Chesapeake Bay Program: Climate Smart Framework and Decision-Support Tool

Climate-Smart Decision-Support Tables

CLIMATE-SMART ADAPTATION DESIGN – CBP WORK PLAN/KEY ACTIONS

Fill this out last

Climate-informed actions and performance targets – Documentation of Results *Check the appropriate box*	
☐	Keep existing actions and performance targets without modification. *If yes, provide reasoning.*
☐	Use existing actions and performance targets but with minor modifications. *If yes, note modifications and the reasoning behind them.*
☐	Use new actions/performance targets or significantly adjust existing ones. *If yes, provide the reasoning.*

Climate-Smart Adaptation Design at the CBP Work Plan/Key Actions Level

Current Action	*What is the CBP action being considered?*	
	Current key action or specific performance target	
Step 1: Screening for Actions	*Will the action be substantially influenced by climate change?*	
	Screening for actions.[1] If yes (influenced by climate change), proceed; if no, set aside the action (check the first box in the check list above)	

Step 2: Category 1 Considerations:	*What stressor(s), characterized by source if appropriate, are addressed by or accounted for in the action?*	
	Specific stressor(s) and source(s). [List separately, include uncertainty and relative sensitivity (low, medium, high.]	• *Identify the stressor(s) (e.g., pollutant, fishing pressure, loss of food or habitat resources, human development, etc.) that the management action addresses or in other ways seeks to account for. It is important to be specific and thorough in identifying the stressor(s) addressed or accounted for by each action, and subsequently (next question) to capture the climate effects on the stressor(s) that are relevant to the action. In some cases, specification of a stressor must also include designation of its source or the medium with which it is associated, as climate change*

[1] This is a screening question to identify and set aside (not proceed with climate-smart revision) actions not likely to be affected by climate change. For example, model improvement efforts will not themselves be directly influenced by climate change, although it would be important to include climate change into CBP models used for planning purposes.

		effects on the stressors may differ based on source. (Note – Any particular action can address or account for more than one stressor).
	What are the key climate change impacts (direction, magnitude, mechanism, uncertainty) on the stressor(s)/source(s)?	
	Key climate influences on stressor(s)/ sources(s)	• *Describe expected climate change impacts on the specified stressors, including information on the direction, magnitude, and mechanism of change. Climate change impacts may have to be considered separately by stressor/source combinations, when applicable. When describing expected climate change effects on the stressor(s) relevant to a management action, the uncertainty associated with assessments about climate changes and their effects on the stressor(s) must also be considered. Again, specificity and detail are important, because this information is intended to support consideration, in subsequent questions, of how actions would have to be modified (e.g., scaled, placed, timed, engineered, etc.) to remain effective. Supporting materials needed to address this question include climate projections, vulnerability and resilience information, etc.*
	What is the expected timing of climate change impacts on the action? This could include seasonal patterns or temporal trends of the climate change effects of concern.	
	Timing of climate change effects	• *Describe the timing of when climate change will affect the target stressor(s) to inform when the action is needed, sequencing with other actions, and the time frame under which future effectiveness should be evaluated. Mid-century is a management-relevant time frame commonly used; however, this also could include seasonal outlooks/forecasts, or shorter-term events like El Niño.*
	Implications for how effectiveness of actions or progress towards performance targets is measured.	
	How is implementation being tracked (e.g. indicators, metrics)?	• *Management actions should be matched with measurable outcomes and appropriate metrics or indicators of changes in the target stressors or the resource, which can later be used to measure effectiveness of the action. This question is intended to capture such information. Potential changes in how to measure the success metrics should also be described here. If possible, suggest targets for quantitative or qualitative changes in the stressor or the resource metric(s) that would be used to measure effectiveness.*
	How will climate change alter the ability to carry out progress measurements or monitoring protocols?	• *Describe how monitoring (e.g., frequency, location, duration, etc.) might need to be modified to given climate change effects on the stressor.*

Step 3: Category 2	*How will climate change impacts on the stressor(s)/source(s) impact effectiveness of the action?*	
	Indirect effects on action	• *Describe how climate impacts on the stressor, considered separately by source if needed, will change the effectiveness of the management action over its implementation and functional lifetime. Will the action be able to*

		handle changes in the target stressor or other climate-driven changes to the resource?
	How will climate change impacts directly on the action impact effectiveness of the action?	
	Direct effects on action	• *Describe how climate change may directly impact the action (particularly relevant for actions that involve physical elements or structures) in ways that will change the effectiveness of the action over its implementation and functional lifetime. Could the action be physically impacted, overwhelmed, or destroyed by climate change impacts?*
	What are climate change-related time frame considerations or constraints on achieving or implementing the action [e.g., urgency, synergies or dependencies on other actions /work plans]?	
	Time frame considerations	• *Identify temporal considerations, including: (1) urgency due to anticipated time frame of climate change effects on the action and (2) temporal needs for planning and implementation of the action (including lead-time for design, permitting, construction, or other enabling conditions).*
	What changes are needed to adapt the action to accommodate the combination of direct and indirect climate change effects over the target periods for implementing the action? Or are there other ideas for actions suggested by these results?	
	Climate-driven adaptations needed	• *Describe the changes needed to adapt the design of the action in terms of place, time, or design (including engineering). Be sure to review and consider the information from all previous questions including the Notes sections.*

Step 4: Climate-Designed Action	***Climate-smart Work Plan/Action***	
	Description	• *Revise the original action to incorporate the climate-smart design considerations as described in the last question of Step 3. Be as specific and comprehensive as possible.*

Notes: What are the information/data gaps and research needs to better understand climate impacts or uncertainties, social or ecological effects, design needs, etc.
Discussions during application of the climate-smart decision tables often highlight instances where particular information that would be needed to fully address the question are not available. This notes section is intended to document these types of information gaps and research needs. In the CBP, many work plans already include strategies and key actions focused on filling recognized information needs in order to further managers' abilities to fulfill CBP goals. This additional information will be useful in subsequent evaluations, for revisiting and refining previous steps in the adaptive management cycle, and for directing future work plan revisions.

Notes: What issues, lessons, or spatial or temporal considerations emerged that might be common across other sites, or Bay-wide? How might these affect higher levels of planning (strategies, approaches)?

As key actions are put through the climate-smart decision tables, discussions on questions in steps 2 and 3 will sometimes generate insights or highlight issues that are more broadly applicable to sites or similar actions around the Bay, which may inform or help direct the revision of higher level decisions (e.g., strategies, approaches, outcomes). This notes section is intended to capture these insights, which should be transferred to the higher level climate-smart decision tables.

Notes: Interactions needed with other GITs/Workgroups that are key to the actions.

Use this notes section to document information exchanges or other interactions needed with other GITs or workgroups to assure that restoration decisions that might be within the purview of one group but are key to the success of actions another group are coordinated.

*Are there any key actions missing?**

The purpose of this activity is to help identify actions that could be added to a work plan by identifying any key vulnerabilities that are not sufficiently addressed, and/or types of strategies or approaches that are not utilized, in the existing plan, and to craft additional actions to fill those gaps.

* *Actions that may be needed to more comprehensively address the climate change impacts identified. The purpose is to identify any key vulnerabilities that are not sufficiently addressed in the existing plan and to craft additional actions to fill those gaps. The ecologically-oriented list of general adaptation strategies from the Climate-smart guide can be used to help in brainstorming these, though actions relevant to implementing those strategies/approaches in your specific management/ecosystem context may need to be brainstormed and/or researched in the literature. Start by listing any new actions listed in the last question of Step 3.*

CLIMATE-SMART ADAPTATION DESIGN – CBP STRATEGIES/MANAGEMENT APPROACHES OR GOALS/OUTCOMES

Fill this out last

Climate-informed strategies/mgmt. approaches – Documentation of Results *Check the appropriate box*	
☐	Keep existing strategies/approaches without modification. *If yes, provide reasoning*
☐	Use existing strategies/approaches but with minor modifications. *If yes, note modifications and the reasoning behind them*
☐	Use new strategies/approaches or significantly adjust existing ones. *If yes, provide the reasoning*

Climate-smart Adaptation Design at the CBP Strategy/Mgmt. Approach (or Goals/Outcomes) Level

Current Strategy	*What is the CBP strategy/ (or goal outcome) being considered?*	
	Current strategy/mgmt. approach	
Step 1: Screening for Goals/Strategies	*Will the strategy (or goal) be influenced by climate change?*	
	Screening for strategies (or goals)[2]. If yes (influenced by climate change), proceed; if no, set aside the strategy (check the first box in the check list above).	

[2] This is a screening question to identify and set aside (not proceed with climate-smart revision) strategies/approaches (or goals/outcomes) not likely to be affected by climate change. For example, education or outreach efforts will not themselves be directly influenced by climate change, although it would be desirable to include climate change information into these types of efforts. Therefore, it would not be necessary to apply this process directly to revision of such strategies. It should be noted that strategies such as development of energetic, system, planning, or other models also are not directly impacted by climate change; however, if climate change effects have not heretofore been considered in the model, then redesign of the model would be recommended.

Step 2: Category 1 Considerations: Climate change effects on the stressors and systems	*What stressor(s), characterized by source if appropriate, are addressed by or accounted for in the strategy?*	
	Specific stressor(s) and source(s). [List separately, include uncertainty and relative sensitivity (low, medium, high.]	• *Identify the stressor(s) (e.g., pollutant, fishing pressure, loss of food or habitat resources, human development, etc.) that the strategy/ approach (or goal/outcome) addresses or in other ways seeks to account for. At this level multiple stressors may be included and should be identified separately, with consideration of how they might vary over the region of concern. It is important to be specific and thorough in identifying the stressor(s), and subsequently (next question) to capture the climate effects on each relevant stressor.*
	What are the key climate change impacts (direction, magnitude, mechanism, uncertainty) on the stressor(s)/source(s), relevant to the resource?[3]	
	Key climate influences on stressor(s)/sources(s)	• *Describe expected climate change impacts on the specified stressors, including information on the direction, magnitude, and mechanism of change. Climate change impacts may have to be considered separately by stressor/source combinations, when applicable. Due to the often larger scale being considered at this level, this needs to consider any variations in impacts or vulnerabilities over the spatial scale of concern. The uncertainty associated with assessments about climate changes and their effects on the stressor(s) must also be considered. Specificity and detail are important, because this information is intended to support consideration, in subsequent questions, of how strategies/approaches (or goals/outcomes) would have to be modified to remain realistic, achievable, and/or effective. Supporting materials needed to address this question include climate projections, vulnerability and resilience information, etc.*
	What are the key climate change impacts directly affecting the resource (direction, magnitude, mechanism, uncertainty)?	
	Key climate influences on target resource(s)	• *Describe expected climate change impacts on the resource being managed (the management target), if this differs from and/or adds to consideration of climate change effects on the relevant stressor(s). The target resource could be a species or organism group (e.g., black ducks, oysters), a component of the ecosystem or a habitat (e.g., wetlands, SAVs, watersheds, protected lands, forests, fish habitat, sediments), a process, use, or condition (e.g., agriculture, stock assessment, land use, stream health, fish passage, federal facilities, wastewater treatment, urban stormwater), or a contaminant.*
	Over what timeframe will key climate change impacts affect targeted resources? Are there seasonal patterns or other short- or long-term temporal factors of the climate change effects of concern?	

[3] Incorporate information from the notes section of any action-level climate-smart decision tables completed on issues, lessons, or spatial or temporal considerations emerged that might be common across other sites, or be relevant Bay-wide, and how these affect higher levels of planning (strategies, approaches).

	Timing of climate change effects	• *Describe the timing of when climate change will affect the target resource or associated stressor(s). This is to inform implementation needs and the time frame under which effectiveness should be evaluated. Mid-century is a management-relevant time frame commonly used; however, this also could include seasonal outlooks/forecasts, or shorter-term events like El Niño.*
	How is progress toward strategy/mgmt. approach (or goal) measured?	
	How is implementation being tracked (e.g. indicators, metrics?	• *Most higher level decisions, particularly strategies, approaches, and outcomes, should be matched with measurable targets and appropriate metrics or indicators of changes in the target stressors or the resource, which can later be used to measure effectiveness of the strategies/approaches (or goals/outcomes). This question is intended to capture such information. If possible, suggest targets for quantitative or qualitative changes in the stressor or the resource metric(s) that would be used to measure effectiveness.*
	How will climate change alter the ability to carry out progress measurement or monitoring protocols?	• *Potential changes in how success metrics would have to be measure because of the impacts or changes related to climate changed should also be described here.*

Step 3: Category 2 Considerations: Climate Change implications for strategies	*How will climate change impacts on the resource itself change the condition (affect the quality or quantity) of and/or trends in the target resource?*	
	Direct effects on resource condition	• *Describe how climate impacts on the resource being managed (the management target), will change the effectiveness of the strategy/management approach (or goal/outcome) over its implementation and functional lifetime. Will the strategy/management approach (or goal/outcome) be able to accommodate climate-driven changes to the resource?*
	How will climate change impacts on the stressor(s) impact the strategy/approach (or goal/outcome)?	
	Indirect effects on strategy/approach (or goal/outcome)	• *Describe how climate impacts on the stressor, considered separately by source if needed, will change the effectiveness of the strategy/ management approach (or goal/outcome). Will they be able to handle changes in the target stressor?*
	How will climate change impacts directly on the strategy/approach (or goal/outcome) impact how realistic, achievable, or effective the strategy/approach (or goal/outcome) is?	
	Direct effects on strategy/approach (or goal/outcome)	• *Describe how climate change may directly impact the strategy/ management approach (or goal/outcome) (particularly relevant to strategies/approaches (or goals/outcomes) that involve physical elements or structures) in ways that will change how realistic, achievable, or effective the strategy/ management approach (or goal/outcome) will be.*
	What are climate change-related time frame considerations or constraints on achieving or implementing the strategy/mgmt. approach [e.g., urgency, synergies or dependencies on other strategies/mgmt. approaches]?	

	Time frame considerations	• *Identify temporal considerations, including: (1) urgency due to anticipated time frame of climate change effects and (2) temporal needs for planning and implementation.*
	What changes are needed to modify the strategy/mgmt. approach (or goal/outcome) to accommodate the combination of direct and indirect climate change effects or the target periods for implementing the strategy? Or are there other ideas for strategies suggested by these results?	
	Climate-driven adaptations needed	• *Describe the changes needed to adapt the formulation of the strategy/ management approach (or goal/outcome) in terms of place (including, for example, selection or prioritization of locations for treatment), time, or design (including engineering). Be sure to review and consider the information from all previous questions including the Notes sections.*

Step 4: Climate-Designed Strategy	***Climate-smart Strategy/Management Approach (or Outcome)***	
	Description	• *Revise the original strategy/management approach (or goal/outcome) to incorporate the climate-smart design considerations as described in the last question of Step 3. Be as specific and comprehensive as possible.*

Notes: What are the information/data gaps and research needs to better understand climate impacts or uncertainties, social or ecological effects, design needs, etc.?
Discussions during application of the climate-smart decision tables often highlight instances where particular information that would be needed to fully address the question are not available. This notes section is intended to document these types of information gaps and research needs. In the CBP, many work plans already include strategies and key actions focused on filling recognized information needs in order to further managers' abilities to fulfill CBP goals. This additional information will be useful in subsequent evaluations, for revisiting and refining previous steps in the adaptive management cycle, and for directing future work plan revisions.

Notes on interactions needed with other GITs/Workgroups that are key to the planned strategies/approaches.
Use this notes section to document information exchanges or other interactions needed with other GITs or workgroups to assure that restoration decisions that might be within the purview of one group but are key to the success of strategies, approaches, or outcomes in another group are coordinated.

*Are there any key strategies/approaches or (goal outcomes) missing?**
The purpose of this activity is to help identify strategies/approaches that could be added to a work plan by identifying any key vulnerabilities that are not sufficiently addressed, and/or types of strategies or approaches that are not utilized, in the existing plan, and to craft additional strategies to fill those gaps. [Note - this activity is, for the most part, not applicable to review of goal outcomes).

* *Strategies/approaches that may be needed to more comprehensively address the climate change impacts identified. The purpose is to identify any key vulnerabilities that are not sufficiently addressed in the existing plan and to craft additional strategies/approaches to fill those gaps. The ecologically-oriented list of general adaptation strategies from the Climate-smart guide can be used to help in brainstorming these. Start by listing any new strategies/management approaches listed in the last question of Step 3.*

Attachment 4

Chesapeake Bay Program: Climate Smart Framework and Decision-Support Tool

Climate-Smart Decision-Support Tables - Blank

CLIMATE-SMART ADAPTATION DESIGN – CBP WORK PLAN/KEY ACTIONS

Fill this out last

Climate-informed actions and performance targets – Documentation of Results *Check the appropriate box*	
☐	Keep existing actions and performance targets without modification. *If yes, provide reasoning.*
☐	Use existing actions and performance targets but with minor modifications. *If yes, note modifications and the reasoning behind them.*
☐	Use new actions/performance targets or significantly adjust existing ones. *If yes, provide the reasoning.*

Climate-smart Adaptation Design at the CBP Work Plan/Key Actions Level

Current Action	*What is the CBP action being considered?*	
	Current key action or specific performance target	
Step 1: Screening for Actions	*Will the action be substantially influenced by climate change?*	
	Screening for actions.[7] If yes (influenced by climate change), proceed; if no, set aside the action (check the first box in the check list above).	

Step 2: Category 1 Considerations: Climate change effects on	*What stressor(s), characterized by source if appropriate, are addressed by or accounted for in the action?*	
	Specific stressor(s) and source(s). [List separately, include uncertainty and relative sensitivity (low, medium, high.]	
	What are the key climate change impacts (direction, magnitude, mechanism, uncertainty) on the stressor(s)/source(s)?	

[7] This is a screening question to identify and set aside (not proceed with climate-smart revision) actions not likely to be affected by climate change. For example, model improvement efforts will not themselves be directly influenced by climate change, although it would be important to include climate change into CBP models used for planning purposes.

	Key climate influences on stressor(s)/sources(s)	
	What is the expected timing of climate change impacts on the action? This could include seasonal patterns or temporal trends of the climate change effects of concern.	
	Timing of climate change effects	
	Implications for how effectiveness of actions or progress towards performance targets is measured.	
	How is implementation being tracked (e.g. indicators, metrics)?	
	How will climate change alter the ability to carry out progress measurements or monitoring protocols?	

Step 3: Category 2 Considerations: **CC** implications for functionality of actions	*How will climate change impacts on the stressor(s)/source(s) impact effectiveness of the action?*	
	Indirect effects on action	
	How will climate change impacts directly on the action impact effectiveness of the action?	
	Direct effects on action	
	What are climate change-related time frame considerations or constraints on achieving or implementing the action [e.g., urgency, synergies or dependencies on other actions /work plans]?	
	Time frame considerations	
	What changes are needed to adapt the action to accommodate the combination of direct and indirect climate change effects over the target periods for implementing the action? Or are there other ideas for actions suggested by these results?	
	Climate-driven adaptations needed	

Step 4: Climate-Designed Action	***Climate-smart Work Plan/Action***	
	Description	

Notes: What are the information/data gaps and research needs to better understand climate impacts or uncertainties, social or ecological effects, design needs, etc.?

Notes: What issues, lessons, or spatial or temporal considerations emerged that might be common across other sites, or Bay-wide? How might these affect higher levels of planning (strategies, approaches)?

Notes: Interactions needed with other GITs/Workgroups that are key to the actions?

*Are there any key actions missing?**

* *Actions that may be needed to more comprehensively address the climate change impacts identified. The purpose is to identify any key vulnerabilities that are not sufficiently addressed in the existing plan and to craft additional actions to fill those gaps. The ecologically-oriented list of general adaptation strategies from the Climate-smart guide can be used to help in brainstorming these, though actions relevant to implementing those strategies/approaches in your specific management/ecosystem context may need to be brainstormed and/or researched in the literature. Start by listing any new actions listed in the last question of Step 3.*

CLIMATE-SMART ADAPTATION DESIGN – CBP STRATEGIES/MANAGEMENT APPROACHES OR GOALS/OUTCOMES

Fill this out last

Climate-informed strategies/mgmt. approaches – Documentation of Results *Check the appropriate box*	
☐	Keep existing strategies/approaches without modification. *If yes, provide reasoning*
☐	Use existing strategies/approaches but with minor modifications. *If yes, note modifications and the reasoning behind them*
☐	Use new strategies/approaches or significantly adjust existing ones. *If yes, provide the reasoning*

Climate-smart Adaptation Design at the CBP Strategy/Mgmt. Approach (or Goals/Outcomes) Level

Current Strategy	*What is the CBP strategy/approach (or goal/outcome) being considered?*	
	Current strategy/mgmt. approach	
Step 1: Screening for Goals/Strategies	*Will the strategy (or goal) be influenced by climate change?*	
	Screening for strategies (or goals)[8]. If yes (influenced by climate change), proceed; if no, set aside the strategy (check the first box in the check list above).	

[8] This is a screening question to identify and set aside (not proceed with climate-smart revision) strategies/approaches (or goals/outcomes) not likely to be affected by climate change. For example, education or outreach efforts will not themselves be directly influenced by climate change, although it would be desirable to include climate change information into these types of efforts. Therefore, it would not be necessary to apply this process directly to revision of such strategies. It should be noted that strategies such as development of energetic, system, planning, or other models also are not directly impacted by climate change; however, if climate change effects have not heretofore been considered in the model, then redesign of the model would be recommended.

Step 2: Category 1 Considerations: Climate change effects on the stressors and systems	*What stressor(s), characterized by source if appropriate, are addressed by or accounted for in the strategy/approach (or goal/outcome)?*	
	Specific stressor(s) and source(s). [List separately, include uncertainty and relative sensitivity (low, medium, high.]	
	What are the key climate change impacts (direction, magnitude, mechanism, uncertainty) on the stressor(s)/source(s), relevant to the resource?[9]	
	Key climate influences on stressor(s)/sources(s)	
	What are the key climate change impacts directly affecting the resource (direction, magnitude, mechanism, uncertainty)?	
	Key climate influences on target resource(s)	
	Over what timeframe will key climate change impacts affect targeted resources? Are there seasonal patterns or other short- or long-term temporal factors of the climate change effects of concern?	
	Timing of climate change effects	
	How is progress toward strategy/approach (or goal/outcome) measured?	
	How is implementation being tracked (e.g. indicators, metrics?	
	How will climate change alter the ability to carry out progress measurement or monitoring protocols?	

Step 3: Category 2 Considerations	*How will climate change impacts on the resource itself change the condition (affect the quality or quantity) of and/or trends in the target resource?*	
	Direct effects on resource condition	
	How will climate change impacts on the stressor(s) impact the strategy/approach (or goal/outcome)?	

[9] Incorporate information from the notes section of any action-level climate-smart decision tables completed on issues, lessons, or spatial or temporal considerations emerged that might be common across other sites, or be relevant Bay-wide, and how these affect higher levels of planning (strategies, approaches).

	Indirect effects on strategy/approach (or goal/outcome)	
	How will climate change impacts directly on the strategy/approach (or goal/outcome) impact how realistic, achievable, or effect the strategy/approach (or goal/outcome) is?	
	Direct effects on strategy/approach (or goal/outcome)	
	What are climate change-related time frame considerations or constraints on achieving or implementing the strategy/mgmt. approach [e.g., urgency, synergies or dependencies on other strategies/mgmt.. approaches]?	
	Time frame considerations	
	What changes are needed to modify the strategy/mgmt. approach (or goal/outcome) to accommodate the combination of direct and indirect climate change effects or the target periods for implementing the strategy? Or are there other ideas for strategies suggested by these results?	
	Climate-driven adaptations needed	

Step 4: Climate-Designed Strategy	***Climate-smart Strategy/Management Approach (or Goal/Outcome)***	
	Description	

Notes: What are the information/data gaps and research needs to better understand climate impacts or uncertainties, social or ecological effects, design needs, etc.?

Notes: Interactions needed with other GITs/Workgroups that are key to the planned strategies/approaches.

*Are there any key strategies/approaches or (goal outcomes) missing?**

* *Strategies/approaches that may be needed to more comprehensively address the climate change impacts identified. The purpose is to identify any key vulnerabilities that are not sufficiently addressed in the existing plan and to craft additional strategies/approaches to fill those gaps. The ecologically-oriented list of general adaptation strategies from the Climate-smart guide can be used to help in brainstorming these. Start by listing any new strategies/management approaches listed in the last question of Step 3.*