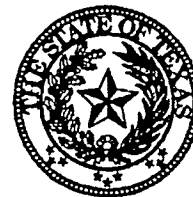


Appendix H
Consensus Criteria for Environmental Flow Needs

EXECUTIVE SUMMARY

ENVIRONMENTAL WATER NEEDS CRITERIA OF THE CONSENSUS PLANNING PROCESS



In pursuit of the goals of reducing conflict among competing water interests, providing consistent State water policy, and increasing planning and regulatory clarity to State water managers, the draft consensus planning methods reached among the three State water agencies for providing water needs involve trade-offs where neither human nor environmental needs unacceptably "prevail" over the other. The proposed methodology is based on the concept of retaining target flows for environmental purposes and allowing human use of flows greater than the target flows. Each of the new project environmental criteria described below provides for the priority of human needs during dry conditions, but also provides for some sharing of the adverse impact of drought by humans and the environment.

Specific data or project features identified in the final design and permitting process of water supply projects may require consideration of detailed criteria, based on site-specific field studies, which were not applied during the longer-range planning process. The environmental provisions specified below are representative of the basic approach to apportion surface water subject to regulatory actions in the entire water development process (i.e., planning through permitting), but only approximating what may be required for environmental needs in the final permit decision. In addition to passage of environmental flows, adequate flows will be passed through for protection of downstream water rights. In lieu of site-specific studies in the permitting process, the criteria will have the rebuttable presumption of validity. When the results of intensive freshwater inflow or instream flow studies are available and criteria have been established, those criteria will be used in the Water Plan rather than any generic rule.

NEW PROJECT ON-CHANNEL RESERVOIRS

The conservation storage of new, on-channel water supply reservoirs would be divided into three zones with provisions for varying levels of instream flows downstream of on-channel reservoir projects. Zone 1 occurs when reservoir water levels are greater than 80% of storage capacity, and inflows will be passed up to the monthly medians, calculated with naturalized daily stream flow estimates. Also, inflows will be passed to provide one channel flushing flow per season to provide for channel and habitat maintenance. Zone 2 occurs as dry conditions drop reservoir levels to between 50 and 80% of storage capacity. In this zone, inflows would be passed only up to the monthly 25th percentile flow values, calculated with naturalized daily stream flow estimates. In Zone 3, drought conditions worsen, dropping reservoir levels below 50% storage capacity. Inflows would be passed up to the established water quality standard (or 7Q2 value published by the TNRCC) for the downstream segment.

In all zones, instream flow pass-throughs would be targeted to reach the associated estuary system. Flows necessary for the protection of downstream water rights will be added to the appropriate instream flow value determined by the above method. In all cases, no releases will be made from water supply storage to provide environmental flows.

NEW DIRECT DIVERSIONS

Criteria governing direct diversions from a river or stream recommended in the State Water Plan would be based on stream flow conditions just upstream of the diversion point after providing for downstream water rights, and would also be divided into three zones based on hydrologic conditions. Zone 1 occurs when flow is greater than monthly medians; minimum flows passed will be the monthly medians, calculated with naturalized daily stream flow estimates. Zone 2 occurs when flows are greater than the monthly 25th percentile and less than or equal to medians. Minimum flows passed will be the monthly 25th percentile, calculated with naturalized daily stream flow estimates. Zone 3 occurs when stream flow is less than or equal to monthly 25th percentile values. Minimum flows passed will be the larger of: (1) the value necessary to maintain downstream water quality, or (2) a continuous flow threshold to be determined by consensus planning staff (e.g., 15th percentile), that would not allow the diversion by itself to dry up the stream.

NEW DIRECT DIVERSION PROJECTS INTO OFF-CHANNEL STORAGE

In those cases where a recommended water supply project would divert its water from a river or stream into off-channel storage, a combination of the direct diversion and reservoir criteria would apply. The direct diversion criteria will govern the ability to divert water into the off-channel reservoir. The reservoir criteria will address the ability of the project to capture water, as well as define the reservoir's operations to pass environmental flows from its own watershed.

BAY AND ESTUARY CONSIDERATIONS

For most planning purposes, the Zone 1 environmental flow requirements previously described will also provide the target inflows to bays and estuaries (B&E). However, where inflow values that are adequate to meet the beneficial inflow needs as described in Texas Water Code §11.147 have been established, those inflow volumes will be used as the basis for calculating the contributing portions of required water during Zone 1 conditions in new reservoirs or direct diversions for projects located within 200 river miles of the coast, to commence at the mouth of the river. No other special B&E provisions would be made in Zone 2 or Zone 3. These inflow values may be determined by TPWD until that agency and the TNRCC jointly make the determination in accordance with Texas Water Code §11.1491.

AMENDMENTS TO EXISTING PERMITS

Once water supply projects are specifically designed and submitted for permit consideration, a more detailed environmental assessment of its features may be performed. The scope of environmental review and permit consideration of an amendment to an existing water right is limited by law. Because of the many varied conditions around the State, the TNRCC can only provide general guidance as to how the Commission would evaluate applications for water rights and amendments to existing permits. In general, evaluation of impacts to instream or estuarine ecosystems will occur when there is a *significant* change in the point of diversion from downstream to upstream, to an adjoining tributary, to endangered species habitat, or if there is a change of purpose of use from non-consumptive to consumptive. Other changes in place or type of use may have limited or no further

environmental review. For further details, refer to A Regulatory Guidance Document for Applications to Divert, Store or Use State Water (June, 1995), published by the TNRCC.

For planning purposes, proposed amendments, such as conversion from non-consumptive to consumptive use (having the effect of a new appropriation) would have the appropriate environmental considerations described for new projects. For other types of amendments where only the intervening river or stream would be affected, the appropriate reservoir or direct diversion instream flow criteria would be applied. Where applicable, environmental flow criteria would only affect that portion of the existing water right subject to change.

ENVIRONMENTAL WATER NEEDS CRITERIA OF THE CONSENSUS PLANNING PROCESS



OVERVIEW

In pursuit of the goals of reducing conflict among competing water interests, providing consistent State water policy, and increasing planning and regulatory clarity to State water managers, the draft consensus proposals reached among the Texas Water Development Board, the Texas Natural Resource Conservation Commission, and the Texas Parks and Wildlife Department on planning methods for providing water needs necessarily involve trade-offs where neither human nor environmental needs unacceptably "prevail" over the other. The challenge facing the technical and policy staff of the three agencies was to craft methods that seek to optimize the provision of environmental flows while minimizing impact on water supply capability.

A guiding desire was to develop a procedure for the Water Plan process that would improve the current method of providing instream flows for environmental purposes with one that will ensure the long-term maintenance of the water-based environment that is so important to Texans, realizing that dry conditions are a natural part of Texas. This process leaves water in the rivers up to an environmental target flow amount and allows human use of flows larger than the target rate. The agencies sought the advice of national experts on how to quantify instream environmental flow targets in a planning process. Their recommendation was that site specific studies should be required, but the instream environment that developed over time should be maintained if river flow rates are normal. The procedure developed uses median flows calculated from naturalized daily streamflow estimates. These estimates are calculated by removing human impacts on the measured flows to represent normal flows, with different operating procedures as river flow conditions change from normal to dry and finally to drought to balance human and environmental uses.

Inter-agency staff have modeled and evaluated well over 100 different scenarios with a variety of alternative management options and in diverse locations and site conditions around the State. We feel the draft proposals listed below produce an acceptable balance between human and environmental needs, and employing straightforward policy considerations and planning methods that are intuitive, consistent, and equitable in their approach. Each of the new project criteria described below provides for the priority of human needs during dry and drought conditions, but at the same time provides for some sharing of the adverse impact of drought by humans and the environment.

It should be emphasized that specific features that are identified in the final project design may require application of detailed criteria during the permitting process which were not applied during the long-range planning process. The environmental provisions specified below are representative of the basic approach to apportion surface water subject to regulatory action in the water planning process, and only approximating what may be required for environmental

needs in the ultimate regulatory decision. In lieu of site-specific studies in the permitting process, the criteria will have the rebuttable presumption of validity.

For planning purposes, the environmental pass-through requirements for all zones will be added to flows that provide for downstream water rights. The protection of downstream water rights will be presented by using the full recorded amount of the existing water right and the higher of current reported use or future projected consumptive use (never larger than the full recorded amount of the right) for each downstream right. This range of available water will be noted so that sponsors of surface water development projects will be aware that certain actions on their part may be needed to produce the projected water supply. This approach will ensure that the full permitted rights are recognized during the planning process while identifying areas where significant amounts of appropriated water are presently not being used and potentially available to meet future water needs through marketing, subordination agreements, or other regulatory means.

NEW PROJECT ON-CHANNEL RESERVOIRS

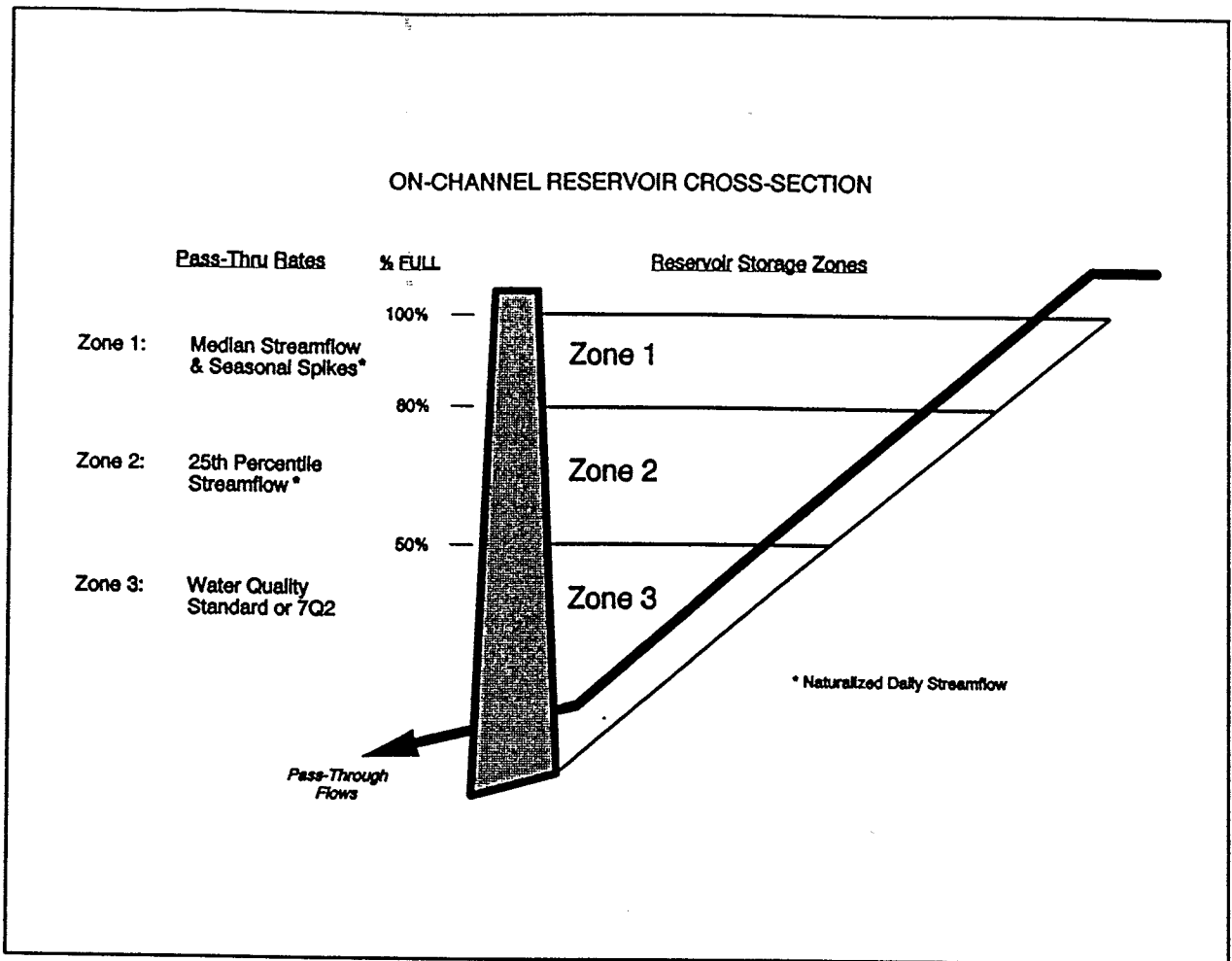
As illustrated in Figure 1, the conservation storage of new-project, on-channel water supply reservoirs would be divided into three zones for environmental instream flow provision as follows:

Zone 1

In Zone 1 of the reservoir, when the reservoir water level is greater than 80% of storage capacity, inflows will be passed up to the monthly medians that are calculated with naturalized daily streamflow estimates.*

Also when the reservoir level is within Zone 1, inflows will be passed to provide one channel flushing flow event per three-month calendar season to provide for channel and habitat maintenance. The default planning criteria allow for a flushing flow event with a 72-hour duration and a peak discharge equal to the site's daily maximum flow with a 1.5-year recurrence interval calculated using an annual historical series of naturalized daily streamflow estimates. During these events, the reservoir will pass-through the higher of: (a) peak flow values, or (b) the sum of environmental pass-throughs, plus flows for protection of downstream water rights. Thus, the flushing flow is not to be stacked on other flow requirements. These environmental criteria should not and are not intended to provide any increase in flooding or cause over-banking below a new reservoir.

* Naturalized streamflow is the estimated amount of water that would have been present in a watercourse with no direct man-made impacts in the watershed. It is calculated by taking values of historically measured streamflow, adding amounts of estimated man-made losses from the upstream watershed caused by diversion and lake evaporation, then subtracting amounts of estimated man-made gains to the upstream watershed caused by return flows.



**FIGURE 1
NEW PROJECT, ON-CHANNEL RESERVOIR CRITERIA
FOR PASSING ENVIRONMENTAL FLOWS**

Zone 2

As dry conditions develop and the reservoir water level declines into Zone 2 between 50 and 80% storage capacity, inflows passed would be reduced and provided only up to the monthly 25th percentile flow values that are calculated with naturalized daily streamflow estimates.

Zone 3

As more severe drought conditions develop and the reservoir level declines into Zone 3 below 50% storage capacity, environmental pass-throughs would be reduced, and flows would be passed up to a target of the established water quality standard for the downstream segment. In lieu of any established water quality standard, the 7Q2 low flow value, as published in the TNRCC's Water Quality Standards, would be used as the default criterion for Zone 3 pass-throughs. If in Zones 1 and 2, the value necessary to maintain downstream water quality is higher than the medians or 25th percentiles then the value necessary to maintain downstream water quality will be used instead of the other target flow values.

All Reservoir Zones

In all zones, it is the intent of these planning criteria that flows passed for instream purposes would also reflect the needs of the associated bay and estuary system. In addition to passage of environmental flows, adequate flows will be passed through for protection of downstream water rights. In all zones, water that can be captured by reservoirs in excess of the environmental provisions is available for water supply storage, and no water will be released from storage to meet environmental targets when inflows are below these limits. However, most future reservoir projects and direct diversions are anticipated to be designed solely for water supply rather than flood control, meaning that most floods can't be captured by the reservoir, but will spill downstream. These spills increase the amount of water available for instream flow maintenance and estuarine needs than would be provided by the environmental criteria alone.

NEW PROJECT DIRECT DIVERSIONS

As illustrated in Figure 2, the criteria for direct diversions from a river or stream that are recommended in the Water Plan, would be based on streamflow conditions just upstream of the diversion point, and would also be divided into three zones as follows:

Zone 1

Zone 1 occurs when actual streamflow is greater than monthly medians calculated with naturalized daily streamflow estimates. When streamflow is within Zone 1, minimum flows passed will be the monthly medians that are calculated with naturalized daily streamflow estimates.

Zone 2

Zone 2 occurs when actual streamflow is less than or equal to medians, but greater than monthly 25th percentile values. When streamflow is within Zone 2, minimum flows passed will be the monthly 25th percentile values that are calculated with naturalized daily streamflow estimates.

Zone 3

Zone 3 occurs when actual streamflow is less than or equal to monthly 25th percentile values. When streamflow is within Zone 3, minimum flows passed will be the larger of: (1) the value necessary to maintain downstream water quality or (2) a continuous flow threshold to be determined by consensus planning staff (e.g., 15th percentile flow) that will not allow the diversion by itself, to dry up the stream.

For perennial river/stream segments where a water quality standard has been established for a stream segment, that value will be used as the pass-by target. Where such a standard has not yet been established, the default planning criterion is the 7Q2 value as published in the TNRCC's Water Quality Standards. For Zones 1 and 2, if the value necessary to maintain downstream water quality is higher than the medians or 25th percentiles, this value necessary to maintain downstream water quality will be used instead of the other values.

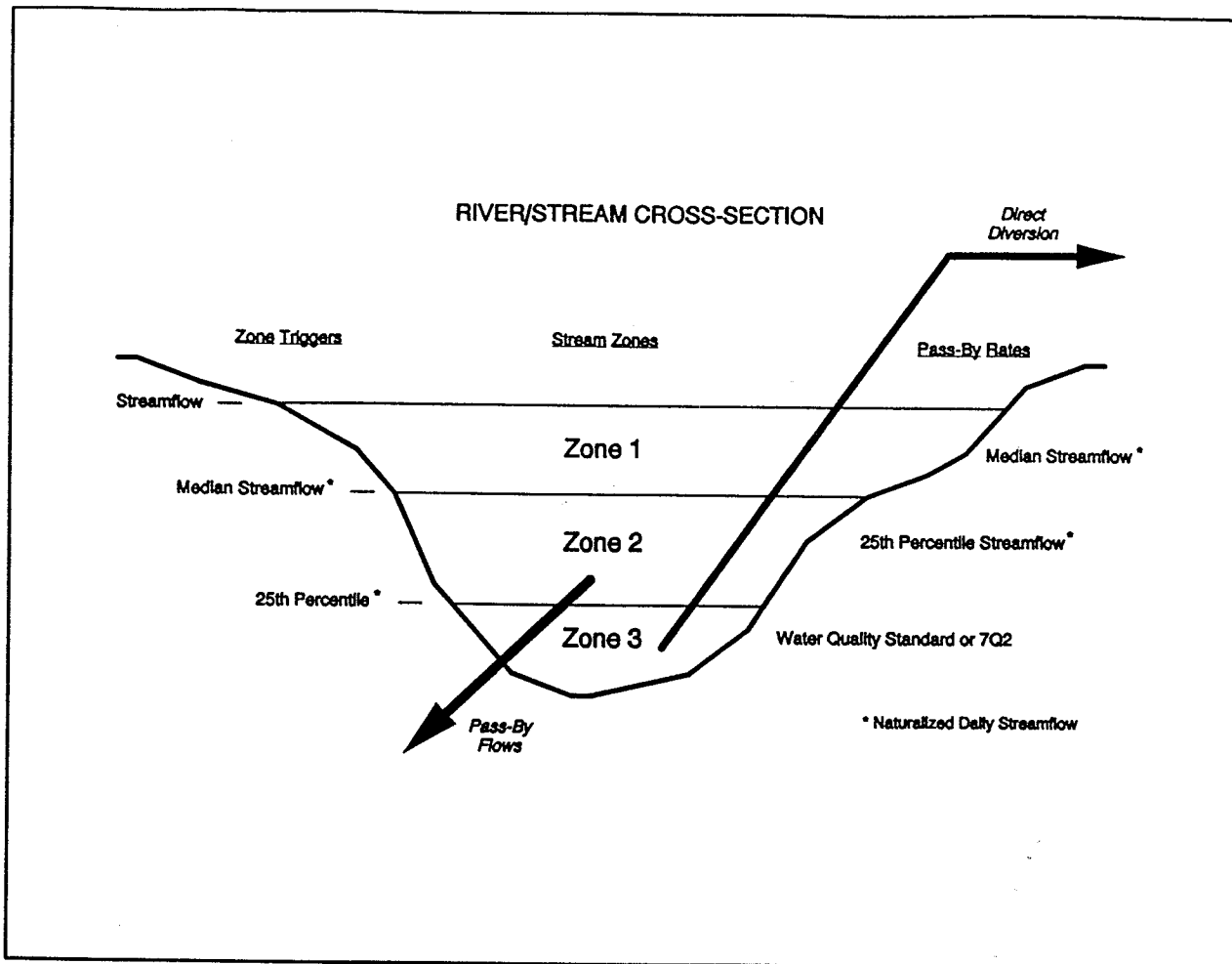


FIGURE 2
NEW PROJECT, DIRECT DIVERSION CRITERIA
FOR PASSING ENVIRONMENTAL FLOWS

All Zones

The trigger values above are calculated with naturalized daily streamflow estimates. In addition to passage of environmental flows, adequate flows will be passed through for protection of downstream water rights. The above procedure, because it provides a specific quantity of flow for environmental use for each zone, does not have smooth transitions between zones for diversion restrictions, and the agencies agree that the procedure should be investigated to see if it is possible to make smoother transitions.

NEW DIRECT DIVERSIONS INTO LARGE OFF-CHANNEL STORAGE

As illustrated in Figure 3, in those cases where a large water supply project would divert its water from a river or stream into off-channel storage, a combination of the direct diversion and reservoir criteria would apply.

The direct diversion criteria will govern the ability to divert water into the off-channel project. The reservoir criteria will address the ability of the reservoir to capture water from its own watershed, as well as define the reservoir's multi-stage operations to pass-through environmental flows, as well as flows for protection of downstream water rights.

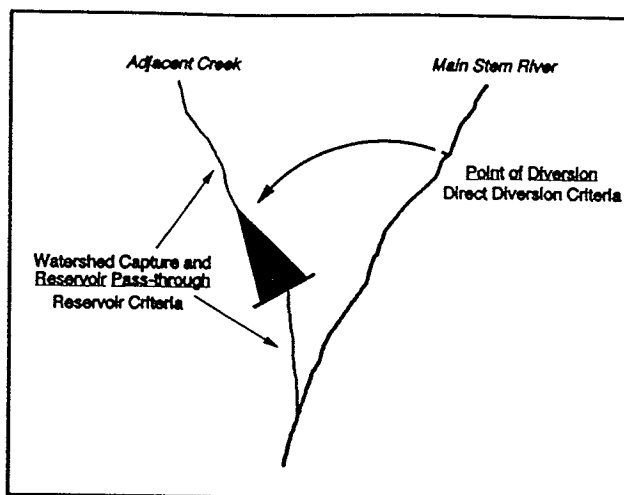


FIGURE 3
COMBINED CRITERIA FOR DIVERSION
INTO OFF-CHANNEL RESERVOIR

BAY AND ESTUARY CONSIDERATIONS

As a planning place-holder value, the Zone 1 reservoir pass-throughs or direct diversion pass-bys described previously will also provide freshwater inflow to the bays and estuaries. However where inflow values adequate to meet the beneficial inflow needs as described in Texas Water Code §11.147 have been established, those inflow volumes will be used for projects within 200 river miles of the coast, commencing from the mouth of the river, as the basis for calculating the relative contributions of fresh water from the associated rivers and coastal basins during times of Zone 1 conditions. No other special provisions would be made for B&E purposes in Zone 2 or 3 conditions for either new reservoirs or large direct diversions. These inflow values may be determined by TPWD until that agency and the TNRCC jointly make the determination in accordance with Texas Water Code §11.1491.

The target flows in Zone 1 of the reservoir operating procedure should be established to provide the beneficial flows as defined in §11.147(a) of the Texas Water Code, i.e. the "salinity, nutrient, and sediment loading regime adequate to maintain an ecologically sound environment in the receiving bay and estuary system that is necessary for the maintenance of productivity of economically important and ecologically characteristic sport or commercial fish and shellfish species and estuarine life upon which such fish and shellfish are dependent."

In practical terms, that means it is not necessarily MinQ or MaxQ produced by the optimization model, but a point along that curve between these values that provides some margin of safety (comfort) in providing sufficient flows in Zone 1 to maintain average historic productivity on the fisheries. The fresh water inflow target is one that has been validated by comparing the seasonal distribution of salinity regimes with the density distribution of selected estuarine flora and fauna.

B&E pass-through requirements for a new water development project will be based on a pro-rata share of that location's contribution of flow to the estuary in question. Once the target amount of water reaches an estuary during a month, no additional flows need to be provided for bay and estuary purposes during that month. For the remainder of the month, environmental flows revert to the instream criteria.

RESULTS OF INFLOW AND INSTREAM STUDIES - USE OF STATE DETERMINATIONS

When the results of intensive fresh water inflow or instream flow studies are available and criteria have been established in the regulatory process, those criteria will be used in the Water Plan rather than any generic rule. The instream flow requirements for the Colorado River have been approved by TNRCC through the regulatory process. When established criteria are available and agreed to by TPWD and TNRCC, bay and estuary inflow requirements would be apportioned to each new project identified in the plan according to its proportional share (based on contribution hydrology), and as provided for by TNRCC's A Regulatory Guidance Document for Applications to Divert, Store or Use State Water (June, 1995). Where possible, this process seeks to restore seasonal flow patterns and minimize cumulative impacts from water development projects.

In order to facilitate the timely completion of the (joint) determination of the inflow conditions necessary for the (remaining) bays and estuaries, TPWD and TNRCC, per §11.1491 of the Texas Water Code, will each designate an employee to share equally in the oversight of the program to review the studies prepared by the TWDB and TPWD under Section 16.058 (bay and estuary inflow studies) to determine inflow conditions necessary for the bays and estuaries. The three agencies will continue to work together as they have in development of the Guadalupe Estuary (San Antonio Bay system) target flows to meet the bay and estuary studies completion deadlines, and that provides a salinity, nutrient, and sediment loading regime at or above the identified needs.

AMENDMENTS TO EXISTING PERMITS

Once projects are specifically designed and submitted for permit consideration, a more straightforward and factual environmental assessment of its features may then be performed. The scope of environmental review and corresponding permit considerations relating to an amendment of an existing water right is limited by law, and is set forth in more detail in the TNRCC's A Regulatory Guidance Document for Application to Divert, Store or Use State Water (June, 1995).

An environmental assessment and any corresponding permit conditions relating to an application for an amendment are limited to addressing any new or additional environmental impacts which may result from granting the amendment, and where such impacts would be beyond that which are possible under the full, legal operation of the existing water right prior to its amendment. Because of the many varied conditions around the State, the TNRCC Regulatory Guidance Document can only provide general procedures in many instances as to how the Commission would evaluate applications for water rights permits and amendments to existing permits. A

summarization and categorization of the TNRCC's general guidance for determining potential adverse impact to the environment is as follows for types of possible water right amendments likely to be considered in the consensus planning process:

| Type of Amendment | Scope of Environmental Review | Basis for Environmental Reservation |
|---|--|---|
| Interbasin Transfer with no change in <i>permitted purpose of use</i> , appropriative amount, point of diversion, and rate of diversion. | No additional environmental impacts considered with respect to the originating basin. Consideration of potential changes in water quality and/or migration of nuisance species, and excessive freshwater inflows to maintain proper salinity levels for B&E's may be made for receiving basin. A social, economic, and environmental impact statement may be required to be submitted. | Not applicable for originating basin. |
| Significant change in point of diversion from downstream to upstream, to adjoining tributary, or to endangered species habitat | Evaluation of impacts to intervening instream or site-affected environmental resources. | Case-by-case basis where level of significance evaluated as per Regulatory Guidance Document. |
| Change of purpose of use from non-consumptive to consumptive use | Evaluation of impacts to instream and B&E environmental resources. | Three-zone planning criteria described previously. |
| Change in purpose of use where there is no increase in the consumption of water from that legally authorized in the existing water right. | No environmental review. | not applicable. |

For consensus planning purposes, possible water rights amendments, such as conversion from non-consumptive to consumptive use (having the effect of a new appropriation) would have the appropriate *instream and B&E* considerations described above for new projects applied in our planning assessment. For other types of amendments where only the intervening river or stream segment would be affected, the appropriate reservoir or direct diversion *instream* criteria would then be applied, in lieu of a detailed, site-specific study.

Where applicable, the "environmental planning criteria" would only affect that portion of the existing water right subject to change. Also, where regional or local planning efforts may specify higher environmental goals than that provided for by existing minimum legal or regulatory requirements, such alternate goals can be requested by the applicant and can be ultimately provided for in the permit language.