TABLE 1

Suite of quantitative severe weather variables retrieved from sounding data.

Severe weather variable	Definition	Threshold value (or range) for severe weather	Reference
CAPE (Convective Available Potential Energy)	Difference between observed and estimated parcel temperature integrated over the depth where rising motion is expected; proxy to buoyancy	> 0 J/kg	Moncrieff & Miller, 1976
LI (Lifted Index)	500 mb observed temperature – estimated 500 mb parcel temperature	< 0°C	Galway, 1956
K-Index	(850 mb temperature – 500 mb temperature) + 850 mb dew point – (700 mb temperature – 700 mb dew point)	≥ 20°C	George, 1960
TT (Total Totals Index)	(850 mb temperature – 500 mb temperature) – (850 mb dew point – 500 mb temperature)	≥ 50°C	Miller, 1972
0–3 km SRH (storm- relative helicity)	Velocity and vorticity product integrated over 0–3 km; proxy to vertical wind shear	\geq 150 m ² /s ²	Davies & Johns, 1993
WBZ (wet-bulb zero) height	Altitude above ground level at which the wet bulb temperature is $0^\circ C$	7,000–10,500 ft (2,100–3,200 m)	Fawbush & Miller, 1953

TABLE 2

Distribution of student responses (n = 5) on severe weather ingredient identification before and after the PBL.

Moisture53Strong jet20Wind shear11Assessment11Helicity (> 75; > 100)02Rising motion30Cause11Cold front11Mid-latitude cyclone11Mid-latitude cyclone01Positive vorticity advection01Outpper-level trough01Joon b divergent signature01Joon b divergent signature22Assessment22K-Index (> 30)02Lifted Index (<0)03CAPE (> 1000)01	Severe weather ingredient	# of responses pre-survey (maximum = 5)	# of responses post-survey (maximum = 5)
Strong jet20Wind shear11Assessment11Helicity (>75;>100)02Rising motion30Cause11Cold front111Mid-latitude cyclone11Mid-latitude cyclone01Positive vorticity advection01Opper-level trough01Jon b divergent signature01Misable atmosphere22Assessment02K-Index (> 30)02Lifted Index (<0)	Moisture	5	3
Wind shear11AssessmentIIHelicity (> 75; > 100)02Rising motion30Cause11Cold front11Mid-latitude cyclone11Warm-air advection01Positive vorticity advection01Upper-level trough01J00 mb divergent signature01Unstable atmosphere22Assessment02Total Totals Index (> 45)02Lifted Index (< 0)	Strong jet	2	0
Assessment Image: Massessment Helicity (> 75; > 100) 0 2 Rising motion 3 0 Cause 1 1 Cold front 1 1 Mid-latitude cyclone 1 1 Warm-air advection 0 1 Voger-level trough 0 1 J00 mb divergent signature 0 1 Unstable atmosphere 2 2 Assessment 0 2 K-Index (> 30) 0 2 Lifted Index (< 0)	Wind shear	1	1
Helicity (> 75; > 100)02Rising motion30Cause11Cold front111Mid-latitude cyclone11Warm-air advection01Positive vorticity advection01Upper-level trough01300 mb divergent signature01Unstable atmosphere22Assessment02K-Index (> 30)02Lifted Index (< 0)03CAPE (> 1000)01	Assessment		
Rising motion30Cause	Helicity (> 75; > 100)	0	2
CauseImage: causeCold front11Mid-latitude cyclone11Warm-air advection01Positive vorticity advection01Upper-level trough01300 mb divergent signature01Unstable atmosphere22Assessment02K-Index (> 30)02Lifted Index (<0)	Rising motion	3	0
Cold front11Mid-latitude cyclone11Warm-air advection01Positive vorticity advection01Upper-level trough01300 mb divergent signature01Unstable atmosphere22Assessment02Total Totals Index (> 45)02Lifted Index (< 0)	Cause		
Mid-latitude cyclone11Warm-air advection01Positive vorticity advection01Upper-level trough01300 mb divergent signature01Unstable atmosphere22Assessment02Total Totals Index (> 45)02K-Index (< 30)	Cold front	1	1
Warm-air advection01Positive vorticity advection01Upper-level trough01300 mb divergent signature01Unstable atmosphere22Assessment	Mid-latitude cyclone	1	1
Positive vorticity advection01Upper-level trough01300 mb divergent signature01Unstable atmosphere22Assessment22Total Totals Index (> 45)02K-Index (> 30)02Lifted Index (< 0)	Warm-air advection	0	1
Upper-level trough 0 1 300 mb divergent signature 0 1 Unstable atmosphere 2 2 Assessment 2 2 Total Totals Index (> 45) 0 2 K-Index (> 30) 0 2 Lifted Index (< 0)	Positive vorticity advection	0	1
300 mb divergent signature 0 1 Unstable atmosphere 2 2 Assessment Total Totals Index (> 45) 0 2 K-Index (> 30) 0 2 Lifted Index (< 0)	Upper-level trough	0	1
Unstable atmosphere 2 2 Assessment Total Totals Index (> 45) 0 2 K-Index (> 30) 0 2 Lifted Index (< 0)	300 mb divergent signature	0	1
Assessment O 2 Total Totals Index (> 45) 0 2 K-Index (> 30) 0 2 Lifted Index (< 0)	Unstable atmosphere	2	2
Total Totals Index (> 45) 0 2 K-Index (> 30) 0 2 Lifted Index (< 0)	Assessment		
K-Index (> 30) 0 2 Lifted Index (< 0)	Total Totals Index (> 45)	0	2
Lifted Index (< 0) 0 3 CAPE (> 1000) 0 1	K-Index (> 30)	0	2
CAPE (> 1000) 0 1	Lifted Index (< 0)	0	3
	CAPE (> 1000)	0	1

Note. Ingredients are in bold, with causes and assessment of those ingredients indented.