
D.1 (+) Connectivity between forested areas
D.2 (+) Wildlife food and cover
D.3 (+) Canopy cover and vertical vegetative structure from established plants
D.4 (+) Carbon storage
D.5 (-) Cropland area
D.6 (+) Cost of installation and maintenance
D.7 (+) Wood fiber production
I.1 (+) Wildlife movement; (-) fragmentation
I.5 (+) Arboreal and understory habitat
I.9 (+) Shade and water consumption
I.12 (-) Crop production (nonwoody)
I.16 (+) Harvestable trees for firewood
I.17 (-) Wildlife habitat (short term)
I.2 (+) Wildlife range and distribution
I.6 (+) Forest edge wildlife
I.7 (+) Beneficial insects
I.11 (+) Soil quality
I.14 (+/-) Potential income
I.3 (+) Wildlife populations (species specific)
1.8 (-) Airborne particles and chemical drift
I.10 (-) Greenhouse gases
I.13 (-) Crop business and support infrastructure
I.15 (+/-) Net return
I.4 (+) Biodiversity
C.3 (+) Air quality
I.18 (+) Recreational business and support infrastructure
C.1 (+) Sustainable wildlife community
C.2 (+) Recreational opportunities
C.4 (+/-) Income and income stability (individuals and community)
LEGEND
Mitigating practice
Associated practice
#. Created by practice
D. Direct effect
I. Indirect effect
C. Cumulative effect
Pathway
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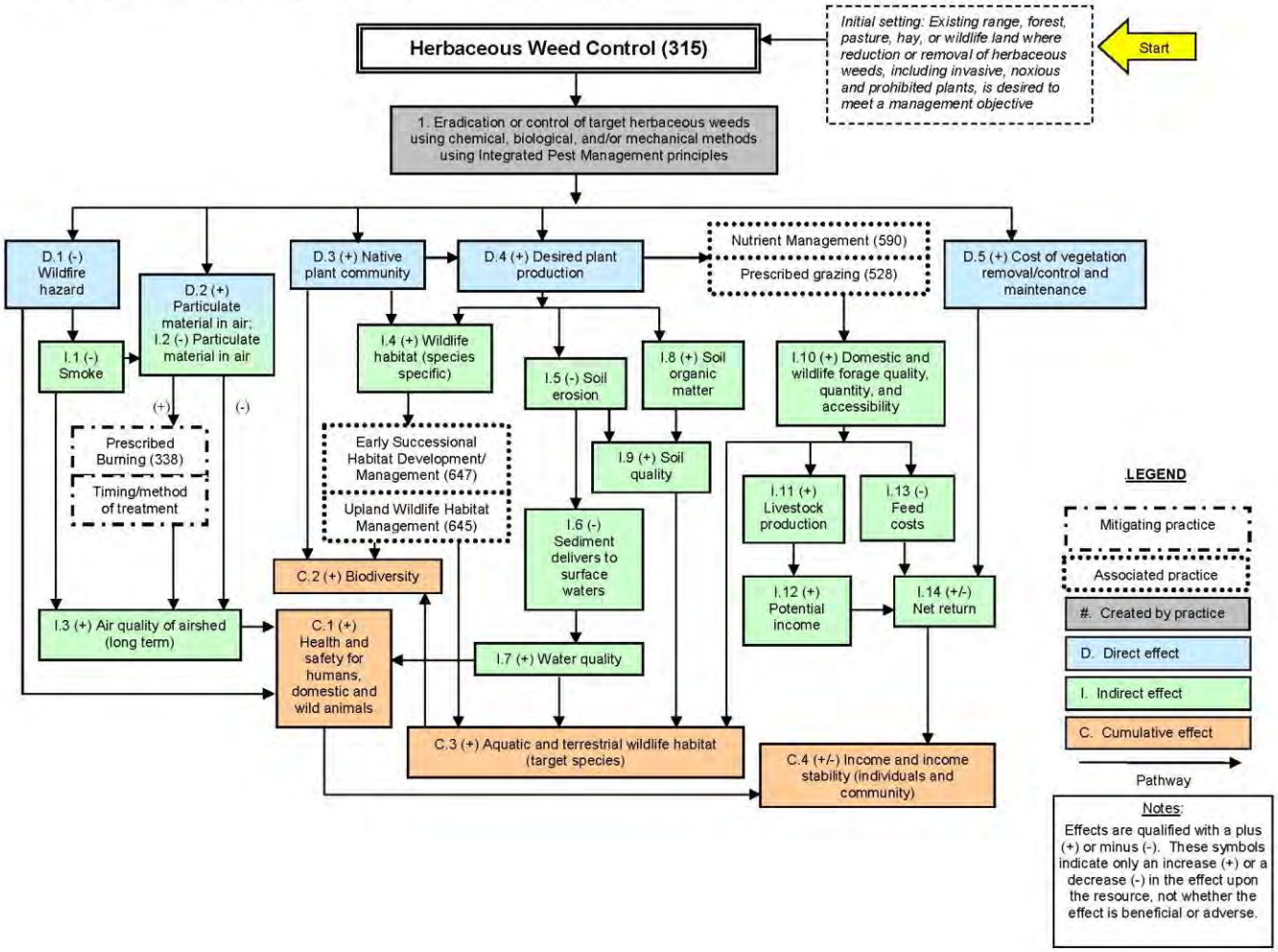
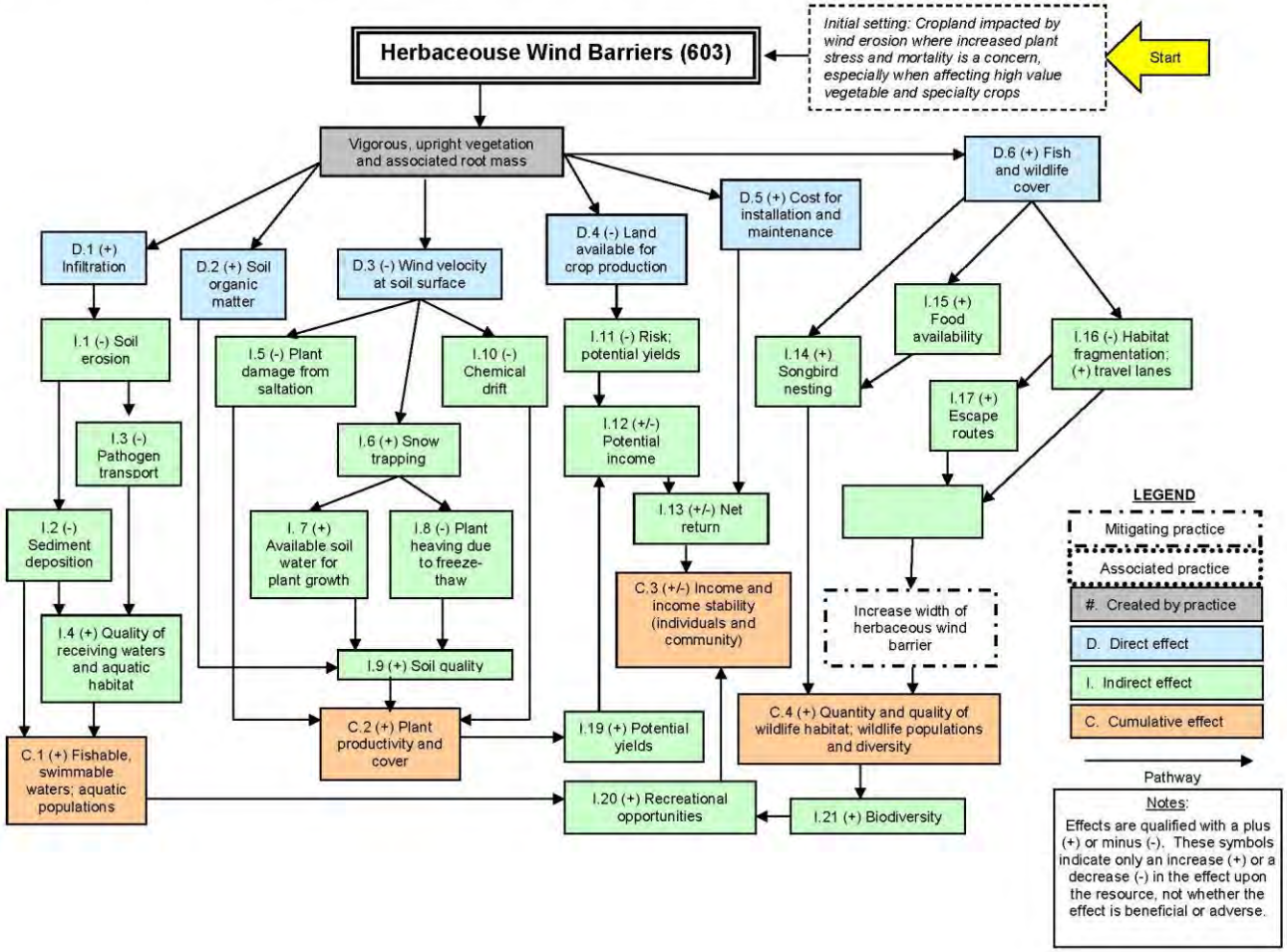
NRCS CONSERVATION PRACTICE EFFECTS - NETWORK DIAGRAM

March 2014



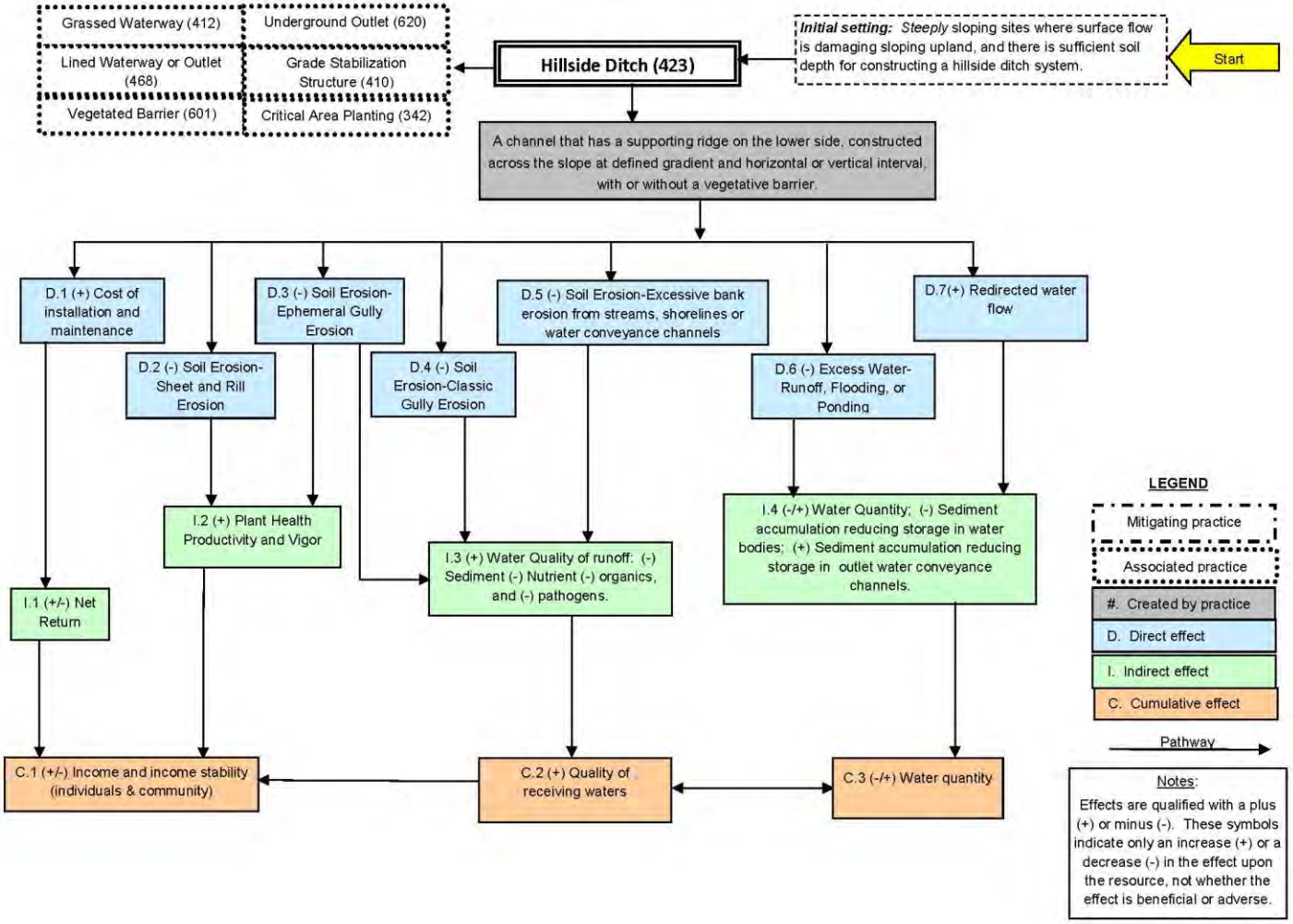
NRCS CONSERVATION PRACTICE EFFECTS - NETWORK DIAGRAM

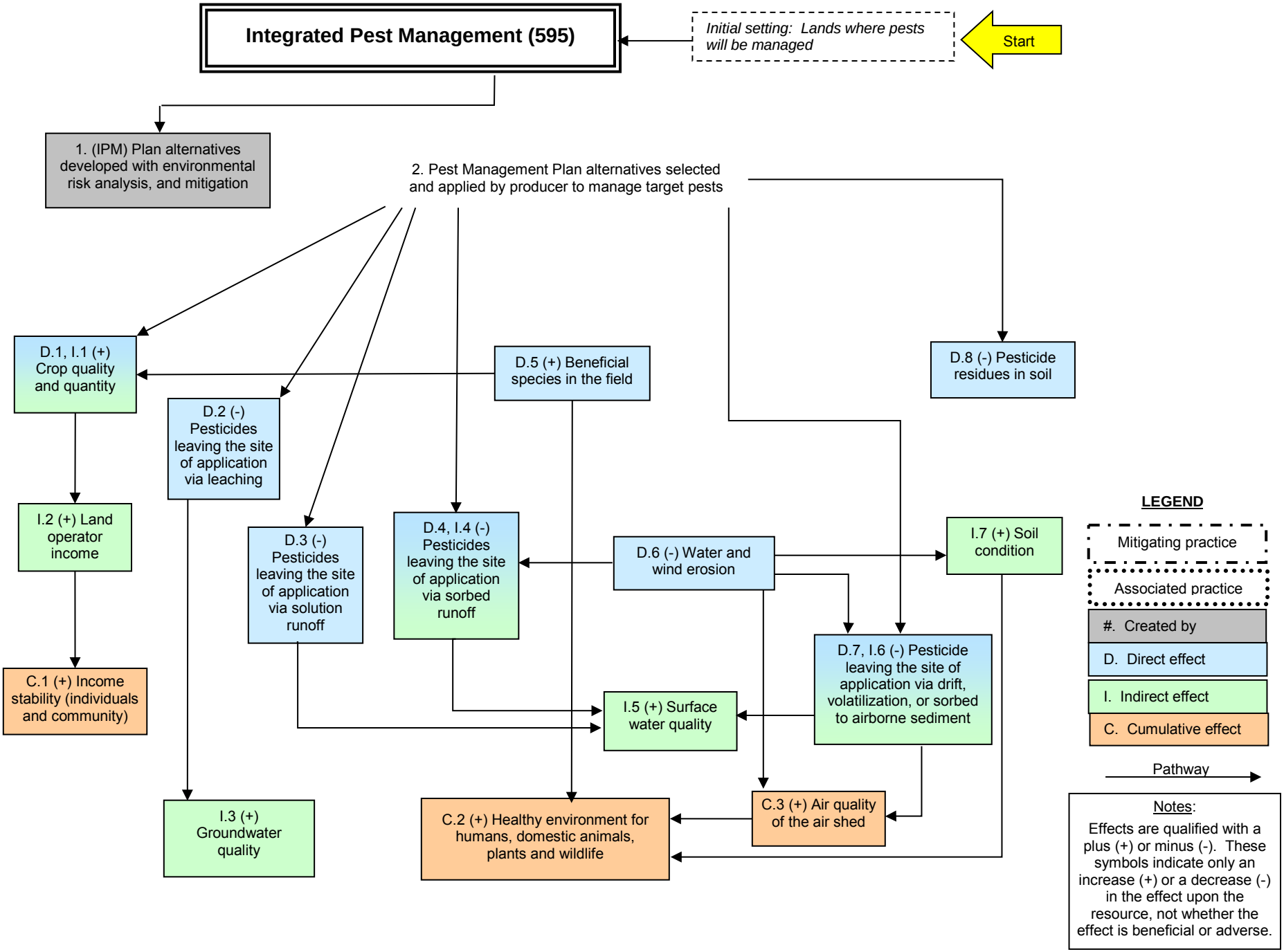
March 2014



NRCS CONSERVATION PRACTICE EFFECTS - NETWORK DIAGRAM

May 2014




Integrated Pest Management (595)
Initial setting: Lands where pests will be managed
Start
1. (IPM) Plan alternatives developed with environmental risk analysis, and mitigation
2. Pest Management Plan alternatives selected and applied by producer to manage target pests
D.1, I.1 (+) Crop quality and quantity
D.5 (+) Beneficial species in the field
D.8 (-) Pesticide residues in soil
D.2 (-) Pesticides leaving the site of application via leaching
I.2 (+) Land operator income
D.3 (-) Pesticides leaving the site of application via solution runoff
D.4, I.4 (-) Pesticides leaving the site of application via sorbed runoff
D.6 (-) Water and wind erosion
I.7 (+) Soil condition
D.7, I.6 (-) Pesticide leaving the site of application via drift, volatilization, or sorbed to airborne sediment
C.1 (+) Income stability (individuals and community)
I.5 (+) Surface water quality
I.3 (+) Groundwater quality
C.2 (+) Healthy environment for humans, domestic animals, plants and wildlife
C.3 (+) Air quality of the air shed
LEGEND
Mitigating practice
Associated practice
#. Created by
D. Direct effect
I. Indirect effect
C. Cumulative effect
Pathway
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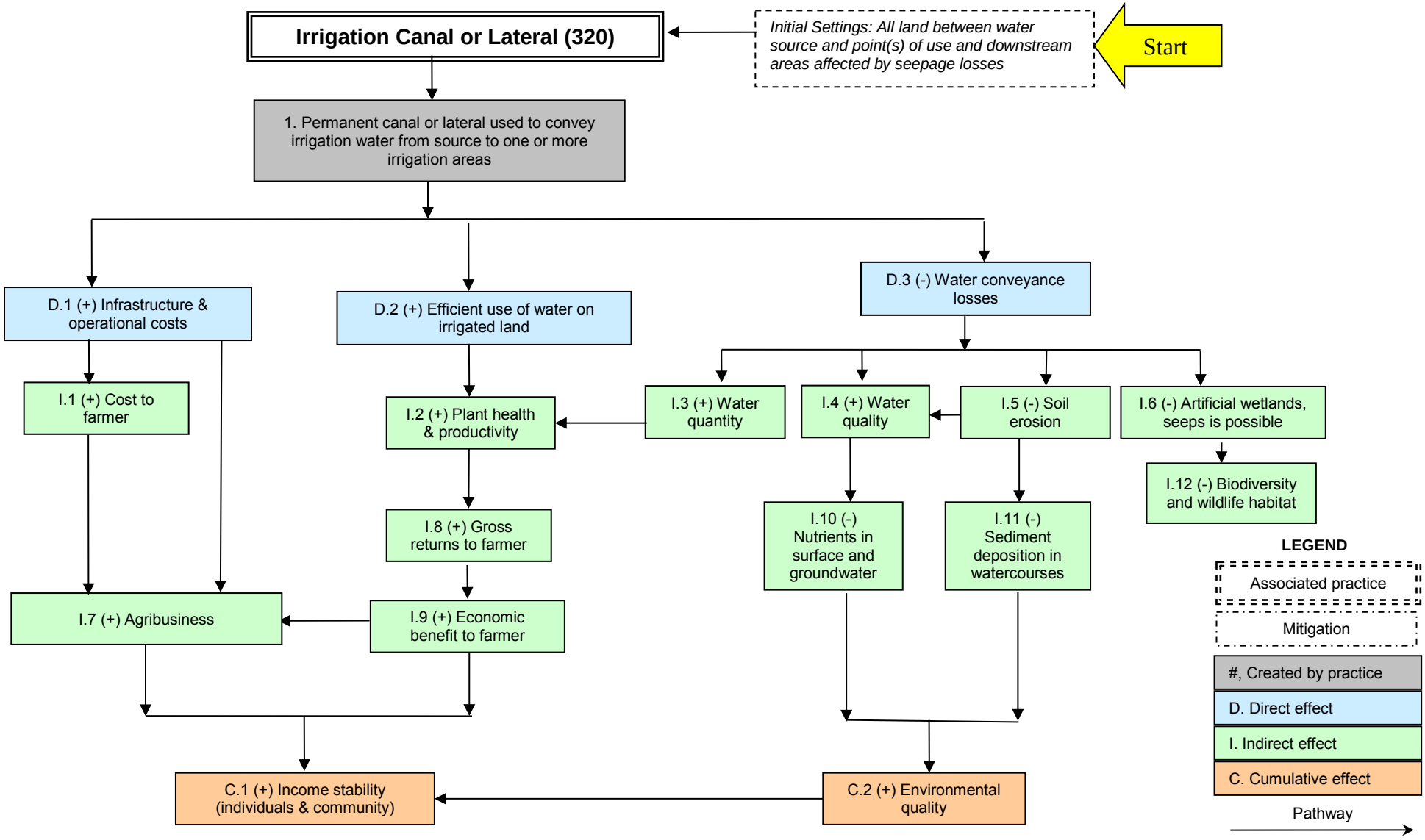

LEGEND

- Associated practice
- Mitigation
- #, Created by practice
- D. Direct effect
- I. Indirect effect
- C. Cumulative effect
- Pathway

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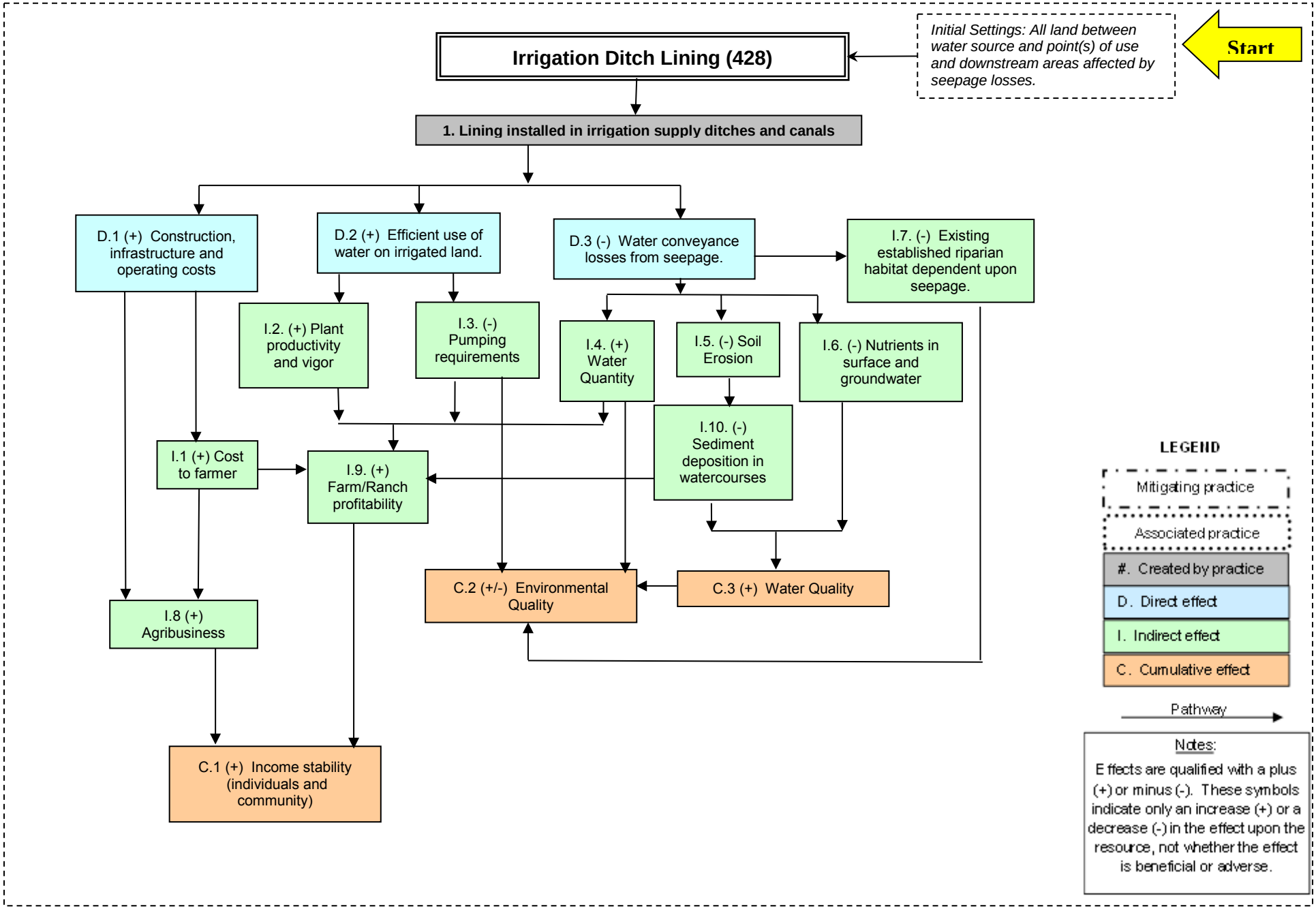
Irrigation Ditch Lining (428)
Initial Settings: All land between water source and point(s) of use and downstream areas affected by seepage losses.
Start
1. Lining installed in irrigation supply ditches and canals
D.1 (+) Construction, infrastructure and operating costs
D.2 (+) Efficient use of water on irrigated land.
D.3 (-) Water conveyance losses from seepage.
I.7. (-) Existing established riparian habitat dependent upon seepage.
I.2. (+) Plant productivity and vigor
I.3. (-) Pumping requirements
I.4. (+) Water Quantity
I.5. (-) Soil Erosion
I.6. (-) Nutrients in surface and groundwater
I.10. (-) Sediment deposition in watercourses
I.1 (+) Cost to farmer
I.9. (+) Farm/Ranch profitability
C.2 (+/-) Environmental Quality
C.3 (+) Water Quality
I.8 (+) Agribusiness
C.1 (+) Income stability (individuals and community)
LEGEND
Mitigating practice
Associated practice
#. Created by practice
D. Direct effect
I. Indirect effect
C. Cumulative effect
Pathway
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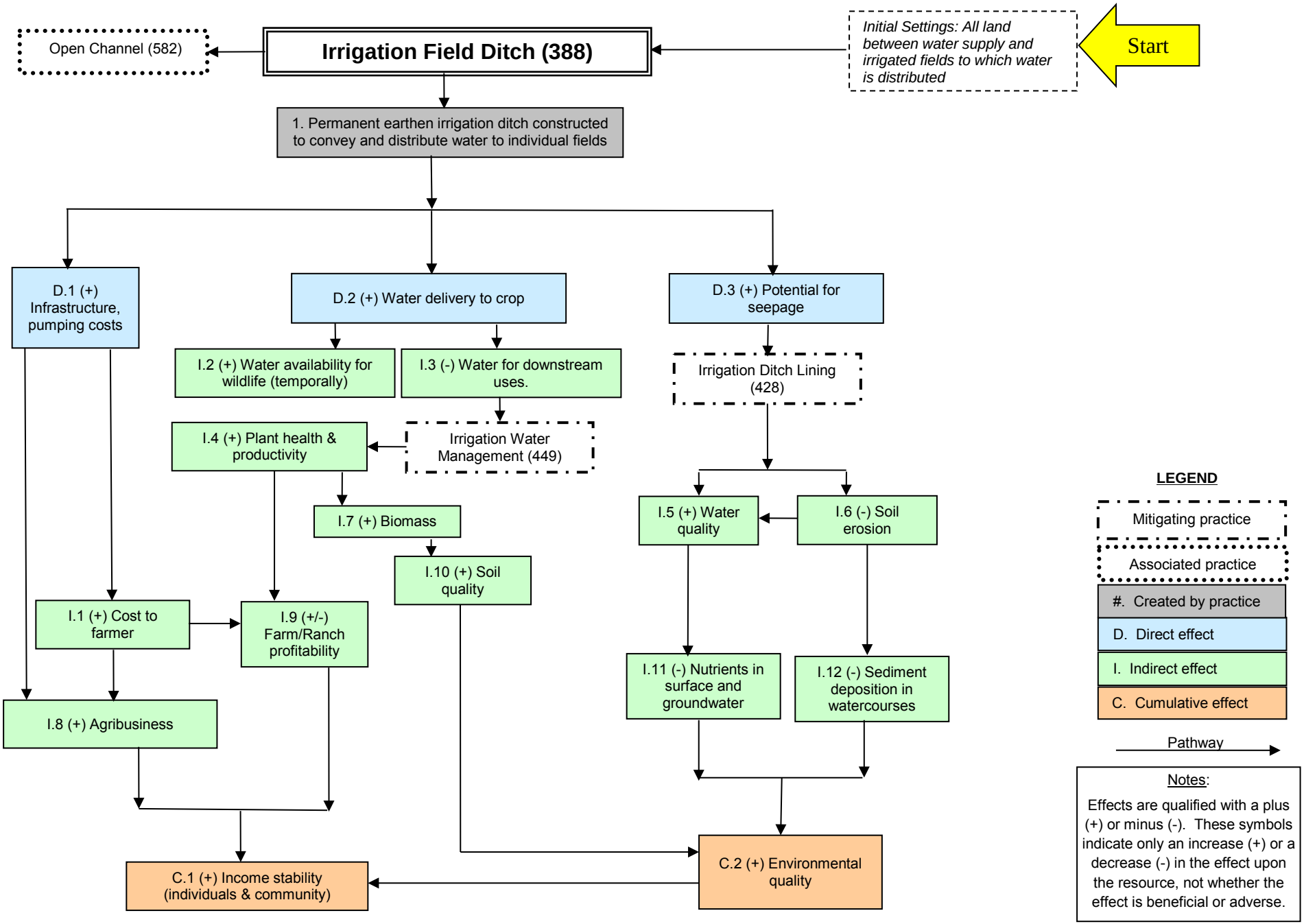
Open Channel (582)
Irrigation Field Ditch (388)
Initial Settings: All land between water supply and irrigated fields to which water is distributed
Start
1. Permanent earthen irrigation ditch constructed to convey and distribute water to individual fields
D.1 (+) Infrastructure, pumping costs
D.2 (+) Water delivery to crop
D.3 (+) Potential for seepage
I.2 (+) Water availability for wildlife (temporally)
I.3 (-) Water for downstream uses.
Irrigation Ditch Lining (428)
I.4 (+) Plant health & productivity
Irrigation Water Management (449)
I.7 (+) Biomass
I.5 (+) Water quality
I.6 (-) Soil erosion
I.10 (+) Soil quality
I.1 (+) Cost to farmer
I.9 (+/-) Farm/Ranch profitability
I.11 (-) Nutrients in surface and groundwater
I.12 (-) Sediment deposition in watercourses
I.8 (+) Agribusiness
C.1 (+) Income stability (individuals & community)
C.2 (+) Environmental quality
LEGEND
Mitigating practice
Associated practice
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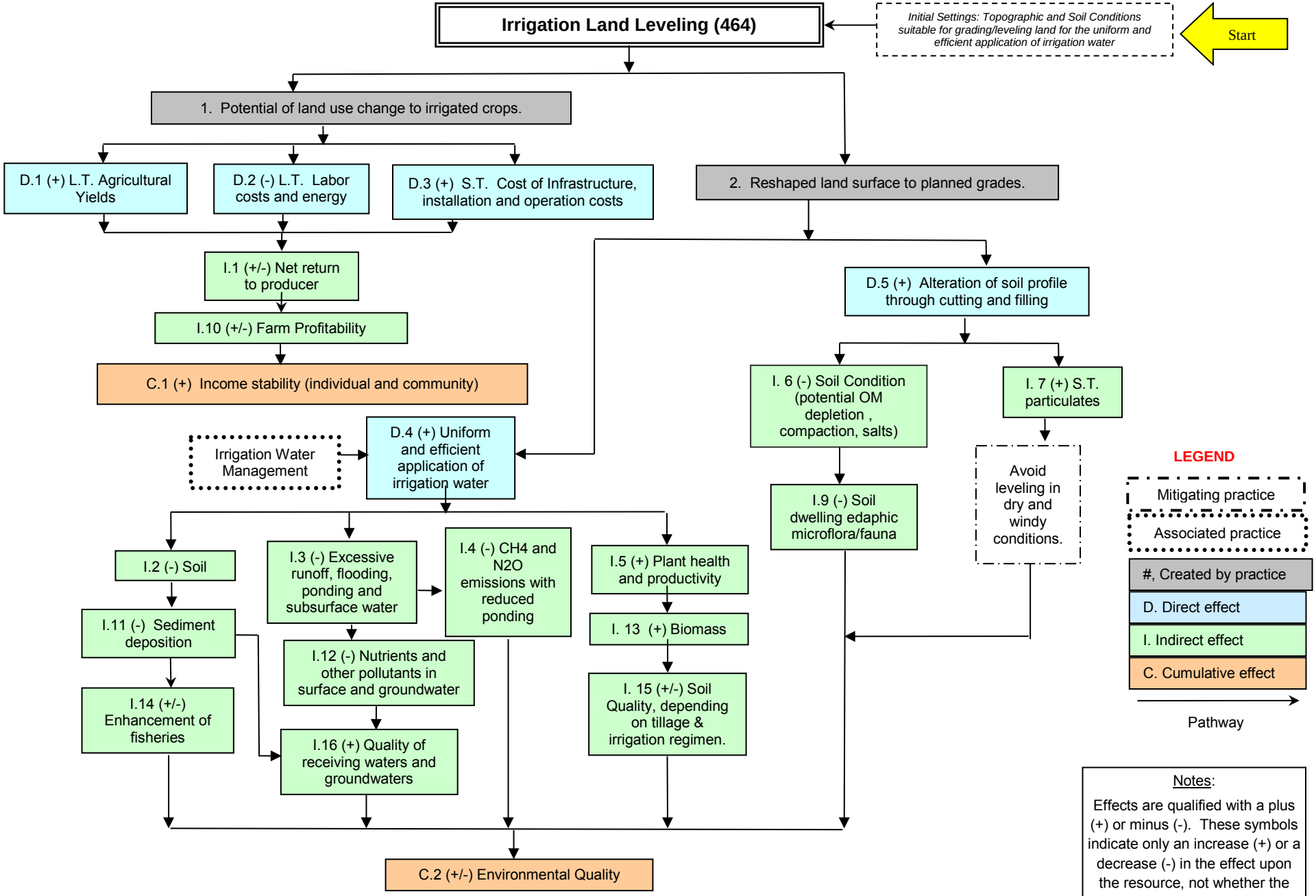

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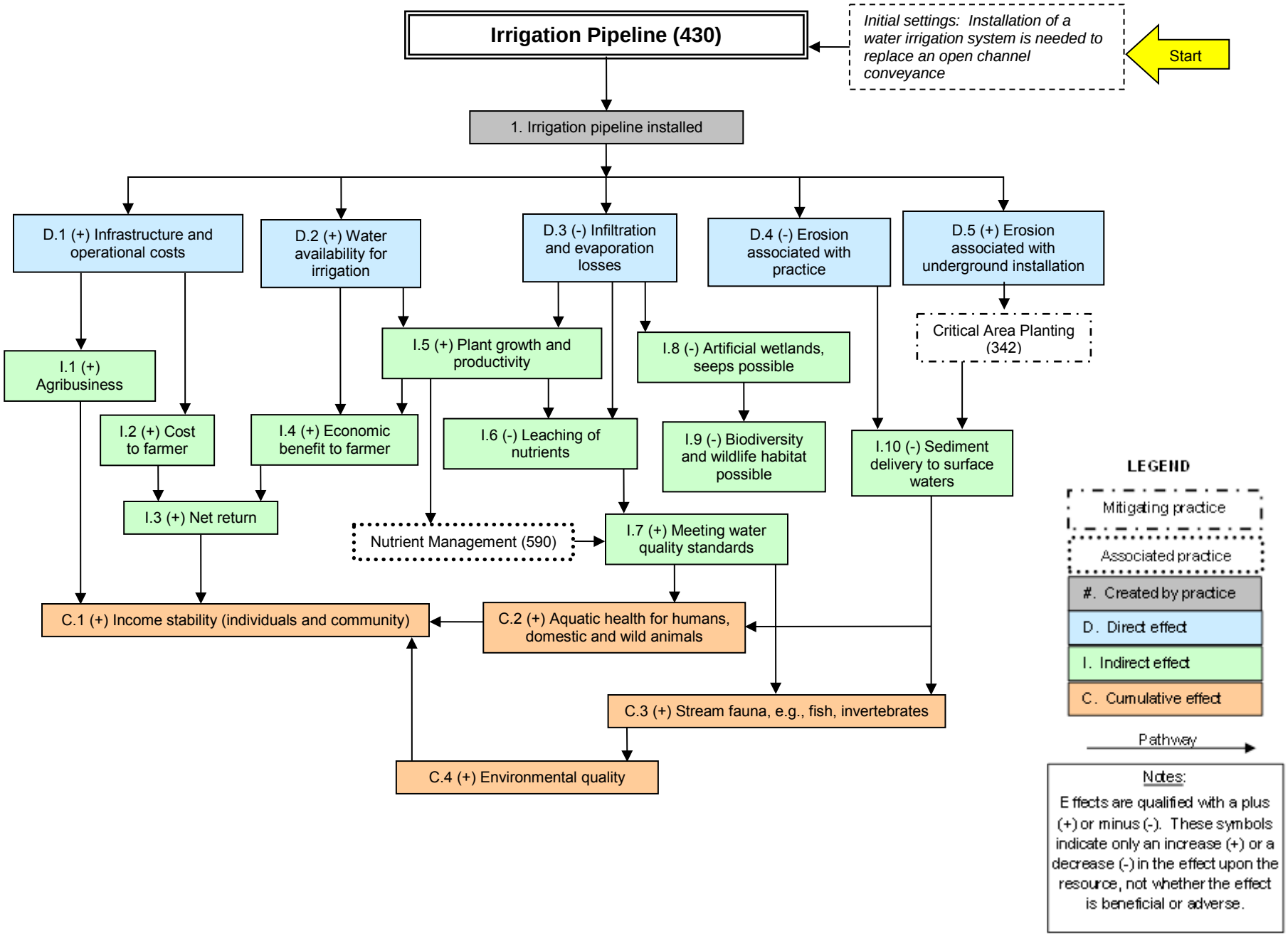
Network Diagram 66


Irrigation Pipeline (430)
Initial settings: Installation of a water irrigation system is needed to replace an open channel conveyance
Start
1. Irrigation pipeline installed
D.1 (+) Infrastructure and operational costs
D.2 (+) Water availability for irrigation
D.3 (-) Infiltration and evaporation losses
D.4 (-) Erosion associated with practice
D.5 (+) Erosion associated with underground installation
Critical Area Planting (342)
I.1 (+) Agribusiness
I.2 (+) Cost to farmer
I.3 (+) Net return
I.4 (+) Economic benefit to farmer
I.5 (+) Plant growth and productivity
I.6 (-) Leaching of nutrients
I.7 (+) Meeting water quality standards
I.8 (-) Artificial wetlands, seeps possible
I.9 (-) Biodiversity and wildlife habitat possible
I.10 (-) Sediment delivery to surface waters
Nutrient Management (590)
C.1 (+) Income stability (individuals and community)
C.2 (+) Aquatic health for humans, domestic and wild animals
C.3 (+) Stream fauna, e.g., fish, invertebrates
C.4 (+) Environmental quality
LEGEND
Mitigating practice
Associated practice
#. Created by practice
D. Direct effect
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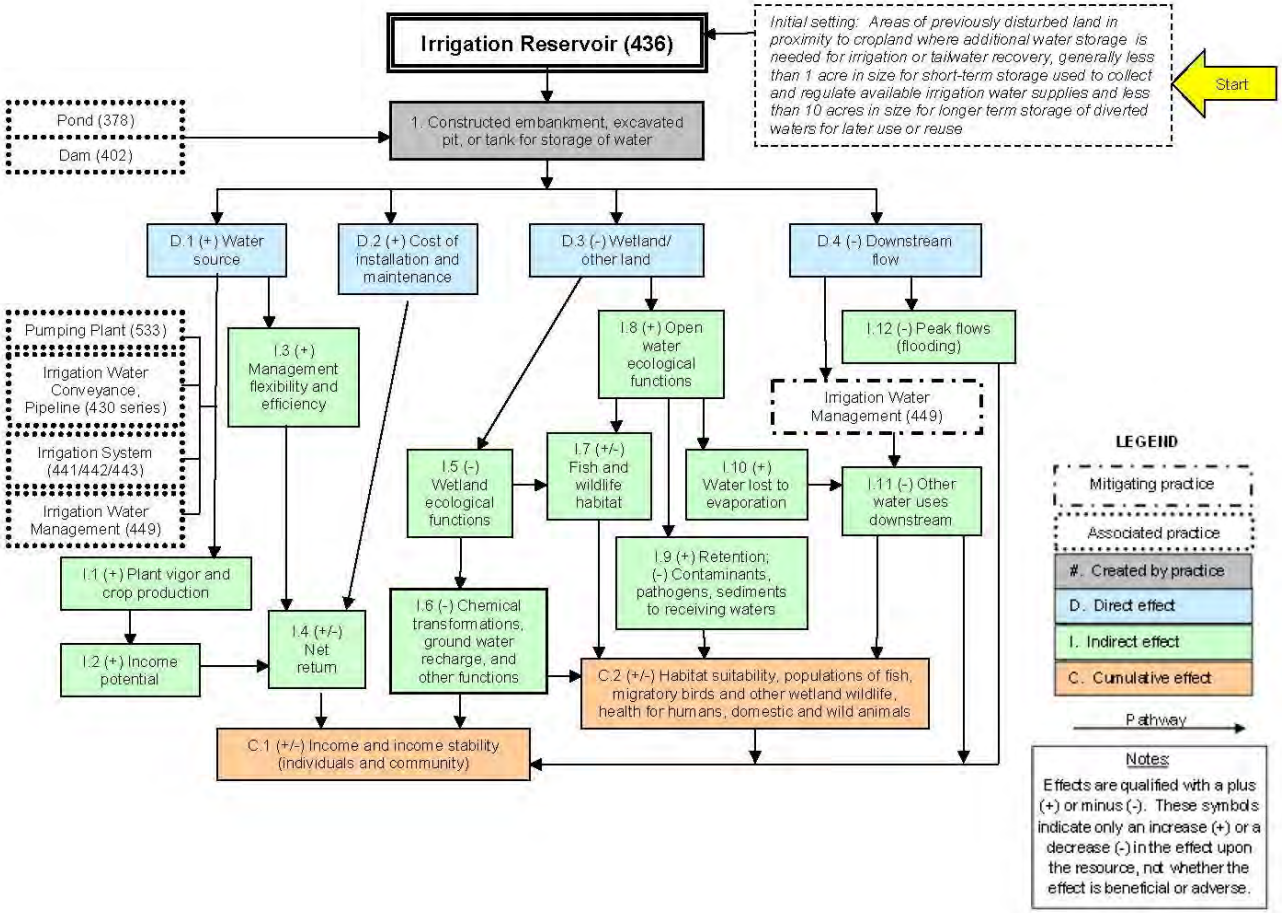
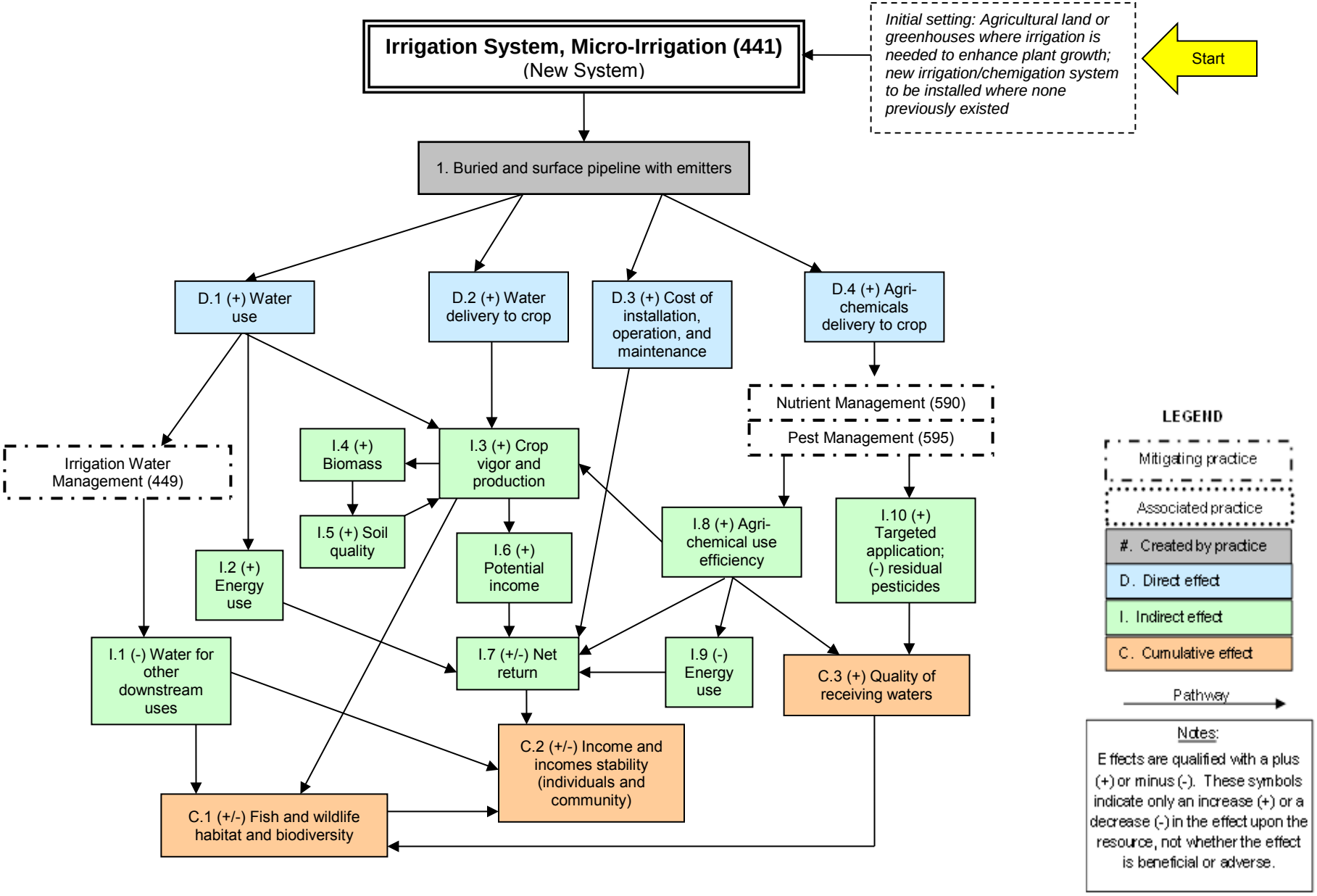
NRCS CONSERVATION PRACTICE EFFECTS - NETWORK DIAGRAM

March 2014




Irrigation System, Micro-Irrigation (441)
(New System)
Initial setting: Agricultural land or greenhouses where irrigation is needed to enhance plant growth; new irrigation/chemigation system to be installed where none previously existed
Start
1. Buried and surface pipeline with emitters
D.1 (+) Water use
D.2 (+) Water delivery to crop
D.3 (+) Cost of installation, operation, and maintenance
D.4 (+) Agri-chemicals delivery to crop
Nutrient Management (590)
Pest Management (595)
Irrigation Water Management (449)
I.4 (+) Biomass
I.3 (+) Crop vigor and production
I.5 (+) Soil quality
I.6 (+) Potential income
I.8 (+) Agri-chemical use efficiency
I.10 (+) Targeted application; (-) residual pesticides
I.2 (+) Energy use
I.1 (-) Water for other downstream uses
I.7 (+/-) Net return
I.9 (-) Energy use
C.3 (+) Quality of receiving waters
C.2 (+/-) Income and incomes stability (individuals and community)
C.1 (+/-) Fish and wildlife habitat and biodiversity
LEGEND
Mitigating practice
Associated practice
#. Created by practice
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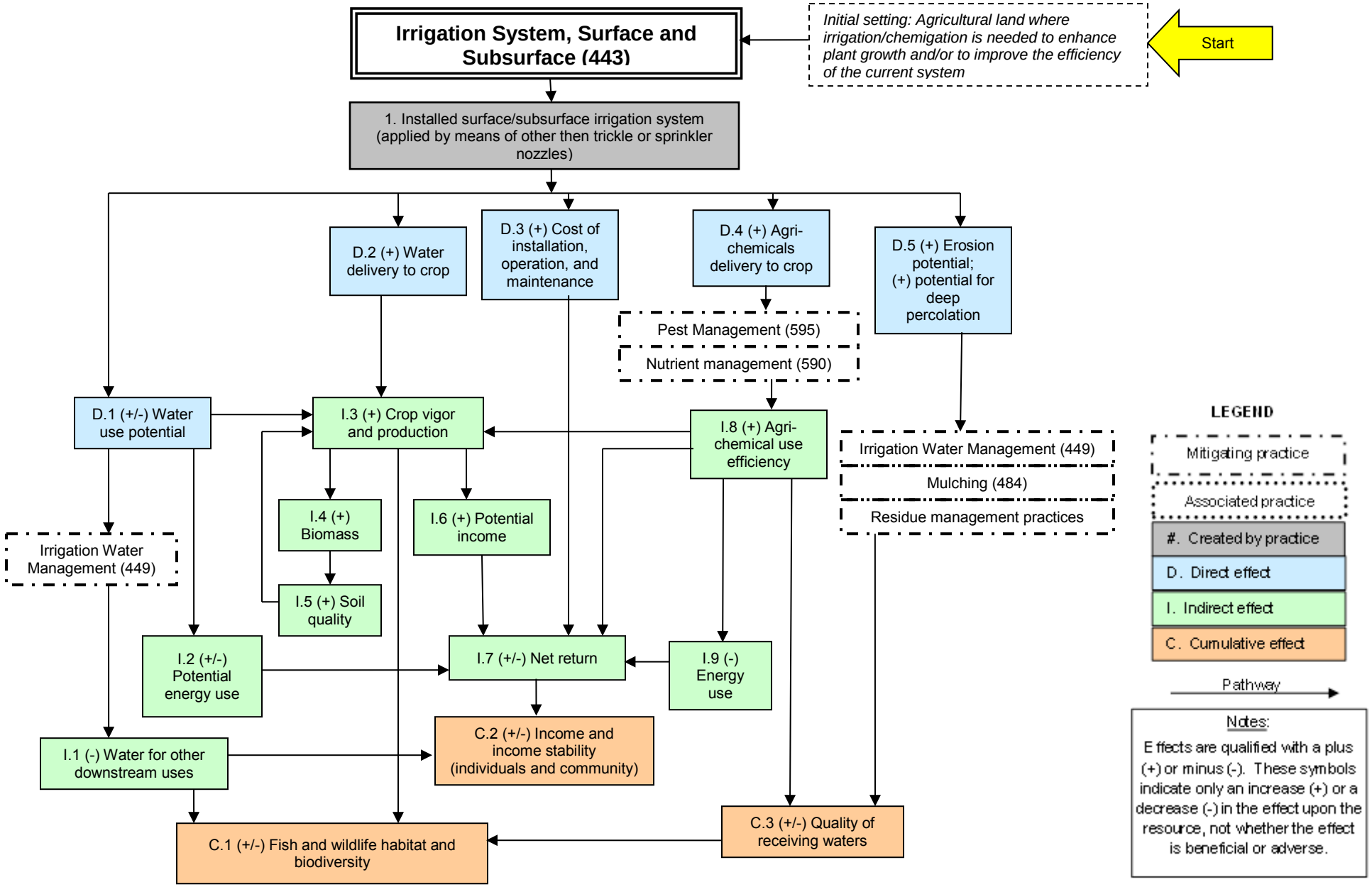
Irrigation System, Surface and Subsurface (443)
Initial setting: Agricultural land where irrigation/chemigation is needed to enhance plant growth and/or to improve the efficiency of the current system
Start
1. Installed surface/subsurface irrigation system (applied by means of other then trickle or sprinkler nozzles)
D.2 (+) Water delivery to crop
D.3 (+) Cost of installation, operation, and maintenance
D.4 (+) Agri-chemicals delivery to crop
D.5 (+) Erosion potential; (+) potential for deep percolation
Pest Management (595)
Nutrient management (590)
D.1 (+/-) Water use potential
I.3 (+) Crop vigor and production
I.8 (+) Agri-chemical use efficiency
Irrigation Water Management (449)
Mulching (484)
Residue management practices
I.4 (+) Biomass
I.6 (+) Potential income
Irrigation Water Management (449)
I.5 (+) Soil quality
I.2 (+/-) Potential energy use
I.7 (+/-) Net return
I.9 (-) Energy use
C.2 (+/-) Income and income stability (individuals and community)
I.1 (-) Water for other downstream uses
C.3 (+/-) Quality of receiving waters
C.1 (+/-) Fish and wildlife habitat and biodiversity
LEGEND
Mitigating practice
Associated practice
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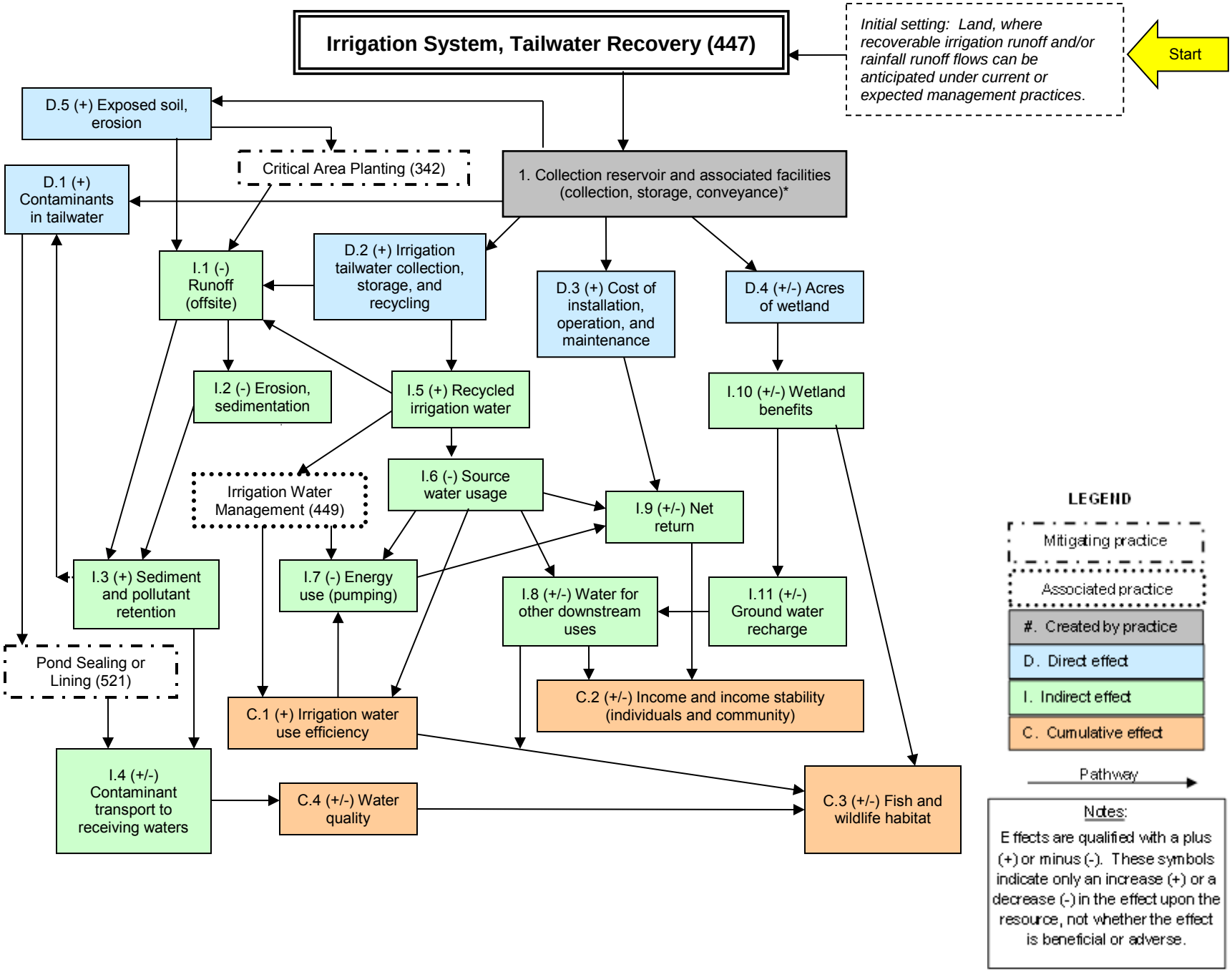
Irrigation System, Tailwater Recovery (447)
Initial setting: Land, where recoverable irrigation runoff and/or rainfall runoff flows can be anticipated under current or expected management practices.
Start
D.5 (+) Exposed soil, erosion
Critical Area Planting (342)
1. Collection reservoir and associated facilities (collection, storage, conveyance)*
D.1 (+) Contaminants in tailwater
I.1 (-) Runoff (offsite)
D.2 (+) Irrigation tailwater collection, storage, and recycling
D.3 (+) Cost of installation, operation, and maintenance
D.4 (+/-) Acres of wetland
I.2 (-) Erosion, sedimentation
I.5 (+) Recycled irrigation water
I.10 (+/-) Wetland benefits
Irrigation Water Management (449)
I.6 (-) Source water usage
I.9 (+/-) Net return
I.3 (+) Sediment and pollutant retention
I.7 (-) Energy use (pumping)
I.8 (+/-) Water for other downstream uses
I.11 (+/-) Ground water recharge
Pond Sealing or Lining (521)
C.1 (+) Irrigation water use efficiency
C.2 (+/-) Income and income stability (individuals and community)
I.4 (+/-) Contaminant transport to receiving waters
C.4 (+/-) Water quality
C.3 (+/-) Fish and wildlife habitat
LEGEND
Mitigating practice
Associated practice
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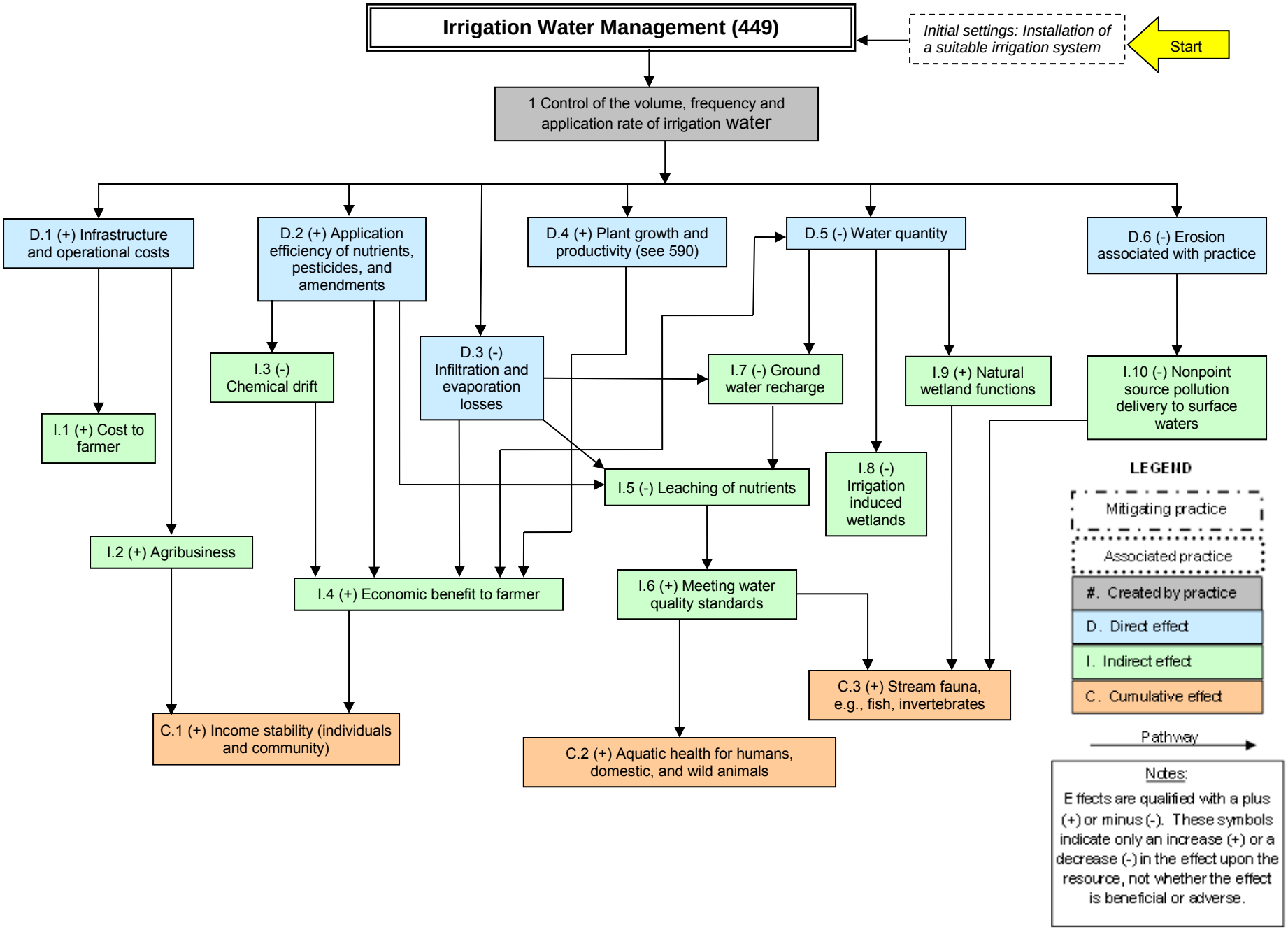
Irrigation Water Management (449)
Initial settings: Installation of a suitable irrigation system
Start
1 Control of the volume, frequency and application rate of irrigation water
D.1 (+) Infrastructure and operational costs
D.2 (+) Application efficiency of nutrients, pesticides, and amendments
D.4 (+) Plant growth and productivity (see 590)
D.5 (-) Water quantity
D.6 (-) Erosion associated with practice
D.3 (-) Infiltration and evaporation losses
I.3 (-) Chemical drift
I.7 (-) Ground water recharge
I.9 (+) Natural wetland functions
I.10 (-) Nonpoint source pollution delivery to surface waters
I.1 (+) Cost to farmer
I.5 (-) Leaching of nutrients
I.8 (-) Irrigation induced wetlands
I.2 (+) Agribusiness
I.4 (+) Economic benefit to farmer
I.6 (+) Meeting water quality standards
C.3 (+) Stream fauna, e.g., fish, invertebrates
C.1 (+) Income stability (individuals and community)
C.2 (+) Aquatic health for humans, domestic, and wild animals
LEGEND
Mitigating practice
Associated practice
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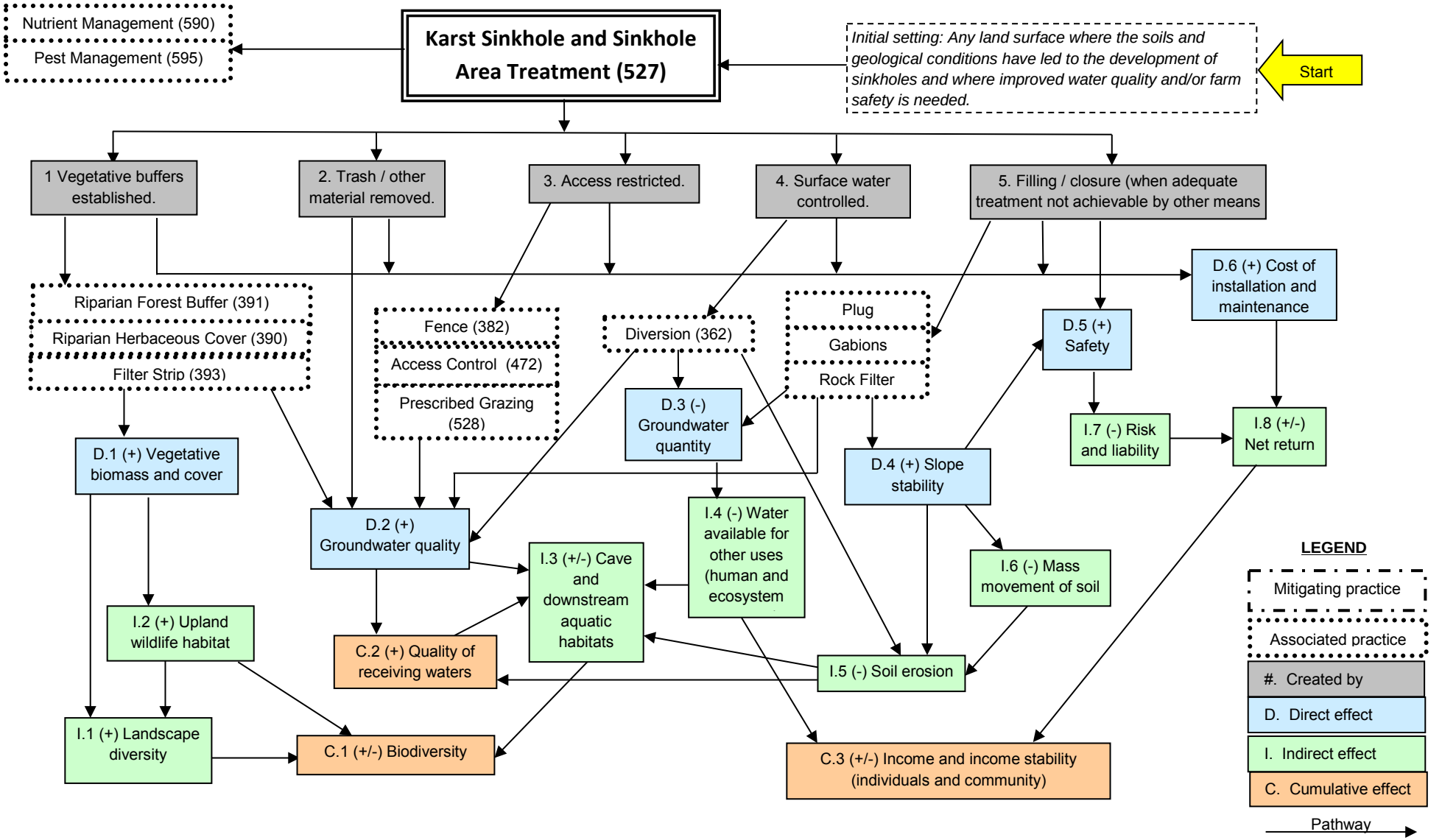

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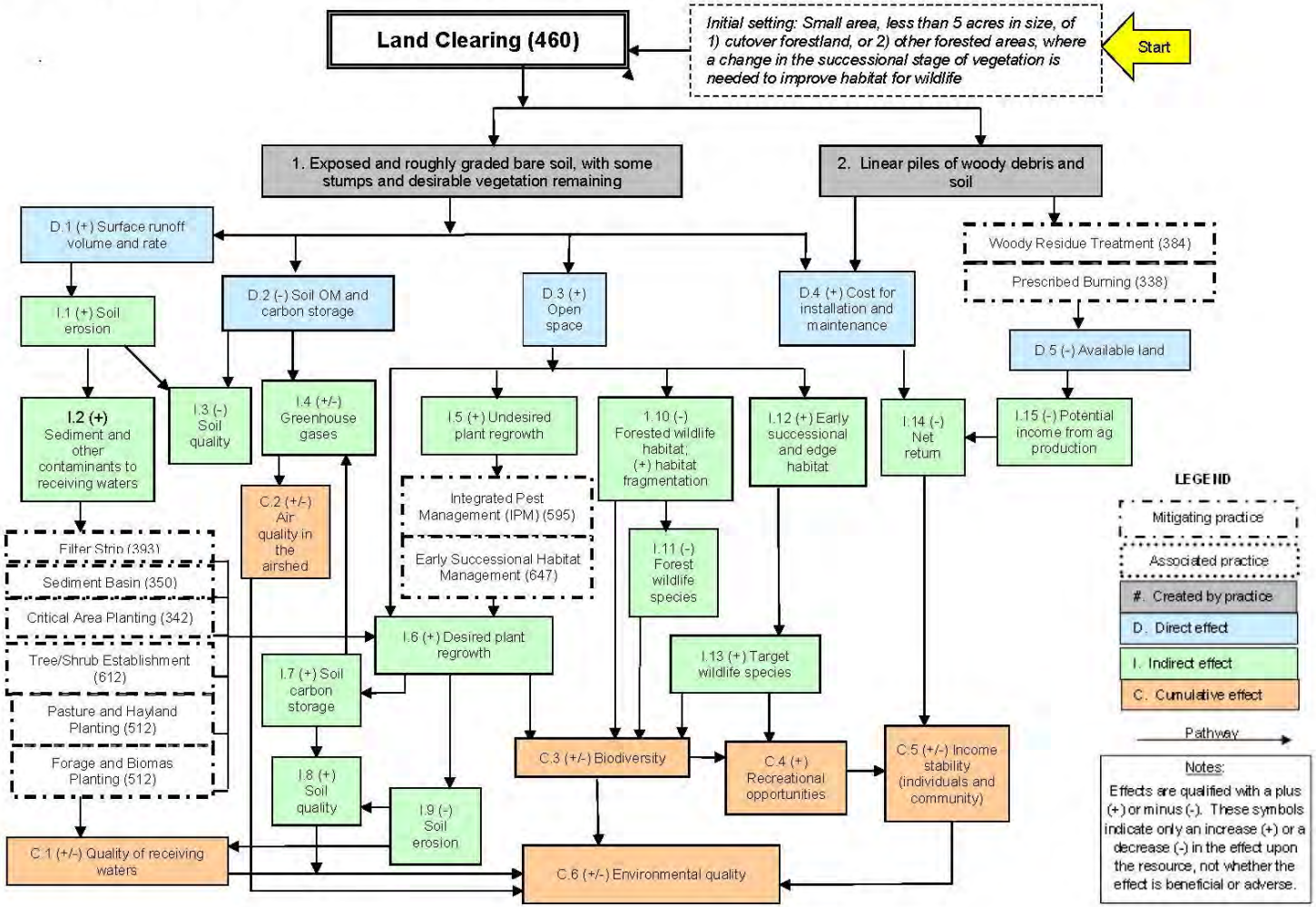
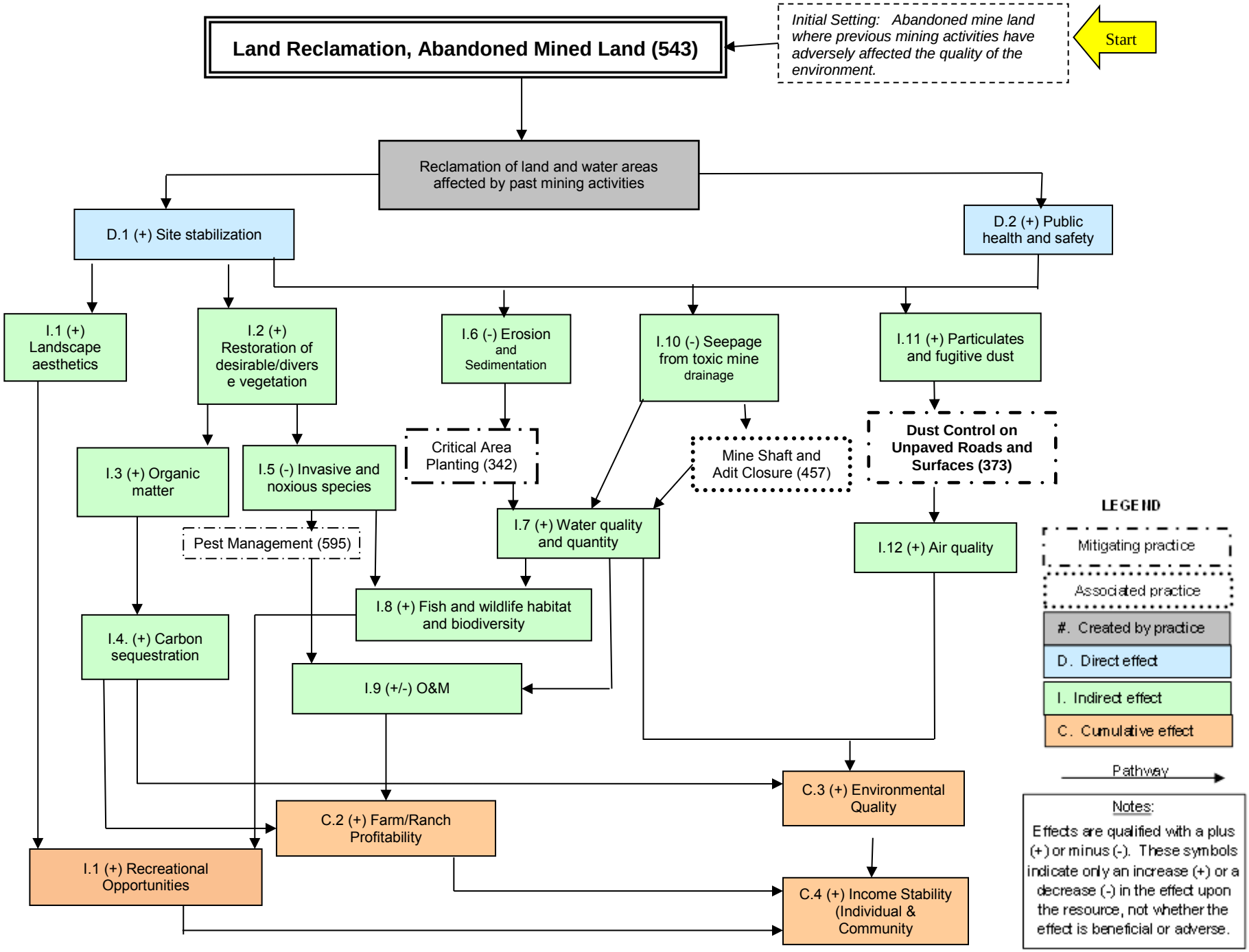
NRCS CONSERVATION PRACTICE EFFECTS - NETWORK DIAGRAM

March 2014




Land Reclamation, Abandoned Mined Land (543)
Initial Setting: Abandoned mine land where previous mining activities have adversely affected the quality of the environment.
Start
Reclamation of land and water areas affected by past mining activities
D.1 (+) Site stabilization
D.2 (+) Public health and safety
I.1 (+) Landscape aesthetics
I.2 (+) Restoration of desirable/diverse vegetation
I.6 (-) Erosion and Sedimentation
I.10 (-) Seepage from toxic mine drainage
I.11 (+) Particulates and fugitive dust
I.3 (+) Organic matter
I.5 (-) Invasive and noxious species
Critical Area Planting (342)
Mine Shaft and Adit Closure (457)
Dust Control on Unpaved Roads and Surfaces (373)
Pest Management (595)
I.7 (+) Water quality and quantity
I.12 (+) Air quality
I.8 (+) Fish and wildlife habitat and biodiversity
I.4. (+) Carbon sequestration
I.9 (+/-) O&M
C.3 (+) Environmental Quality
C.2 (+) Farm/Ranch Profitability
I.1 (+) Recreational Opportunities
C.4 (+) Income Stability (Individual & Community
LEGEND
Mitigating practice
Associated practice
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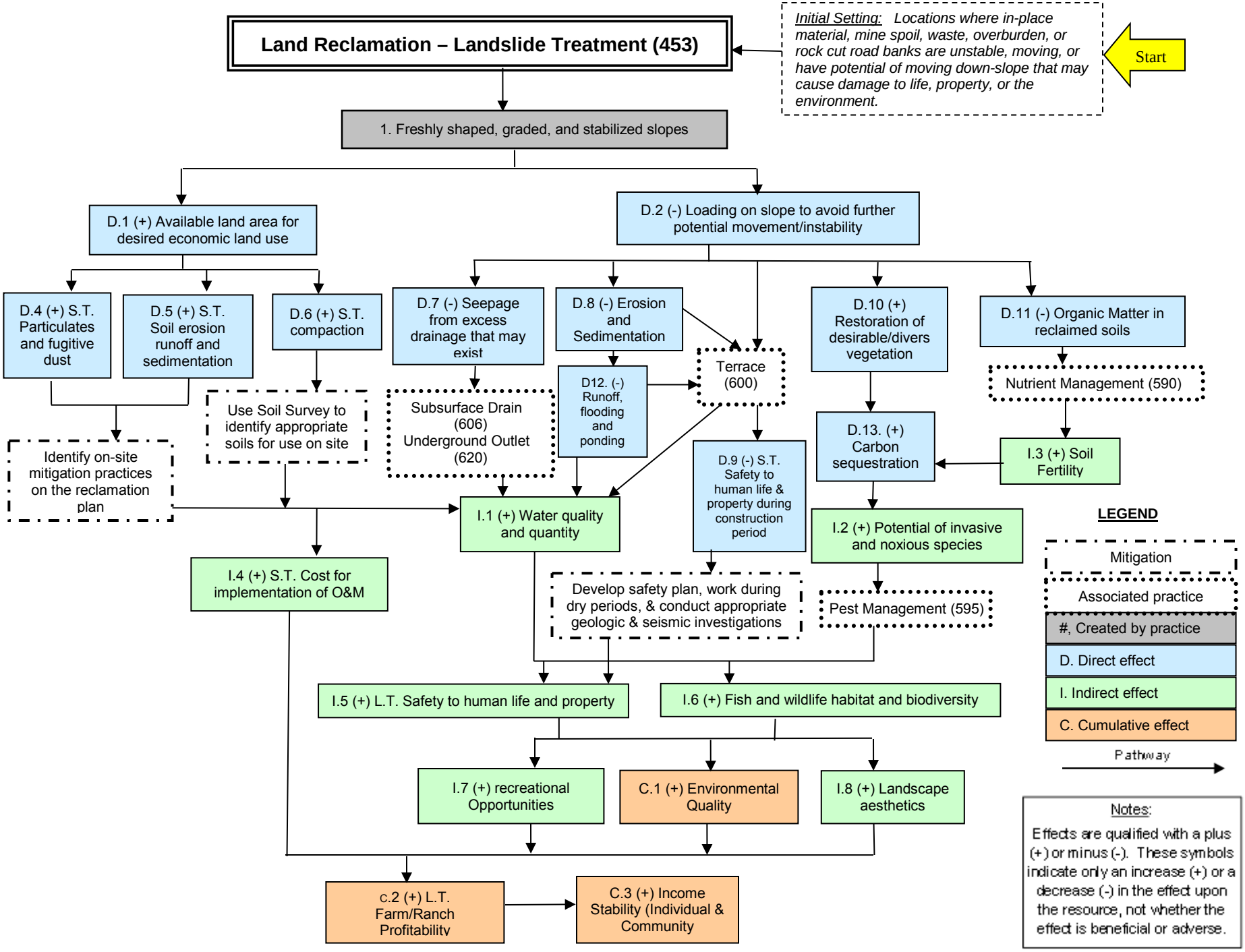
Land Reclamation – Landslide Treatment (453)
Initial Setting: Locations where in-place material, mine spoil, waste, overburden, or rock cut road banks are unstable, moving, or have potential of moving down-slope that may cause damage to life, property, or the environment.
Start
1. Freshly shaped, graded, and stabilized slopes
D.1 (+) Available land area for desired economic land use
D.2 (-) Loading on slope to avoid further potential movement/instability
D.4 (+) S.T. Particulates and fugitive dust
D.5 (+) S.T. Soil erosion runoff and sedimentation
D.6 (+) S.T. compaction
D.7 (-) Seepage from excess drainage that may exist
D.8 (-) Erosion and Sedimentation
D.10 (+) Restoration of desirable/divers vegetation
D.11 (-) Organic Matter in reclaimed soils
Terrace (600)
D12. (-) Runoff, flooding and ponding
Nutrient Management (590)
Use Soil Survey to identify appropriate soils for use on site
Subsurface Drain (606) Underground Outlet (620)
D.13. (+) Carbon sequestration
I.3 (+) Soil Fertility
Identify on-site mitigation practices on the reclamation plan
D.9 (-) S.T. Safety to human life & property during construction period
I.1 (+) Water quality and quantity
I.2 (+) Potential of invasive and noxious species
I.4 (+) S.T. Cost for implementation of O&M
Develop safety plan, work during dry periods, & conduct appropriate geologic & seismic investigations
Pest Management (595)
I.5 (+) L.T. Safety to human life and property
I.6 (+) Fish and wildlife habitat and biodiversity
I.7 (+) recreational Opportunities
C.1 (+) Environmental Quality
I.8 (+) Landscape aesthetics
c.2 (+) L.T. Farm/Ranch Profitability
C.3 (+) Income Stability (Individual & Community
LEGEND
Mitigation
Associated practice
#, Created by practice
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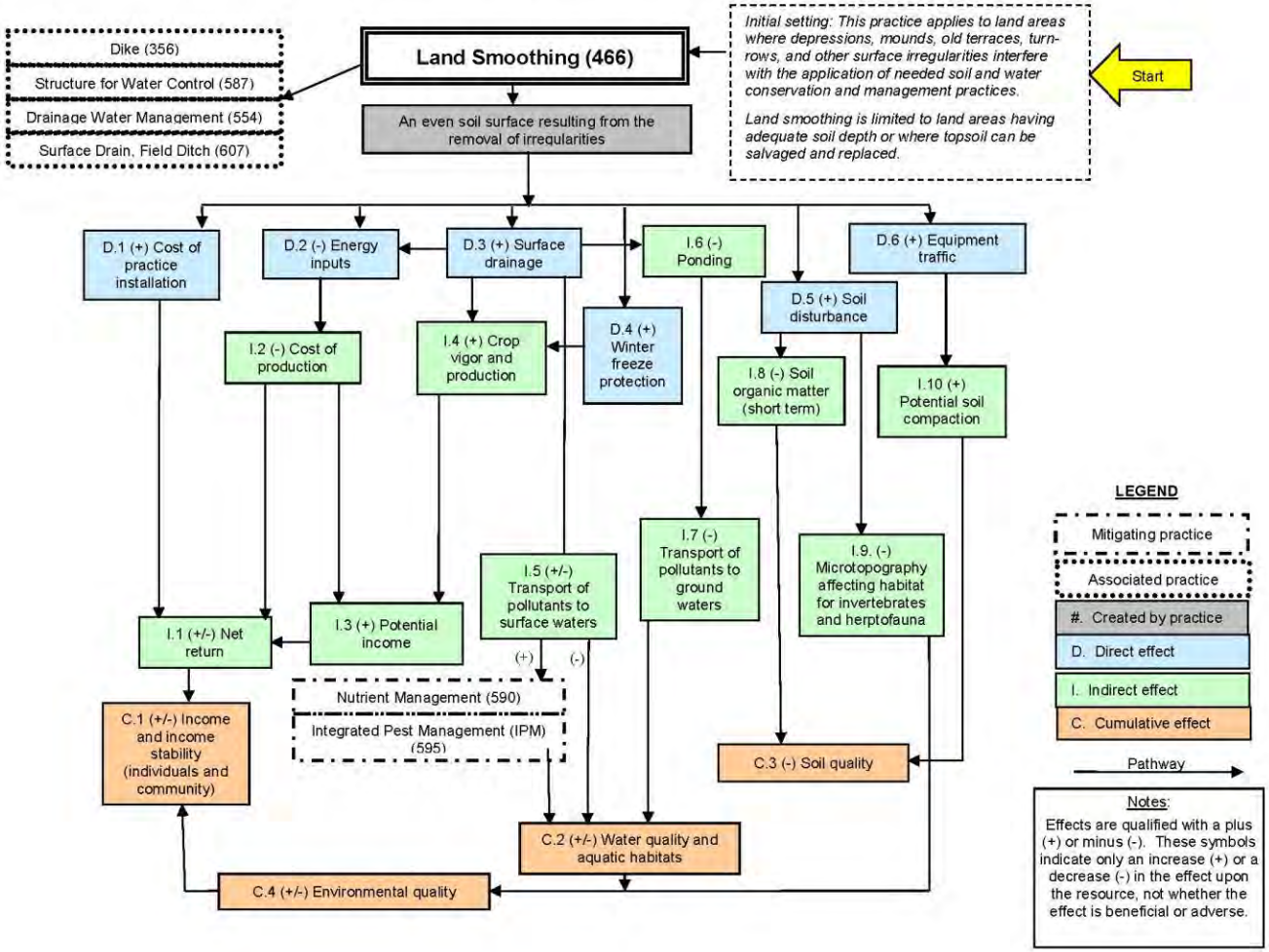
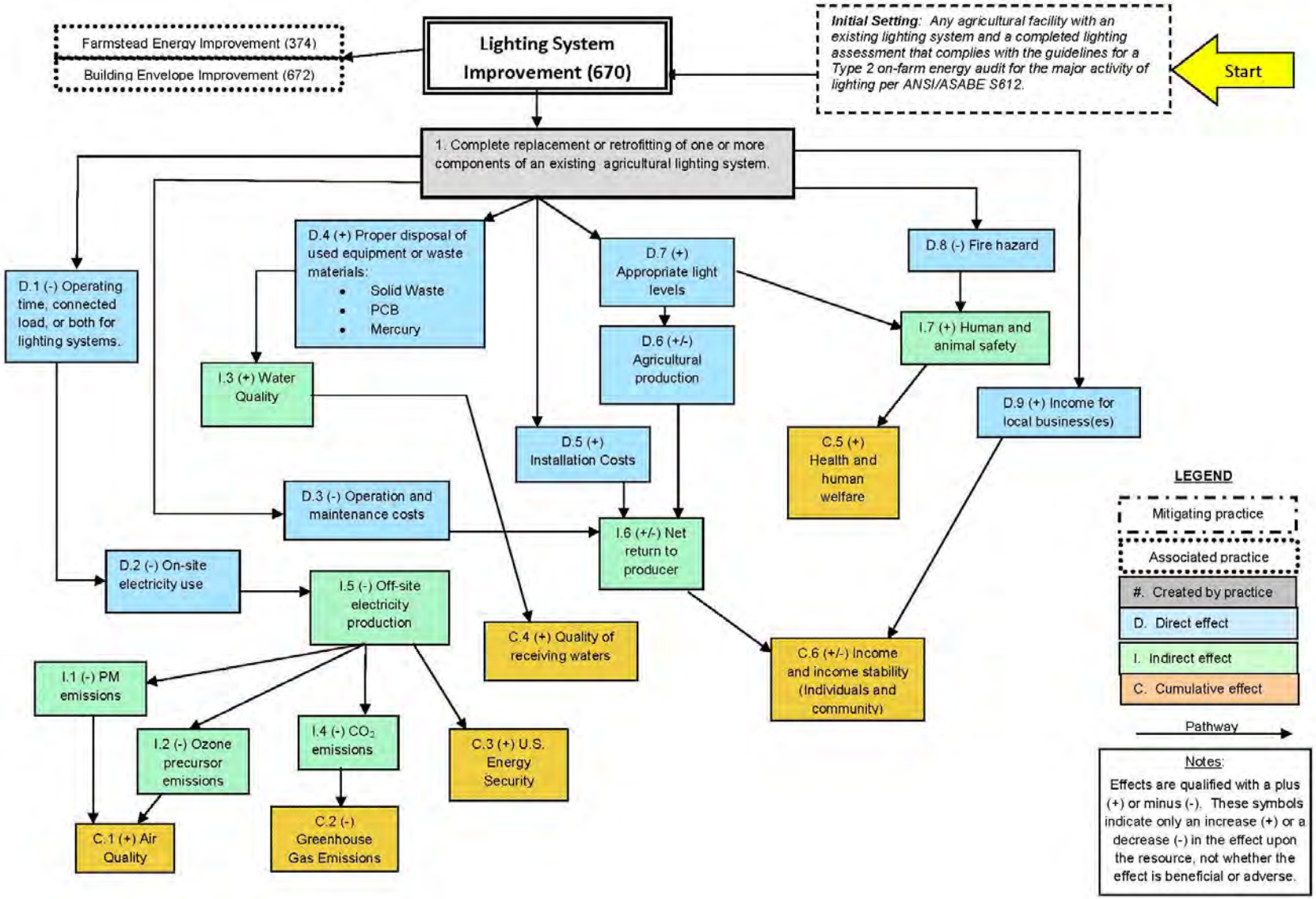
NRCS CONSERVATION PRACTICE EFFECTS - NETWORK DIAGRAM

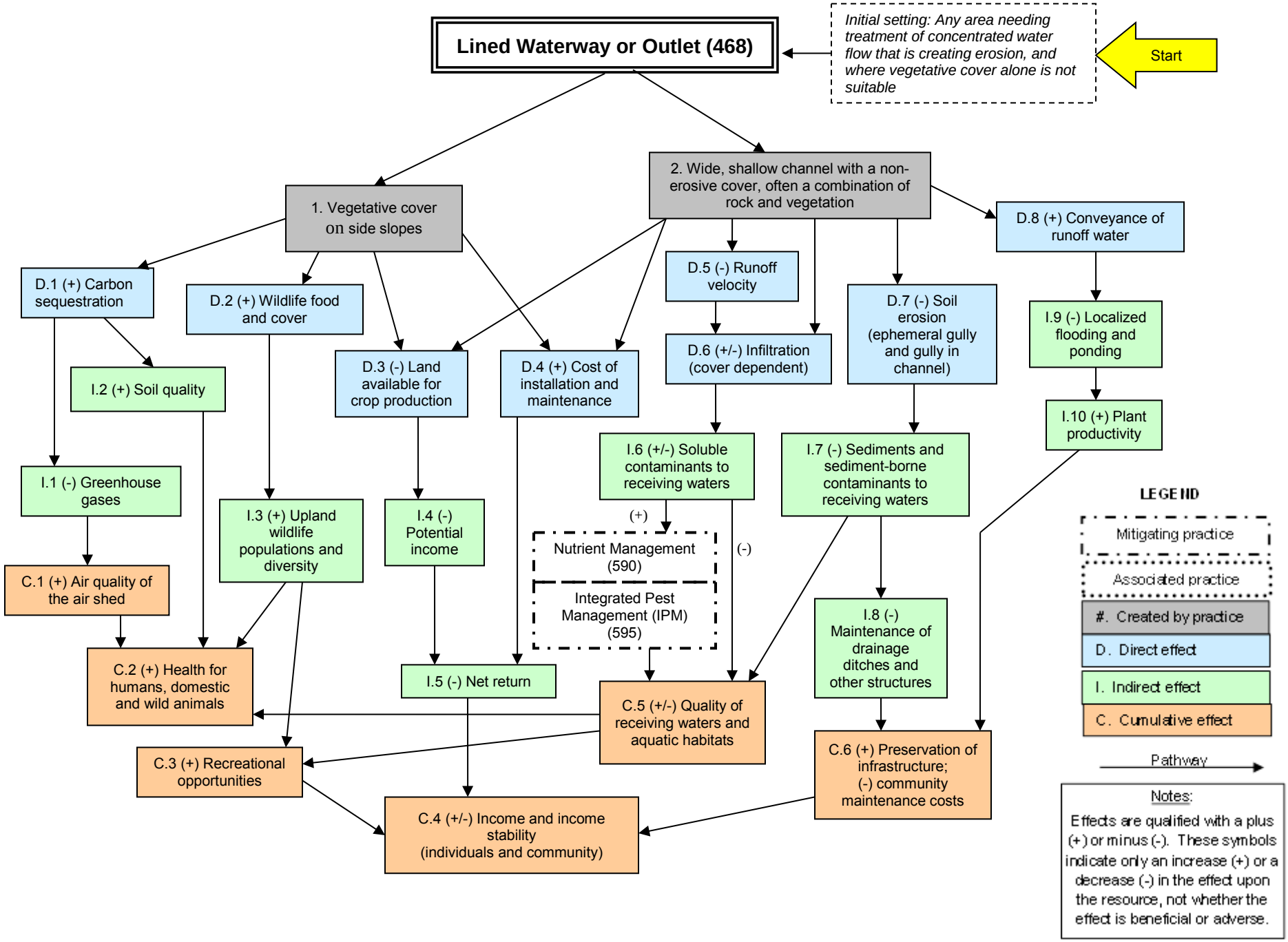
May 2014



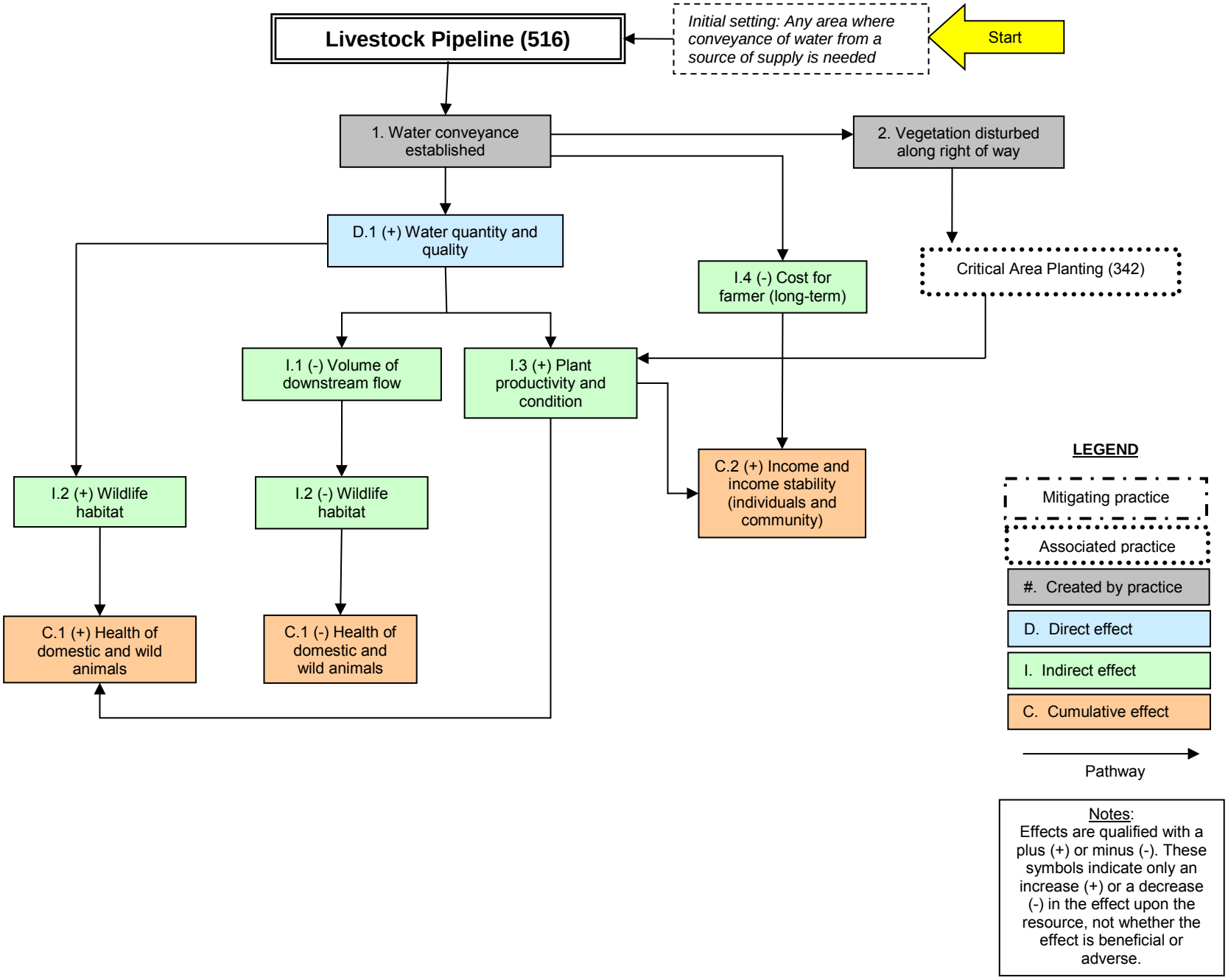
NRCS CONSERVATION PRACTICE EFFECTS - NETWORK DIAGRAM

June 2014





Network Diagram 80


Livestock Pipeline (516)
Initial setting: Any area where conveyance of water from a source of supply is needed
Start
1. Water conveyance established
2. Vegetation disturbed along right of way
D.1 (+) Water quantity and quality
Critical Area Planting (342)
I.4 (-) Cost for farmer (long-term)
I.1 (-) Volume of downstream flow
I.3 (+) Plant productivity and condition
C.2 (+) Income and income stability (individuals and community)
I.2 (+) Wildlife habitat
I.2 (-) Wildlife habitat
C.1 (+) Health of domestic and wild animals
C.1 (-) Health of domestic and wild animals
LEGEND
Mitigating practice
Associated practice
#. Created by practice
D. Direct effect
I. Indirect effect
C. Cumulative effect
Pathway
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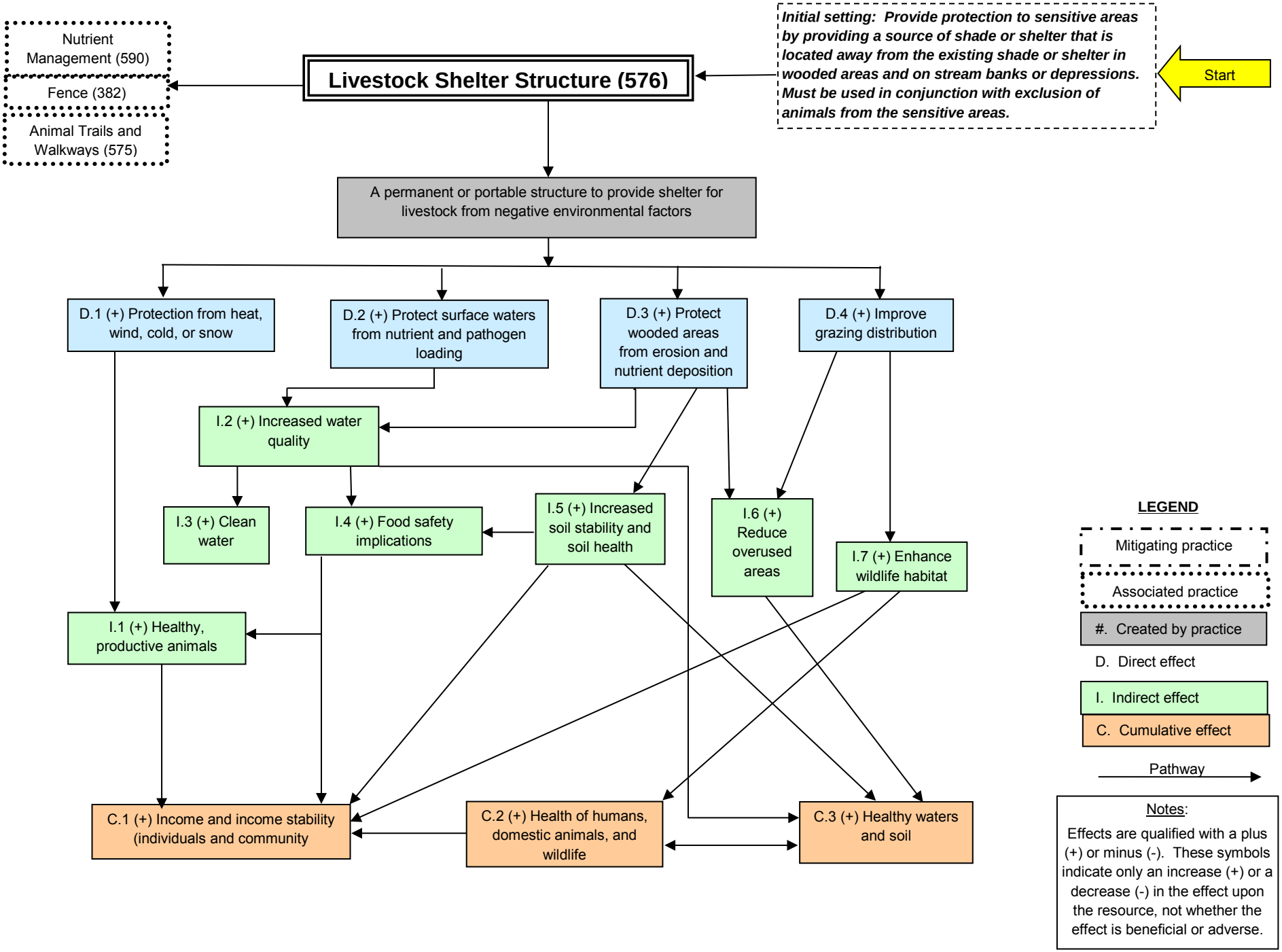
Nutrient Management (590)
Fence (382)
Animal Trails and Walkways (575)
Livestock Shelter Structure (576)
Initial setting: Provide protection to sensitive areas by providing a source of shade or shelter that is located away from the existing shade or shelter in wooded areas and on stream banks or depressions. Must be used in conjunction with exclusion of animals from the sensitive areas.
Start
A permanent or portable structure to provide shelter for livestock from negative environmental factors
D.1 (+) Protection from heat, wind, cold, or snow
D.2 (+) Protect surface waters from nutrient and pathogen loading
D.3 (+) Protect wooded areas from erosion and nutrient deposition
D.4 (+) Improve grazing distribution
I.2 (+) Increased water quality
I.3 (+) Clean water
I.4 (+) Food safety implications
I.5 (+) Increased soil stability and soil health
I.6 (+) Reduce overused areas
I.7 (+) Enhance wildlife habitat
I.1 (+) Healthy, productive animals
C.1 (+) Income and income stability (individuals and community
C.2 (+) Health of humans, domestic animals, and wildlife
C.3 (+) Healthy waters and soil
LEGEND
Mitigating practice
Associated practice
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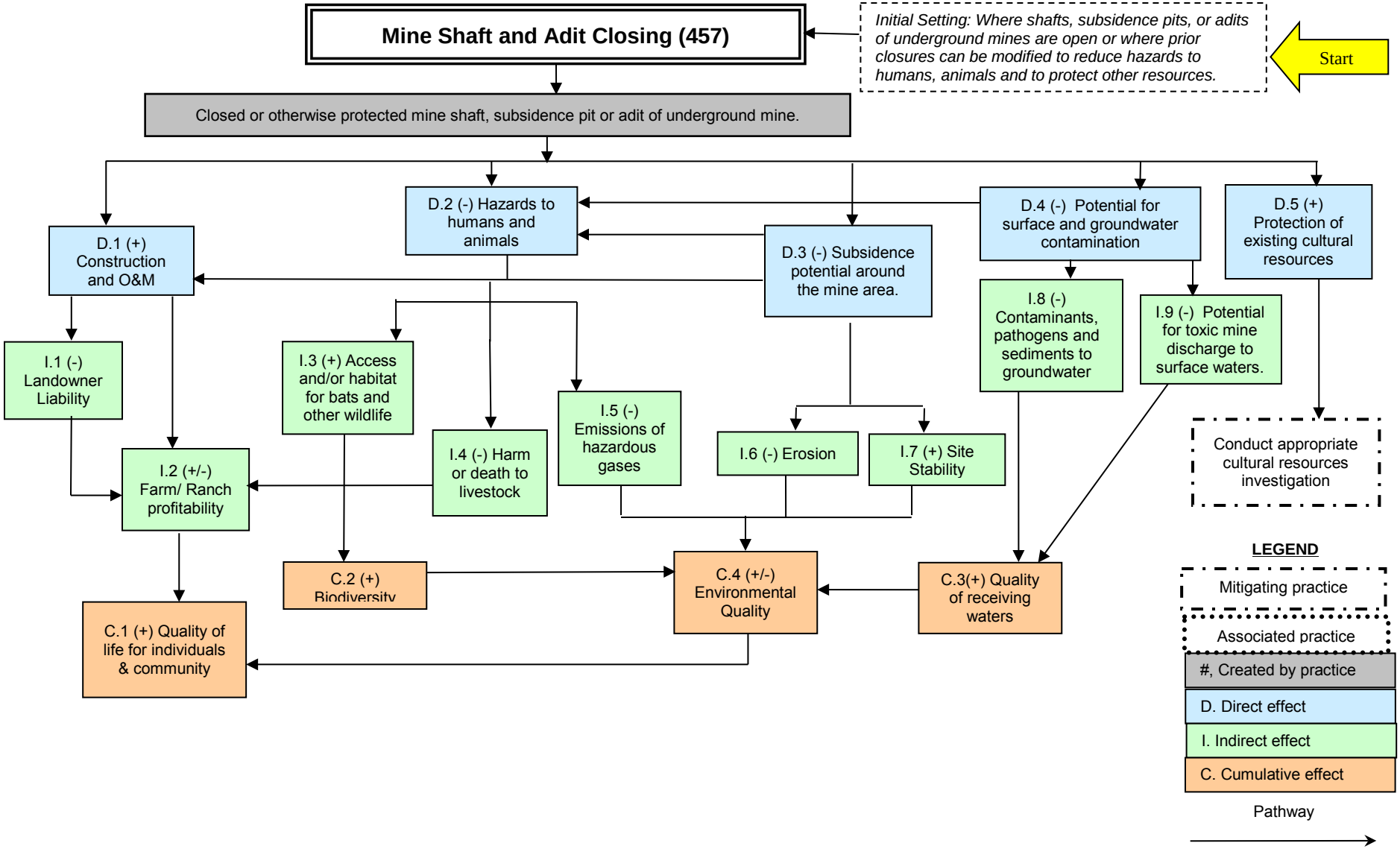

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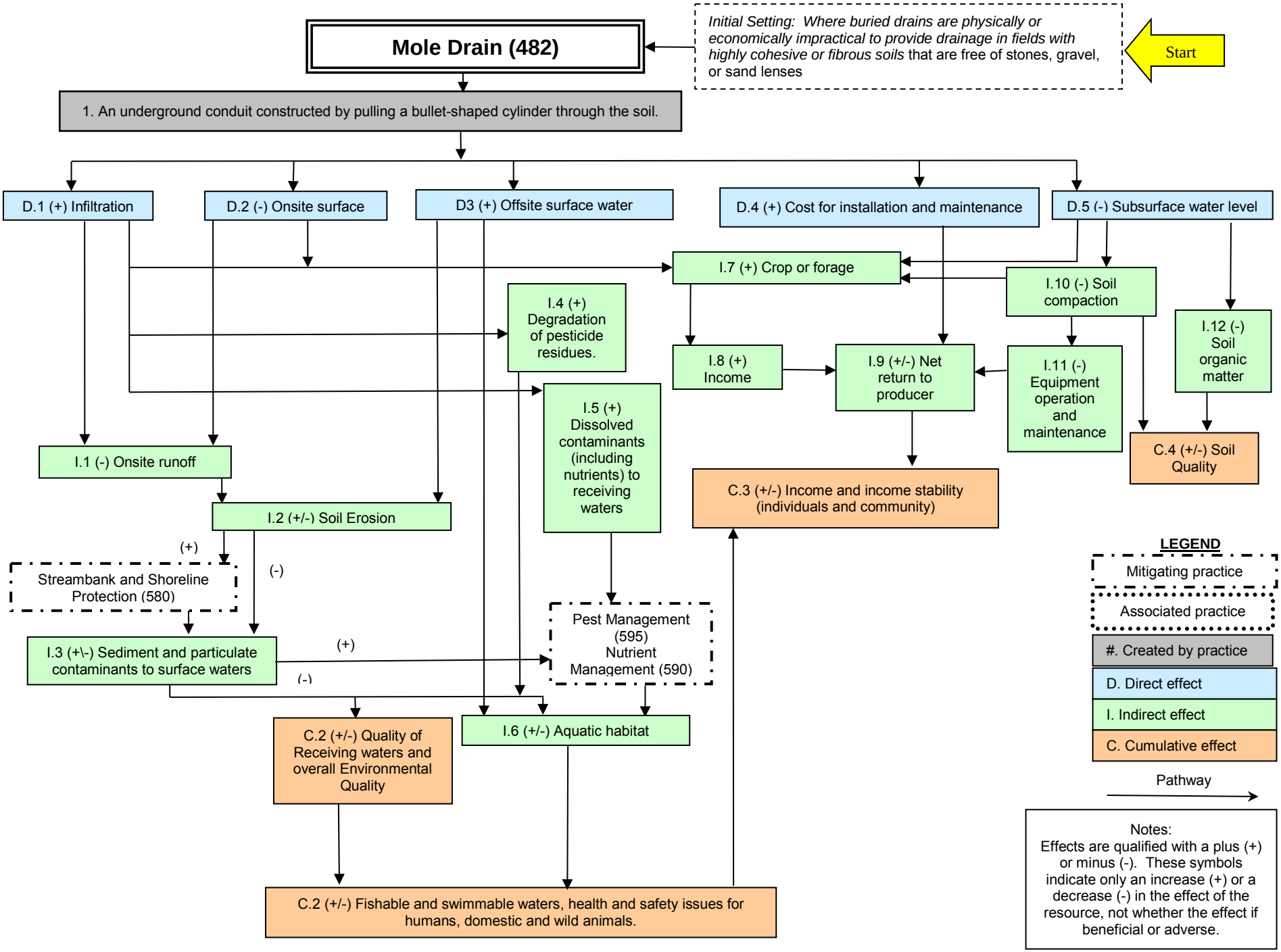
Mole Drain (482)
Initial Setting: Where buried drains are physically or economically impractical to provide drainage in fields with highly cohesive or fibrous soils that are free of stones, gravel, or sand lenses
Start
1. An underground conduit constructed by pulling a bullet-shaped cylinder through the soil.
D.1 (+) Infiltration
D.2 (-) Onsite surface
D3 (+) Offsite surface water
D.4 (+) Cost for installation and maintenance
D.5 (-) Subsurface water level
I.7 (+) Crop or forage
I.10 (-) Soil compaction
I.4 (+) Degradation of pesticide residues.
I.12 (-) Soil organic matter
I.8 (+) Income
I.9 (+/-) Net return to producer
I.11 (-) Equipment operation and maintenance
I.5 (+) Dissolved contaminants (including nutrients) to receiving waters
C.4 (+/-) Soil Quality
I.1 (-) Onsite runoff
C.3 (+/-) Income and income stability (individuals and community)
I.2 (+/-) Soil Erosion
(+)
(-)
Streambank and Shoreline Protection (580)
Pest Management (595) Nutrient Management (590)
I.3 (+\-) Sediment and particulate contaminants to surface waters
(+)
(-)
C.2 (+/-) Quality of Receiving waters and overall Environmental Quality
I.6 (+/-) Aquatic habitat
C.2 (+/-) Fishable and swimmable waters, health and safety issues for humans, domestic and wild animals.
LEGEND
Mitigating practice
Associated practice
#. Created by practice
D. Direct effect
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Pathway
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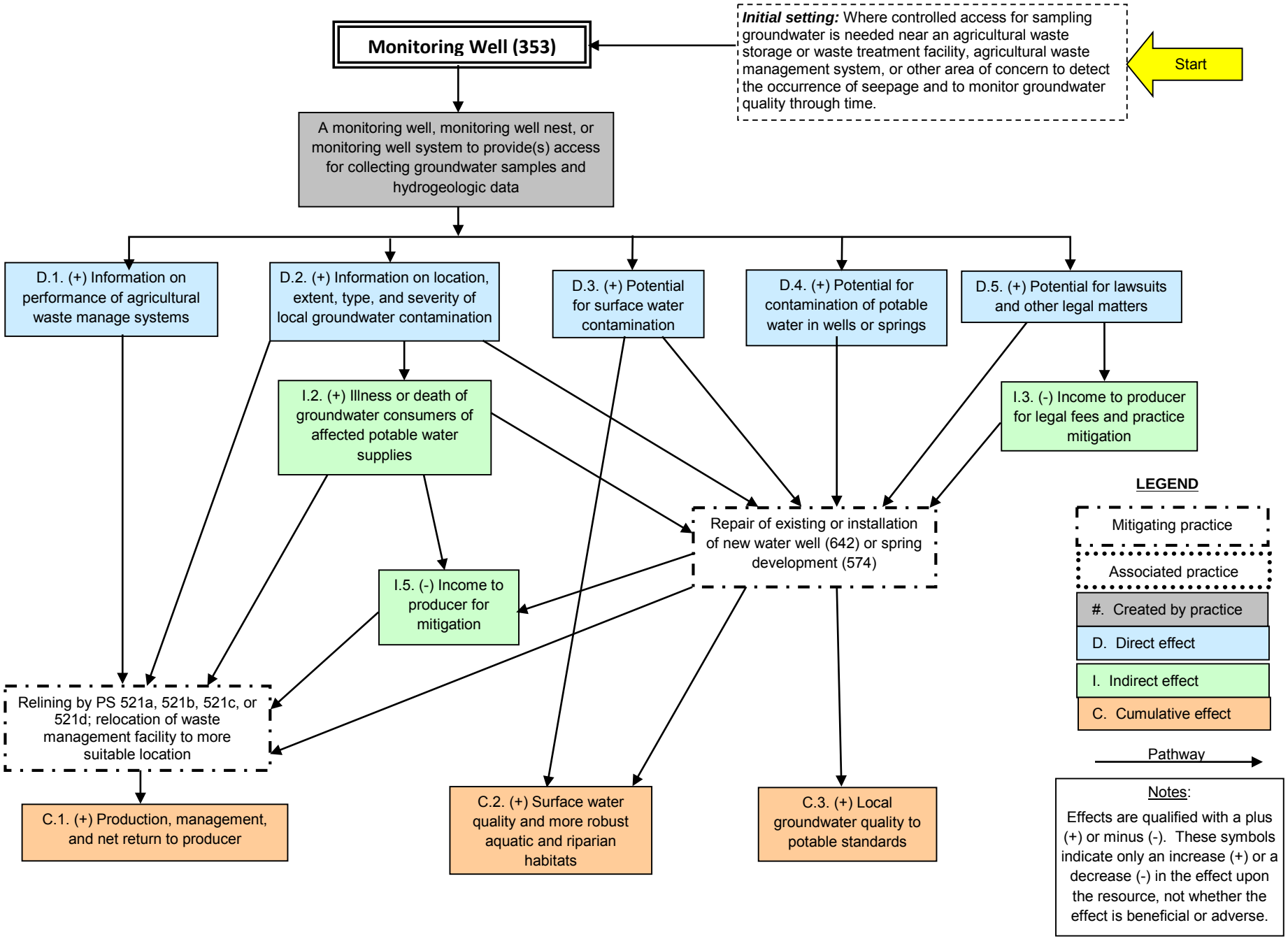
Monitoring Well (353)
Initial setting: Where controlled access for sampling groundwater is needed near an agricultural waste storage or waste treatment facility, agricultural waste management system, or other area of concern to detect the occurrence of seepage and to monitor groundwater quality through time.
Start
A monitoring well, monitoring well nest, or monitoring well system to provide(s) access for collecting groundwater samples and hydrogeologic data
D.1. (+) Information on performance of agricultural waste manage systems
D.2. (+) Information on location, extent, type, and severity of local groundwater contamination
D.3. (+) Potential for surface water contamination
D.4. (+) Potential for contamination of potable water in wells or springs
D.5. (+) Potential for lawsuits and other legal matters
I.2. (+) Illness or death of groundwater consumers of affected potable water supplies
I.3. (-) Income to producer for legal fees and practice mitigation
Repair of existing or installation of new water well (642) or spring development (574)
I.5. (-) Income to producer for mitigation
Relining by PS 521a, 521b, 521c, or 521d; relocation of waste management facility to more suitable location
C.1. (+) Production, management, and net return to producer
C.2. (+) Surface water quality and more robust aquatic and riparian habitats
C.3. (+) Local groundwater quality to potable standards
LEGEND
Mitigating practice
Associated practice
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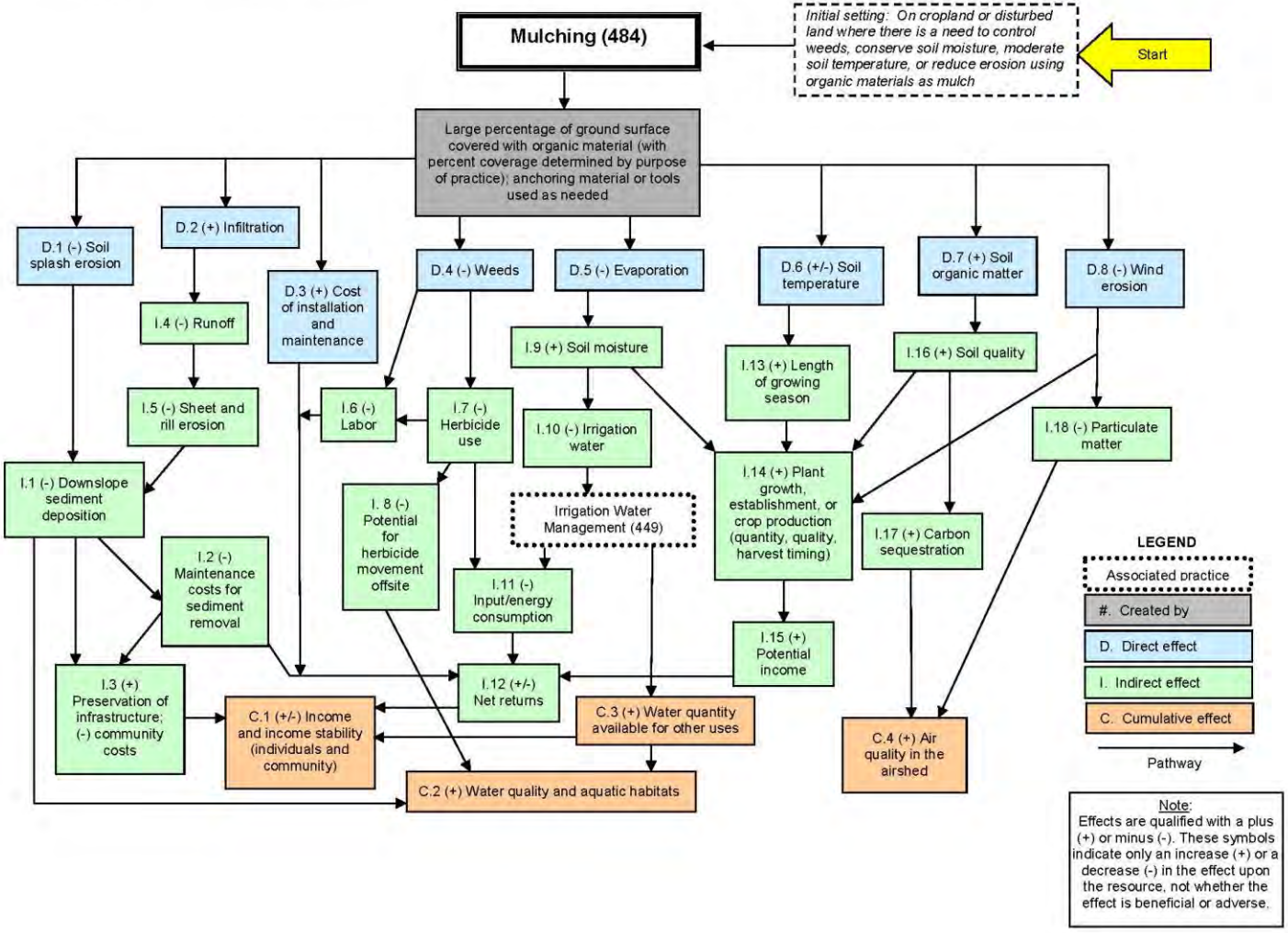
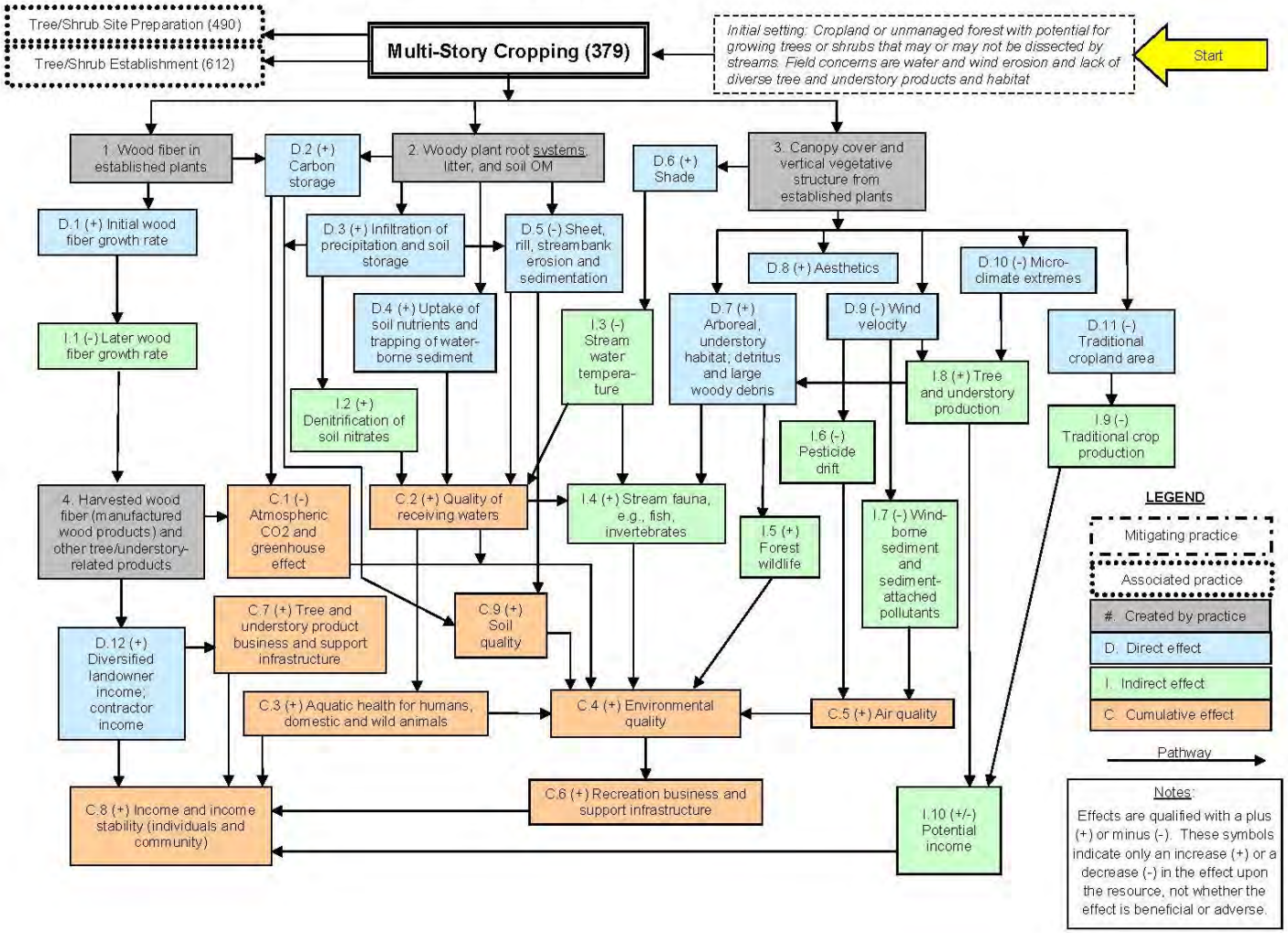
NRCS CONSERVATION PRACTICE EFFECTS - NETWORK DIAGRAM

March 2014



NRCS CONSERVATION PRACTICE EFFECTS - NETWORK DIAGRAM

May 2014



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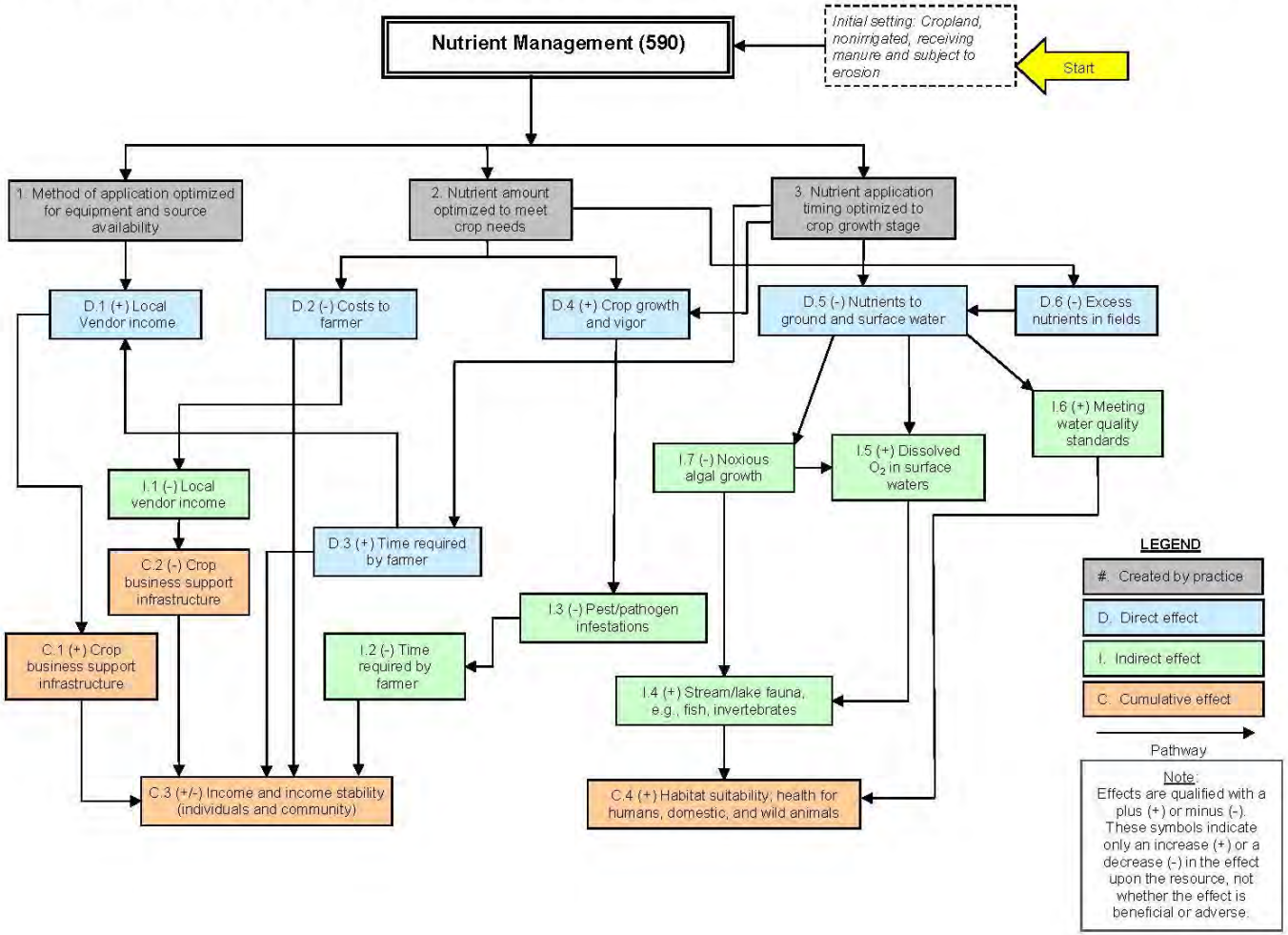

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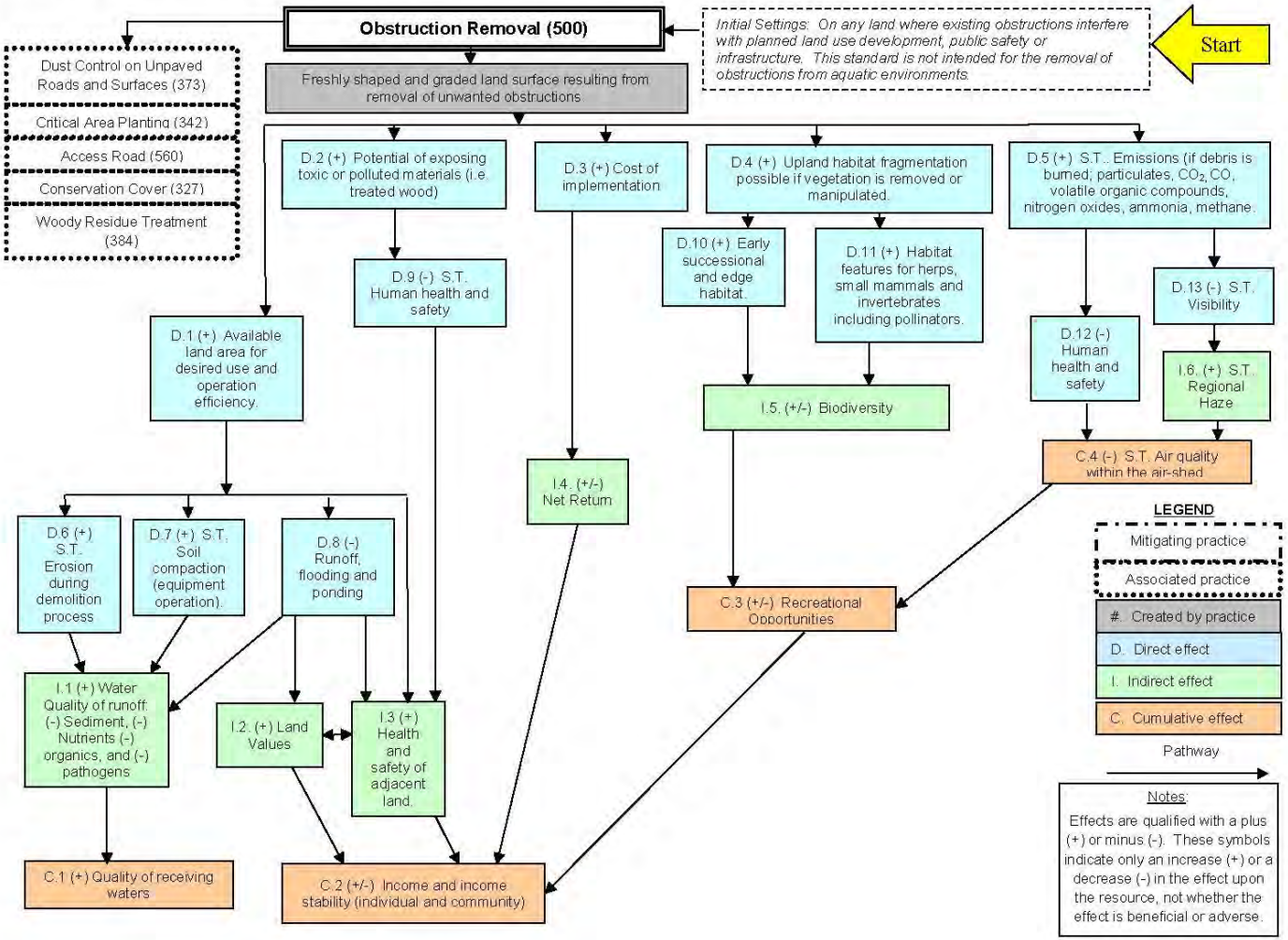
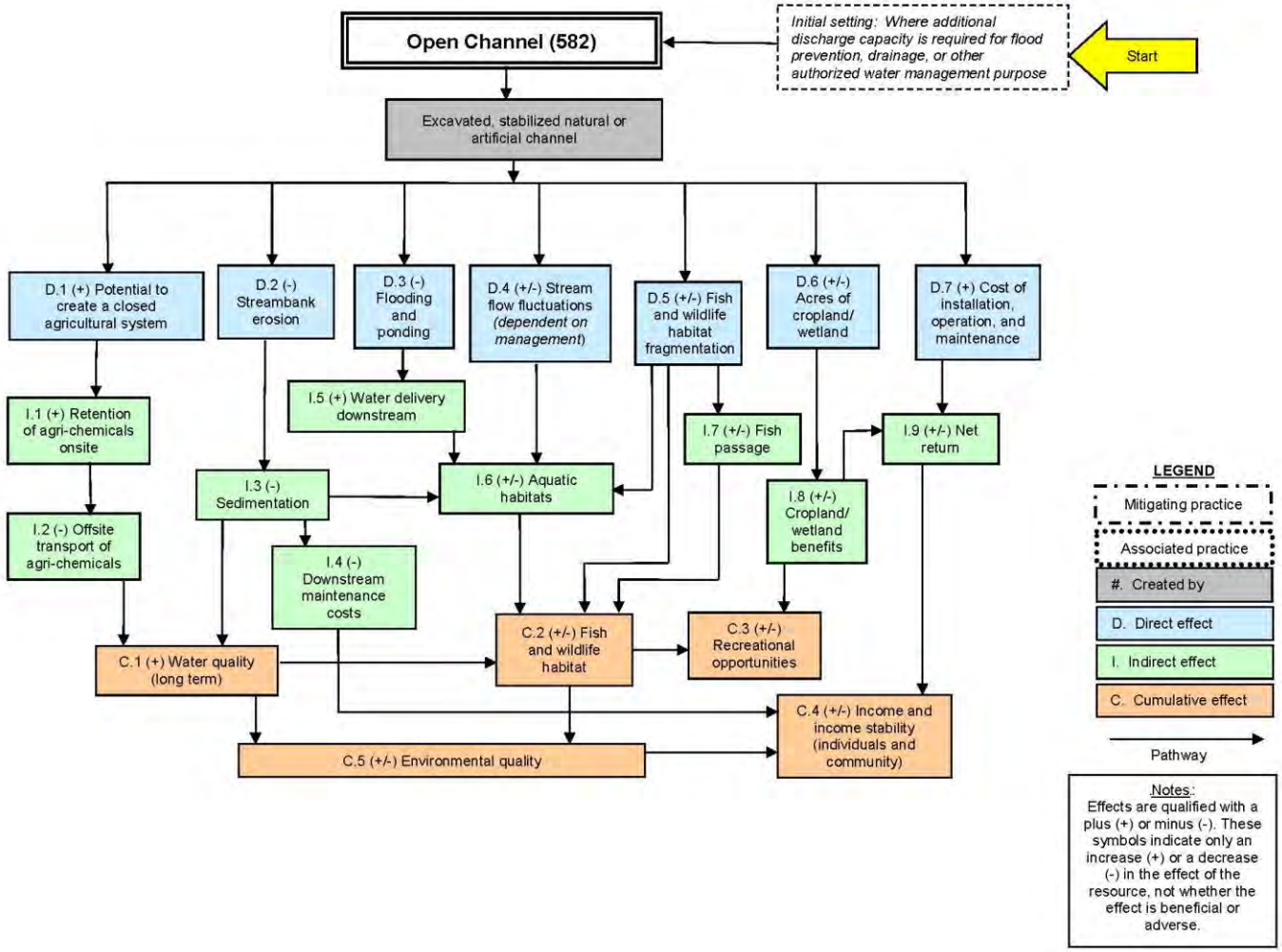


NRCS CONSERVATION PRACTICE EFFECTS - NETWORK DIAGRAM

March 2014



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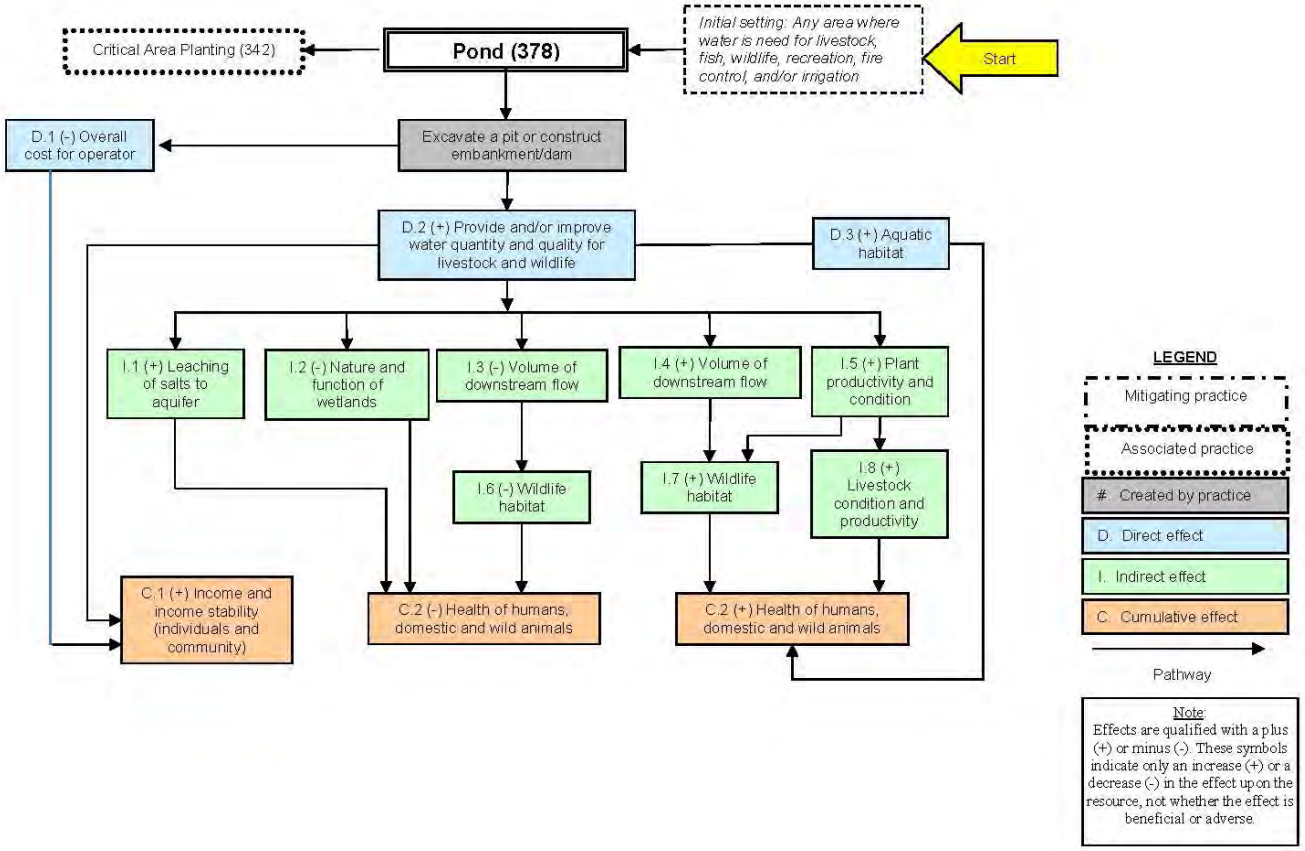

LEGEND

- Mitigating practice
- Associated practice
- # Created by practice
- D. Direct effect
- I. Indirect effect
- C. Cumulative effect
- Pathway

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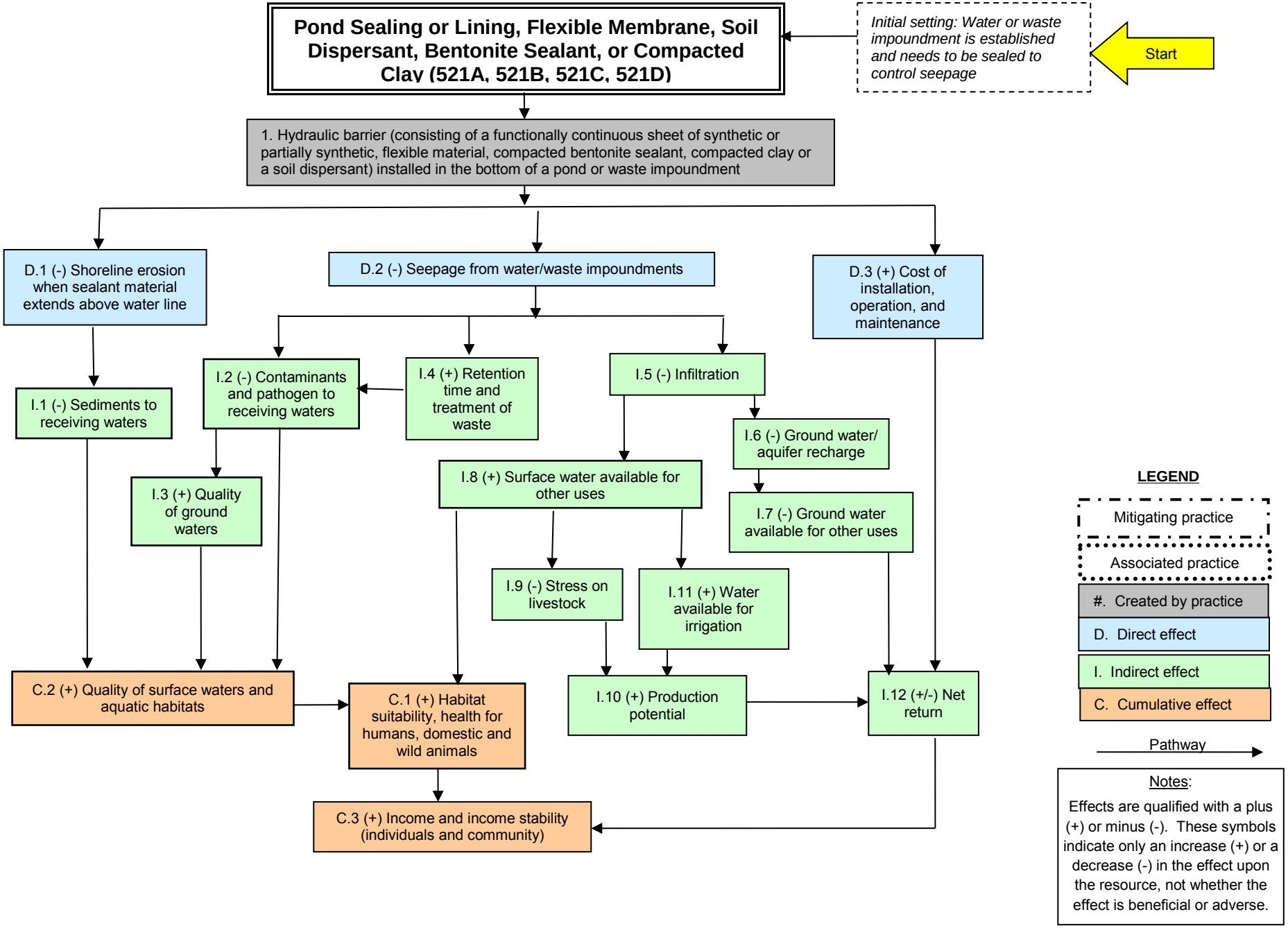
Pond Sealing or Lining, Flexible Membrane, Soil Dispersant, Bentonite Sealant, or Compacted Clay (521A, 521B, 521C, 521D)
Initial setting: Water or waste impoundment is established and needs to be sealed to control seepage
Start
1. Hydraulic barrier (consisting of a functionally continuous sheet of synthetic or partially synthetic, flexible material, compacted bentonite sealant, compacted clay or a soil dispersant) installed in the bottom of a pond or waste impoundment
D.1 (-) Shoreline erosion when sealant material extends above water line
D.2 (-) Seepage from water/waste impoundments
D.3 (+) Cost of installation, operation, and maintenance
I.1 (-) Sediments to receiving waters
I.2 (-) Contaminants and pathogen to receiving waters
I.4 (+) Retention time and treatment of waste
I.5 (-) Infiltration
I.6 (-) Ground water/ aquifer recharge
I.3 (+) Quality of ground waters
I.8 (+) Surface water available for other uses
I.7 (-) Ground water available for other uses
I.9 (-) Stress on livestock
I.11 (+) Water available for irrigation
C.2 (+) Quality of surface waters and aquatic habitats
C.1 (+) Habitat suitability, health for humans, domestic and wild animals
I.10 (+) Production potential
I.12 (+/-) Net return
C.3 (+) Income and income stability (individuals and community)
LEGEND
Mitigating practice
Associated practice
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D. Direct effect
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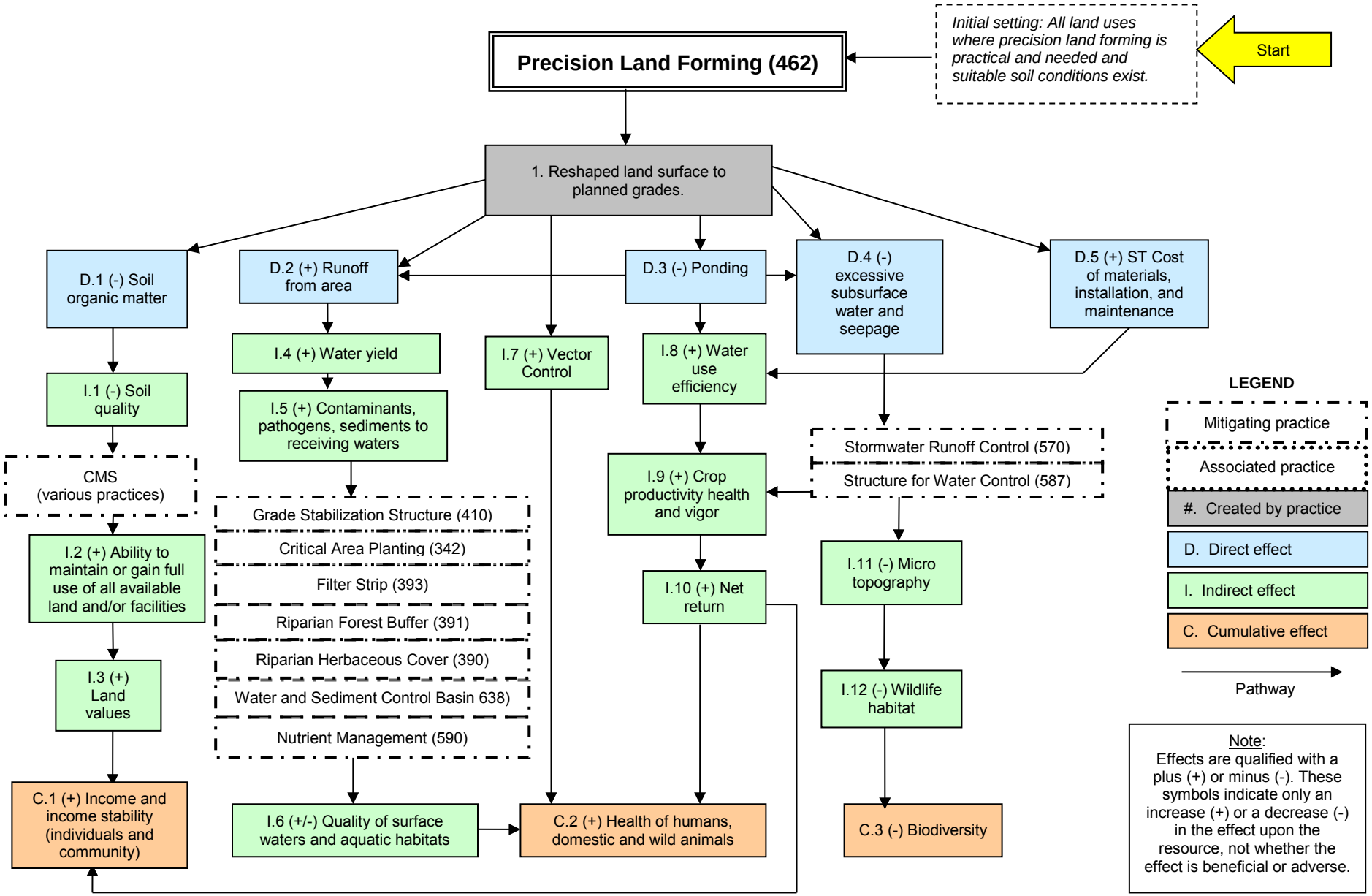
Precision Land Forming (462)
Initial setting: All land uses where precision land forming is practical and needed and suitable soil conditions exist.
Start
1. Reshaped land surface to planned grades.
D.1 (-) Soil organic matter
D.2 (+) Runoff from area
D.3 (-) Ponding
D.4 (-) excessive subsurface water and seepage
D.5 (+) ST Cost of materials, installation, and maintenance
I.1 (-) Soil quality
I.4 (+) Water yield
I.7 (+) Vector Control
I.8 (+) Water use efficiency
I.5 (+) Contaminants, pathogens, sediments to receiving waters
CMS (various practices)
Stormwater Runoff Control (570)
Structure for Water Control (587)
I.9 (+) Crop productivity health and vigor
Grade Stabilization Structure (410)
Critical Area Planting (342)
Filter Strip (393)
Riparian Forest Buffer (391)
Riparian Herbaceous Cover (390)
Water and Sediment Control Basin 638)
Nutrient Management (590)
I.2 (+) Ability to maintain or gain full use of all available land and/or facilities
I.10 (+) Net return
I.11 (-) Micro topography
I.3 (+) Land values
I.12 (-) Wildlife habitat
C.1 (+) Income and income stability (individuals and community)
I.6 (+/-) Quality of surface waters and aquatic habitats
C.2 (+) Health of humans, domestic and wild animals
C.3 (-) Biodiversity
LEGEND
Mitigating practice
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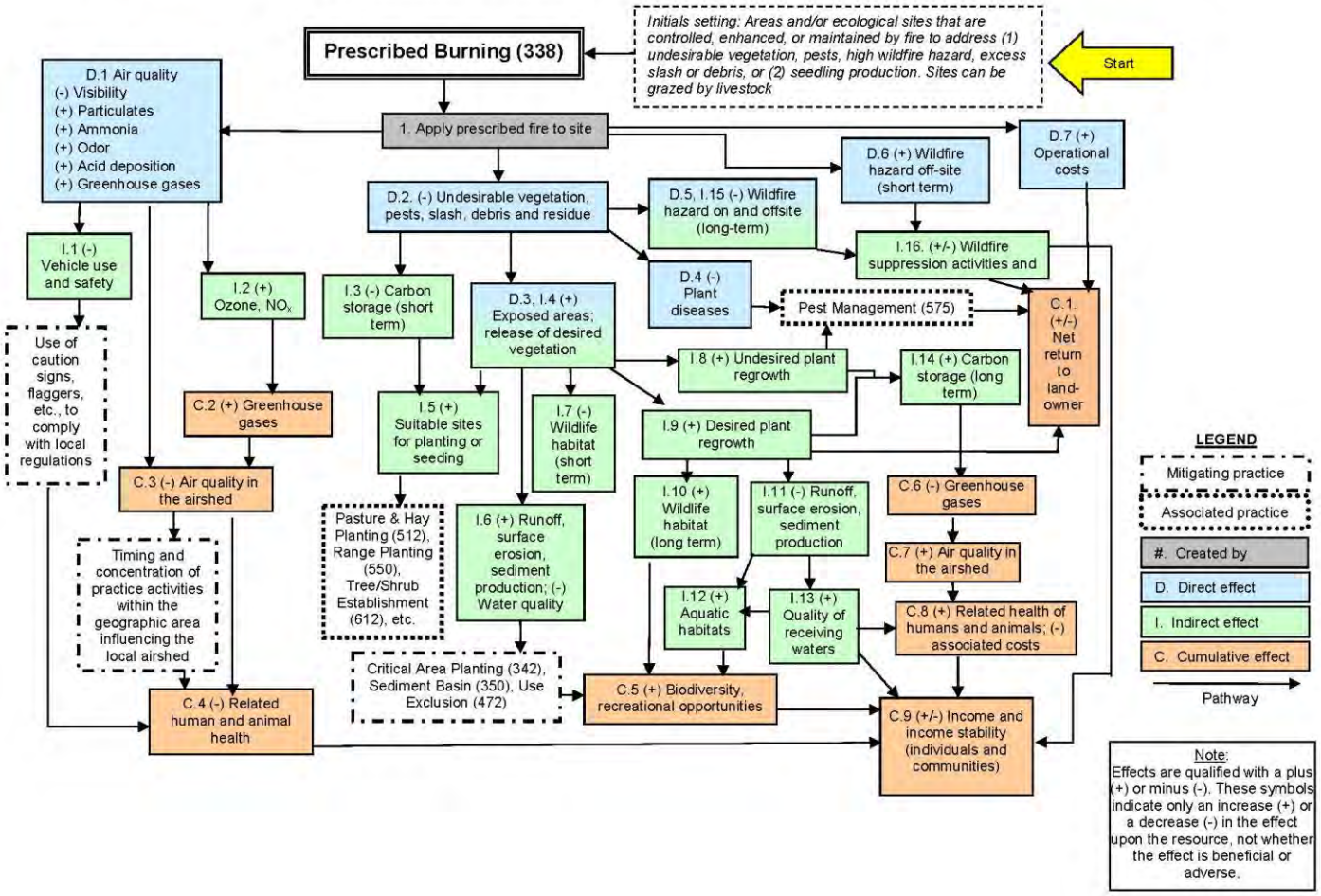
NRCS CONSERVATION PRACTICE EFFECTS - NETWORK DIAGRAM

March 2014



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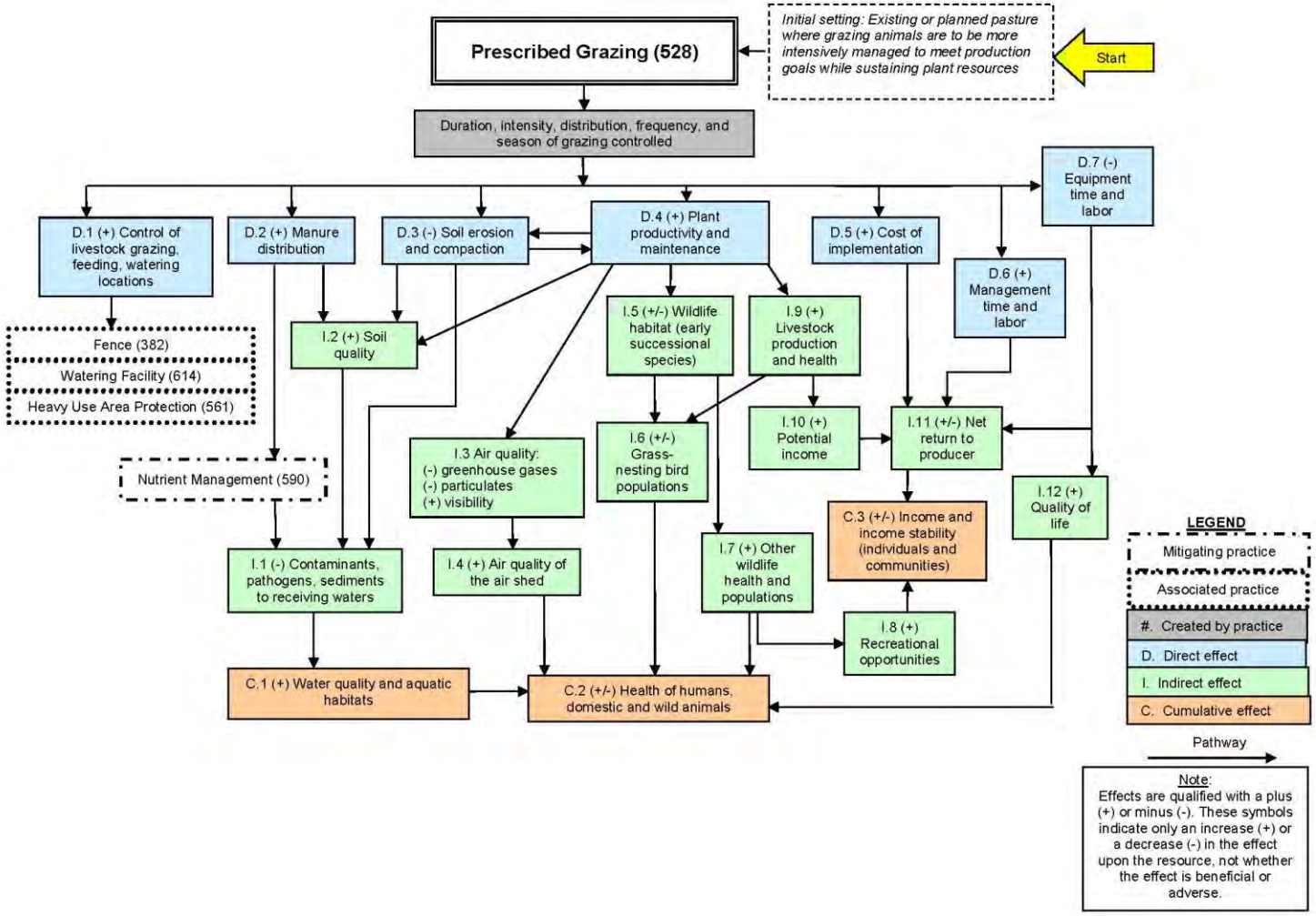

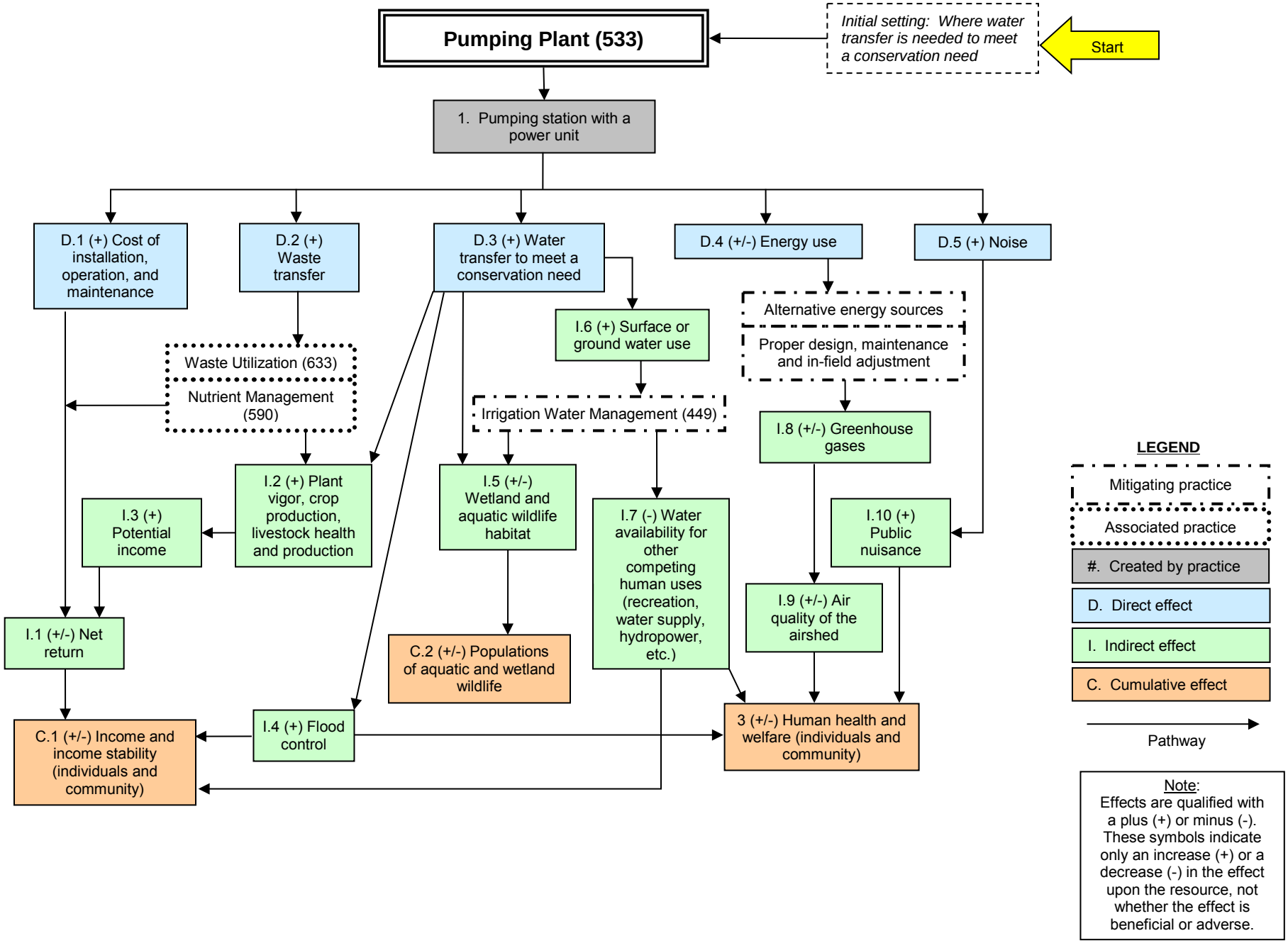
Pumping Plant (533)
Initial setting: Where water transfer is needed to meet a conservation need
Start
1. Pumping station with a power unit
D.1 (+) Cost of installation, operation, and maintenance
D.2 (+) Waste transfer
D.3 (+) Water transfer to meet a conservation need
D.4 (+/-) Energy use
D.5 (+) Noise
Alternative energy sources
Proper design, maintenance and in-field adjustment
I.6 (+) Surface or ground water use
Waste Utilization (633)
Nutrient Management (590)
Irrigation Water Management (449)
I.8 (+/-) Greenhouse gases
I.2 (+) Plant vigor, crop production, livestock health and production
I.5 (+/-) Wetland and aquatic wildlife habitat
I.7 (-) Water availability for other competing human uses (recreation, water supply, hydropower, etc.)
I.10 (+) Public nuisance
I.3 (+) Potential income
I.9 (+/-) Air quality of the airshed
I.1 (+/-) Net return
C.2 (+/-) Populations of aquatic and wetland wildlife
I.4 (+) Flood control
C.1 (+/-) Income and income stability (individuals and community)
3 (+/-) Human health and welfare (individuals and community)
LEGEND
Mitigating practice
Associated practice
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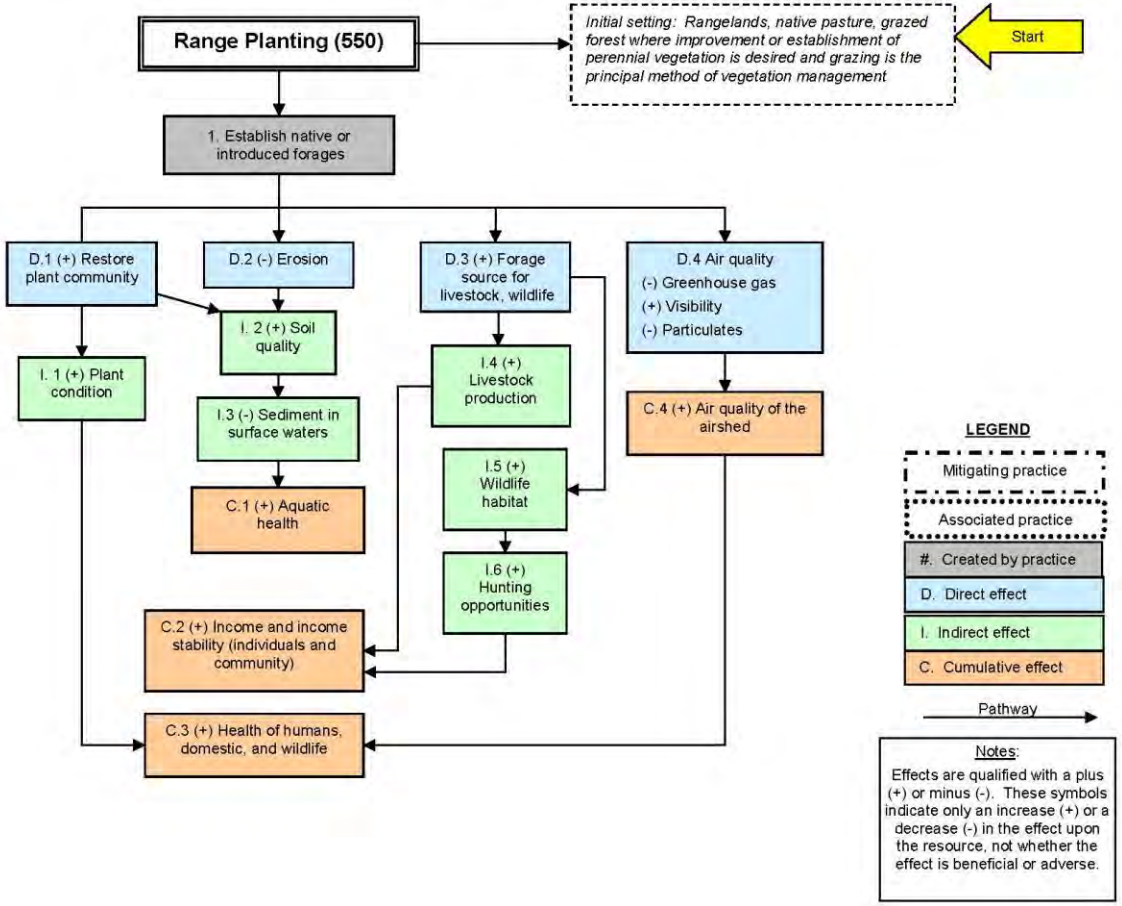

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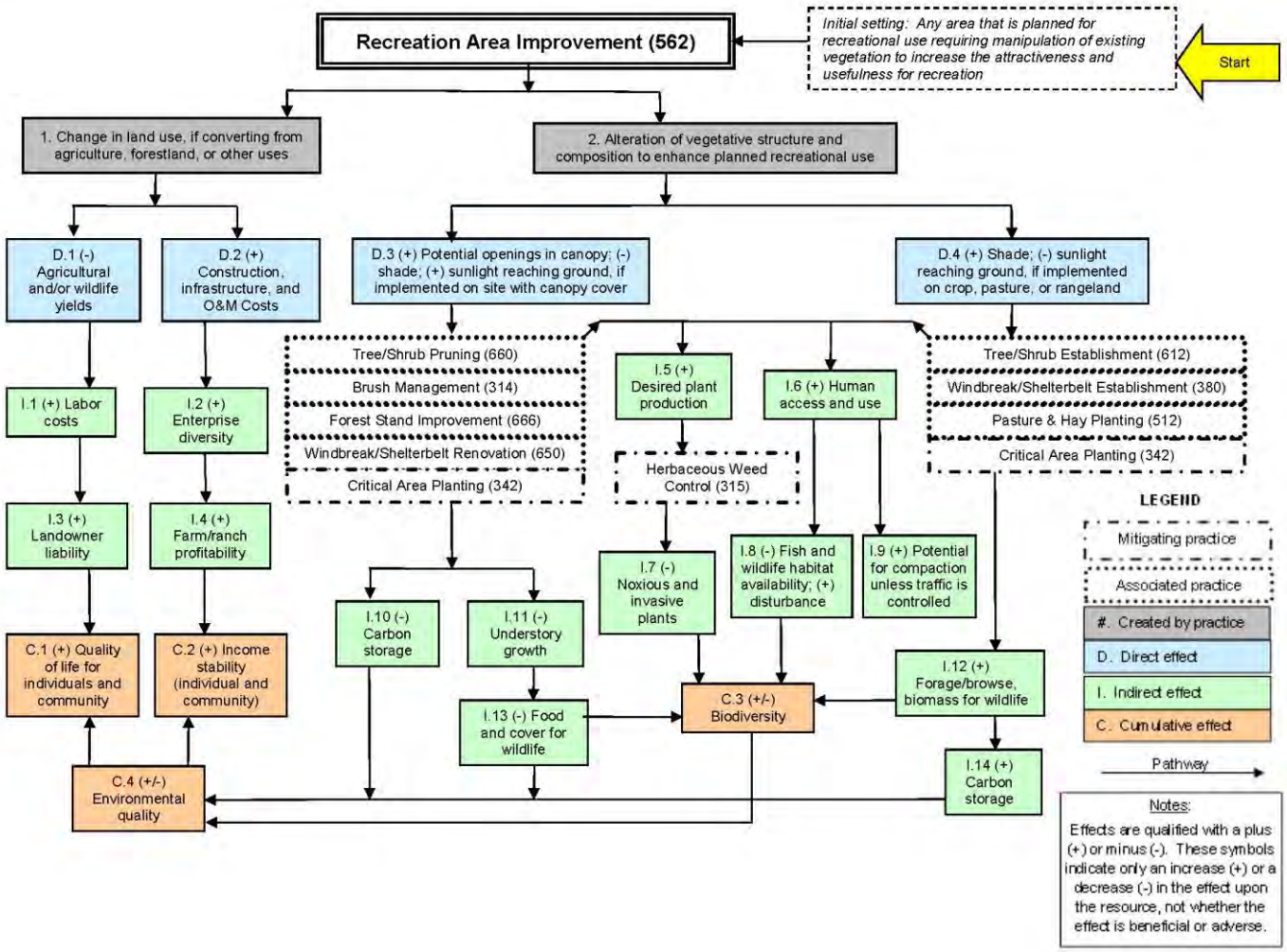

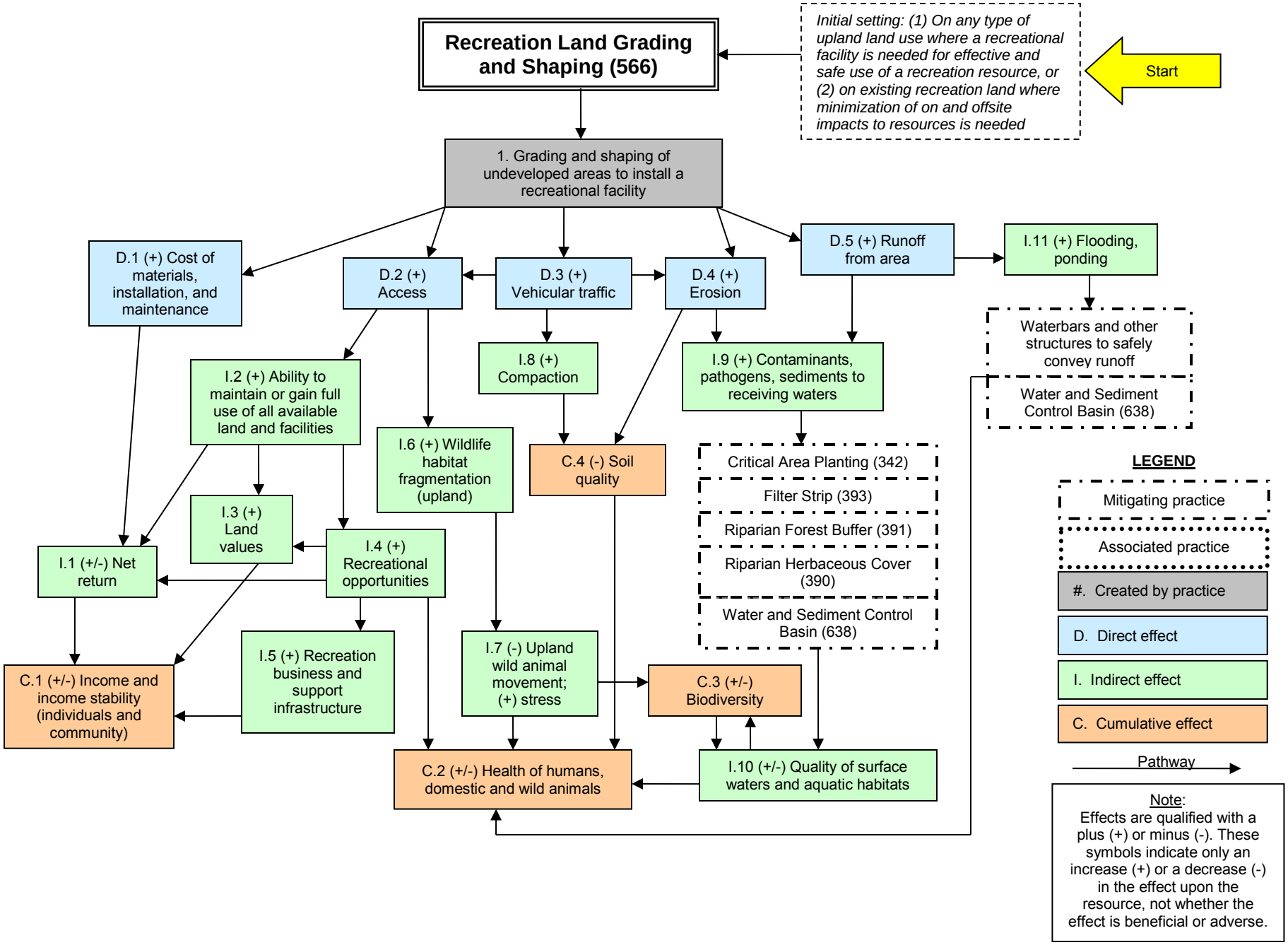
Recreation Land Grading and Shaping (566)
Initial setting: (1) On any type of upland land use where a recreational facility is needed for effective and safe use of a recreation resource, or (2) on existing recreation land where minimization of on and offsite impacts to resources is needed
Start
1. Grading and shaping of undeveloped areas to install a recreational facility
D.1 (+) Cost of materials, installation, and maintenance
D.2 (+) Access
D.3 (+) Vehicular traffic
D.4 (+) Erosion
D.5 (+) Runoff from area
I.11 (+) Flooding, ponding
Waterbars and other structures to safely convey runoff
Water and Sediment Control Basin (638)
I.2 (+) Ability to maintain or gain full use of all available land and facilities
I.8 (+) Compaction
I.9 (+) Contaminants, pathogens, sediments to receiving waters
I.6 (+) Wildlife habitat fragmentation (upland)
C.4 (-) Soil quality
Critical Area Planting (342)
Filter Strip (393)
Riparian Forest Buffer (391)
Riparian Herbaceous Cover (390)
Water and Sediment Control Basin (638)
I.3 (+) Land values
I.4 (+) Recreational opportunities
I.1 (+/-) Net return
I.5 (+) Recreation business and support infrastructure
I.7 (-) Upland wild animal movement; (+) stress
C.3 (+/-) Biodiversity
C.1 (+/-) Income and income stability (individuals and community)
C.2 (+/-) Health of humans, domestic and wild animals
I.10 (+/-) Quality of surface waters and aquatic habitats
LEGEND
Mitigating practice
Associated practice
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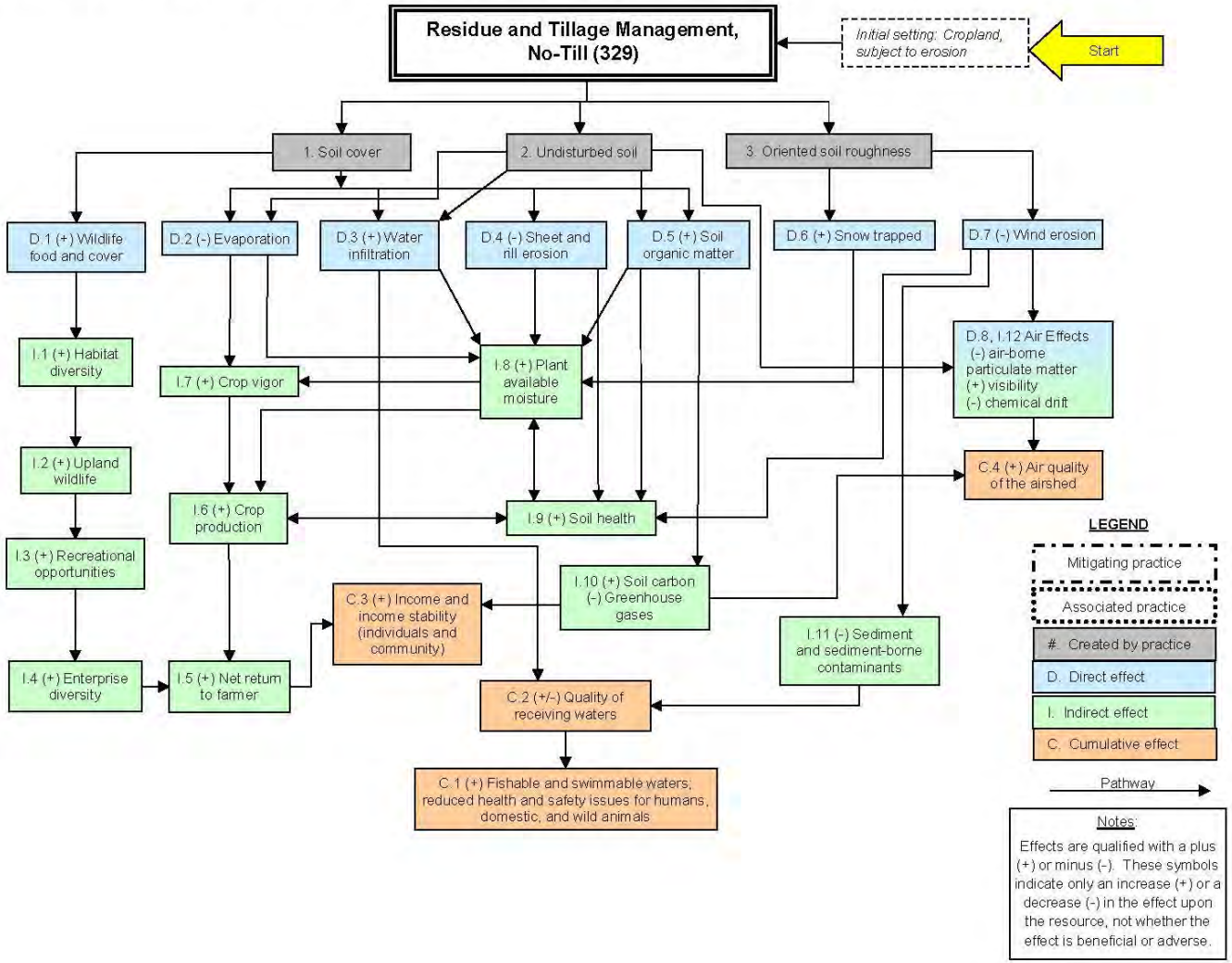

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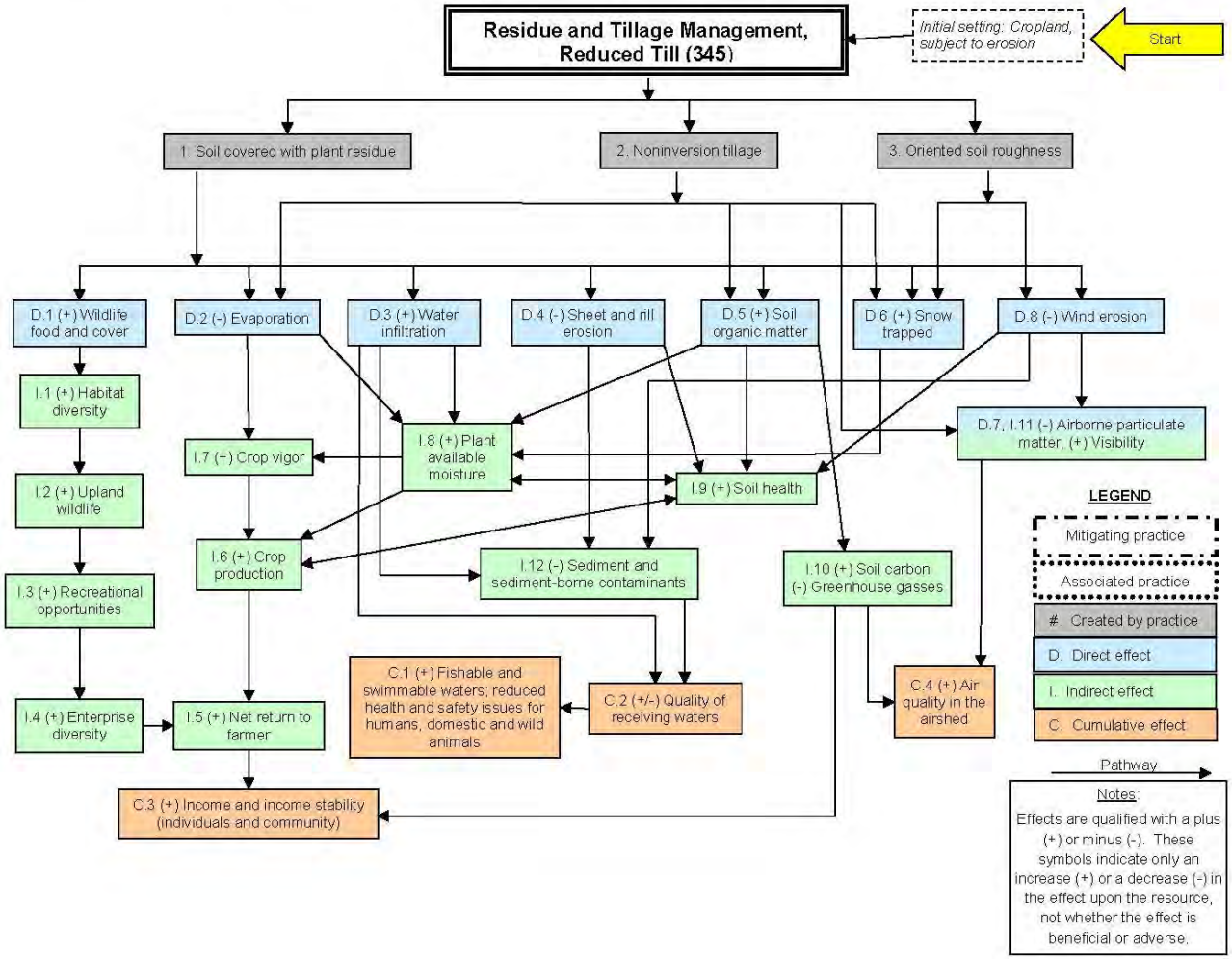

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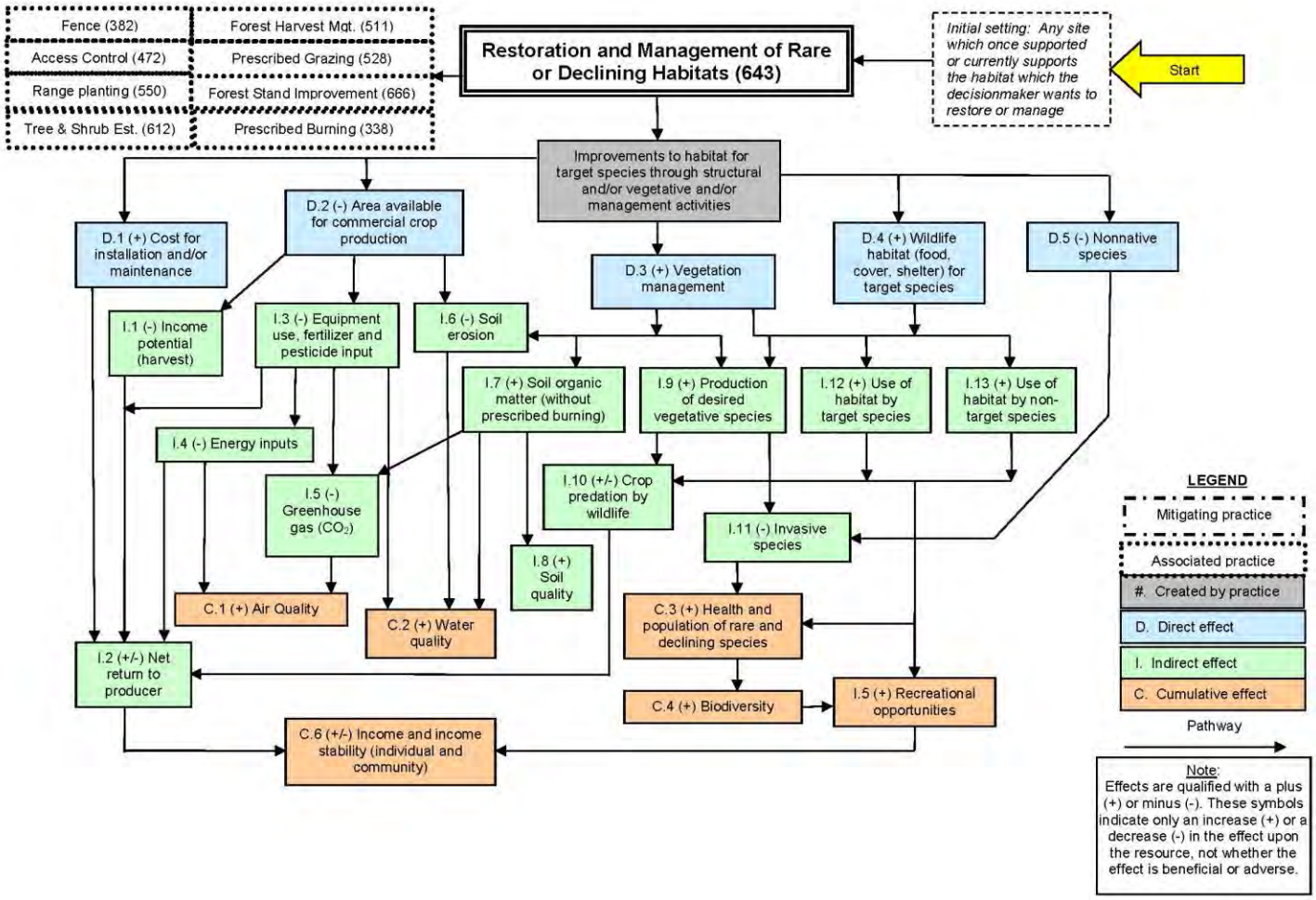

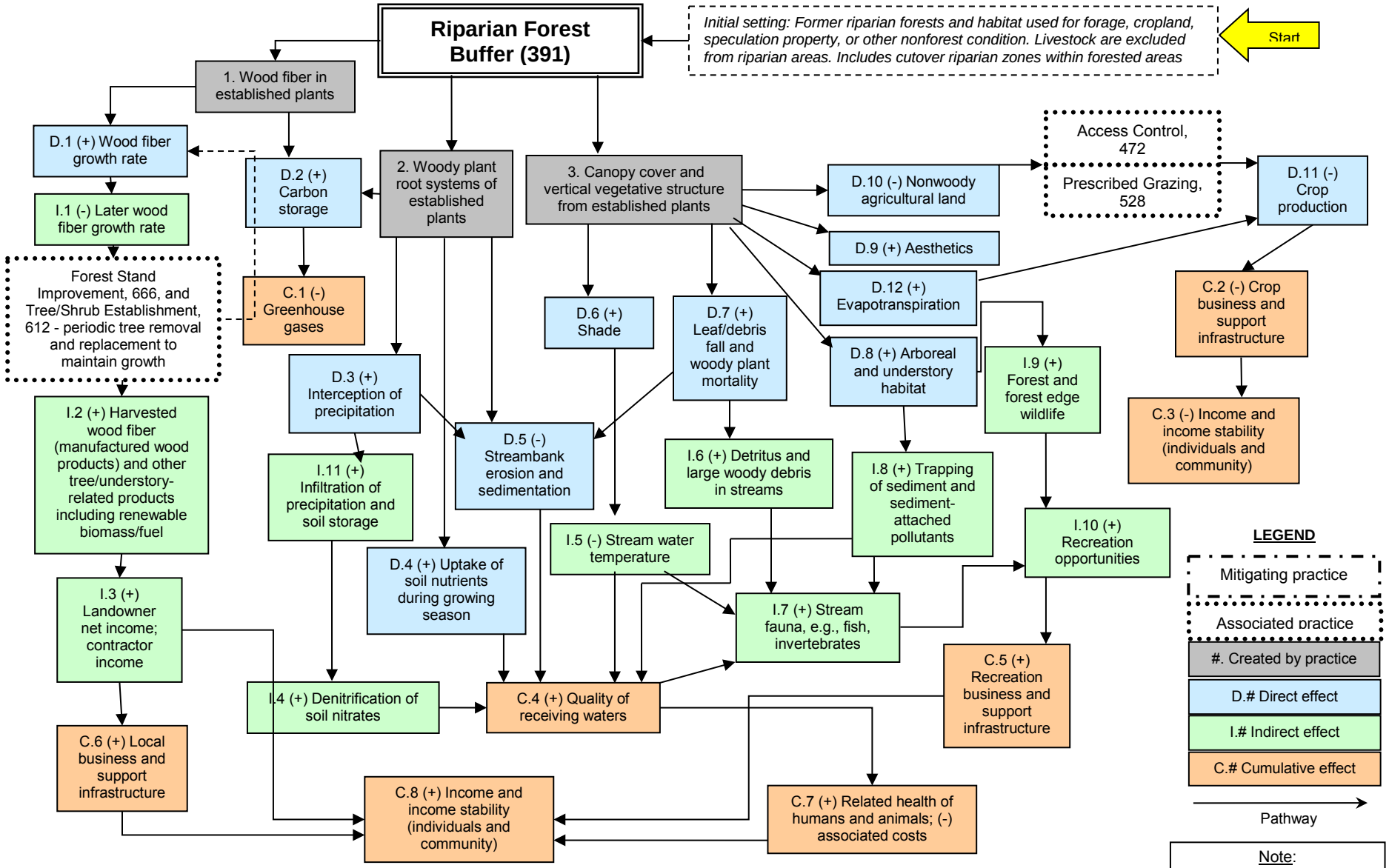
Riparian Forest Buffer (391)
Initial setting: Former riparian forests and habitat used for forage, cropland, speculation property, or other nonforest condition. Livestock are excluded from riparian areas. Includes cutover riparian zones within forested areas
Start
1. Wood fiber in established plants
2. Woody plant root systems of established plants
3. Canopy cover and vertical vegetative structure from established plants
D.1 (+) Wood fiber growth rate
I.1 (-) Later wood fiber growth rate
Forest Stand Improvement, 666, and Tree/Shrub Establishment, 612 - periodic tree removal and replacement to maintain growth
I.2 (+) Harvested wood fiber (manufactured wood products) and other tree/understory-related products including renewable biomass/fuel
I.3 (+) Landowner net income; contractor income
C.6 (+) Local business and support infrastructure
D.2 (+) Carbon storage
C.1 (-) Greenhouse gases
D.3 (+) Interception of precipitation
I.11 (+) Infiltration of precipitation and soil storage
D.4 (+) Uptake of soil nutrients during growing season
I.4 (+) Denitrification of soil nitrates
D.5 (-) Streambank erosion and sedimentation
C.4 (+) Quality of receiving waters
D.6 (+) Shade
I.5 (-) Stream water temperature
D.7 (+) Leaf/debris fall and woody plant mortality
I.6 (+) Detritus and large woody debris in streams
I.7 (+) Stream fauna, e.g., fish, invertebrates
D.10 (-) Nonwoody agricultural land
D.9 (+) Aesthetics
D.12 (+) Evapotranspiration
D.8 (+) Arboreal and understory habitat
I.8 (+) Trapping of sediment and sediment-attached pollutants
Access Control, 472
Prescribed Grazing, 528
D.11 (-) Crop production
I.9 (+) Forest and forest edge wildlife
I.10 (+) Recreation opportunities
C.2 (-) Crop business and support infrastructure
C.3 (-) Income and income stability (individuals and community)
C.5 (+) Recreation business and support infrastructure
C.8 (+) Income and income stability (individuals and community)
C.7 (+) Related health of humans and animals; (-) associated costs
LEGEND
Mitigating practice
Associated practice
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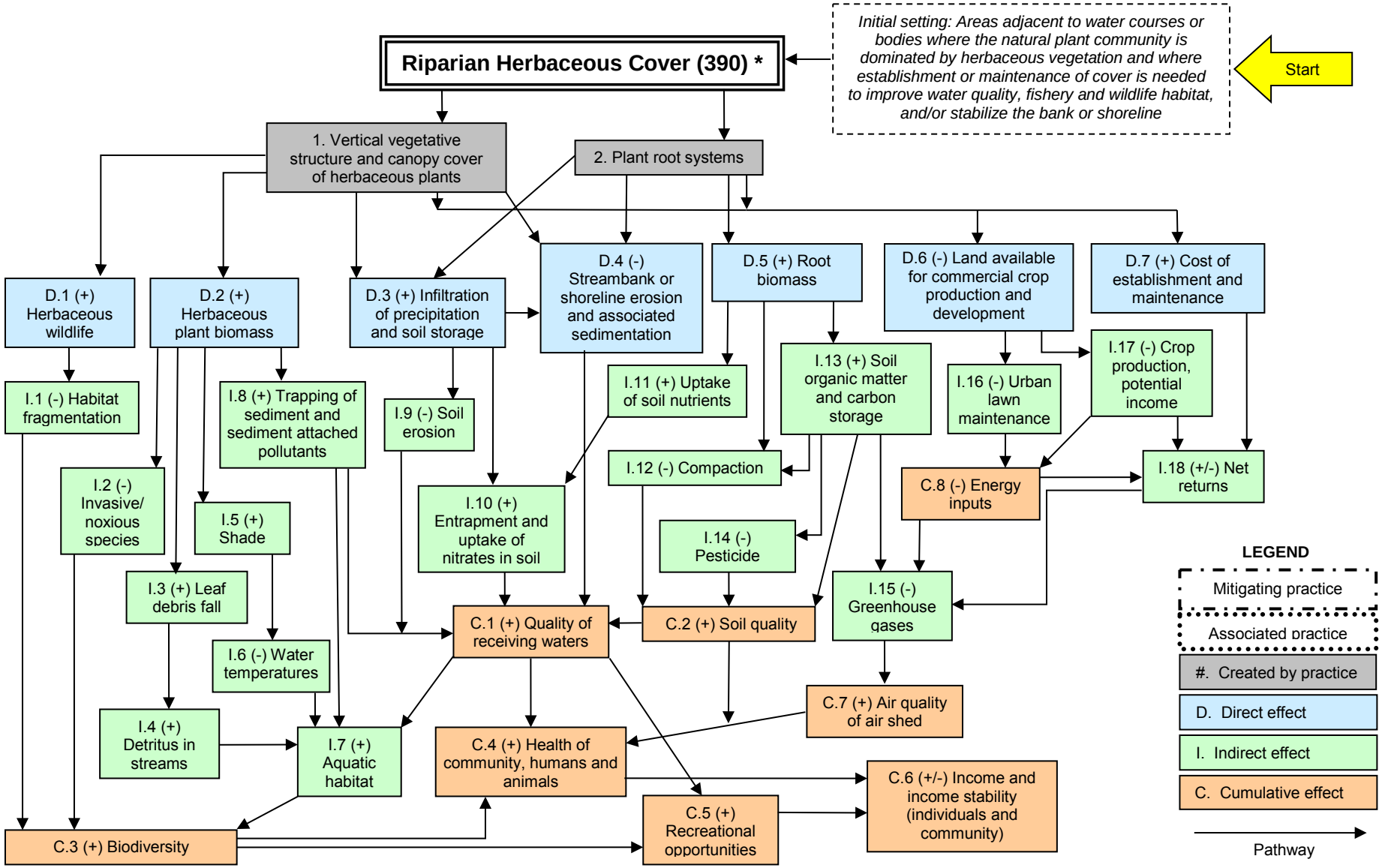

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*Effects start at establishment and continue through to fully functional condition.

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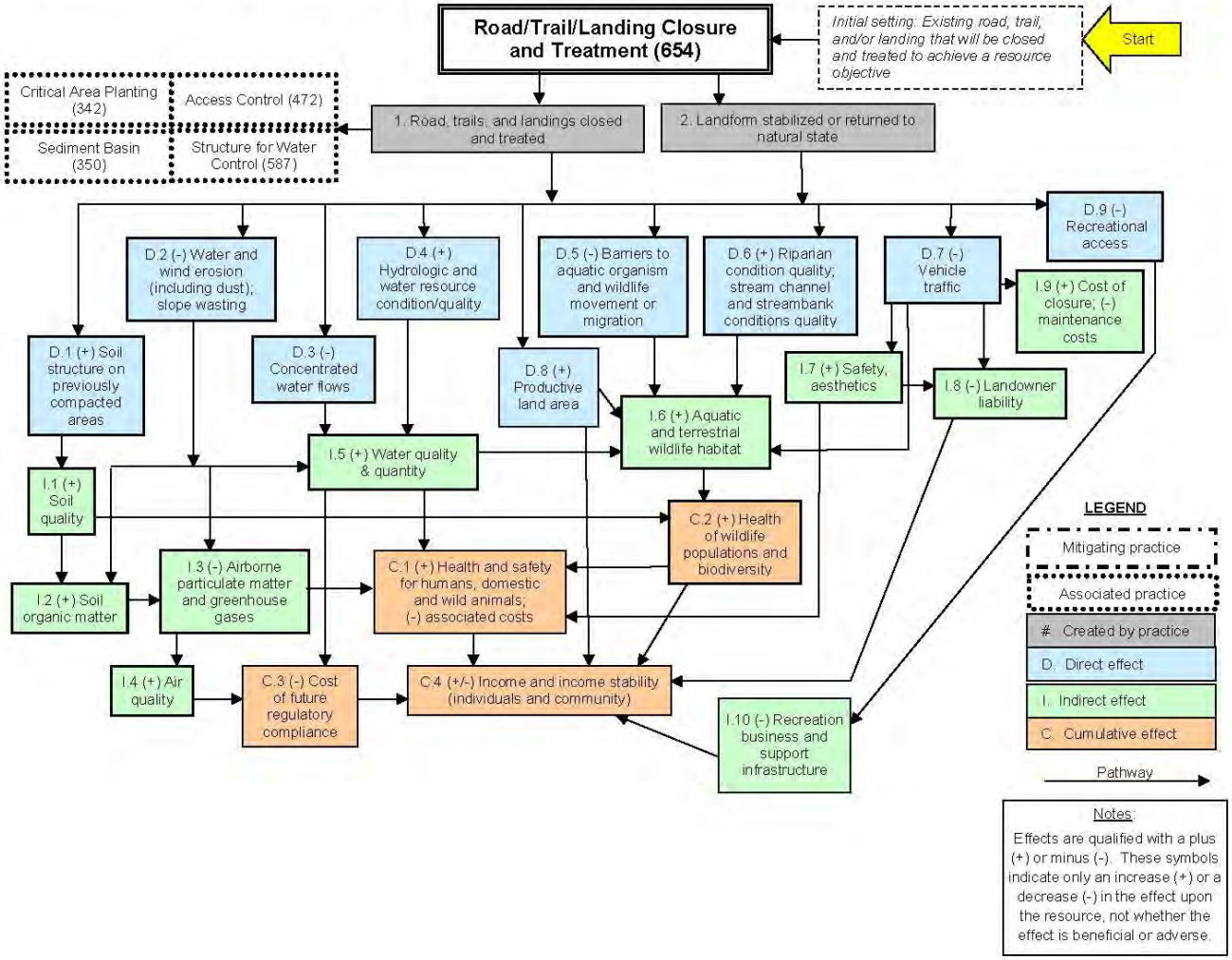

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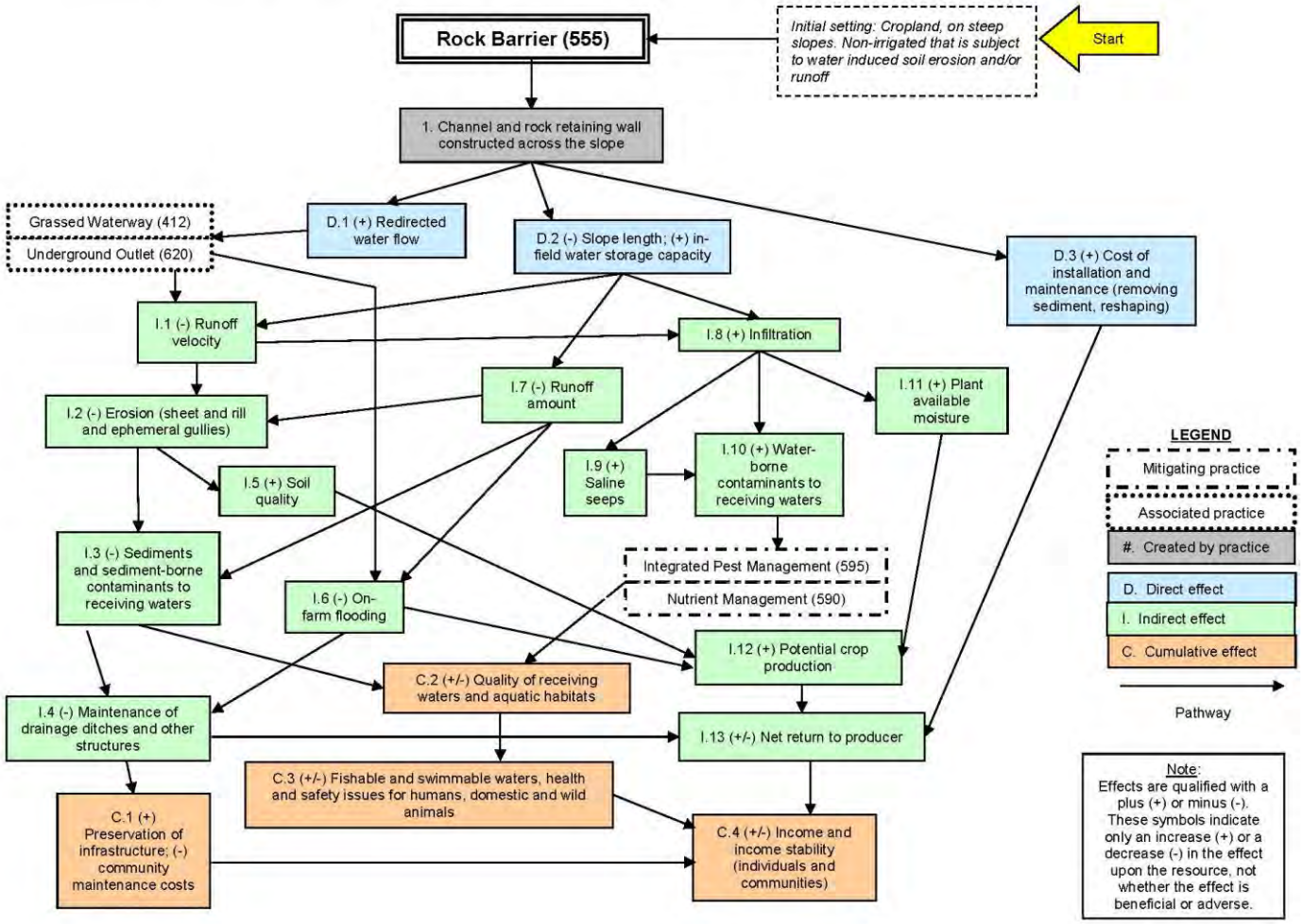

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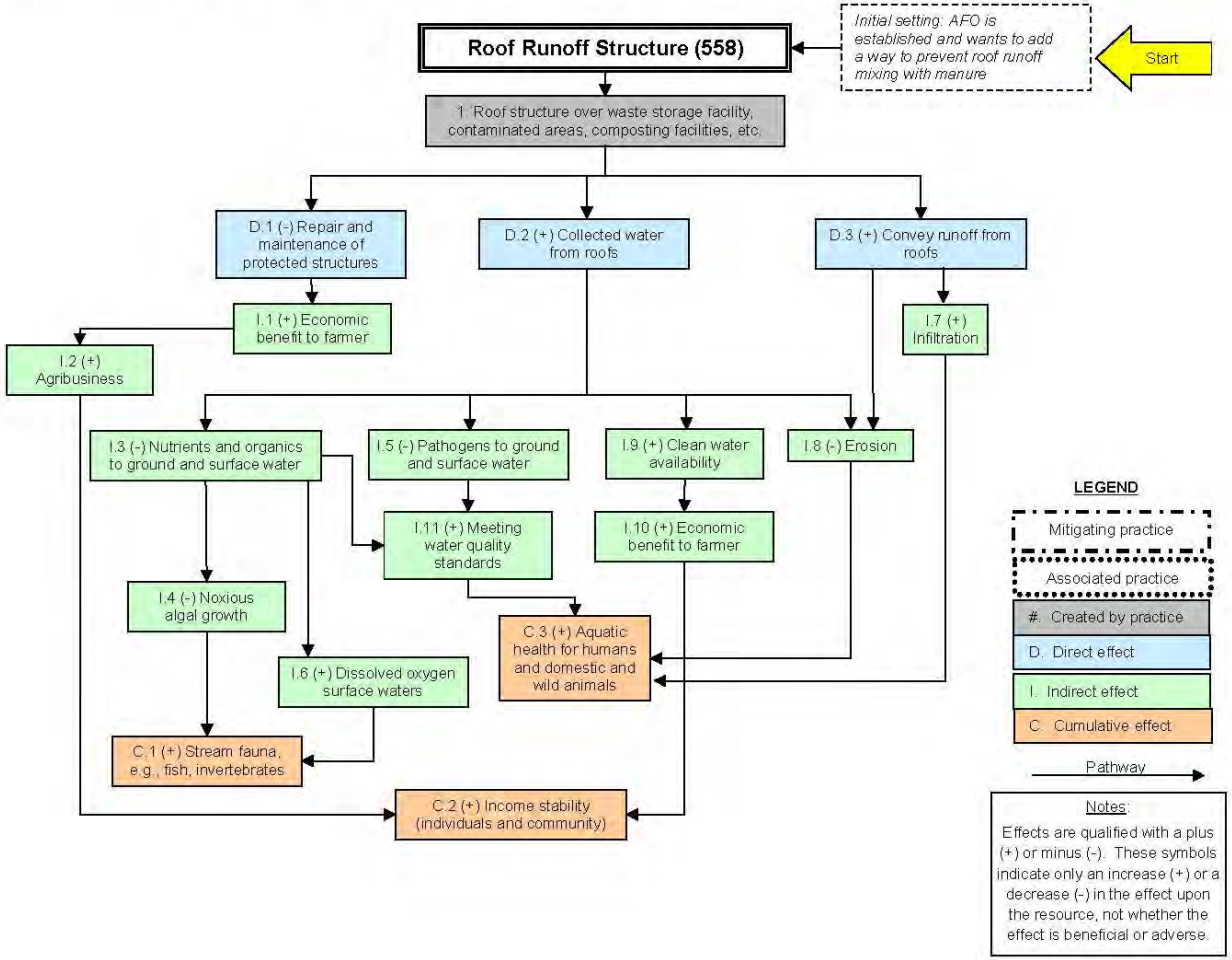

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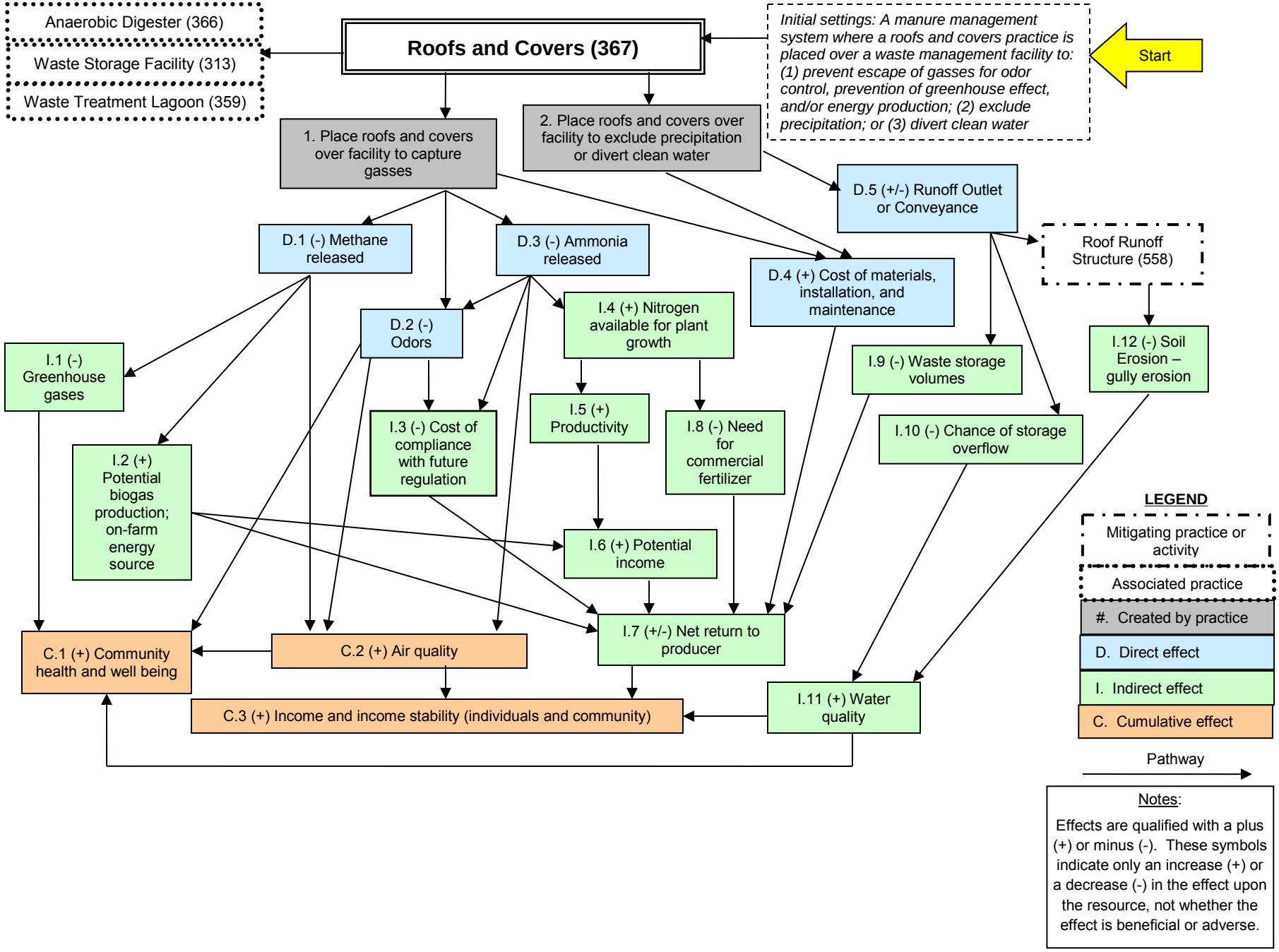
Anaerobic Digester (366)
Waste Storage Facility (313)
Waste Treatment Lagoon (359)
Roofs and Covers (367)
Initial settings: A manure management system where a roofs and covers practice is placed over a waste management facility to: (1) prevent escape of gasses for odor control, prevention of greenhouse effect, and/or energy production; (2) exclude precipitation; or (3) divert clean water
Start
1. Place roofs and covers over facility to capture gasses
2. Place roofs and covers over facility to exclude precipitation or divert clean water
D.5 (+/-) Runoff Outlet or Conveyance
Roof Runoff Structure (558)
D.1 (-) Methane released
D.3 (-) Ammonia released
D.4 (+) Cost of materials, installation, and maintenance
D.2 (-) Odors
I.4 (+) Nitrogen available for plant growth
I.12 (-) Soil Erosion – gully erosion
I.1 (-) Greenhouse gases
I.9 (-) Waste storage volumes
I.3 (-) Cost of compliance with future regulation
I.5 (+) Productivity
I.8 (-) Need for commercial fertilizer
I.10 (-) Chance of storage overflow
I.2 (+) Potential biogas production; on-farm energy source
I.6 (+) Potential income
I.7 (+/-) Net return to producer
C.1 (+) Community health and well being
C.2 (+) Air quality
C.3 (+) Income and income stability (individuals and community)
I.11 (+) Water quality
LEGEND
Mitigating practice or activity
Associated practice
#. Created by practice
D. Direct effect
I. Indirect effect
C. Cumulative effect
Pathway
Notes:
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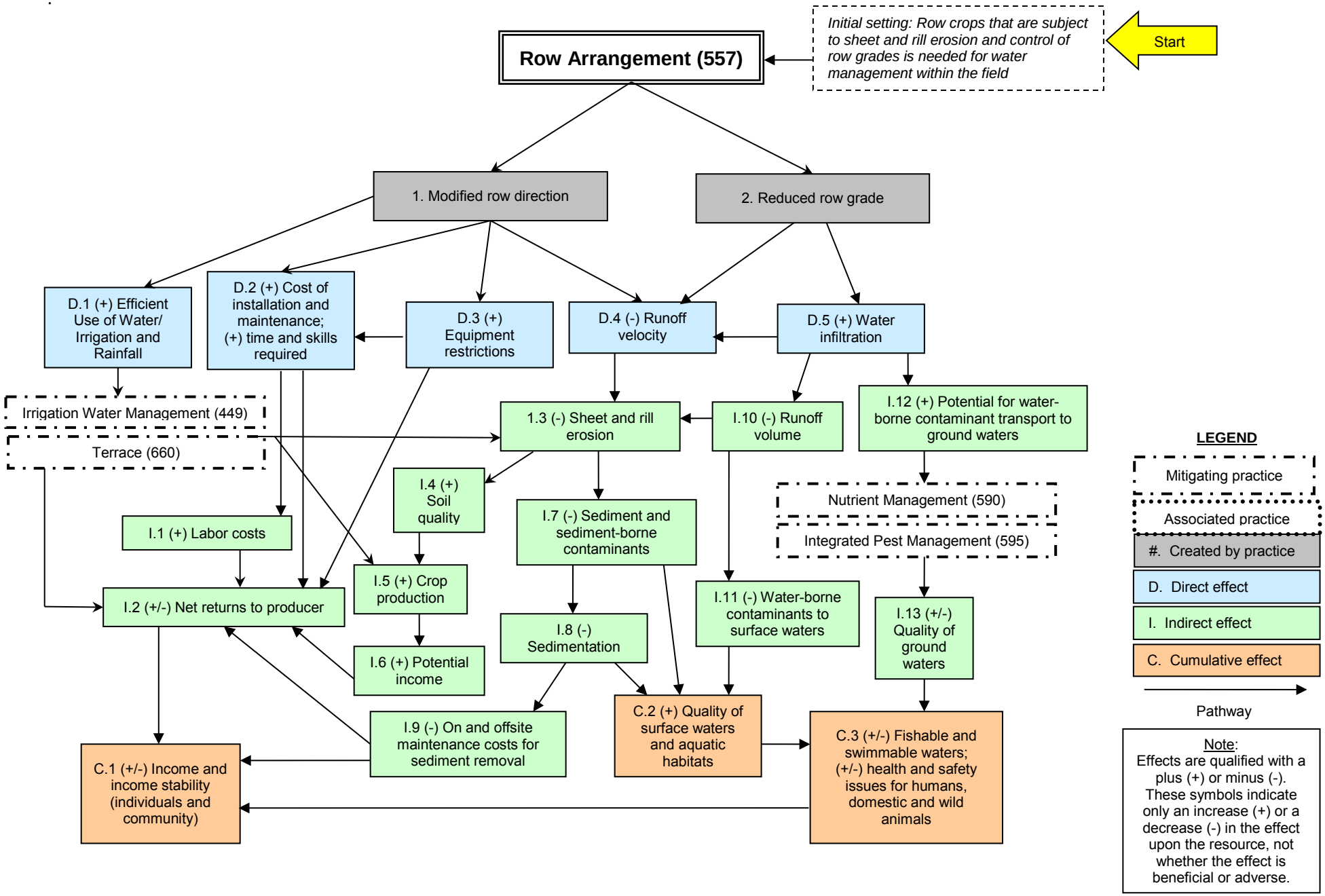
Row Arrangement (557)
Initial setting: Row crops that are subject to sheet and rill erosion and control of row grades is needed for water management within the field
Start
1. Modified row direction
2. Reduced row grade
D.1 (+) Efficient Use of Water/ Irrigation and Rainfall
D.2 (+) Cost of installation and maintenance; (+) time and skills required
D.3 (+) Equipment restrictions
D.4 (-) Runoff velocity
D.5 (+) Water infiltration
Irrigation Water Management (449)
Terrace (660)
1.3 (-) Sheet and rill erosion
I.10 (-) Runoff volume
I.12 (+) Potential for water-borne contaminant transport to ground waters
I.4 (+) Soil quality
I.7 (-) Sediment and sediment-borne contaminants
Nutrient Management (590)
Integrated Pest Management (595)
I.1 (+) Labor costs
I.5 (+) Crop production
I.2 (+/-) Net returns to producer
I.11 (-) Water-borne contaminants to surface waters
I.13 (+/-) Quality of ground waters
I.8 (-) Sedimentation
I.6 (+) Potential income
I.9 (-) On and offsite maintenance costs for sediment removal
C.2 (+) Quality of surface waters and aquatic habitats
C.3 (+/-) Fishable and swimmable waters; (+/-) health and safety issues for humans, domestic and wild animals
C.1 (+/-) Income and income stability (individuals and community)
LEGEND
Mitigating practice
Associated practice
#. Created by practice
D. Direct effect
I. Indirect effect
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Pathway
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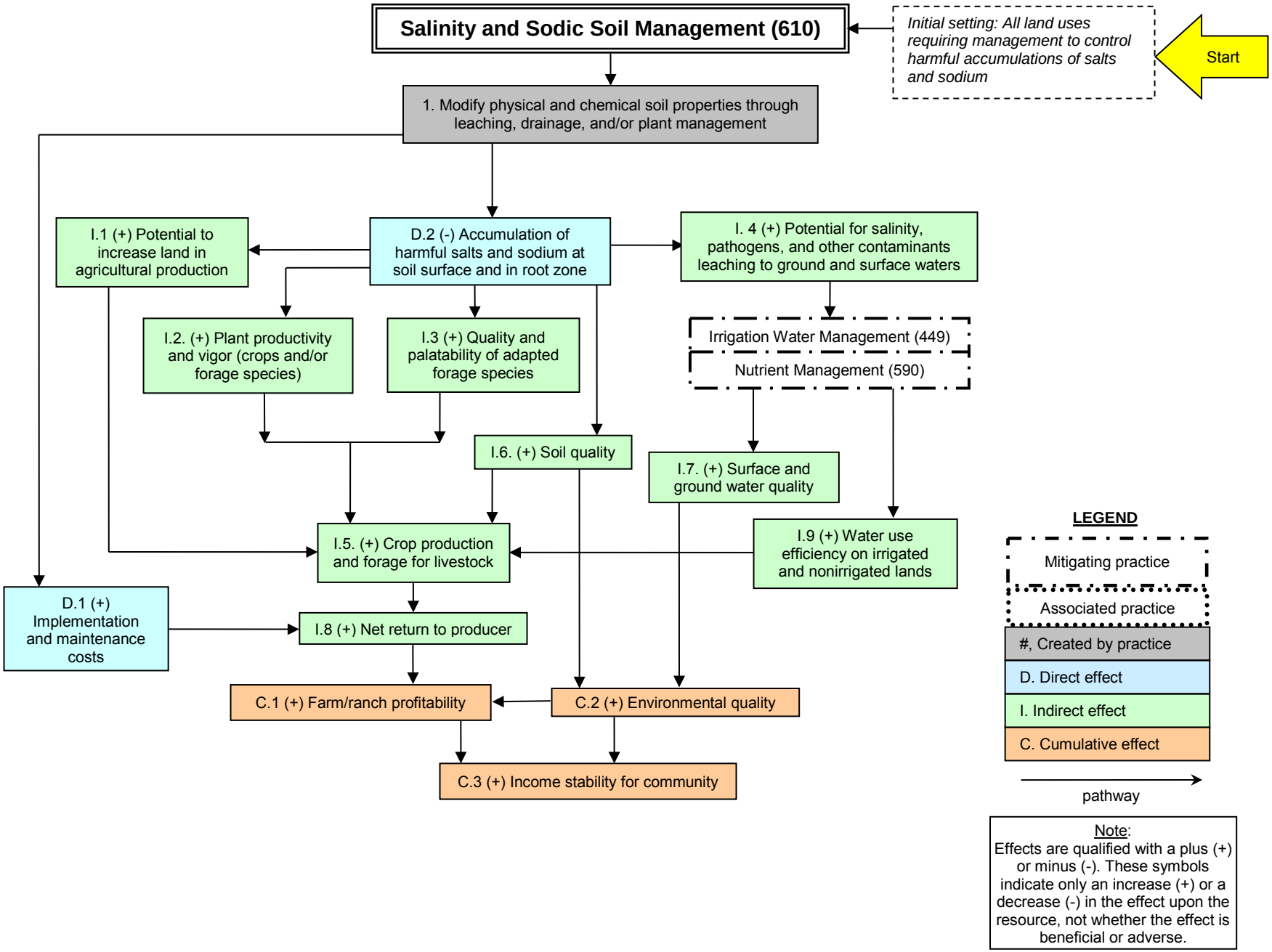
Salinity and Sodic Soil Management (610)
Initial setting: All land uses requiring management to control harmful accumulations of salts and sodium
Start
1. Modify physical and chemical soil properties through leaching, drainage, and/or plant management
I.1 (+) Potential to increase land in agricultural production
D.2 (-) Accumulation of harmful salts and sodium at soil surface and in root zone
I. 4 (+) Potential for salinity, pathogens, and other contaminants leaching to ground and surface waters
I.2. (+) Plant productivity and vigor (crops and/or forage species)
I.3 (+) Quality and palatability of adapted forage species
Irrigation Water Management (449)
Nutrient Management (590)
I.6. (+) Soil quality
I.7. (+) Surface and ground water quality
I.5. (+) Crop production and forage for livestock
I.9 (+) Water use efficiency on irrigated and nonirrigated lands
D.1 (+) Implementation and maintenance costs
I.8 (+) Net return to producer
C.1 (+) Farm/ranch profitability
C.2 (+) Environmental quality
C.3 (+) Income stability for community
LEGEND
Mitigating practice
Associated practice
#, Created by practice
D. Direct effect
I. Indirect effect
C. Cumulative effect
pathway
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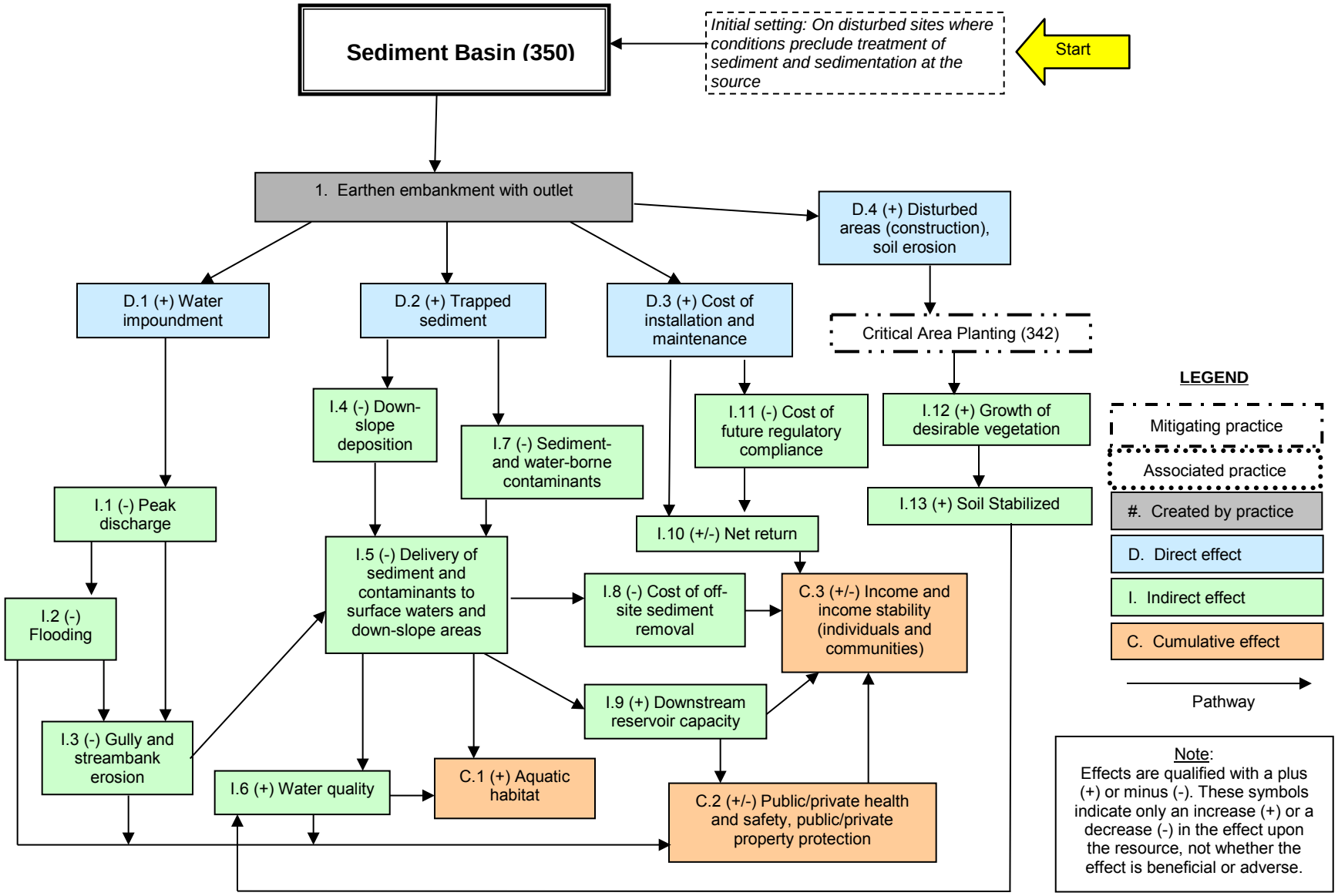
Sediment Basin (350)
Initial setting: On disturbed sites where conditions preclude treatment of sediment and sedimentation at the source
Start
1. Earthen embankment with outlet
D.4 (+) Disturbed areas (construction), soil erosion
D.1 (+) Water impoundment
D.2 (+) Trapped sediment
D.3 (+) Cost of installation and maintenance
Critical Area Planting (342)
I.4 (-) Down-slope deposition
I.7 (-) Sediment- and water-borne contaminants
I.11 (-) Cost of future regulatory compliance
I.12 (+) Growth of desirable vegetation
I.1 (-) Peak discharge
I.13 (+) Soil Stabilized
I.10 (+/-) Net return
I.5 (-) Delivery of sediment and contaminants to surface waters and down-slope areas
I.8 (-) Cost of off-site sediment removal
C.3 (+/-) Income and income stability (individuals and communities)
I.2 (-) Flooding
I.9 (+) Downstream reservoir capacity
I.3 (-) Gully and streambank erosion
I.6 (+) Water quality
C.1 (+) Aquatic habitat
C.2 (+/-) Public/private health and safety, public/private property protection
LEGEND
Mitigating practice
Associated practice
#. Created by practice
D. Direct effect
I. Indirect effect
C. Cumulative effect
Pathway
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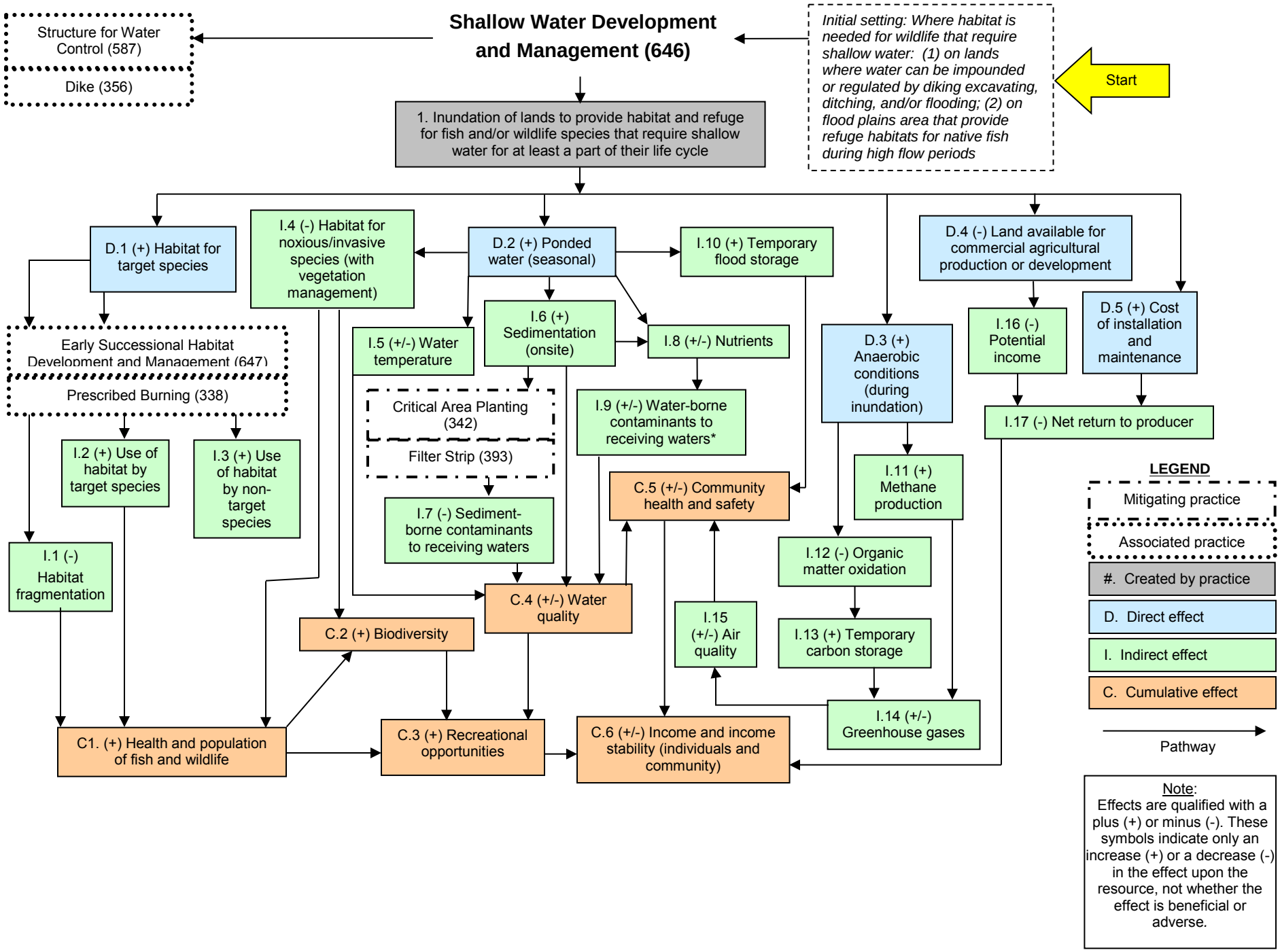
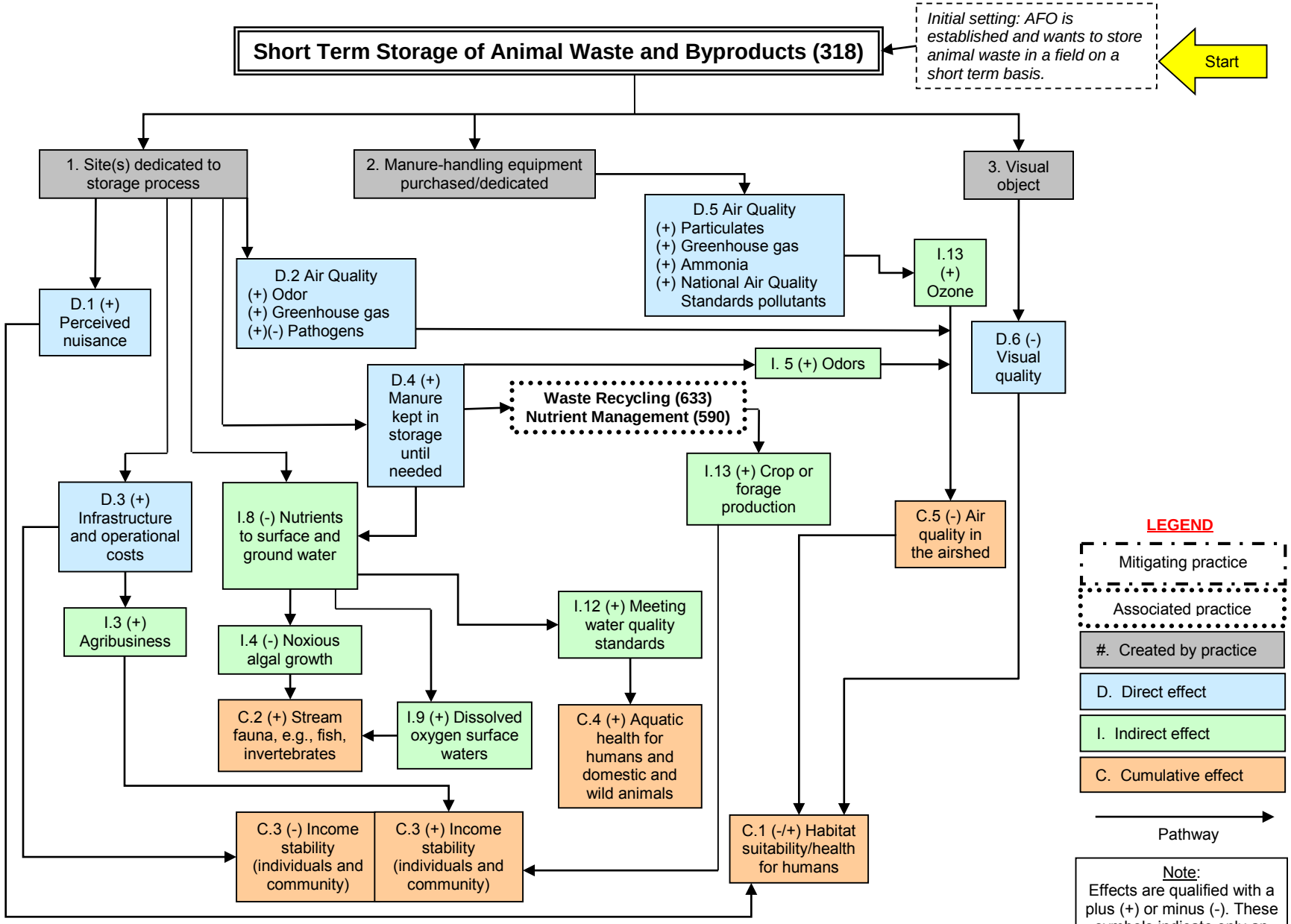
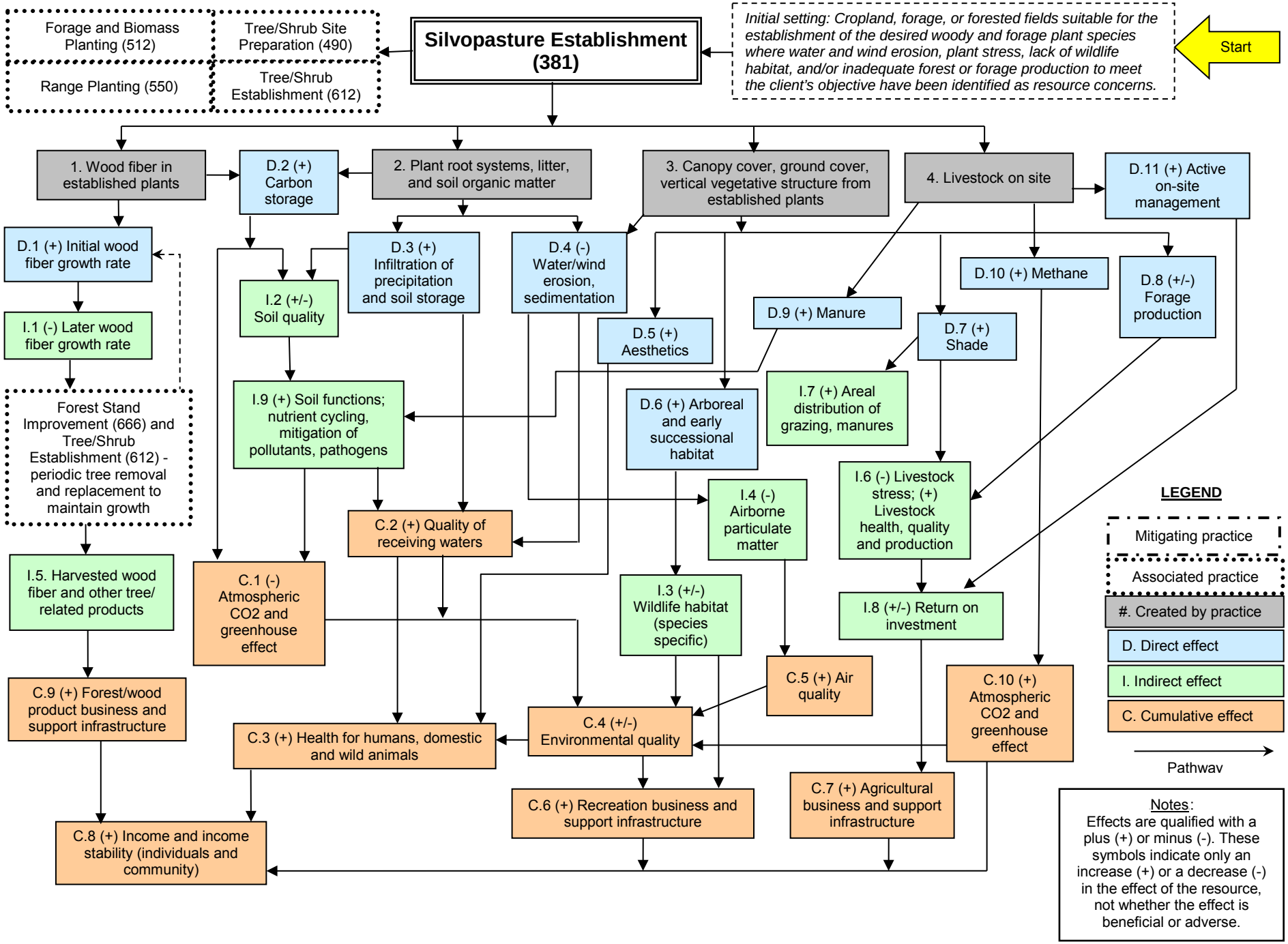


Network Diagram 112



Network Diagram 113


Forage and Biomass Planting (512)
Tree/Shrub Site Preparation (490)
Range Planting (550)
Tree/Shrub Establishment (612)
Silvopasture Establishment (381)
Initial setting: Cropland, forage, or forested fields suitable for the establishment of the desired woody and forage plant species where water and wind erosion, plant stress, lack of wildlife habitat, and/or inadequate forest or forage production to meet the client's objective have been identified as resource concerns.
Start
1. Wood fiber in established plants
D.2 (+) Carbon storage
2. Plant root systems, litter, and soil organic matter
3. Canopy cover, ground cover, vertical vegetative structure from established plants
4. Livestock on site
D.11 (+) Active on-site management
D.1 (+) Initial wood fiber growth rate
I.1 (-) Later wood fiber growth rate
Forest Stand Improvement (666) and Tree/Shrub Establishment (612) - periodic tree removal and replacement to maintain growth
I.5. Harvested wood fiber and other tree/ related products
C.9 (+) Forest/wood product business and support infrastructure
C.8 (+) Income and income stability (individuals and community)
I.2 (+/-) Soil quality
D.3 (+) Infiltration of precipitation and soil storage
D.4 (-) Water/wind erosion, sedimentation
D.5 (+) Aesthetics
D.6 (+) Arboreal and early successional habitat
D.9 (+) Manure
D.10 (+) Methane
D.7 (+) Shade
D.8 (+/-) Forage production
I.9 (+) Soil functions; nutrient cycling, mitigation of pollutants, pathogens
I.7 (+) Areal distribution of grazing, manures
I.6 (-) Livestock stress; (+) Livestock health, quality and production
I.4 (-) Airborne particulate matter
C.2 (+) Quality of receiving waters
C.1 (-) Atmospheric CO2 and greenhouse effect
I.3 (+/-) Wildlife habitat (species specific)
I.8 (+/-) Return on investment
C.5 (+) Air quality
C.10 (+) Atmospheric CO2 and greenhouse effect
C.4 (+/-) Environmental quality
C.3 (+) Health for humans, domestic and wild animals
C.6 (+) Recreation business and support infrastructure
C.7 (+) Agricultural business and support infrastructure
LEGEND
Mitigating practice
Associated practice
#. Created by practice
D. Direct effect
I. Indirect effect
C. Cumulative effect
Pathway
Notes:
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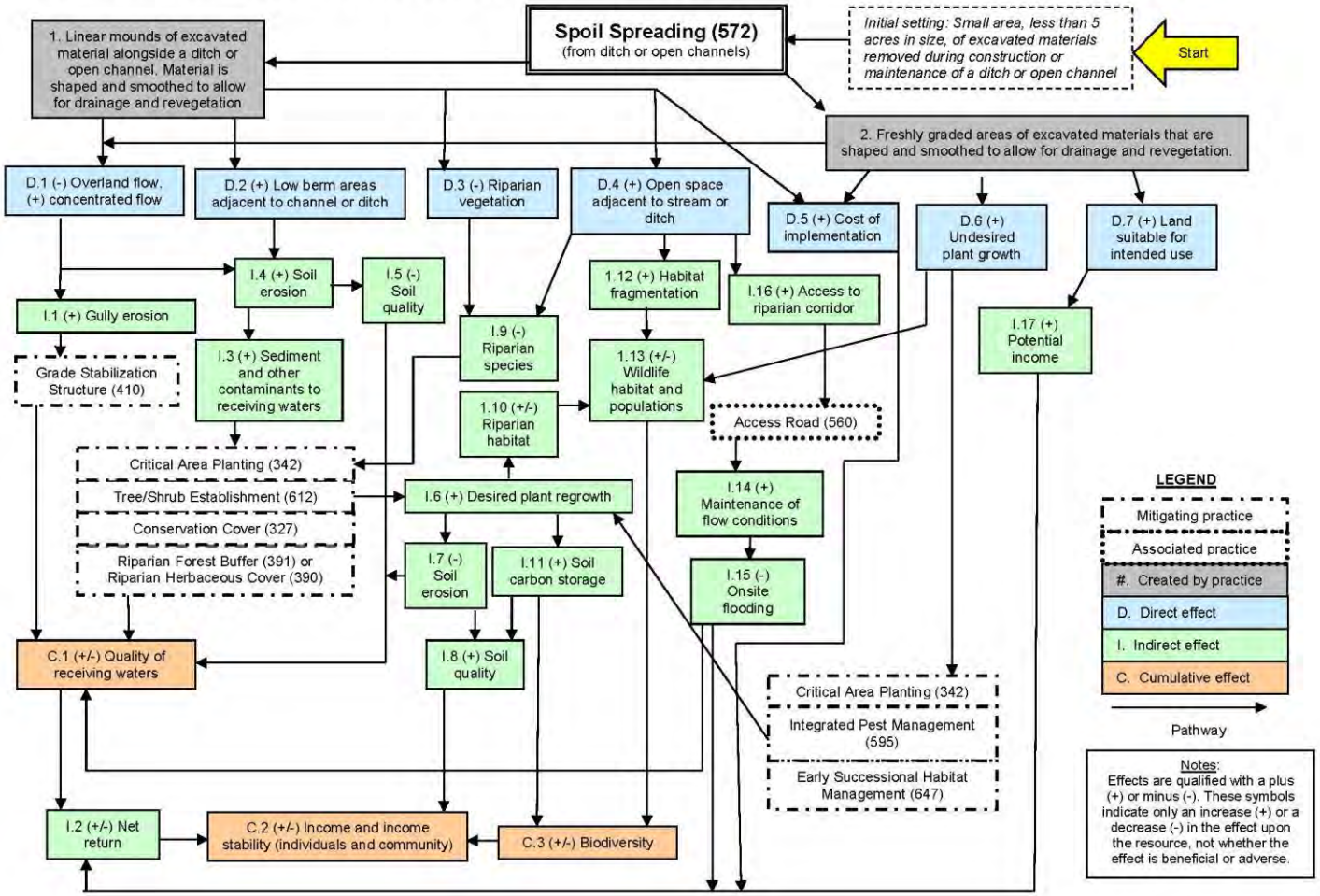
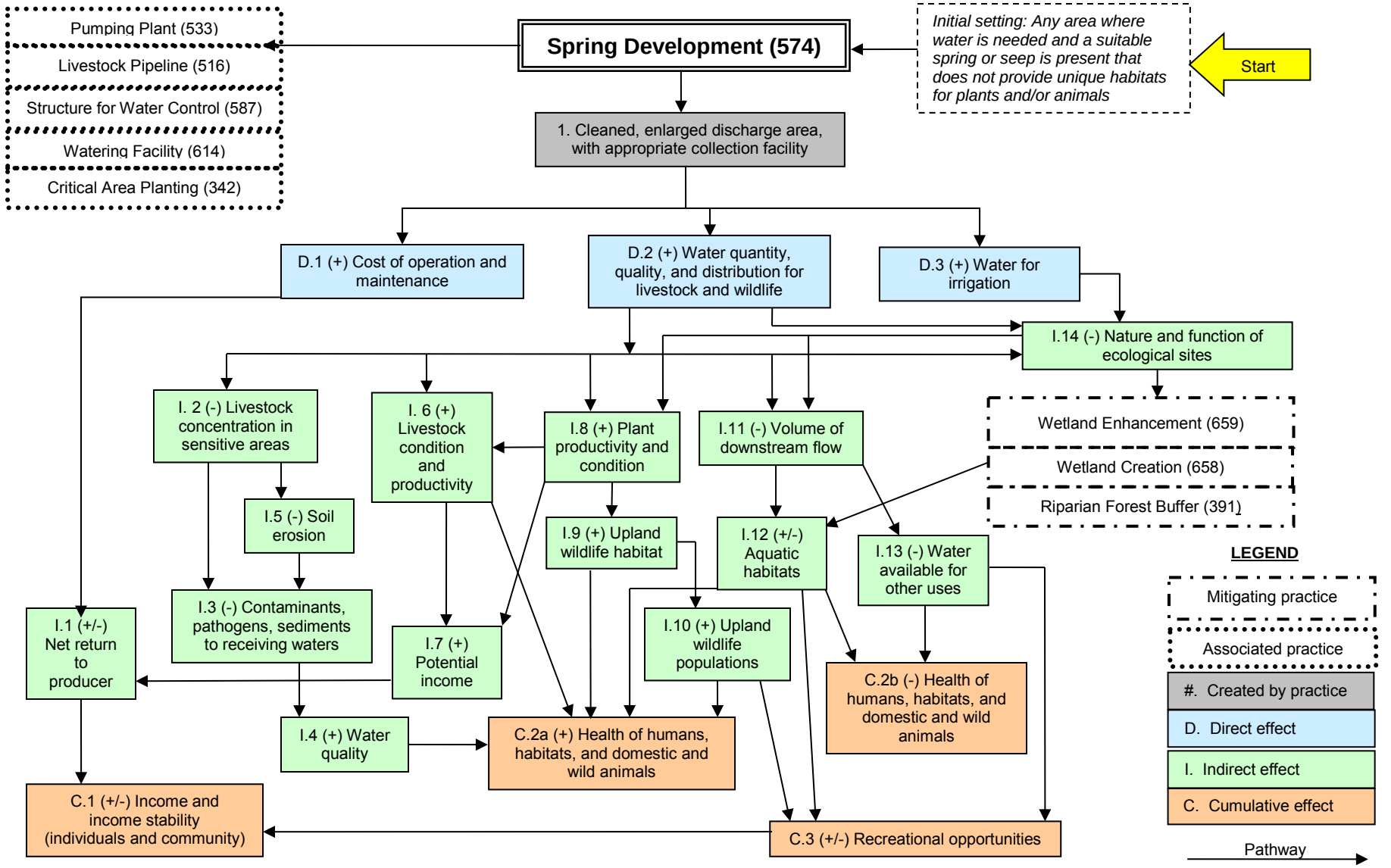
NRCS CONSERVATION PRACTICE EFFECTS - NETWORK DIAGRAM

March 2014





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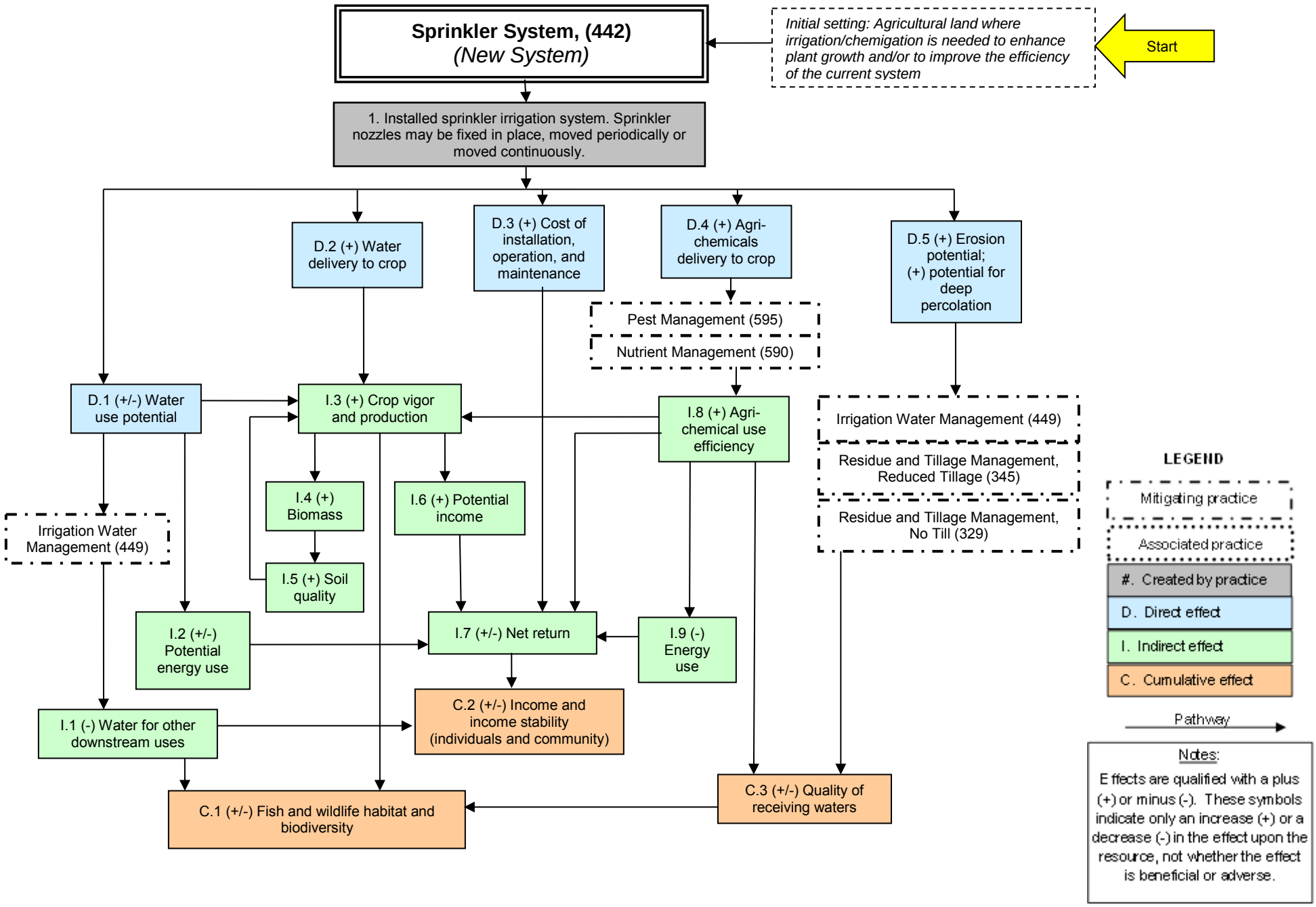
Sprinkler System, (442)
(New System)
Initial setting: Agricultural land where irrigation/chemigation is needed to enhance plant growth and/or to improve the efficiency of the current system
Start
1. Installed sprinkler irrigation system. Sprinkler nozzles may be fixed in place, moved periodically or moved continuously.
D.2 (+) Water delivery to crop
D.3 (+) Cost of installation, operation, and maintenance
D.4 (+) Agri-chemicals delivery to crop
D.5 (+) Erosion potential; (+) potential for deep percolation
Pest Management (595)
Nutrient Management (590)
D.1 (+/-) Water use potential
I.3 (+) Crop vigor and production
I.8 (+) Agri-chemical use efficiency
Irrigation Water Management (449)
Residue and Tillage Management, Reduced Tillage (345)
Residue and Tillage Management, No Till (329)
I.4 (+) Biomass
I.6 (+) Potential income
Irrigation Water Management (449)
I.5 (+) Soil quality
I.2 (+/-) Potential energy use
I.7 (+/-) Net return
I.9 (-) Energy use
C.2 (+/-) Income and income stability (individuals and community)
I.1 (-) Water for other downstream uses
C.1 (+/-) Fish and wildlife habitat and biodiversity
C.3 (+/-) Quality of receiving waters
LEGEND
Mitigating practice
Associated practice
#. Created by practice
D. Direct effect
I. Indirect effect
C. Cumulative effect
Pathway
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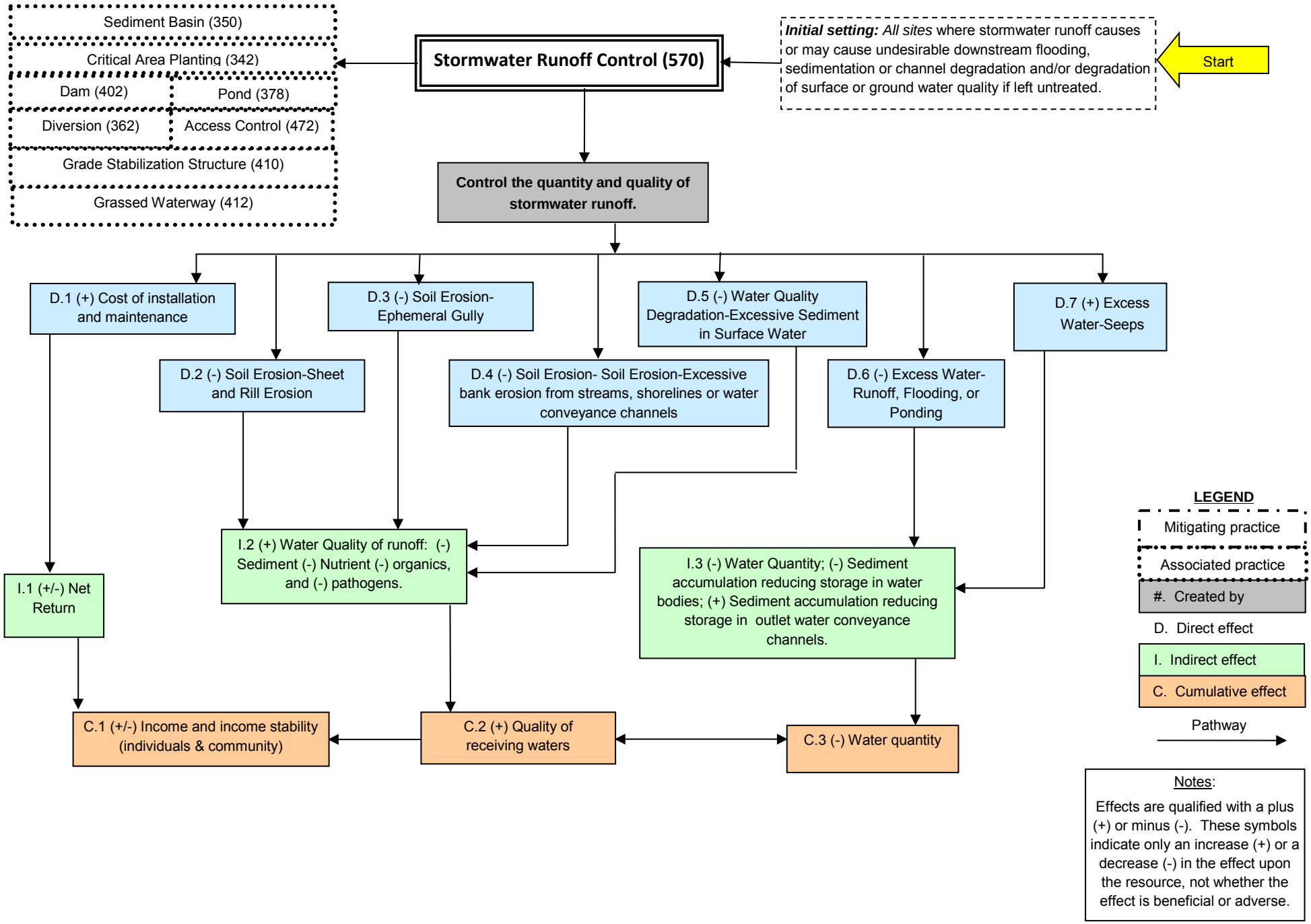
Sediment Basin (350)
Critical Area Planting (342)
Dam (402)
Pond (378)
Diversion (362)
Access Control (472)
Grade Stabilization Structure (410)
Grassed Waterway (412)
Stormwater Runoff Control (570)
Initial setting: All sites where stormwater runoff causes or may cause undesirable downstream flooding, sedimentation or channel degradation and/or degradation of surface or ground water quality if left untreated.
Start
Control the quantity and quality of stormwater runoff.
D.1 (+) Cost of installation and maintenance
D.2 (-) Soil Erosion-Sheet and Rill Erosion
D.3 (-) Soil Erosion-Ephemeral Gully
D.4 (-) Soil Erosion- Soil Erosion-Excessive bank erosion from streams, shorelines or water conveyance channels
D.5 (-) Water Quality Degradation-Excessive Sediment in Surface Water
D.6 (-) Excess Water-Runoff, Flooding, or Ponding
D.7 (+) Excess Water-Seeps
I.1 (+/-) Net Return
I.2 (+) Water Quality of runoff: (-) Sediment (-) Nutrient (-) organics, and (-) pathogens.
I.3 (-) Water Quantity; (-) Sediment accumulation reducing storage in water bodies; (+) Sediment accumulation reducing storage in outlet water conveyance channels.
C.1 (+/-) Income and income stability (individuals & community)
C.2 (+) Quality of receiving waters
C.3 (-) Water quantity
LEGEND
Mitigating practice
Associated practice
#. Created by
D. Direct effect
I. Indirect effect
C. Cumulative effect
Pathway
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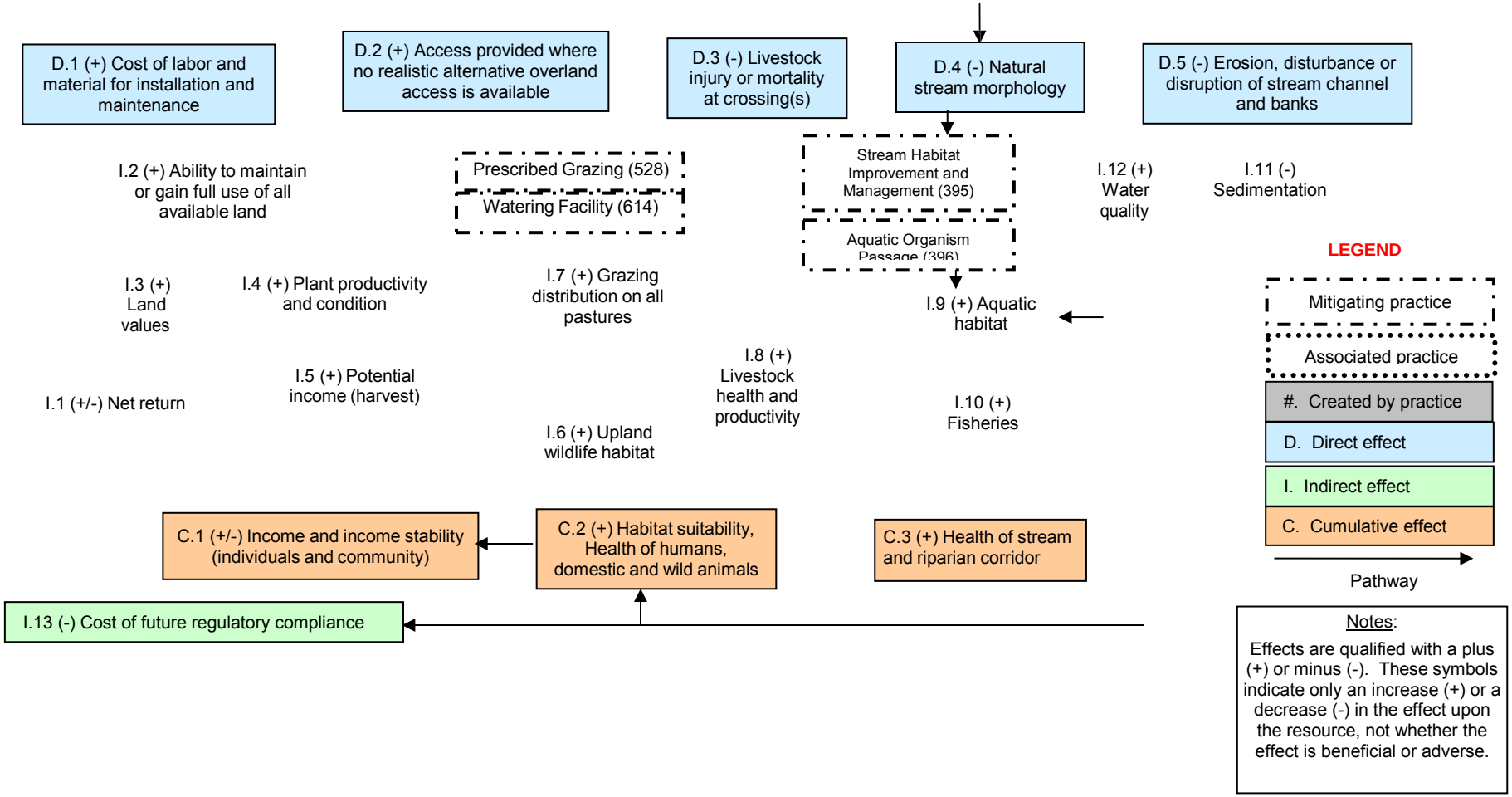
Forest Trails and Landings (655)	Heavy Use Area Protection (561)
Animal Trails and Walkways (575)	Aquatic Organism Passage (396)
Channel Bed Stabilization (584)	Critical Area Planting (342)
	Access Road (560)
Structure for Water Control (587)	Fence (382)

Stream Crossing (578)

1. A stable, fordable, or elevated stream crossing constructed to safely allow access to land on both sides of the stream for livestock, pedestrians, wildlife, and/or vehicles and towed equipment

Initial setting: One or more of the following: (1) current stream crossing is unsafe or unstable in its current condition contributing to downstream scour and sedimentation and/or restricting or impeding flood or baseflows and disrupting migrating aquatic life; (2) currently no stream crossings exist, but one or more are desired or needed for access purposes; or (3) uncontrolled stream ingress and egress by livestock is causing localized or widespread damage to riparian vegetation, the fishery, and streambanks and beds along the course of a stream flowing through a pasture

Start



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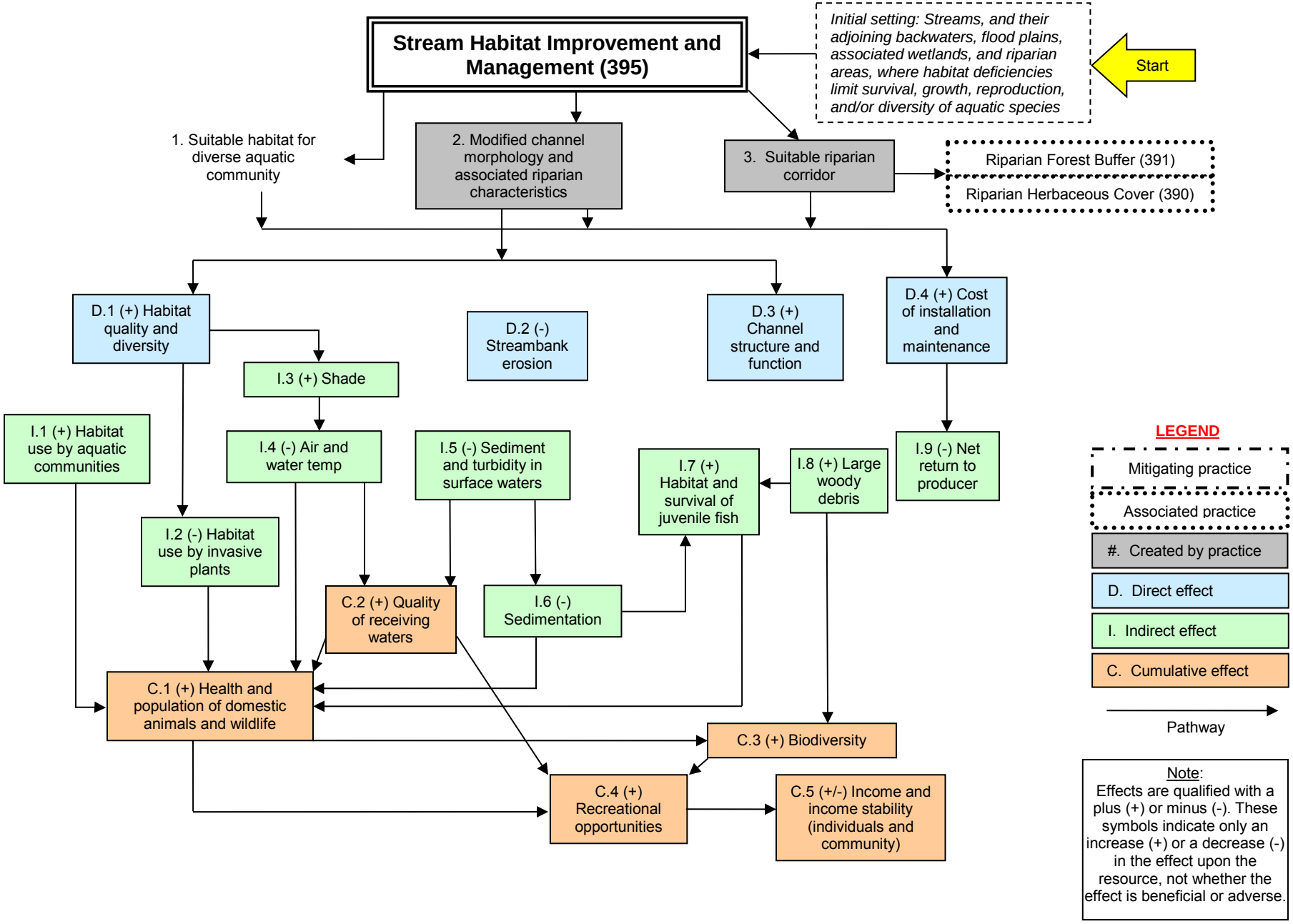
Stream Habitat Improvement and Management (395)
Initial setting: Streams, and their adjoining backwaters, flood plains, associated wetlands, and riparian areas, where habitat deficiencies limit survival, growth, reproduction, and/or diversity of aquatic species
Start
1. Suitable habitat for diverse aquatic community
2. Modified channel morphology and associated riparian characteristics
3. Suitable riparian corridor
Riparian Forest Buffer (391)
Riparian Herbaceous Cover (390)
D.1 (+) Habitat quality and diversity
D.2 (-) Streambank erosion
D.3 (+) Channel structure and function
D.4 (+) Cost of installation and maintenance
I.3 (+) Shade
I.1 (+) Habitat use by aquatic communities
I.4 (-) Air and water temp
I.5 (-) Sediment and turbidity in surface waters
I.7 (+) Habitat and survival of juvenile fish
I.8 (+) Large woody debris
I.9 (-) Net return to producer
I.2 (-) Habitat use by invasive plants
C.2 (+) Quality of receiving waters
I.6 (-) Sedimentation
C.1 (+) Health and population of domestic animals and wildlife
C.3 (+) Biodiversity
C.4 (+) Recreational opportunities
C.5 (+/-) Income and income stability (individuals and community)
LEGEND
Mitigating practice
Associated practice
#. Created by practice
D. Direct effect
I. Indirect effect
C. Cumulative effect
Pathway
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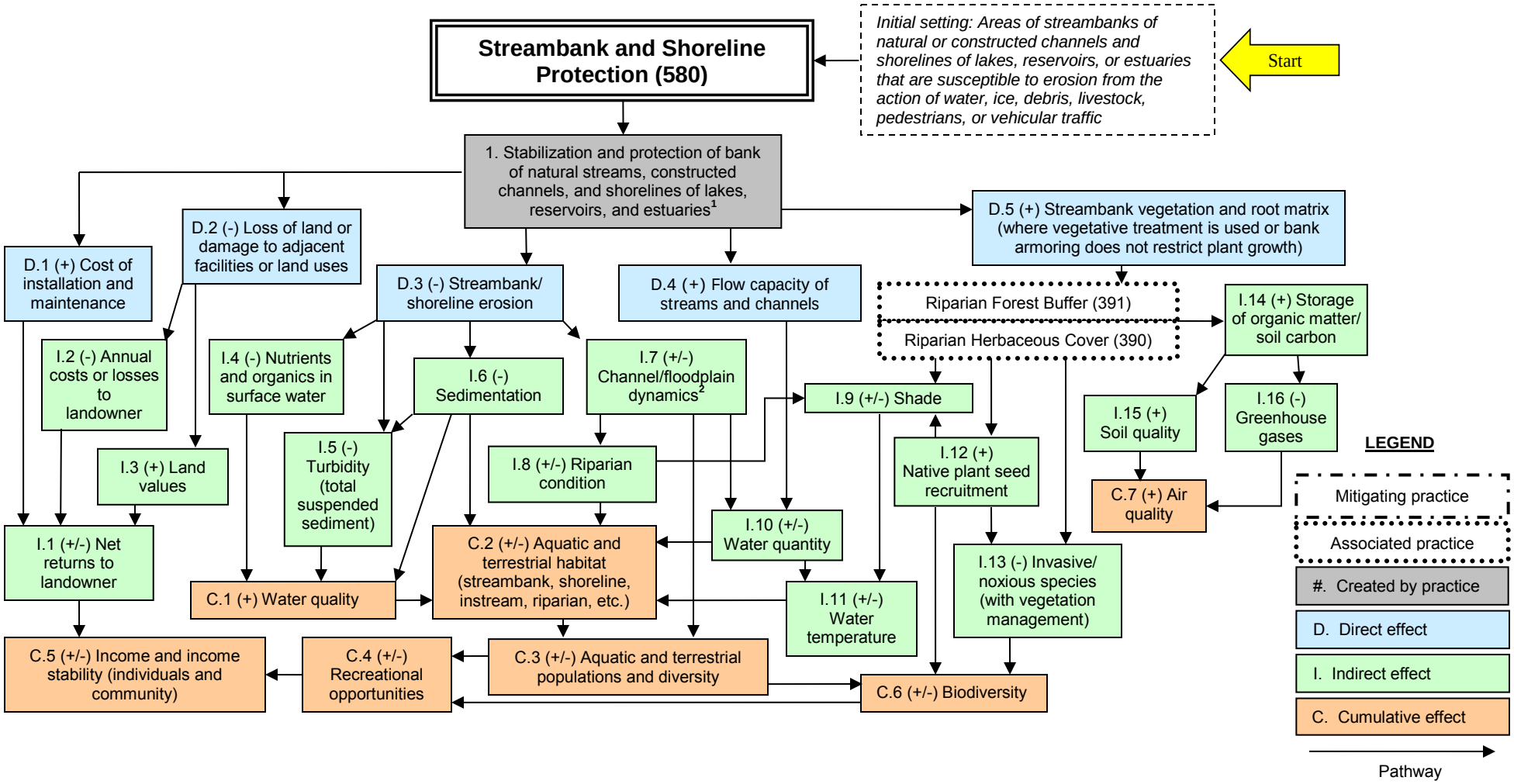

Notes:

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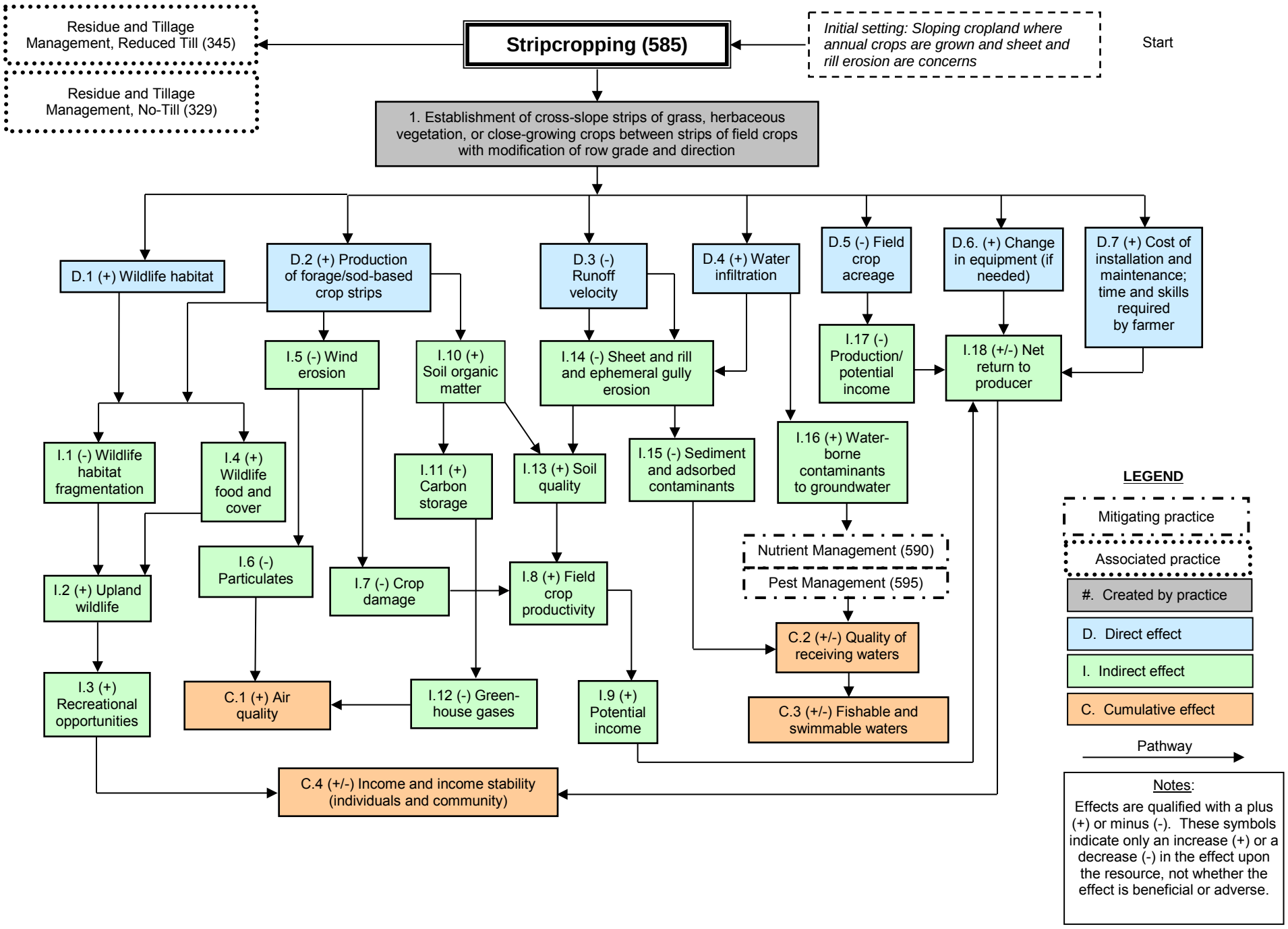
[1] Additional information about potential protection measures and their impacts is available in the EIS for the Emergency Watershed Protection (EWP) Program.

[2] Conventional bank armoring (e.g., rip rap, gabions) may result in decreased (-) channel/flood plain dynamics, and associated impacts, while other less intrusive methods (e.g., stream barbs, stone toes with sloped, vegetated banks) may result in increased (+) channel/flood plain dynamics.


Residue and Tillage Management, Reduced Till (345)
Residue and Tillage Management, No-Till (329)
Stripcropping (585)
Initial setting: Sloping cropland where annual crops are grown and sheet and rill erosion are concerns
Start
1. Establishment of cross-slope strips of grass, herbaceous vegetation, or close-growing crops between strips of field crops with modification of row grade and direction
D.1 (+) Wildlife habitat
D.2 (+) Production of forage/sod-based crop strips
D.3 (-) Runoff velocity
D.4 (+) Water infiltration
D.5 (-) Field crop acreage
D.6. (+) Change in equipment (if needed)
D.7 (+) Cost of installation and maintenance; time and skills required by farmer
I.5 (-) Wind erosion
I.10 (+) Soil organic matter
I.14 (-) Sheet and rill and ephemeral gully erosion
I.17 (-) Production/ potential income
I.18 (+/-) Net return to producer
I.1 (-) Wildlife habitat fragmentation
I.4 (+) Wildlife food and cover
I.11 (+) Carbon storage
I.13 (+) Soil quality
I.15 (-) Sediment and adsorbed contaminants
I.16 (+) Water-borne contaminants to groundwater
Nutrient Management (590)
Pest Management (595)
I.6 (-) Particulates
I.7 (-) Crop damage
I.8 (+) Field crop productivity
I.2 (+) Upland wildlife
C.2 (+/-) Quality of receiving waters
I.3 (+) Recreational opportunities
C.1 (+) Air quality
I.12 (-) Green-house gases
I.9 (+) Potential income
C.3 (+/-) Fishable and swimmable waters
C.4 (+/-) Income and income stability (individuals and community)
LEGEND
Mitigating practice
Associated practice
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D. Direct effect
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Pathway
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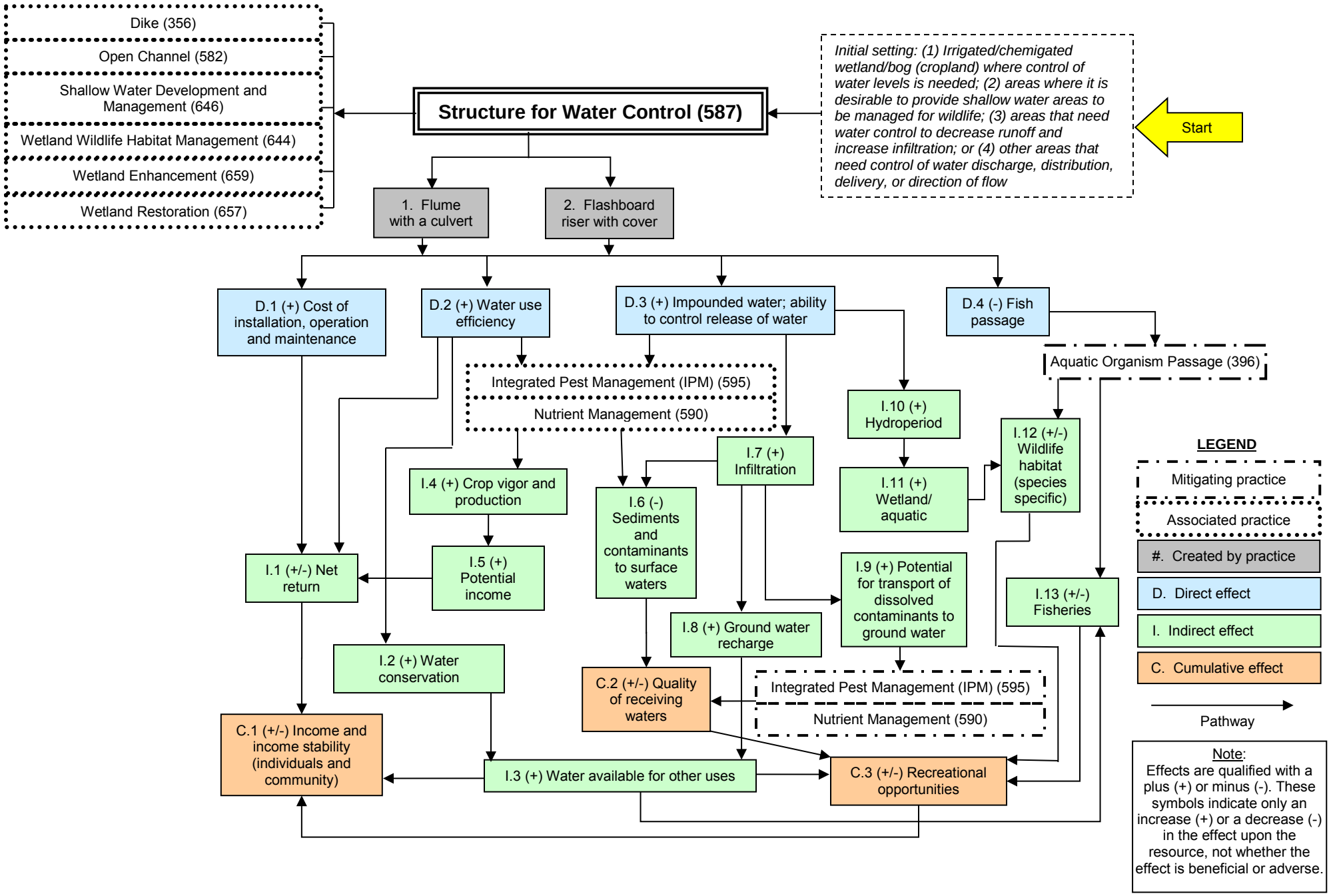
Dike (356)
Open Channel (582)
Shallow Water Development and Management (646)
Wetland Wildlife Habitat Management (644)
Wetland Enhancement (659)
Wetland Restoration (657)
Structure for Water Control (587)
Initial setting: (1) Irrigated/chemigated wetland/bog (cropland) where control of water levels is needed; (2) areas where it is desirable to provide shallow water areas to be managed for wildlife; (3) areas that need water control to decrease runoff and increase infiltration; or (4) other areas that need control of water discharge, distribution, delivery, or direction of flow
Start
1. Flume with a culvert
2. Flashboard riser with cover
D.1 (+) Cost of installation, operation and maintenance
D.2 (+) Water use efficiency
D.3 (+) Impounded water; ability to control release of water
D.4 (-) Fish passage
Aquatic Organism Passage (396)
Integrated Pest Management (IPM) (595)
Nutrient Management (590)
I.10 (+) Hydroperiod
I.12 (+/-) Wildlife habitat (species specific)
I.7 (+) Infiltration
I.4 (+) Crop vigor and production
I.6 (-) Sediments and contaminants to surface waters
I.11 (+) Wetland/ aquatic
I.1 (+/-) Net return
I.5 (+) Potential income
I.9 (+) Potential for transport of dissolved contaminants to ground water
I.13 (+/-) Fisheries
I.8 (+) Ground water recharge
I.2 (+) Water conservation
C.2 (+/-) Quality of receiving waters
Integrated Pest Management (IPM) (595)
Nutrient Management (590)
C.1 (+/-) Income and income stability (individuals and community)
I.3 (+) Water available for other uses
C.3 (+/-) Recreational opportunities
LEGEND
Mitigating practice
Associated practice
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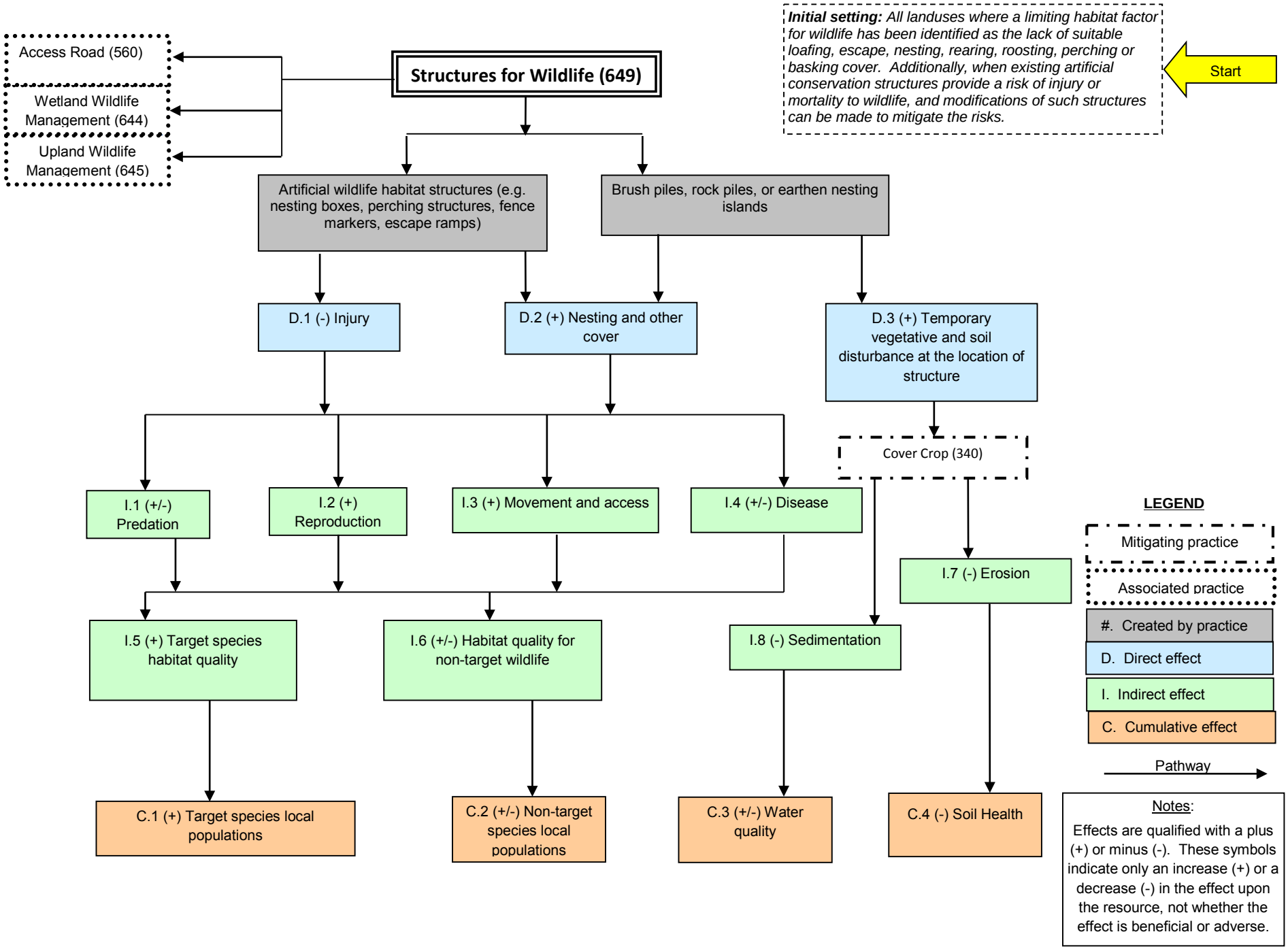
Initial setting: All landuses where a limiting habitat factor for wildlife has been identified as the lack of suitable loafing, escape, nesting, rearing, roosting, perching or basking cover. Additionally, when existing artificial conservation structures provide a risk of injury or mortality to wildlife, and modifications of such structures can be made to mitigate the risks.
Start
Structures for Wildlife (649)
Access Road (560)
Wetland Wildlife Management (644)
Upland Wildlife Management (645)
Artificial wildlife habitat structures (e.g. nesting boxes, perching structures, fence markers, escape ramps)
Brush piles, rock piles, or earthen nesting islands
D.1 (-) Injury
D.2 (+) Nesting and other cover
D.3 (+) Temporary vegetative and soil disturbance at the location of structure
Cover Crop (340)
I.1 (+/-) Predation
I.2 (+) Reproduction
I.3 (+) Movement and access
I.4 (+/-) Disease
I.7 (-) Erosion
I.5 (+) Target species habitat quality
I.6 (+/-) Habitat quality for non-target wildlife
I.8 (-) Sedimentation
C.1 (+) Target species local populations
C.2 (+/-) Non-target species local populations
C.3 (+/-) Water quality
C.4 (-) Soil Health
LEGEND
Mitigating practice
Associated practice
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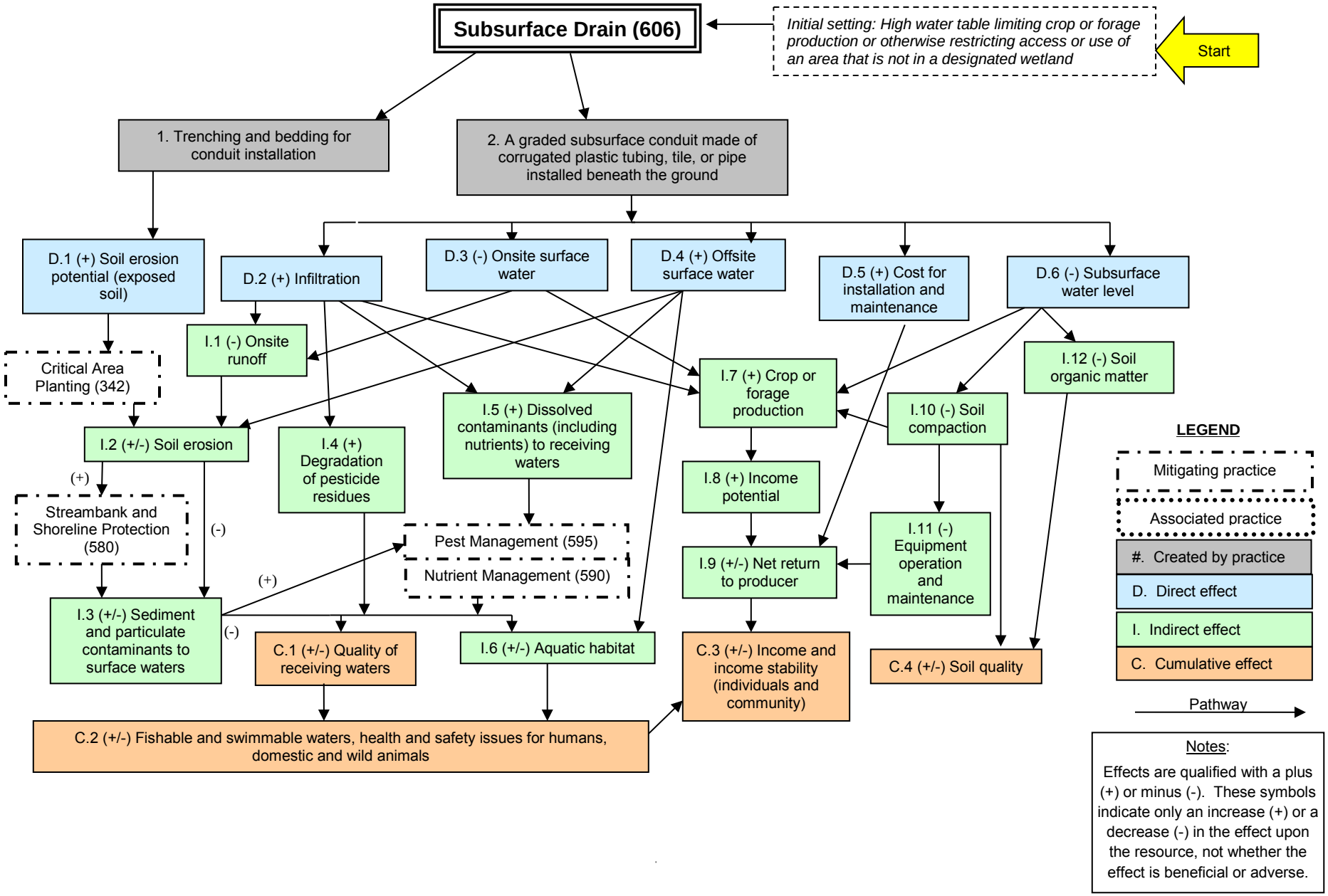
Subsurface Drain (606)
Initial setting: High water table limiting crop or forage production or otherwise restricting access or use of an area that is not in a designated wetland
Start
1. Trenching and bedding for conduit installation
2. A graded subsurface conduit made of corrugated plastic tubing, tile, or pipe installed beneath the ground
D.1 (+) Soil erosion potential (exposed soil)
D.2 (+) Infiltration
D.3 (-) Onsite surface water
D.4 (+) Offsite surface water
D.5 (+) Cost for installation and maintenance
D.6 (-) Subsurface water level
Critical Area Planting (342)
I.1 (-) Onsite runoff
I.2 (+/-) Soil erosion
(+)
Streambank and Shoreline Protection (580)
(-)
I.3 (+/-) Sediment and particulate contaminants to surface waters
(+)
(-)
I.4 (+) Degradation of pesticide residues
I.5 (+) Dissolved contaminants (including nutrients) to receiving waters
Pest Management (595)
Nutrient Management (590)
I.6 (+/-) Aquatic habitat
C.1 (+/-) Quality of receiving waters
C.2 (+/-) Fishable and swimmable waters, health and safety issues for humans, domestic and wild animals
I.7 (+) Crop or forage production
I.8 (+) Income potential
I.9 (+/-) Net return to producer
C.3 (+/-) Income and income stability (individuals and community)
I.10 (-) Soil compaction
I.11 (-) Equipment operation and maintenance
I.12 (-) Soil organic matter
C.4 (+/-) Soil quality
LEGEND
Mitigating practice
Associated practice
#. Created by practice
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Pathway
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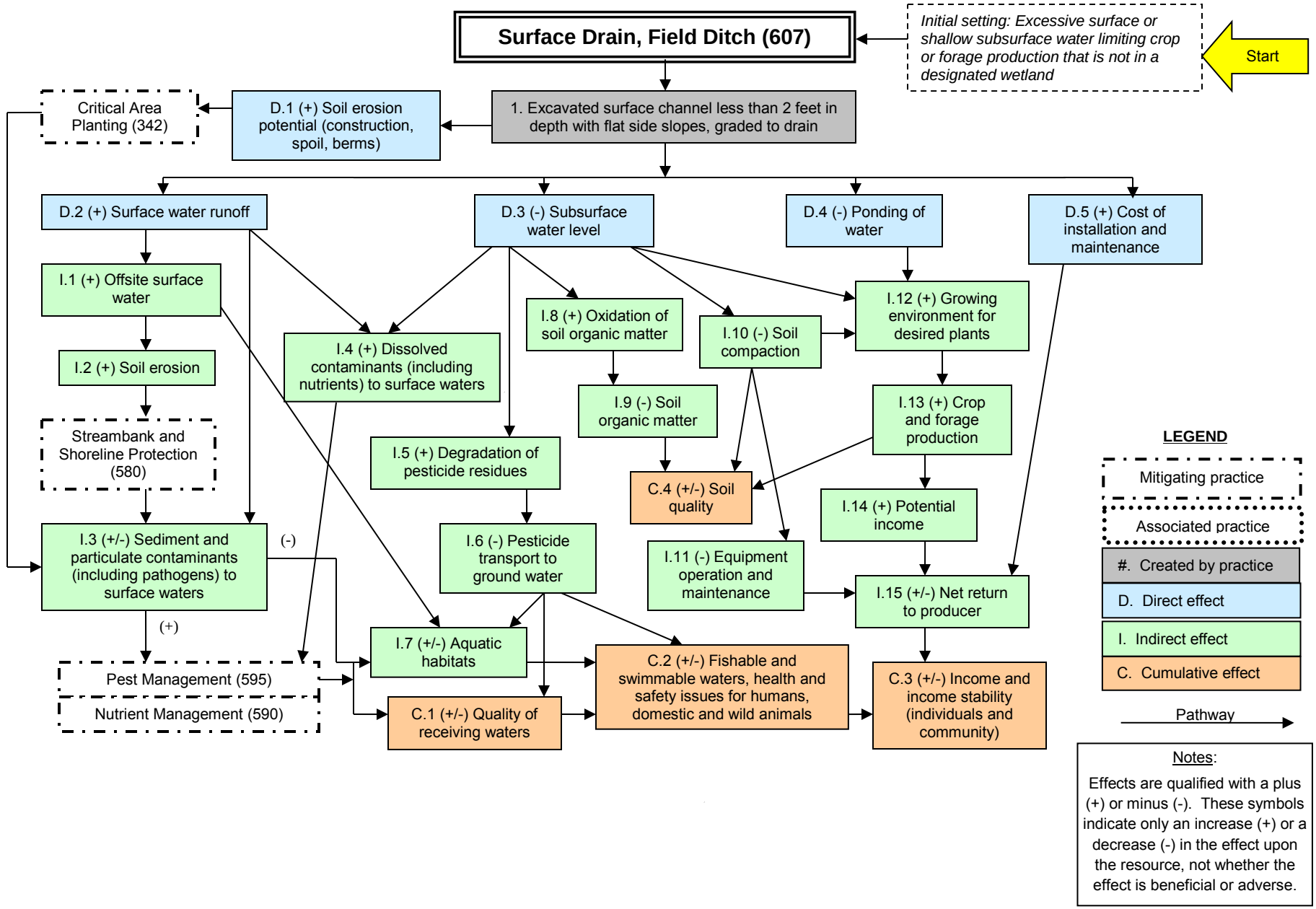
Surface Drain, Field Ditch (607)
Initial setting: Excessive surface or shallow subsurface water limiting crop or forage production that is not in a designated wetland
Start
Critical Area Planting (342)
D.1 (+) Soil erosion potential (construction, spoil, berms)
1. Excavated surface channel less than 2 feet in depth with flat side slopes, graded to drain
D.2 (+) Surface water runoff
D.3 (-) Subsurface water level
D.4 (-) Ponding of water
D.5 (+) Cost of installation and maintenance
I.1 (+) Offsite surface water
I.2 (+) Soil erosion
Streambank and Shoreline Protection (580)
I.3 (+/-) Sediment and particulate contaminants (including pathogens) to surface waters
(-)
(+)
Pest Management (595)
Nutrient Management (590)
I.4 (+) Dissolved contaminants (including nutrients) to surface waters
I.5 (+) Degradation of pesticide residues
I.6 (-) Pesticide transport to ground water
I.7 (+/-) Aquatic habitats
C.1 (+/-) Quality of receiving waters
I.8 (+) Oxidation of soil organic matter
I.9 (-) Soil organic matter
C.4 (+/-) Soil quality
I.10 (-) Soil compaction
I.11 (-) Equipment operation and maintenance
I.12 (+) Growing environment for desired plants
I.13 (+) Crop and forage production
I.14 (+) Potential income
I.15 (+/-) Net return to producer
C.2 (+/-) Fishable and swimmable waters, health and safety issues for humans, domestic and wild animals
C.3 (+/-) Income and income stability (individuals and community)
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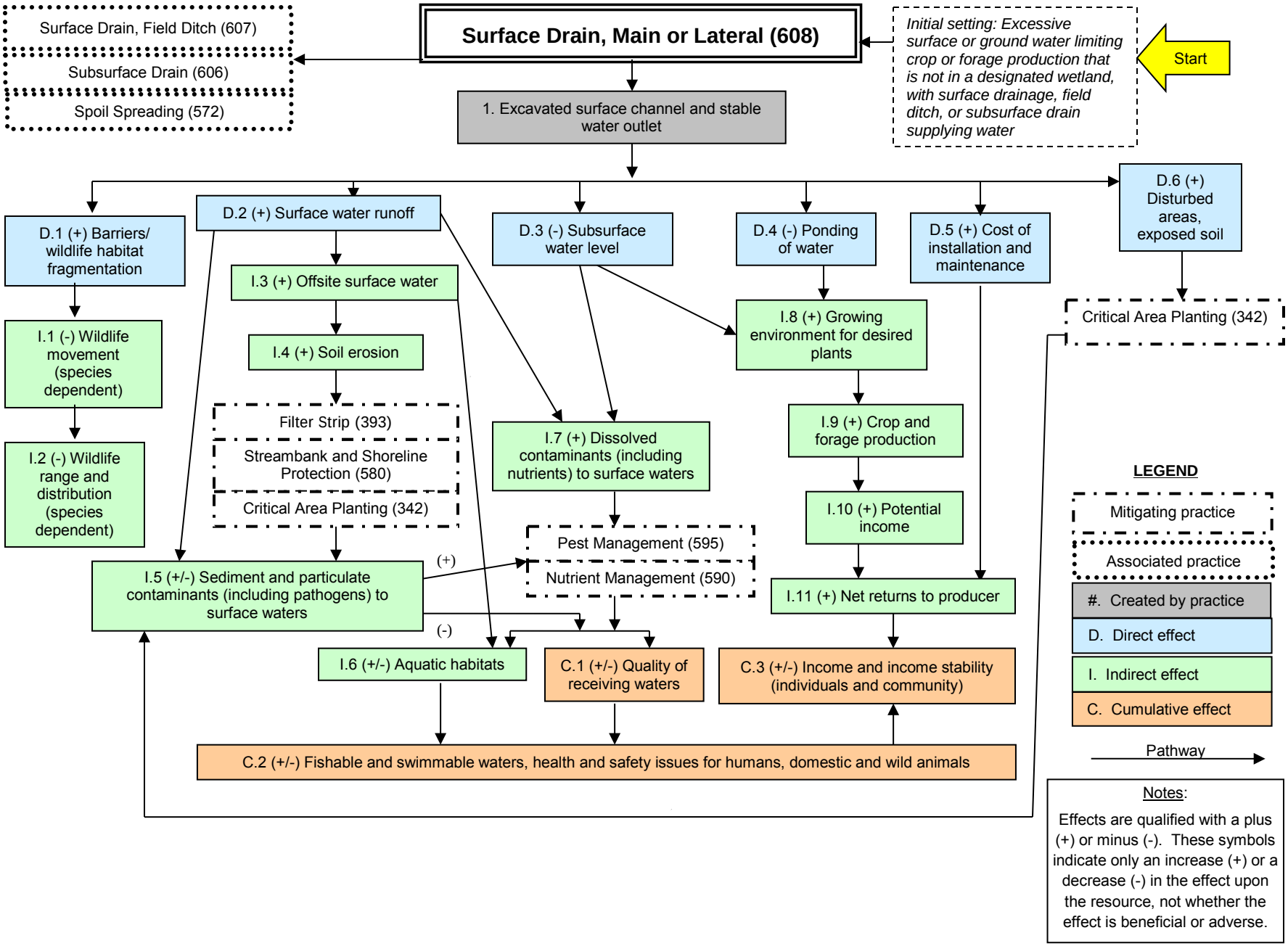
Surface Drain, Field Ditch (607)
Subsurface Drain (606)
Spoil Spreading (572)
Surface Drain, Main or Lateral (608)
Initial setting: Excessive surface or ground water limiting crop or forage production that is not in a designated wetland, with surface drainage, field ditch, or subsurface drain supplying water
Start
1. Excavated surface channel and stable water outlet
D.1 (+) Barriers/ wildlife habitat fragmentation
D.2 (+) Surface water runoff
D.3 (-) Subsurface water level
D.4 (-) Ponding of water
D.5 (+) Cost of installation and maintenance
D.6 (+) Disturbed areas, exposed soil
Critical Area Planting (342)
I.1 (-) Wildlife movement (species dependent)
I.2 (-) Wildlife range and distribution (species dependent)
I.3 (+) Offsite surface water
I.4 (+) Soil erosion
Filter Strip (393)
Streambank and Shoreline Protection (580)
Critical Area Planting (342)
I.5 (+/-) Sediment and particulate contaminants (including pathogens) to surface waters
(+)
(-)
I.7 (+) Dissolved contaminants (including nutrients) to surface waters
Pest Management (595)
Nutrient Management (590)
I.8 (+) Growing environment for desired plants
I.9 (+) Crop and forage production
I.10 (+) Potential income
I.11 (+) Net returns to producer
I.6 (+/-) Aquatic habitats
C.1 (+/-) Quality of receiving waters
C.3 (+/-) Income and income stability (individuals and community)
C.2 (+/-) Fishable and swimmable waters, health and safety issues for humans, domestic and wild animals
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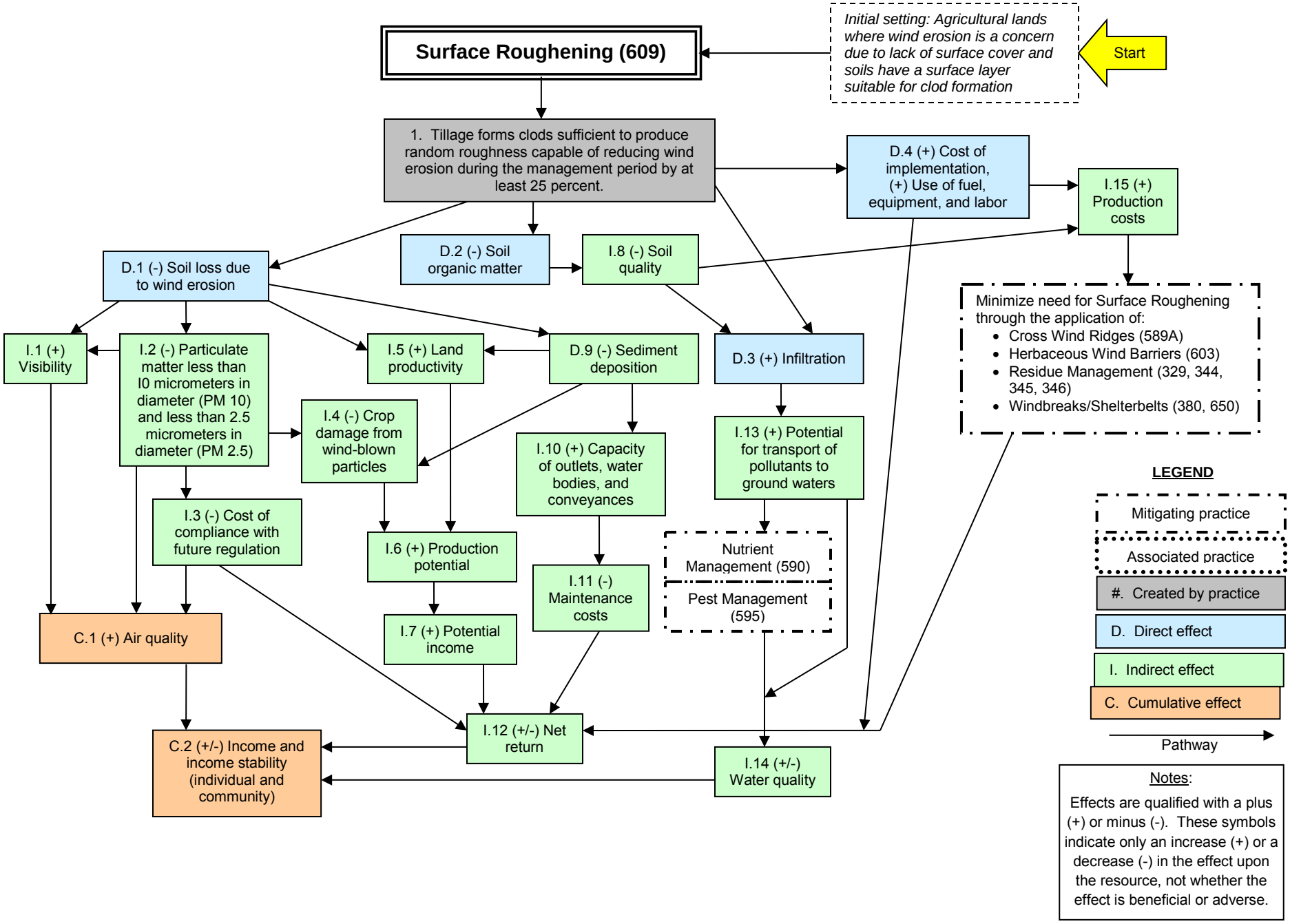
Surface Roughening (609)
Initial setting: Agricultural lands where wind erosion is a concern due to lack of surface cover and soils have a surface layer suitable for clod formation
Start
1. Tillage forms clods sufficient to produce random roughness capable of reducing wind erosion during the management period by at least 25 percent.
D.4 (+) Cost of implementation, (+) Use of fuel, equipment, and labor
I.15 (+) Production costs
D.2 (-) Soil organic matter
I.8 (-) Soil quality
D.1 (-) Soil loss due to wind erosion
Minimize need for Surface Roughening through the application of:
• Cross Wind Ridges (589A)
• Herbaceous Wind Barriers (603)
• Residue Management (329, 344, 345, 346)
• Windbreaks/Shelterbelts (380, 650)
I.1 (+) Visibility
I.2 (-) Particulate matter less than I0 micrometers in diameter (PM 10) and less than 2.5 micrometers in diameter (PM 2.5)
I.5 (+) Land productivity
D.9 (-) Sediment deposition
D.3 (+) Infiltration
I.4 (-) Crop damage from wind-blown particles
I.10 (+) Capacity of outlets, water bodies, and conveyances
I.13 (+) Potential for transport of pollutants to ground waters
I.3 (-) Cost of compliance with future regulation
I.6 (+) Production potential
Nutrient Management (590)
Pest Management (595)
I.11 (-) Maintenance costs
C.1 (+) Air quality
I.7 (+) Potential income
I.12 (+/-) Net return
C.2 (+/-) Income and income stability (individual and community)
I.14 (+/-) Water quality
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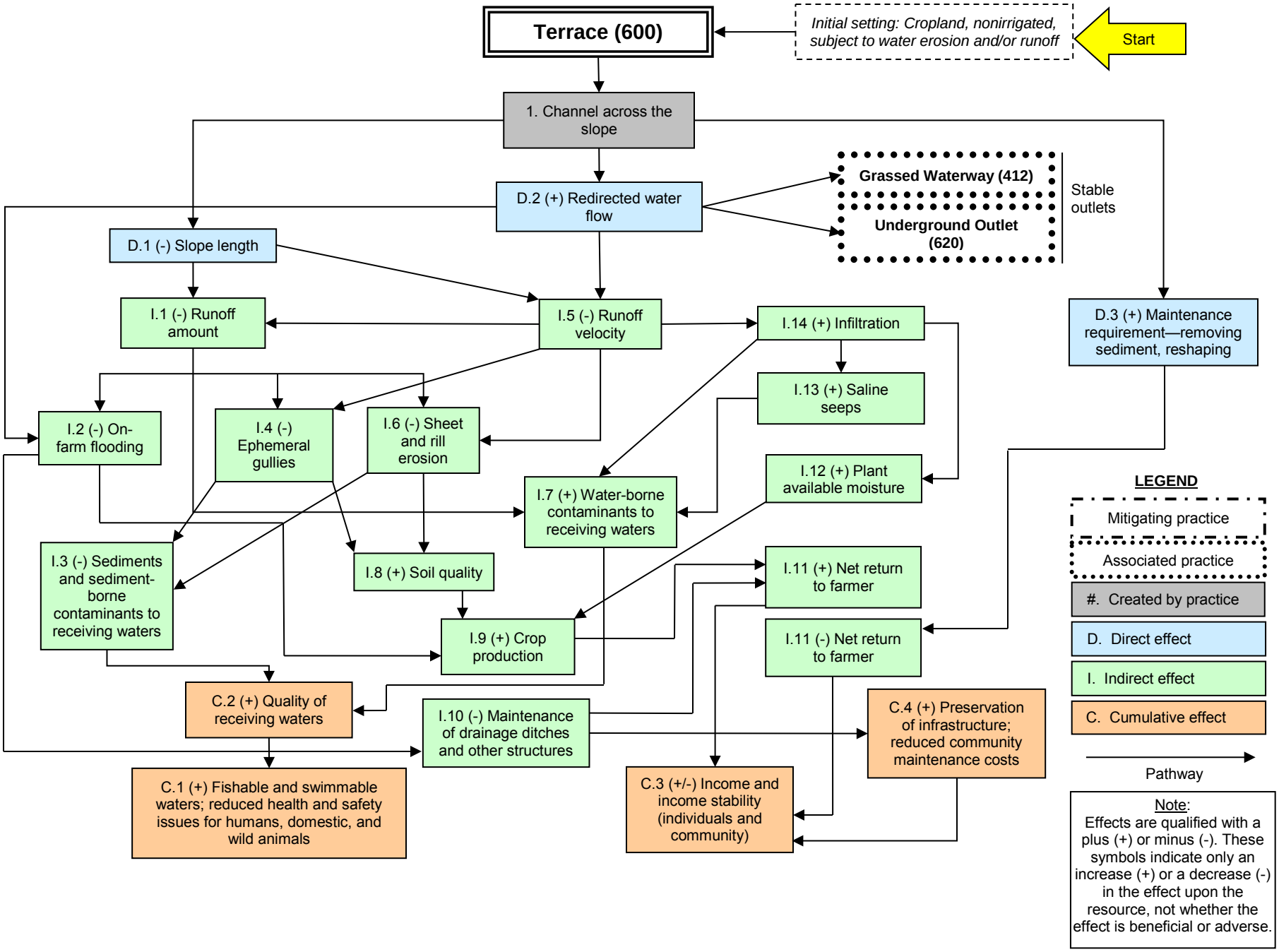
Terrace (600)
Initial setting: Cropland, nonirrigated, subject to water erosion and/or runoff
Start
1. Channel across the slope
D.2 (+) Redirected water flow
Grassed Waterway (412)
Underground Outlet (620)
Stable outlets
D.1 (-) Slope length
I.1 (-) Runoff amount
I.5 (-) Runoff velocity
I.14 (+) Infiltration
D.3 (+) Maintenance requirement—removing sediment, reshaping
I.13 (+) Saline seeps
I.2 (-) On-farm flooding
I.4 (-) Ephemeral gullies
I.6 (-) Sheet and rill erosion
I.12 (+) Plant available moisture
I.7 (+) Water-borne contaminants to receiving waters
I.3 (-) Sediments and sediment-borne contaminants to receiving waters
I.8 (+) Soil quality
I.11 (+) Net return to farmer
I.9 (+) Crop production
I.11 (-) Net return to farmer
C.2 (+) Quality of receiving waters
I.10 (-) Maintenance of drainage ditches and other structures
C.4 (+) Preservation of infrastructure; reduced community maintenance costs
C.1 (+) Fishable and swimmable waters; reduced health and safety issues for humans, domestic, and wild animals
C.3 (+/-) Income and income stability (individuals and community)
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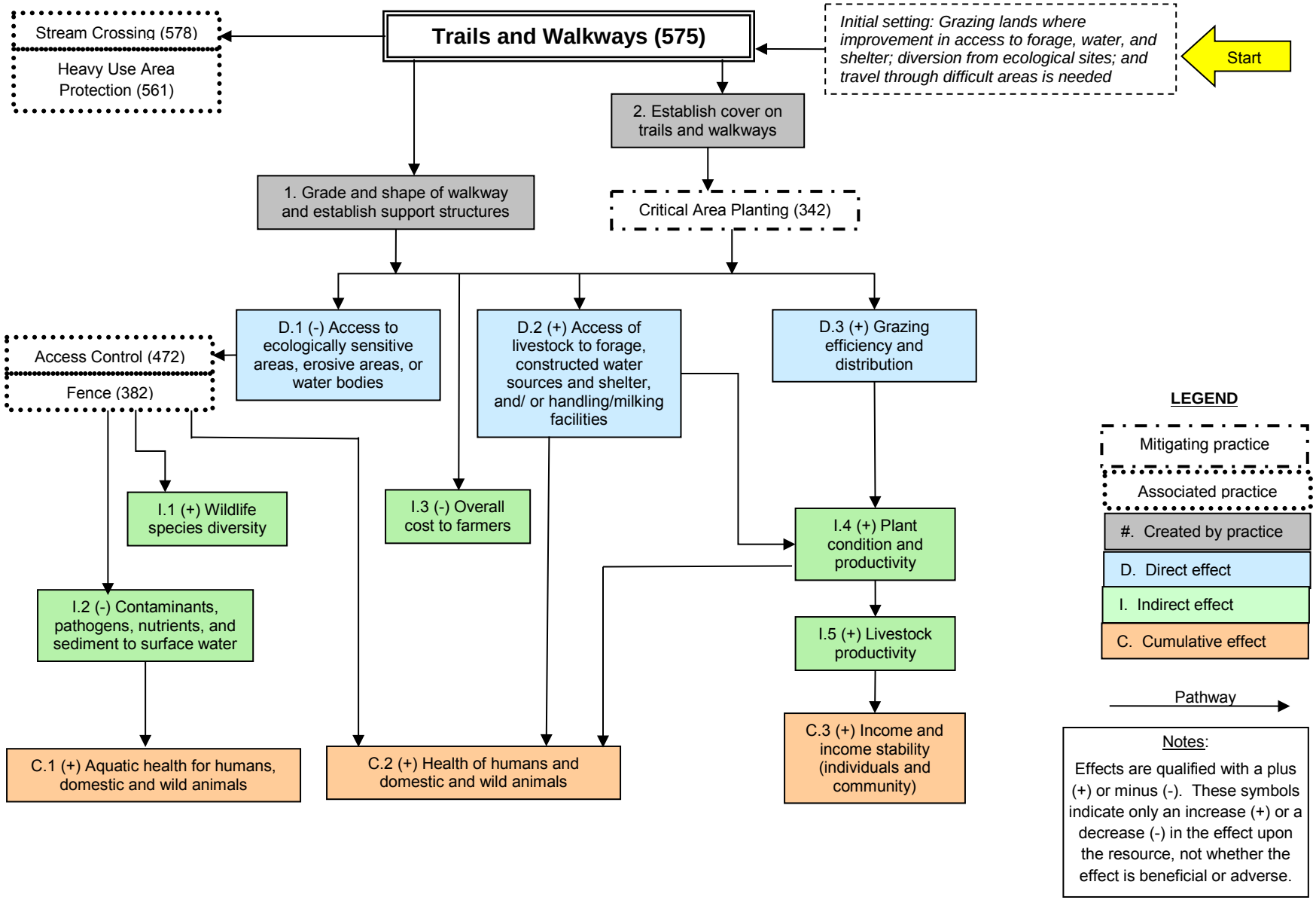
Trails and Walkways (575)
Initial setting: Grazing lands where improvement in access to forage, water, and shelter; diversion from ecological sites; and travel through difficult areas is needed
Start
Stream Crossing (578)
Heavy Use Area Protection (561)
2. Establish cover on trails and walkways
1. Grade and shape of walkway and establish support structures
Critical Area Planting (342)
D.1 (-) Access to ecologically sensitive areas, erosive areas, or water bodies
D.2 (+) Access of livestock to forage, constructed water sources and shelter, and/ or handling/milking facilities
D.3 (+) Grazing efficiency and distribution
Access Control (472)
Fence (382)
I.1 (+) Wildlife species diversity
I.3 (-) Overall cost to farmers
I.4 (+) Plant condition and productivity
I.2 (-) Contaminants, pathogens, nutrients, and sediment to surface water
I.5 (+) Livestock productivity
C.1 (+) Aquatic health for humans, domestic and wild animals
C.2 (+) Health of humans and domestic and wild animals
C.3 (+) Income and income stability (individuals and community)
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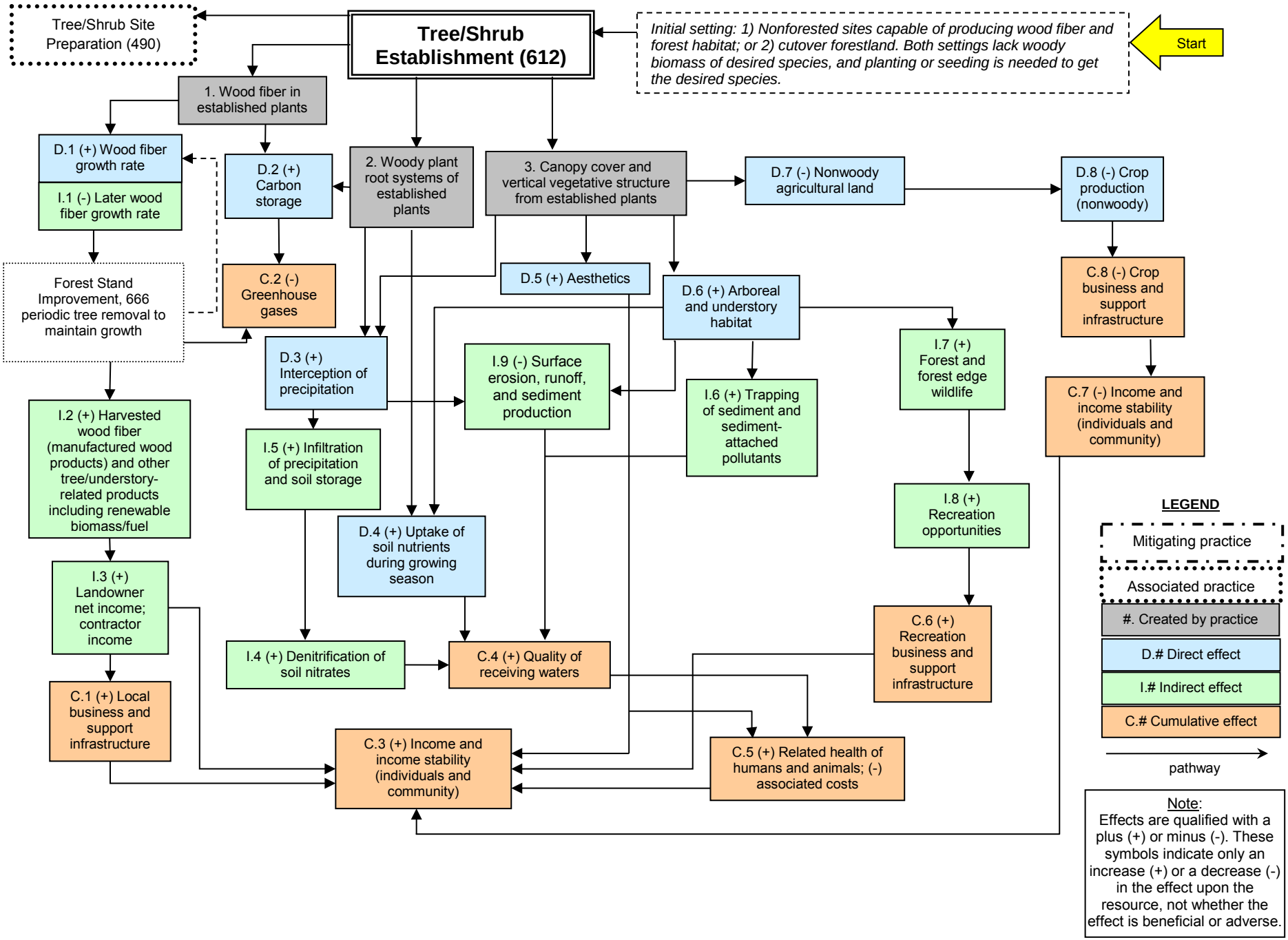
Tree/Shrub Site Preparation (490)
Tree/Shrub Establishment (612)
Initial setting: 1) Nonforested sites capable of producing wood fiber and forest habitat; or 2) cutover forestland. Both settings lack woody biomass of desired species, and planting or seeding is needed to get the desired species.
Start
1. Wood fiber in established plants
2. Woody plant root systems of established plants
3. Canopy cover and vertical vegetative structure from established plants
D.1 (+) Wood fiber growth rate
I.1 (-) Later wood fiber growth rate
D.2 (+) Carbon storage
C.2 (-) Greenhouse gases
D.7 (-) Nonwoody agricultural land
D.8 (-) Crop production (nonwoody)
C.8 (-) Crop business and support infrastructure
C.7 (-) Income and income stability (individuals and community)
Forest Stand Improvement, 666 periodic tree removal to maintain growth
D.5 (+) Aesthetics
D.6 (+) Arboreal and understory habitat
I.7 (+) Forest and forest edge wildlife
I.8 (+) Recreation opportunities
C.6 (+) Recreation business and support infrastructure
D.3 (+) Interception of precipitation
I.9 (-) Surface erosion, runoff, and sediment production
I.6 (+) Trapping of sediment and sediment-attached pollutants
I.2 (+) Harvested wood fiber (manufactured wood products) and other tree/understory-related products including renewable biomass/fuel
I.5 (+) Infiltration of precipitation and soil storage
D.4 (+) Uptake of soil nutrients during growing season
I.3 (+) Landowner net income; contractor income
I.4 (+) Denitrification of soil nitrates
C.4 (+) Quality of receiving waters
C.1 (+) Local business and support infrastructure
C.3 (+) Income and income stability (individuals and community)
C.5 (+) Related health of humans and animals; (-) associated costs
LEGEND
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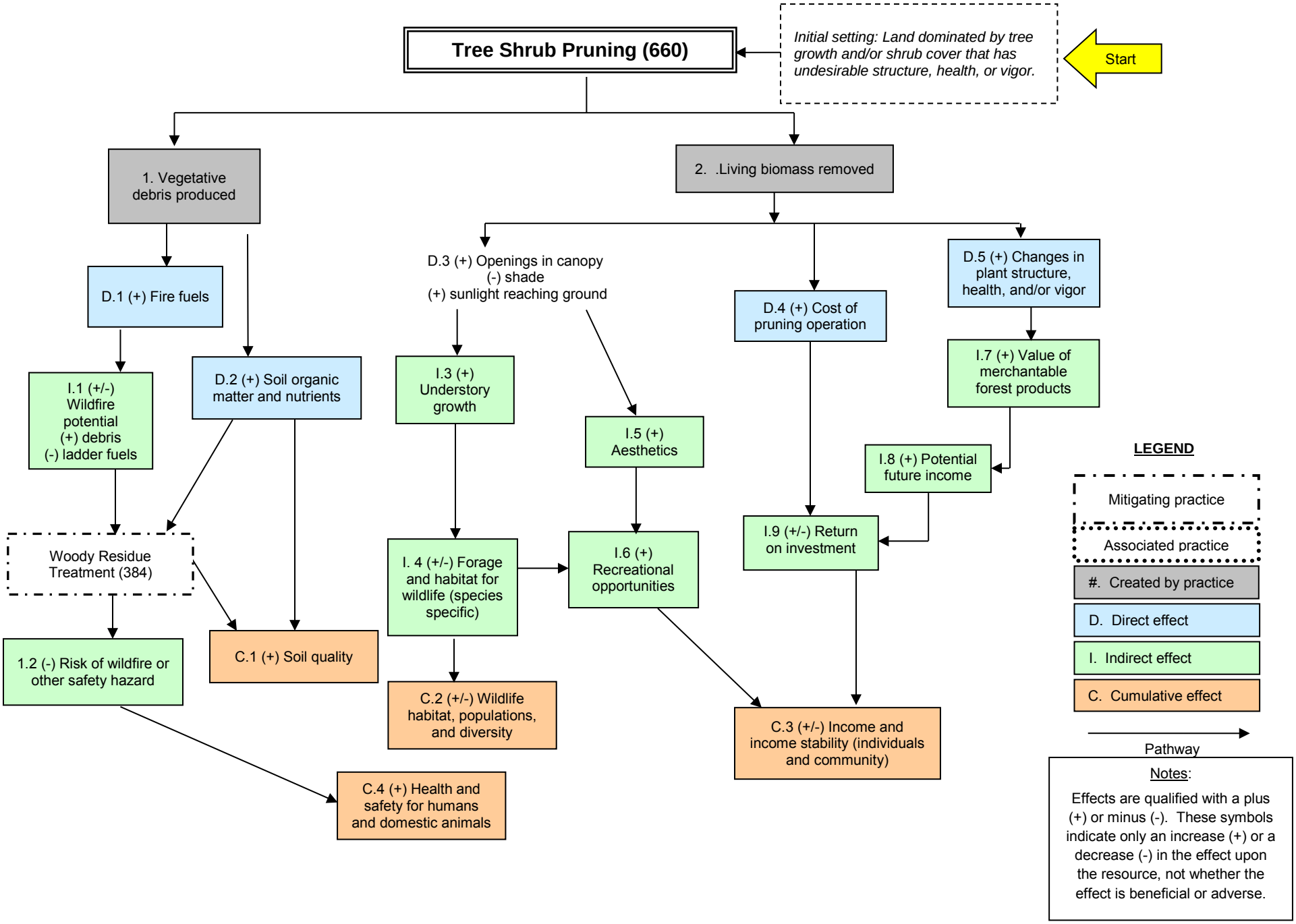
Tree Shrub Pruning (660)
Initial setting: Land dominated by tree growth and/or shrub cover that has undesirable structure, health, or vigor.
Start
1. Vegetative debris produced
2. .Living biomass removed
D.1 (+) Fire fuels
D.2 (+) Soil organic matter and nutrients
D.3 (+) Openings in canopy
(-) shade
(+) sunlight reaching ground
D.4 (+) Cost of pruning operation
D.5 (+) Changes in plant structure, health, and/or vigor
I.1 (+/-) Wildfire potential
(+) debris
(-) ladder fuels
I.3 (+) Understory growth
I.5 (+) Aesthetics
I.7 (+) Value of merchantable forest products
I.8 (+) Potential future income
Woody Residue Treatment (384)
I. 4 (+/-) Forage and habitat for wildlife (species specific)
I.6 (+) Recreational opportunities
I.9 (+/-) Return on investment
1.2 (-) Risk of wildfire or other safety hazard
C.1 (+) Soil quality
C.2 (+/-) Wildlife habitat, populations, and diversity
C.3 (+/-) Income and income stability (individuals and community)
C.4 (+) Health and safety for humans and domestic animals
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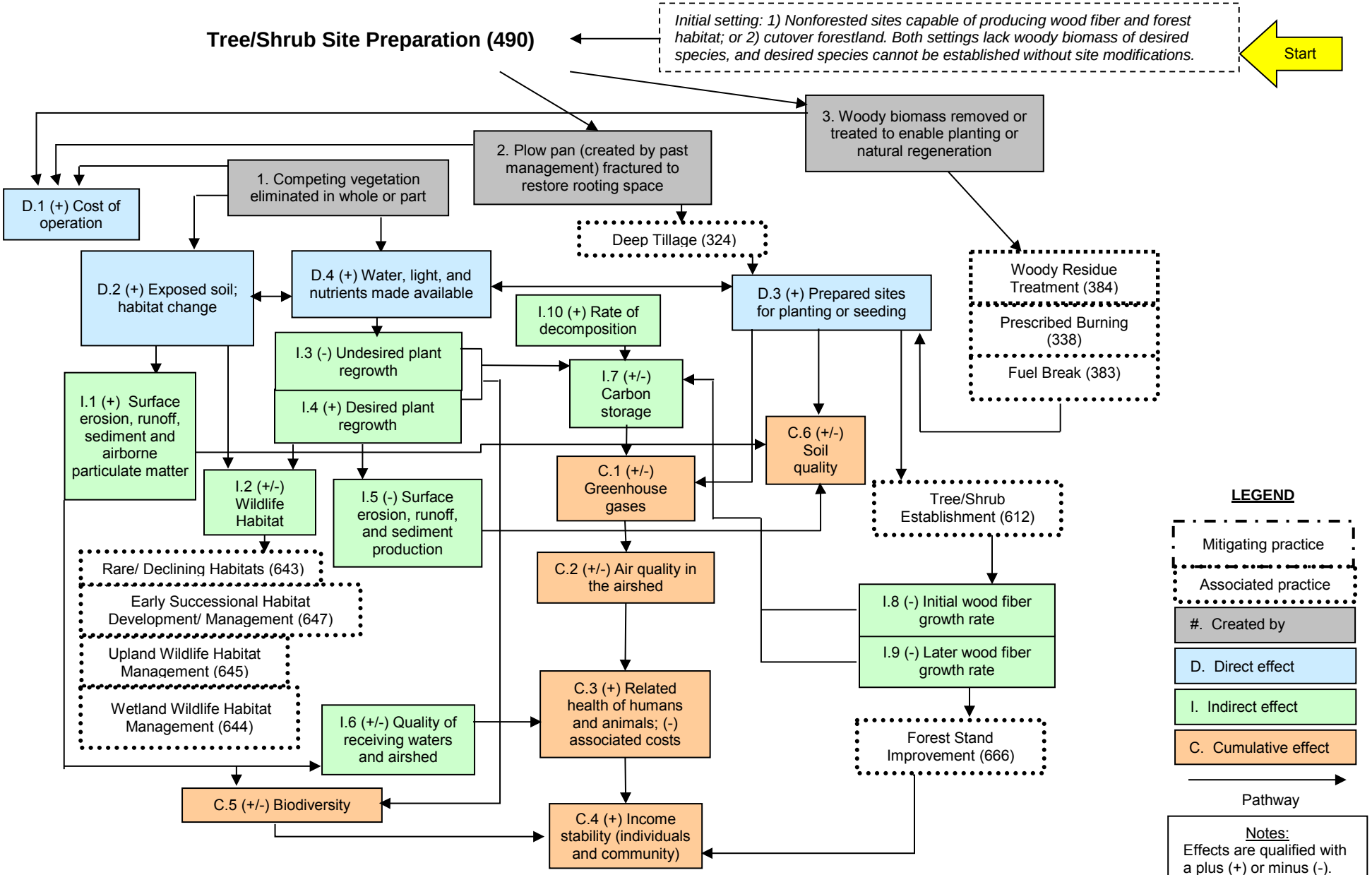
Tree/Shrub Site Preparation (490)
Initial setting: 1) Nonforested sites capable of producing wood fiber and forest habitat; or 2) cutover forestland. Both settings lack woody biomass of desired species, and desired species cannot be established without site modifications.
Start
3. Woody biomass removed or treated to enable planting or natural regeneration
2. Plow pan (created by past management) fractured to restore rooting space
1. Competing vegetation eliminated in whole or part
D.1 (+) Cost of operation
Deep Tillage (324)
Woody Residue Treatment (384)
Prescribed Burning (338)
Fuel Break (383)
D.2 (+) Exposed soil; habitat change
D.4 (+) Water, light, and nutrients made available
D.3 (+) Prepared sites for planting or seeding
I.10 (+) Rate of decomposition
I.3 (-) Undesired plant regrowth
I.4 (+) Desired plant regrowth
I.7 (+/-) Carbon storage
I.1 (+) Surface erosion, runoff, sediment and airborne particulate matter
C.6 (+/-) Soil quality
C.1 (+/-) Greenhouse gases
I.2 (+/-) Wildlife Habitat
I.5 (-) Surface erosion, runoff, and sediment production
Tree/Shrub Establishment (612)
Rare/ Declining Habitats (643)
C.2 (+/-) Air quality in the airshed
Early Successional Habitat Development/ Management (647)
I.8 (-) Initial wood fiber growth rate
Upland Wildlife Habitat Management (645)
I.9 (-) Later wood fiber growth rate
Wetland Wildlife Habitat Management (644)
C.3 (+) Related health of humans and animals; (-) associated costs
I.6 (+/-) Quality of receiving waters and airshed
Forest Stand Improvement (666)
C.5 (+/-) Biodiversity
C.4 (+) Income stability (individuals and community)
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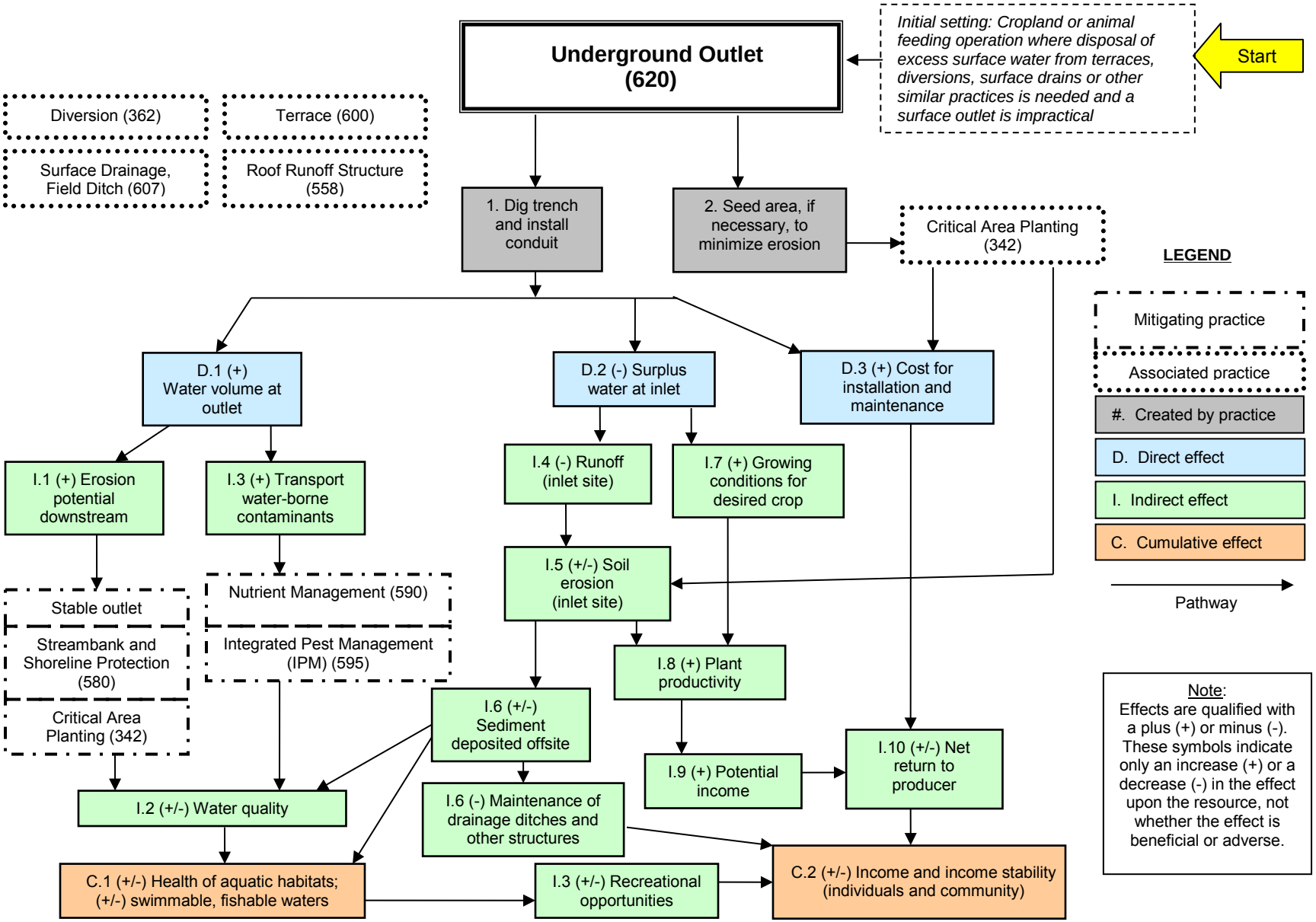
Underground Outlet (620)
Initial setting: Cropland or animal feeding operation where disposal of excess surface water from terraces, diversions, surface drains or other similar practices is needed and a surface outlet is impractical
Start
Diversion (362)
Terrace (600)
Surface Drainage, Field Ditch (607)
Roof Runoff Structure (558)
1. Dig trench and install conduit
2. Seed area, if necessary, to minimize erosion
Critical Area Planting (342)
LEGEND
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D.1 (+) Water volume at outlet
D.2 (-) Surplus water at inlet
D.3 (+) Cost for installation and maintenance
I.1 (+) Erosion potential downstream
I.3 (+) Transport water-borne contaminants
I.4 (-) Runoff (inlet site)
I.7 (+) Growing conditions for desired crop
I.5 (+/-) Soil erosion (inlet site)
Stable outlet
Streambank and Shoreline Protection (580)
Critical Area Planting (342)
Nutrient Management (590)
Integrated Pest Management (IPM) (595)
I.8 (+) Plant productivity
I.6 (+/-) Sediment deposited offsite
I.9 (+) Potential income
I.10 (+/-) Net return to producer
I.2 (+/-) Water quality
I.6 (-) Maintenance of drainage ditches and other structures
C.1 (+/-) Health of aquatic habitats; (+/-) swimmable, fishable waters
I.3 (+/-) Recreational opportunities
C.2 (+/-) Income and income stability (individuals and community)
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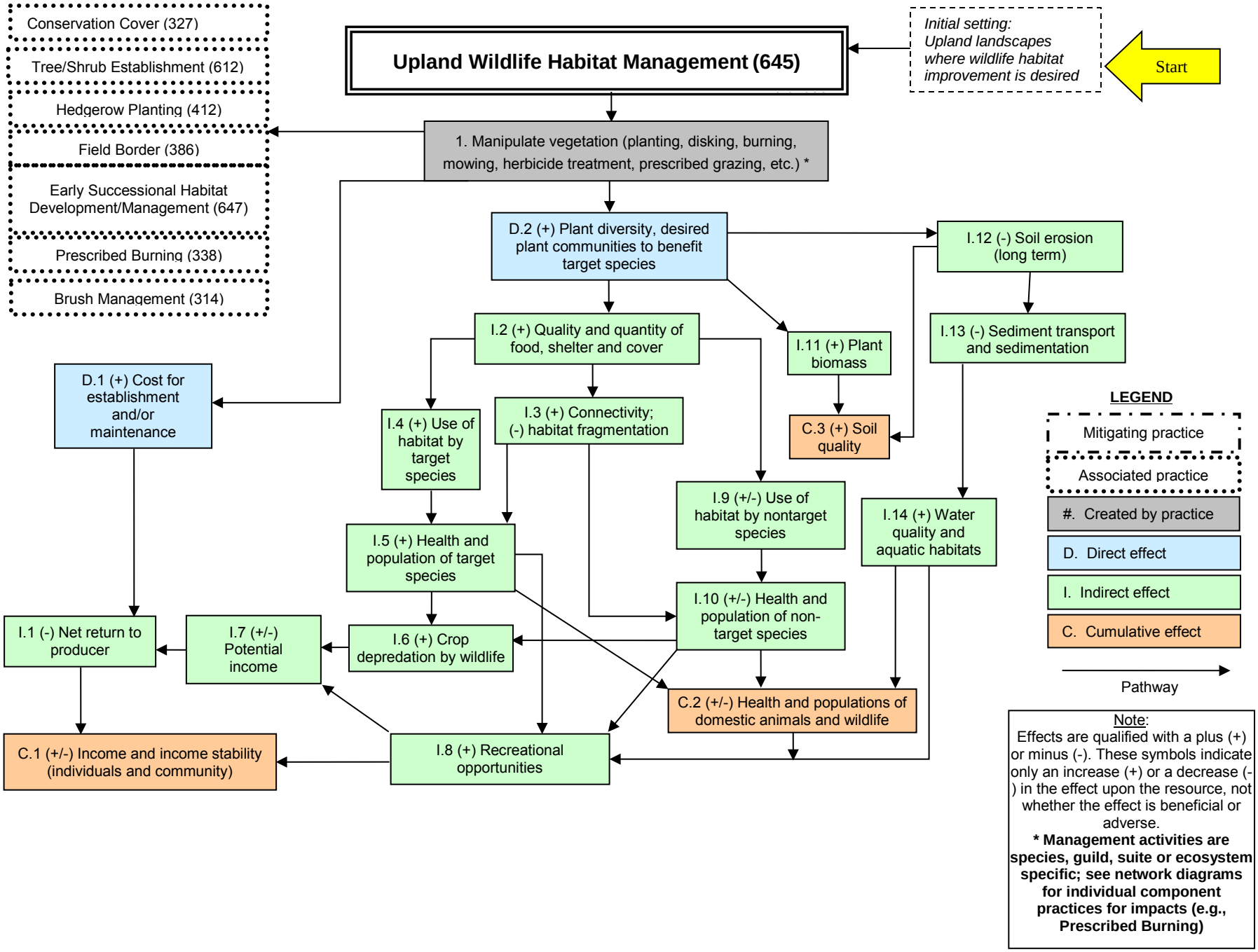
Upland Wildlife Habitat Management (645)
Initial setting: Upland landscapes where wildlife habitat improvement is desired
Start
Conservation Cover (327)
Tree/Shrub Establishment (612)
Hedgerow Planting (412)
Field Border (386)
Early Successional Habitat Development/Management (647)
Prescribed Burning (338)
Brush Management (314)
1. Manipulate vegetation (planting, disking, burning, mowing, herbicide treatment, prescribed grazing, etc.) *
D.2 (+) Plant diversity, desired plant communities to benefit target species
I.12 (-) Soil erosion (long term)
I.2 (+) Quality and quantity of food, shelter and cover
I.11 (+) Plant biomass
I.13 (-) Sediment transport and sedimentation
D.1 (+) Cost for establishment and/or maintenance
I.4 (+) Use of habitat by target species
I.3 (+) Connectivity; (-) habitat fragmentation
C.3 (+) Soil quality
I.9 (+/-) Use of habitat by nontarget species
I.14 (+) Water quality and aquatic habitats
I.5 (+) Health and population of target species
I.10 (+/-) Health and population of non-target species
I.1 (-) Net return to producer
I.7 (+/-) Potential income
I.6 (+) Crop depredation by wildlife
C.2 (+/-) Health and populations of domestic animals and wildlife
C.1 (+/-) Income and income stability (individuals and community)
I.8 (+) Recreational opportunities
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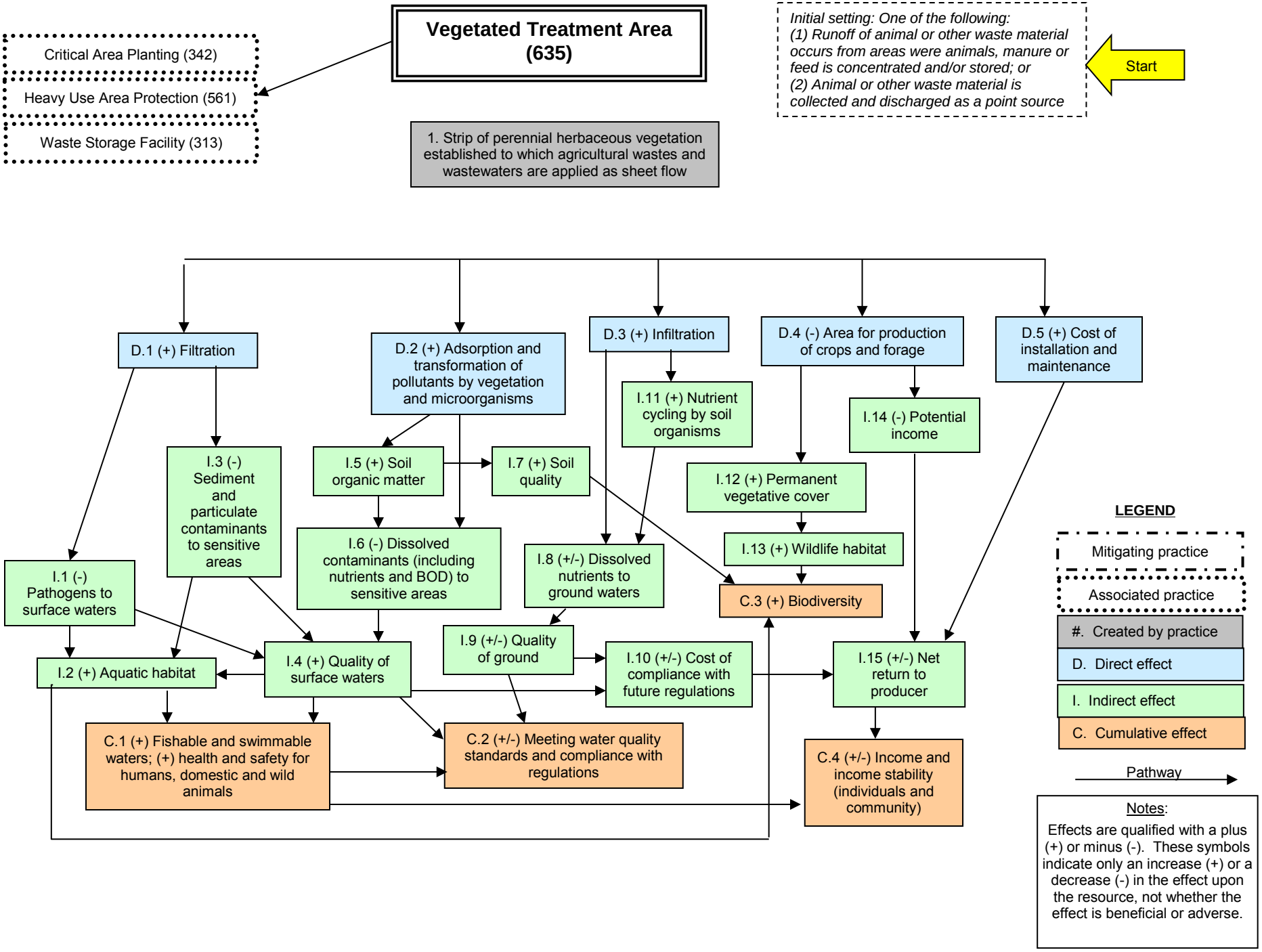
* Management activities are species, guild, suite or ecosystem specific; see network diagrams for individual component practices for impacts (e.g., Prescribed Burning)


Vegetated Treatment Area (635)
Critical Area Planting (342)
Heavy Use Area Protection (561)
Waste Storage Facility (313)
1. Strip of perennial herbaceous vegetation established to which agricultural wastes and wastewaters are applied as sheet flow
Initial setting: One of the following:
(1) Runoff of animal or other waste material occurs from areas were animals, manure or feed is concentrated and/or stored; or
(2) Animal or other waste material is collected and discharged as a point source
Start
D.1 (+) Filtration
D.2 (+) Adsorption and transformation of pollutants by vegetation and microorganisms
D.3 (+) Infiltration
D.4 (-) Area for production of crops and forage
D.5 (+) Cost of installation and maintenance
I.11 (+) Nutrient cycling by soil organisms
I.14 (-) Potential income
I.3 (-) Sediment and particulate contaminants to sensitive areas
I.5 (+) Soil organic matter
I.7 (+) Soil quality
I.12 (+) Permanent vegetative cover
I.6 (-) Dissolved contaminants (including nutrients and BOD) to sensitive areas
I.8 (+/-) Dissolved nutrients to ground waters
I.13 (+) Wildlife habitat
I.1 (-) Pathogens to surface waters
C.3 (+) Biodiversity
I.9 (+/-) Quality of ground
I.2 (+) Aquatic habitat
I.4 (+) Quality of surface waters
I.10 (+/-) Cost of compliance with future regulations
I.15 (+/-) Net return to producer
C.1 (+) Fishable and swimmable waters; (+) health and safety for humans, domestic and wild animals
C.2 (+/-) Meeting water quality standards and compliance with regulations
C.4 (+/-) Income and income stability (individuals and community)
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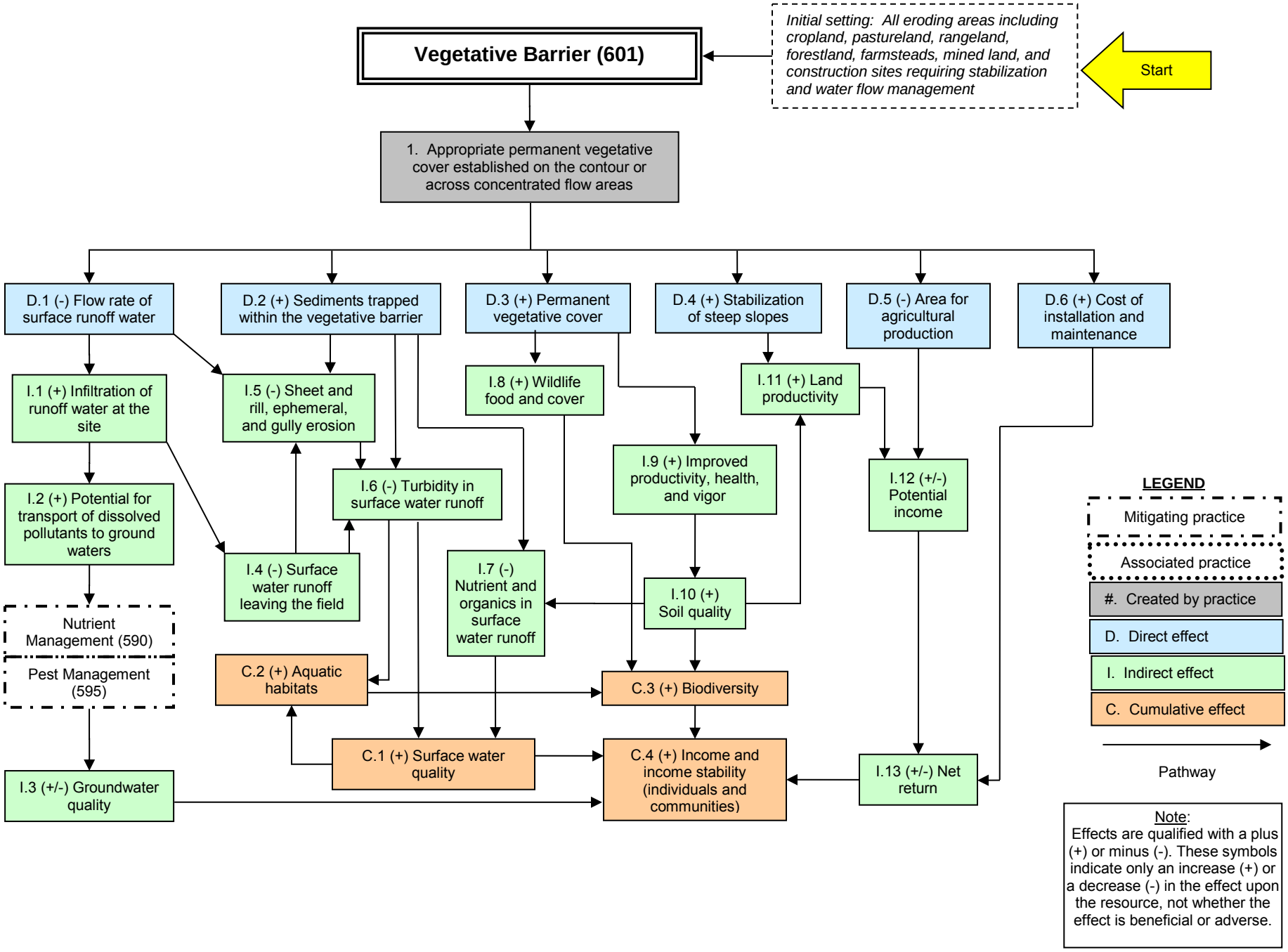
Vegetative Barrier (601)
Initial setting: All eroding areas including cropland, pastureland, rangeland, forestland, farmsteads, mined land, and construction sites requiring stabilization and water flow management
Start
1. Appropriate permanent vegetative cover established on the contour or across concentrated flow areas
D.1 (-) Flow rate of surface runoff water
D.2 (+) Sediments trapped within the vegetative barrier
D.3 (+) Permanent vegetative cover
D.4 (+) Stabilization of steep slopes
D.5 (-) Area for agricultural production
D.6 (+) Cost of installation and maintenance
I.1 (+) Infiltration of runoff water at the site
I.5 (-) Sheet and rill, ephemeral, and gully erosion
I.8 (+) Wildlife food and cover
I.11 (+) Land productivity
I.9 (+) Improved productivity, health, and vigor
I.12 (+/-) Potential income
I.2 (+) Potential for transport of dissolved pollutants to ground waters
I.6 (-) Turbidity in surface water runoff
I.4 (-) Surface water runoff leaving the field
I.7 (-) Nutrient and organics in surface water runoff
I.10 (+) Soil quality
Nutrient Management (590)
Pest Management (595)
C.2 (+) Aquatic habitats
C.3 (+) Biodiversity
C.1 (+) Surface water quality
C.4 (+) Income and income stability (individuals and communities)
I.13 (+/-) Net return
I.3 (+/-) Groundwater quality
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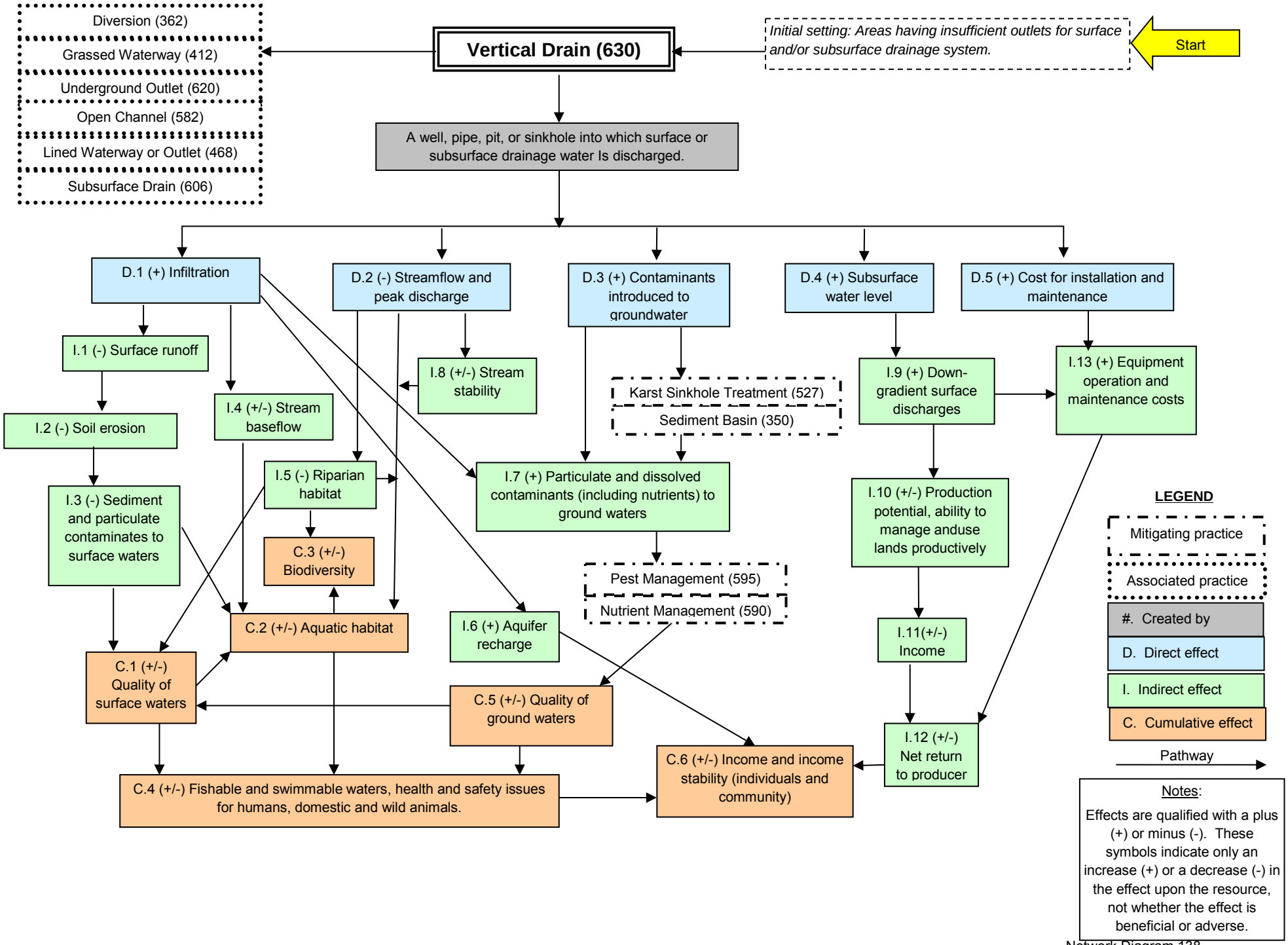
Diversion (362)
Grassed Waterway (412)
Underground Outlet (620)
Open Channel (582)
Lined Waterway or Outlet (468)
Subsurface Drain (606)
Vertical Drain (630)
Initial setting: Areas having insufficient outlets for surface and/or subsurface drainage system.
Start
A well, pipe, pit, or sinkhole into which surface or subsurface drainage water Is discharged.
D.1 (+) Infiltration
D.2 (-) Streamflow and peak discharge
D.3 (+) Contaminants introduced to groundwater
D.4 (+) Subsurface water level
D.5 (+) Cost for installation and maintenance
I.1 (-) Surface runoff
I.2 (-) Soil erosion
I.3 (-) Sediment and particulate contaminates to surface waters
I.4 (+/-) Stream baseflow
I.5 (-) Riparian habitat
I.8 (+/-) Stream stability
Karst Sinkhole Treatment (527)
Sediment Basin (350)
I.7 (+) Particulate and dissolved contaminants (including nutrients) to ground waters
I.9 (+) Down-gradient surface discharges
I.13 (+) Equipment operation and maintenance costs
I.10 (+/-) Production potential, ability to manage anduse lands productively
C.3 (+/-) Biodiversity
Pest Management (595)
Nutrient Management (590)
C.2 (+/-) Aquatic habitat
I.6 (+) Aquifer recharge
I.11(+/-) Income
C.1 (+/-) Quality of surface waters
C.5 (+/-) Quality of ground waters
I.12 (+/-) Net return to producer
C.6 (+/-) Income and income stability (individuals and community)
C.4 (+/-) Fishable and swimmable waters, health and safety issues for humans, domestic and wild animals.
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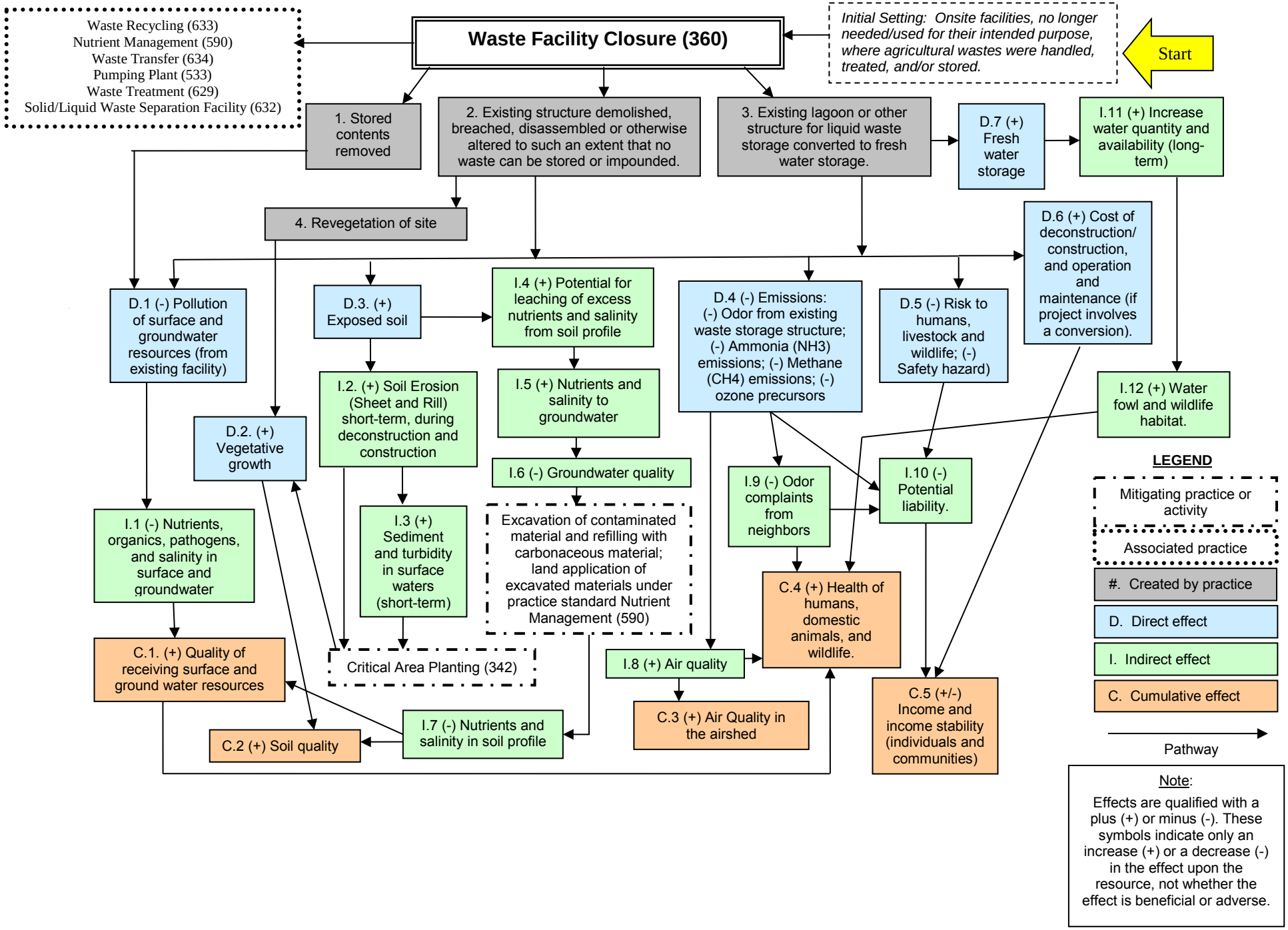
Waste Recycling (633)
Nutrient Management (590)
Waste Transfer (634)
Pumping Plant (533)
Waste Treatment (629)
Solid/Liquid Waste Separation Facility (632)
Waste Facility Closure (360)
Initial Setting: Onsite facilities, no longer needed/used for their intended purpose, where agricultural wastes were handled, treated, and/or stored.
Start
1. Stored contents removed
2. Existing structure demolished, breached, disassembled or otherwise altered to such an extent that no waste can be stored or impounded.
3. Existing lagoon or other structure for liquid waste storage converted to fresh water storage.
D.7 (+) Fresh water storage
I.11 (+) Increase water quantity and availability (long-term)
4. Revegetation of site
D.6 (+) Cost of deconstruction/ construction, and operation and maintenance (if project involves a conversion).
D.1 (-) Pollution of surface and groundwater resources (from existing facility)
D.3. (+) Exposed soil
I.4 (+) Potential for leaching of excess nutrients and salinity from soil profile
D.4 (-) Emissions: (-) Odor from existing waste storage structure; (-) Ammonia (NH3) emissions; (-) Methane (CH4) emissions; (-) ozone precursors
D.5 (-) Risk to humans, livestock and wildlife; (-) Safety hazard)
I.12 (+) Water fowl and wildlife habitat.
I.2. (+) Soil Erosion (Sheet and Rill) short-term, during deconstruction and construction
I.5 (+) Nutrients and salinity to groundwater
D.2. (+) Vegetative growth
I.6 (-) Groundwater quality
I.9 (-) Odor complaints from neighbors
I.10 (-) Potential liability.
I.1 (-) Nutrients, organics, pathogens, and salinity in surface and groundwater
I.3 (+) Sediment and turbidity in surface waters (short-term)
Excavation of contaminated material and refilling with carbonaceous material; land application of excavated materials under practice standard Nutrient Management (590)
C.4 (+) Health of humans, domestic animals, and wildlife.
C.1. (+) Quality of receiving surface and ground water resources
Critical Area Planting (342)
I.8 (+) Air quality
C.5 (+/-) Income and income stability (individuals and communities)
C.2 (+) Soil quality
I.7 (-) Nutrients and salinity in soil profile
C.3 (+) Air Quality in the airshed
LEGEND
Mitigating practice or activity
Associated practice
#. Created by practice
D. Direct effect
I. Indirect effect
C. Cumulative effect
Pathway
Note:
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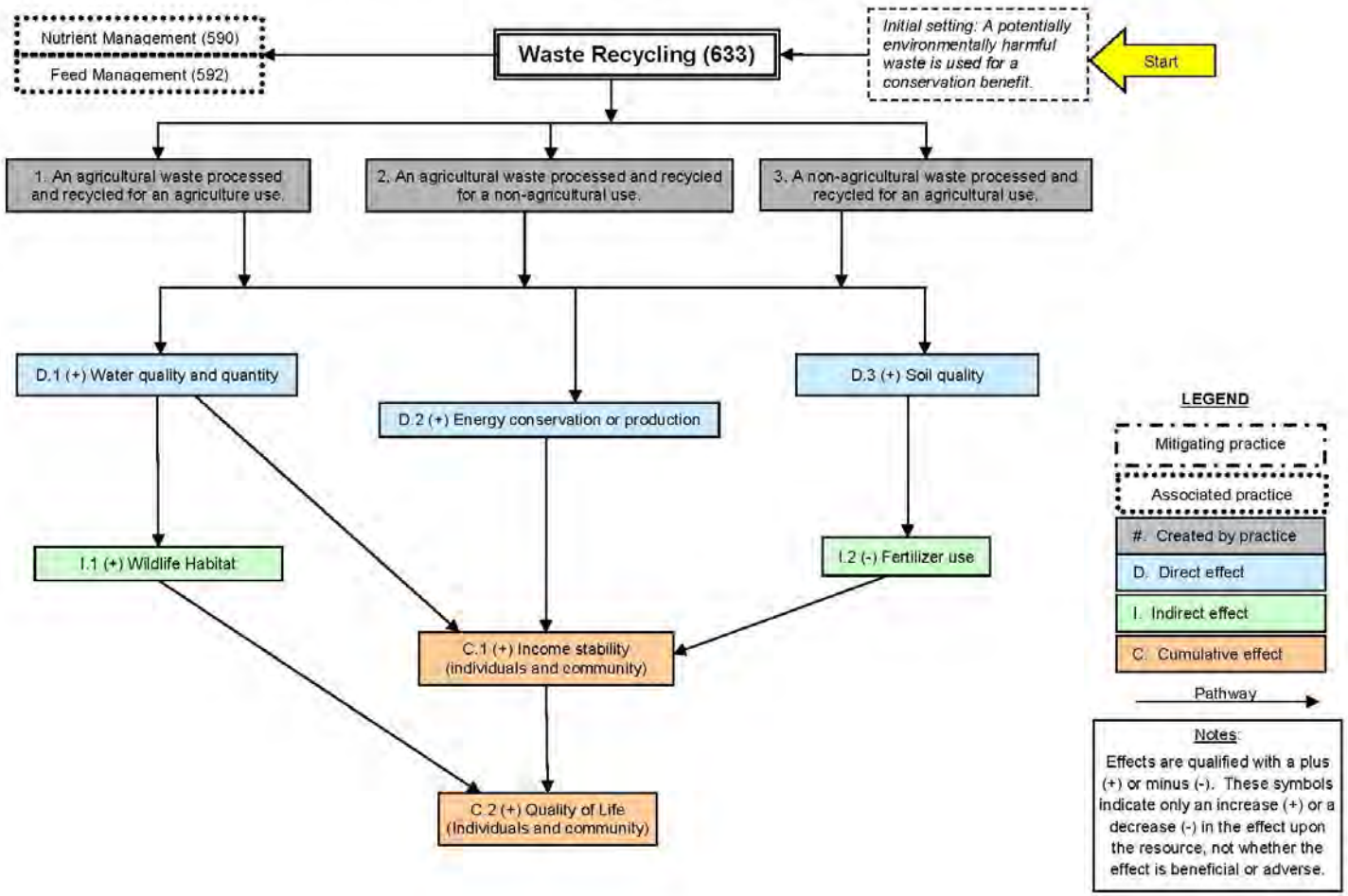
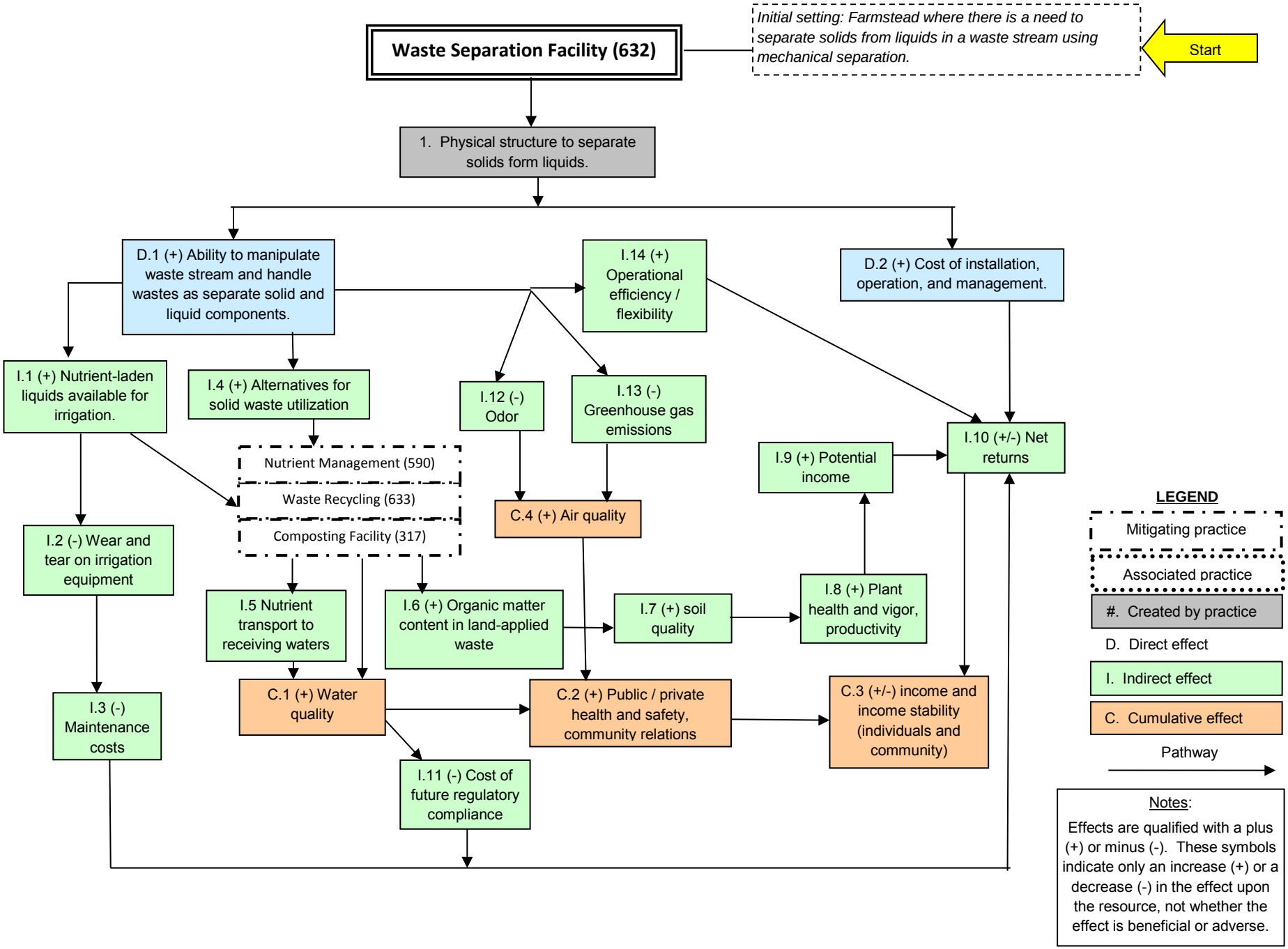
NRCS CONSERVATION PRACTICE EFFECTS - NETWORK DIAGRAM

March 2014




Waste Separation Facility (632)
Initial setting: Farmstead where there is a need to separate solids from liquids in a waste stream using mechanical separation.
Start
1. Physical structure to separate solids form liquids.
D.1 (+) Ability to manipulate waste stream and handle wastes as separate solid and liquid components.
I.14 (+) Operational efficiency / flexibility
D.2 (+) Cost of installation, operation, and management.
I.1 (+) Nutrient-laden liquids available for irrigation.
I.4 (+) Alternatives for solid waste utilization
I.12 (-) Odor
I.13 (-) Greenhouse gas emissions
I.10 (+/-) Net returns
I.9 (+) Potential income
Nutrient Management (590)
Waste Recycling (633)
Composting Facility (317)
C.4 (+) Air quality
I.2 (-) Wear and tear on irrigation equipment
I.5 Nutrient transport to receiving waters
I.6 (+) Organic matter content in land-applied waste
I.7 (+) soil quality
I.8 (+) Plant health and vigor, productivity
I.3 (-) Maintenance costs
C.1 (+) Water quality
C.2 (+) Public / private health and safety, community relations
C.3 (+/-) income and income stability (individuals and community)
I.11 (-) Cost of future regulatory compliance
LEGEND
Mitigating practice
Associated practice
#. Created by practice
D. Direct effect
I. Indirect effect
C. Cumulative effect
Pathway
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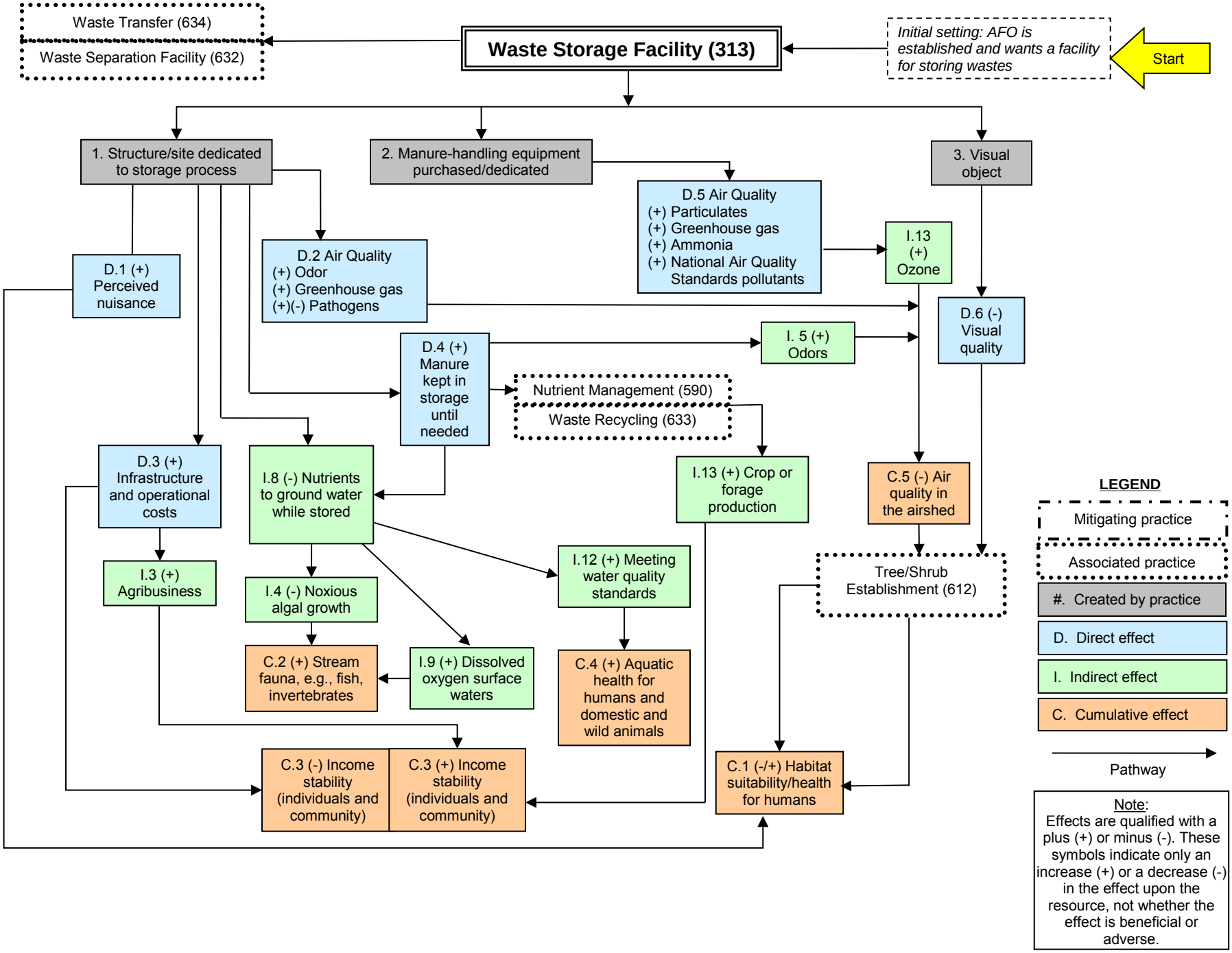
Waste Transfer (634)
Waste Separation Facility (632)
Waste Storage Facility (313)
Initial setting: AFO is established and wants a facility for storing wastes
Start
1. Structure/site dedicated to storage process
2. Manure-handling equipment purchased/dedicated
3. Visual object
D.5 Air Quality
(+) Particulates
(+) Greenhouse gas
(+) Ammonia
(+) National Air Quality Standards pollutants
I.13 (+) Ozone
D.1 (+) Perceived nuisance
D.2 Air Quality
(+) Odor
(+) Greenhouse gas
(+)(-) Pathogens
D.6 (-) Visual quality
D.4 (+) Manure kept in storage until needed
I. 5 (+) Odors
Nutrient Management (590)
Waste Recycling (633)
D.3 (+) Infrastructure and operational costs
I.8 (-) Nutrients to ground water while stored
I.13 (+) Crop or forage production
C.5 (-) Air quality in the airshed
I.3 (+) Agribusiness
I.4 (-) Noxious algal growth
I.12 (+) Meeting water quality standards
Tree/Shrub Establishment (612)
C.2 (+) Stream fauna, e.g., fish, invertebrates
I.9 (+) Dissolved oxygen surface waters
C.4 (+) Aquatic health for humans and domestic and wild animals
C.3 (-) Income stability (individuals and community)
C.3 (+) Income stability (individuals and community)
C.1 (-/+) Habitat suitability/health for humans
LEGEND
Mitigating practice
Associated practice
#. Created by practice
D. Direct effect
I. Indirect effect
C. Cumulative effect
Pathway
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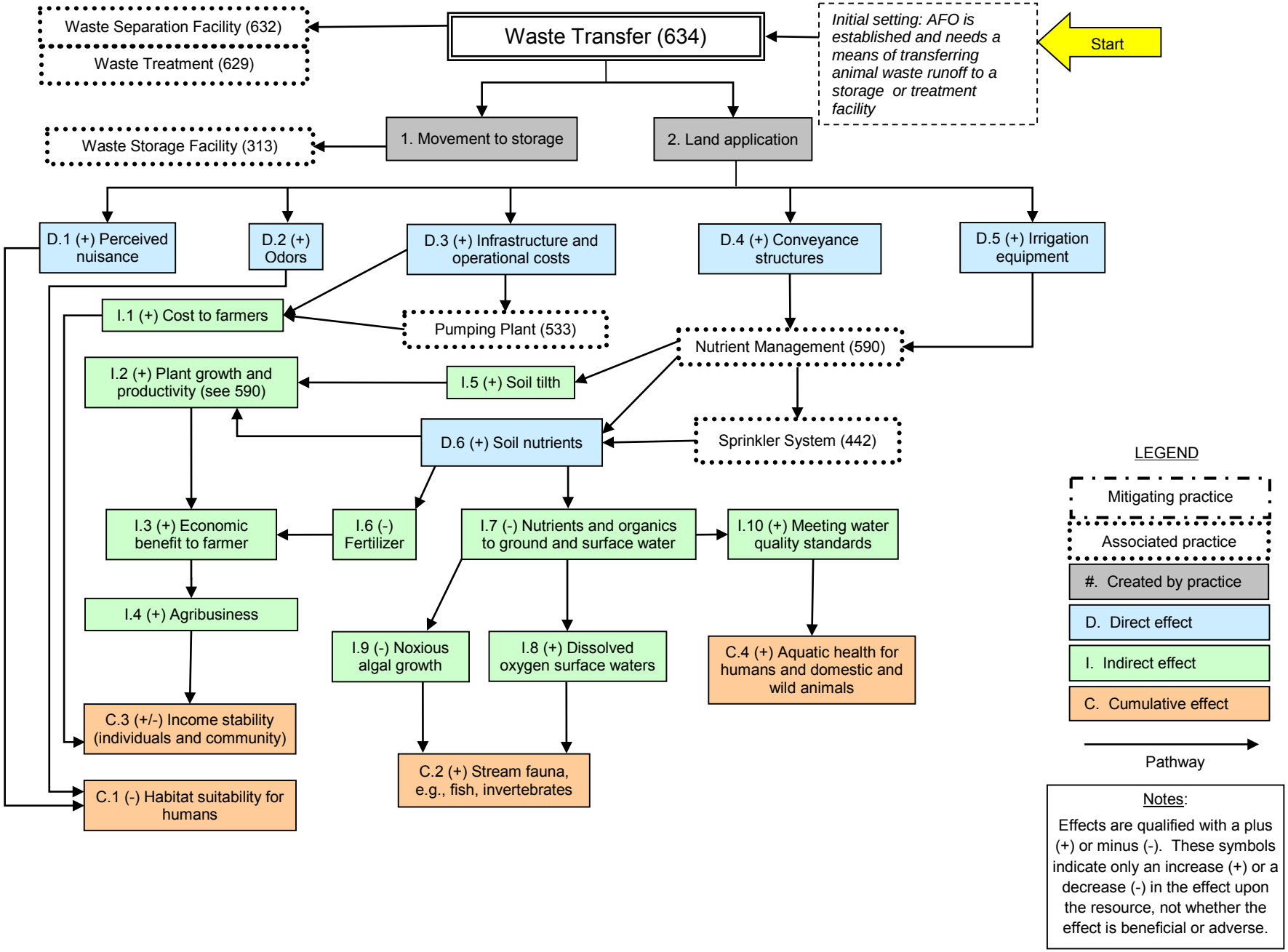
Waste Separation Facility (632)
Waste Treatment (629)
Waste Transfer (634)
Initial setting: AFO is established and needs a means of transferring animal waste runoff to a storage or treatment facility
Start
Waste Storage Facility (313)
1. Movement to storage
2. Land application
D.1 (+) Perceived nuisance
D.2 (+) Odors
D.3 (+) Infrastructure and operational costs
D.4 (+) Conveyance structures
D.5 (+) Irrigation equipment
I.1 (+) Cost to farmers
Pumping Plant (533)
Nutrient Management (590)
I.2 (+) Plant growth and productivity (see 590)
I.5 (+) Soil tilth
D.6 (+) Soil nutrients
Sprinkler System (442)
I.3 (+) Economic benefit to farmer
I.6 (-) Fertilizer
I.7 (-) Nutrients and organics to ground and surface water
I.10 (+) Meeting water quality standards
I.4 (+) Agribusiness
I.9 (-) Noxious algal growth
I.8 (+) Dissolved oxygen surface waters
C.4 (+) Aquatic health for humans and domestic and wild animals
C.3 (+/-) Income stability (individuals and community)
C.2 (+) Stream fauna, e.g., fish, invertebrates
C.1 (-) Habitat suitability for humans
LEGEND
Mitigating practice
Associated practice
#. Created by practice
D. Direct effect
I. Indirect effect
C. Cumulative effect
Pathway
Notes:
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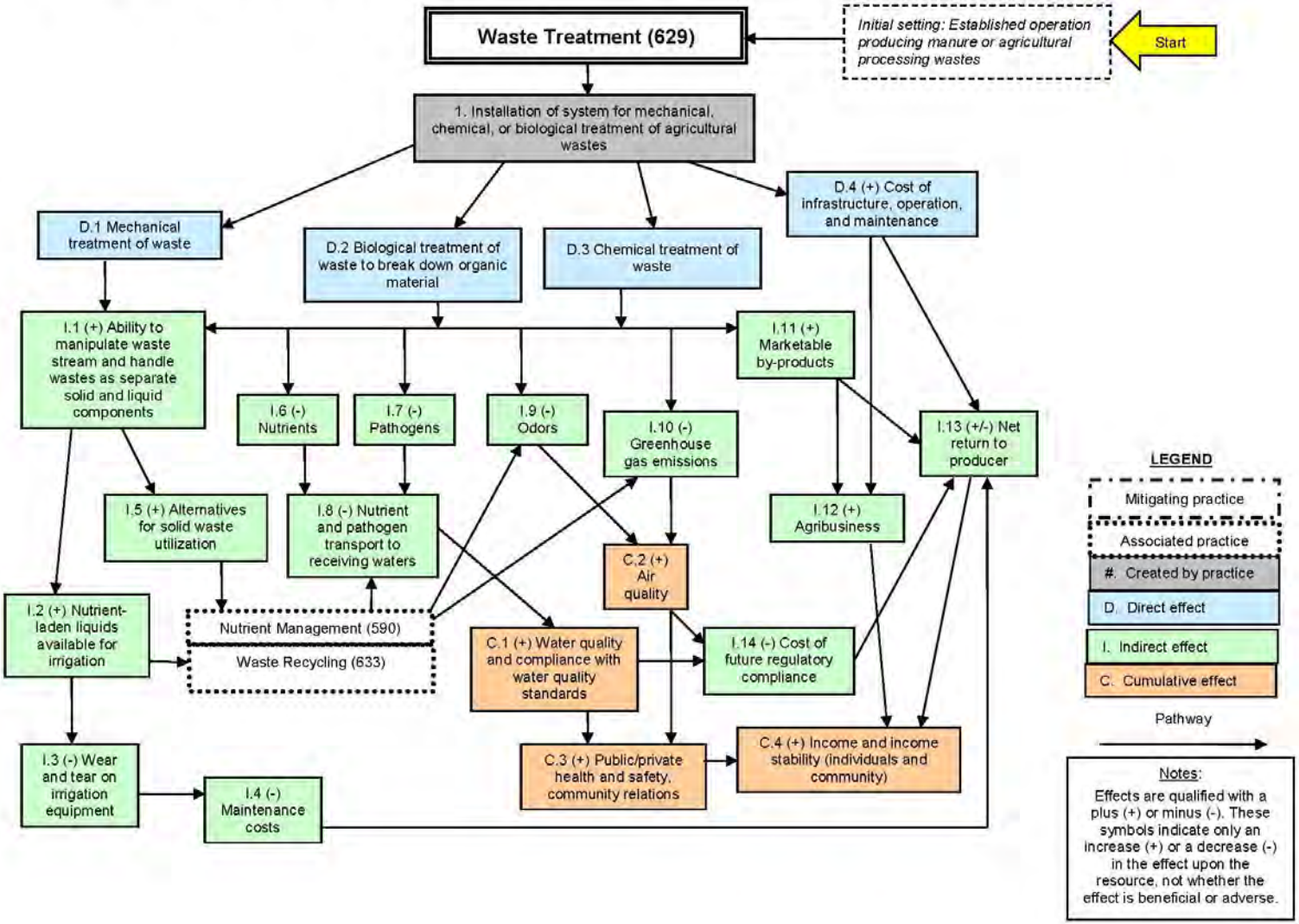
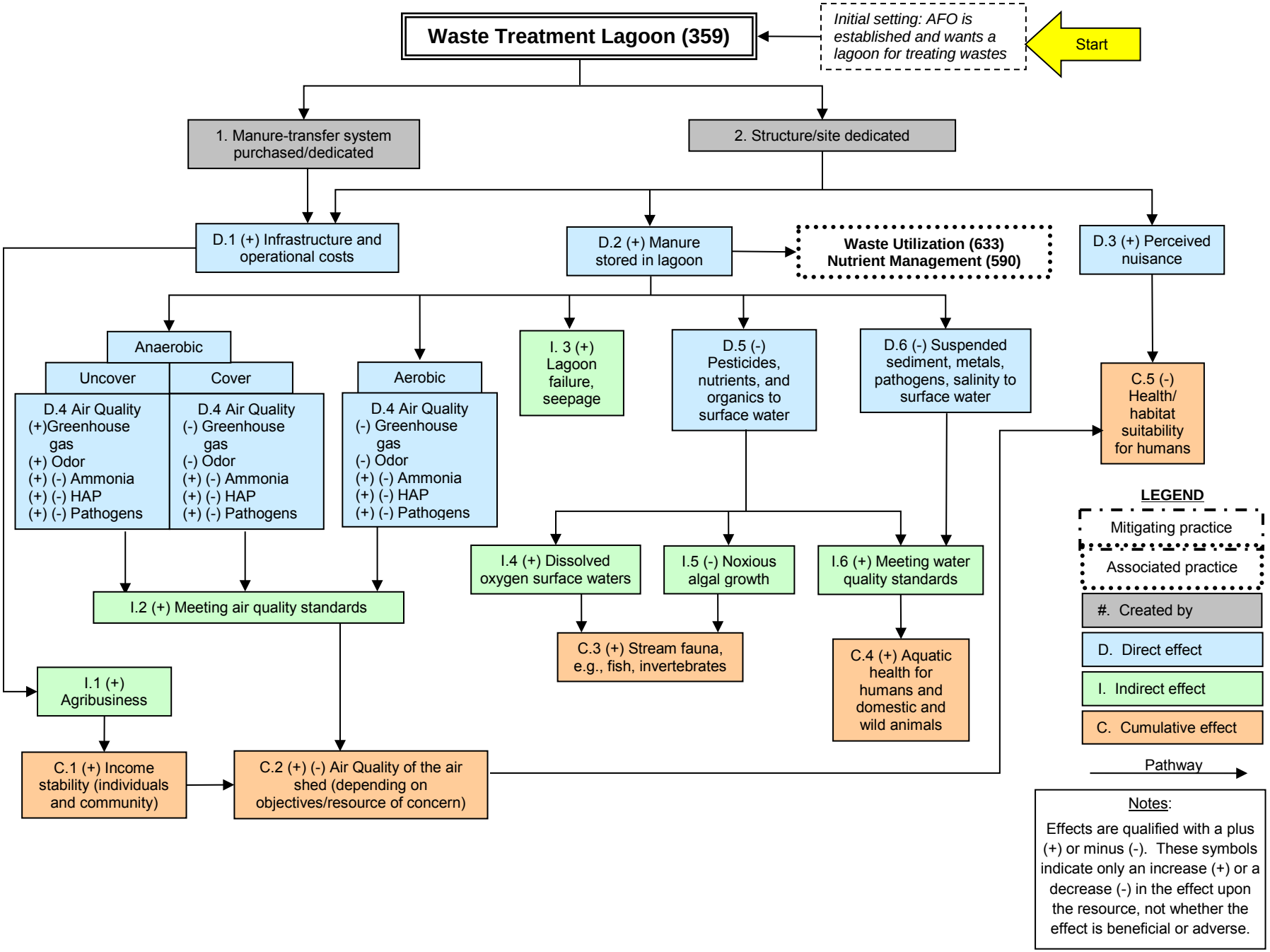
NRCS CONSERVATION PRACTICE EFFECTS - NETWORK DIAGRAM

March 2014




Waste Treatment Lagoon (359)
Initial setting: AFO is established and wants a lagoon for treating wastes
Start
1. Manure-transfer system purchased/dedicated
2. Structure/site dedicated
D.1 (+) Infrastructure and operational costs
D.2 (+) Manure stored in lagoon
Waste Utilization (633)
Nutrient Management (590)
D.3 (+) Perceived nuisance
Anaerobic
Uncover
Cover
Aerobic
D.4 Air Quality (+)Greenhouse gas (+) Odor (+) (-) Ammonia (+) (-) HAP (+) (-) Pathogens
D.4 Air Quality (-) Greenhouse gas (-) Odor (+) (-) Ammonia (+) (-) HAP (+) (-) Pathogens
D.4 Air Quality (-) Greenhouse gas (-) Odor (+) (-) Ammonia (+) (-) HAP (+) (-) Pathogens
I. 3 (+) Lagoon failure, seepage
D.5 (-) Pesticides, nutrients, and organics to surface water
D.6 (-) Suspended sediment, metals, pathogens, salinity to surface water
C.5 (-) Health/ habitat suitability for humans
I.2 (+) Meeting air quality standards
I.4 (+) Dissolved oxygen surface waters
I.5 (-) Noxious algal growth
I.6 (+) Meeting water quality standards
C.3 (+) Stream fauna, e.g., fish, invertebrates
C.4 (+) Aquatic health for humans and domestic and wild animals
I.1 (+) Agribusiness
C.1 (+) Income stability (individuals and community)
C.2 (+) (-) Air Quality of the air shed (depending on objectives/resource of concern)
LEGEND
Mitigating practice
Associated practice
#. Created by
D. Direct effect
I. Indirect effect
C. Cumulative effect
Pathway
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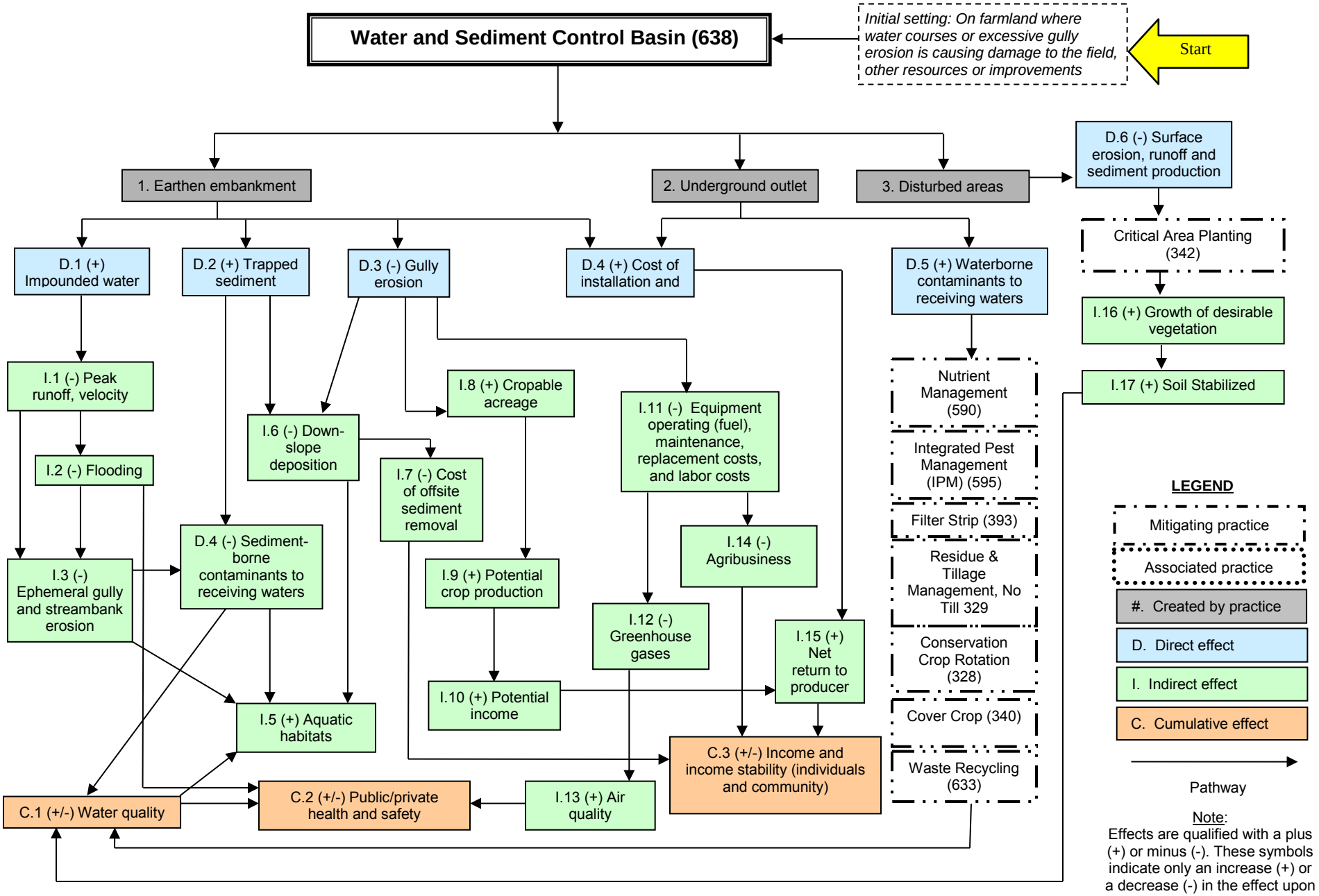
Water and Sediment Control Basin (638)
Initial setting: On farmland where water courses or excessive gully erosion is causing damage to the field, other resources or improvements
Start
1. Earthen embankment
2. Underground outlet
3. Disturbed areas
D.6 (-) Surface erosion, runoff and sediment production
D.1 (+) Impounded water
D.2 (+) Trapped sediment
D.3 (-) Gully erosion
D.4 (+) Cost of installation and
D.5 (+) Waterborne contaminants to receiving waters
Critical Area Planting (342)
I.16 (+) Growth of desirable vegetation
I.17 (+) Soil Stabilized
I.1 (-) Peak runoff, velocity
I.2 (-) Flooding
I.3 (-) Ephemeral gully and streambank erosion
I.6 (-) Down-slope deposition
I.7 (-) Cost of offsite sediment removal
I.8 (+) Cropable acreage
I.9 (+) Potential crop production
I.10 (+) Potential income
I.11 (-) Equipment operating (fuel), maintenance, replacement costs, and labor costs
I.12 (-) Greenhouse gases
I.13 (+) Air quality
I.14 (-) Agribusiness
I.15 (+) Net return to producer
D.4 (-) Sediment-borne contaminants to receiving waters
I.5 (+) Aquatic habitats
C.1 (+/-) Water quality
C.2 (+/-) Public/private health and safety
C.3 (+/-) Income and income stability (individuals and community)
Nutrient Management (590)
Integrated Pest Management (IPM) (595)
Filter Strip (393)
Residue & Tillage Management, No Till 329
Conservation Crop Rotation (328)
Cover Crop (340)
Waste Recycling (633)
LEGEND
Mitigating practice
Associated practice
#. Created by practice
D. Direct effect
I. Indirect effect
C. Cumulative effect
Pathway
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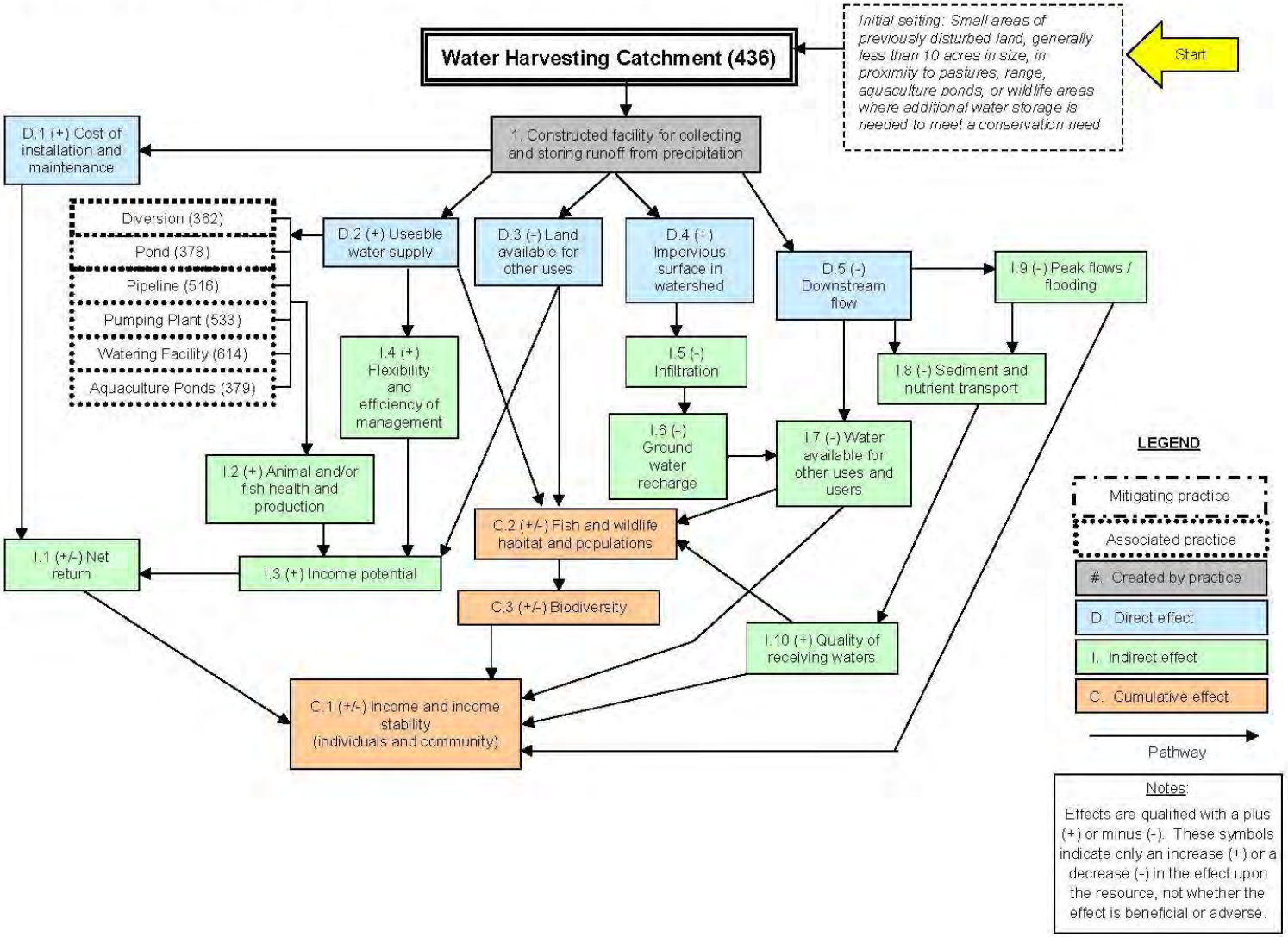
NRCS CONSERVATION PRACTICE EFFECTS - NETWORK DIAGRAM

March 2014



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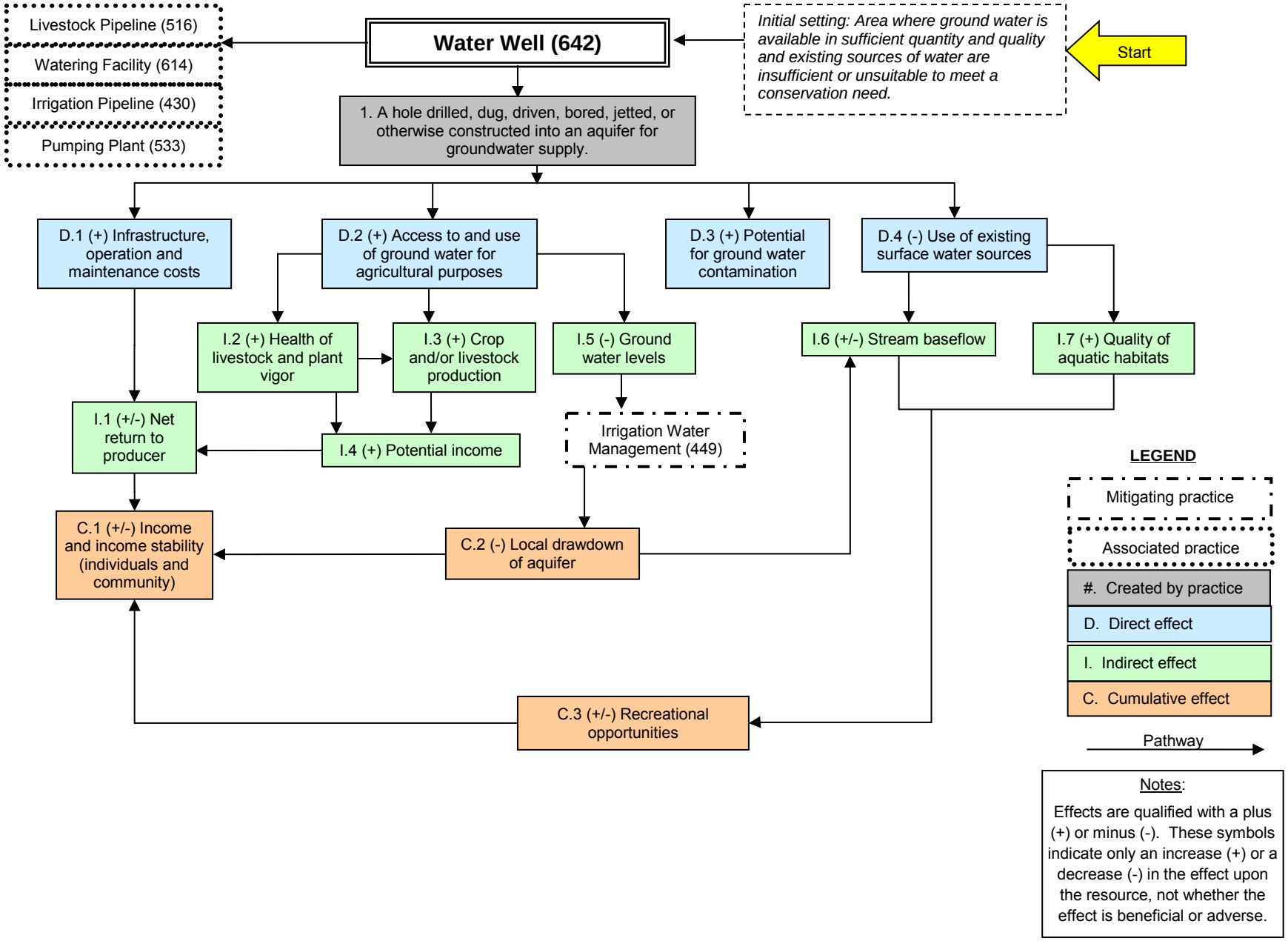

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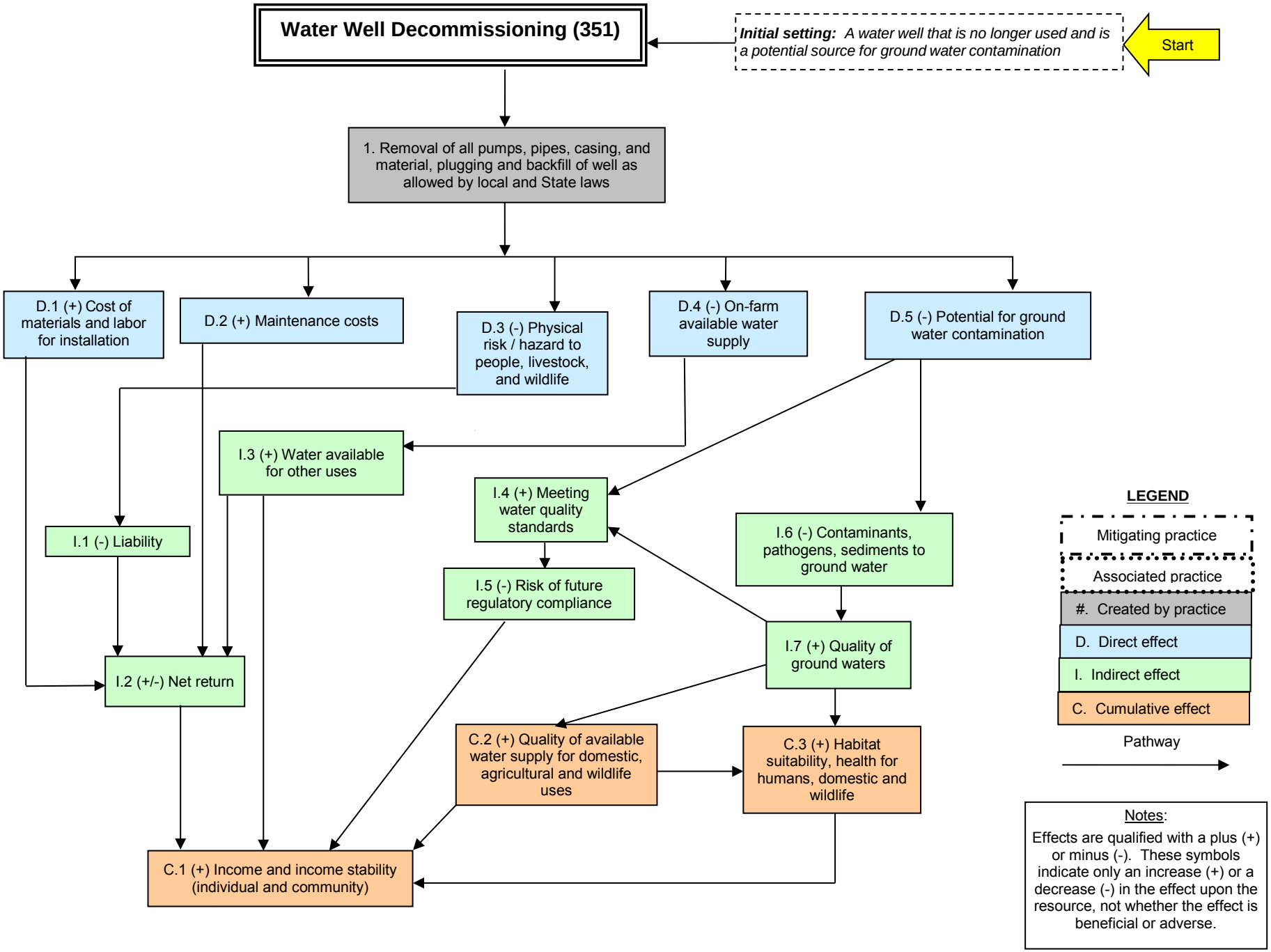
Water Well Decommissioning (351)
Initial setting: A water well that is no longer used and is a potential source for ground water contamination
Start
1. Removal of all pumps, pipes, casing, and material, plugging and backfill of well as allowed by local and State laws
D.1 (+) Cost of materials and labor for installation
D.2 (+) Maintenance costs
D.3 (-) Physical risk / hazard to people, livestock, and wildlife
D.4 (-) On-farm available water supply
D.5 (-) Potential for ground water contamination
I.3 (+) Water available for other uses
I.4 (+) Meeting water quality standards
I.1 (-) Liability
I.6 (-) Contaminants, pathogens, sediments to ground water
I.5 (-) Risk of future regulatory compliance
I.7 (+) Quality of ground waters
I.2 (+/-) Net return
C.2 (+) Quality of available water supply for domestic, agricultural and wildlife uses
C.3 (+) Habitat suitability, health for humans, domestic and wildlife
C.1 (+) Income and income stability (individual and community)
LEGEND
Mitigating practice
Associated practice
#. Created by practice
D. Direct effect
I. Indirect effect
C. Cumulative effect
Pathway
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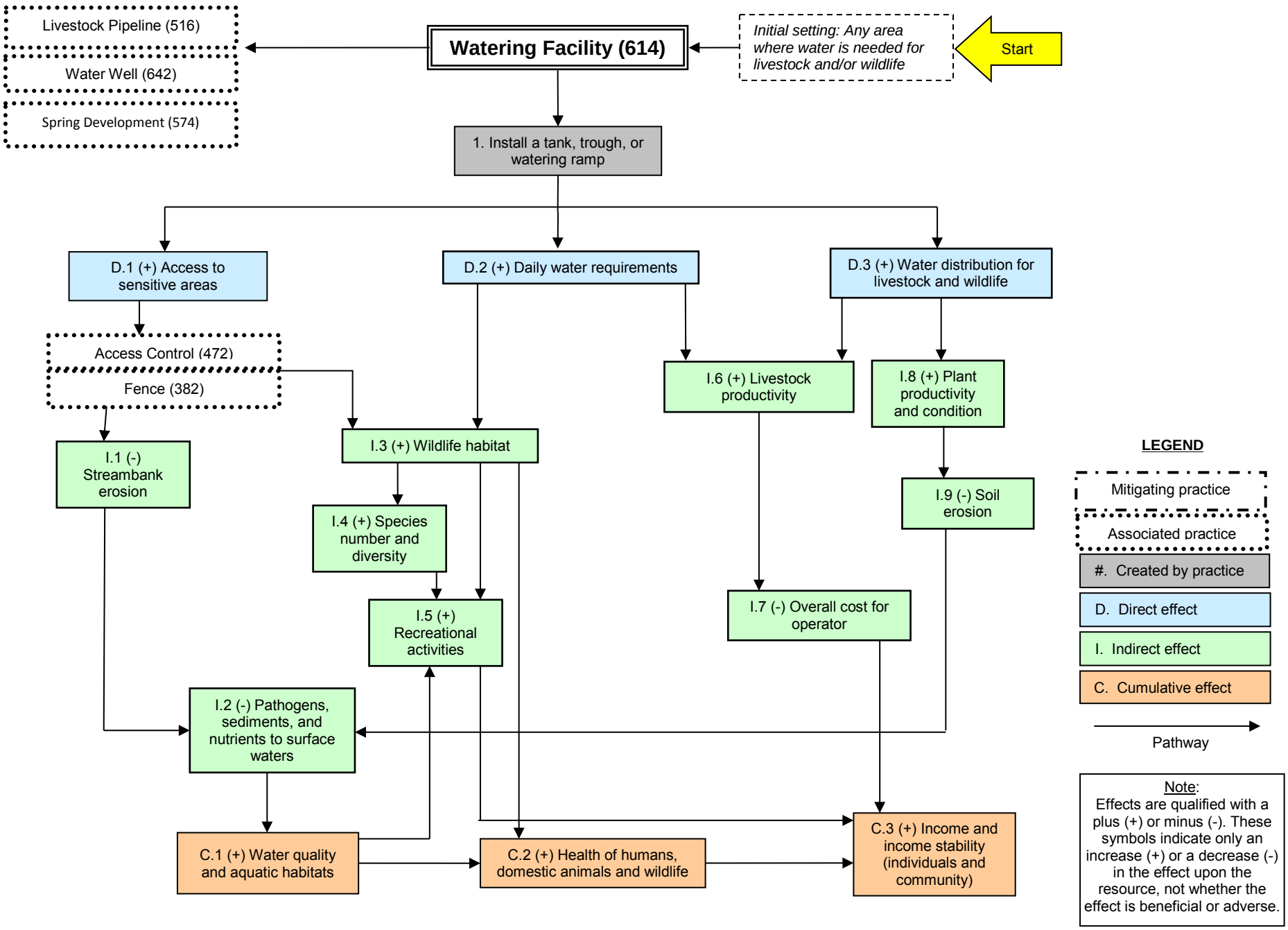
Livestock Pipeline (516)
Water Well (642)
Spring Development (574)
Watering Facility (614)
Initial setting: Any area where water is needed for livestock and/or wildlife
Start
1. Install a tank, trough, or watering ramp
D.1 (+) Access to sensitive areas
D.2 (+) Daily water requirements
D.3 (+) Water distribution for livestock and wildlife
Access Control (472)
Fence (382)
I.6 (+) Livestock productivity
I.8 (+) Plant productivity and condition
I.1 (-) Streambank erosion
I.3 (+) Wildlife habitat
I.9 (-) Soil erosion
I.4 (+) Species number and diversity
I.5 (+) Recreational activities
I.7 (-) Overall cost for operator
I.2 (-) Pathogens, sediments, and nutrients to surface waters
C.1 (+) Water quality and aquatic habitats
C.2 (+) Health of humans, domestic animals and wildlife
C.3 (+) Income and income stability (individuals and community)
LEGEND
Mitigating practice
Associated practice
#. Created by practice
D. Direct effect
I. Indirect effect
C. Cumulative effect
Pathway
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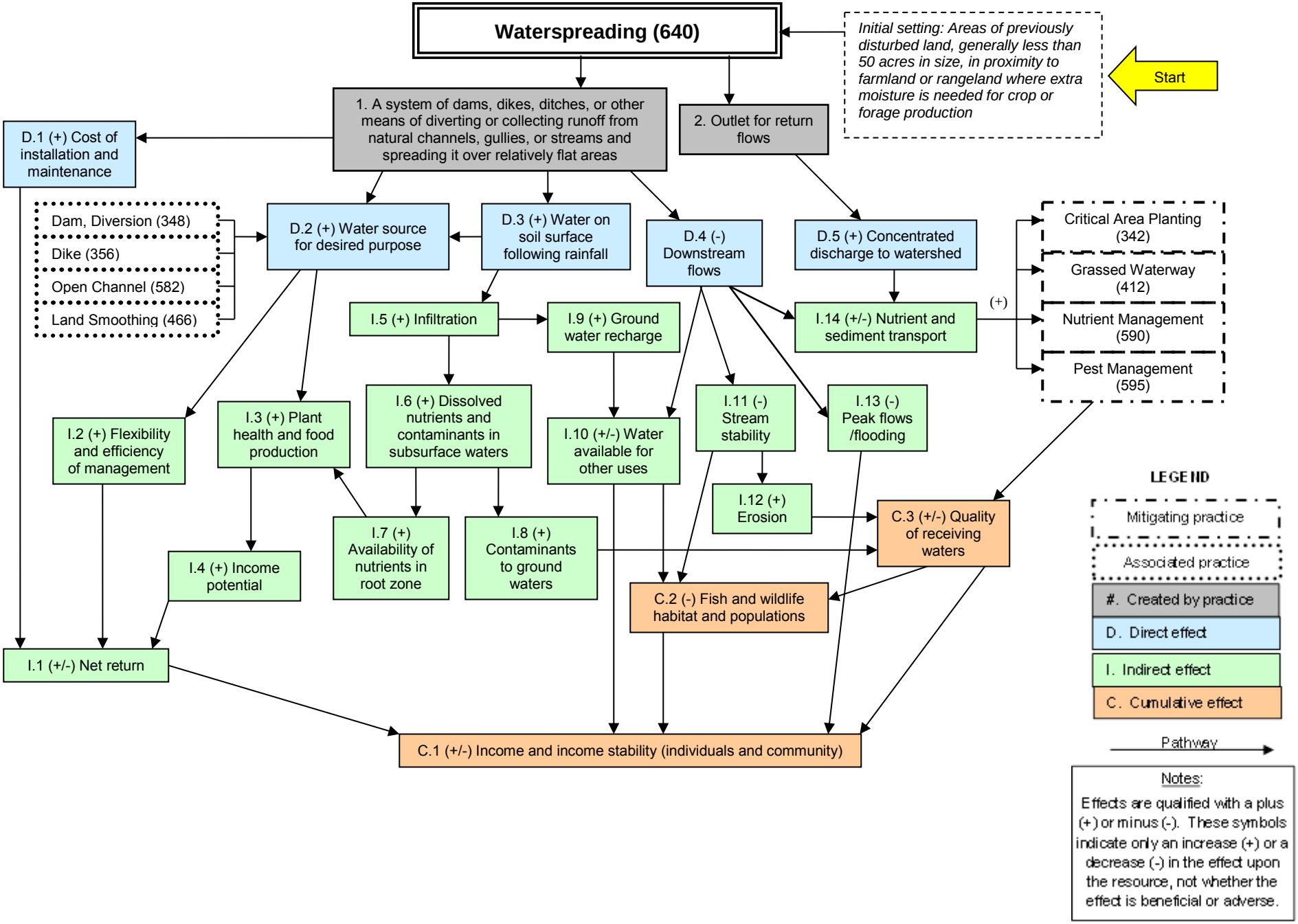
Waterspreading (640)
Initial setting: Areas of previously disturbed land, generally less than 50 acres in size, in proximity to farmland or rangeland where extra moisture is needed for crop or forage production
Start
1. A system of dams, dikes, ditches, or other means of diverting or collecting runoff from natural channels, gullies, or streams and spreading it over relatively flat areas
2. Outlet for return flows
D.1 (+) Cost of installation and maintenance
Dam, Diversion (348)
Dike (356)
Open Channel (582)
Land Smoothing (466)
D.2 (+) Water source for desired purpose
D.3 (+) Water on soil surface following rainfall
D.4 (-) Downstream flows
D.5 (+) Concentrated discharge to watershed
Critical Area Planting (342)
Grassed Waterway (412)
Nutrient Management (590)
Pest Management (595)
(+)
I.5 (+) Infiltration
I.9 (+) Ground water recharge
I.14 (+/-) Nutrient and sediment transport
I.2 (+) Flexibility and efficiency of management
I.3 (+) Plant health and food production
I.6 (+) Dissolved nutrients and contaminants in subsurface waters
I.10 (+/-) Water available for other uses
I.11 (-) Stream stability
I.13 (-) Peak flows /flooding
I.12 (+) Erosion
C.3 (+/-) Quality of receiving waters
I.7 (+) Availability of nutrients in root zone
I.8 (+) Contaminants to ground waters
I.4 (+) Income potential
C.2 (-) Fish and wildlife habitat and populations
I.1 (+/-) Net return
C.1 (+/-) Income and income stability (individuals and community)
LEGEND
Mitigating practice
Associated practice
#. Created by practice
D. Direct effect
I. Indirect effect
C. Cumulative effect
Pathway
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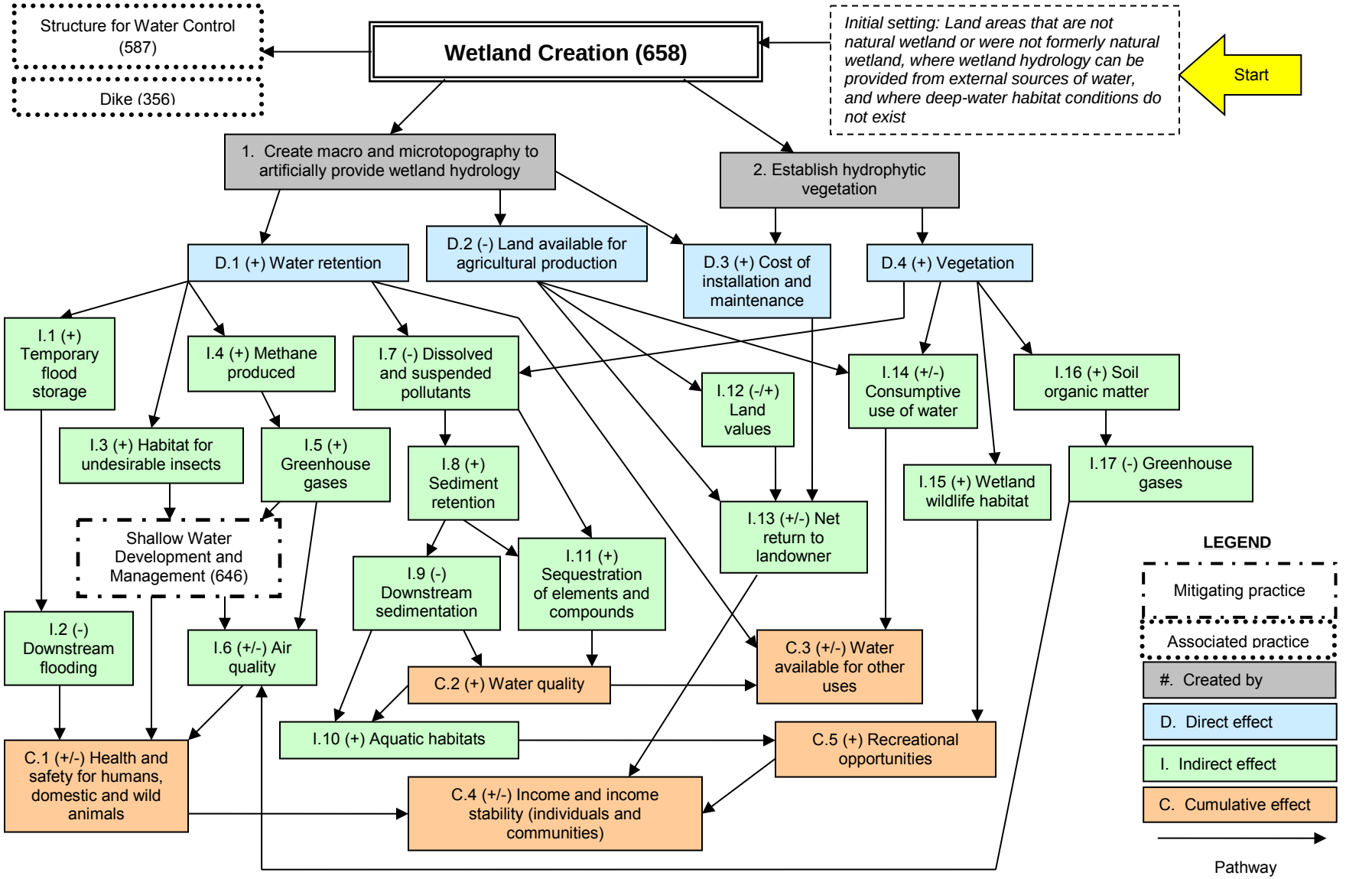

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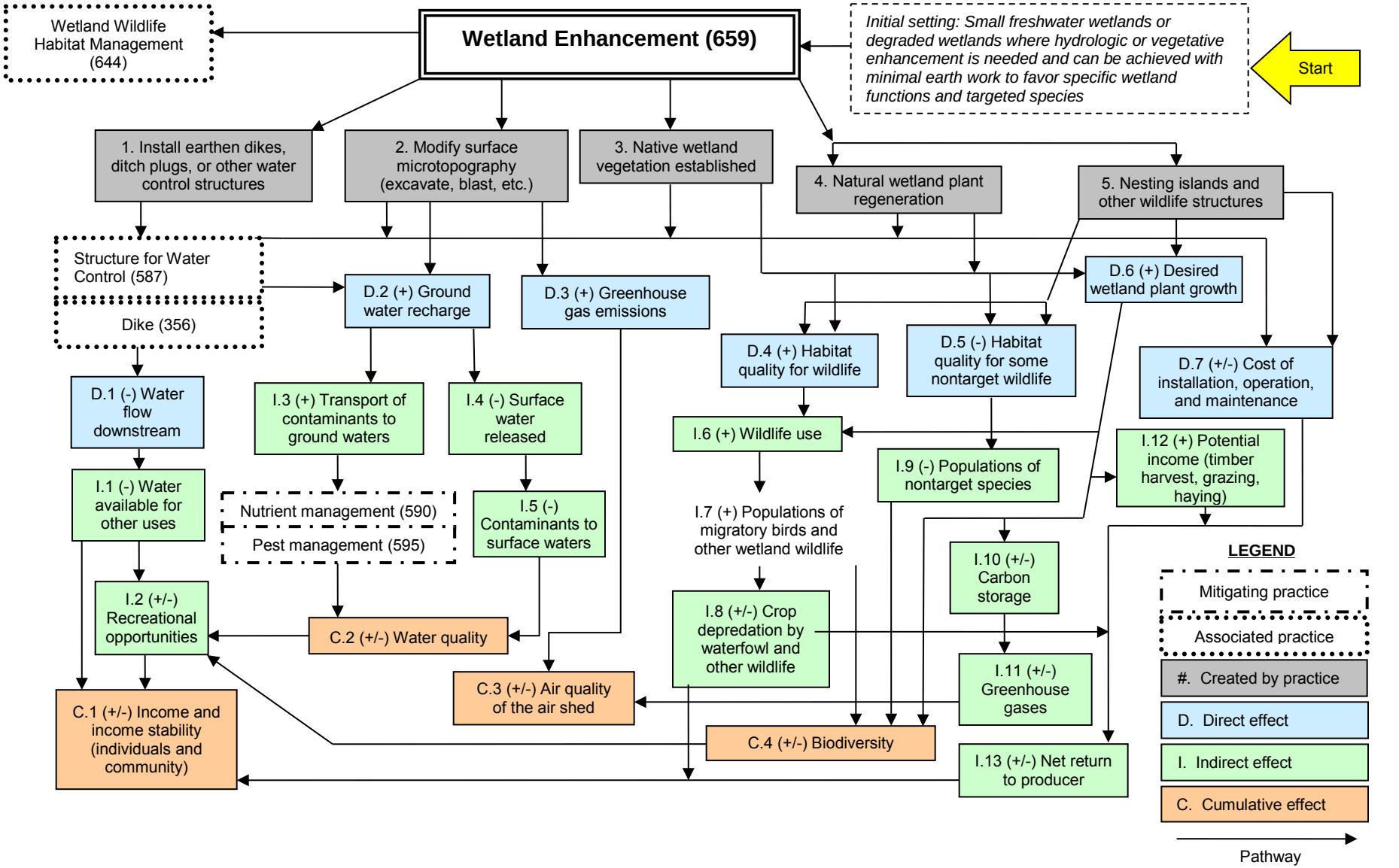

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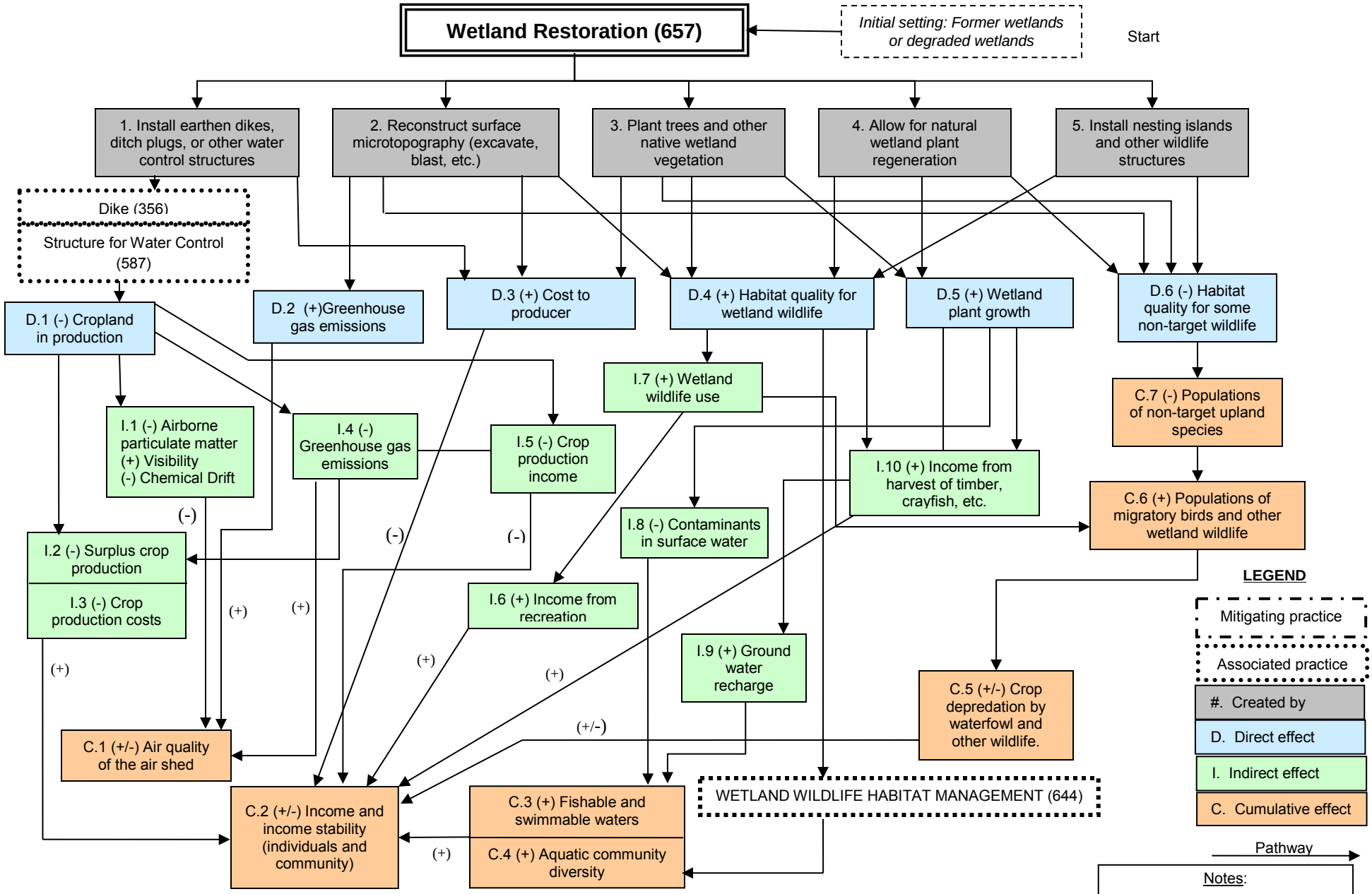
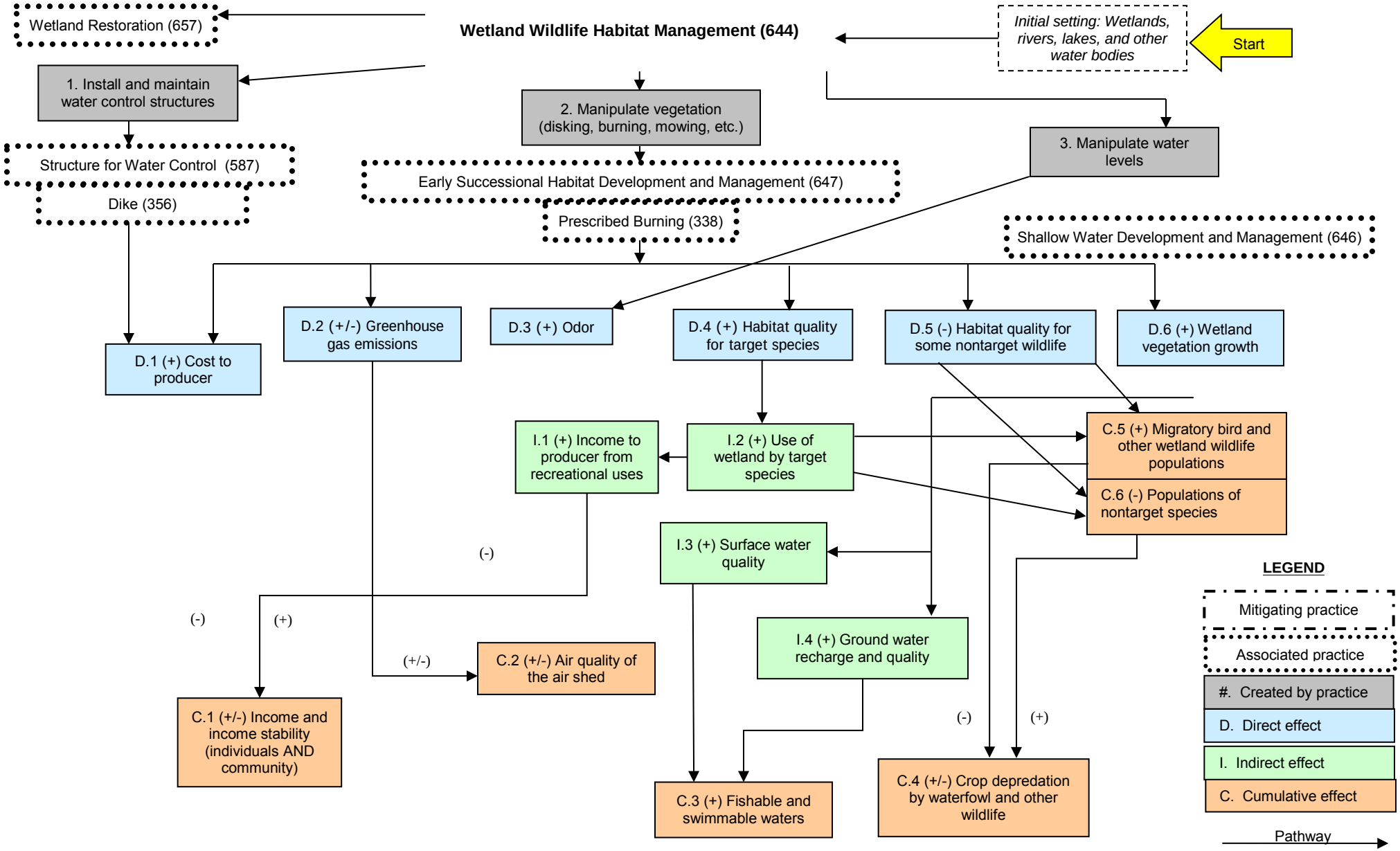


Network Diagram 154



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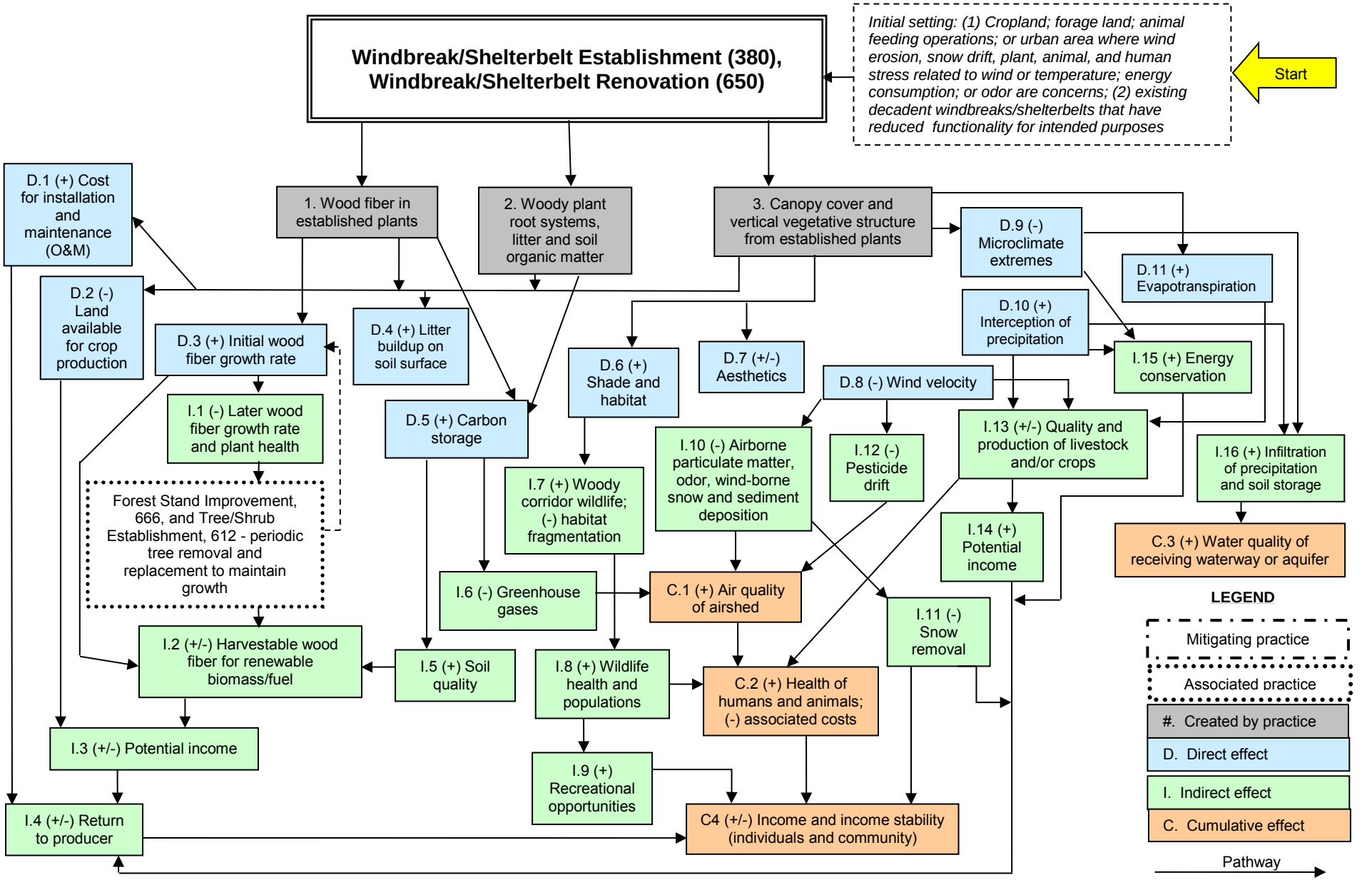
Network Diagram 155

NRCS CONSERVATION PRACTICE EFFECTS - NETWORK DIAGRAM

March 2014



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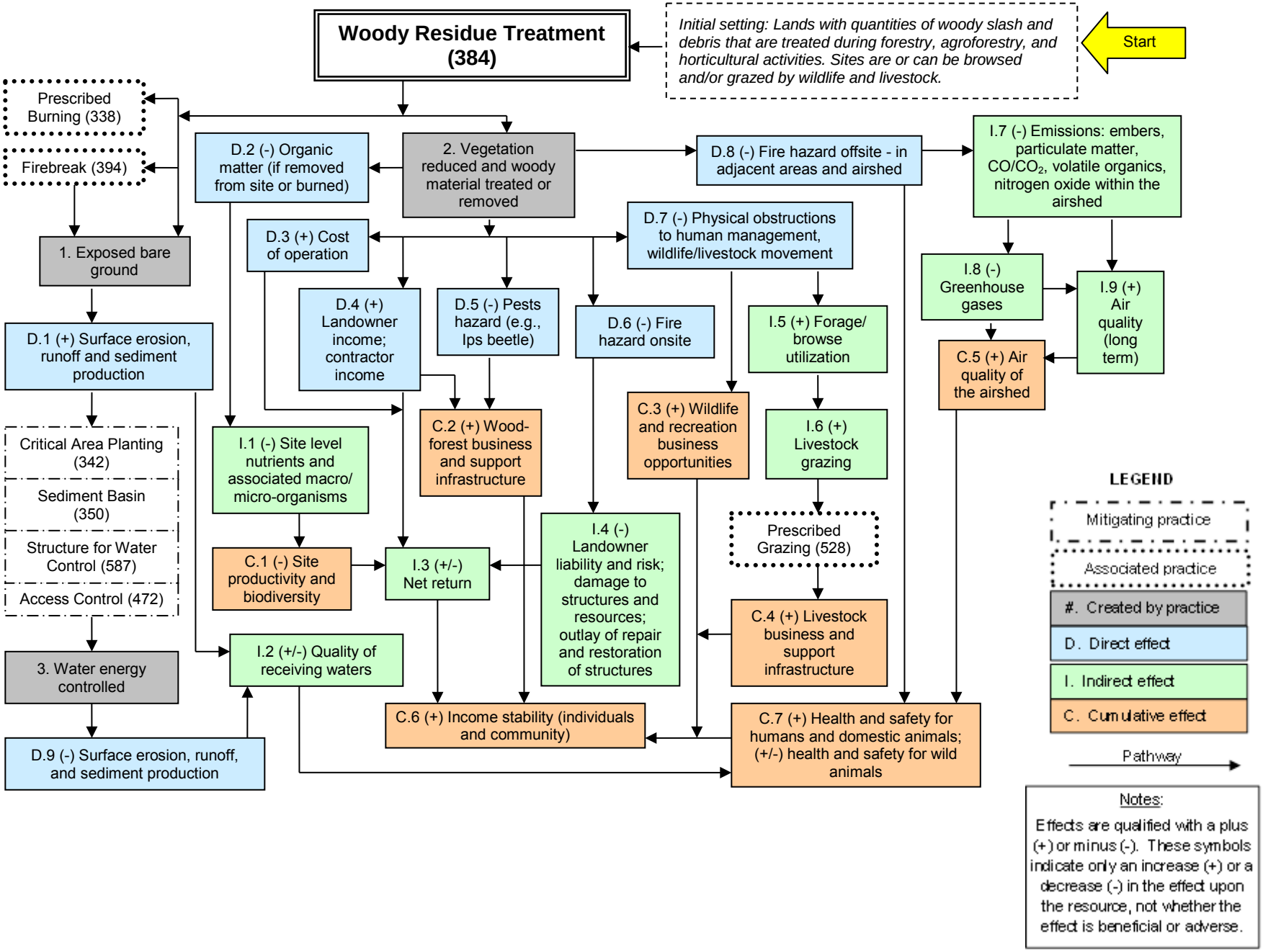
Woody Residue Treatment (384)
Initial setting: Lands with quantities of woody slash and debris that are treated during forestry, agroforestry, and horticultural activities. Sites are or can be browsed and/or grazed by wildlife and livestock.
Start
Prescribed Burning (338)
Firebreak (394)
1. Exposed bare ground
D.1 (+) Surface erosion, runoff and sediment production
Critical Area Planting (342)
Sediment Basin (350)
Structure for Water Control (587)
Access Control (472)
3. Water energy controlled
D.9 (-) Surface erosion, runoff, and sediment production
D.2 (-) Organic matter (if removed from site or burned)
2. Vegetation reduced and woody material treated or removed
D.8 (-) Fire hazard offsite - in adjacent areas and airshed
I.7 (-) Emissions: embers, particulate matter, CO/CO2, volatile organics, nitrogen oxide within the airshed
D.3 (+) Cost of operation
D.7 (-) Physical obstructions to human management, wildlife/livestock movement
I.8 (-) Greenhouse gases
I.9 (+) Air quality (long term)
D.4 (+) Landowner income; contractor income
D.5 (-) Pests hazard (e.g., Ips beetle)
D.6 (-) Fire hazard onsite
I.5 (+) Forage/ browse utilization
C.5 (+) Air quality of the airshed
C.3 (+) Wildlife and recreation business opportunities
I.6 (+) Livestock grazing
I.1 (-) Site level nutrients and associated macro/ micro-organisms
C.2 (+) Wood-forest business and support infrastructure
Prescribed Grazing (528)
I.4 (-) Landowner liability and risk; damage to structures and resources; outlay of repair and restoration of structures
C.1 (-) Site productivity and biodiversity
I.3 (+/-) Net return
C.4 (+) Livestock business and support infrastructure
I.2 (+/-) Quality of receiving waters
C.6 (+) Income stability (individuals and community)
C.7 (+) Health and safety for humans and domestic animals; (+/-) health and safety for wild animals
LEGEND
Mitigating practice
Associated practice
#. Created by practice
D. Direct effect
I. Indirect effect
C. Cumulative effect
Pathway
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